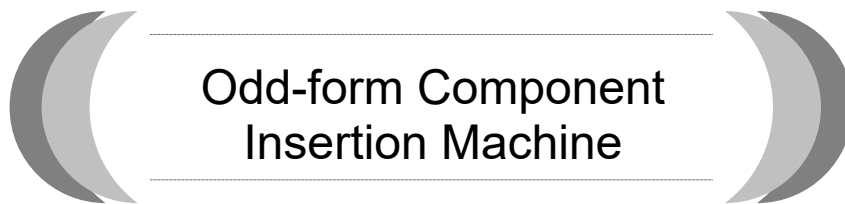


Specification

【 Electronic Component Mounting System 】



Model ID : **NPM-VF**
Model No. : NM-EJR9A

Cautions Regarding These Specifications

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12. The contents of this document are valid as of January 5, 2021.

 Precautions for Safe Use	
• Thoroughly read the instruction manual and use the machine only as directed.	• The machine described in this Specification is an industrial machine. Confirm the operation requirements described in the separate instruction manuals. Regarding machine installation, operation and maintenance, and handling of necessary materials, the local laws and requirements may be applied. • Before carrying out the operation and maintenance of this machine, confirm the descriptions in the separate instruction manuals and warning information attached on this machine regardless of the operating condition of this machine. Ignoring safety functions might cause injury, electric shock or machine trouble.

Revision History

This document content is based on the version of the last date printed below.

[illegible]

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1. General Description

■ High Productivity

High speed insertion of odd-form components via twin bean and multi-recognition camera. Parts exhaust stop time is reduced by using stackable stick feeder. In addition, tray feeders are replenishable during machine operation, achieving high operation ratio. Component pick-up by vacuum nozzle eliminates dead space between adjacent insertion component, and motorized chuck optimizes chuck opening, minimizes chuck dead space and achieves high productivity.

■ Versatility

Insertion head is equipped with variable body chuck, swing nozzle, lead chuck and vacuum nozzle to handle various shapes of odd-form components. The component feeding and supply section of the stackable stick feeders can be adjusted to suit components of different sizes.

NPM-VF is standard compatible with large-sized PCBs up to L 510 mm × W 460 mm.

It is also applicable to the placement of SMT components with pickup nozzle.

■ High-Quality Insertion

The camera recognizes insertion holes and component forms before insertion to increase insertion quality. Furthermore, clinch function* after insertion is also equipped to stabilize the component and improve solder strength, achieving high quality insertion of odd-form components.

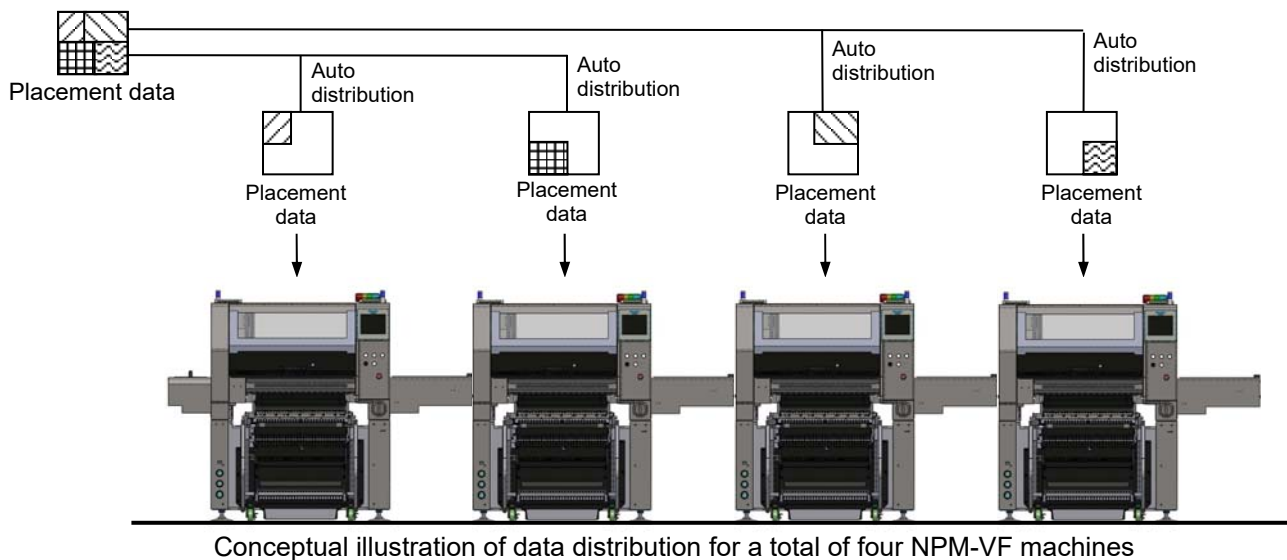
* Cut & Clinch function is an option.

2. Features

High Productivity

Support for machine coupling (modularizing)

NPM-VF supports coupling (modularizing); up to 15 machines* can be coupled.

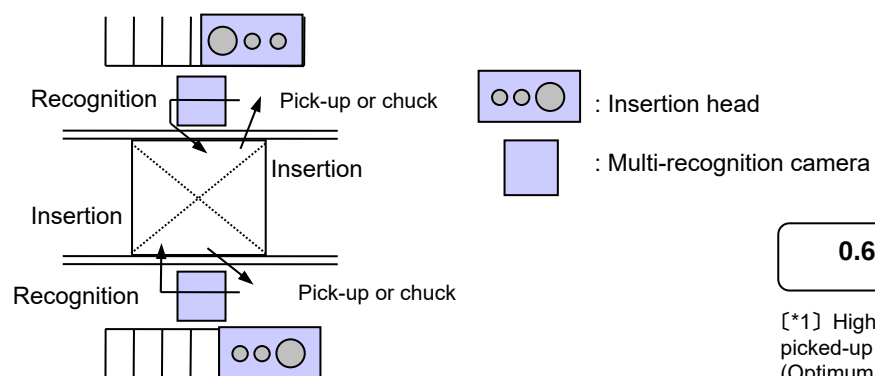


* When the number of machines coupled exceeds 15 machines, please consult us.

* It can be connected with NPM-W2/ W.

Please consult us separately should you connect it to NPM-D3/ D2/ D. It cannot be connected to NPM-TT and NPM.

Insertion tact



Conceptual Illustration of Insertion (3-station head)

0.65 s/component (*1)

[*1] Highest tact when 3 components are picked-up by 3-station heads of the 2 beams (Optimum condition)

** Remarks **

- Optimum conditions mean the insertion conditions defined by our original standards.

Features of components supply during operation

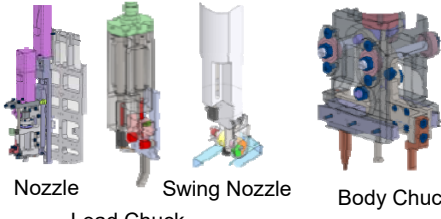
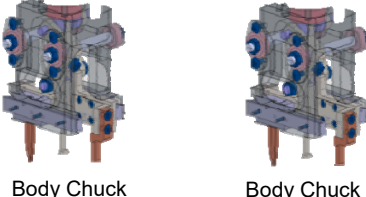
NPM-VF uses stackable stick feeders which can be replenished during operation. In addition, tape splicing of radial tape feeders and intelligent tape feeders can be conducted without stopping the insertion process during operation.

It is possible to predict stockout in the machine if you register component quantity data beforehand.

Head

In NPM-VF, you can select any head (3-station head, 2-station head) for each beam.*¹

* Please select the head for each beam.
For front and rear beam, both 3-station head and 2-station head are available.

3-station head	2-station head
 Nozzle Swing Nozzle Body Chuck Lead Chuck You can choose two types.	 Body Chuck Body Chuck

* For exchanging of the whole head, on-site construction work can be conducted.
For changing the configuration of each station, please consult us.

Versatility

Support for Odd-form Components

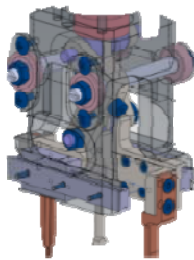
NPM-VF insertion head is equipped with variable body chuck, swing nozzle, lead chuck and vacuum nozzle to handle various shapes of odd-form components.

Body chuck can support large-sized odd-form components up to $\sim 130 \text{ mm} \times 35 \text{ mm}$. Applicable component body height is 55mm. If lead length is included, it can support component height up to 60 mm^{*1}.

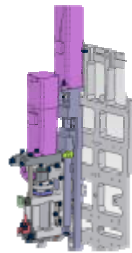
Maximum weight of components supported is 200g although this value varies according to each head type.

^{*1} Please consult us separately if component height is more than 60 mm.

Body Chuck



Vacuum Nozzle



Lead Chuck



Swing Nozzle



Number of setting feeder and tray

When the front and rear of NPM-VF is equipped with fixed supply unit or feeder cart,

maximum 30 pcs of stick feeder S^{*1} (15 pcs each for front and rear)

maximum 20 pcs of radial tape feeders (10 pcs each for front and rear)

maximum 60 pcs of intelligent tape feeders (30 pcs each for front and rear) can be set.

On the table where single tray feeder is attached, 13-slot feeder base is equipped, maximum of 20 trays and maximum 6 pcs of stick feeder S^{*2} or 4 pcs of radial tape feeders or 13 pcs of intelligent tape feeders can be set.

On the table where twin tray feeder is attached, maximum 40 trays^{*3} can be set.

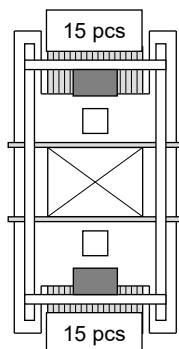
^{*1} Max. 14 pcs in the case of stick feeder L (7 pcs each for front and rear)

^{*2} Max. 3 pcs in the case of stick feeder L

^{*3} Max. quantity of trays varies according to height of tray components.

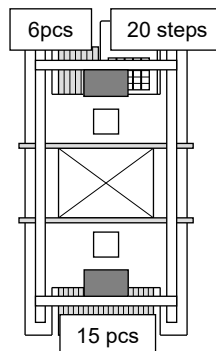
■ Examples when stick feeder S is equipped

Fixed supply unit (30 slots)



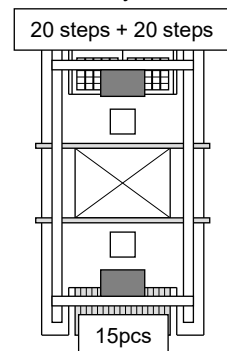
Fixed supply unit (30 slots)

Single tray feeder
+ 13-slot feeder base



Fixed supply unit (30 slots)

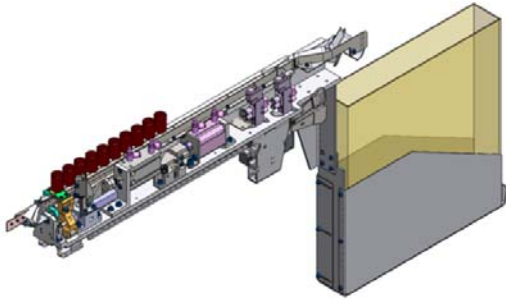
Twin tray feeder



Fixed supply unit (30 slots)

Versatility of feeders

There are 3 types of feeders, radial tape feeders, stick feeders and intelligent tape feeders.



Radial tape feeder

There are 2 types of feeding pitch (P12.7mm and P 15mm) which apply to the component between feeding holes.

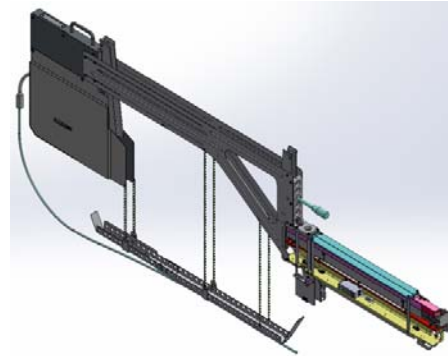
In addition to common type, there is another type applying to nozzle picking-up.

Option (other feeder) applies to components which are placed directly above the feeding hole.

Other than that, there is splicing position detection type applying to component verification.

Therefore, with the combination of above 4 types of specification, there are total 16 types can be selected.

- * Please use the radial tape feeder with body guide to nozzle picking-up.
- * Lead chuck can't be used to the radial tape feeder with body guide.
- * When using body chuck, if component slant in the width direction of component body (lead wire bend) is 1 mm or more, please use radial tape feeder with Body Guide.
- * Depending on the size of component inserted with radial tape feeder with Body Guide, it is required to adjust the position of the guide at the component side
- * When using radial tape feeder with body guide, the minimum and maximum component sizes of component inserted with radial tape feeder with Body Guide are different. For detail information, please refer to 4.3 Supply Unit Configuration.



Stackable stick feeder

2 types are available: S type / L type

In addition to common type, there is another type applying to component verification

With the combination of above 2 types of specification, there are total 4 types can be selected.

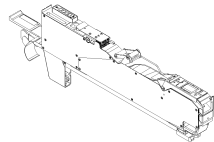
We design to make the component feeding unit or the stick of the feeder adjustable to improve the versatility.

However, depending on the shape of parts and sticks, there are cases where it cannot fully correspond with the standard adjustment range. At that time customization is required. We recommend to confirm the components and stick used in advance.

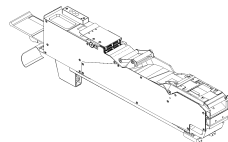
- * We do not recommend daily changeover work. We recommend stackable stick feeder changeover for per component.

Intelligent tape feeders

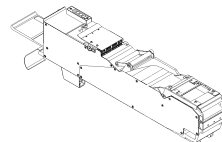
The feeders, which are compatible with the AM100 and CM series, support 12-mm up to 104-mm embossed tape. Tape feeding is driven by the servomotor; feed pitch and feed speed are set according to the components. These parameters are set by the data sent from the main body.



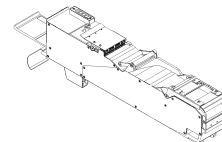
24/ 32 mm Tape feeder



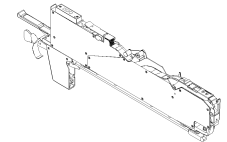
44/ 56 mm Tape feeder



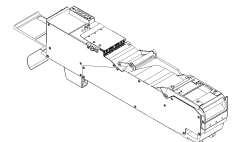
72 mm tape feeder



88 mm tape feeder



12/ 16 mm Tape feeder



104 mm tape feeder

Changeover

Automatic changeover

This supports changeovers (production data change and rail width change), minimizing the time loss of operation caused by product changes.

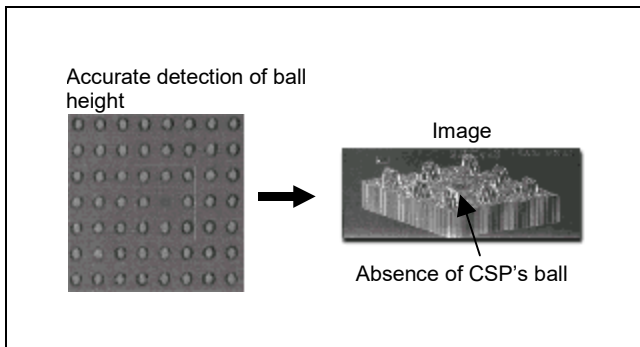
In accordance with each customer's operation, selection can be made from following three types, "External scanner read type", "Head read type", and "Planned form read type."

High Quality Insertion

- **Component recognition function (Multi-recognition camera: Type 1)**
High insertion quality is realized with recognition of component shape and lead tip.
- **Calibration function**
High quality insertion is realized with unique calibration programme.
Initial condition is maintained during operation with auto-calibration function.
(Gauge position is recognized regularly and each parameter is corrected during operation)
- **High speed low vibration control**
High speed low vibration control is installed for XY unit movement.

High-Quality Placement

- **3D-measurement function (Multi-recognition camera: Type 3)**
It is possible to detect coplanarity of all leads of QFP/ SOP, etc. and existence or nonexistence/absence of all balls of BGA/ CSP, etc.



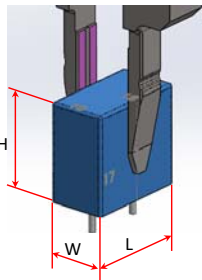
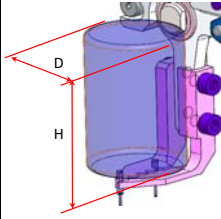
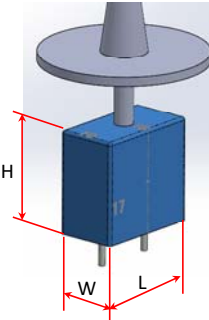
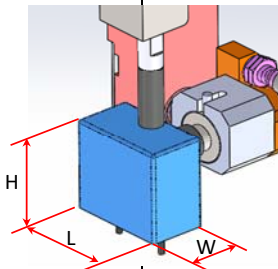
3. Specification

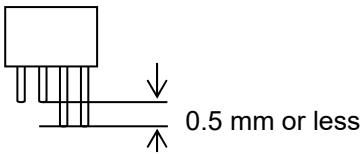
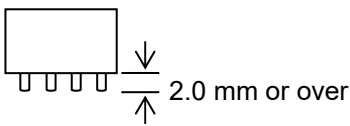
3.1 Standard Specifications

Electric Source	- Rated voltage - Frequency - Rated capacity - Feeding specification - Peak current value during operation	3-phase, AC 200/ 220 V $\pm$ 10 V, AC 380/ 400/ 420/ 480 V $\pm$ 20 V 50/ 60 Hz 2.7 kVA For the case of AC 290 V or more (380V or more tap), make sure that the feeding side is in star (Y) connection and the voltage between the PE (protective earth) terminal and each phase is AC 290 V or less. 38 A (Rated voltage: AC 200 V) *Please take this into account when choosing the capacity of the primary power supply AVR (the stabilized power supply), etc. *Please be careful of a voltage drop due to the primary power cable length and the wire diameter.
Pneumatic source	- Supply air pressure - Supply air amount	0.5 MPa ~ 0.8 MPa (Working air pressure: 0.5 MPa ~ 0.505 MPa) 200 L/min (A.N.R.)
Dimensions	- Main body (Including loader cover) - Tray feeder connected: - Stackable stick feeder connected to front and rear: - Stackable stick feeder connected to front and rear+ Tray feeder connected:	W 1 866 x D 2 332 x H 1 554 mm W 1 866 x D 2 438 x H 1 554 mm W 1 866 x D 4 203 x H 1 554 mm W 1 866 x D 4 364 x H 1 554 mm (Without Signal Tower and Touch Panel)
Mass	- Main body - Feeder cart - Single tray feeder - Twin tray feeder	2 590 kg 200 kg 200 kg 360 kg
Environment	- Temperature - Humidity - Altitude	10 °C ~ 35 °C 25 %RH ~ 75 %RH (No condensation) 1 000 m or less, above sea level
Operating unit	Interactive operation with LCD color touch panels (Standard equipment)	One touch changeover between English, Japanese and Chinese Recognition screen display (Components/PCB recognition screen is displayed in super-impose screen with one touch of a button) Hierarchical operation (Operator/Engineer) * Recognition screen is displayed on operating screen.
Paint color	Standard color	White: W-13 (G50) *The paint color cannot be designated.
Control System	Microcomputer system (VxWORKS)	Full closed-loop system (Linear servomotor) [X, Y axis] Semi closed-loop system (AC servomotors) [Z, θ , W, XA, YA, ZA, θ A, WA axis]
Command System	Designation of X, Y, Z, θ, W coordinates	
Production data	- No. of placement points: - No. of Patterns (Blocks): - No. of Mark settings*	Max. 10 000 points/machine, Max. 10 000 points/line* ¹ (Mounting coordinates, recognition mark coordinates and bad mark coordinates are included) Max. 1 000 patterns/machine, Max. 1 000 patterns/line Max. 1 000 points/machine, Max. 1 000 points/line *The number exclusive of representative bad marks and group bad marks.
Others	- Program Functions - Data creation	Please refer to "5. Other Standard Functions". Please refer to "NPM-DGS Specification".

*1 If the number of placement points exceeds 10 000 points/line, please contact us.

3.2 Standard Functions

Item	Specifications				
	3-station head			2-station head	
Insertion tact (*Under optimum conditions)	Maximum tact time when using 2 beam with 3-station head 0.65 s/point * *except when anvil is attached				
Applicable component					
Component dimensions Body chuck/nozzle/Swing nozzle : L x W Lead chuck : D	Body Chuck	Lead Chuck	Nozzle	Swing Nozzle	
					
	5mm x 5mm ~ 130mm x 35mm 125mm x 50mm Body Height Min. 5mm Max 55 mm *1 Max 60 mm including lead length		~130mm x 35mm 100mm x 90mm Body Height Max 55 mm *1 Max 60 mm including lead length		
	5mm x 5mm ~ 146mm x 50mm 150mm x 38mm Body Height Min 5 mm Max 24 mm *1 Max 29 mm including lead length	~ φ 20mm Body Height Min. 3mm Max 30 mm *1	5mm x 5mm ~ 125mm x 90mm 150mm x 38mm Body Height Min 5 mm Max 24 mm *1 Max 29 mm including lead length	10mm x 2mm ~18mm x 10mm Body Height Min 17 mm Max 30 mm *1	16mm x 2mm~ 18mm x10mm Body Height Min 17 mm Max 30 mm *1
	5mm x 5mm ~ 75mm x 24mm 61mm x 50mm Body Height Min. 5mm Max 60 mm *1 Max 65 mm including lead length		~Diagonal 38mm Body Height Max 60 mm *1 Max 65 mm including lead length	Lead length Max 5 mm	
	*1 Above conditions may not be fulfilled depending on the combination of component size and body height. Component dimensions may be subjected to constraints when chucking/pick-up position is offset from center of component. Components with sizes larger than the above restrictions can also be inserted in some cases. For more information, please consult us.				
Mass	Max. 200 g	Max.30 g	Max.50 g	Max. 3 g	Max. 30 g

Item	Specifications
Recognition	- Multi-recognition camera(2D) - Multi-recognition camera(3D)/option
Component lead condition	
Lead pitch	0.5 mm or over
Lead diameter	ϕ 0.4 mm or over
Lead group / Number of leads	Lead group : 32 groups per one component at maximum Number of leads : 255 leads per one group at maximum
Height difference	± 0.5 mm or less 
Protrusion	2.0 mm or over 
Material	Metal lead
Insertion detection	Insertion height detection method (± 1 mm) *Floating height within 1 mm can't be detected. Parts with weak leads and unstable parts may not be detected. If clinch is present, the detection will be on the clinch side.
Cut & Clinch *Option	
Lead diameter	$\phi 0.4$ mm $\sim\phi 1.0$ mm (annealed copper wire) $\phi 0.4$ mm $\sim\phi 0.8$ mm (hard copper wire, CP wire) For other types of wires, please consult us.
Detection system	Piezoelectric detection
Lead bend angle	10 degrees $\sim$ 40 degrees
Clinch length	1.0 mm $\sim$ 2.0 mm
Clinch direction	Outward clinch 60 degrees
Clinch pitch	2.5 mm $\sim$ 40 mm
Insertion direction	360 degrees (± 180 degrees)

Item	Specifications
PCB exchange time	
Single conveyor	4.5 s
Anvil conveyor (Option)	5.5 s
	* Values may differ according to PCB specifications. * Only standard conveyor is applicable to surface mount components placement.
Applicable PCB	
Standard conveyor	• Dimension 50 × 50 mm ~ 510 × 460 mm • Insertion area 50 × 44 mm ~ 510 × 454 mm • Thickness 0.3 mm ~ 8.0 mm • Mass 3.0 kg or less (After mounting, including the carrier mass) • Flow direction Left←Right, Left→Right (Option specification) * Please consult us separately if you connect it to NPM • Reference Front reference (Please consult us for rear reference support)
Anvil conveyor *Option	• Dimension 50 × 50 mm ~ 460 × 400 mm • Insertion area 50 × 44 mm ~ 460 × 394 mm • Thickness 0.3 mm ~ 8.0 mm • Mass 3.0 kg or less (After mounting, including the carrier mass) • Flow direction Left←Right, Left→Right (Option specification) * Please consult us separately if you connect it to NPM • Reference Front reference (Rear reference not supported) • Movable area The diagram illustrates the layout of a PCB for an anvil conveyor. It shows a rectangular area with dimensions 50~460 mm in width and 50~400 mm in height. The top and bottom edges have a width of 50~460 mm. The left and right edges have a height of 50~400 mm. The top and bottom edges are labeled with 'min. 6.5' and '3' dimensions. The top and bottom edges are labeled 'No components allowed in this area'. The diagram also shows several circular holes and dashed lines indicating component placement. The bottom edge is labeled 'min. 6.5' and '3'. • Clinch The diagram shows two views of a clinch. The left view shows a clinch angle of 60°. The right view shows a clinch length/lead bend angle of 10deg~40deg. The clinch length is labeled as 1~2. * Clinch length and angle may vary depending on component lead diameter, shape, material, and PCB hole size.
PCB transfer height	900 mm ~ 920 mm

Item	Specifications			
Component Supply Unit	• Radial tape feeder Max. 20 inputs* • Stackable Stick Feeder (S) Max. 30 inputs* • Stackable Stick Feeder (L) Max. 14 inputs* • Intelligent tape feeder 12/ 16 mm Max. 60 pcs * : nozzle pickup only 24/ 32 mm Max. 30 pcs * : nozzle pickup only 44/ 56 mm Max. 20 pcs * : nozzle pickup only 72 mm Max. 14 pcs * : nozzle pickup only 88 mm Max. 12 pcs * : nozzle pickup only 104 mm Max. 10 pcs * : nozzle pickup only • Single tray feeder Max. 20 pieces: Only body chuck, nozzle and swing nozzle • Twin tray feeder Max. 40 pieces: Only body chuck, nozzle and swing nozzle * Under condition that front and rear is fixed supply unit or feeder cart.			
Body chuck	For 3-station head, 1 unit can be attached, For 2-station head, 2 units can be attached			
Applicable component	~130 mm x 35 mm or 125 mm x 50 mm、 Body height 5 mm ~55 mm (Not including lead length) / Height 60 mm and below (including lead length)	~146 mm x 50 mm or 150 mm x 38 mm、 Body height 5 mm ~ 24 mm (Not including lead length) /Height 29 mm and below (Including lead length)	~75 mm x 24 mm or 61 mm x 50 mm、 Body height 5 mm ~60 mm (Not including lead length) / Height 65 mm and below (Including lead length)	
				* Above conditions may not be fulfilled depending on the combination of component size and body height. Component dimensions may be subjected to constraints when chucking/pick-up position is offset from center of component. Components with sizes larger than the above restrictions can also be inserted in some cases. For more information, please consult us
	Insertion direction	360 degrees(±180 degrees) *1 degree unit		
	Chuck exchange *Option	Automatic exchange of adapter via tool changer *2 types are available for round and flat shape		
	Insertion force control	5N~100N		
Lead chuck	For 3-station head, 1 unit can be attached, Note) cannot be attached to 2-station head			
Applicable components	Radial taping components (lead pitch P2.5 mm,5 mm,7.5 mm,10 mm) Body dia. within 20 m, body height within 3~30 mm *please consult us for other cases *Radial tape feeder with body guide cannot be used.			
Possible chucking lead dimension	φ0.4 mm~φ0.8 mm			
Insertion direction	360 degrees (±180 degrees) *1 degree unit			
Lead pitch	P2.5 mm,5 mm,7.5 mm,10 mm *Please consult us for pitches other that stated on the left			
Insertion force control	Fixed at 10N			

Nozzle	For 3-station head, 2 units can be attached, (Note) cannot be attached to 2-station head		
Applicable component	~130 mm x 35 mm or 100 mm x 90 mm、 Body Height 55 mm and below (Not including lead length) / Height 60 mm and below (Including lead length)	~125 mm x 90 mm or 150 mm x 38 mm、 Body Height 5 mm ~ 24 mm (Not including lead length) /Height 29 mm and below (Including lead length)	~Diagonal 38 mm Body Height 60 mm and below (Not including lead length) / Height 65 mm and below (Including lead length)
	* Above conditions may not be fulfilled depending on the combination of component size and body height. Component dimensions may be subjected to constraints when chucking/pick-up position is offset from center of component. Components with sizes larger than the above restrictions can also be inserted in some cases. For more information, please consult us.		
Insertion direction	360 degrees (±180 degrees)*1 degree unit		
Nozzle exchange	Automatic exchange via nozzle changer		
Insertion force control	0.5 N~100 N		
Placement accuracy (Under optimum conditions)	QFP placement ±0.05 mm: Cpk≥1		
Swing nozzle	For 3-station head, one unit can be attached, (Note) cannot be attached to 2-station head		
Applicable component	Φ8 mm pad	2 mm x 10 mm ~ 10 mm x 18 mm Body height 17 mm ~ 30 mm	
	φ15 mm pad	2 mm x 16 mm ~ 10 mm x 18 mm Body height 17 mm ~ 30 mm	
	*Please consult us if components are not within the range stated above		
Insertion direction	360 degrees (±180 degrees) *1 degree unit		
Nozzle exchange	2 types S type (φ8 mm pad), L type (φ15 mm pad) *Exchanging of S type and L type requires on-site engineer support.		
Insertion force control	*Please consult us (Basically fixed at 6.3 N)		

***Component with cavity, component which the top is not flat**
(Applicable : Body chuck, lead chuck, swing nozzle)

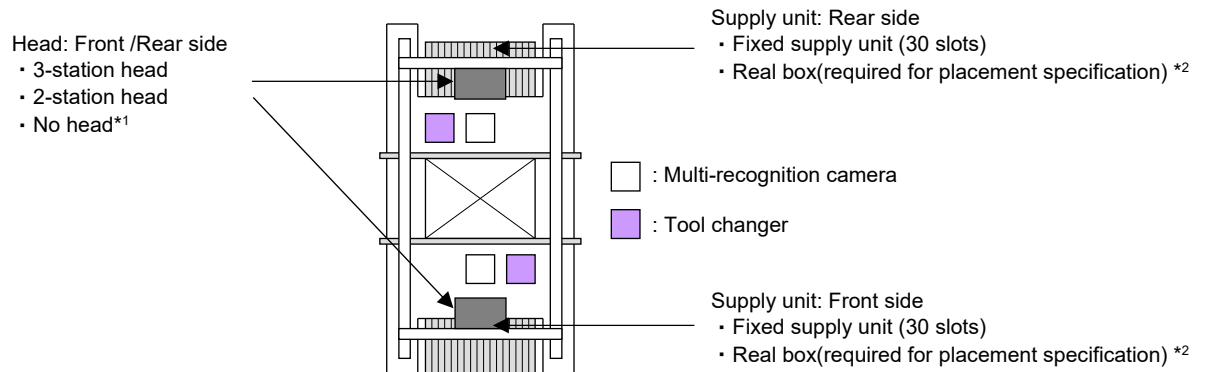
When inserting component with cavities (i.e. connector, fuse holder), the stability of the insertion, insertion detection and the lifespan of the pusher rubber will be affected.

In addition, when inserting component which the top is not flat, the stability of the insertion and the insertion detection will also be affected as the pusher rubber is not fully pushing against the top of the component. Please consult Panasonic for further details.

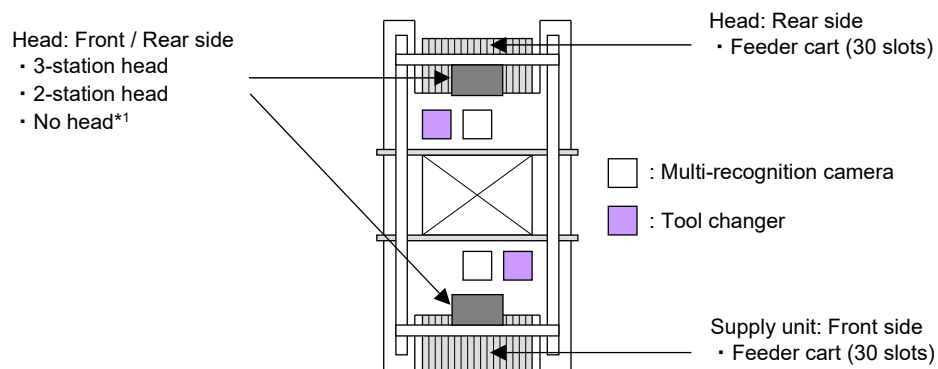
4. Machine Configuration

■ Insertion specification/ Placement specification

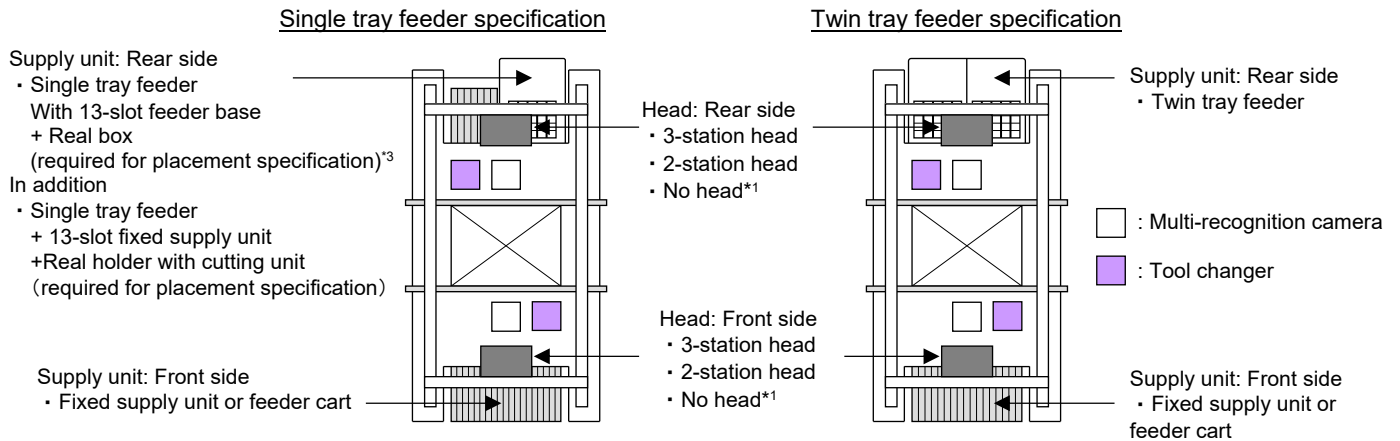
- Fixed supply specification (tray feeder and feeder cart cannot be installed on the front and rear side)



- Feeder cart specification (tray feeder cannot be installed)



- Tray feeder specification (feeder cart cannot be installed on the rear side)



*1 For "No head", both front and rear cannot be selected together.

*2 For fixed supply unit(30-slot) specification, cutting unit and reel holder are not included. If cutting unit is required, please select feeder cart specification(with reel holder) for placement. If cutting unit is not required and only reel holder is needed, please select reel box in fixed supply unit option.

*3 For 13-slot fixed supply unit specification, cutting unit and reel holder are not included. If required, please select fixed supply unit option.

■ Data creation

Data creation is carried out using NPM-DGS. (NPM-DGS is sold separately)

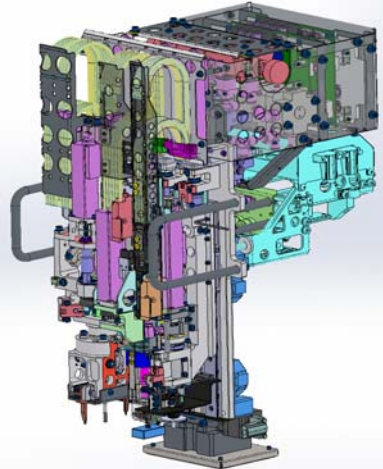
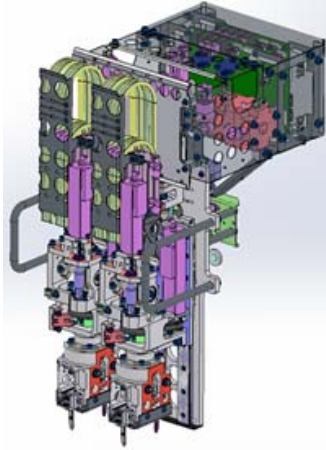
Please prepare NPM-DGS hardware on your own.

** Remarks **

- The special specifications may potentially not comply with the CE mark specifications.
- The floor slope in the feeder cart installation area needs to be 6 mm or less in the right/left direction and 11 mm or less in the forward/backward direction. If the floor slope is beyond the above limit, the feeder cart cannot be taken in and out.
- For the anvil specification, Considering daily maintenance and workability of the anvil unit. component supply unit:give priority to select feeder cart specification at front side. Component supply unit: If fixed supply unit specification is required at front side, please consult us.

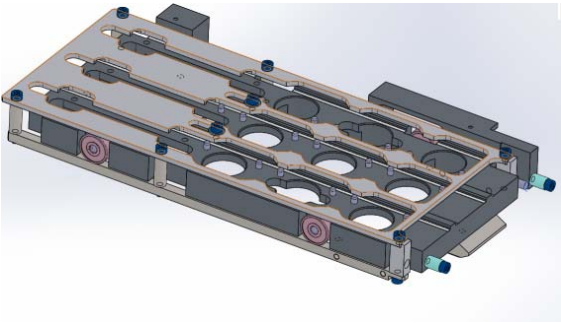
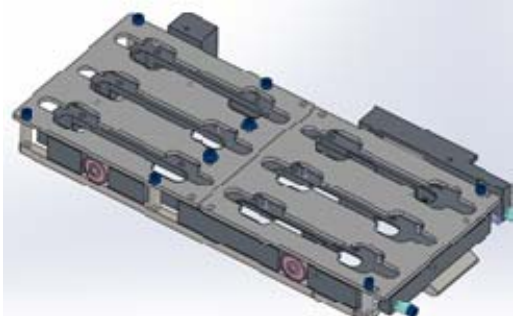
4.1 Head Configuration

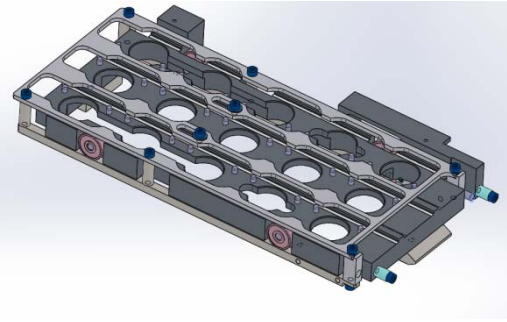
■ Insertion Head

3-station head		2-station head	
			
Accessories	Tool changer Choose from 3 adapter & nozzle type, adapter type, or nozzle type.	Accessories	Tool changer (Adapter-only type)

*1 Adapter type cannot be selected if insertion head has picking up nozzle.

■ Tool changer

Adapter & nozzle type	Adapter-only type
	
Includes 3 sets of adapters for chuck and 9 sets of nozzles	Includes 6 sets of adapters for chuck

Nozzle type

Includes 13 sets of nozzles

**** Remarks ****

• The above accessories do not come together with spare head. When you select spare head, be sure to select options according to each head as well. Please refer to “9. Options” for details.

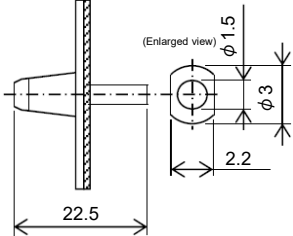
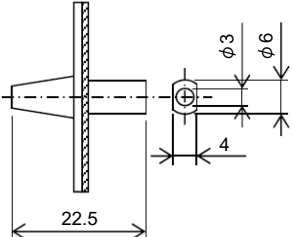
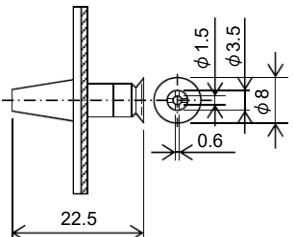
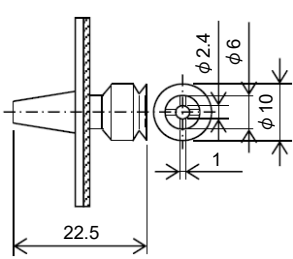
4.2 3-station Head Nozzle Configuration

All nozzles are available as options so that you will be able to select an optimal combination that suits your production style.

- All the shapes of holes shown here are maximized. Therefore the actual shapes are different.
- The tips of nozzles which include "C" in their No. are made from the ceramic.
- The nozzles which include "N" in their No. are exclusively made for NPM series with 2D code applied on flange area. Wrong nozzle setup can be detected by verification of nozzle No. for the nozzles with the code.
- The nozzles which do not include "N" in their No. are common with CM series (CM602, CM402, CM401, CM400, DT401, CM232, CM212, and CM101).
- The recognition method depends on components.

■ Nozzles for 3-station head (For small components)

- The special nozzles can support the components whose vacuum pick up surface's shape is special.
- For details, please consult us.

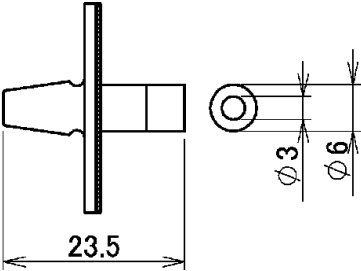
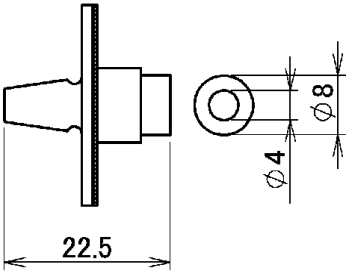
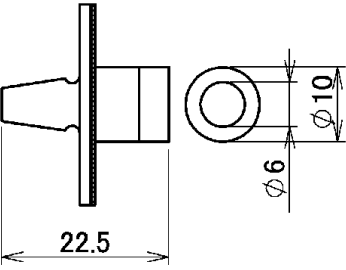
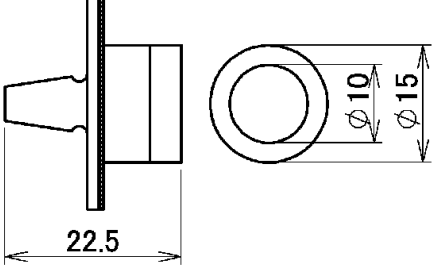
No.	Shape (Unit: mm)	Max. component mass	Applicable component (Typical examples)
1002 1002N		0.2g	Aluminium capacitors, connectors, ICs, covers etc.
1003 1003N		0.8g	
1004 1004N		25g	
1005 1005N		30g	

■ Nozzles for 3-station head (For radial taping components)

- The nozzle applies to the components with slight irregularities on the top of components like radial taping As Al electrolytic capacitor.

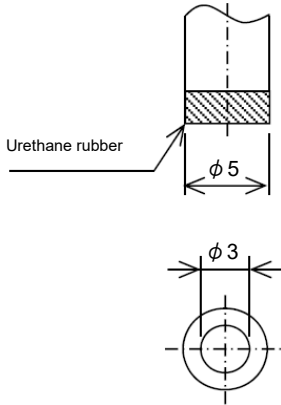
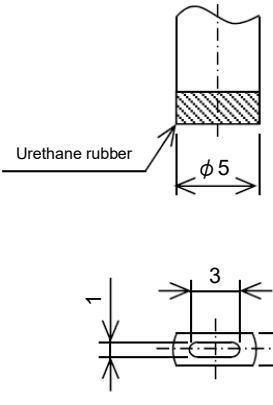
Due to the characteristics of the material, the adsorption of sponge pad to uneven surface is stable, however, the life span of pad is short.

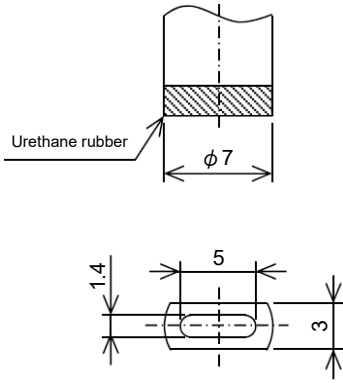
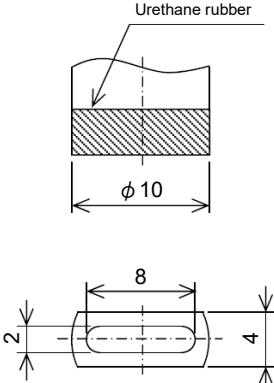
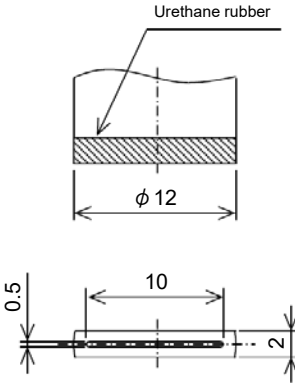
Since only replacing pad is allowed, we recommend to you to prepare spare pad for replacement.

No.	Shape (Unit: mm)	Max. com- ponent mass	Applicable component (Typical examples)
3484 3484N		2g	Radial taping Al electrolysis etc
3485 3485N		4g	
3486 3486N		10g	
3487 3487N		30g	

■ Nozzles for 3-station head (For small to medium-sized components)

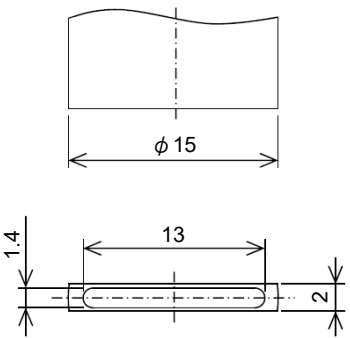
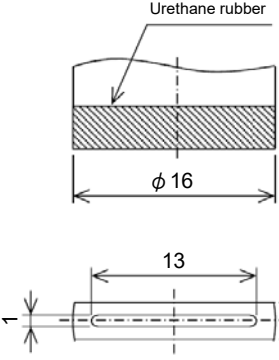
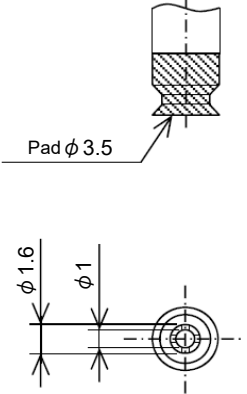
* The product number should be used for order placements.

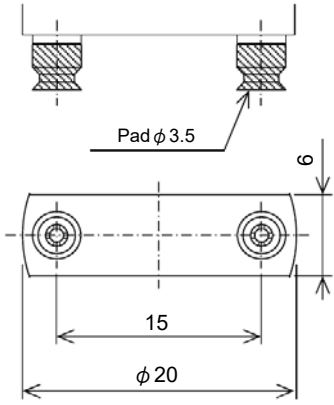
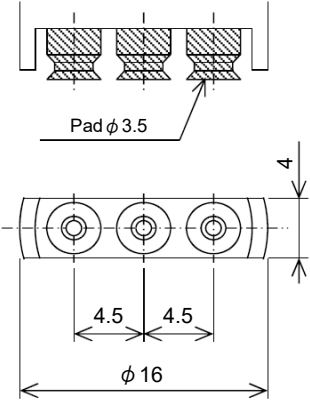
Nozzle No.	1479 / 1479N	2405 / 2405N
Product number	KXFX05ASA00 N610117226AA(With 2D code)	KXFX05BVA00 N610117223AA(With 2D code)
Shape (Unit: mm)		
Max. component mass	3.5 g	1.5 g
Remarks	With a urethane rubber Nozzle length: 27.5 mm	With a urethane rubber Nozzle length: 22.5 mm

Nozzle No.	1404 / 1404N	1421 / 1421N	2467 / 2467N
Product number	KXFX0558A00 N610117224AA(With 2D code)	KXFX056AA00 N610117225AA(With 2D code)	KXFX05F9A00 N610128174AA(With 2D code)
Shape (Unit: mm)			
Max. component mass	3.0 g	8.0 g	2.5 g
Remarks	With a urethane rubber Nozzle length: 22.5 mm	With a urethane rubber Nozzle length: 22.5 mm	With a urethane rubber Nozzle length: 22.5 mm

■ Nozzles for 3-station head (For large components)

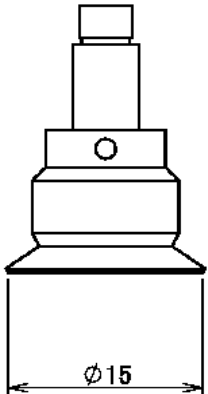
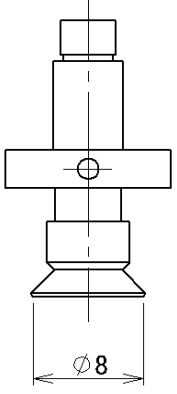
* The product number should be used for order placements.

Nozzle No.	1115 / 1115N	2418 / 2418N	1424 / 1424N
Product number	KXFX04PJA00 N610117221AA(With 2D code)	KXFX05CMA00 N610117211AA(With 2Dcode)	KXFX056PA00 N610127619AA(With 2D code)
Shape (Unit: mm)			
Max. component mass	2.0 g	6.5 g	4.8 g
Remarks	Nozzle length: 22.5 mm	With a urethane rubber Nozzle length: 22.5 mm	With a urethane rubber Nozzle length: 22.5 mm

Nozzle No.	1427 / 1427N	2421 / 2421N
Product number	KXFX0570A00 N610127623AA(With 2D code)	KXFX05CTA00 N610117212AA(With 2D code)
Shape (Unit: mm)		
Max. component mass	9.7 g	14.5 g
Remarks	With a urethane rubber Nozzle length: 22.5 mm	With a urethane rubber Nozzle length: 22.5 mm

■ Nozzles for swing nozzle head

* The product number should be used for order placements.

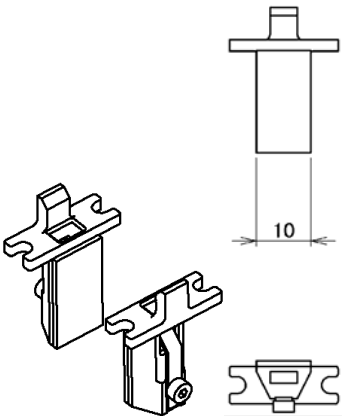
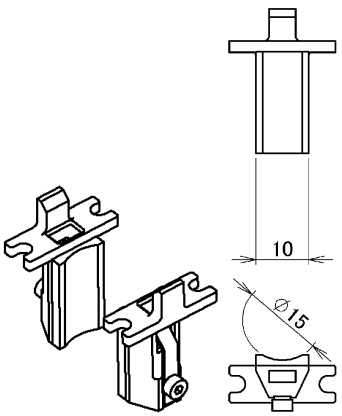
Nozzle No.	12001	12002
Product number	MTKU001115AA	MTKU001319AA
Shape (Unit: mm)		
Max. component mass	30 g	3.0 g
Max. component height	30 mm	30 mm
Remarks	Swing nozzle L	Swing nozzle S

*Automatic exchange of swing nozzles is not supported.

Please note that exchange of S type and L type will require on-site engineer support.

■ Adapters for body chuck head (For transformers, shield cases, connectors etc., and other odd-form components)

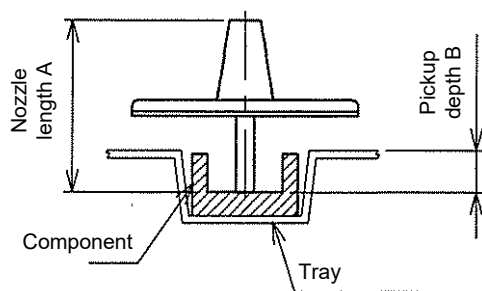
* The product number should be used for order placements.

Nozzle No.	10002	10003
Product number	MTKA006857AA	MTKA009855AA
Shape (Unit: mm)		
Max. component mass	200 g	200 g
Max. component height	60 mm	60 mm
Remarks	Flat adapter	Round adapter

*Adapters for body chuck come in a set (2 adapters per set) under 1 product number.

■ Correspondence between the pickup depth of electronic component and the nozzle length

The necessary nozzle length varies according to the pickup depth (distance from top of tray to pickup surface) of electronic component to be placed.



Pickup depth B	0 mm to below 3 mm	3 mm to below 8 mm	8 mm to below 13 mm
Nozzle length A	22.5 mm	27.5 mm	32.5 mm

■ Pickup-ready component size and nozzle arrangement

The sizes of components that 3-station head can pick up are as follows.

(●: Can pick up, ○: Cannot pick up)

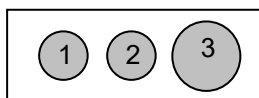
Nozzle side (No. 1, 2 in the figure)

Component of diagonal 38 mm (26 x 26 mm)*¹ or less

Body chuck side (No. 3 in the figure)

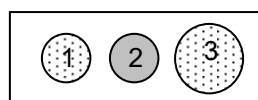
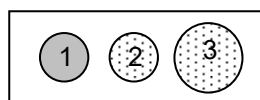
Component of diagonal 79 mm or less and 50 mm or less in width (W)

*¹ The numerical value inside () is an example of L=W.



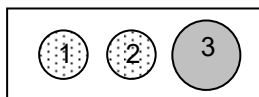
Component length 130 mm or less and 35 mm or less in W.

Component length 100 mm or less and 90 mm or less in W (No. 1 or No. 2 in the figure)



Body chuck side

Component of diagonal 135 mm or less and 50 mm or less in W (No. 3 in the figure)



* Above conditions may not be fulfilled depending on the combination of component size and body height.

Please consult us if it is different from the above.

Component dimensions are subject to constraints if the chucking / pickup position is offset from the center of a component.

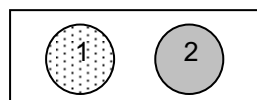
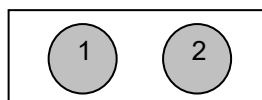
Components with sizes larger than the above restrictions can also be inserted in some cases. For more information, please consult us.

The sizes of components that 2-station head can pick up are as follows.

(●: Can pick up, ○: Cannot pick up)

Component with diagonal 79 mm or less and 50 mm or less in width (W).

Component of diagonal 135 mm or less and 50 mm or less in width



* Above conditions may not be fulfilled depending on the combination of component size and body height.

Please consult us if it is different from the above.

Component dimensions are subject to constraints if the chucking position is offset from the center of a component.

Components with sizes larger than the above restrictions can also be inserted in some cases. For more information, please consult us.

4.3 Supply Unit Configuration

■ Stackable Stick Feeder and Radial Tape Feeder

There are two types of stackable stick feeders: S size and L size, each are equipped with unique adjustment mechanisms which makes them flexible and enables them to be adjustable according to stick size and component dimensions. *7

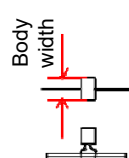
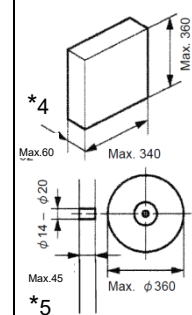
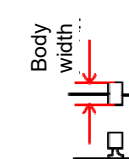
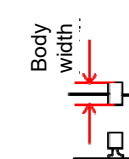
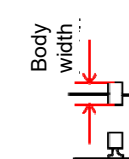
There are two tape feeders; Standard type, and Traceability type(shutter function was added for the purpose of managing the component traceability.)

Radial tape feeders, using the technology from our insertion machine series, are available in 2 types of feeding pitches.

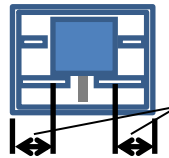
In addition to standard type, there is another type (with body guide) applying to nozzle pickup.

Other feeder applies to components which are placed directly above the feeding hole.

Other than that, there is a feeder with the joint detection sensor that detects splicing positions for the purpose of managing the component traceability.

Feeder type	Type		Feeding pitch	Max. load*1	Component dimension		Max. component weight	Packaging Dimension			
Stackable Stick Feeder *8	S	Standard	No step (adjustable)	30 pcs	W	4mm~20mm	2kg (total weight of components set in feeder)	Stick length 300 mm~700 mm *10	Stick width *12		
		Traceability*11			L	5mm~80mm			8~24mm		
	L	Standard		14 pcs	W	4mm~60mm			Stick width *12		
		Traceability*11			L	5mm~80mm			8~64mm		
				H	2.5mm~20mm	Stick height 10~29mm					
				H	12mm~45mm	Stick height 21~54mm					
Radial tape feeder	Standard *2	12.7 mm	20pcs		Component height Min.3mm (Lead chuck) Min.5mm (Body chuck) Body dimension ~ ϕ 20 mm (Lead chuck) Body width 5~20mm Body length ~30mm (Body chuck) Body width 	—		Unit: mm			
		15 mm									
	Special *3	12.7 mm							H0 dimension 16 mm~20 mm Lead diameter ϕ 0.4mm~ ϕ 1.0mm * 6	Component height Min.6mm (nozzle) Min.12mm (Body chuck) Body width 8~20mm Body length ~30mm (Nozzle) Body width 5~20mm Body length ~30mm (Body chuck) Body width: 	
		15 mm									
Standard *2	12.7 mm	Component height Max 30mm *H0=16mm Lead pitch Max 10mm *13			Component height Min.6mm (nozzle) Min.12mm (Body chuck) Body width 8~20mm Body length ~30mm (Nozzle) Body width 5~20mm Body length ~30mm (Body chuck) Body width: 	—					
	15 mm										
Special *3	12.7 mm								Lead diameter ϕ 0.4mm~ ϕ 1.0mm * 6	Component height Max 30mm *H0=16mm Lead pitch Max 10mm *13	Component height Min.6mm (nozzle) Min.12mm (Body chuck) Body width 8~20mm Body length ~30mm (Nozzle) Body width 5~20mm Body length ~30mm (Body chuck) Body width: 
	15 mm										

- *1 When front and rear side is fixed supply unit or feeder cart (Excluding when tray is attached)
- *2 When component is located in between tape feeding holes
- *3 When tape feeding hole is located between component leads
- *4 It is possible to adjust feeder width to support component width larger than 60 mm (Max.80 mm) however max. number of feeders that can be loaded is reduced and loading position will be restricted.
- *5 Please consult us for reel component support as this will be customized spec.
- *6 For insertion with lead chucks, lead diameter is between $\phi 0.4\text{mm}$ and $\phi 0.8\text{mm}$.
Contact us when lead diameter of components is larger than $\phi 1.0\text{mm}$.
- *7 We do not recommend daily changeover work. We recommend stick feeder changeover for per component.
- *8 Depending on the size and shape of the components, guide rail, special pushers or other special parts may be required.
This will be classified as customized spec.
For parts of which flat surface of the bottom of the body is extremely narrow:3mm or less, parts with leads protruding from the side of the part body, or parts with steps and protrusions on the bottom and sides of the body, please contact us separately.
In addition, when pushing components in the stick, the components that overlap or ride up will not be applicable.
- *9
 - Please use radial tape feeder with Body Guide if nozzle is used to pick up component.
 - Lead chuck cannot be used with radial tape feeder with Body Guide.
 - When using body chuck, if component slant in the width direction of component body (lead wire bend) is 1 mm or more, please use radial tape feeder with Body Guide.
 - Depending on the size of component inserted with radial tape feeder with Body Guide, it is required to adjust the position of the guide at the component side.
- *10 This is a length without cutting unit in fixed supply unit.
For specification with cutting unit in a feeder cart or fixed supply unit, length would be 380mm to 700mm.
- *11 In traceability type, with parameter, it is possible to select individual verification which collates sticks one by one to replenish sticks or group-verification which collates sticks in a group to replenish.
When stackable stick feeder is used in individual verification, it can attach up to 4sticks.
- *12 Contact us when both sides of length between component side and stick side of components is 3mm or larger than 3mm. They need special care.

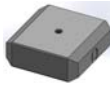
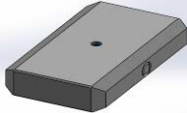


Components need to be handled specially when both sides of length is 3mm or larger than 3mm.

- *13 The maximum suitable lead pitch at special care is 27.5mm and nozzles or body chucks are used for insertions, You cannot use lead chucks. Contact us for more details.

■ Pusher for Stackable Stick Feeder

Pushers for stackable stick feeder are available in the 5 types shown below.

Pusher type	Shape	Dimensions	Max. component width (Reference value)	Stackable Stick feeder	
				S	L
S size *		W 4×H 4×L25mm	10mm	Standard	Standard
M size		W10×H10×L25mm	15mm	Option	Option
L size		W15×H10×L30mm	30mm (20mm for stick feeder S)	Option	Option
LL size		W30×H10×L30mm	50mm	—	Option
LLL size		W50×H10×L30mm	60mm	—	Option

- * S size pusher is included as standard with the stackable stick feeder.
If S size pusher is purchased as spare, it will come in a set with the feeding wire because the pusher is glue-fixed to the wire.
For M~LLL size pushers, they are designed such that they can be used by slotting into the S size pusher.
- * Depending on the size and shape of the components, special pushers or other special parts may be required.
This will be classified as customized spec.

■ Intelligent Tape Feeder

There are two groups of tape feeders: with or without the joint detection sensor, which detects splicing positions for the purpose of managing the component traceability and etc. According to the tape width, each group is classified as shown below.

The feed pitch is automatically set according to the production data.

Intelligent Tape Feeder is applicable to nozzle only.

Feeder type		Type	Setting pitch	Maximum depth of Boss	Reel*1 diameter	Maximum Setting reel	Feed pitch (1 pitch = 4 mm)																
							0.25	0.5	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
12/ 16 mm	12 mm	Emboss	21 mm	15 mm	Small	60			○	○	○	○											
	Large				60*2																		
16 mm	Large																						
24/ 32 mm			42 mm	26 mm*3	Large	30			○	○	○	○	○	○	○								
44/ 56 mm			63 mm			20				○	○	○	○	○	○	○	○	○	○	○	○	○	○
72 mm			84 mm	15 mm 21 mm		14				○	○	○	○	○	○	○	○	○	○	○	○	○	○
88 mm (With detection sensor)			105 mm	21 mm		12				○	○	○	○	○	○	○	○	○	○	○	○	○	○
104 mm (With detection sensor)			126 mm			10				○	○	○	○	○	○	○	○	○	○	○	○	○	○

*1 Small reel: $\phi 178$ mm, Large reel: $\phi 178$ mm ~ $\phi 382$ mm

*2 Depending on the width of reel, the maximum setting count may be reduced.

*3 When emboss depth of components is over 21 mm, you need to make modifications to the feeder cart (or 13-slot feeder base).
(Custom specifications)

** Remarks **

- In the case of 12 mm/ 16 mm emboss tape, the emboss depth is possible to up to 15 mm.
If the tape width is narrow, you need to adjust the feeder groove width for restraining the tape.
In this case, the emboss depth is limited to 13 mm or less. For further information, please contact us.

Tray Feeder

When the NPM-VF main unit is for tray feeder specification, it can be connected to the rear side. It cannot be installed to the front side

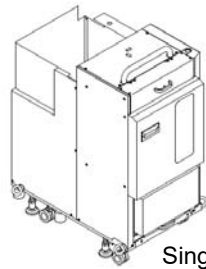
- Single tray feeder (Max. 20 product types)*
- Twin tray feeder (Max. 40 product types)

Applicable head: 3-station head, 2-station head

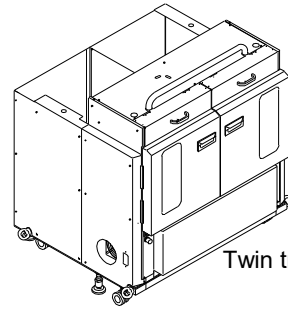
* 13-slot feeder base is included with the single tray feeder.

* Here are about Twin tray feeder;

- ① Can pickup components from one tray and at the same time, open a cover of the other tray which is not being used to prepare for the next production
- ② If the same components are set at both trays, this provides continuation of production by picking up components from the other tray, and at the same time allows the empty tray cover to be open to replenish components when one tray gets empty.



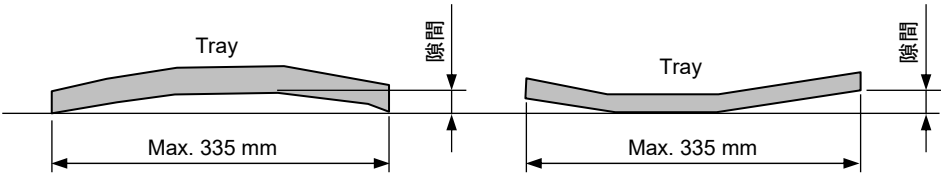
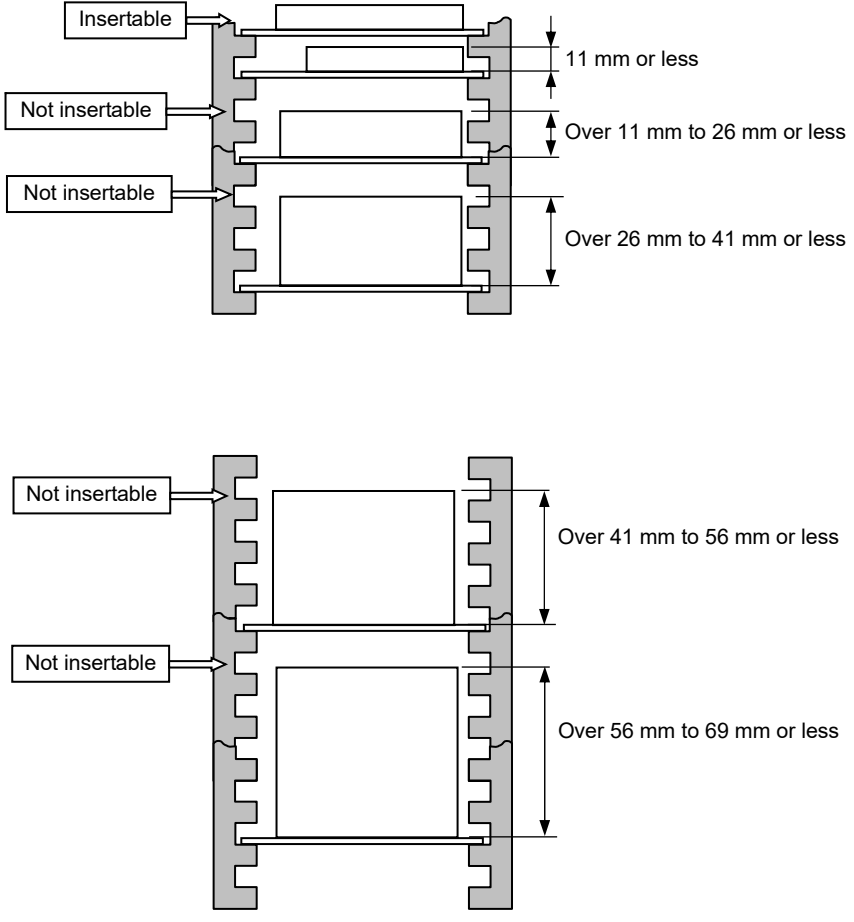
Single tray feeder



Twin tray feeder

Tray Conditions

Item	Specification	
Tray dimensions	Tray dimensions	L 85 × W 100 mm ~ L 230 × W 335 mm
	Tray height	2 mm ~ 69 mm * When height exceed 30mm, tray replenishment unit cannot be used.
Component position error	Pick up face of components	Position error
	Under 10 × 10 mm	±1.0 mm or less
	Above 10 × 10 mm	±1.0 mm or less
* The pick-up face of a component must be flat.		

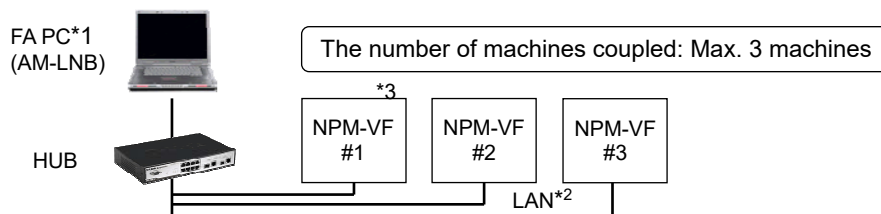
Item	Specification
Permissible tray warpage (Gap)	Warpage (Gap): Max. 0.5 mm 
Type	- Use an injection molded tray of sufficient strength and dimension accuracy. - If you use any tray other than the above, consult us, separately.
Mass	- Mass of the tray: 1 kg or less - Tray + components = Max. 1 kg/ pallet (Excluding the mass of pallet) - Total mass of the tray magazine: 20 kg or less - Magazine + pallets + trays + components = Max. 20 kg/ magazine
Pallet insertion limitations	- If the height of the tray on a pallet exceeds 11 mm, a pallet cannot be inserted into the magazine slot being one step higher of the pallet. - If the height of the tray on a pallet exceeds 26 mm, a pallet cannot be inserted into the magazine slot being one and two steps higher of the pallet. - If the height of the tray on a pallet exceeds 41mm, a pallet cannot be inserted into the magazine slit being one and three steps higher of the pallet. - If the height of the tray on a pallet exceeds 56mm, a pallet cannot be inserted into the magazine being one and four steps higher on the pallet. 

4.4 Line Configuration

- Regardless of stand-alone installment or line connection, PC designed for LNB is always needed to set up NPM-VF.
- When connecting to more than 4 NPM-VF, when using system software(Optional), or when the line is made up with NPM-VF and other machine models, FA PC is required.

■ Examples of system configuration

- The line is made up with NPM-VF only(The number of machines coupled: maximum 3 machines)



- *1 Please prepare PC designed for AM-LNB by yourself.
Common with NPM-DGS. (Supported OS: Windows® 10 Pro only)
Options below cannot be used.

- Automatic model changeover
- Component traceability
- Feeder arrangement navi
- Host communication
- Support station box (Component traceability type)
- APC system ready
- Pattern mark communication
- Support for PanaCIM-EE
- Quality information viewer
- Remaining components monitor
- Machine software version up

- *2 Please prepare the LAN cable by yourself.
(Because the required cable varies in length depending on where you install the FA PC and the HUB)
Basic specification: UTP cable of enhanced category 5 or later

- *3 The following functions cannot be used.
- PCB barcode recognition, pattern barcode recognition
 - Model distinction mark detection
 - Component pre-pickup detection
 - Connection between machines (barcode information, pattern recognition information, bad pattern information, PCB warpage information, detection information)

• HUB:

Basic specifications of HUB:

Standard	IEEE802.3 standard
Data rate	10BASE-T/100BASE-TX/1000BASE-T(Auto-Negotiation)
Recommended type	DGS-1016D (made by D-Link)

* Please prepare the LAN cable by yourself.

• AM-LNB (Line Network Box)

AM-LNB is a relay system connecting the machine and NPM-DGS(Data Creation System), and can be used on PC with Windows installed.

It handles multiple machines as a line; thereby centrally managing information, downloading production data, and compiling production management information.

(This software is included in the NPM-VF system software DVD-ROM)

- Main functions:
- ① Downloading production data to machines
 - ② Retaining production data and managing differences
 - ③ Retaining/Compiling production management information
 - ④ Retaining event information

■ Operating environment of AM-LNB

Please prepare the following hardware and software by yourself.

In the case that NPM-DGS is used together with PC, the PC must fulfill the following specifications.

• Hardware Specifications

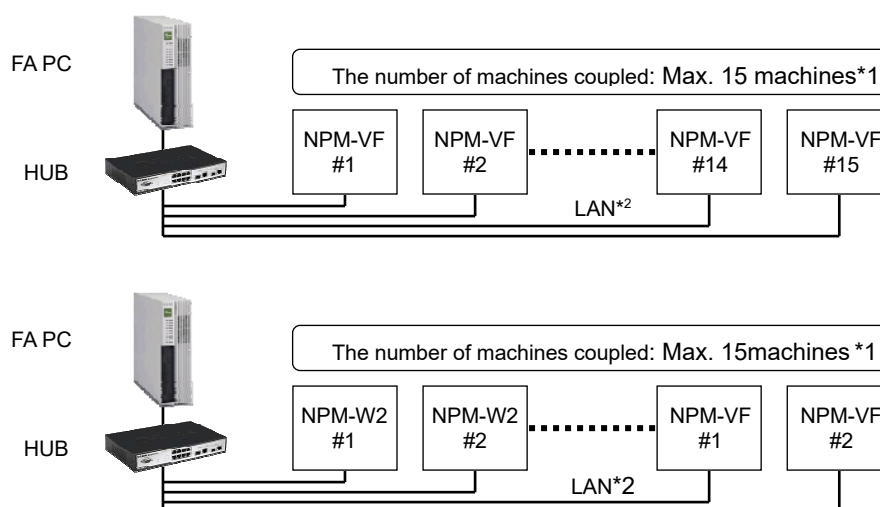
Item	Specification	Required or Recommended
Main body	IBM PC/AT compatible machine (A desktop PC is strongly recommended)	Required
CPU	Intel® Core™ i5-2430M equivalent or greater	
Mother board	IBM-fully-compatible machine	
Serial I/O	IBM-fully compatible machine	
Graphic board	SXGA or higher Desk top region: 1 280 x 1 024 dot or more	
Memory	4 GB or more	
HDD	120 GB or more available space (NTFS file system)	
Optical drive	DVD drive To be used in installation	
LAN port	For 100/1000BASE-T	

• Software Specifications

Item	Specification	Required or recommended
OS	Microsoft® Windows® 10 Pro (32-bit/ 64-bit version)	Required
Support language	English, Chinese, Japanese	
Virus check	Virus buster™ Program version 7.0 or higher	Recommended

- Microsoft and Windows are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- Intel and Intel Core are registered trademarks or trademarks of Intel Corporation in the United States.
- Virus Buster is a registered trademark or trademark of Trend Micro Incorporated.

2. The line is made up by NPM-VF only (The number of machines coupled: minimum 4 machines), system software (Option) is used, or the line is made up with NPM-VF and other machine models



*1 When the number of machines coupled exceeds 15 machines, please consult us.

*2 Please prepare the LAN cable by yourself.

(Because the required cable varies in length depending on where you install the FA PC and the HUB)
 Basic specification: UTP cable of enhanced category 5 or later

*3 The following functions cannot be used.

- Feeder Setup Navigator
- Quality information viewer
- APC system ready

▪ FA PC & HUB:

A set is required for each line in the case of FA PC equipped with line server function.
 LNB will be installed.

Basic specifications of FA PC:

Type	FC-E27B-GL2CP7 (made by NEC)
Auxiliary storage	Internal HDD: 500 GB × 2 as standard (Mirroring supported)
OS	Miracle Linux (Version 6)
Outside dimension	W 100 × D 360 × H 310 mm
Mass	10.0 kg

* Please prepare the power supply cable by yourself.

Basic specifications of HUB:

Standard	IEEE802.3 standard
Data rate	10BASE-T/ 100BASE-TX/ 1000BASE-T(Auto-Negotiation)
Recommended type	DGS-1016D (made by D-Link)

* Please prepare the LAN cable by yourself.

- LNB(Line Network Box)

LNB (Line Network Box) is a relay system connecting the machine and NPM-DGS (Data Creation System), being installed on the FA PC.

It handles multiple machines as a line; thereby centrally managing information, downloading production data, and compiling production management information. (This software is included in the NPM-VF system software DVD-ROM.)

- Main functions:
- ① Downloading production data to machines
 - ② Retaining production data and managing differences
 - ③ Retaining/Compiling production management information
 - ④ Retaining event information

- LWS(Line Work Station)

Access to LNB using PC* shows actual data retained by LNB.

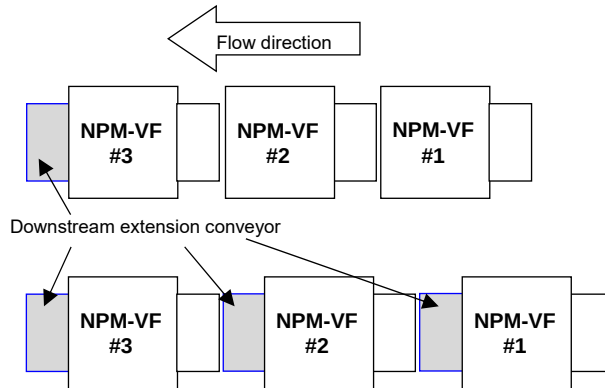
* Please prepare PC by yourself. No dedicated software installation is required.

For details, please refer to "NPM-DGS Specification."

■ Examples of line configuration (Transfer direction: Right to left flow sample)

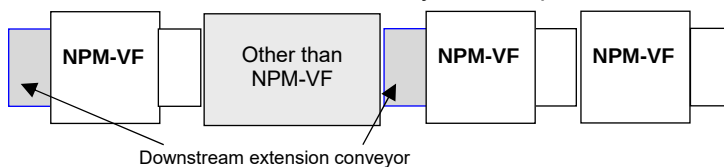
The line configuration of NPM-VF and the location of the extension conveyors and others are as follows. It is required for the first and last equipment of the NPM-VF to ensure the safety of the transfer opening. When the extension conveyor is installed between the NPM-VFs please select the conveyor for downstream side.

1. For the line of NPM-VF alone



2. For the line of NPM-VF combined with other systems

Make sure to select an extension conveyor at the point where NPM-VF lies next to another system.



* The above line configuration is a sample.

It may differ depending on your system configuration and the like. For details, please contact us.

* It is able to connect with NPM-W2/ W.

* Please consult us separately should you connect it to NPM-D3/ D2/ .D.

* It is not able to connect with NPM-TT and NPM.

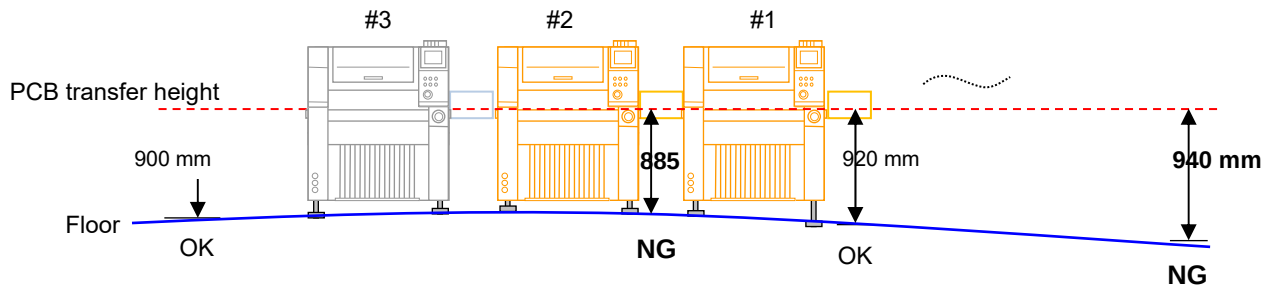
* Please use machine by connecting it to BHU or other machines. It is not recommended to feed and remove PCB manually.

■ PCB transfer height

The standard NPM-VF PCB transfer height is 900 mm ~ 920 mm.

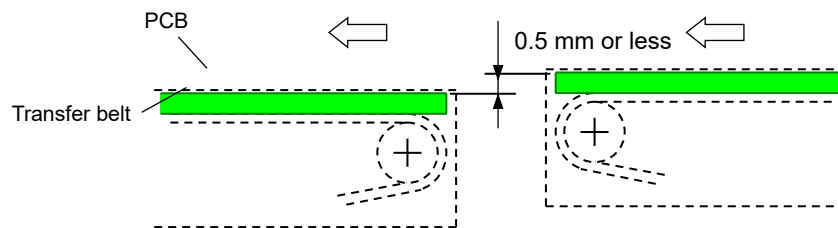
The PCB transfer height if the production line may differ based on the condition of the floor in the customer's factory. The figure below shows an example in which the feeder cart for #2 cannot connect with the equipment as usual.

Please contact us if all of the NPM-VF transfer heights in a production line are not 900 mm to 920 mm.



■ Height difference between PCB transfer units

The difference in height between the machines when transferring PCBs should be 0.5 mm or less.



4.5 Recognition Unit Configuration

■ Head camera

- Field of view: 31 mm × 31 mm

(For information about the PCB recognition mark dimensions, please refer to “7. PCB Design Standard”)

■ Multi-recognition camera: Type 1

The position and the angle deviation in picking up the component are corrected.

Component's outer shape and leads are detected.

Recognition method	Applicable Component
Batch recognition or split recognition	When the short side of the component exceeds 45 mm, split recognition comes into use. BGA, CSP, QFP, SOP, and connector etc.

* When the outside dimensions exceed 45 × 45 mm, split recognition comes into use.

* Please consult us regarding components which do not fall within above specifications.

Recognition conditions of QFP (Type 1)

Placement conditions of QFP are as follows.

(Basically, placement of QFP is studied and experimented after getting the sample of it, and then it is judged to be placed or not.)

Outside dimensions	5 × 5 mm ~ 80 mm × 80 mm* ¹
Thickness	1.0 mm ~ 28 mm
Lead pitch	0.5 mm, 0.65 mm, 1.0 mm, 1.27 mm, 1.5 mm
Lead width	0.2 mm or over
Lead shape	Leads must be protruding out of the mold area by 1 mm or over.

- Feeding type: Taping and tray

*¹ When the outside dimensions exceed 45 mm × 45 mm, split recognition comes into use.

* For information about the components that are not conforming to the above specifications, please consult us.

Recognition conditions of BGA/ CSP (Type 1)

Placement conditions of BGA/ CSP are as follows.

(Basically, placement of BGA/ CSP is studied and experimented after getting the sample of it, and then it is judged to be placed or not.)

Outside dimensions	5 × 5 mm ~ 90 × 90 mm ^{*1}
Thickness	0.3 mm ~ 28 mm
Ball pitch	0.5 ~ 1.5 mm
Ball diameter	φ0.15 mm ~ φ0.9 mm
Ball shape	Globular or cylindroid ^{*2}
Materials of ball	High temperature solder, eutectic solder
Maximum ball count	4 096 In positive grid arrangement, number of rows on most outer regions × number of columns is 64 × 64 In staggered arrangement, number of rows on most outer regions × number of columns is 32 × 32
Minimum ball count	9 Number of rows on most outer regions × number of columns is obtained by 3 × 3.
Arrangement of ball	The pitch and dimensions of ball shall be consistent. (The ball missing and the staggered pattern are the same as those defined by JEDEC and EIAJ regarding BGA/ CSP.)

- To enable the simultaneous recognition of BGA/ CSP appearance and solder balls, the body shall be made of the glass epoxy. There are some cases in which the recognition is difficult depending on conditions (pattern, with or without through hall, luster, etc.) of placement surfaces of solder balls.
- BGA/ CSP which is made of ceramic or has the gold body is placed with only the contour recognition.
- Surface of ball
The surface of ball should be free from the blur due to oxidation.
(Effect extent of oxidation for the recognition needs to be checked by an experiment.)
- Feeding type: Taping and tray

^{*1} When the outside dimensions exceed 45 × 45 mm, split recognition comes into use.
(recognition range: 80 × 80 mm)

^{*2} Placement may fail depending on the combinations of ball pitches or ball diameters.

Recognition conditions of connector (Type 1)

The general conditions of placement connectors are as follows.

(Basically, placement of connector is studied and experimented after getting the sample of it, and then it is judged to be placed or not.)

Outside dimensions	L 125 × W 90 mm or less ^{*1*2} L 150 × W 38 mm or less ^{*1}
Lead pitch	0.5 mm or over
Lead width	0.2 mm or over
Lead shape	Leads must be protruding out of the body by 1 mm or over.
Other shape	No through holes around contact pins shall exist in a vertical direction. Contact pins shall not be exposed to the underside.

- Feeding type: Taping, tray and stick

^{*1} In the case of the placement of large sized connectors, in addition to those, some limitations may be imposed on the dimensions depending on the relation between the pick up position and the recognition range.
For further information, please contact us.

^{*2} When the recognition range (W) is more than 45 mm but less than 80 mm, split recognition comes into use.

■ 3D-measurement function (Multi-recognition camera: Type 3)

(Option)

- The coplanarity and XY-direction positions of all leads of such as QFP/ SOP can be detected at high speed.
- Detection is possible for existence or nonexistence/absence of all balls of such as BGA/ CSP.

Recognition method	Recognition speed	Typical example of components	Min. lead/ Min. ball pitch	Min. lead width/ Min. ball diameter	Min. ball height
Batch recognition	3D high speed	QFP, SOP	0.5 mm	0.2 mm	—
		BGA, CSP	0.5 mm	0.3 mm	0.25 mm

* The multi-recognition camera on NPM-D3, NPM-W2 or later, some parts cannot be shared with the conventional line camera.
(Such as using the option of the brightness check function etc.)

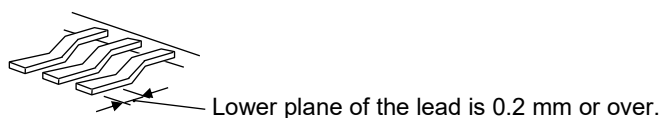
Recognition conditions of QFP (Type 3)

Placement conditions of QFP are as follows.

(Basically, placement of QFP is studied and experimented after getting the sample of it, and then it is judged to be placed or not.)

Outside dimensions	5 × 5 mm ~ 80 × 80 mm*
Thickness	1.0 mm ~ 28 mm
Lead pitch	0.5 mm, 0.65 mm, 1.0 mm, 1.27 mm, 1.5 mm
Lead width	0.2 mm or over
Lead shape	Leads must be protruding out of the mold area by 1 mm or over.

- The measuring range of lead coplanarity is up to ± 0.5 mm.
- 0.2 mm-or-more flat part is needed on the lead underside.



- Depending on the recognition speed and/or the lead count, the waiting time for recognition processing may occur in placement. For further information, please contact us.
- Feeding type: Taping and tray

* When the outside dimensions exceed 45 × 45 mm, split recognition comes into use.

Recognition conditions of BGA/ CSP (Type 3)

Placement conditions of BGA/ CSP are as follows.

(Basically, placement of BGA/ CSP is studied and experimented after getting the sample of it, and then it is judged to be placed or not.)

Outside dimensions	5 × 5 mm ~ 90 × 90 mm*
Thickness	0.3 mm ~ 28 mm
Min. ball pitch	0.5 mm
Min. ball diameter	φ0.25 mm
Ball shape	Globular
Materials of ball	High temperature solder, eutectic solder
Number of balls	Matrix of Min. 2 × 2 to Max. 64 × 64
Arrangement of ball	The pitch and dimensions of ball shall be consistent. The ball missing and the staggered pattern are the same as those defined by JEDEC and EIAJ regarding BGA.

- Depending on surface conditions of ball, it may not be possible to recognize such balls.
- The underside must have terminals in ball form at the time of feeding.
- Depending on the recognition speed and/or the ball count, the waiting time for recognition processing may occur in placement. For further information, please contact us.
- Feeding type: Taping and tray

* When the outside dimensions exceed 45 mm × 45 mm, split recognition comes into use. (Recognition range: 80 mm × 80 mm)

Recognition conditions of connector (Type 3)

The general conditions of connector placements are as follows.

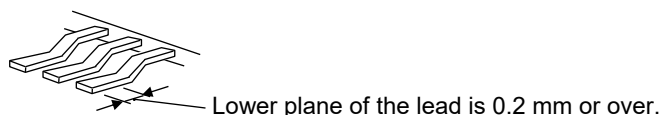
(Basically, placement of connector is studied and experimented after getting the sample of it, and then it is judged to be placed or not.)

Outside dimensions	L 125 × W 90 mm or less* ¹ * ² L 150 × W 38 mm or less* ¹
Lead pitch	0.5 mm or over
Lead width	0.2 mm or over
Lead shape	Leads must be protruding out of the body by 1 mm or over.
Other shape	No through holes around contact pins shall exist in a vertical direction. Contact pins shall not be exposed to the underside.

*¹ In the case of the placement of large sized connectors, in addition to those, some limitations may be imposed on the dimensions depending on the relation between the pick up position and the recognition range. For further information, please contact us.

*² When the recognition range (W) is more than 45 mm but less than 80 mm, split recognition comes into use.

- The measuring range of lead coplanarity is up to ±0.5 mm.
- 0.2 mm-or-more flat part is needed on the lead underside.



- Depending on surface conditions of lead underside, it may not be possible to recognize such leads.
- Feeding type: Taping, tray and stick

5. System software

5.1 Component Verification*¹

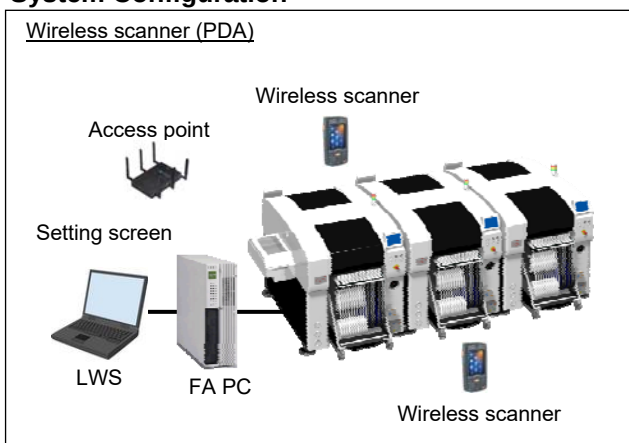
This prevents components from being put wrongly. If you set components that are inconsistent with production data that are downloaded to the machine, interlock function of the machine operates to create automatically the mode where production cannot be continued. It is possible to customize order of barcode scanning and/or barcode definition, according to customers' operation.

Regarding the main body of the scanner, this verification uses wireless scanner (PDA).

*1 Component verification is embedded as a product of PanaCIM-EE material verification.

Based on your operation system, component verification can be used on per a line basis without installing the PanaCIM server. Installation of the PanaCIM server allows you to control material IDs in the entire floor and develop the system such as traceability. For details, see the PanaCIM-EE specification.

■ System Configuration



*Wired scanner cannot be used.

■ Function List

Item		Description
Feeder Verification	Component verification at the time of preparation	Components are verified at the time of preparation.
	Component verification at the time of component exhaustion	Components are verified when they are replenished at the time of component exhaustion
	Component verification at the time of splicing	Components are verified at the time of splicing.
Periodic check		Components are checked at random time, such as time of shift change, etc. There's no need for stopping production while the periodic check is done.
Re-check	Re-check for feeder jam releasing	Re-check is done at the time of feeder jam releasing.
	Re-check for releasing splicing error detection	Re-check is done at the time of releasing splicing error detection.
	Re-check function for In-inserting/removing of feeder	Re-check is done in the case where feeder insertion/removal is done due to some reasons while single stop occurs.
Automatic line selection		Wireless scanner (PDA) allows you to select lines on the screen. The wireless scanners (PDA) on other lines can also be used.
Setting function	Verification component information definition	Based on your operation system, component information read from barcode can be defined during verification. The code indicating the component type is added into barcode so that you do not need to define the order to read information.
	Barcode setting	This defines barcode. This is applicable for complicated multi barcode. (Even in the case that one barcode includes multiple meanings, you can accomplish scanning by only one scan.)

■ Standard Specifications

Item	Description
Scan code	 <u>1D code(Barcode):</u> UPC/EAN/JAN, UCC/EAN 128, Code 39, Code 128, etc.
	 <u>2D code:</u> Maxicode, Data Matrix (ECC 200), QR code, etc.
Restrictions for code	Restrictions for code used for Part name, Lot name, Vendor name, and etc. ASCII alphanumeric and signs within 30 characters As for signs, only followings can be used: - + = , . _ @
Display language	English, Chinese, Japanese*1 1) Applicable for the display screen of the setting terminal on LWS 2) Applicable for the display screen on the wireless scanner (PDA)

*1 The wireless scanner (PDA) for Chinese supported version is under development.

■ Standard Configuration

Item	Description	
Wireless scanner (PDA)	Wireless scanner (PDA) Main body*1*2 	Product name: MC55 Manufacturer: Motorola, Inc.
	Access point*1 AP7522 Set 	This is an antenna that communicates with the wireless scanner (PDA). Installation of one antenna for one line is recommended. Product name: AP-7522-67040-APME-AC –SET Wireless LANL Access point Dual-band antenna AC adapter *3 Manufacturer: Zebra Technologies Corp.
License	A license is required for each machine. Please refer to “14. Regarding Licenses.”	

*1 Please prepare the wireless scanner, related accessories, and table yourself.

*2 Software for the main body of wireless scanner (PDA) is included in NPM-VF system software DVD-ROM.

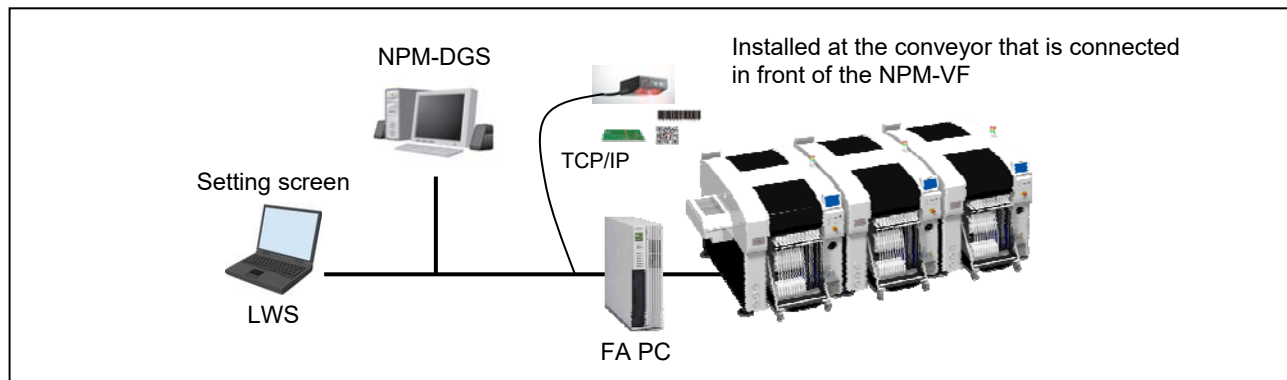
*3 Please prepare power cables and related equipment that are suitable for use in your local area.

5.2 Automatic Changeover

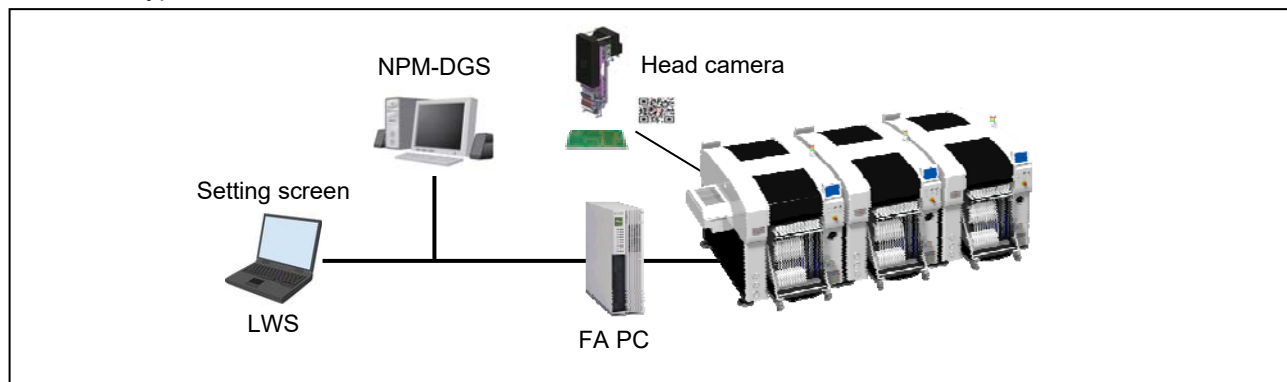
This supports changeovers (production data change and rail width change), minimizing the time loss of operation caused by product changes. In accordance with each customer's operation, selection can be made from following three types, "External scanner read type", "Head read type", and "Planned form read type."

■ System Configuration

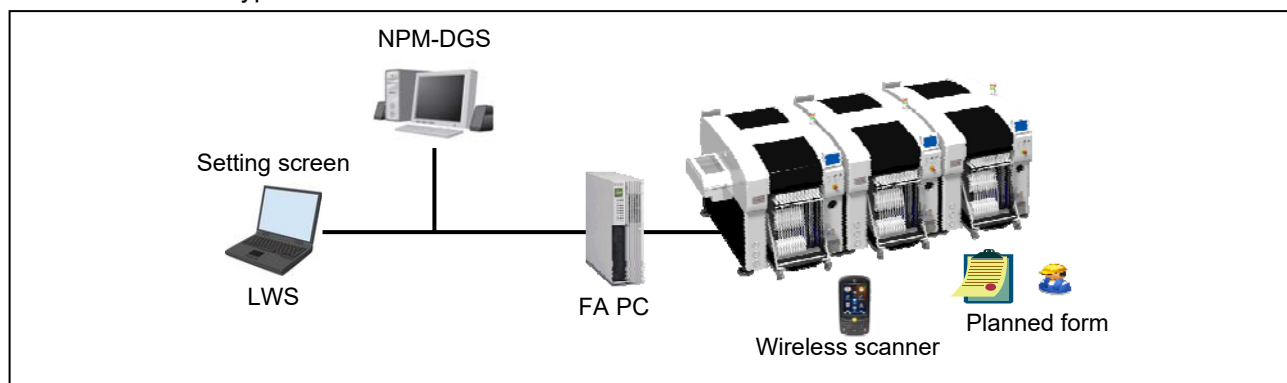
External scanner read type



Head read type



Planned form read type



Function List

Item	Description
Changeover function	External scanner read type External scanner is installed on the first conveyor, and the scanner reads 1D/ 2D codes* ¹ on boards, automatically implementing changeovers.
	Head read type * With production data restrictions* ³ 2D code* ¹ on boards is read by Head camera on the first NPM-VFVF, making it possible to implement automatic changeover.
	Planned form read type You print out lot list of production per day as planned form on paper using 1D/ 2D code* ² . Then you let the wireless scanner read the planned form, making it possible to implement automatic changeover.
Setting function	Barcode setting This defines barcode. This is used to specify production data, and two types of method of specifying are available. • <u>Method of specifying character string</u> Method in which data extracted from barcode is character string, which corresponds to production data name on a one-to-one level. • <u>Method of specifying range</u> Method in which data extracted from barcode is numeric value, and its range corresponds to production data name on a one-to-one level.

*¹ This option does not include printing function of 1D/ 2D code on PCBs.

*² This option does not include printing function of 1D/ 2D code on papers.

*³ Board width cannot be adjusted. So, all data of board width must be common.
All data of 2D code coordinate, which is used for changeover, also must be common.
(As for the 2D code coordinate of splittable board, there's no need for the commonality.)

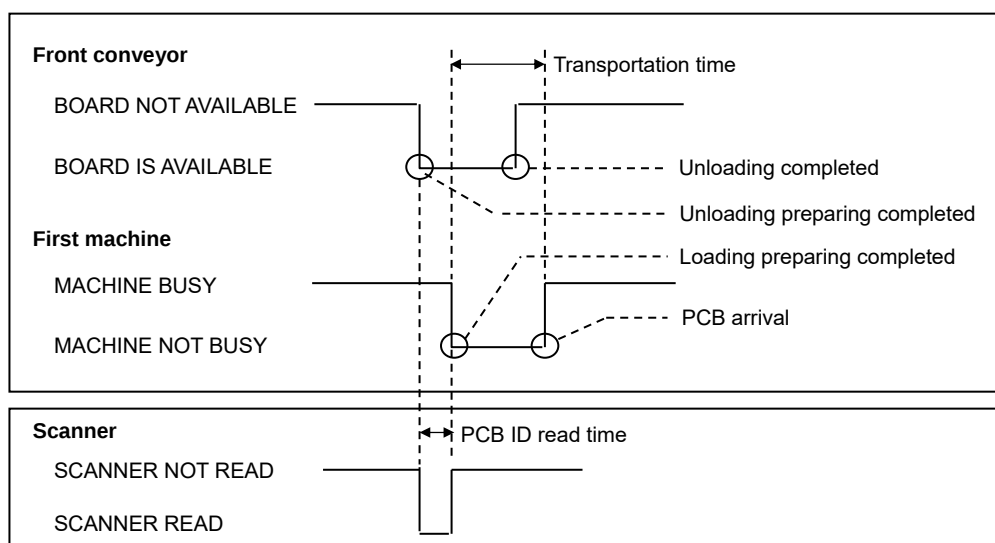
Standard Specifications

Item	Description
Readable code	External scanner read type  <u>1D code (Barcode):</u> CODE39, ITF, Industrial2of5, COOP2of5, NW-7, CODE128, EAN128, CODE93, JAN/EAN/UPC (supporting add-on), TriopticCode39, etc.  <u>2D code:</u> QR code, MicroQR, Data Matrix (ECC200), PDF417, MicroPDF, Maxicode, etc.
	Head read type  <u>2D code:</u> QR code, MicroQR, Data Matrix (ECC200) Max. dimension: 5 mm × 5 mm
	Planned form read type  <u>1D code (Barcode):</u> UPC/EAN/JAN, UCC/EAN 128, Code 39, Code 128, etc.  <u>2D code:</u> Maxicode, Data Matrix (ECC 200), QR code, etc.
Restrictions for code	Restrictions for code used for Board ID and Pattern ID ASCII alphanumeric and signs within 128 characters. As for signs, only followings can be used: - + = , . _ @
Display language	English, Chinese, Japanese (Applicable for display screen of setting terminal on LWS)

■ Standard Configuration

Item	Description
Hardware	External scanner read type • <u>External scanner unit</u> This is not supplied by us and for the purpose of 1D/ 2D code reading. One device is required for each lane in a line. Following is the scanner for which operation was confirmed by us. Please consult us when you use other scanners. Scanner: SR-510 (KEYENCE CORPORATION) Communication unit: N-L1 (KEYENCE CORPORATION) • <u>Conveyor</u> This conveyor is not supplied by us. This is located on the Head of the line. This must be in conformity with following specifications. 1) Availability of board waiting with stopper 2) Equipment of mechanism that can change width automatically or manually with a handle. 3) Availability of SMEMA communication*
	Head read type Head camera is used, so hardware is not needed.
	Planned form read type • <u>Main body of wireless scanner</u> This is for reading barcode. One device is required for a line. Common use with component verification option is possible.
License	A license is required for each machine. Please refer to "14. Regarding Licenses".

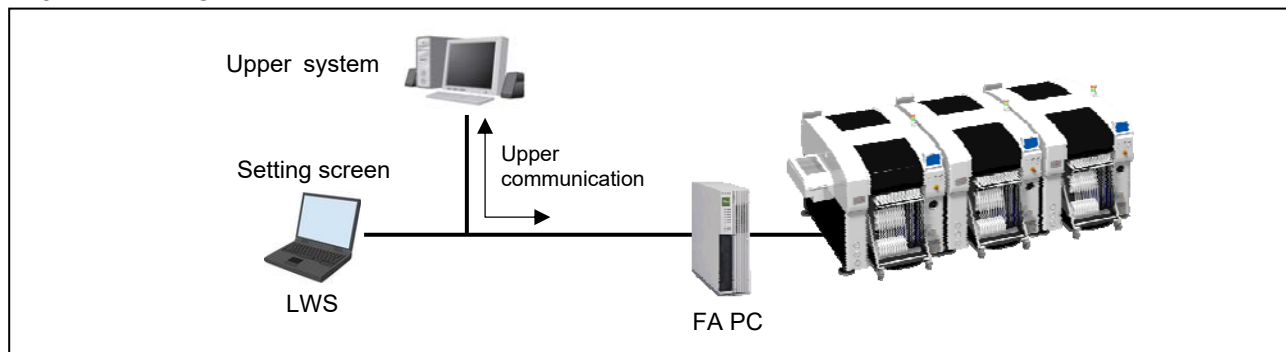
* FA PC controls scanner through intervention in SMEMA communication. Communication between FA PC and machine is implemented through TCP/IP. There is a timing chart of SMEMA communication below.
SMEMA communication between conveyor and machine must be in conformity with this timing chart.



5.3 Upper Communication

This is an interface which in cooperation with customer's existing system. As standard interface is prepared, it's possible to intercommunicate necessary information. Depending on the purpose of customer's system, functions of "Event", "Component verification with other vendor's machine", and "Information for component management" can be used.

■ System Configuration



■ Function List

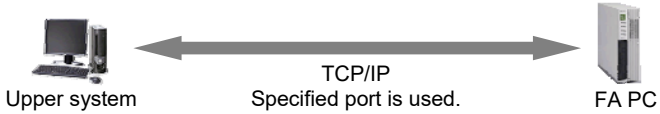
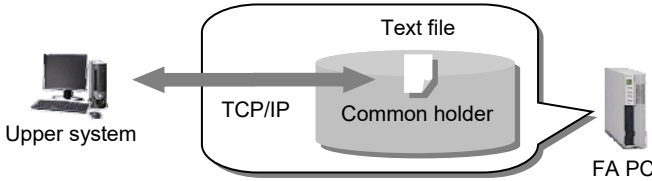
Item	Description	
Standard Interface	Event* ¹	This outputs machine's events in real time. e.g.) When you would like to construct a system which combines machine's events and displays machine's status in real time.
	Component verification with other vendor's machine	This intercommunicates with customer's component verification system. e.g.) When there is other vendor's machine in the floor, and you would like to construct a component verification system that functions in cooperation with the machine by setting our system.
	Information for component management	This outputs following two information regarding components. 1) component remaining information 2) Trace information Combined information of components* ² and boards* ³ is output. e.g.) When you would like to construct a system which controls component remaining in the whole floor by receiving component remaining information that is transmitted after production of every single board in real time.
Setting function	This sets network transmission.	

*1 This is a function that transmits information to the upper system at the timing of the machine's detection of disorders, such as occurrence of component exhaustion.

*2 Component information inputs, which are done by using function of component verification option or "component verification with other vendor's machine" of this option, are required.

*3 Board information inputs, which are done by using function of automatic changeover option, are required.

■ Standard Specifications

Item	Description	
Communication form	Socket communication form	Sockets are used for this communication. There is no over head caused by hard disc accesses. This communication can be used when the file sharing is prohibited. 
	Text communication form	Windows file-sharing function is used for this communication. Technologically, it is easier to construct this form than that of socket communication, because text files, which were input/output to file-sharing area, are used. This communication is also suitable for debugging. 
Communication format	XML form	
Communication cache	This makes it possible to receive events of late 3 hours at the time of reconnection after the occurrence of disconnection.	
Upper system connection	One upper system can be connected for one FA PC.	
Display language	English, Chinese, Japanese (Applicable for display screen of setting terminal on LWS)	

■ Standard Configuration

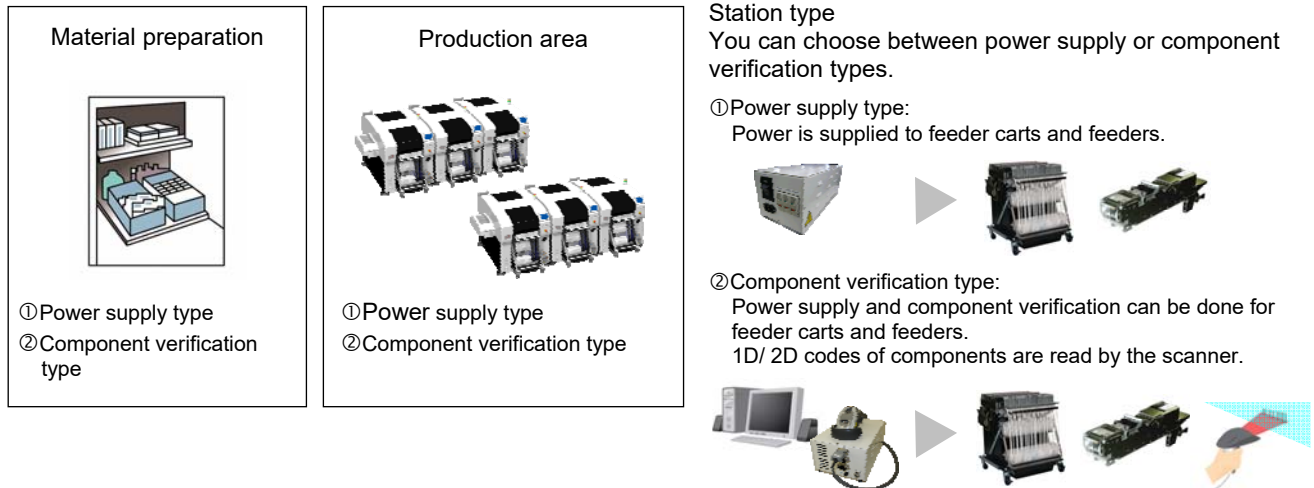
Item	Description
License	A license is required for each machine. Please refer to "14. Regarding Licenses."

5.4 Support station

Time loss caused by changeover is drastically reduced by using spare feeder carts or feeders, which you have, and by preparing for next products while the machine continues its operation.

This has two types: one of them only supplies power to feeder carts and feeders, and another one implements component verification in addition to the power supplying.

*Component verification type is applicable only to intelligent tape feeder, is not applicable to stackable stick feeder or radial tape feeder.



■ Function List

Item	Description	
	Power supply type	Component verification type
Feeder cart preparation	This supplies power to feeder carts, enabling preparations for next products while the machine continues its operation.	This supplies power to feeder carts, enabling preparations for next products while the machine continues its operation.
Feeder preparation	This supplies power to feeders, enabling preparations for next products while the machine continues its operation.	This supplies power to feeders, enabling preparations for next products while the machine continues its operation.
Component verification	Not supported	This verifies components of next products.

* In NPM series, "Change Cart Preparation Unit" in CM series is not available.

■ Standard Configuration

Power and air supply type

Item	Description
Power supply unit*1 *2 Regulator*3 	This supplies power and air to feeder carts and feeders. The following items are included in this unit. • Power supply unit - Rated voltage : Single-phase, AC 100 V ~ 240 V - Frequency : 50/ 60 Hz - Rated capacity : 90 VA • Power supply cable to feeder • Power supply cable to feeder cart • Regulator, Air connector

Component verification type * Applicable only to intelligent feeder

Item	Description
Support station box*1 *2 	This supplies power to feeder carts and feeders and additionally verifies components. The following items are included in this unit. • Power supply unit - Rated voltage : Single-phase, AC 100 V ~ 240 V - Frequency : 50/ 60 Hz - Rated capacity : 90 VA • Power supply cable to feeder • Power supply cable to feeder cart • Wired scanner • Scanner connecting cable * Select this option when PanaCIM-EE is used for off-line setup (component verification).
License	A license is required for each machine. Please refer to "14. Regarding Licenses." * The license is not required for off-line setup (component verification) using PanaCIM-EE.
Support station PC*4 	This is for verifying components. * This is not supplied by us.

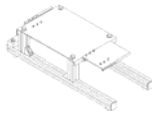
*1 The electric source cable is not prepared by us. Regarding the connecting plug, please use the ones that are suitable for the following standards:

AC plug (IEC 60320 C13: 10 A/ 250 V)

*2 In NPM series, "Change Cart Preparation Unit" in CM series is not available.

*3 Please prepare air supply source and air hose by yourself.

*4 Software for the support station PC is included in NPM-VF system software DVD-ROM.

Item	Description
Feeder setting Jig 	This is a jig dedicated for the purpose of setting intelligent tape feeders. Setting of one tape feeder of 12/ 16mm to 104 mm(2 tape feeders of 12/16mm feeder) is possible.

■ Component verification type—Standard Specifications

Item	Description
Readable code	 <u>1D code (Barcode):</u> UPC/EAN/JAN, UCC/EAN 123, Code 39, Code 128, etc.  <u>2D code:</u> Maxicode, DataMatrix (ECC200), QR code, etc.
Restrictions for code	Restrictions for code used for Part name, Lot name, Vendor name, and etc. ASCII alphanumeric and signs within 30 characters As for signs, only followings can be used: - + = , . _ @
Display language	English, Chinese, Japanese

■ Component verification type—Support station PC

• Hardware Specifications (Required)

Item	Specification
Main body	IBM PC/AT compatible machine
CPU	Intel® Pentium4 2.4 GHz or greater
Mother board	IBM-fully-compatible machine
Graphic board	XGA or higher Desk top region: 1 024 × 768 dot or more
Memory	1 GB or more
HDD	80 GB or more
Optical drive	DVD drive
Keyboard	English version: 101 keyboard Japanese version: 106 keyboard
Mouse	Supported by your OS as standard
Monitor	XGA-compliant
LAN port	1000/100BASE-TX × 2

• Software Specifications (Required)

Item	Specification
OS	Microsoft® Windows® 10 Pro (32-bit/ 64-bit version) * IE (Internet Explorer) is necessary.
Support language	English, Chinese, Japanese

- Microsoft, Windows and Windows Vista are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- Intel is a registered trademark or trademark of Intel Corporation in the United States.

5.5 PCB information communication function (standard feature)

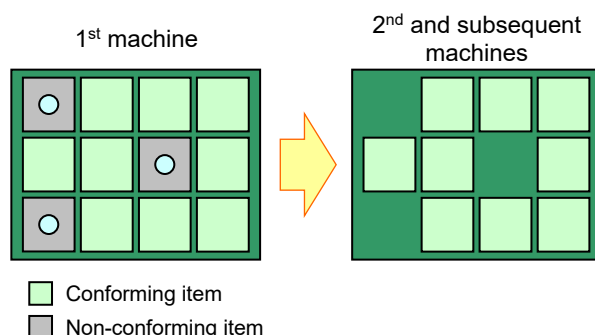
The first machine in the line performs mark recognition and then passes mark recognition data or information on to the downstream machines.

The use of the transferred data by the downstream machines can enable a shortening of the tact time.

■ Bad mark communication

Bad marks are recognized by the first machine in line, and then the bad mark recognition data is passed on to the downstream machines.

This enables the downstream machines to shorten the time required to recognize the bad marks.



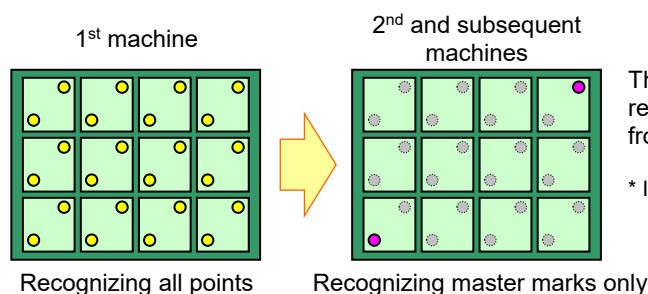
The 2nd and subsequent machines will skip bad mark recognition based on the mark recognition data or information transferred from the upstream machine.

* Intended machine: NPM- VF/W2/ W

■ Pattern mark communication

The first machine in the line recognizes pattern marks and then passes correction value data on to the downstream machines.

This allows the downstream machines to recognize only master marks, which helps shorten the PCB recognition time.



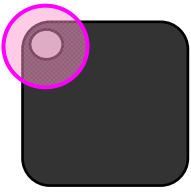
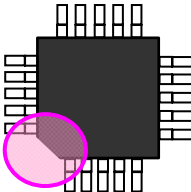
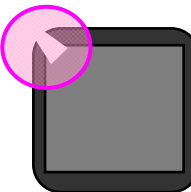
The 2nd and subsequent machines, based on master mark recognition results and the data or information transferred from the upstream machine, will make corrections.

* Intended machine: NPM-VF/W2/ W

* Transfer of PCB information from any machine other than the NPM series to subsequent machines should be examined individually. For details, please contact us.

5.6 Component inspection before pickup (Polarity)

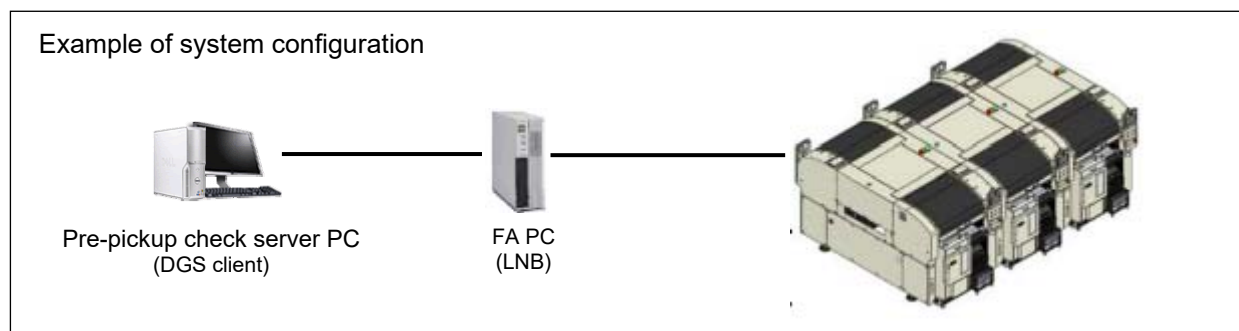
This function recognizes the surface of a component captured by the head camera before picking it up from the tray, in order to prevent possible misloading through the polarity checks.

Misloading prevention This function detects the orientation of the components by recognizing any of the following features on the components to prevent misproduction.		
Polarity mark	Chamfering	Feature of luminosity
		

If the polarity is right, go on with pickup and mounting. But the polarity is wrong; it will show the picture with a single stop.

■ System Configuration

Recognition images are captured by the machine, and polarities are confirmed by the pre-pickup check server PC. Pre-pickup check PC is to be connected to one line (1 FA PC). (Recommended*1)
Besides, the pre-pickup check server PC can also be served as NPM-DGS client PC.)



*1 When the heads to be checked is 6 or less, up to 2 lines (2 FA PCs) can be connected.
In case of more than 6 heads, required check time may be longer.

■ Function List

Items	Description
Polarity inspection (Misloading prevention)	Inspection method: Select from among "Pattern matching", "Chamfering detection" and "Average luminance". 1) Select "Pattern matching" to recognize the polarity mark. 2) Select "Chamfering detection" to recognize the chamfering. 3) Select "Average luminance" to select any features of luminosity.
Setting when to check	Selectable from among "First component", "All components in tray", and "Specified interval".
Handling components judged as NG	Components judged as NG can be handled by either of the following: 1) If the component is correct, press [OK] to pick it up. 2) If the component is wrong, take out the tray and replace it, or change it to a correct one, and make check again.
Automatic pickup angle adjustment function	This function automatically corrects the angle in order to continue pickup and placement without stoppage.

■ Basic specifications

Items		Description			
Applicable components		Components to be supplied in tray			
Processing time required (including image pickup)* ¹		Approx. 1 s per component (1 FOV) Approx. 2 s (4 FOVs)			
Recognition requirements * ²					
Polarity mark	Mark type* ³	Processed or printed with ink			
	Mark shape				
		Circle	Square	Ring	Frame
Chamfering	Component shape	Must have a lead in four directions respectively and only one corner out of four corners must be chamfered.			
Feature of luminosity	Component shape	Must have one characteristics luminosity area at the position other than the center of the component.			

*¹ Time required may vary depending on the conditions, such as production data.

*² Recognition performance may be degraded if:

1) there is a soil, damage or foreign matter on the surface of the component

2) the working environment of the machine or designed shape of the tray pocket may affect the captured images

*³ Check result may not be satisfactory if the laser markings are low contrast image.

* Recognition check can be performed in advance by PSFS. Contact us for details.

■ Basic configuration

Item	Specification
Pre-pickup check (Polarity) license	A license is required for each machine.
Pre-pickup check server PC	PC used to run the pre-pickup check server software for character/2D code recognition. Hardware and software specification comply with those of the NPM-DGS. * Must be prepared by customer. * The pre-pickup check server PC can also be served as NPM-DGS client PC. (Recommended) The pre-pickup check server PC cannot be served as NPM-DGS server PC.

6. Other Standard Functions

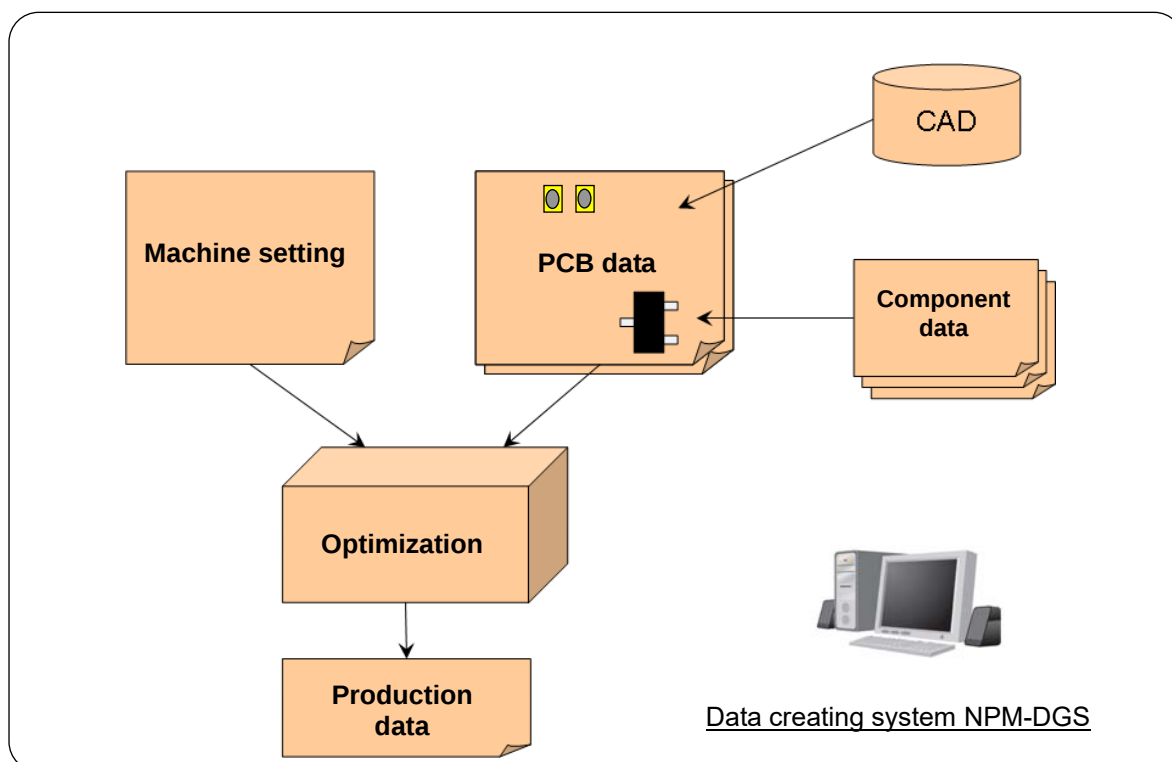
6.1 Programming Functions

Data are created on NPM-DGS, the data creating system. The production data created on NPM-DGS will be downloaded to the machine via AM-LNB PC or FA PC. Some data, however, can be modified on the machine. The data modified on the machine and what was taught will be retained and reusable.

* The hardware for NPM-DGS should be prepared by yourself. (NPM-DGS should be purchased separately.)

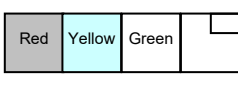
Regarding the license in NPM-DGS and in the option of NPM-DGS, a license is required for each machine, so you need to purchase license as many as the number of the machine you have.

For details about NPM-DGS, please refer to "NPM-DGS Specification."



6.2 Signal Tower

Color of signal tower and lighting standard

Standard: Horizontal mounting  1 624 mm from floor 1 740 mm from floor  Vertical mounting is also possible. The height is 1 740 mm above the floor.	Signal Color	Classification	Lighting Standard
	Red	Emergency stop error	• Trouble in shafts of motors, etc. • Drop in air pressure • Trouble in PCB supports • Head trouble • Tape trouble ,and etc.
	Yellow	Single stop error	• Pickup error • Placement error • PCB transfer error • Component run out • Nozzle change error, and etc.
	Green	In operation	Electric source ON (e.g., in automatic operation) (This, however, is off while red or yellow is blinking)
	Blue or Red	Blue is lighted up on the machine that becomes bottleneck –the machine that requires longest cycle– among the machines coupled. Red is lighted up when the emergency stop switch is pushed.	

* Lighting specifications are programmable.

7. Insertion Component Specifications

7.1 Component Dimensions and Taping

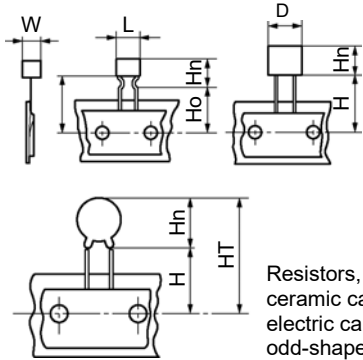
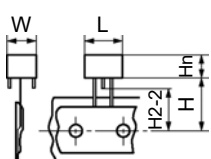
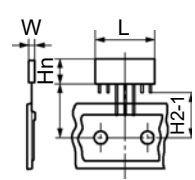
The component dimensions for insertion and the taping specification for the NPM-VF are shown below.

The insertion component specifications are very important factor for stable machine operation and will affect the life-span of the machine parts, so make sure to follow the following conditions.

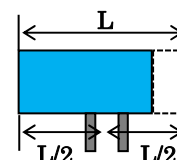
Depending on components, tools (lead chuck, body chuck or nozzle) are different.

Please refer to the limit of component dimension and shape of tools and radial feeders. For any enquiries, please contact us.

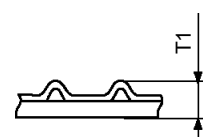
Unit: mm

Radial Taping Components			NPM-VF
Standard Type	 Resistors, ceramic capacitors, electric capacitors, radial odd-shaped components, etc.	H	16~20
		Ho	16~20
		Hn	Max. 30
		HT	Max. 46
		L · W	$(L/2+9.75)^2+(W/2)^2 \leq 18.5^2$ *1
		D	Max. φ20
Spare Leg Type	 Trimmer potentiometers, light touch switch, radial odd-shaped component, etc.	H	16~20
		Hn	Max. 30
		H2-2	Min. 17
		HT	Max. 46
		L · W	$(L/2+9.75)^2+(W/2)^2 \leq 18.5^2$ *1
Inline type	 Resistor network, capacitor network, connector, etc.	H	16~20
		Hn	Max. 30
		H2-1	Min. 17
		HT	Max. 46
		L · W	$(L/2+9.75)^2+(W/2)^2 \leq 18.5^2$ *1

- Even with JIS specifications taping, the detailed dimensions of the component and product Strength may vary according to the maker. Please test insert prior to use.
- The component shape must be symmetrical left and right for the mounting tape.
In the case that component shape is not symmetrical against the leads, the component dimensions are taken to be those as shown in the figure on the right.



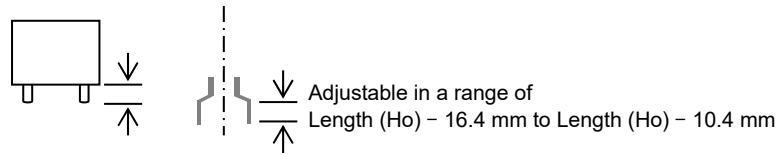
- * According to the combination of electronics components to be inserted simultaneously, Some of them may be hard to be inserted.
- The total thickness (T1) of lead terminals, carrier tape and holding tape must be 1.5mm or less.



- In the case of anvil conveyor specifications, if the spare leg of a spare leg type component (trimmer potentiometer, connector and others) protrudes from beneath the PCB, it can cause interference with the clinch edge, depending on the protrusion length/position of the spare leg, thus leading to an insertion error or a phenomenon in which component leads are loosely clinched. For information on the dead space below PCB, please refer to anvil lead pitch and dead space relation specified in the later pages, or consult us.

*1 Maximum suitable length is 30mm when nozzles or body chucks are used. See page 24 for more details.

- Lead length after the cutting at radial feeder is adjustable in a range of Length(Ho) – 16.4 mm (0 mm when Length(Ho) is ≤ 16.4 mm) to Length(Ho) – 10.4 mm. Pay attention to the degree of the lead wire that protrudes under the PCB if not clinched after inserted. For lead length outside the above range, contact us.

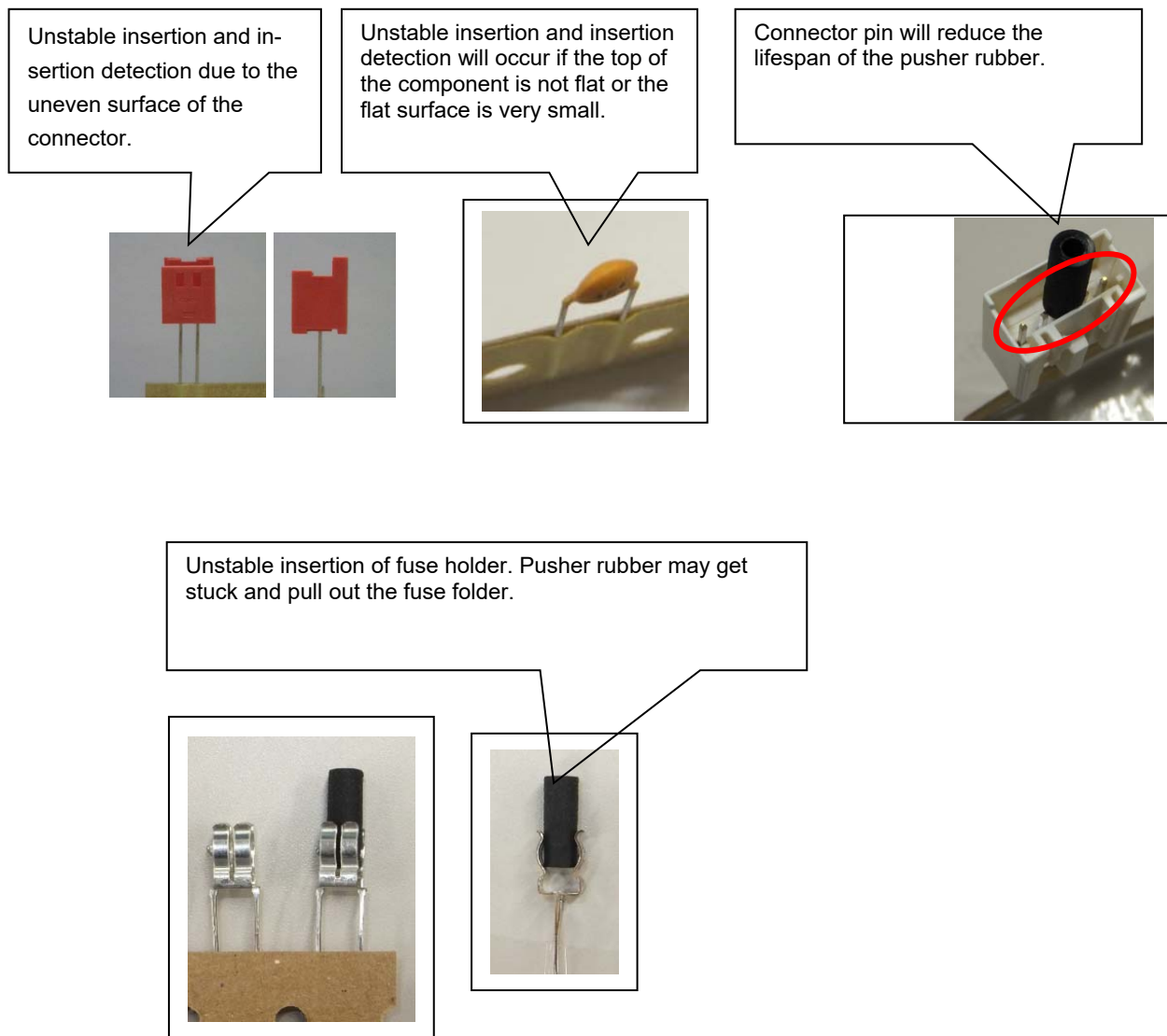


***Component with cavity, component which the top is not flat**

When inserting component with cavities (i.e. connector, fuse holder), please take note of the pusher rubber dimension limit. It will affect the stability of the insertion, insertion detection and the lifespan of the pusher rubber.

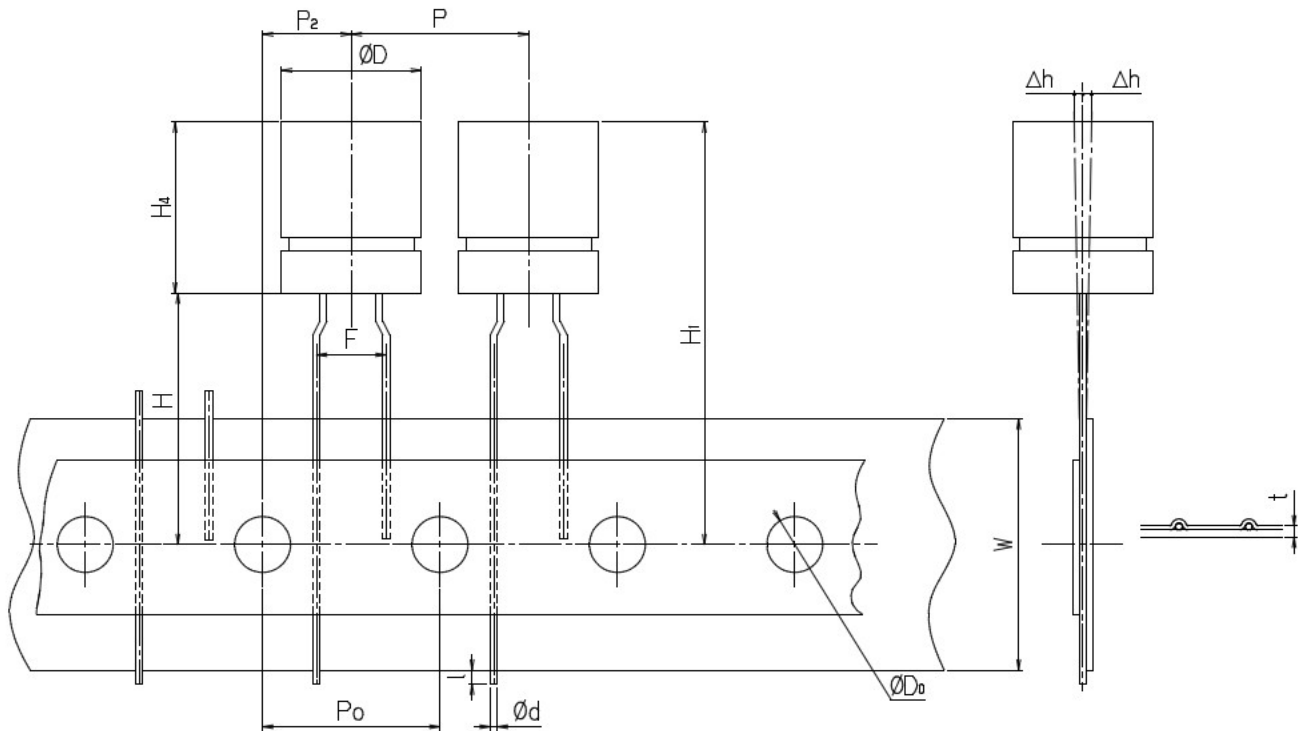
In addition, when inserting component which the top is not flat, the stability of the insertion and insertion detection will also be affected as the pusher rubber is not fully pushing against the top of the component.

Please refer to illustration below for connector and fuse holder. Please consult us for further details.



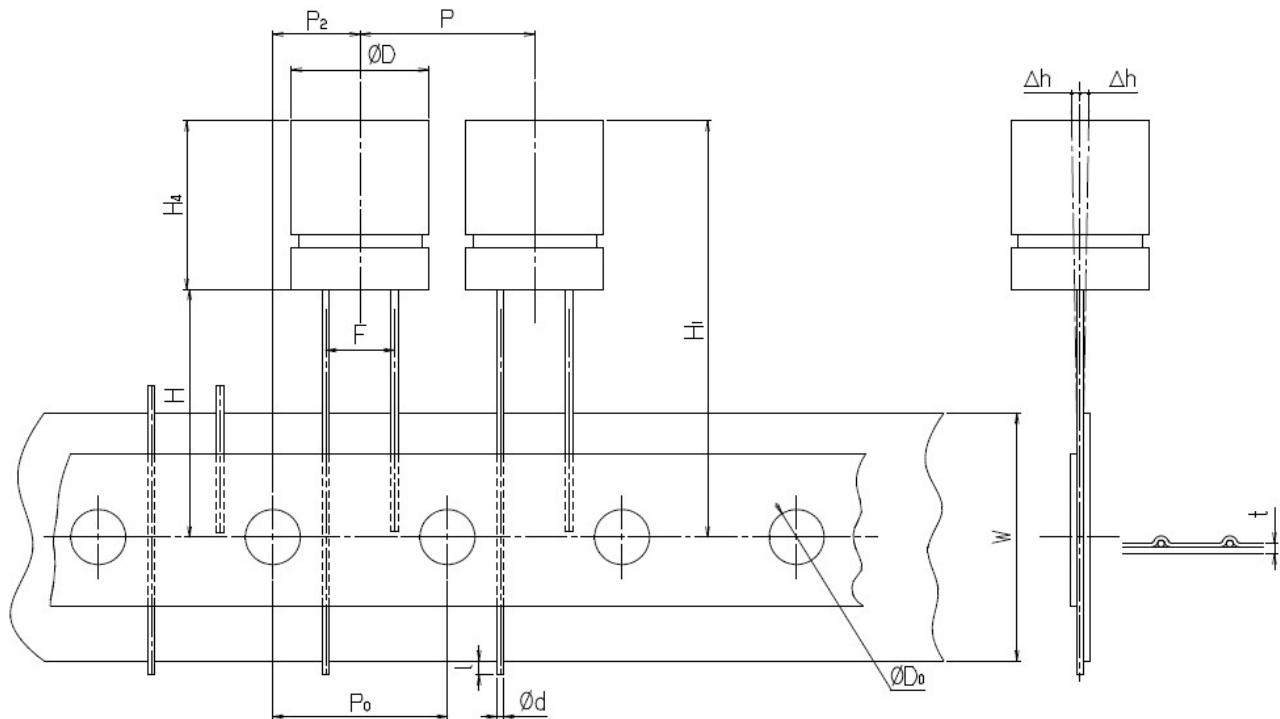
Examples of applicable component:

1) Electrolytic Capacitors (A)



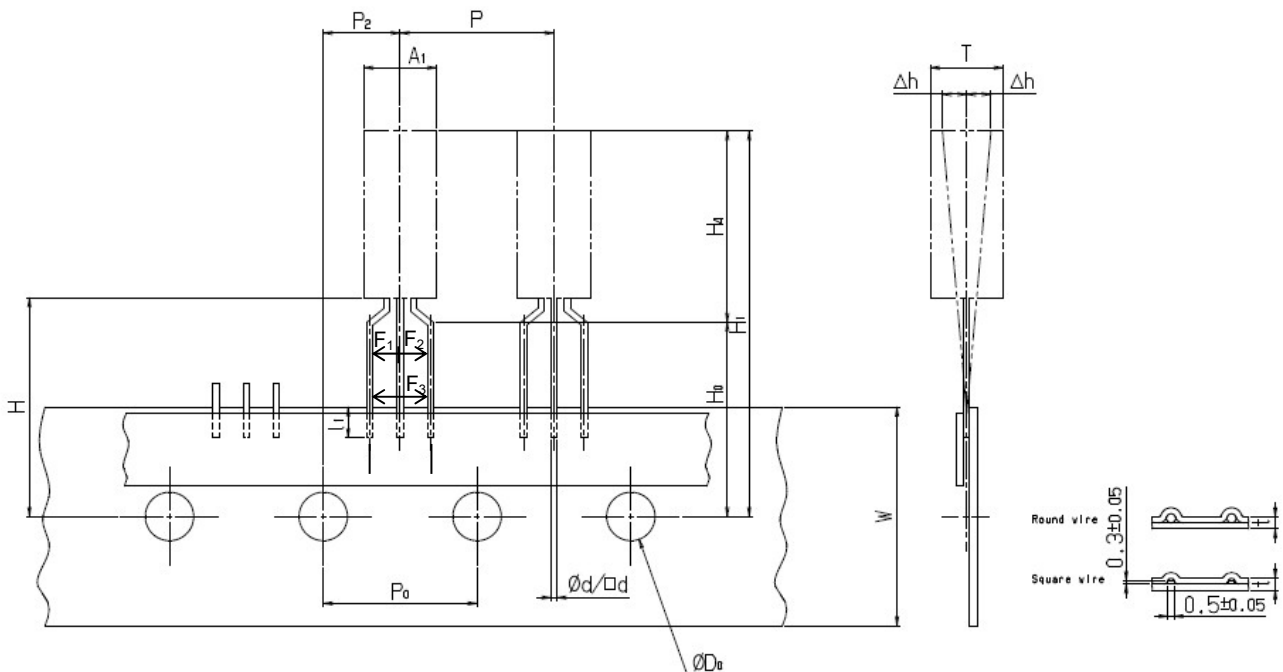
Items	Symbol	Dimensions (mm)		Remarks
		Value	Tolerance	
Body diameter	ϕD	13.0	max	
Lead Wire Diameter	ϕd	0.6	± 0.05	$\phi 0.6$ mm for annealed copper wire $\phi 0.5 \pm 0.05$ mm for hard copper and CP wire
Component Pitch	P	12.7	± 1.0	
Feed hole pitch	P_0	12.7	± 0.3	Cumulative Pitch Error = 1.0 mm /20 pitches
Feed hole center to component center	P_2	6.35	± 1.3	
Lead to lead distance	F	5.0	+0.5 -0.2	To lead tip within tolerance
Component alignment	Δh	1.0	max	The tolerance of component alignment (Δh) from the center point of the lead is ± 1 mm
Tape Width	W	18	+1.0 -0.5	
Height of body's bottom from tape center	H	18	+2.0	
Component height	H_1	33.75	$H_1 \leq 44.0$	
Body height (Reference)	H_4	15.75	max	
Lead wire protrusion	l	0	max	Because there is potential for damage due to rubbing of the tape guide
Feed hole diameter	ϕD_0	4.0	± 0.2	
Total tape thickness	t	0.3	+0.2 0	Base paper thickness: Min 0.3 mm

2) Electrolytic Capacitors (B)



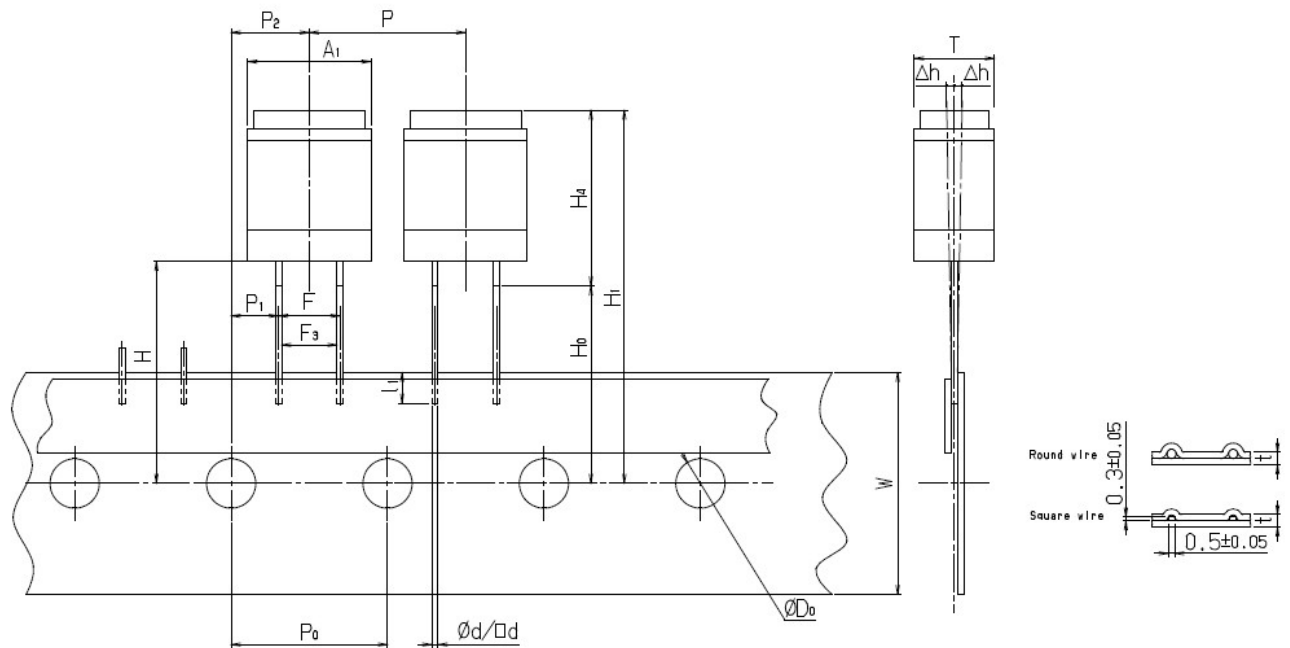
Items	Symbol	Dimensions (mm)		Remarks
		Value	Tolerance	
Body diameter	ϕD	13.0	max	
Lead Wire Diameter	ϕd	0.6	± 0.05	$\phi 0.6$ mm for annealed copper wire $\phi 0.5 \pm 0.05$ mm for hard copper wire and CP wire
Component Pitch	P	12.7	± 1.0	
Feed hole pitch	P_0	12.7	± 0.3	Cumulative Pitch Error = 1.0 mm /20 pitches
Feed hole center to component center	P_2	6.35	± 1.3	
Lead to lead distance	F	5.0	+0.5 -0.2	To lead tip within tolerance
Component alignment	Δh	1.0	max	The tolerance of component alignment (Δh) from the center point of the lead is ± 1 mm
Tape Width	W	18	+1.0 -0.5	
Height of body's bottom from tape center	H	18	+2.0	
Component height	H_1	30.25	$H_1 \leq 44.0$	
Body height (Reference)	H_4	12.25	max	
Lead wire protrusion	l	0	max	Because there is potential for damage due to rubbing of the tape guide
Feed hole diameter	ϕD_0	4.0	± 0.2	
Total tape thickness	t	0.3	+0.2 0	Base paper thickness: Min 0.3 mm

3) Transistors



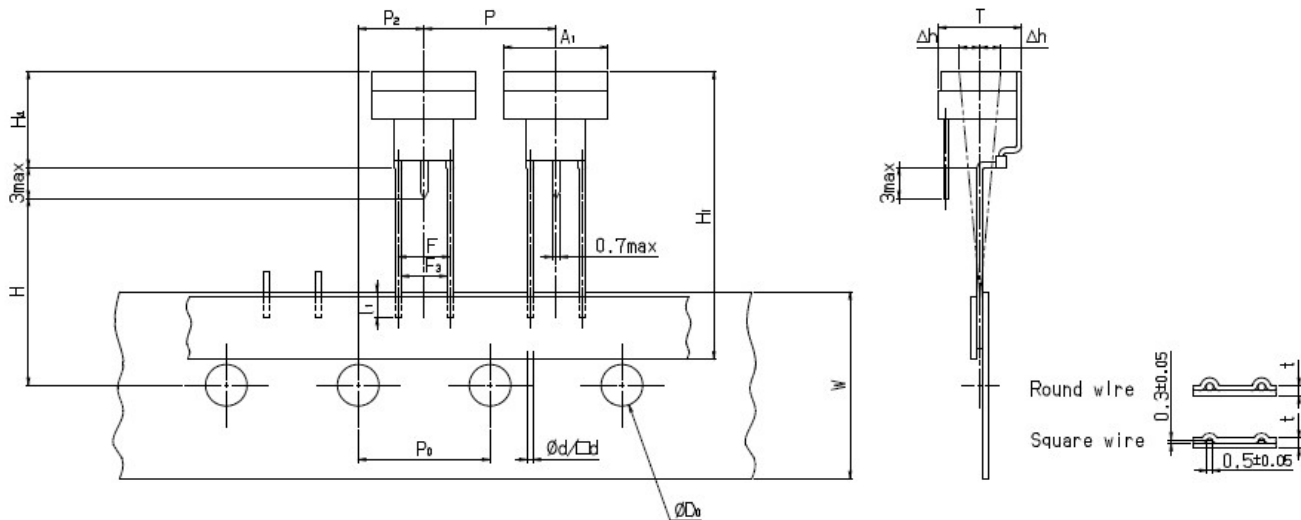
Items	Symbol	Dimensions (mm)		Remarks
		Value	Tolerance	
Body width	A_1	6.0	max	
Body thickness	T	6.0	max	
Lead Wire Diameter	Round wire	ϕd	0.5 ± 0.05	
	Square wire	$\square d$	0.5 ± 0.05	$*(0.5 \pm 0.05) \times (0.3 \pm 0.05)$
Component Pitch	P	12.7	± 1.0	
Feed hole pitch	P_0	12.7	± 0.3	Cumulative Pitch Error = 1.0 mm / 20 pitches
Feed hole center to component center	P_2	6.35	± 1.3	
Lead to lead distance	F_1, F_2	2.5	$+0.4$ -0.1	To lead tip within tolerance
Lead to lead distance(Square wire)	F_3	4.45	min	
Component alignment	Δh	1.0	max	The tolerance of component alignment (Δh) from the center point of the lead is ± 1 mm
Tape Width	W	18	$+1.0$ -0.5	
Height of body's bottom from tape center	H	18	$+2.0$	
Lead wire clinch height	H_0	16	$+2.0$ 0	
Component height	H_1	31.75	$H_1 \leq 44.0$	
Body height (Reference)	H_4	15.75	max	
Feed hole diameter	ϕD_0	4.0	± 0.2	
Total tape thickness	t	0.3	$+0.2$ 0	Base paper thickness: Min 0.3 mm

4) Tact switches



Items	Symbol	Dimensions (mm)		Remarks
		Value	Tolerance	
Body width	A_1	10	max	
Body thickness	T	6.5	max	
Lead Wire Diameter	Round wire	ϕd	0.5	± 0.05
	Square wire	$\square d$	$*0.5$	± 0.05
Component Pitch	P	12.7	± 1.0	$*(0.5 \pm 0.05) \times (0.3 \pm 0.05)$
Feed hole pitch	P_0	12.7	± 0.3	Cumulative Pitch Error = 1.0 mm /20 pitches
Feed hole center to component center	P_2	6.35	± 1.3	
Lead to lead distance	F	5.0	$+0.5$ -0.2	To lead tip within tolerance
Lead to lead distance(Square wire)	F_3	4.45	min	
Component alignment	Δh	1.0	max	The tolerance of component alignment (Δh) from the center point of the lead is ± 1 mm
Tape Width	W	18	$+1.0$ -0.5	
Height of body's bottom from tape center	H	18	$+2.0$	
Lead wire clinch height	H_0	16	$+2.0$ 0	
Component height	H_1	31.75	$H_1 \leq 44.0$	
Body height (Reference)	H_4	15.75	max	
Feed hole diameter	ϕD_0	4.0	± 0.2	
Total tape thickness	t	0.3	$+0.2$ 0	Base paper thickness: Min 0.3 mm

5) Semi-fixed VRs

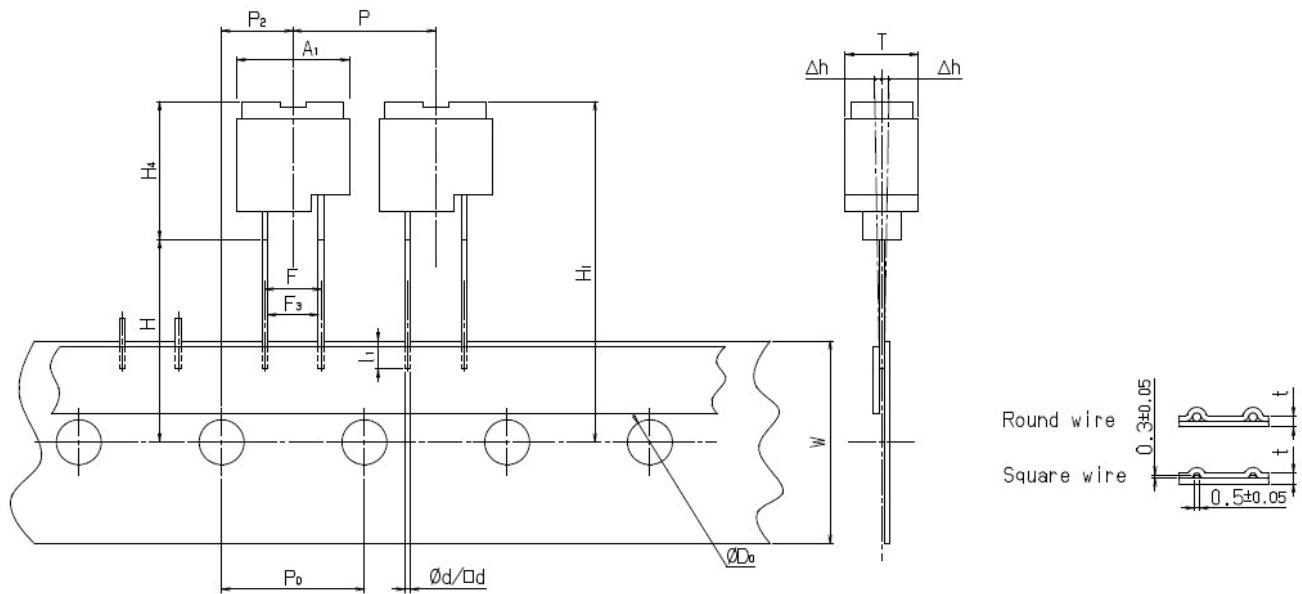


Items		Symbol	Dimensions (mm)		Remarks
			Value	Tolerance	
Body width		A_1	10	max	
Body thickness		T	8.0	max	
Lead Wire Diameter	Round wire	ϕd	0.5	± 0.05	
	Square wire	$\square d$	*0.5	± 0.05	*(0.5 $\pm$ 0.05) x (0.3 $\pm$ 0.05)
Component Pitch		P	12.7	± 1.0	
Feed hole pitch		P_0	12.7	± 0.3	Cumulative Pitch Error = 1.0 mm /20 pitches
Feed hole center to component center		P_2	6.35	± 1.3	
Lead to lead distance		F	5.0	+0.5 -0.2	To lead tip within tolerance
Lead to lead distance(Square wire)		F_3	4.45	min	
Component alignment		Δh	1.0	max	The tolerance of component alignment (Δh) from the center point of the lead is ± 1 mm
Tape Width		W	18	+1.0 -0.5	
Height of body's bottom from tape center		H	18	+2.0	
Component height		H_1	30.25	$H_1 \leq 44.0$	
Body height (Reference)		H_4	9.25	max	
Feed hole diameter		ϕD_0	4.0	± 0.2	
Total tape thickness		t	0.3	+0.2 0	Base paper thickness: Min 0.3 mm

Note) If the spare leg protrudes from beneath the PCB, it can cause interference with a clinch edge, depending on the protrusion length or the position of the spare leg, thus leading to an insertion error or a phenomenon in which component leads are loosely clinched.

For information on the dead space below PCB, please refer to "7.2 Lead Pitch and Dead Space for Anvil Conveyor Specification (Option)"

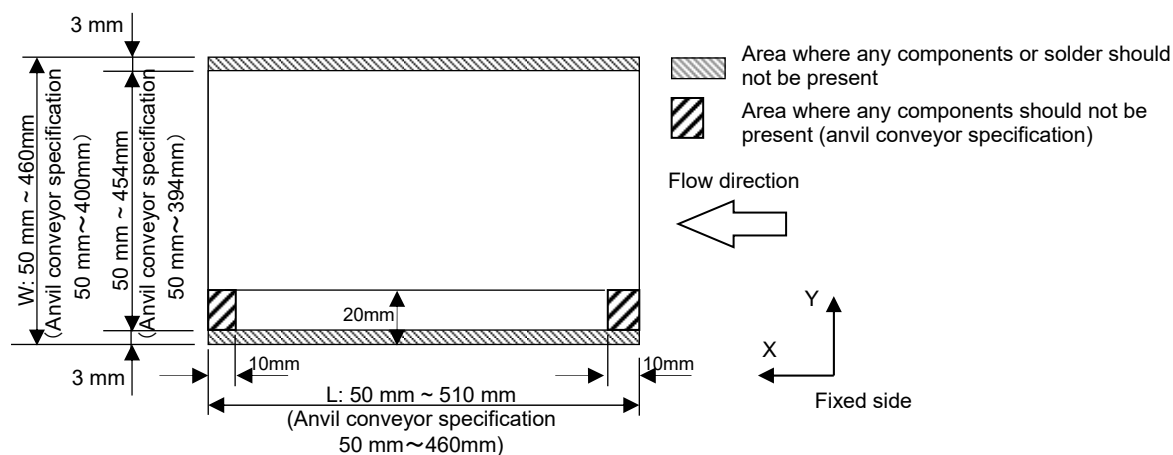
6) Trimmer capacitors



Items	Symbol	Dimensions (mm)		Remarks
		Value	Tolerance	
Body width	A ₁	10	max	
Body thickness	T	6.5	max	
Lead Wire Diameter	Round wire	φd	0.5	±0.05
	Square wire	□d	*0.5	±0.05
Component Pitch	P	12.7	±1.0	*(0.5 ±0.05) x (0.3 ±0.05)
Feed hole pitch	P ₀	12.7	±0.3	Cumulative Pitch Error = 1.0 mm /20 pitches
Feed hole center to component center	P ₂	6.35	±1.3	
Lead to lead distance	F	5.0	+0.5 -0.2	To lead tip within tolerance
Lead to lead distance(Square wire)	F ₃	4.45	min	
Component alignment	Δh	1.0	max	The tolerance of component alignment (Δh) from the center point of the lead is ±1 mm
Tape Width	W	18	+1.0 -0.5	
Height of body's bottom from tape center	H	18	+2.0	
Component height	H ₁	30.25	H ₁ ≤ 44.0	
Body height (Reference)	H ₄	12.25	max	
Feed hole diameter	φD ₀	4.0	±0.2	
Total tape thickness	t	0.3	+0.2 0	Base paper thickness: Min 0.3 mm

8. PCB Design Standard

8.1 PCB Specifications

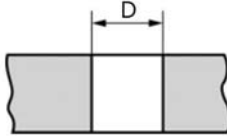
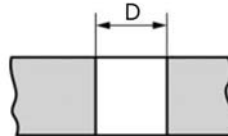
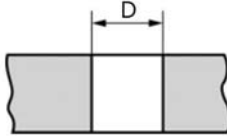
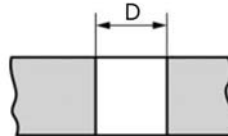
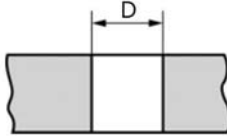
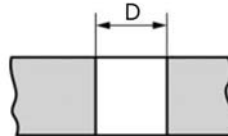


Item	Specifications								
PCB dimensions	Single conveyor : 50 × 50 mm ~ 510 × 460 mm Anvil conveyor : 50 × 50 mm ~ 460 × 400 mm ($L \geq W$)								
Placement area	Single conveyor : 50 × 44 mm ~ 510 × 454 mm Anvil conveyor : 50 × 44 mm ~ 460 × 394 mm								
PCB thickness	0.3 mm ~ 8.0 mm								
PCB mass ^{*1}	Single conveyor, Anvil conveyor : 3.0 kg or less * PCB mass after inspection (including carrier mass)								
Permissible PCB warpage	Max. 0.5 mm PCB section Max. 0.5 mm								
Conditions of PCB before placement	3 mm 3 mm 3 mm 3 mm 80 mm 28 mm^{*2} φ 3 Area where any components should not be present Support pin^{*2} (Please leave 2 mm or more between this and back side components.) <Placement height> <table border="1"> <tr> <td>Body chuck</td> <td>: 60 mm</td> </tr> <tr> <td>Lead chuck</td> <td>: 30 mm</td> </tr> <tr> <td>Nozzle</td> <td>: 60 mm</td> </tr> <tr> <td>Swing nozzle</td> <td>: 30 mm</td> </tr> </table>	Body chuck	: 60 mm	Lead chuck	: 30 mm	Nozzle	: 60 mm	Swing nozzle	: 30 mm
Body chuck	: 60 mm								
Lead chuck	: 30 mm								
Nozzle	: 60 mm								
Swing nozzle	: 30 mm								

*1 When mass of PCB (including carrier mass) exceeds 3.0 kg, please consult us separately.

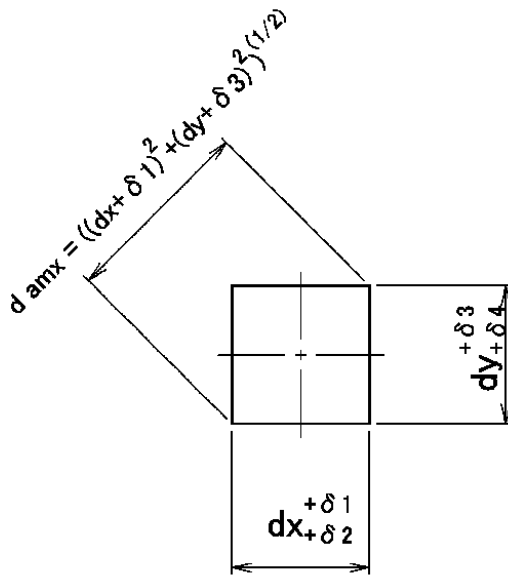
*2 There is no support pin for anvil conveyor. The height is 12 mm.

* For ceramic PCBs, please consult us.

PCB material	The following are the applicable PCB types. ①Glass epoxy ②Phenol ③Ceramic Note) customized spec (increase rail resistance towards abrasion) ④Flexible PCB Note) PCB carrier									
Diameter of insertion hole	<table><tr><th colspan="2">Recommended hole diameter example</th></tr><tr><td>Lead wire tip position accuracy: ±0.1 mm Insertion hole position accuracy: ±0.1 mm</td><td>Lead wire tip position accuracy: ±0.2 mm Insertion hole position accuracy: ±0.1 mm</td></tr><tr><td></td><td></td></tr><tr><td>Max Lead Diameter +0.6 +0.5 mm</td><td>Max Lead Diameter +0.85 +0.75 mm</td></tr></table> * Depending on lead wire accuracy, lead wire diameter accuracy, lead wire position accuracy and PCB hole position accuracy are different. For detail information, please refer to next content.		Recommended hole diameter example		Lead wire tip position accuracy: ±0.1 mm Insertion hole position accuracy: ±0.1 mm	Lead wire tip position accuracy: ±0.2 mm Insertion hole position accuracy: ±0.1 mm			Max Lead Diameter +0.6 +0.5 mm	Max Lead Diameter +0.85 +0.75 mm
Recommended hole diameter example										
Lead wire tip position accuracy: ±0.1 mm Insertion hole position accuracy: ±0.1 mm	Lead wire tip position accuracy: ±0.2 mm Insertion hole position accuracy: ±0.1 mm									
										
Max Lead Diameter +0.6 +0.5 mm	Max Lead Diameter +0.85 +0.75 mm									

Insertion hole diameter

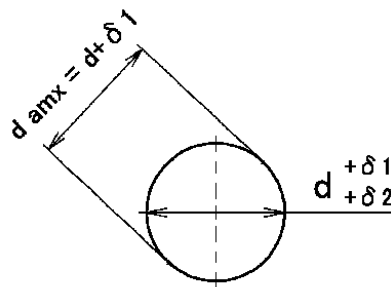
- ① Set the maximum dimension of the lead wire of the component to $d_{\max}$



【When the lead wire section is square】

The length and vertical dimension tolerance of each side are $dx + \delta 1 / + \delta 2$, $dy + \delta 3 / + \delta 4$

Maximum value of diagonal : $d_{\max} = ((dx + \delta 1)^2 + (dy + \delta 3)^2)^{(1/2)}$



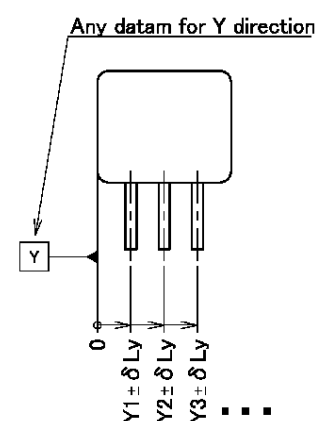
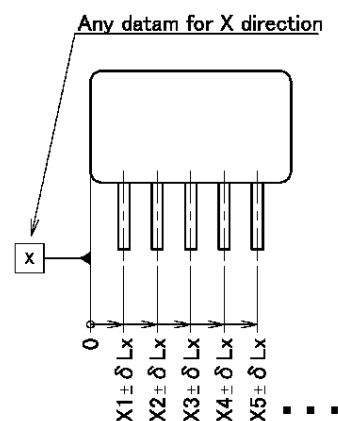
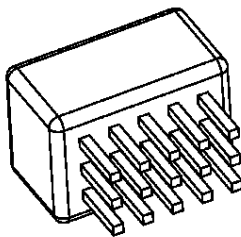
【When the lead wire section is round】

Diameter and vertical dimension tolerance:

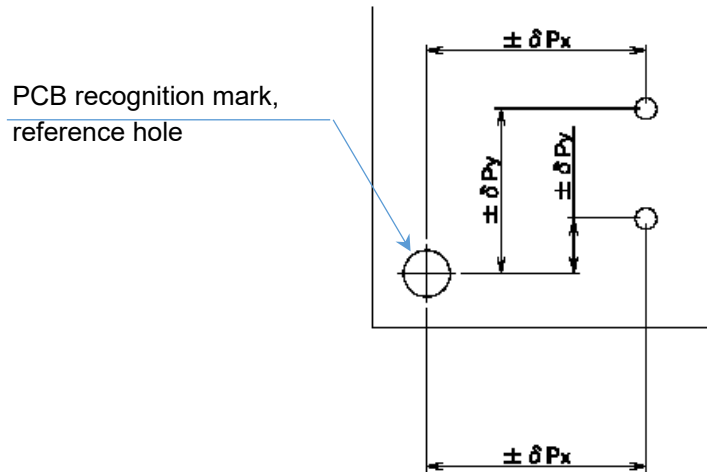
$d + \delta 1 / + \delta 2$

Maximum value of diameter : $d_{\max} = dx + \delta 1$

- ② Set the pitch error at the lead wire tip position and the accuracy of the lead wire bend in the X direction and the Y direction to $\pm \delta L_x$, $\pm \delta L_y$.

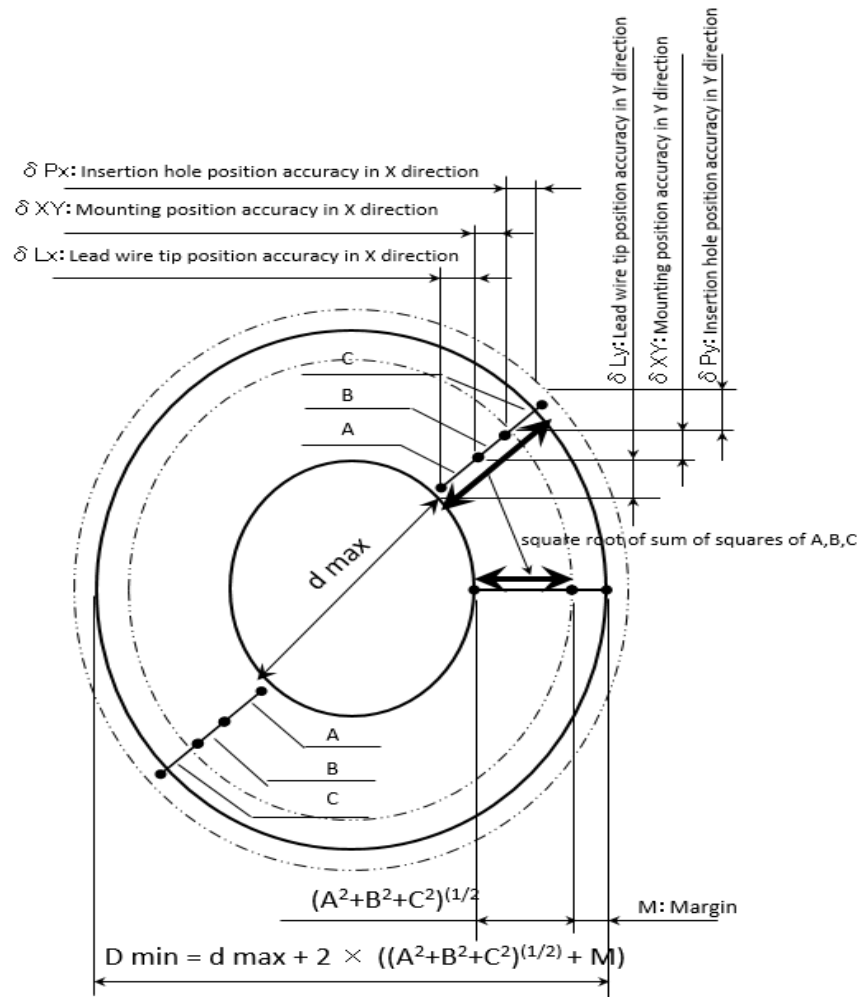


- ③ Set the mounting position accuracy in the X and Y directions to δXY .
The detail value $\delta XY = 0.05\text{mm}$
- ④ Set PCB recognition mark or insertion position accuracy to reference insertion hole in X and Y directions to δPx , δPy .



- ⑤ Set PCB insertion hole diameter to D , and plus smaller value of dimension accuracy, the maximum value of insertion hole diameter is $D \text{ min}$.
- ⑥ As a margin of the gap between the side of the lead wire and the side of the insertion hole, $M = 0.05 \text{ mm}$ (1 side: 0.05mm , 2 sides: 0.1mm)

The relationship of ①②③④⑤.6 is as below, and it is the specification of the insertion hole diameter.



d max : Maximum lead wire dimension

A : Necessary clearance for lead wire tip position accuracy : $(\delta Lx^2 + \delta Ly^2)^{(1/2)}$

B : Necessary clearance for mounting position accuracy : $(0.05^2 + 0.05^2)^{(1/2)} = 0.071$

C : Necessary clearance for PCB insertion hole position accuracy : $(\delta Px^2 + \delta Py^2)^{(1/2)}$

M : Margin of gap between the side of the lead wire and the side of the insertion hole : 0.05

D min : Maximum dimension of PCB insertion hole diameter

When applying to square root of sum of squares of A,B,C

$$D \min = d \max + 2 \times ((A^2 + B^2 + C^2)^{(1/2)} + M)$$

$$= d \max + 2 \times ((\delta Lx^2 + \delta Ly^2) + (\delta Px^2 + \delta Py^2) + 0.005)^{(1/2)} + 0.05$$

Example① When Lead wire tip position accuracy : $\pm 0.1\text{mm}$, And PCB insertion hole position accuracy : $\pm 0.1\text{mm}$

$$D \min = d \max + 2 \times (((0.1^2 + 0.1^2) + (0.1^2 + 0.1^2) + 0.005)^{(1/2)} + 0.05) = d \max + 0.5$$

Set PCB insertion hole diameter accuracy to $+0.1/0$

PCB insertion hole diameter : $D = d \max + 0.6/+0.5$

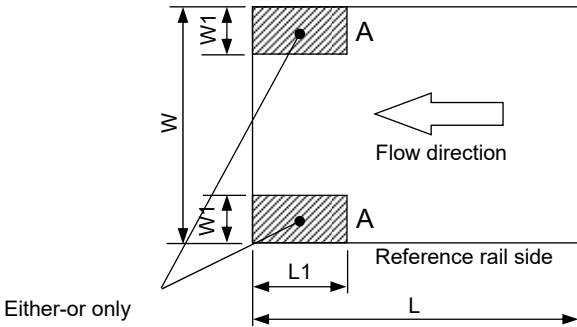
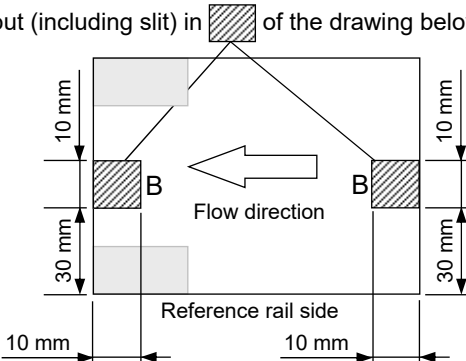
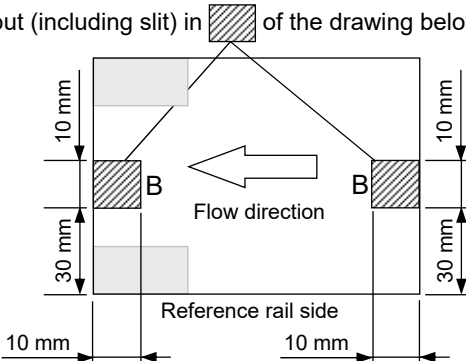
Example② When Lead wire tip position accuracy : $\pm 0.2\text{mm}$, and PCB hole insertion hole position accuracy : $\pm 0.1\text{mm}$,

$$D \min = d \max + 2 \times (((0.2^2 + 0.2^2) + (0.1^2 + 0.1^2) + 0.005)^{(1/2)} + 0.05) = d \max + 0.75$$

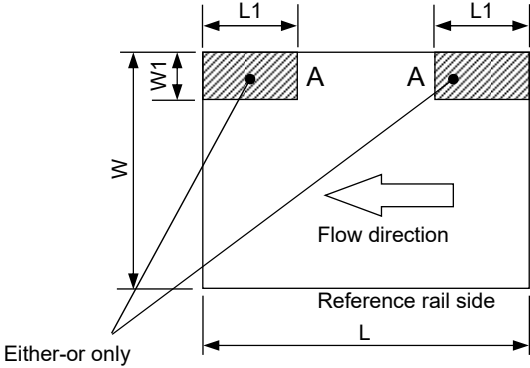
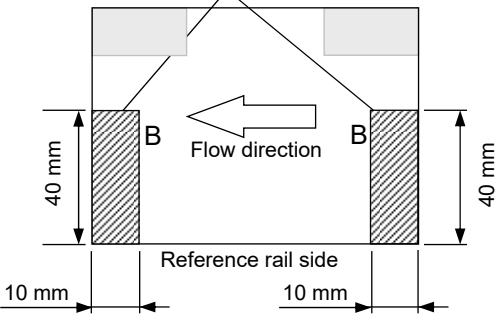
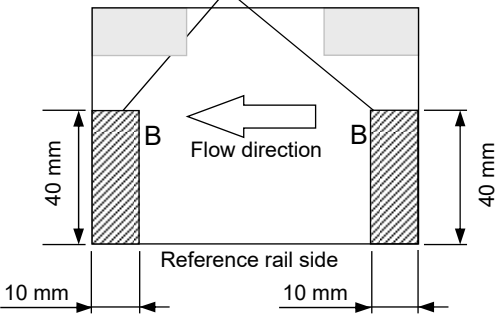
Set PCB insertion hole diameter accuracy to $+0.1/0$

PCB insertion hole diameter : $D = d \max + 0.85/+0.75$

■ Single conveyor specifications (PCB notch conditions)

Item	Specifications												
PCB notch condition	PCB notch dimensions should meet the following two conditions.												
Condition A	PCB notch dimensions should meet the following conditions.  Either-or only <table border="1"> <thead> <tr> <th>L</th><th>L1</th></tr> </thead> <tbody> <tr> <td>$50 \text{ mm} \leq L \leq 350 \text{ mm}$</td><td>Less than $L/4$</td></tr> <tr> <td>$350 \text{ mm} < L \leq 510 \text{ mm}$</td><td>Whichever is smaller, $L/4$ or 100 mm</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>W</th><th>W1</th></tr> </thead> <tbody> <tr> <td>$50 \text{ mm} \leq W \leq 260 \text{ mm}$</td><td>Whichever is smaller, $W/3$ or 30 mm</td></tr> <tr> <td>$260 \text{ mm} < W \leq 460 \text{ mm}$</td><td>Please consult us.</td></tr> </tbody> </table> *The above cases show PCBs of 1.6 mm or less in thickness. For PCBs over 1.6mm, please consult us. * For PCBs with cutout size larger than shown above or special PCBs with trapezoidal shape or uneven shape, a PCB transfer test should be conducted before receiving order. * The cutout should be on only 1 position regardless of its position on the side of the reference rail or the movable rail. * In the case of left → right flow, the left and right sides of the above figure are reversed.	L	L1	$50 \text{ mm} \leq L \leq 350 \text{ mm}$	Less than $L/4$	$350 \text{ mm} < L \leq 510 \text{ mm}$	Whichever is smaller, $L/4$ or 100 mm	W	W1	$50 \text{ mm} \leq W \leq 260 \text{ mm}$	Whichever is smaller, $W/3$ or 30 mm	$260 \text{ mm} < W \leq 460 \text{ mm}$	Please consult us.
L	L1												
$50 \text{ mm} \leq L \leq 350 \text{ mm}$	Less than $L/4$												
$350 \text{ mm} < L \leq 510 \text{ mm}$	Whichever is smaller, $L/4$ or 100 mm												
W	W1												
$50 \text{ mm} \leq W \leq 260 \text{ mm}$	Whichever is smaller, $W/3$ or 30 mm												
$260 \text{ mm} < W \leq 460 \text{ mm}$	Please consult us.												
Condition B	There should be no cutout (including slit) in  of the drawing below.  * The drawing presented above is based on the front reference. For the back reference, the reference rail will be located at the back.												
Condition for component protruding from the edge face of PCB	Please consult us.												

■ Anvil conveyor specification (PCB notch conditions)

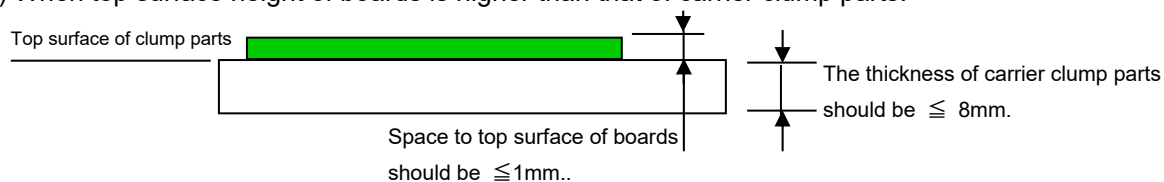
Item	Specifications												
PCB notch condition	PCB notch dimensions should meet the following two conditions.												
Condition A	PCB notch dimensions should meet the following conditions.  Either-or only <table border="1"> <thead> <tr> <th>L</th><th>L1</th></tr> </thead> <tbody> <tr> <td>$50 \text{ mm} \leq L \leq 350 \text{ mm}$</td><td>Less than $L/4$</td></tr> <tr> <td>$350 \text{ mm} < L \leq 460 \text{ mm}$</td><td>Whichever is smaller, $L/4$ or 100 mm.</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>W</th><th>W1</th></tr> </thead> <tbody> <tr> <td>$50 \text{ mm} \leq W \leq 260 \text{ mm}$</td><td>Whichever is smaller, $W/3$ or 30 mm.</td></tr> <tr> <td>$260 \text{ mm} < W \leq 400 \text{ mm}$</td><td>Please consult us.</td></tr> </tbody> </table> * The above cases show PCBs of 1.6 mm or less in thickness. For PCBs over 1.6mm, please consult us. * For PCBs with cutout size larger than shown above or special PCBs with trapezoidal shape or uneven shape, a PCB transfer test should be conducted before receiving order. * Cutout must not be on reference rails side	L	L1	$50 \text{ mm} \leq L \leq 350 \text{ mm}$	Less than $L/4$	$350 \text{ mm} < L \leq 460 \text{ mm}$	Whichever is smaller, $L/4$ or 100 mm.	W	W1	$50 \text{ mm} \leq W \leq 260 \text{ mm}$	Whichever is smaller, $W/3$ or 30 mm.	$260 \text{ mm} < W \leq 400 \text{ mm}$	Please consult us.
L	L1												
$50 \text{ mm} \leq L \leq 350 \text{ mm}$	Less than $L/4$												
$350 \text{ mm} < L \leq 460 \text{ mm}$	Whichever is smaller, $L/4$ or 100 mm.												
W	W1												
$50 \text{ mm} \leq W \leq 260 \text{ mm}$	Whichever is smaller, $W/3$ or 30 mm.												
$260 \text{ mm} < W \leq 400 \text{ mm}$	Please consult us.												
Condition B	There should be no cutout (including slit) in  of the drawing below.  * The drawing presented above is based on the front reference. Back reference is not available for anvil conveyor specification.												
Condition for component protruding from the edge face of PCB	Please consult us.												

■ Notes on the use of board carriers

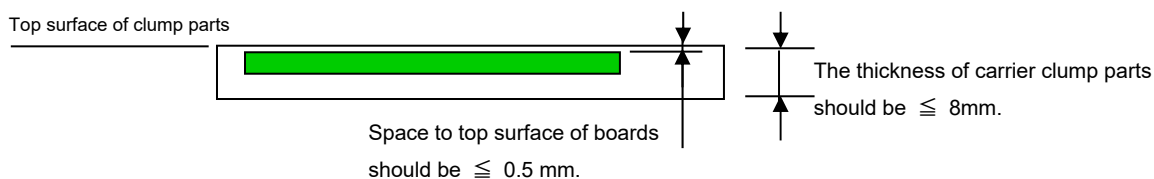
1. Carrier thickness (Clump parts) : 8 mm or less

2. The high relation between carriers and boards

(1) When top surface height of boards is higher than that of carrier clump parts:

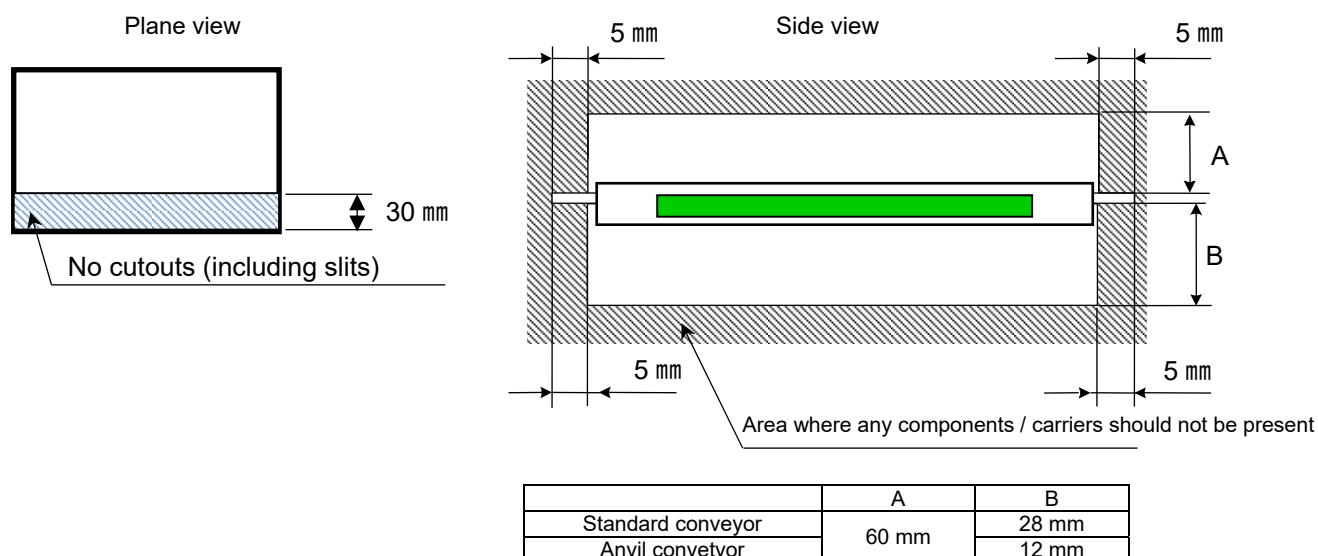


(2) When top surface height of boards is lowerer than that of carrier clump parts:

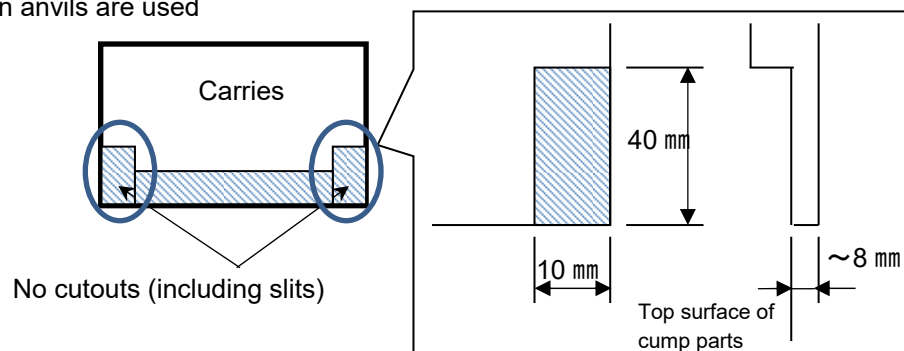


(3) Carrier mass should be 3kg or less. (Boards and mounted components are included)

(4) Others



(5) When anvils are used



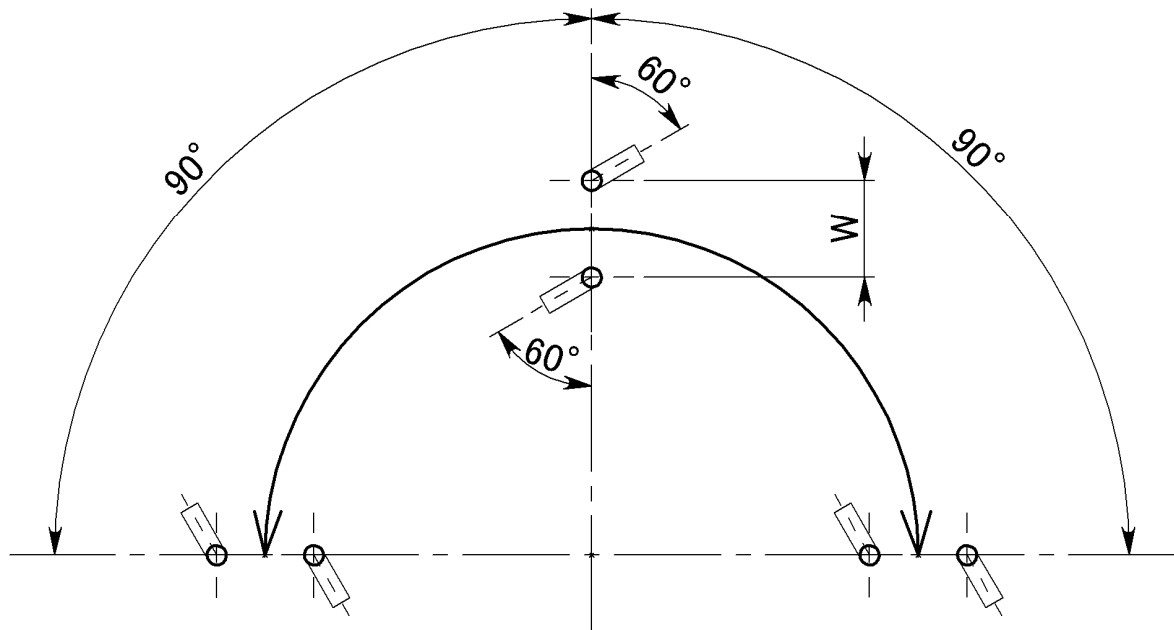
* For dead spaces in insertions, see "8.2 Lead pitch and Dead Space for Anvil Conveyor Specification (Option)" and "8.4 Dimensions/ Dead Spaces of Each Station Heads".

* Make sure that boards are securely fixed.

Looseness of boards will result in insertion failure due to the deviation of boards during mounting.
(when clinching is required In a specification where anvils are used)

8.2 Lead Pitch and Dead Space for Anvil Conveyor Specification (Option) (Pitch 2.5 mm to 40 mm)

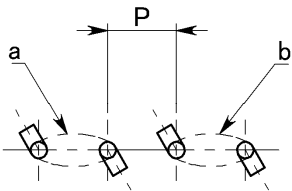
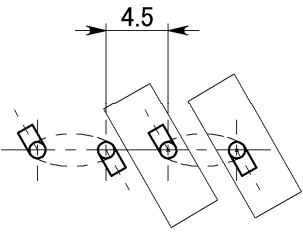
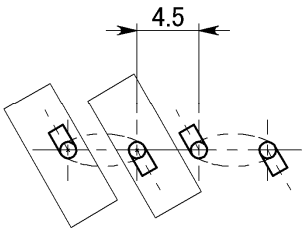
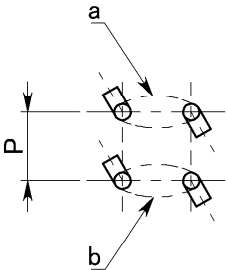
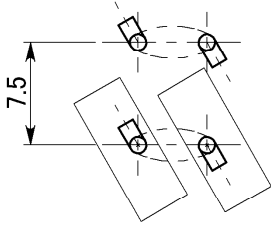
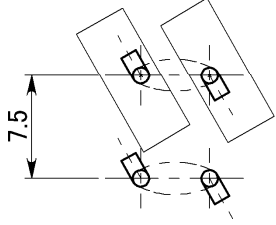
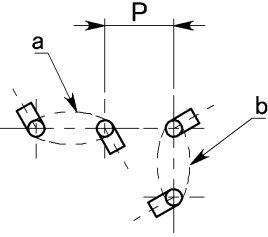
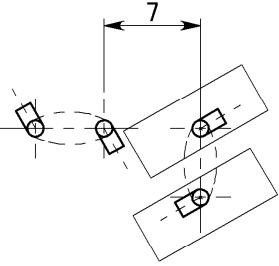
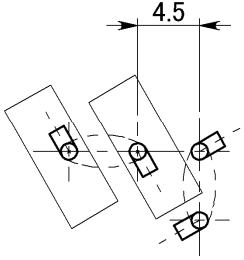
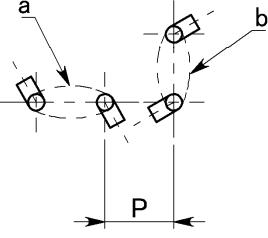
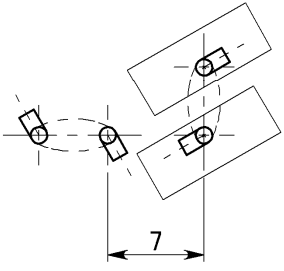
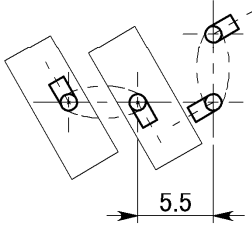
Explanation diagram of clinch direction and θ rotation direction
(View from top of PCB)



Anvil dead space from various heights below PCB

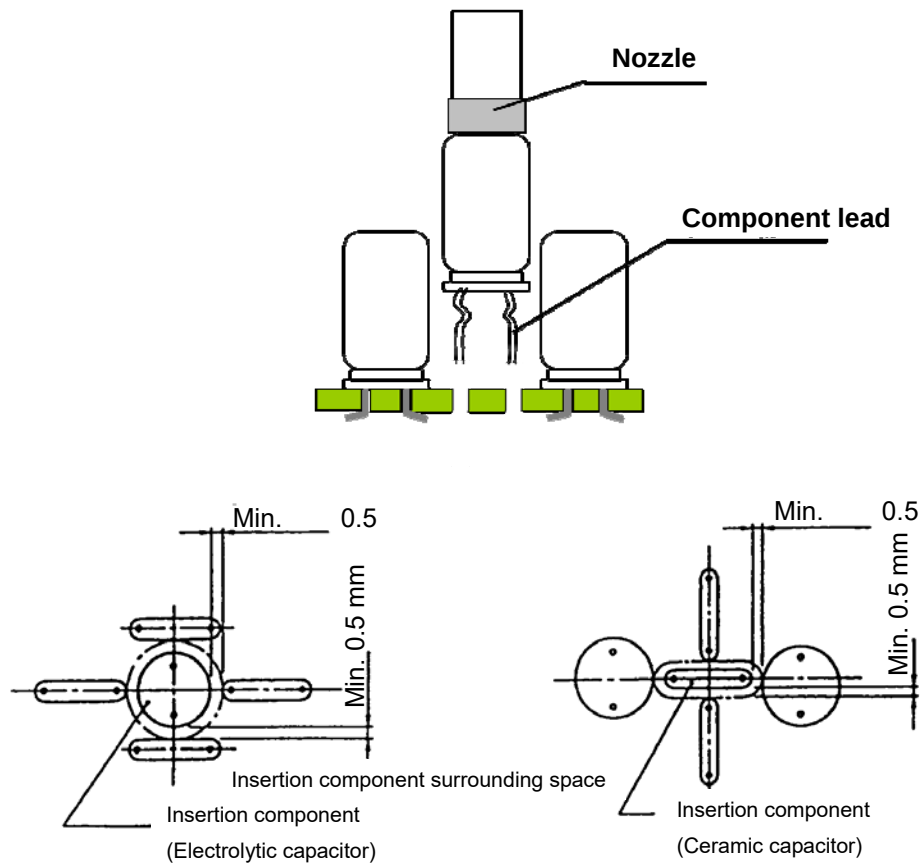
0~1mm	1~2mm	2~3mm	3~4mm
4~5mm	5~6mm	6~7mm	7~8mm
8~9mm	9~10mm	10~11mm	11~12mm

Conditions for adjacent components for anvil of odd-form components insertion machine

	a → b	b → a
		
		
		
		

8.3 Minimum Clearance between Adjacent Components

- (1) Leave a space of at least 0.5mm between the adjacent components, considering the inclination of the components already inserted.

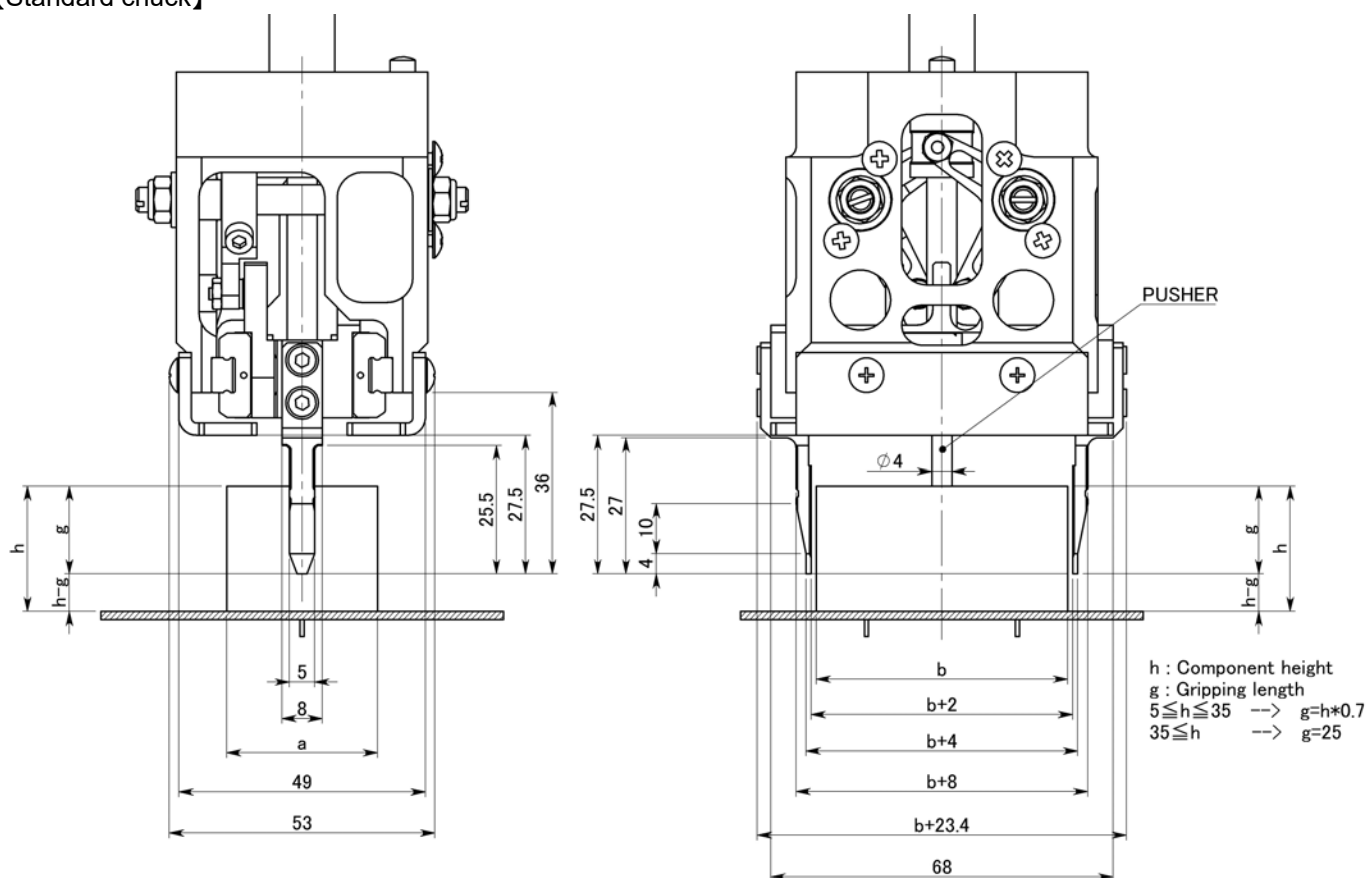


Note) When components have been inserted at high densities, be careful that the cut and cinched lead wires do not short especially on the back of the PCB, and bridging does not occur at soldering.
In the case of parts that are easy to tilt after insertion, such as levitated parts, it is necessary to consider the inclination of components.

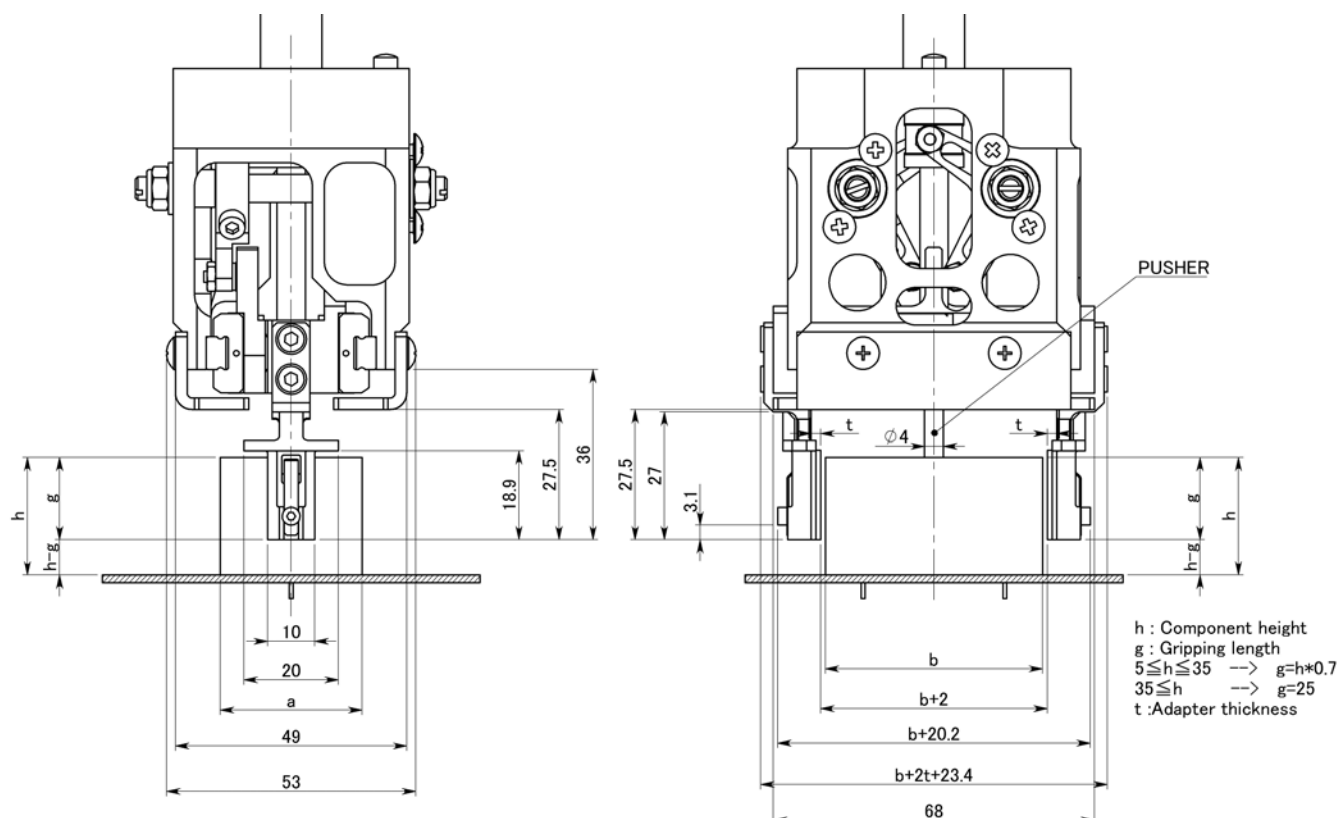
- (2) Insert the components in order of height to ensure high-reliable insertion.
When inserting the short components adjacent to tall components, consider the dead space made by the insertion pusher.

8.4 Dimensions / Dead Spaces of Each Station Heads

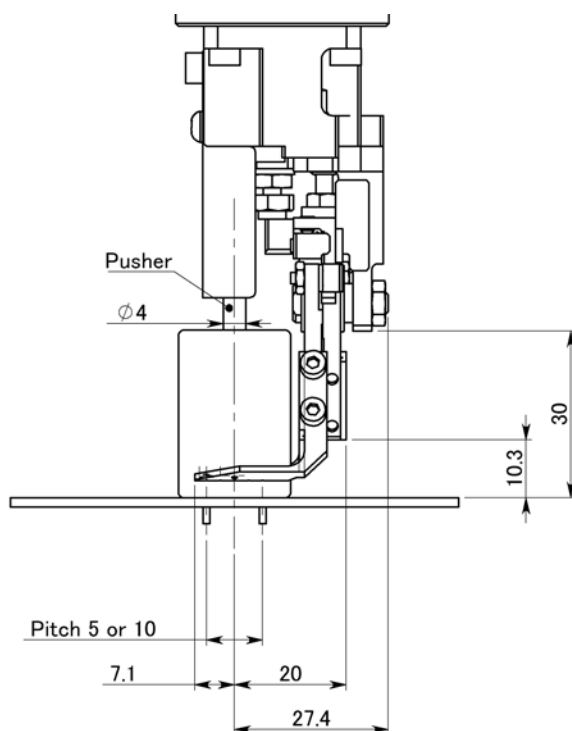
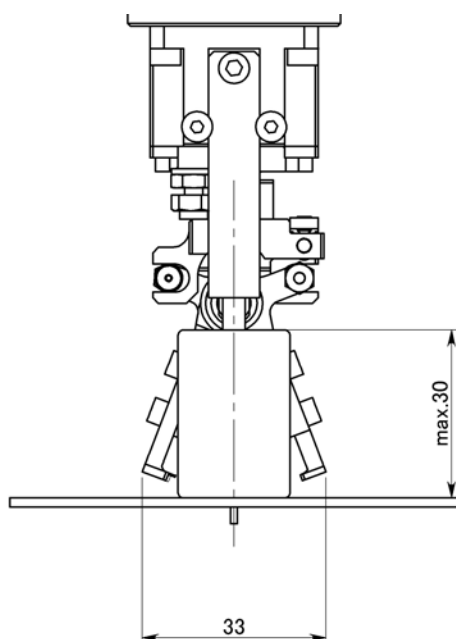
■Body Chuck
【Standard chuck】



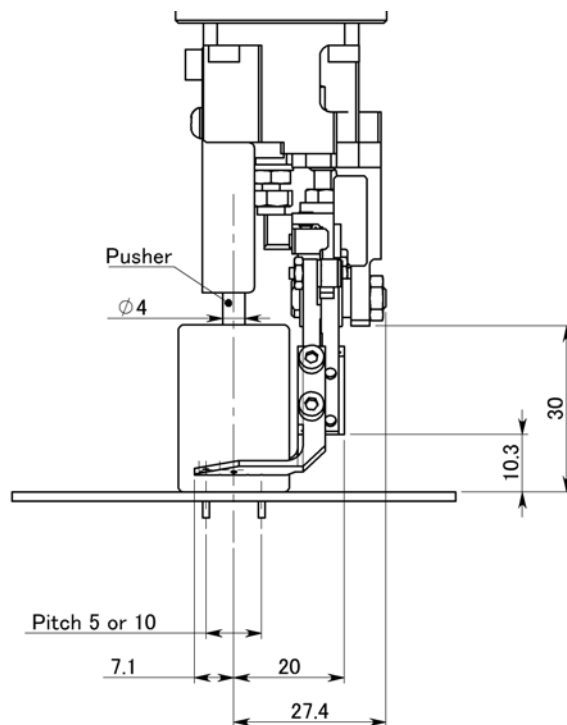
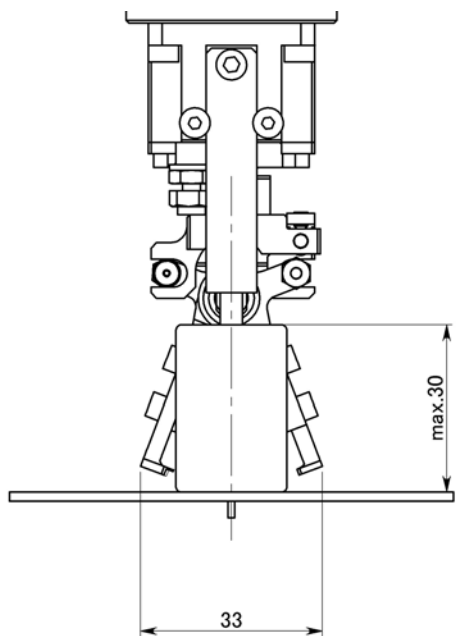
【When adapter is attached】



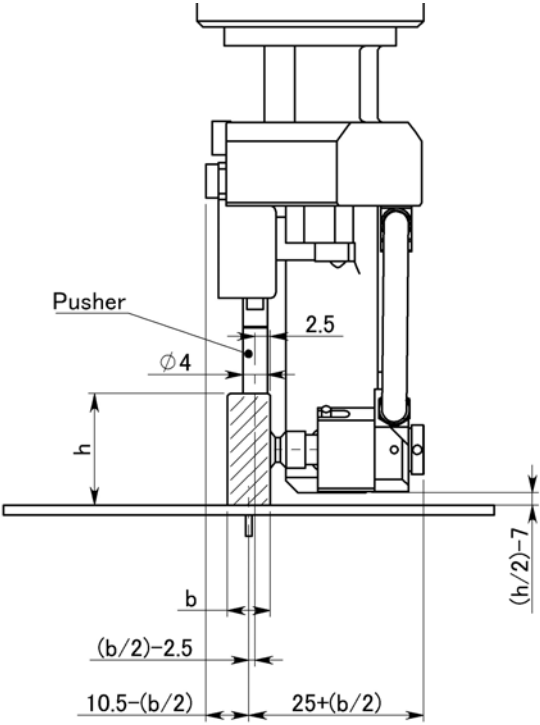
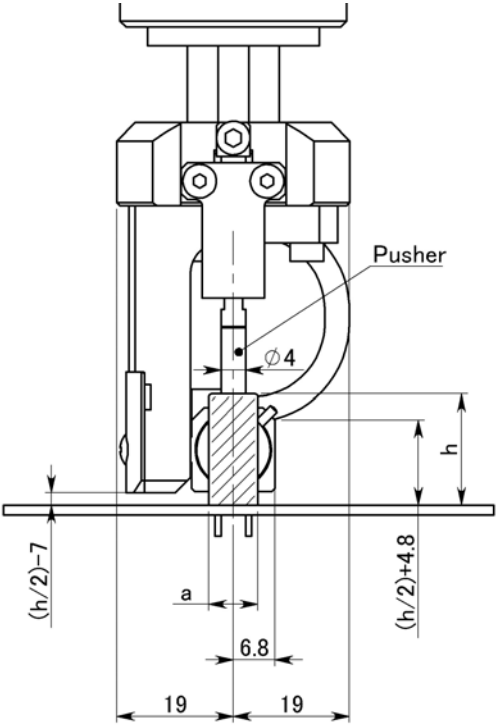
■Lead Chuck
【For pitch 5 mm and 10 mm】



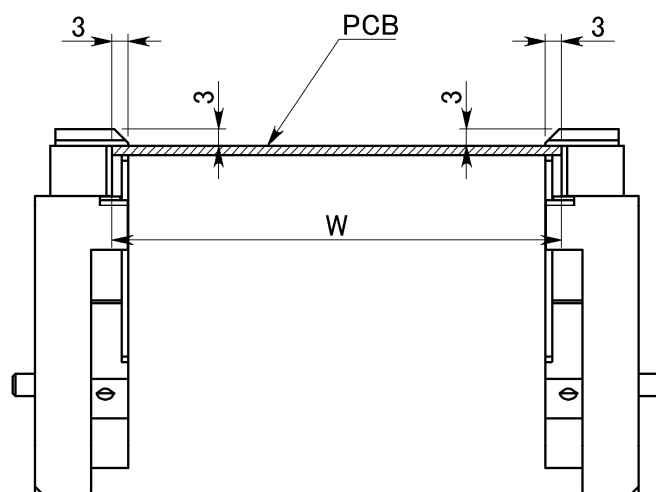
【For pitch 2.5 mm and 7.5 mm】



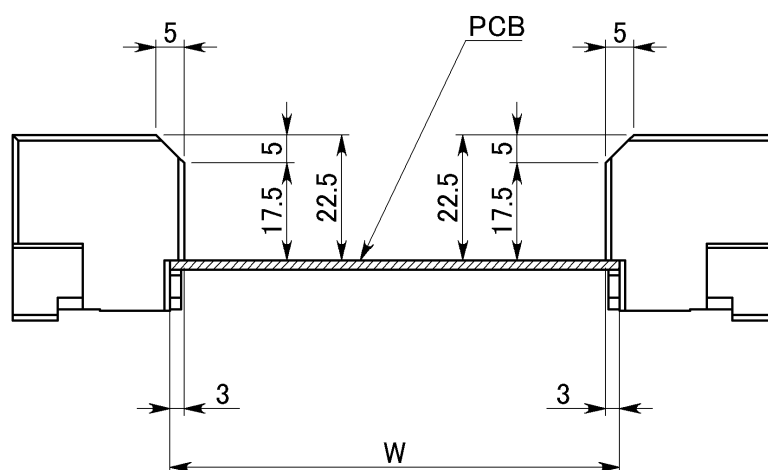
■ Swing Nozzle



■ Transfer rail (Single conveyor)



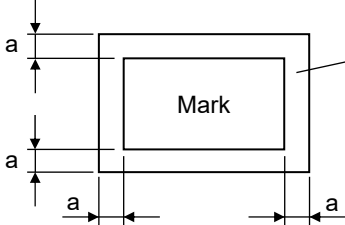
■ Transfer rail (Anvil conveyor)



8.5 Recognition Mark, Reference Hole

PCB needs two PCB recognition marks, or holes at its opposite corners.

■ PCB Recognition Mark Specifications

Standard Mark Shapes and Dimensions	Standard Mark Shapes	Dimensions
	○	φ0.5 mm ~ φ1.6 mm
	△(Equilateral triangle)	Length of one side: 0.5 mm ~ 1.6 mm
	□	Length and width: 0.5 mm ~ 1.6 mm
	+	Length and width: 0.5 mm ~ 1.6 mm (Line width: 0.3 mm or more)
	Length and width means the dimensions of the quadrangle circumscribing the mark.	
Mark Materials and Circuit Pattern	Because PCB recognition correction is based on the positional relationship between the marks and the circuit pattern (conductor pattern), the marks must be made in the same process and of the same materials as those of the circuit pattern from the viewpoint of correction accuracy.	
Image Conditions of Mark Materials and PCB Base	Because, basically, mark recognition process is carried out based on the intensity difference of reflected light, a fixed contrast is required between the mark materials and the PCB base. This difference varies significantly depending on the plating condition, oxidation condition, surface height, unevenness, degree of mirroring, coating, or disturbance light; therefore, the assessment of the marks is required beforehand.	
Mark Dimensions and Background	Noninterference area of larger than a certain dimension is required outside of the mark.  Noninterference area $a \geq 0.2 \text{ mm or more}$ Not all the marks are black.	

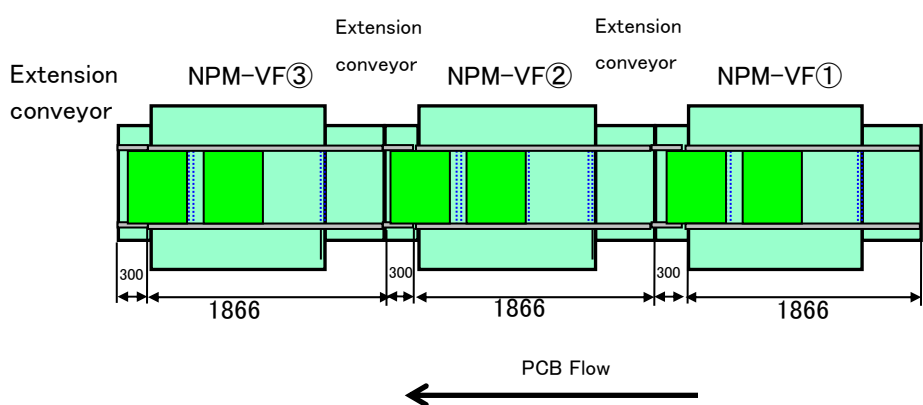
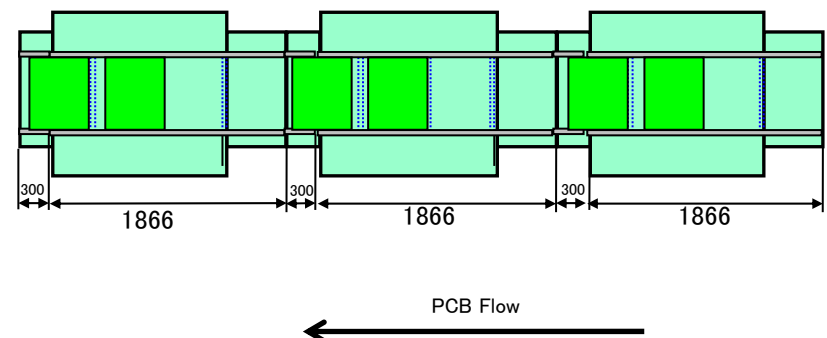
- PCB recognition mark should basically be located inside the placement area.

■ PCB Reference Hole Specifications

Reference hole shape and dimensions	Shape	Dimensions
	○ (Round)	φ 3 mm ~ φ 5 mm
	PCB reference hole should basically be diagonal to each other and located inside the placement area	
Others	Minimum space of 1mm is required for adjacent hole.	

8.6 PCB waiting condition

■ With extension conveyor

PCB length: L	Description
Single conveyor $50 \text{ mm} < L \leq 510 \text{ mm}$	When single conveyor specification is selected, PCB waiting conditions are as the following. *Dimensions in PCB transfer direction include dimensions of PCB protrusion.  A piece of PCB can wait in the downstream.
Anvil conveyor $50 \text{ mm} < L \leq 460 \text{ mm}$	When anvil conveyor specification is selected, PCB waiting conditions are as the following. *Dimensions in PCB transfer direction include dimensions of PCB protrusion.  A piece of PCB can wait in the downstream.

* In the case of insertion error, PCB will be ejected to upstream conveyor and flowed in again (after recovery action).

Therefore, PCB cannot wait in the upstream.

* In the case of flowing left →right, PCB recognition conveyor is mounted at the left side of main body and extension conveyor is mounted at the right side.

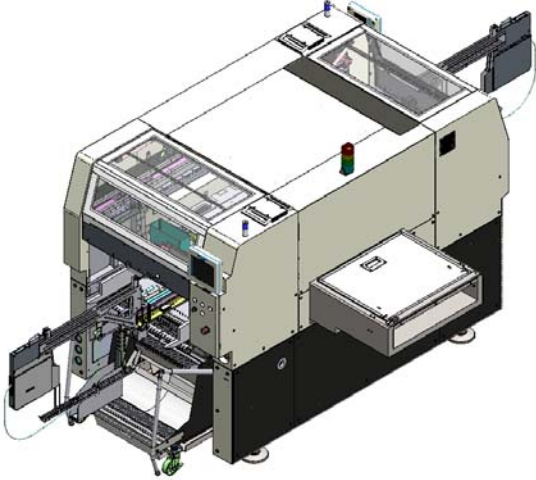
■ Without extension conveyor

PCB length: L	Description
Single conveyor $50 \text{ mm} < L \leq 285 \text{ mm}$	When single conveyor specification is selected, PCB waiting conditions are as the following. *Dimensions in PCB transfer direction include dimensions of PCB protrusion. Extension conveyor NPM-VF③ NPM-VF② NPM-VF① PCB Flow A piece of PCB can wait in the downstream.
	PCB Flow No PCB waiting at downstream.
	No PCB waiting at downstream.
Anvil conveyor $50 \text{ mm} < L \leq 175 \text{ mm}$	When anvil conveyor specification is selected, PCB waiting conditions are as the following. *Dimensions in PCB transfer direction include dimensions of PCB protrusion. PCB Flow A piece of PCB can wait in the downstream.
	PCB Flow No PCB waiting at downstream.
	No PCB waiting at downstream.

* In the case of insertion error, PCB will be ejected to upstream conveyor and flowed in again (after recovery action). Therefore, PCB cannot wait in the upstream.

* In the case of flowing left →right, PCB recognition conveyor is mounted at the left side of main body and extension conveyor is mounted at the right side.

9. Standard Machine Configuration

Item	Description	Quantity
Main body		1 set
Accessories	System disk • Machine system, Recognition system, and AM-LNB system (DVD-ROM) • Machine parameter SD card • Install system SD card • Password-changing SD card	1 set each
	Manual Parts list Control wiring diagram	1 set/Line

10. Options

Options are classified as follows.

Category	Description
Factory	These options need to be supported when the machine is being manufactured before shipment.
On-site	These options can be added after the machine has been delivered. However, a construction work is required on the spot.
Customer	These options can be added after the machine has been delivered. A construction work on the spot is not required.

Category	By beam	Whole machine
	Can be supported for each beam	Supported as a whole machine.

* Depending on user's machine specification, the manufacturing No., etc., some options may not fit the above classification.
For details, please consult us before purchasing the machine.

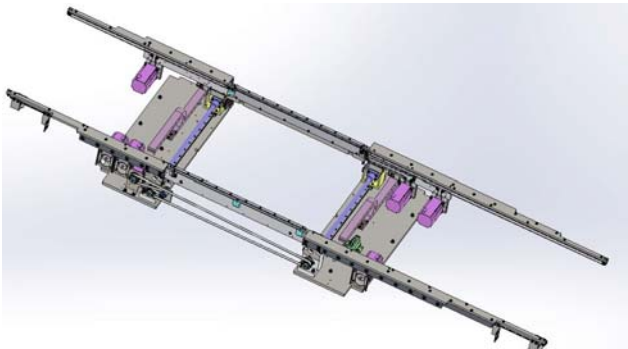
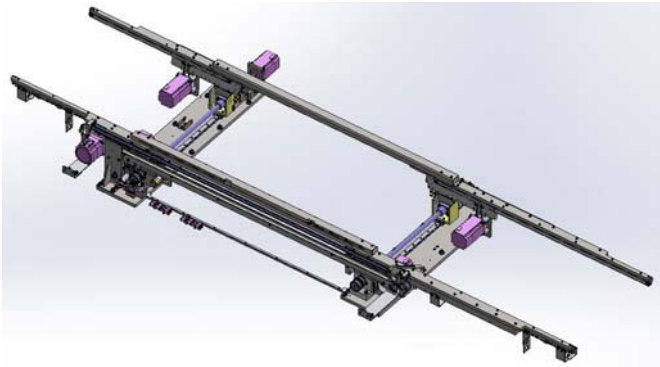
Please select options that answer your purposes.

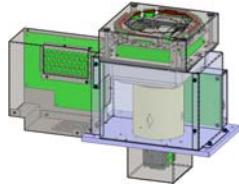
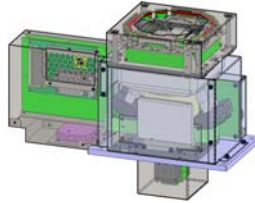
No.	Purpose / Feature	Option name	Category	
A	1 To select required options.	• HUB (Connect with 3 NPM-VF machines or less)	On-site	-
		• FA PC • HUB (4 NPM-VF or more are connected or the line is made up with NPM-VF and other machine models)	On-site	
		• Single conveyor • Anvil conveyor	Factory	Whole machine
		• Downstream extension conveyor (L=300 mm)	Factory	-
	2 To select a component recognition unit suitable for the intended use.	• Multi-recognition camera: Type 1/ 3	On-site	By beam
	3 To set the PCB transfer height at 930 mm/ 950 mm above the floor.	• Support for 930 mm transfer line • Support for 950 mm transfer line	Factory	-
B	1 To select the nozzle and adapter in accordance with the production pattern.	• Nozzle (each type) • Adapter (2 types: flat, round) • Storage nozzle case	Customer	-
		• Swing nozzle	On-site	
	2 To select the radial tape feeder in accordance with the production pattern.	• For feeding pitch P = 12.7 mm • For feeding pitch P = 15.0 mm • For feeding pitch P = 12.7 mm (special) • For feeding pitch P = 15.0 mm (special) • For feeding pitch P= 12.7 mm (with body guide) • For feeding pitch P= 15.0 mm (with body guide) • For feeding pitch P= 12.7 mm (Special) (with body guide) • For feeding pitch P= 15.0 mm (Special) (with body guide) • Verification function for each of above feeding pitch.	Customer	-
	3 To select the stackable stick feeder in accordance with the production pattern.	• Stackable stick feeder (S) • Stackable stick feeder (S) for traceability • S, M, L size pusher for S type • Stackable stick feeder (L) • Stackable stick feeder (L) for traceability • S, M, L, LL, LLL size pusher for L type	Customer	-
	4 To manage and store radial tape feeders and stackable stick feeders. To prepare in advance.	• Feeder stand • Power and air supply unit (For stand)	Customer	-
	5 To select the intelligent tape feeder in accordance with the production pattern.	• Intelligent tape feeder	Customer	
	6 To manage and store intelligent tape feeders.	• Intelligent tape feeder stand	Customer	

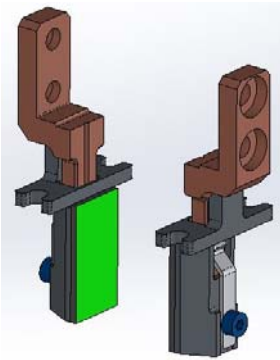
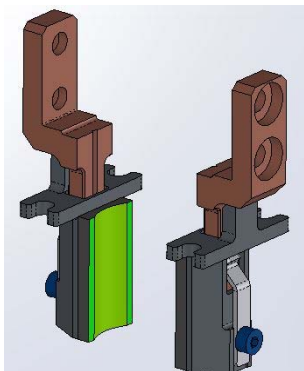
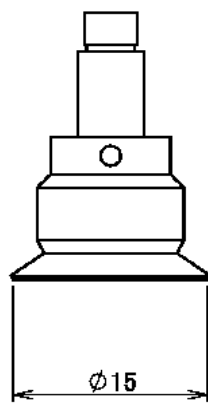
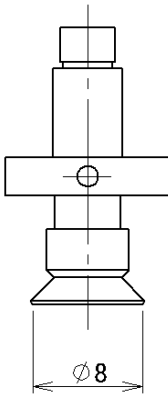
No.		Purpose / Feature	Option name	Category	
B	7	To prepare for the replacement of a support pin.	- PCB support block - Support pin setting jig - Additional support pins	Customer	-
	8	To prepare feeders in advance and change them collectively.	Feeder cart	Customer	-
	9	To place tray-feeding components.	- Single tray feeder - Twin tray feeder	Factory	-
			- Additional tray magazine - Additional tray pallet - Additional components-ejection tray - Pallet for vacuum-molded tray	Customer	-
	10	To select 30-slot fixed supply unit option	Real box	Customer	
	11	To select13-slot fixed supply unit option	Real box	Customer	
			Real holder with cutting unit	Factory	
12	To improve the workability of tape splicing of . intelligent tape feeder	Splicing cart	Customer		

C	1	To replace the placement head.	- Space insertion head - Spare tool changer	On-site	By beam
			Spare multi-recognition camera: Type 1/ 3	On-site	By beam
	2	To align and eject the NG components onto the conveyor.	NG-components ejection conveyor	Customer	-
	3	To implement production with a Head/Heads removed.	- No Head attachment - Safety cover	Customer	-
	4	To manage and store the removed Heads.	Head stand (For Heads)	Customer	-
	5	To reduce time for changeovers	Supporpt station	On-site	
			Feeder setting jig	Customer	
	6	Wishes to use all sorts of function modules of PanaCIM-EE	PanaCIM-EE ready (License)	On-site	
	7	Wishes to use all sorts of function modules of iLNB	iLNB ready (License)	On-site	
	8	To implement changeover efficiently.	Automatic changeover (License)	On-site	
	9	To prevent setting error at the time of component change	Component verification (License)	On-site	
	10	To use existing system effectively	Upper communication (License)	Customer	
11	To connect the factory-side plumbing to equipment to enable primary air connecting	Primary air hose unit	Customer	-	
12	To use large reels	Separator for feeder cart	Customer	-	

D	1	To keep the machine condition in regular maintenance.	- Grease gun set - Maintenance jig	Customer	-
	2	To calibrate as needed.	- Standard calibration jig kit - Nozzle calibration jig kit - Jig kit for adjusting the main body (For body chuck) - Jig kit for adjusting the main body (For nozzle) - Jig kit for accuracy detection - Plane calibration jig - Jig kit for adjusting the anvil	Customer	-
	3	To remove the head	Unit exchanging tool	Customer	-

A-1	Selection of required options
On-site	HUB(A maximum of 3 NPM-VF are coupled) - Always required for maximum of 3 NPM-VF line. (1 set/line) - For more information, please refer to "4.4 Line configuration".
On-site	FA PC HUB (When 4 NPM-VF or more are connected or the line is made up with NPM-VF and other machine models) - It is required in the case of 4 NPM-VF or more are connected or the line is made up with NPM-VF and other machine models. - Please refer to "4.4 Line Configuration" for details.
Factory	Whole machine Single conveyor  - This is a single lane conveyor that transfers PCBs and fixes them at each stop position. * PCB support block and support pin is not attached.
Factory	Whole machine Anvil conveyor  - This is a single lane conveyor for anvil specification that transfers PCBs and fixes them at each stop position. - Anvil is included. - For anvil specification, considering the maintenance and workability of anvil unit, components supply unit: select feeder cart specification at front side. Component: If fixed supply unit specification at front side is required, please consult us. * PCB support block and support pin is not attached. * It is not available to select for the surface placement components.
Factory	Downstream extension conveyor (L=300 mm) - It is required at the last NPM-VF of the line to ensure the safety of the transfer opening. - For single conveyor PCB length L 285 mm and above / max L 510 mm, for anvil conveyor PCB length L 175 mm and above / max L 460 mm is allowed to standby.

A-2	To select a component recognition unit suitable for the intended use.
On-site By beam	Multi-recognition camera: Type 1  • The position in picking up the chip and the angle deviation are corrected. • Please be sure to select it for the table where the placement head is selected. • Please refer to "4.5 Recognition Unit Configuration" for details.
On-site By beam	Multi-recognition camera: Type 3 (3D-measurement function)  • The coplanarity and XY-direction positions of all leads of such as QFP/ SOP can be detected. The presence/absence and absence of balls of such as BGA/ CSP can be detected. • This supports each Placement head. • Please refer to "4.5 Recognition Unit Configuration" for details.
A-3	To set the PCB transfer height at 930 mm/ 950 mm above the floor.
Factory	Support for 930 mm transfer line (Adjustable range: 920 mm ~ 950 mm) Support for 950 mm transfer line (Adjustable range: 940 mm ~ 970 mm) • The standard height of the PCB transfer line is 900 mm ~ 920 mm above the floor.

B-1	To select the nozzle and adapter in accordance with the production pattern.
Customer Nozzle	
• Please refer to “4.2 3-station Head Nozzle Configuration” for details. • For information about the special nozzles, please contact us. • The nozzles are compatible with CM602, CM402/ DT401series, CM232, CM212, CM101, and NPM series.	
Customer Adapter	
 Adapter 平タイプ (FLAT TYPE)  Adapter 丸タイプ (ROUND TYPE)	
• In the case where gripping condition of standard chuck is unstable, adaptors are fitted on to the tips of the chuck. There are two types: flat type and round type. These can be automatically changed via tool changer. • For information about special adapters, please consult us.	
Customer Storage nozzle case	
• This case, which is made of plastic, is manageable because it can be checked for its contents from outside. • It can accommodate 21 nozzles • The nozzle case is compatible with storage cases for NPM series' 8-nozzle head and 3 or 2 nozzle head.	
On-site Swing nozzle	
 Swing nozzle L 12001 (MTKU001115AA)  Swng nozzle S 12002 (MTKU001319AA)	
• Unlike vacuum nozzle, swing nozzle cannot support automatic exchange. Exchange of S type and L type requires on-site engineer support.	

B-2	To select the radial tape feeder in accordance with the production pattern.
Customer	
Radial tape feeder For feeding pitch P = 12.7 mm For feeding pitch P = 15.0 mm For feeding pitch P = 12.7 mm (special) For feeding pitch P = 15.0 mm (special) For feeding pitch P = 12.7 mm (with body guide) For feeding pitch P = 15.0 mm (with body guide) For feeding pitch P = 12.7 mm (special) (with body guide) For feeding pitch P = 15.0 mm (special) (with body guide) For feeding pitch P = 12.7 mm (With the joint detection sensor) For feeding pitch P = 15.0 mm (With the joint detection sensor) For feeding pitch P = 12.7 mm (special) (With the joint detection sensor) For feeding pitch P = 15.0 mm (special) (With the joint detection sensor) For feeding pitch P = 12.7 mm (with body guide) (With the joint detection sensor) For feeding pitch P = 15.0 mm (with body guide) (With the joint detection sensor) For feeding pitch P = 12.7 mm (special) (with body guide) (With the joint detection sensor) For feeding pitch P = 15.0 mm (special) (with body guide) (With the joint detection sensor)	
• Please refer to “4.3 Supply unit configuration” for details. • Please consult us if components are picked up by nozzle.	

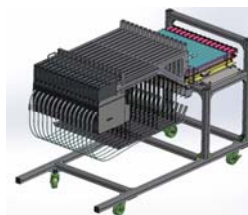
B-3	To select the stackable stick feeder in accordance with the production pattern.
Customer	
Stackable stick feeder Stackable stick feeder (S) Stackable stick feeder (S) for traceability S, M, L size pusher for S type Stackable stick feeder (L) Stackable stick feeder (L) for traceability S, M, L, LL, LLL size pusher for L type	
• Please refer to “4.3 Supply unit configuration” for details.	

B-4

To manage and store radial tape feeders and stackable stick feeders. To conduct advance preparation.

Customer

Feeder stand



- This is a stand for stackable stick feeders and radial tape feeders.
- For stackable stick feeder (S), up to 15 pcs can be stocked. For stackable stick feeder (L), up to 7 pcs can be stocked. For radial tape feeders, up to 10 pcs can be stocked.
- When there is intelligent tape feeders only, it is available to use stand for intelligent feeders.

Customer

Power and air supply unit (For stand)

- By adding power and air supply unit to the feeder stand, power and air can be supplied to the feeders and offline feeder movement is possible.
- Items below are included.

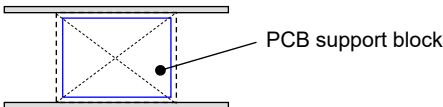
1. Power supply unit

Item	Specification
Rated voltage	Single phase, AC 100 V ~ 240 V
Frequency	50/ 60 Hz
Rated capacity	90VA

2. Power supply cable for feeder**3. Power supply cable****4. Regulator • Air connector**

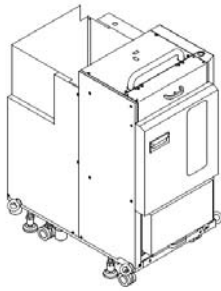
* Please prepare power supply source, cable, air supply source and air hose by yourself.

B-5	To select the intelligent tape feeder in accordance with the production pattern.
Customer	Intelligent tape feeder
	• Please refer to “4. 3 Feeder Carriage Configuration” for details.
B-6	To manage and store intelligent tape feeders.
Customer	Intelligent tape feeder stand 
	• This is a stand for intelligent tape feeders. • For the 12/16 mm tape feeder, for example, up to 90 ones can be stocked.

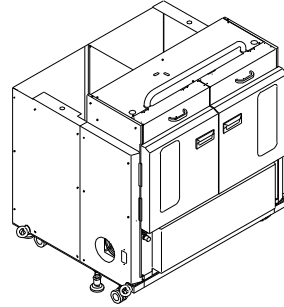
B-7	To prepare for the replacement of a support pin.
Customer	PCB support block (For single conveyor) - PCB support block and support pins (20) are included. - It can be additionally purchased by the block. The support pin is not included if additionally purchased. Please select "Additional support pin" as needed. - To set up the positions of support pins for new PCB externally, please select "Support pin setting jig" separately. - There is no PCB support block for anvil conveyor. 
Customer	Support pin setting jig (For single conveyor) - To prepare the support pins externally, please select the "PCB support block" separately. - Common with AM100.
Customer	Additional support pins - Please select when needed in addition. (20 pieces are included in 1 set.) - Common with AM100 and NPM series.
B-8	To prepare feeders in advance and change them collectively.
Customer	Feeder cart(30-slot)  - The floor slope in the feeder cart installation area needs to be 6 mm or less in the right/left direction and 11 mm or less in the forward/backward direction. If the floor slope is beyond the above limit, the feeder cart cannot be taken in and out. - Exclusive to NPM-VF. - Air supply unit for feeder is included - Cutting unit and reel holder are included.

B-9

To place tray-feeding components.

Factory

Max. 20 products

Single tray feeder
with 13-slot feeder base

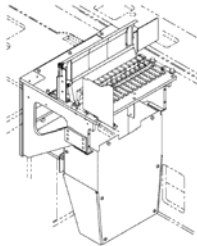
Max. 40 products

Twin tray feeder

Standard accessory	Single tray feeder*	Twin tray feeder
Tray magazine (15 mm pitch × 10 stages)	2 pcs.	4 pcs.
Tray pallet	21 pcs.	42 pcs.
Components-ejection tray	1 pc.	2 pcs.

* The single tray feeder is common to the tray feeder for the NPM-VF, NPM-W2/W, NPM-D3/ D2/ D, NPM-TT, NPM and AM100.
 The twin tray feeder is common to the tray feeder of the NPM-W2/W.
 When connecting the tray feeder for the existing NPM-D (or NPM), modification of tray feeder wiring may be required.
 Please ask us for details. (Custom specification)

- Not connectable if the main unit is to the feeder cart specifications.
- 13-slot feeder base is included with the single tray feeder.
 (with an air supply unit for feeder)

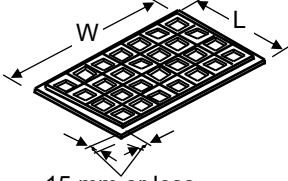


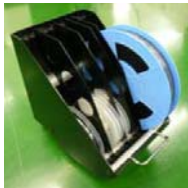
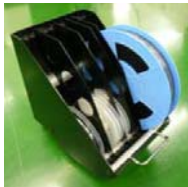
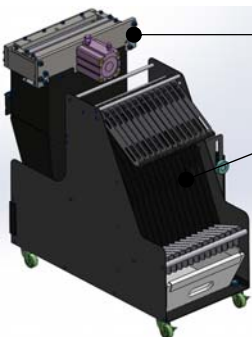
13-slot feeder base

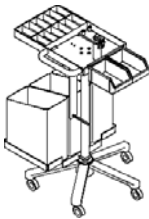
Radial tape feeder	Max. 4 (p = 12.7 mm)
Radial tape feeder	Max. 4 (p = 15.0 mm)
Radial tape feeder	Max. 4 (p = 12.7 mm special)
Radial tape feeder	Max. 4 (p = 15.0 mm special)

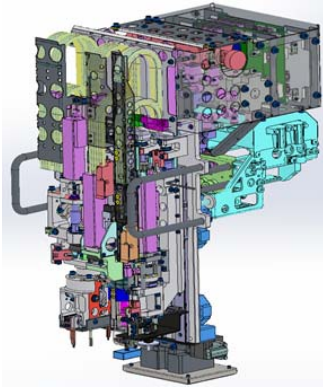
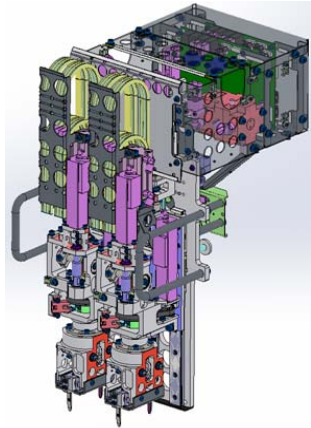
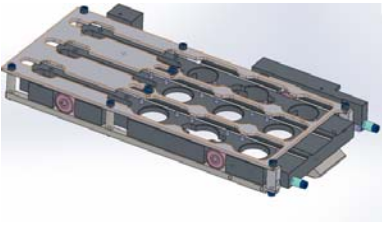
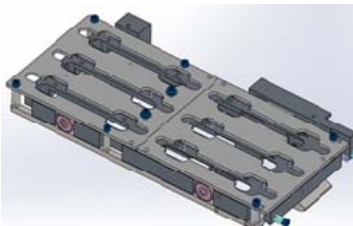
Stackable stick feeder (S)	Max. 6
Stackable stick feeder (L)	Max. 3

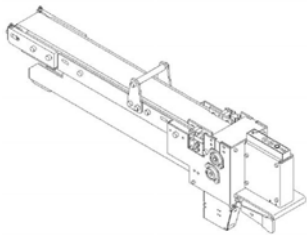
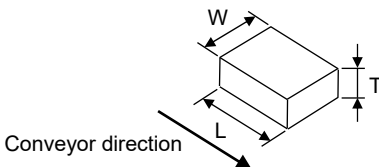
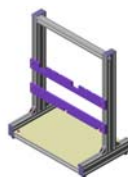
12/ 16 mm tape	Max. 13
24/ 32 mm tape	Max. 6
44/ 56 mm tape	Max. 4
72 mm tape	Max. 3
88 mm tape	Max. 2
104 mm tape	Max. 2
NG-components ejection conveyer	1

B-9	To place tray-feeding components.
Customer	Additional tray magazine (15 mm pitch × 10 stages) Additional tray pallet Additional components-ejection tray
	Please select this option when needed additionally.
Customer	Pallet for vacuum-molded-tray Pallet for vacuum-molded-tray (Magnet fixed type)
	Please select this option when using vacuum-molded trays. [Applicable tray dimensions] $L \times W = \text{Max. } 230 \times 318 \text{ mm}$  15 mm or less (Magnet fixed type: 10 mm or less)

B-10	To select 30-slot fixed supply unit option.
Customer	Reel box  • Up to 12 reels can be stored in 1 real box. (real width is below 19mm) • It is required for placement. • Up to 2 items are required for per table. Please select one or two pieces according to the required reel number. • Cutting unit of taping components is not included. If cutting unit is required, please select feeder cart (30-slot).
B-11	To select 13-slot fixed supply unit option.
Customer	Reel box  • Up to 12 reels can be stored in 1 real box. (real width is below 19mm) • It is required for placement. • 1 item is required for per table. • Cutting unit of taping components is not included If cutting unit is required, please select real holder with cutting unit.
Factory	Real holder with cutting unit  • Up to 13 reels can be stored. • It is required for placement. • Cutting unit is included.

B-12	To improve the workability of tape splicing of intellilgent tape feeders.
Customer Splicing cart  • This cart improves the workability of tape splicing. (For Intelligent tape feeder)	

C-1	To replace the Head.
On-site	By beam
 Spare 3-station head  Spare 2-station head	
• It should be replaced for each beam. Different Heads can be installed to the front and rear beams. • Tool changer is not included, please select them separately as options. • 3-station head and 2-station head is exclusive to NPM-VF.	
Customer	By beam
 3 sets of chuck adapters and 9 sets of nozzles are included  6 sets of chuck adapters are included  15 sets of nozzles are included	
• 3-station head and 2-station head is exclusive to NPM-VF.	
On-site	By beam
Spare multi-recognition camera: Type 1 Spare multi-recognition camera: Type 3	

C-2	To align and eject the NG components onto the conveyor.
Customer	NG-components ejection conveyor  - Applicable component dimensions Max. W 42 × L 60 mm T = 1 mm ~ 10.5 mm - Component shape ① No space exceeding 0.3 mm on its underside on a horizontal surface ② No extremely unstable shape, e.g. small underside compared with its height  Conveyor direction - This is used for ejecting recognition NG components. - This option will occupy four feeder setting slots. (Uses 4 slots at supply unit's right side.) - It is possible to install for the 13-slot feeder base. - This cannot be installed on tables for which the Twin tray feeder is selected.
C-3	To implement production with a Head/Heads removed.
Customer	No Head attachment - This is an attachment that is required to implement production with one side Head in where one Head is removed due to maintenance, etc. (Normally, the machine cannot operate with the Head removed.) - When the attachment setting is done for both sides (front and rear), the machine can operate with PCBs only passing through the machine.
Customer	Safety cover: Front side Safety cover: Rear side - Please be sure to select the safety cover. (Not required when Feeder cart is attached.) - This is exclusively for NPM- VF.
C-4	To manage and store the removed Heads.
Customer	Head stand (For one head)  - This is used to store the removed heads after exchanging. - One stand can store one head. - This is exclusively for NPM-VF.

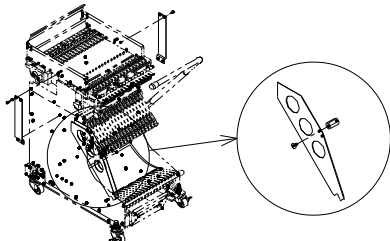
C-5	To reduce time for changeovers.
On-site	Support station (Power and air supply type) Support station box (Component verification type) • By using the spare feeder carts and feeders, which you have, you can prepare for next products while the machine continues its operation. • This has two types: one of them only supplies power and air to feeder carts and feeders, and another one implements component verification in addition to the power and air supplying. • Component verification type is applicable only to intelligent feeder, is not applicable to stackable stick feeder or radial stick feeder. • To use PanaCIM-EE for off-line setup, "Support station box (Component verification type)" is required. • Please refer to "5.4 Support Station" for details. * Please prepare power supply source, cable, air supply source and air hose by yourself. * In NPM series, "Change Cart Preparation Unit" in CM series is not available.
On-site	Support station: Component verification type (License) • This is required for the use of "Support station box (Component verification type)." * The license is not required for off-line setup (component verification) using PanaCIM-EE.
Customer	Feeder setting jig • The feeder setting jig is used as a feeder holder to set components on the feeder and to verify components.

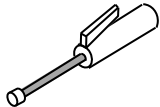
C-6	Wishes to use all sorts of function modules of PanaCIM-EE.
On-site	PanaCIM-EE ready (License) • Please select this option when connecting to PanaCIM-EE. • It supports each functional module of PanaCIM-EE. • It includes "Component verification (License)" and "Upper communication (License)." • Please refer to "PanaCIM-EE Specification" booklet for details.

C-7	Wishes to use all sorts of function modules of iLNB.
On-site	iLNB ready (License) • Please select this option when connecting to iLNB. • It supports each functional module of iLNB. • It includes "Upper communication (License)." • Please refer to "iLNB Specification" booklet for details.

C-8	To implement changeover efficiently.
On-site	
	Automatic changeover (License)
	• This supports changeovers (production data change and rail width change), minimizing the time loss of operation caused by product changes. In accordance with each customer's operation, selection can be made from following three types, "External scanner read type", "Head read type", and "Planned form read type". • Please refer to "5.2 Automatic Changeover" for details.
C-9	To prevent setting error at the time of component change.
On-site	
	Component verification (License)
	• This prevents components from being put wrongly. If wrong components are put, interlock function of the machine operates to create the mode automatically where production cannot be continued. It is possible to customize order of barcode scanning and/or barcode definition, according to customers' operation. • Component verification (old LNB component verification) is unified under PanaCIM-EE. • Please select a desired license from "PanaCIM-EE support". • Please refer to "5.1 Component Verification" for details.
C-10	To use existing system effectively.
Customer	
	Upper communication (License)
	• This is an open interface which is in cooperation with customer's existing system. As standard interface is prepared, it's possible to intercommunicate necessary information. Depending on the purpose of customer's system, functions of "Event", "Component verification with other vendor's machine", and "Information for component management" can be used. • It is not available to select with "PanaCIM-EE ready (License)" at the same time. (It is included in "PanaCIM-EE ready (License).") • It is not available to select with "iLNB ready (License)" at the same time. (It is included in "iLNB ready (License).") • Please refer to "5.3 Upper Communication" for details.

C-11	To connect the factory-side plumbing to equipment to enable primary air connecting
Customer	
Primary air hose unit	
Primary air hose unit is used for primary air connecting where factory-side plumbing is connected to equipment.	

C-12	To use large reels
Customer	
Separator for feeder cart	
Separator for feeder cart is used when supplying taping components for large reels.	

D-1	To keep the machine condition in regular maintenance.		
Option name	Usage	Description	Remarks
Customer Grease gun set	Greasing the specified parts of machine	Grease gun Nozzle 	Common with insertion machine series
Customer Maintenance jig	Regular maintenance	Grease for Heads (Contained in a syringe) Nozzle cleaning jig (Pin gauge) Cleaning brush	Common with NPM series and AM100
• These are used for the periodical application of grease and cleaning in machine maintenance, etc. • They are necessary in purchasing the first machine.			

D-2		To calibrate as needed.							
• Insertion head jig kits for various adjustments.									
Option name	Usage	Description	Recommended set						
			Calibration after head exchanging				All calibration		
			Insertion only			Including placement	Insertion only		Including placement
			Head with Body Chuck	Head with One Nozzle Attached	Head with Two Nozzles Attached	Head with One or Two Nozzle Head Attached	Head without Nozzle	Head with One Nozzle Attached	Head with Two Nozzles Attached
Customer ① Standard calibration jig kit	For calibration in changing heads	Jig station Jig parts Jig for body chuck	①	① +	① +	① +	① +	① +	① +
Customer ② Nozzle head calibration jig kit (one nozzle attached)	For calibration in changing heads For pickup position calibration (Nozzle only)	Jig parts Jig for nozzle Used for 1003 nozzle Jig for component pickup height teaching Used for 1002 nozzle							
Customer ③ Nozzle head calibration jig kit (two nozzles attached)	For calibration in changing heads	1003 nozzle (Additional)							
Customer ④ Jig kit for adjusting the main body (For body chuck)	For mul-ti-recognition-camera-related calibration	Multi-camera jig							
Customer ⑤ Jig kit for adjusting the main body (For nozzle)	For mul-ti-recognition-camera-related calibration	Multi-camera jig							
Customer ⑥ Jig kit for accuracy detection	For QFP placement position teach/accuracy detection	Jig parts, Jig parts supplier, Jig parts supply pallet, Glass PCB and Two 1005 nozzle							
Customer ⑦ Plane calibration jig	For plane calibration	Common with NPM-W2, AM100							
Customer Jig kit for adjusting the anvil	For calibration when removing the anvil	Jig for anvil position calibration							

D-3	To remove the head	
Option	Usage	Description
Customer Unit exchanging tool	Replacement of removal of head unit	Torque wrench Long bit
• This is exclusively for NPM series.		

11. Paint Color

■ Standard color

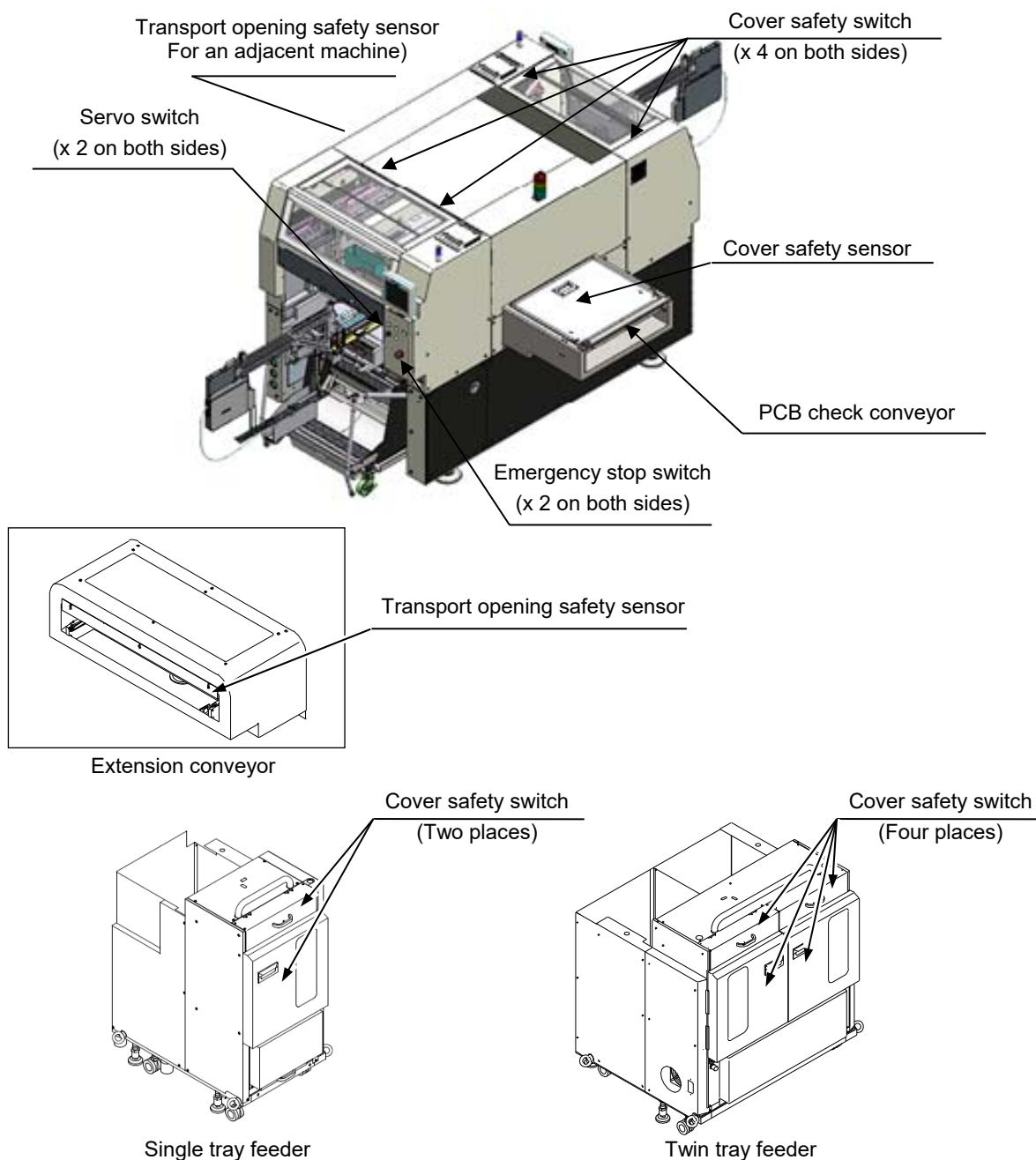
White W-13 (G50)

* The paint color cannot be designated.

12. Safety Devices

NPM-VF has the following safety devices for the safety use of machine.

When an emergency stop switch is pressed or the cover is opened while the machine is operating, the operation is forcibly stopped.



** Remarks **

- Please check thoroughly the separate instruction manuals and the warning instructions of equipment to operate the machine properly, regardless of it being in operation or in stop, for the purpose of safety uses.
- Illustration of the main body shows the PCB transferring left←right. In the case of transferring left→right, PCB recognition conveyor shall be mounted at the left side of main body.

13. Electric / Pneumatic

13.1 Electric Source Unit

- The power source should be connected with four-conductor cable ranging from 3.5 mm² to 5.5 mm², by using the exclusive tool.
- The cable should be clamped in to points as the lower left figure shows.
 1. Outer diameter dimensions of the cable: $\phi 13.5$ mm ~ $\phi 18.0$ mm
 2. Be sure to secure the cable with the cable clamps so that it will not be moved by being pulled (100 N) or turned.

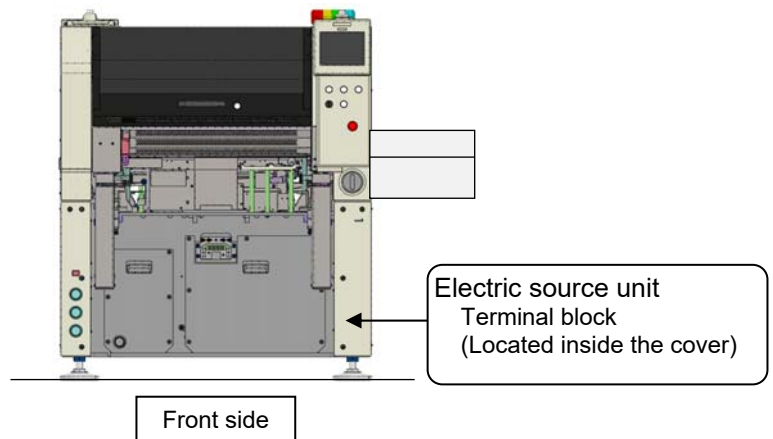
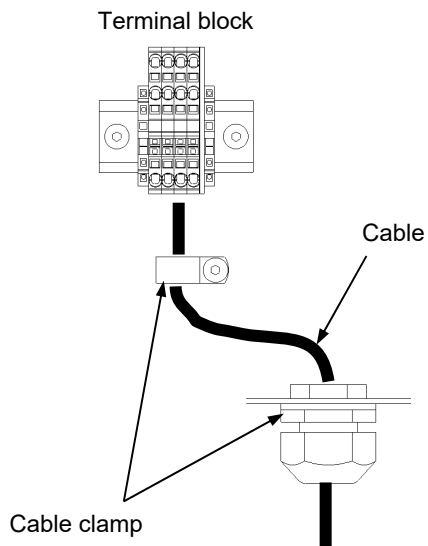


Illustration of the main body shows the PCB transferring left←right. In the case of transferring left→right, PCB recognition conveyor shall be mounted at the left side of main body.

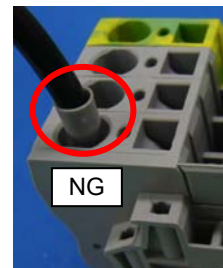
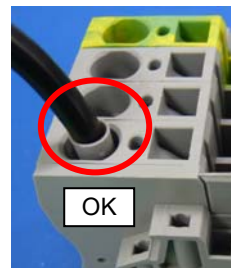
Precautions in terminal block connection

Terminal connecting pin (Recommended)
 Manufacturer: Phoenix Contact
 Type: 3.5 mm² ~ 4.0 mm² AI 4-12 GY
 5.5 mm² ~ 6.0 mm² AI 6-12 YE

1. Insert the sleeve terminal with its uneven surface parallel to the terminal block.
2. Make sure that the sleeve terminal is fully inserted.
3. Use a tool like the one shown below.



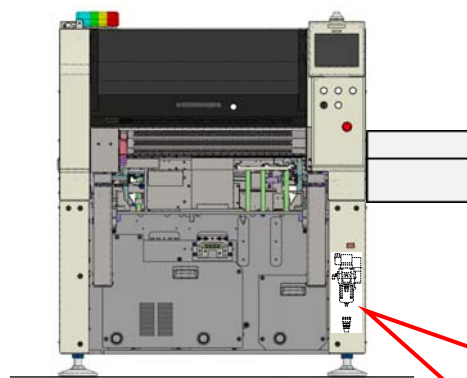
4. If the sleeve terminal is not used, fully check for the conductors spread out and the inserted state.



** Remarks **

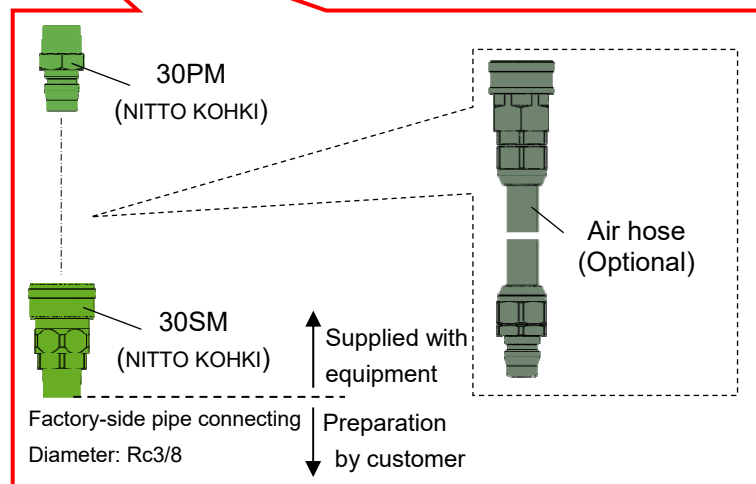
- Please prepare the electric source cable by yourself.

13.2 Pneumatic Source Unit



Rear side

Illustration of the main body shows the PCB transferring left←right. In the case of transferring left→right, PCB recognition conveyor shall be mounted at the left side of main body.

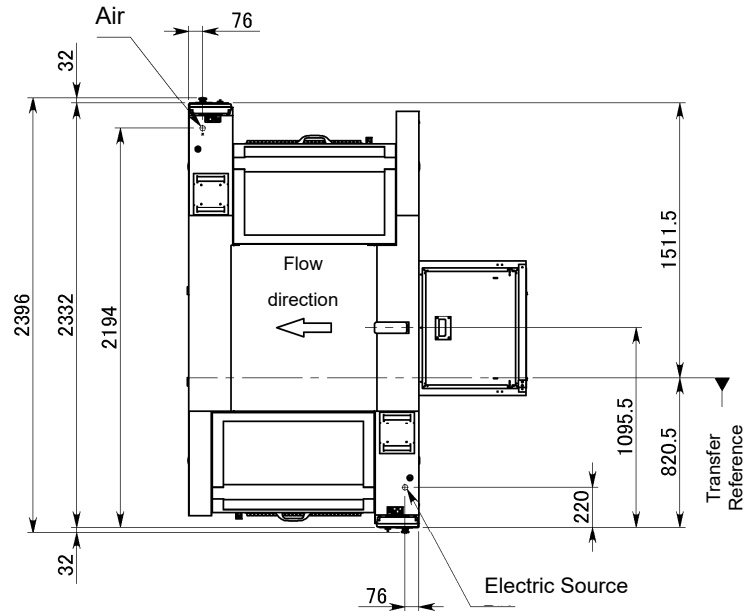


14. Dimensions

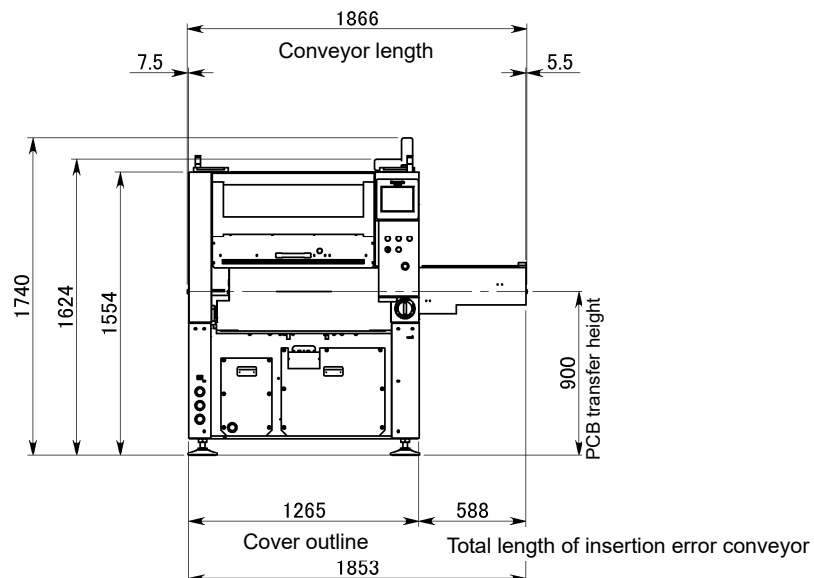
(Unit: mm)

■ Main body dimensions (Without extension conveyor)

Without extension conveyor



Front side



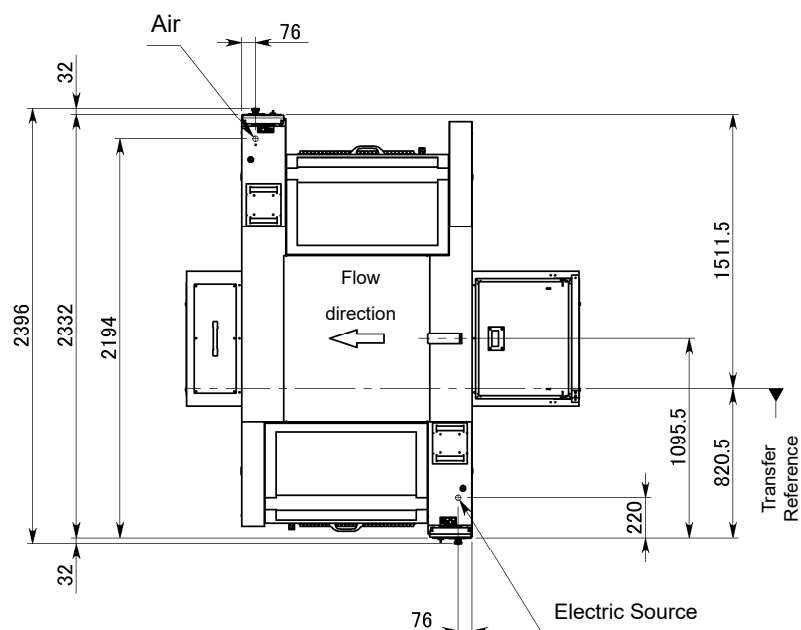
** Remarks **

- The above illustrations do not strictly agree with the actual machine in a reduced scale, etc. When examining the line configuration, dimensions, etc., please ask for the materials for them.
- If passing ducts etc. under this machine, please secure 40mm or more space in between them.
- When transferring left →right, PCB recognition conveyor is mounted at the left side of main body.

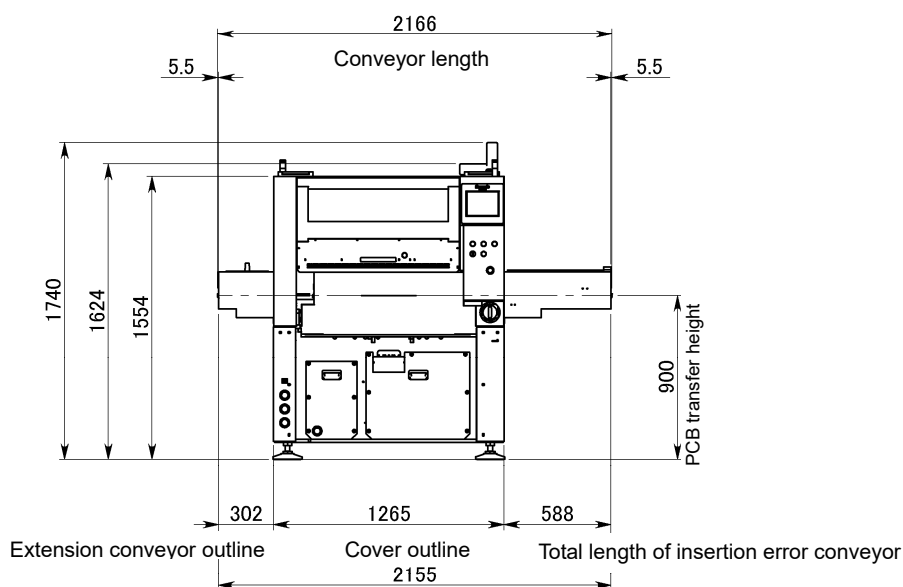
(Unit: mm)

■ Main body dimensions (With extension conveyor)

With extension conveyor



Front side

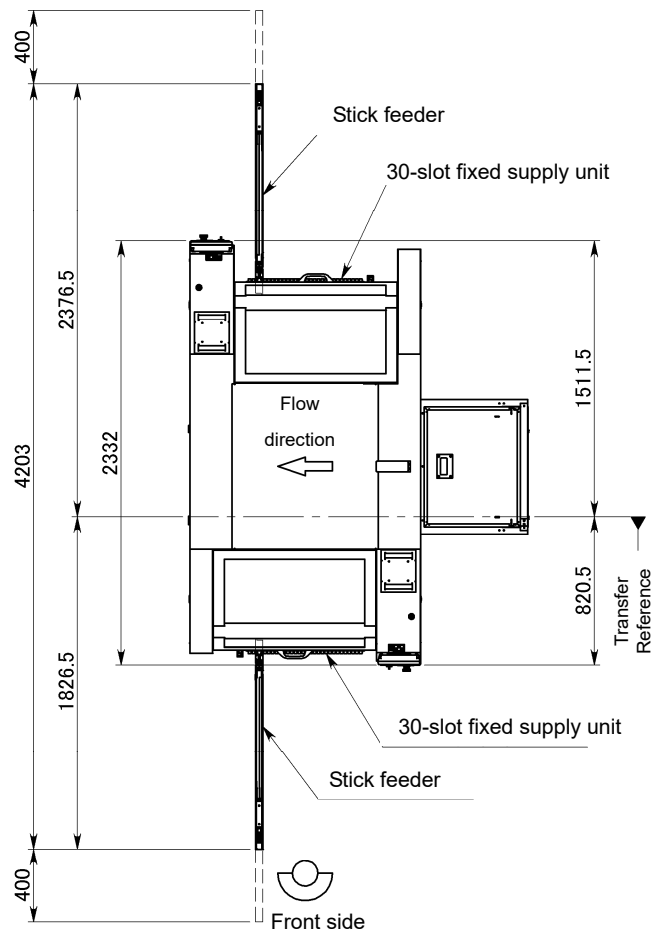


**** Remarks ****

- The above illustrations do not strictly agree with the actual machine in a reduced scale, etc. When examining the line configuration, dimensions, etc., please ask for the materials for them.
- If passing ducts etc. under this machine, please secure 40mm or more space in between them.
- When transferring left →right, PCB recognition conveyor is mounted at the left side of main body, main body is mounted at the right side.

(Unit: mm)

■ When connecting to 30-slot fixed supply unit on both sides

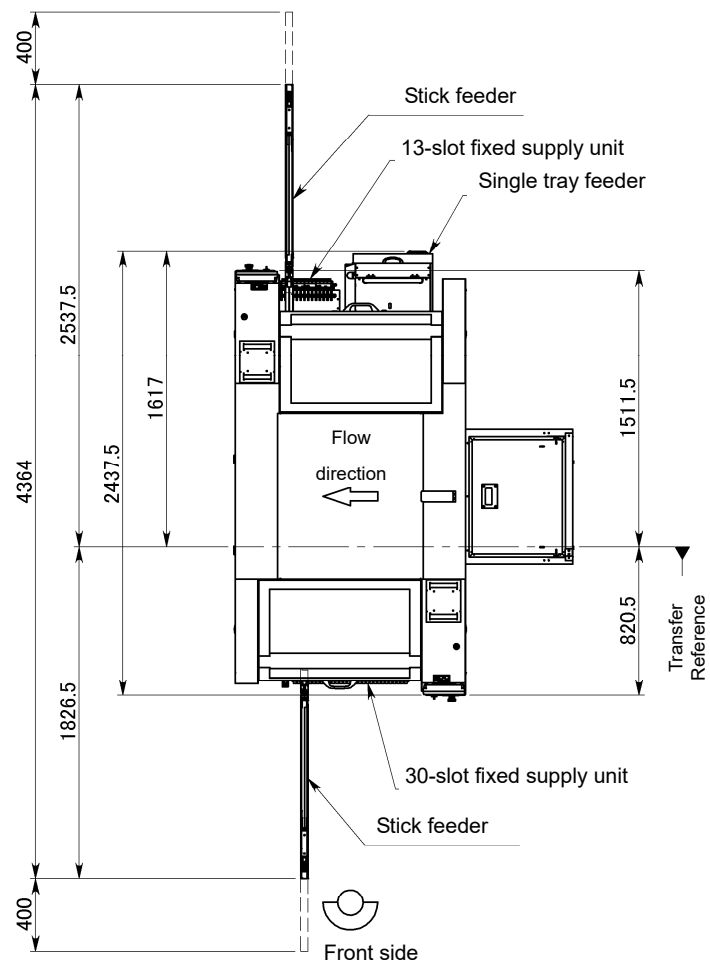


* When exchanging the feeder, the space required is as the following.

- When removing feeders from the side, a space of 400mm as in the figure above is required.
- In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required.

(Unit: mm)

■ When connecting to 30-slot fixed supply unit on the front side and single tray feeder on the rear side

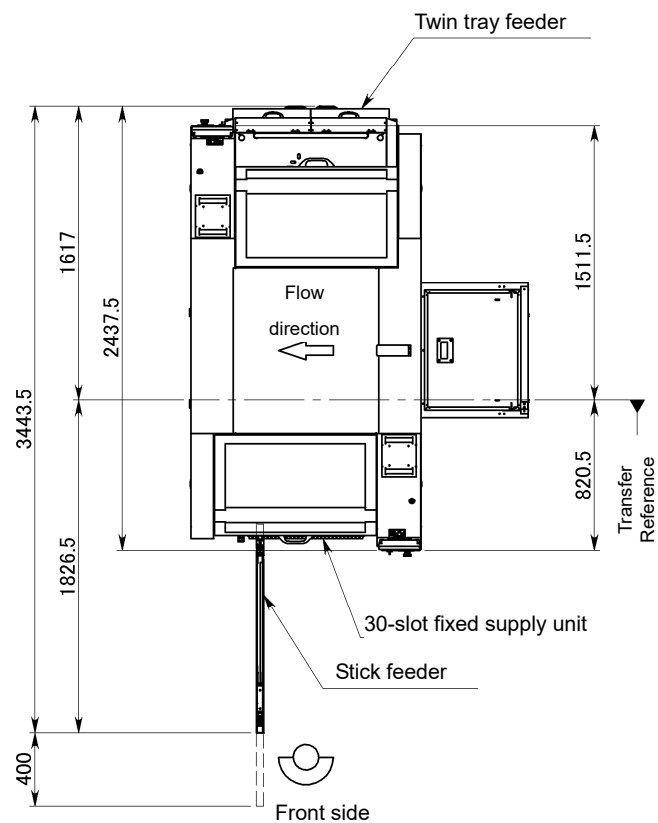


* When exchanging the feeder, the space required is as the following.

- When removing feeders from the side, a space of 400mm as in the figure above is required.
- In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required.

(Unit: mm)

■ When connecting to 30-slot fixed supply unit on the front side and twin tray feeder on the rear side

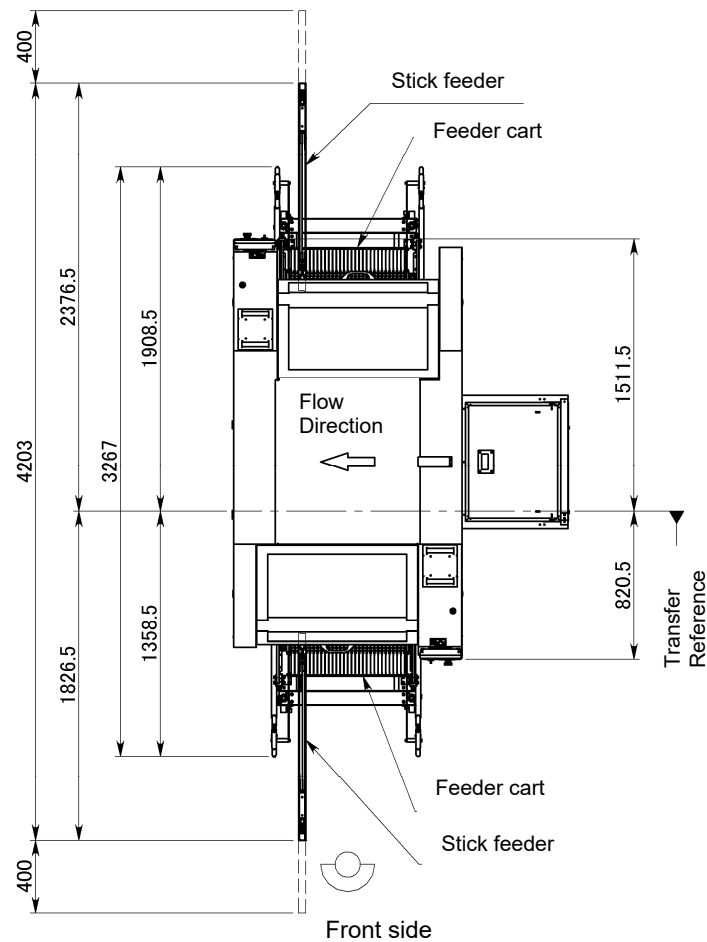


* When exchanging the feeder, the space required is as the following.

- When removing feeders from the side, a space of 400mm as in the figure above is required.
- In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required.

(Unit: mm)

■ When connecting to feeder cart on both sides

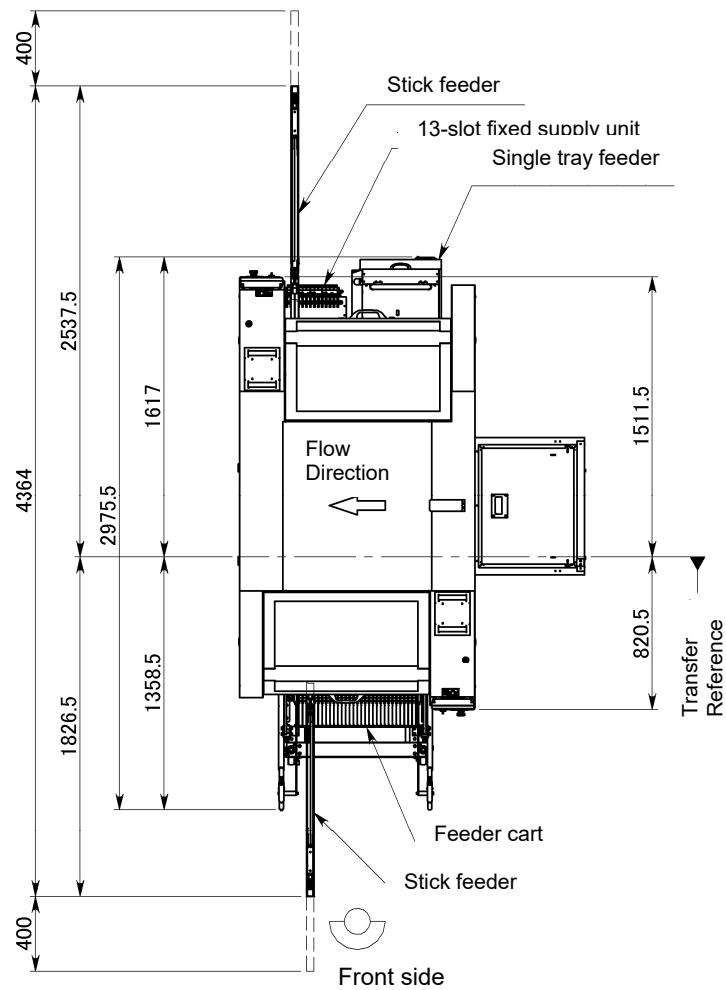


* When exchanging the feeder, the space required is as the following.

- When removing feeders from the side, a space of 400mm as in the figure above is required.
- In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required.

(Unit: mm)

■ When connecting to feeder cart on the front side and single tray feeder on the rear side

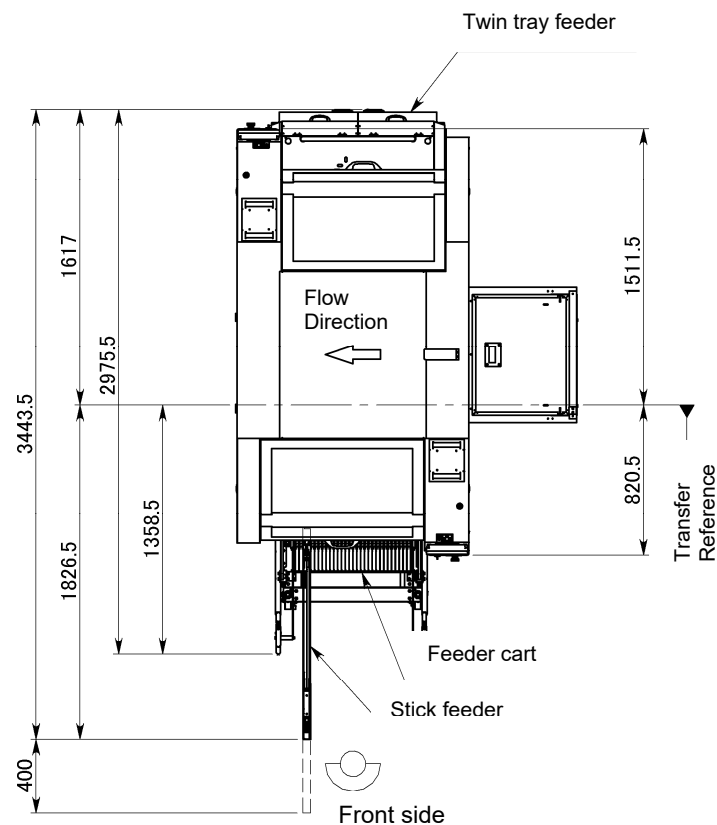


* When exchanging the feeder, the space required is as the following.

- When removing feeders from the side, a space of 400mm as in the figure above is required.
- In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required.

(Unit: mm)

■ When connecting to feeder cart on the front side and twin tray feeder on the rear side

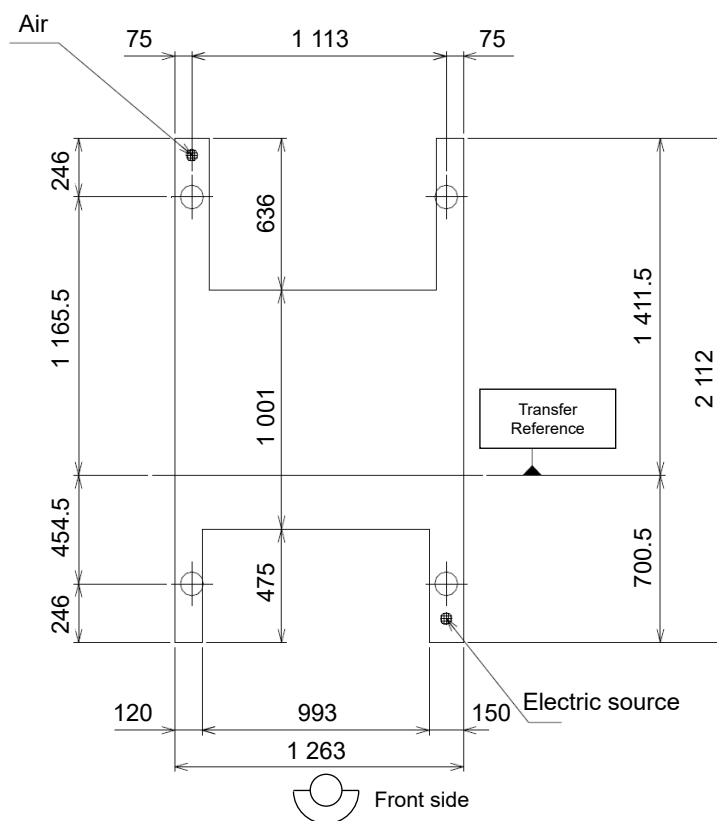


* When exchanging the feeder, the space required is as the following.

- When removing feeders from the side, a space of 400mm as in the figure above is required.
- In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required.

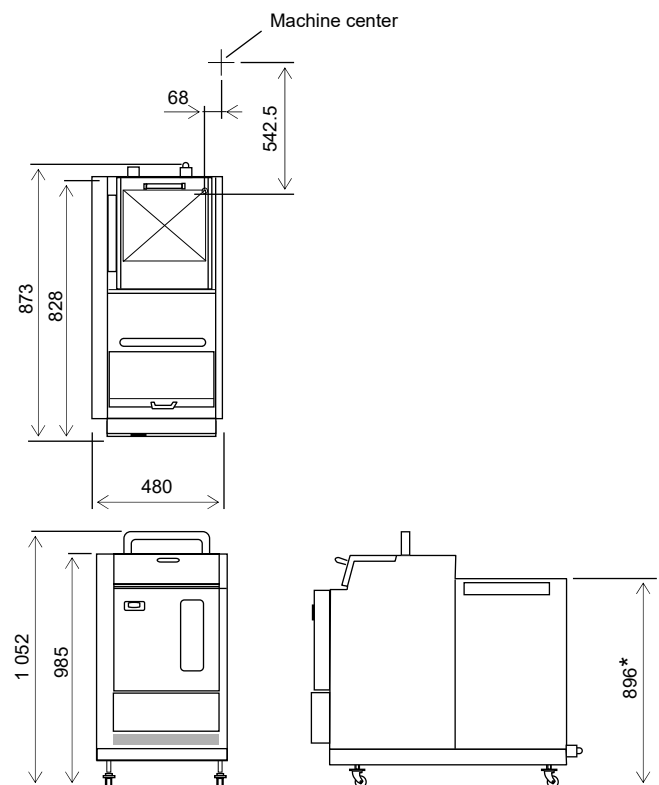
(Unit: mm)

■ Adjust Bolt Diagram



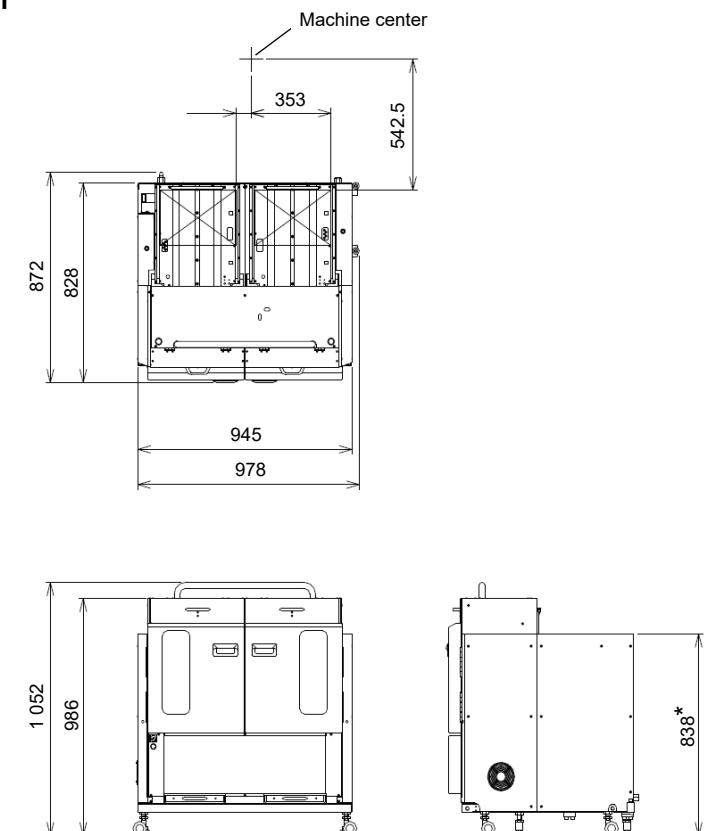
(Unit: mm)

■ Single tray feeder



* The tray feeding height of 896 mm is a standard value when the PCB transport height of NPM-VF is 900mm.
The adjustable range: $896^{+65}_{-16.5}$ mm

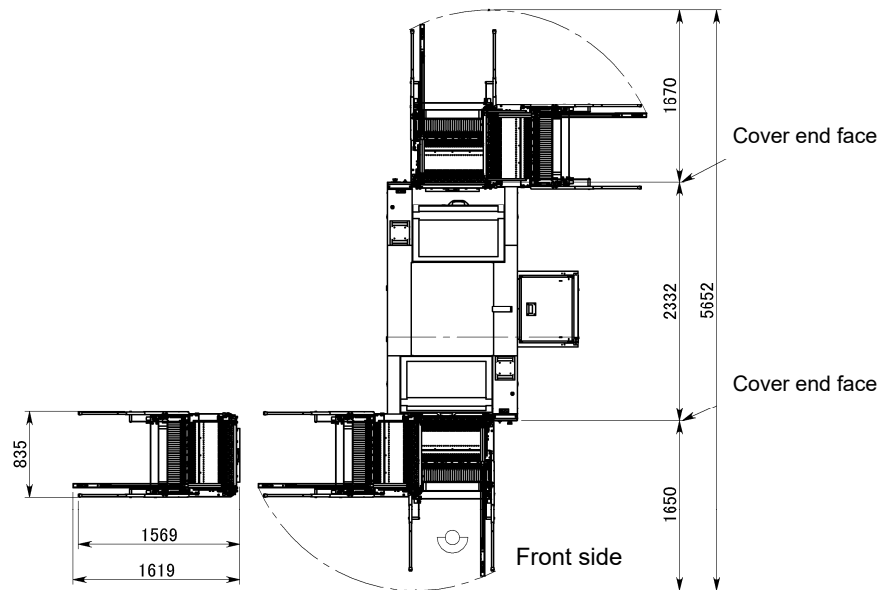
■ Twin tray feeder



* The tray feeding height of 838 mm is a standard value when the PCB transport height of NPM-VF is 900mm.
The adjustable range: $838^{+65}_{-16.5}$ mm

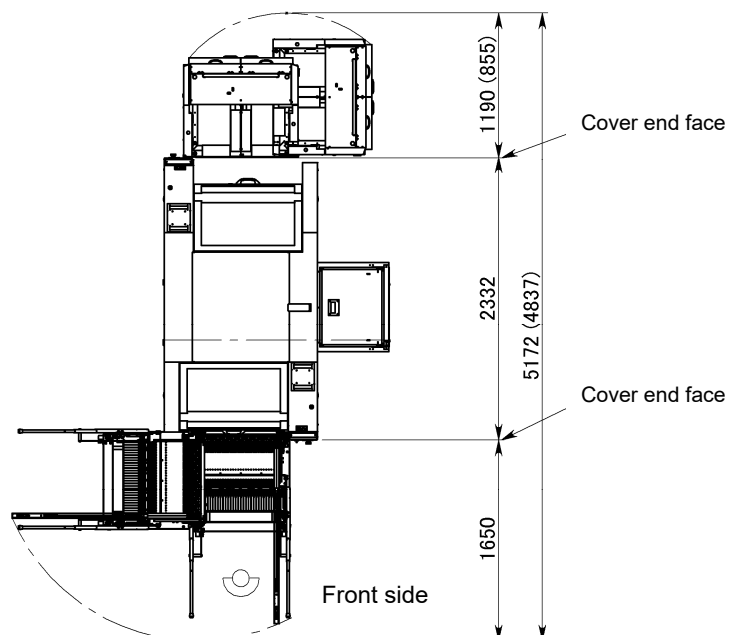
When exchanging the feeder cart, this is a necessary minimum space.
Before installing the machine, please be sure to secure the following space.

(Unit: mm)



This is the minimum space to be required in installing the twin tray feeder.
Since the tray feeder may be detached in maintenance, please be sure to secure the following space.

- The dimensions in () are used for the single tray feeder.



** Remarks **

- The floor slope in the feeder cart installation area needs to be 6 mm or less in the right/left direction and 11 mm or less in the forward/backward direction. If the floor slope is beyond the above limit, the feeder cart cannot be taken in and out.

15. Regarding Licenses

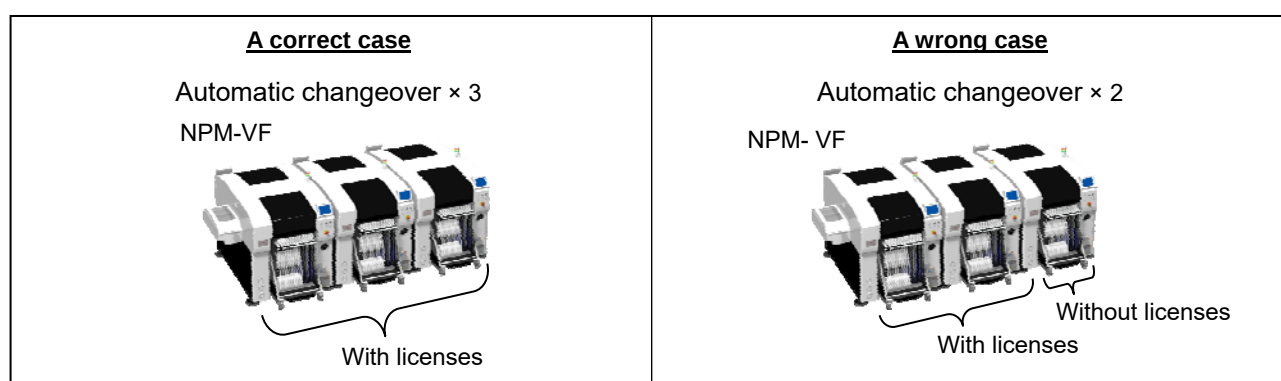
In order to operate the following software (options), you are required to purchase licenses for respective software.

- PanaCIM-EE ready
- iLNB ready
- Component Verification
- Automatic changeover
- Upper Communication
- Support station box (Component verification type)
- Component inspection before pickup (Polarity)

A license is required for each machine that is intended for the operation.

Selections for the above software must be identical among all machines in a line.

Regarding the case in where machines with or without software licenses mixed up in a line, we cannot assure the operation in the whole line.



IMPORTANT—

In order to use above software, you are required to agree to the “Terms and conditions regarding the use of software” on the following page.

Please be sure to look through it.

Terms and conditions regarding the use of software

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Important Notes

1. Performance assurance of the Product is subject to the condition that the Product is used in accordance with specifications, specification manuals, and operating instructions provided by us. We do not guarantee performance if the Product is used in any way other than those described in such documents.
 - (a) Never use the Product near any noise generation sources such as welding machines, which will result in malfunctions.
 - (b) Do not unnecessarily turn off the power switch, servo switch, or air during operation; it will run without being controlled, which will result in damage.
 - (c) Before teaching operations or conducting manual operations in a servo free state, make sure there is no interference in the unit, which will result in damage.
 - (d) The covers of the main body, loader/unloader, tray feeder, and the other covers may be cylinder-locked.
Do not attempt to forcibly open the covers, which will result in damage to the covers and/or cylinders.
 - (e) Do not take apart or alter the equipment and its units, as it may influence product safety and/or its quality.
 - (f) Data modifications must only be undertaken by professionally trained and approved personnel. Modifications by unqualified personnel may be a cause of input error, which will result in malfunctions.
 - (g) Do not block any of exhaust openings and intakes. Excessive temperature in the control box is a cause of abnormal functioning.
 - (h) Do not turn off the servo switch during operation, as it may result in control failure.
Always set the Product to a temporarily paused state (e.g. single stop or cycle stop) or operation stop state before the Product is turned off.
 - (i) Be attentive to water quality when using spraying devices and/or humidifiers. In an environment where ultrasonic humidifiers are used, for example, mineral components such as calcium or magnesium, and components such as silica, carbonate, or iron, are released to the air. Such airborne particles stick to the equipment, resulting in the malfunction of sliding parts and/or optical components.
 - (j) Do not use the Product in an atmosphere where gasified low molecular weight siloxane exists.
Low molecular siloxane, released by exposed silicone-based materials (e.g. silicone adhesives, silicone oils, or silicone powders), sticks to the electric contact parts and/or optical components, and will result in contact failure and/or malfunction.
 - (k) Do not use the Product in corrosive gas environments (e.g. nitric acid, hydrogen sulfide, or ammonia), halogen gas environments, or any environment where conductive foreign substances may enter.
Electrodes and/or metal parts of electric components will corrode, and will become a cause of the malfunction of electronic circuits and/or malfunctions.
2. We shall not be held liable for the following failures and damages.
 - (a) Failure and/or damage caused by wrong use or improper repair, adjustment or modification
 - (b) Incidental damage (e.g. loss of profits or the interruption of business) arising from the use of or inability to use the Product
 - (c) Failure and/or damage caused by relocation or transportation of the Product, the dropping of the Product itself or by objects falling on the Product after purchase
 - (d) Failure and/or damage caused by fire, earthquake, flood, thunderbolt, other natural or man-made disasters, pollution damage, salt damage, gas damage (e.g. corrosive gas or halogen gas), abnormal voltage, or the use of power sources besides those specified (e.g. voltage or frequency)
 - (e) Failure and/or damage caused by carriers during delivery via vehicle, ship, or other modes of transport.
 - (f) Damage arising from failure to observe the instructions/cautions of the operating instructions provided with the Product.
 - (g) Any failure caused by hacking, unauthorized access, attacks upon the Product or connected networks and from other similar threats
3.
 - (a) We shall not be held liable for any damage caused by any dispute alleging or claiming the infringement of intellectual property rights and other rights arising in connection with manufacturing inspections or other processes performed during the use of the Products, including any allegation or claim that any items manufactured and/or inspected using the Products is infringing intellectual property rights or other rights of any third party.
 - (b) We shall not be held liable for any allegation or claim of infringement which has been settled or which judgment has been reached without our express written consent.
4. We shall in no event be held liable for any indirect or consequential damages, or for loss of profit that may arise in connection with the Products or their use.
5. The user shall be responsible for determining the necessary structural reinforcement or modifications to the building in which the Products will be installed and for the completion of such measures, all at its own cost and expense, prior to the date of delivery of the Products.

Some of our products fall under the export control items (or technologies) established in the Foreign Exchange and Foreign Trade Act. When exporting (or providing technologies overseas), please check its legal restrictions and be sure to take necessary procedures such as to obtain the export permission.

Panasonic Smart Factory Solutions Co., Ltd.