Panasonic

Ver. 2021.0212

Specification

【 Electronic Component Mounting System 】

Production Modular

Model ID : NPM-W2

Model No. : NM-EJM7D (Mount)
NM-EJM7D-MD (Mount + Dispense)
NM-EJM7D-MA (Mount + AOI)
NM-EJM7D-D (Dispense)
NM-EJM7D-A (AOI)

Panasonic Smart Factory Solutions Co., Ltd.

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● 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.

Revision date	Version	Revised page	Revisions
Dec. 10, 2014	Ver. 2014.1210	---	First edition
Dec. 16, 2014	Ver. 2014.1216	P. 5, 12, 39, 84, 89, 95, 98	Addition of 4 mm thin type single tape feeder and its associated options
Apr. 1, 2015	Ver. 2015.0401	P. 39, 52 ~ 56, 65, 66, 76, 85, 89, 96, 100, 109 ~ 113	・Addition of maintain the thin type single tape feeder by IFCU ・PanaCIM (support “Material Control module” and “Production Monitoring module”) ・Feeder Setup Navigator(support mobile terminal, others) ・Addition of Head maintenance unit and its associated options ・“4.7 Recognition Unit Configuration” :Addition of explanation ・Addition of Win8.1 support. For the PC (NIP) which is using interface software from other companies.
Apr. 28, 2015	Ver. 2015.0428	P. 86, 112, 113	Addition of Automatic Tape Splicing Unit (ATSU)
Jun. 15, 2015	Ver. 2015.0615	P. 69, 87, 115, 116, 128	Addition of Component Supply Navigator Addition of Feeder Maintenance Unit (IFMU).
Jul. 24, 2015	Ver. 2015.0724	P. 69, 85, 98, 112, 113	・Revision of Component Supply Navigator ・Revision of Head maintenance unit
Aug. 20, 2015	Ver. 2015.0820	P. 61	・Change of the product name of wireless scanner(PDA). MC75 ⇒ MC55
Jan. 22, 2016	Ver. 2016.0122	P. 101	・Correction of typo On-site ⇒ Factory
Feb. 19, 2016	Ver. 2016.0219	P. 11	・“3.2 Standard Functions” :Addition of explanation
May. 25, 2016	Ver. 2016.0525	P. 79 ~ 81, 132	Function addition： ・Automatic recovery function for pickup error ・Component inspection before pickup (Polarity) ・Message board ・Head diagnosis
Oct. 18, 2016	Ver. 2016.1018	P. 3 ~ 5, 39 ~ 41, 90, 96, 97, 122, 124, 126	・Addition of 8mm Auto Load Feeder and its associated options
Nov. 18, 2016	Ver. 2016.1118	P. 62, 72	・Revision of Component Verification
May. 22, 2017	Ver. 2017.0522	P. 12, 26, 31, 42, 60, 80, 83, 92, 93, 100, 105, 107, 118 ~ 125, 145	・Deletion of the reference on 32 mm adhesive tape feeder ・Addition of Nozzle changer large type for 8-nozzle head ・Change to Nozzle 1599/1599N ・Microsoft® Windows® 10 Pro Addition of (32-bit/ 64-bit version) ・Revision of Component inspection before pickup (Polarity) <u>Function addition：</u> ・16-nozzle head constant mount load control (Lightweight type) ・16-nozzle head transfer (Lightweight type) ・Load checker ・Pre-pickup Inspection (Char/2D) ・Multi-recognition camera PIP lighting ・AOI info display function

Jul. 28, 2017	Ver. 2017.0728	P. 94, 130 ~ 135, 138	・Revision of Automatic Tape Splicing Unit (ATSU) ・Revision of Feeder Maintenance Unit (IFMU)
Aug. 31, 2017	Ver. 2017.0831	P. 12, 42, 44 ~ 46, 49, 76, 96, 104, 105, 116, 149 ~ 151	Function addition ・Stackable stick feeder ・Single stick feeder
Oct. 13, 2017	Ver. 2017.1013	P. 140	・Addition of Microsoft® Windows® 10 Pro for IFMU
Nov. 07, 2017	Ver. 2017.1107	P. 50, 56, 72, 78, 83, 123, 140, 142	・Change of software OS specifications, etc.
Feb. 23, 2018	Ver. 2018.0223	P. 46	・Addition of explanation about management of stackable stick feeder
Apr.16, 2018	Ver. 2018.0416	P. 26, 87, 88, 98, 122, 126 ~ 129	・Addition of tape feeder components in “Polarity recognition” and “Character/2D code recognition” in component inspection before pickup ・Addition of supplementary explanation about lightweight 8-nozzle head ・Modification of applicable component dimensions of multi-functional transfer unit
Sep. 05, 2018	Ver. 2018.0905	P. 60, 141, 158	・Addition of the size of applicable components of Multi-recognition camera (Type 2) ・Addition of specification to the PC requirements about IFMU ・Addition of “Important Notes”
Oct. 12, 2018	Ver. 2018.1012	P. 7, 45, 73, 80 ~ 83, 85 ~ 87, 89, 102, 103, 110, 125 ~ 127, 129 ~ 136, 161	・Revision of APC System ・Addition of APC-MFB2 ・Modification of the “Constraint condition” about Feeder Setup Navigator ・Addition of the descriptions for the use of stackable stick feeders
Nov. 1, 2018	Ver. 2018.1101	P. 34, 49, 94, 103, 122, 123, 161	・Addition of iLNB ready ・Addition of a dedicated jig(nozzle) list for head diagnosis ・Corrected errors, added descriptions, revised descriptions
Dec. 21, 2018	Ver. 2018.1221	P. 6, 7, 45, 73, 79 ~ 83, 85 ~ 90, 104, 126, 149	・Revision of descriptions about APC ready ・Addition of “Note” on auto load feeder ・Corrected errors, added descriptions, revised descriptions
Oct. 15, 2019	Ver. 2019.1015	P. 96 ~ 104, 113 ~ 115, 140 ~ 149, 160, 172	・Deleted explanations about IFCU ・Standardized the following options: ・Remote operation ・Biometric authentication ・Mount complete position recognition ・LCR checker (Feeder shape type)
Nov. 1, 2019	Ver. 2019.1101	P. 1, 11 52	・Revised the descriptions on connection to DX, D3/ D2/ D
Jan. 17, 2020	Ver. 2020.0117	----	・Deleted "Note" given at the beginning
Feb. 2, 2020	Ver. 2020.0207	P. 87	・Added APC-MFB, AOI recognition level and the range where MFB could be applied
Apr. 27, 2020	Ver. 2020.0427	P. 51, 79	・Quality information viewer, Support station (operating system compatibility updated) ・Other
Jun. 25, 2020	Ver. 2020.0625	P. 73	・Modification of the “System Requirements” about Feeder Setup Navigator
Sep. 28, 2020	Ver. 2020.0928	P. 66 ~ 68, 153, 156, 162 ~ 164	・Added LCR checker(Built-in type) ・Revised Feeder Maintenance Unit(IFMU) ・Added an additional explanation to Head Maintenance Unit
Oct 30, 2020	Ver. 2020.1030	P. 121	・Specified the fact that multi-recognition camera Type3 comes with side lighting
Jan 5, 2021	Ver. 2021.0105	P. 118, 154, 168	・Added Primary air hose to the options (illustration changed) ・Added separators to options

Feb 12, 2021	Ver. 2021.0212	P. 34	・Corrected an operational standard between pickup depth and nozzle length

Contents

1. General Description

■ **High Productivity**
Simultaneously materialized the further improved area productivity and the high accuracy placement through a lightweight 16-nozel head, a multi-recognition camera and a high rigid frame.

■ **Versatility**
It is possible to combine the “lightweight 16-nozzle head”, “12-nozzle head” suitable for super-high speed placement of microchips, the “lightweight 8-nozzle head” suitable for high speed placement of microchips to medium-size components, and the “3-nozzle head V2” that supports various kinds of odd-shaped components. Moreover, it is possible to support various processes by combination of the “2D inspection head” that performs various inspections of produced PCBs and the “Dispensing head” that applies adhesives in order to temporarily joint electric components.
Its standard compatibility with large-sized PCBs of up to L 750 × W 550 mm* has further enhanced its general versatility.
Possible to upgrade from 2D measurement specification to 3D (Thickness, 3D measurement) by employing “Multi-recognition camera” consolidated 3 functions (2D, Thickness and 3D measurement).
* For single conveyor specifications

■ **Efficient Changeover**
In the independent mode*, you can conduct a changeover on one lane while production continues on the other lane. It supports automatic support pin replacement (option) and an automatic changeover (option) so that it provides the best changeover for your production type.
* For dual conveyor specifications

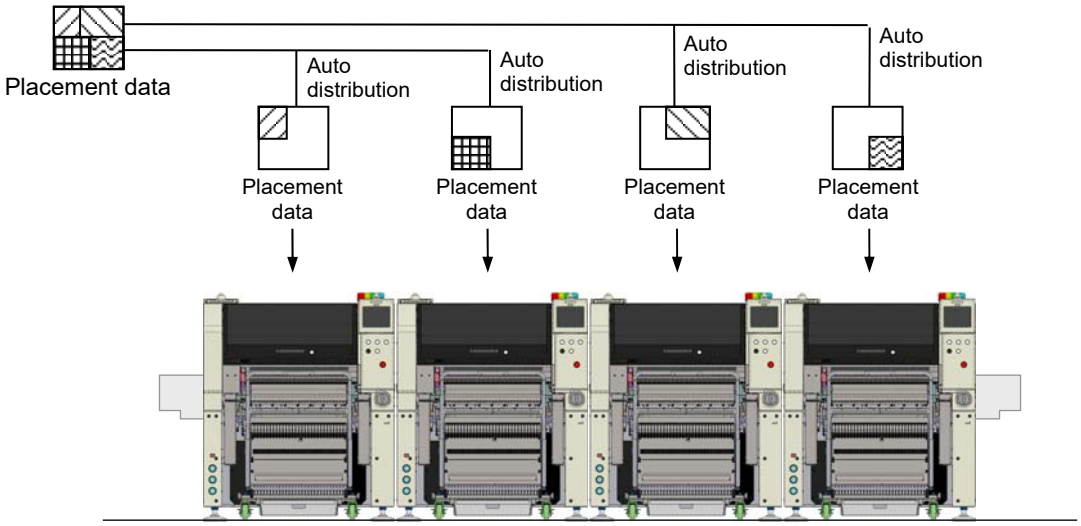
■ **High-Quality Placement**
High-quality placement is possible carrying over various unit and functions of NPM series.

2. Features

High Productivity

Support for machine coupling (modularizing)

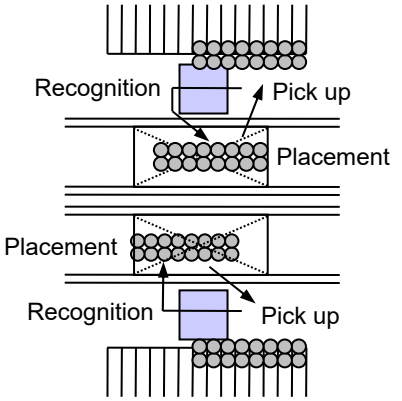
NPM-W2 supports coupling (modularizing); up to 15 machines* can be coupled.



Conceptual illustration of data distribution for a total of four NPM-W2 machines

* When the number of machines coupled exceeds 15 machines, please consult us.
* Connecting to NPM-DX/ D3/ D2/ D requires a traverser between them. The machine cannot be connected to NPM-TT or NPM.

Placement tact time



Conceptual illustration of placement.
(Lightweight 16-nozzle head)

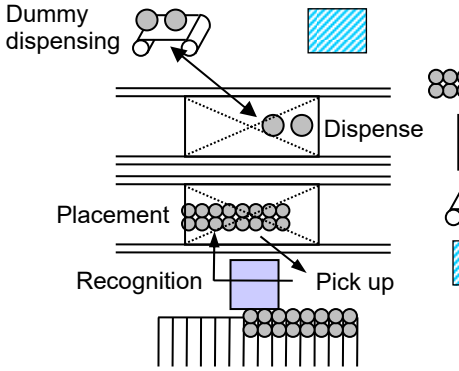
: Placement head

: Multi-recognition camera

0.047 s/chip

With 16-nozzle head specifications
(When high production mode is “ON”)

Dispense tact time



Conceptual illustration of dispensing

: Dispensing Head

: Placement Head

: Multi-recognition camera

: Dummy Dispensing unit

: Wiping Station

Dot dispense

0.16 s/dot

- XY movement: within 10 mm
- Without θ rotation
- Blow-off time: within 20 ms
- During continuous operation under optimum conditions

Draw dispense*1

4.25 s/part*2

- Drawing size: within 30 × 30 mm
- Corner dispensing,
  Under optimum conditions

*1 For drawing dispense (non-contact dispense), the height sensor (option) is required.
*2 PCB height measurement time (0.5 s) is included. (30 × 30 mm, with 4-point measurement)

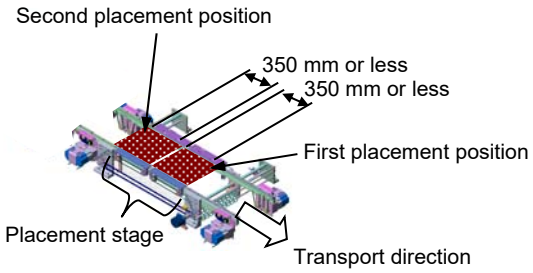
**** Remarks ****

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

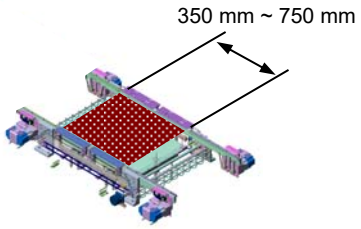
PCB exchange time

Two PCBs can be clamped when PCB length is up to 350 mm.
Even when the NPM-W2 is dual conveyor specification, clamping two PCBs per lane is also available.*1
When two PCBs are clamped, after the placement of the PCB on the downstream side is complete, that on the upstream side is carried out continuously.
In the case of PCBs of 350mm or less in length (L), one PCB is replaced by another within 2.3 seconds*2.
(That is attainable if no components are placed on the back side, and support pins are not used.
The others are based on our measurement conditions.)

*1 The two PCBs clamping is not done when share mode is selected in dual lane mode.
*2 Transfer time varies depending on such conditions as a PCB size and whether the support pins are used or not.
For further information, please contact us.



For small and middle sized PCBs as those for mobile phones, personal computers, and in-vehicle equipment, etc.



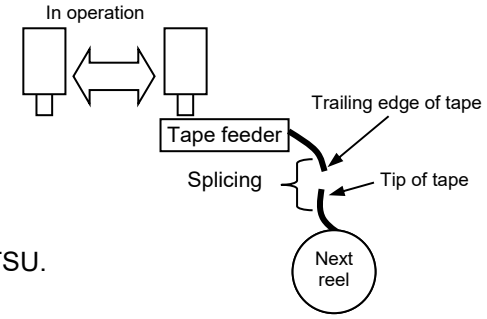
For large PCBs as those for AV equipment and server, etc.

When you use the dual conveyor (option), it is possible for you to exchange PCBs in one lane while you are placing components in another lane, resulting in actual PCB exchange time of 0 s.
(It can't be 0 s, when the cycle time is less than PCB exchange time.)

Feature of components supply during operation

NPM-W2 has a tape splicing function, which allows components to be supplied without stopping the placement process during operation.

If the number of components is pre-registered, a warning will be issued before they run out.



Tape splicing can be done in manual by hand or automatic by ATSU.

However, by using an auto load feeder,
tape splicing will not be needed and a continuous components supply can be provided.

Versatility

Auto Load Feeder (8 mm) *

This is a thin type feeder materialized automatic component tape setup.
The off-line setup time can be drastically reduced by the simple work of inserting a tape, then pressing the “Send” button. (Approx. 30s/reel ⇒Approx. 15s/reel)
If insert a following component in advance, this feeder can detect the tape end of preceding component and automatically supply the following component during production.
Because you don’t need a tape splicing work, the error stop of splice mistake can be prevented.
This auto load feeder can also use a short cut tape (longer than 120mm).

* Not available for emboss tape.
* Available for 0402, 0603, 1005 and 1608 paper tape components. If want to use 2012 or 3216, please contact us.

Compatibility with large-sized PCBs or components

NPM-W2 is standard compatible with large-sized PCBs of up to L 750 × W 550 mm*.
Large components of up to 150 × 25 mm (or 120 × 90 mm) and 30 mm high can be placed by the 3-nozzle head V2.

* For single conveyor specifications

Flexible location of the tape feeder*

The tape feeder can be located flexibly within the same table.
You can locate components alternately and the feeder for the next product at an empty slot.

* Using the “Support station: Component verification type”, you need to write data to tape feeders in advance. “Component verification (license)” is also needed.

Head exchange function

In NPM-W2, you can select any head from among the different types (placement, dispensing and inspection heads*2) for each table.*1

*1 Please select the Head for each table. It is possible to set different types of Heads to the front and the rear table. For the table of tray feeder, however, only the lightweight 8-nozzle head and the 3-nozzle head V2 are available.
*2 Inspection head can be selected for front side only.

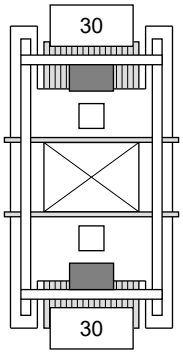
Number of setting feeder and tray

Up to 60 double tape feeders can be set on NPM-W2.
At this time, 120 reels can be set. (for the small reel)

30 feeders × 2 reels × 2 tables = 120 of 8 mm tape reels can be set.

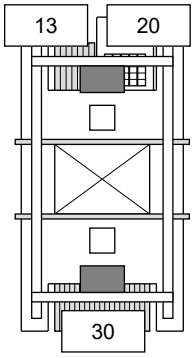
The single tray feeder connection table, equipped with 13-slot feeder base, allows you to set up 20 types of trays and 13 double tape feeders at the maximum.
Up to 40 types of trays can be set to the twin tray feeder connection table.

Feeder table



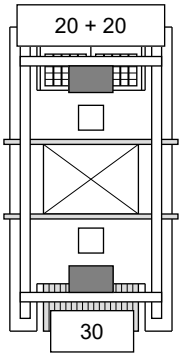
Feeder table

Single tray feeder
with 13-slot feeder base



Feeder table

Twin tray feeder



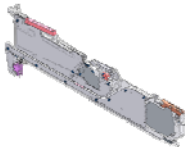
Feeder table

Compatibility with the CM series

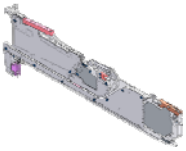
Compatibility of feeders, nozzle and others are secured for NPM series with CM series (CM602, CM402, CM401, CM400, DT401, CM232, CM212 and CM101) having good track record.

Versatility of feeders

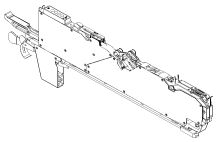
The feeders, which are compatible with the AM100 and CM series, support 4-mm up to 104-mm paper/ embossed tape.
Tape feeding is driven by the servomotor; feed pitch and feed speed are set according to the components.
These parameters are set by the data sent from the main body.



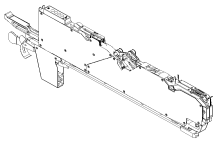
4 mm thin type
single tape feeder*



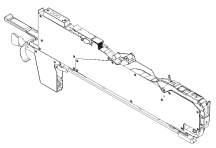
8 mm thin type
single tape feeder*



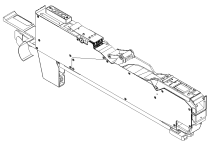
8 mm double
tape feeder



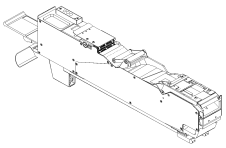
8 mm single
tape feeder



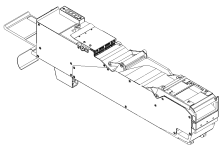
12/ 16 mm Tape feeder



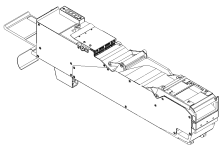
24/ 32 mm Tape feeder



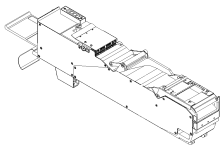
44/ 56 mm Tape feeder



72 mm tape feeder



88 mm tape feeder



104 mm tape feeder

8 mm thin type
auto load feeder*

*Thin type tape feeders cannot be used in CM series.

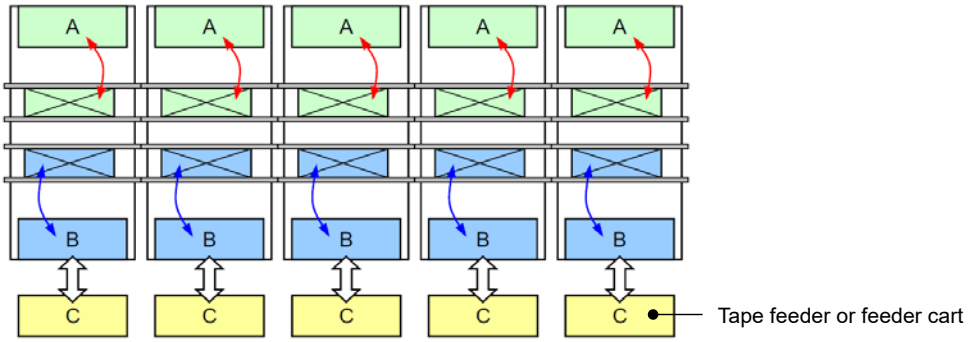
Efficient Changeover

Independent changeover

In the independent mode*1, you can perform a changeover (product data change and feeder cart replacement) on one lane while production continues on the other lane.*2

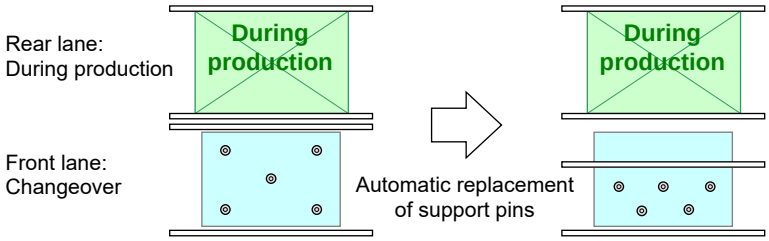
*1 For dual conveyor specifications
*2 It is not possible to do works by opening safety covers (such as manual replacement of support pins).
The “independent changeover support unit (option)” is necessary for feeder cart exchange.

Production example of the different types of products in the independent mode



Automatic replacement of support pins

A function to automatically set up the support pins using the placement head.
This does not need to access an operator inside the machine, contributing manpower saving for changeover and prevention of human errors.
It also realizes non-stop changeover during production in dual lane mode.



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.”

Multi job production

Per NPM-W2, 120 types of components (on an 8 mm tape basis) can be set. Even while the machine is running, it is possible to set the taped components for another model to vacant slots in advance, increasing the efficiency of changeovers. The data creating system NPM-DGS can sort the placement data for each stage, taking this multi-job production system into consideration.

High-Quality Placement

■ Component thickness measurement function (Multi-recognition camera: Type 2/ Type 3)

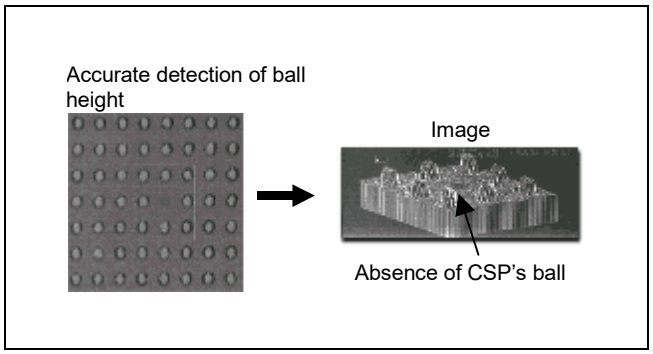
Two functions provide high quality placement. These are applicable for each Placement head.

・Measurement function of component thickness:
Component thickness is measured, and the results are reflected on placement height, making the placement more stable. Standing/tilted standing of micro components at the time of their pickup can also be checked simultaneously.

・Check function of nozzle tips:
Placement quality can be enhanced by periodical nozzle height checks.

■ 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.



■ Calibration feature

Our unique calibration program realizes high accuracy placement. An automatic calibration feature maintains initial high precision even during operation.
(Each parameter is automatically corrected by periodically recognizing the gauge mark during operation.)

■ High speed low vibration control

High speed low vibration control has been introduced to the XY unit operation.

■ 2D inspection function (solder inspection and component inspection)

Using color CCD camera and its own unique lighting, it executes inspection based on color processing.

・Items of solder inspection: Oozing, blurring, displacement, abnormal shape, bridging

・Items of component inspection: Component presence, misalignment, polarity difference, reversed, foreign object inspection (flying chips etc.)

There are two inspection types; resolution of 9μm can inspect component size of 0402 or more, and resolution of 18μm can inspect component size of 0603 or more.

■ APC (Advanced Process Control) System

APC-FF (Feed Forward)

APC-FF is our unique in-line process control system to improve the quality of mounting; it feedforwards deviation of the mounting position to mounters based on the position data of soldering inspection.

APC-FB (Feed Back)

APC-FB is our unique in-line process control system to improve the quality of mounting; it feedbacks deviation of the mounting position to printers based on the position data of soldering inspection.

APC-MFB (Mounter Feed Back)

APC-MFB is a control system to maintain the quality of mounting; it feedbacks the position data of mounted parts measured with inspection machines (AOI) to mounters after the parts were mounted.

■ Dispense of Pre-bonding adhesives

Quality enhancements can be made by dispense of pre-bonding adhesives to avoid movement of large components during material handling as well as to avoid large components dropping during reflow.

■ Corner Bonding

Panasonic's Patented "Corner Bonding" is a process. Prior to placement of BGA/ CSPs, dispensing of adhesives which do not interfere with the self-alignment effect will mitigate the risk of cracks in the interconnect which is induced by warpage of substrates. Dispensing is performed prior to placement where solder connection and curing of the adhesive is done simultaneously. *1
Point dispense or straight line drawing dispense is used for the corner bonding.*2

*1 Underfill process requires dispense > cure after reflow requiring 2 cycles of heat.

* 2 Advance proof must be necessary.

■ Height Sensor

It controls the placement/dispensing height of the nozzle by measuring the height (warpage) of PCB.
If a measurement result exceeds the acceptable value, a warning is issued prior to placement or dispensing to prevent the occurrence of quality defects.
There are two independent functions; PCB warpage correction (for placement head) and local PCB height correction (for dispensing head)

- PCB warpage correction (for placement head)
  Controls the placement height by measuring the height (warpage) of the whole PCB.

- Local PCB height correction (for dispensing head)
  Adjusts to the optimal nozzle height by measuring several PCB heights (warps) near the draw dispensing (non-contact dispensing) positions.

3. Specification

3.1 Standard Specifications

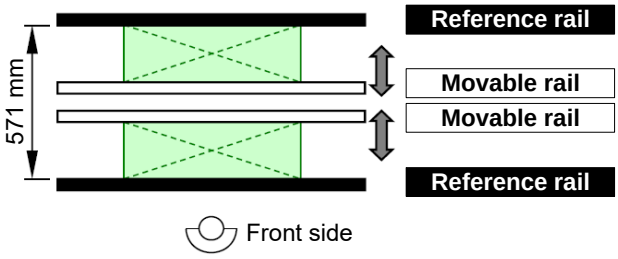
Item	Specifications
Electric source	・Rated voltage: 3-phase, AC 200/ 220 V ±10 V, AC 380/ 400/ 420/ 480 V ±20 V ・Frequency: 50/ 60 Hz ・Rated capacity: 2.8 kVA ・Feeding specification: For the case of AC 290 V or more (380 V or more tap), make sure that the feeding side is in star (Y) connection and the voltage between the PE (protective earth) terminal and each phase is AC 290 V or less. ・Peak current value during operation: 40 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: 0.5 MPa ~ 0.8 MPa (Working air pressure: 0.5 MPa ~ 0.505 MPa) ・Supply air amount: 200 L/min (A.N.R.)
Dimensions	・Feeder cart connected: W 1 280 × D 2 465 × H 1 444 mm ・Tray feeder connected: W 1 280 × D 2 570 × H 1 444 mm (without Signal Tower and Touch Panel)
Mass	・Main body: 2 470 kg ・Feeder cart: 190 kg ・Single tray feeder: 200 kg ・Twin tray feeder: 360 kg ・Inspection box: 70 kg ・Standard structure mass: 2 850 kg (Main body and two feeder carts)
Environment	・Temperature: 10 °C ~ 35 °C (Placement head) 22 °C ~ 28 °C (Dispensing head) 10 °C ~ 28 °C (Inspection head) ・Humidity: 25 %RH ~ 75 %RH (No condensation) ・Altitude: 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 (Chip/PCB recognition screen is displayed in superimpose 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.

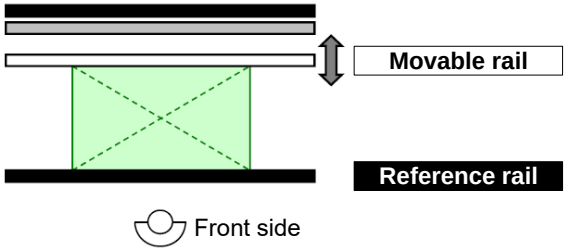
Control System	・Microcomputer system (VxWORKS) Full closed-loop system (Linear servomotor) [X, Y axis and Z axis (16-/ 12-nozzle head)] Semi closed-loop system (AC servomotors) [Z axis (lightweight 8-/ 3-nozzle head V2) and Dispensing head), θ axis and SC (Screw) axis]
Command System	・Designation of X, Y, Z and θ coordinates
Production data	・No. of placement points: Max. 10 000 points/machine, Max. 10 000 points/line*1 (Mounting coordinates, recognition mark coordinates, bad mark coordinates and PCB warp measurement points are included.) ・No. of Patterns (Blocks): Max. 1 000 patterns/machine, Max. 1 000 patterns/line (If PCB warpage measurement points are included, it shall be Max. 100 patterns/machine.) ・No. of Mark settings*: Max. 1 000 patterns/machine, Max. 1 000 patterns/line * The number exclusive of representative bad marks and group bad marks.
Others	・Program Functions: Please refer to “6. Other Standard Functions.” ・Data creation: Please refer to “NPM-DGS Specification.”

*1 In the dual lane mode production, it is the total of placement points in both front and rear lanes.
If the number of placement points exceeds 10 000 points/line, please contact us.
If the line is made up with the CM and NPM series coupled, please contact us.

3.2 Standard Functions

<table>
<tr><td rowspan="2">Item</td><td colspan="4">Specifications</td></tr>
<tr><td>16-nozzle head
(Lightweight type)</td><td>12-nozzle head</td><td>8-nozzle head
(Lightweight type)</td><td>3-nozzle head V2</td></tr>
<tr><td>Placement tact time
(Under optimum conditions)</td><td>77 000 CPH*1
(Chip: 0.047 s/chip)
70 000 CPH*2
(Chip: 0.051 s/chip)
IPC9850 (1608C):
59 200 CPH*1
56 000 CPH*2</td><td>64 500 CPH*1
(Chip: 0.056 s/chip)
62 500 CPH*2
(Chip: 0.058 s/chip)</td><td>41 600 CPH
(Chip: 0.087 s/chip)</td><td>16 640 CPH
(Chip: 0.217 s/chip)
13 000 CPH
(QFP: 0.277 s/QFP)</td></tr>
<tr><td colspan="4">* This may vary depending on components.
*1 When high production mode is “ON.”
*2 When high production mode is “OFF.”</td></tr>
<tr><td rowspan="2">Placement accuracy
(Under optimum conditions)</td><td>0402(01005”), 0603(0201”), 1005 placement
±0.04 mm*1: Cpk≧1
03015*2, 0402(01005”), 0603(0201”), 1005 placement
±0.03 mm*3: Cpk≧1
±0.025 mm*4: Cpk≧1</td><td>0402 (01005”), 0603 (0201”), 1005 placement
±0.04 mm*1: Cpk≧1
±0.03 mm*3: Cpk≧1</td><td>0402 (01005”), 0603 (0201”), 1005 placement
±0.03 mm: Cpk≧1
QFP placement
±0.05 mm: Cpk≧1
(12 × 12 mm or less)
±0.03 mm: Cpk≧1
(12 × 12 mm over to 32 × 32 mm or less)</td><td>QFP placement
±0.03 mm: Cpk≧1</td></tr>
<tr><td colspan="4">* This may vary depending on components.
* This data is applicable when the placement angle is 0°, 90°, 180°, or 270°.
For the other angles, the data changes.
* Sudden ambient temperature changes may affect the accuracy.
*1 When high production mode is “ON.”
*2 When “03015 placement support” is selected. (Panasonic specified requirements)
*3 When high production mode is “OFF.”
*4 When “±0.025 mm placement support” is selected. (Panasonic specified requirements)</td></tr>
<tr><td colspan="5">Applicable component</td></tr>
<tr><td></td><td>Component dimensions</td><td>03015*1 chip
~ 6 × 6 mm</td><td>0402 (01005”) chip
~ 12 × 12 mm
(There are pickup limitations on components over 6 × 6 mm.)</td><td>0402 (01005”) chip
~ 32 × 32 mm
(There are pickup limitations on components over 12 × 12 mm.)</td><td>0603 (0201”) chip
~ 120 × 90 mm
or 150 × 25 mm*2</td></tr>
<tr><td colspan="4">*1 When “03015 placement support” is selected. (Panasonic specified requirements)
*2 Component dimensions may be subject to constraints under either of two conditions; the placement of a large-sized connector and the relation between the pickup position and the recognition range. Any components over 45 × 45 mm are subject to the restriction of the placement speed. For more information, please contact us.</td></tr>
<tr><td></td><td>Component height</td><td>Max. 3 mm*</td><td>Max. 6.5 mm*</td><td>Max. 12 mm*</td><td rowspan="2">Max. 30 mm</td></tr>
<tr><td colspan="4">* Only for components with a pickup depth (the distance between the top surface of an embossed tape and the pickup surface) of 2 mm or less. (Mechanical constraints of the tape feeder and nozzles)</td></tr>
<tr><td></td><td>Mass</td><td>---</td><td>---</td><td>---</td><td>Max. 30 g</td></tr>
<tr><td colspan="2">Placement load control</td><td>---</td><td>---</td><td>---</td><td>0.5 N ~ 100 N
(In increments of 0.01 N)</td></tr>
<tr><td colspan="2">Placement Angle</td><td colspan="4">-180° ~ 180° (In increments of 0.01°)</td></tr>
<tr><td colspan="2">Recognition</td><td colspan="4">Head camera
・ Offset of PCB position and orientation by using recognition mark.
Multi-recognition camera: Type 1
・ Recognition and offset of all applicable components.
Multi-recognition camera: Type 2 (Type 1 + Component thickness measurement)
・ Measurement of component thickness (chip data registration, placement height control), detection of standing/tilted standing of components at the time of pickup, nozzle tip check.
Multi-recognition camera: Type 3 (Type 2 + 3D-measurement function)
・ Detection of coplanarity and XY-direction positions of all leads (pins) of such as QFP/ SOP.
・ Detection of existence or nonexistence/absence of all balls of such as BGA/ CSP.</td></tr>
<tr><td colspan="2">PIP lighting
(Applicable heads)</td><td colspan="4">3-nozzle head</td></tr>
</table>

<table>
<tr><th colspan="2">Item</th><th>Specifications</th></tr>
<tr><td colspan="3">PCB exchange time</td></tr>
<tr><td></td><td>Single conveyor</td><td>2.3 s (L 350 mm or less)
4.4 s (L 350 mm over to L 450 mm or less)
5.2 s (L 450 mm over to L 750 mm or less)*1
*1 It can be 4.4s, with the extension conveyor between equipment but without the backside mounting.</td></tr>
<tr><td></td><td>Dual conveyor</td><td>・Dual lane mode: 0 s
(It cannot be 0 s, when the cycle time is less than PCB exchange time.)
・Single lane mode*1:
2.3 s (L 350 mm or less)
4.4 s (L 350 mm over to L 450 mm or less)
5.2 s (L 450 mm over to L 750 mm or less)*2
*1 When production is implemented in a single lane mode, the optional PCB support block that supports single lane mode is needed.
*2 It can be 4.4s, with the extension conveyor between equipment but without the backside mounting.</td></tr>
<tr><td colspan="3">Applicable PCB</td></tr>
<tr><td></td><td>Single conveyor</td><td>・Dimension 50 × 50 mm ~ 750 × 550 mm
・Placement area 50 × 44 mm ~ 750 × 544 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 (Selectable)
・Reference Front reference, Rear reference (Selectable)
* Connecting to NPM-DX/ D3/ D2/ D requires a traverser between them.
The machine cannot be connected to NPM-TT or NPM.</td></tr>
<tr><td></td><td>Dual conveyor</td><td>・Dimension Dual lane mode : 50 × 50 mm ~ 750 × 260 mm
Single lane mode*1 : 50 × 50 mm ~ 750 × 510 mm
・Placement area Dual lane mode : 50 × 44 mm ~ 750 × 254 mm
Single lane mode*1 : 50 × 44 mm ~ 750 × 504 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 (Selectable)
・Reference
[Dual lane mode]
 

[Single lane mode*1]
 

*1 When production is implemented in a single lane mode, the optional PCB support block that supports single lane mode is needed.
* The rear reference is available when the machine is reversed.
(For single lane mode production only)
* Connecting to NPM-DX/ D3/ D2/ D requires a traverser between them.
The machine cannot be connected to NPM-TT or NPM.</td></tr>
<tr><td colspan="2">PCB transfer height</td><td>900 mm ~ 920 mm</td></tr>
</table>

Item	Specifications
Component Supply Unit	・Taping 4 mm Max. 120 inputs*1: Thin type tape feeder 8 mm Max. 120 inputs*1: Double/ Thin type tape feeder (Small reel) Max. 60 inputs*1 : Double/ Thin type tape feeder (Large reel) Max. 60 inputs*1 : Single tape feeder 12/ 16 mm Max. 60 inputs*1 24/ 32 mm Max. 30 inputs*1 44/ 56 mm Max. 20 inputs*1 72 mm Max. 14 inputs*1 : Only 3-nozzle head 88 mm Max. 12 inputs*1 : Only 3-nozzle head 104 mm Max. 10 inputs*1 : Only 3-nozzle head ・Single stick feeder Max. 30 inputs*1 : Only 8-nozzle head and 3-nozzle head ・3-lot stick feeder Max. 14 inputs*1 : Only 8-nozzle head and 3-nozzle head ・Stackable stick feeder (S) *2 Max. 8 inputs *1: Only 8-nozzle head and 3-nozzle head ・Stackable stick feeder (L) *2 Max. 8 inputs*1 : Only 8-nozzle head and 3-nozzle head ・Single tray feeder Max. 20 pieces : Only 8-nozzle head and 3-nozzle head ・Twin tray feeder Max. 40 pieces : Only 8-nozzle head and 3-nozzle head ・Auto load feeder Max. 120 inputs*1: When attachments for auto load feeder are used *1 When both front and rear units are the feeder carts. *2When using the stackable stick feeder, "Air supply unit for feeder" is required.

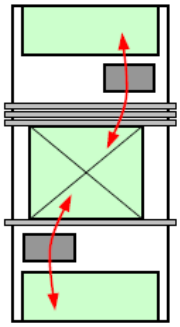
<table>
<tr><td colspan="2">Item</td><td colspan="2">Specifications</td></tr>
<tr><td colspan="2">2D Inspection Head</td><td>2D inspection head A</td><td>2D inspection head B</td></tr>
<tr><td></td><td>Field</td><td>44.4 × 37.2 mm (Resolution 18 µm)</td><td>21.1 × 17.6 mm (Resolution 9 µm)</td></tr>
<tr><td></td><td>Inspection processing time</td><td colspan="2">Solder inspection: 0.35 s/field
Component inspection: 0.5 s/field</td></tr>
<tr><td></td><td></td><td colspan="2">* This varies depending on inspection conditions. The following is the measurement conditions.
<table>
<tr><td></td><td>2D inspection head A</td><td>2D inspection head B</td></tr>
<tr><td>Solder inspection</td><td>88 points or less/field (in 1005)</td><td>22 points or less/field (in 1005)</td></tr>
<tr><td>Component inspection</td><td>111 points/field (in 1005)</td><td>25 points/field (in 1005)</td></tr>
</table></td></tr>
<tr><td></td><td>Object for Inspection*</td><td>Solder inspection
Chip component: 0.1 × 0.15 mm or more (0603 [0201”] or more)
Package component: φ0.15 mm or more</td><td>Solder inspection
Chip component: 0.08 × 0.12 mm or more (0402 [01005”] or more)
Package component: φ0.12 mm or more</td></tr>
<tr><td></td><td></td><td>Component inspection
Square chip (0603 [0201”] or more), SOP, QFP (0.4 mm pitch or more), BGA, CSP, Aluminum electrolytic capacitor, Volume, Trimmer, Coil, Connector, Network resistor, Transistor, Diode, Inductor, Tantalum capacitor, Cylindrical chip</td><td>Component inspection
Square chip (0402 [01005”] or more), SOP, QFP (0.3 mm pitch or more), BGA, CSP, Aluminum electrolytic capacitor, Volume, Trimmer, Coil, Connector, Network resistor, Transistor, Diode, Inductor, Tantalum capacitor, Cylindrical chip</td></tr>
<tr><td></td><td>Items of Inspection</td><td colspan="2">Solder inspection: Oozing, blurring, displacement, abnormal shape, bridging
Component inspection: Component presence, misalignment, reversed, polarity difference, foreign material inspection</td></tr>
<tr><td></td><td>The number of inspection</td><td colspan="2">Solder inspection: Solder points: Max. 30 000 points/machine (Component points: Max. 10 000 points/machine)
Component inspection: Component points: Max. 10 000 points/machine</td></tr>
<tr><td></td><td>Inspection accuracy (Under optimum conditions)</td><td>±0.02 mm: Cpk≧1.0</td><td>±0.01 mm: Cpk≧1.0</td></tr>
<tr><td></td><td></td><td colspan="2">* This is the solder position inspection accuracy measured with our reference using our glass PCB for plane calibration. It may also be affected by sudden change of ambient temperature.</td></tr>
</table>

* 03015R are not eligible.

<table>
<tr><td colspan="2">Dispensing Head</td><td>Dot dispense</td><td>Draw dispense</td></tr>
<tr><td></td><td>Dispensing tact time*1</td><td>0.16 s/dot
・ XY movement: within 10 mm
・ Without θ rotation
・ Blow-off time: within 20 ms
・ Without trial dispensing
・ During continuous operation under optimum conditions</td><td>4.25 s/part*2
・ Drawing size: within 30 × 30 mm
・ 10mm long L-shape corner dispensing
・ Without trial dispensing
・ Under optimum conditions</td></tr>
<tr><td></td><td>Dispensing Accuracy*1</td><td>±0.075 mm: Cpk≧1.0
・ Dispensing for 1608 at the condition of φ0.7 ±0.1 mm
・ Under optimum conditions</td><td>±0.1 mm: Cpk≧1.0
・ Dispensing for BGA at the condition of 30 × 30 mm shape
・ Under optimum conditions</td></tr>
<tr><td></td><td></td><td colspan="2">*1 The values such as tact time and accuracy are varied depending on conditions (e.g. adhesive).
*2 PCB height measurement time (0.5 s) is included. (30 × 30 mm, with 4-point measurement)</td></tr>
<tr><td></td><td>No. of nozzles loaded</td><td colspan="2">Max. 2 types</td></tr>
<tr><td></td><td>Applicable Components</td><td>1608 chip to SOP, PLCC, QFP, Connector, BGA and CSP</td><td>BGA and CSP</td></tr>
<tr><td></td><td>Supply vessel (barrel)</td><td colspan="2">30 mL (general: PS30S manufactured by Iwashita engineering, Inc.)
* Syringe of HDP series cannot use.</td></tr>
<tr><td></td><td>The Number of dispensing</td><td colspan="2">Max. 10 000 points/machine</td></tr>
</table>

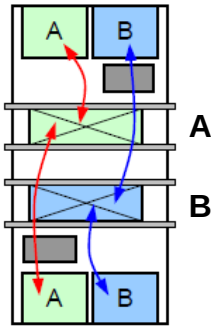
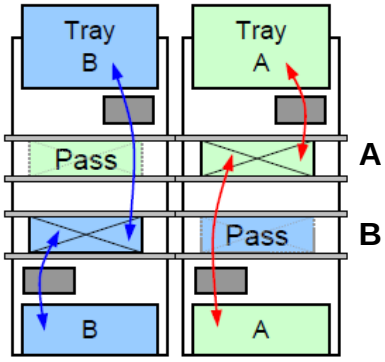
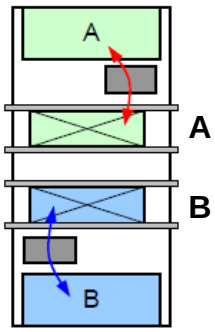
3.3 Placement mode

■ Single lane

	Share mode
Pattern	
Motion	Heads move in an alternating pattern during production.

■ Dual lane

Dual lane allows for 3 different placement modes with the movement of the front and rear heads.

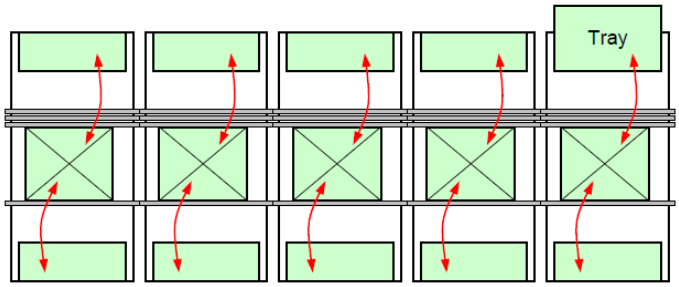
	Share mode	Share mode (front/rear)*1	Independent mode*1
Pattern			
Motion	Each head works on boards in both lanes. The heads, moving alternately, handle boards in one lane once completing production in the other lane.	< Share mode (front) > The front and rear heads are used to handle boards in the front lane while those in the rear lane just pass though. < Share mode (rear) > The front and rear heads are used to handle boards in the rear lane while those in the front lane just pass through.	Each head independently handles production boards in each lane. Front head: handling front lane Rear head: handling rear lane
Feature	PCB transport losses are minimized.	Production can be initiated or stopped according to lane.	Production can be initiated or stopped according to lane. The elimination of the heads' standby time (waiting for the opposed head's movement) associated with their alternating movement contributes to increased productivity.* * Some PCB board sizes bring the heads into a standby state.
Changeover	Changeover can be conducted in each lane after stopping the machine.	Changeover (production data change, feeder cart replacement, and tray magazine replacement) can be conducted in a suspended lane while boards are passing through the other lane.*2	Changeover (production data change, feeder cart replacement) can be conducted in a suspended lane while producing boards in the opposite lane. *2

*1 Independent mode and Share mode (front/rear) are available for placement head specifications only.
*2 It is not possible to do works by opening safety covers (such as manual replacement of support pins).
The "independent changeover support unit (option)" is necessary for feeder cart exchange.

The combination of placement modes allows NPM-W2 to respond to the needs of your various production patterns.

■ Large size PCB mounting line

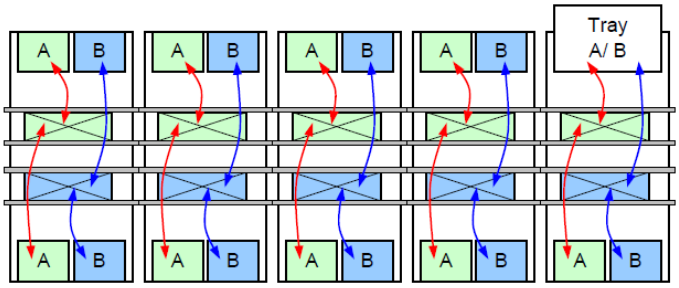
Share mode (Single lane)



・Specifically designed for large size boards that cannot make use of dual transport.

■ High-efficiency mounting line

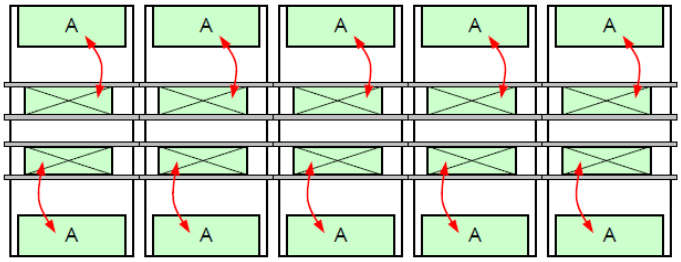
Share mode



・Minimizes board transport losses.
・Realizes highly efficient production through the smallest number of feeder locations.

■ Fastest mounting line

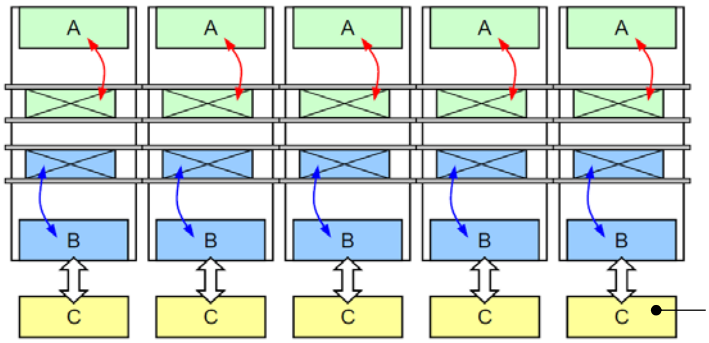
Independent mode



・Realizes the fastest placement of PCBs of a pattern at the fastest rate.

■ Non-stop changeover line

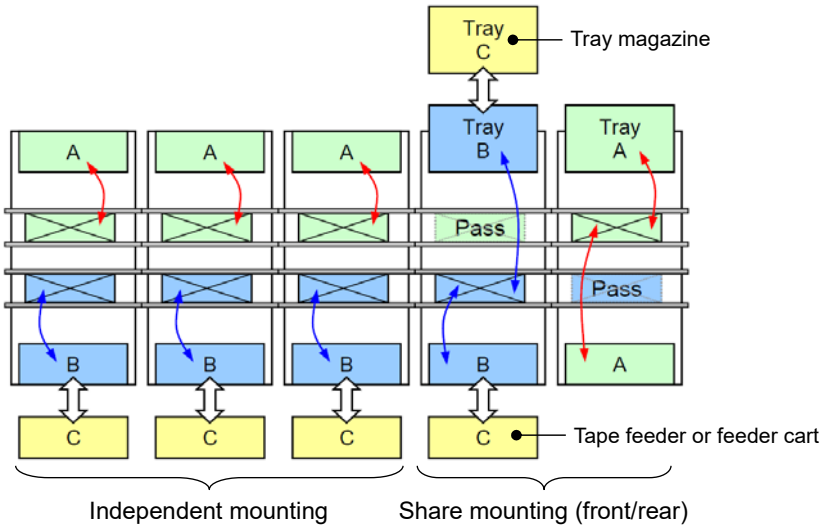
Independent mode



・You can keep producing in one lane while conducting a changeover in the other lane.*
(Independent changeover)

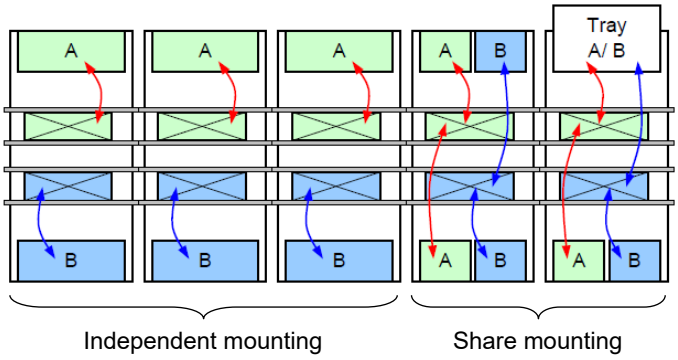
* It is not possible to do works by opening safety covers (such as manual replacement of support pins).
* The “independent changeover support unit (option)” is necessary for feeder cart exchange.

Independent mode plus Share mode (front/ rear)



■ High-speed/High-efficiency mounting line

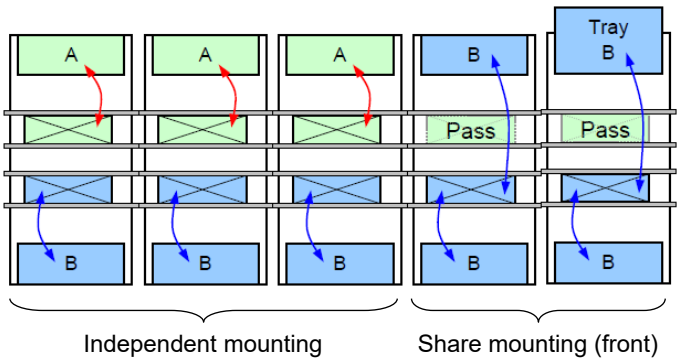
Independent mode plus Share mode



・Line configuration that utilizes the merits of Independent and Alternate modes.
・Chip parts can be mounted faster, and atypical or tray components, more efficiently.

■ Imbalanced mounting line

Independent mode plus Share mode (front/ rear)

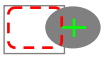
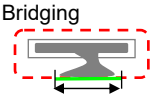
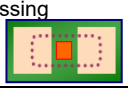
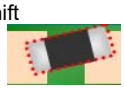
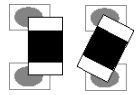
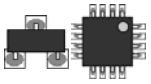
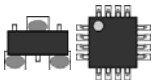
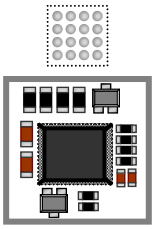
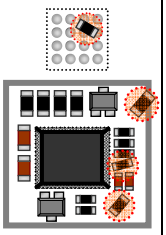


・You may configure the mounting line shown in the left figure if unable to achieve a production balance between the front and rear lanes.

e.g.) Board A: 300 placement points (chip parts only)
Board B: 600 placement points (chip parts plus atypical components)

3.4 Description of Inspections

■ Items of inspection

Inspection kind*1		Detected defect	Inspection method	OK	NG
Solder inspection	Oozing 	Solder is oozing out (too much)	Solder area is measured, and it is good if the margin of error is within tolerance value against mask design area.		
	Blurring 	Solder is blurring (too less)			
	Displacement 	Solder position is displaced.	Solder position is measured and it is good if the displaced amount is within tolerance against center of gravity position of mask design.		
	Abnormal shape 	Solder shape differs from the setting.	Solder outer shape is measured and it is good if the margin of error is within tolerance against mask design value.		
	Bridging 	Bridging occurs.	Search frame is created close to the target solder. It is good if the solder is not present to the length on the frame exceeding the tolerance value.		
Component inspection	Missing 	There are no components in the placement position.	It is good, if there is no PCB color or if there is a component color.		
	Shift 	・The placement position of the component shifts. ・The placement angle of the component shifts.	Positions of terminals or components are measured. It is good if the shift amount is within the set value.		
	Flipping 	・The placement components flip. ・The placement components turn sideways.	It is defective if there are colors of the back and side of the component.		
	Polarity 	The direction of the placement component is wrong. (Applicable: components with polarity)	It is good if there are the colors of polarity.		
	Foreign object *2 	・There are falling components under the components that try to be placed. ・There are foreign objects under the components that try to be placed. (The side of placement of the components (related components *2) placed by NPM with the inspection Head installed is inspected.) ・Foreign objects before the shields are placed are inspected. ・Foreign objects before the BGAs are placed are inspected.	It is good if there are no colors other than PCB color.		

*1 The color or inspection area for each inspection is set using previously obtained images.
For the color of PCB, colors of solder, land, silk or others are set in advance.

*2 Lower limit of foreign objects that can be detected
2D inspection head A (Resolution: 18 µm): over thickness of 0603 (0.2 mm)
2D inspection head B (Resolution: 9 µm): over thickness of 0402 (0.15 mm)

■ Object for Inspection

・Items of solder inspection object

Solder shape	2D inspection head A (Resolution: 18 µm)	2D inspection head B (Resolution: 9 µm)
	φ0.15 mm or more	φ0.12 mm or more
	0.1 × 0.15 mm or more	0.08 × 0.12 mm or more

* As solder is the mixture of solder ball and flux, surface condition is not always even depending on content rate of flux or composition of metal. Therefore, difference of color or brightness may not exist between solder and land. Also, color or brightness might vary due to material of PCB or component, or wave or deformation of PCB. In such cases, inspection might not be executed. In order to operate the optical system normally, please avoid setting it in a place where exposed to direct sunlight or near a strong light.

■ Object for Inspection

・Items of component inspection object

Representative kind of applicable components for inspection	Shape	Inspection kind			
		Missing	Shift	Flipping	Polarity
Square chip resistor		○	○	○*1	
Square chip capacitor					
Cylindrical chip					
Tantalum capacitor					○*2
Aluminum electrolytic capacitor					
Volume					
Trimmer					
Coil					
Connector					
Network resistor					
Transistor					
Diode					
Inductor					○*2
SOP					
QFP					
BGA/CSP					

* As for the placed components, if their colors are missing by being shaded by their adjacent ones, the inspection processes may not be possible. And If there are no difference of color and brightness between the PCB and the components (or the printed solder), if there are color and brightness change by the material of PCB and components, or the undulating and transforming of the PCB, the inspection processes may not be possible.
Similarly to solder inspection, please do not install it where direct sunshine strikes or near a strong lighting.

*1 As for such a square chip resistor as has different colors on its front and back, the flipping inspection can be set.

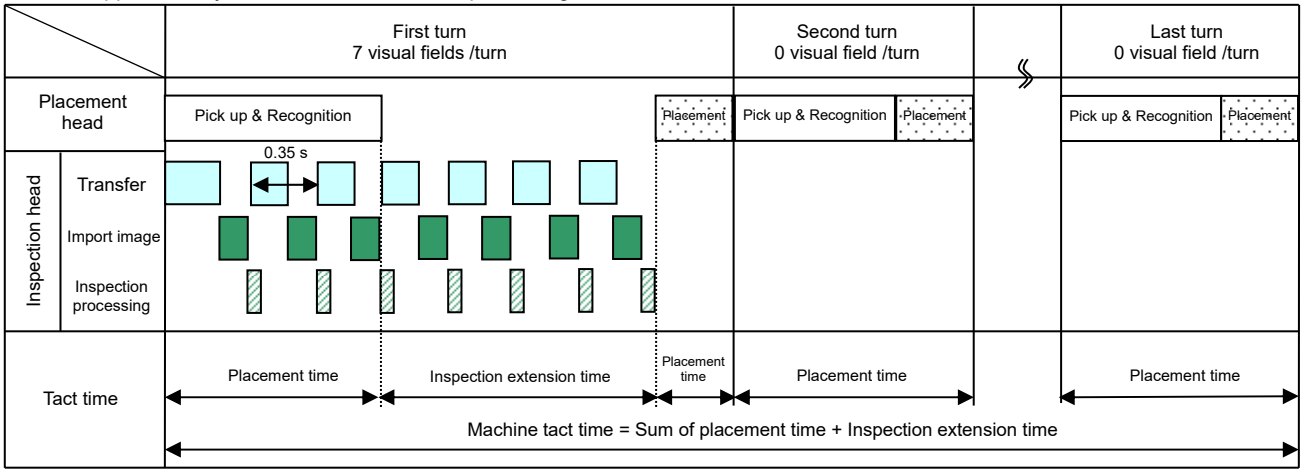
*2 Not only the contrast of the polarity mark is clear, the polarity marks shall not be contaminated and blurred. In addition, variations in color and brightness shall be minimum. As for ICs, the polarity shapes shall be identifiable on the image and they shall not be subject to change. These are the conditions to carry out normal inspection.

■ Inspection time

・Standard case examples of solder inspection tact time

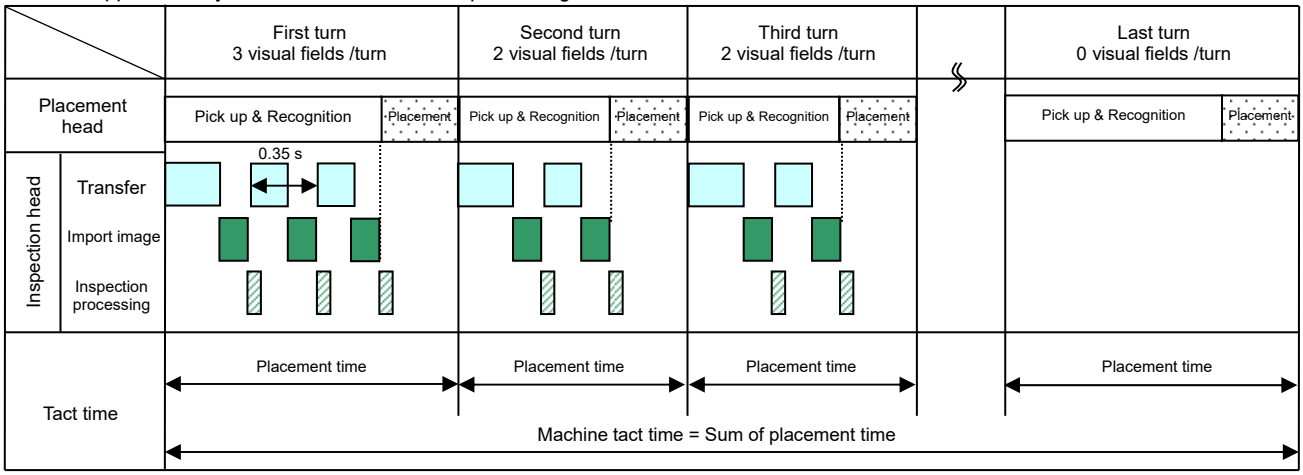
[Accuracy priority mode]

Unless all solder inspections are complete, it does not allow proceeding to placement operation.
This is advantageous operation mode for accuracy as the opposed axis is stopped.
It takes approximately 0.35 sec. to move and capture image.



[Tact priority mode]

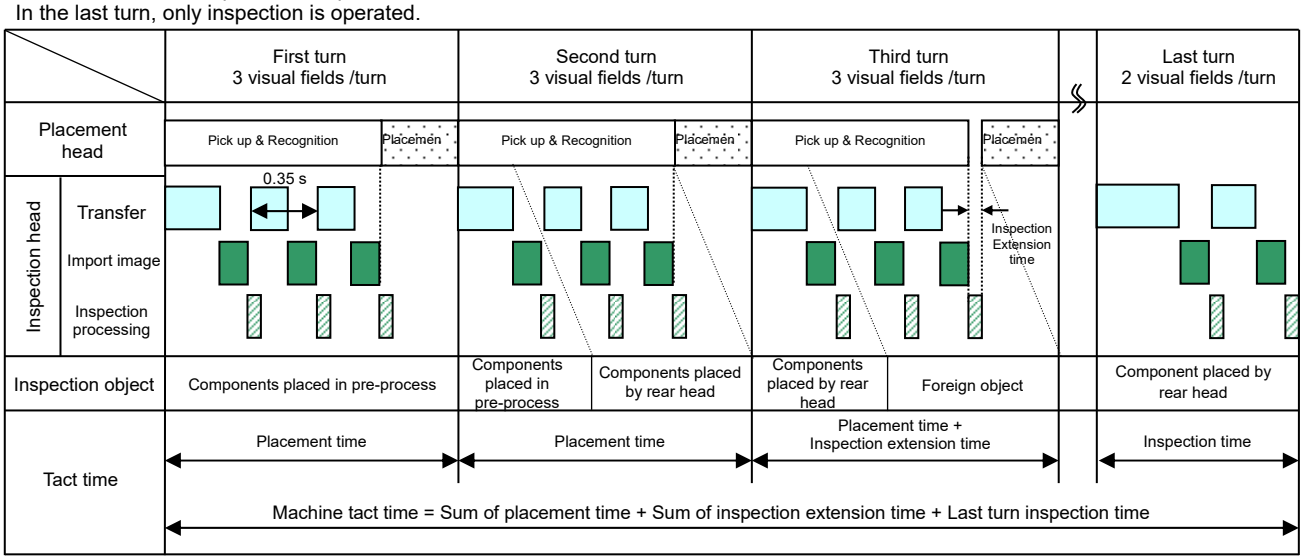
Solder inspection and placement operations are executed alternately. This operation mode is advantageous for tact time.
It takes approximately 0.35 sec. to move and capture image.



* In case of solder inspection for components such as 0402 which requires accuracy, please use “Accuracy priority mode.”

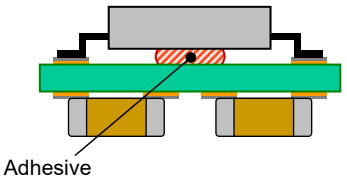
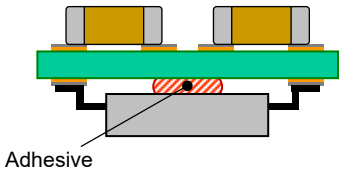
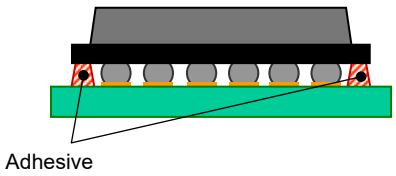
・Standard case example of component inspection tact time

It is possible to inspect multiple visual fields in single turn. It takes approximately 0.35 sec. to move and capture image.
When inspection time such as foreign object inspection is longer than component pickup and recognition time, placement operation is executed after the inspection completes with results.
In the last turn, only inspection is operated.



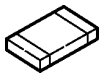
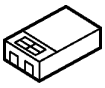
3.5 Dispense Capability

■ Dispense Applications/Types

(1) Avoiding movement of large components during material handling	(2) Avoid fall-off of bottom side components during reflow.	(3) Reinforcements for BGA, CSPs*
		* Advance proof must be necessary. 

■ Applicable components and dispense size examples

(Content may vary depending on adhesive manufacturer and model number. Please change volume per your shear force requirements)

Component	Appearance	Dimensions*1 (mm) X	Y	T	Nozzle (VS = 1 point Dispense, S = 2 point dispense, L = 4 point dispense)	Dot Size*2 (mm)
1608R, C		1.6	0.8	0.4 ~ 0.8	S or VS × 2 (for 1608)	φ0.6 ~ φ0.7
2012R, C		2.0	1.25	0.4 ~ 0.8	S	φ0.65 ~ φ0.75
3216R, C		3.2	1.6	0.4 ~ 0.8		φ0.7 ~ φ0.8
Mini Mold Tr		2.8	2.8	1.1		φ0.8
Mini Power Tr		4.3	4.5	1.5	S × 2	φ0.85
Cylindrical Component		2.0	ø1.0	—	S (0° or 90°)	φ0.8
		3.6	ø1.4	—		φ1.0
Tantalum Capacitor Y		3.2	1.6	1.6	S	φ0.8
Tantalum Capacitor X		3.5	2.8	1.9		φ1.0
Tantalum Capacitor C		6.0	3.2	2.5	L	φ1.2
Tantalum Capacitor D		7.3	4.3	2.8		
Aluminum Electrolytic Capacitor S		4.3	4.3	5.4		φ0.8
Aluminum Electrolytic Capacitor L		6.6	6.6	5.4		φ1.2
Trimmer Potentiometer		4.5	3.8	1.5		
Trimmer Potentiometer (Center Opening)		3.7	3.1	2.0		
Trimmer Potentiometer (Tapered Opening)		4.8	4.0	3.0		
Trimmer Capacitor (Flat Upper Surface)		4.5	4.0	2.6		
Trimmer Capacitor		4.5	4.0	2.6		
IFT Coil		5.8	5.8	4.2		
Film Capacitor		4.8	3.3	1.4		
Light-Touch Switch		6.2	6.2	2.0		

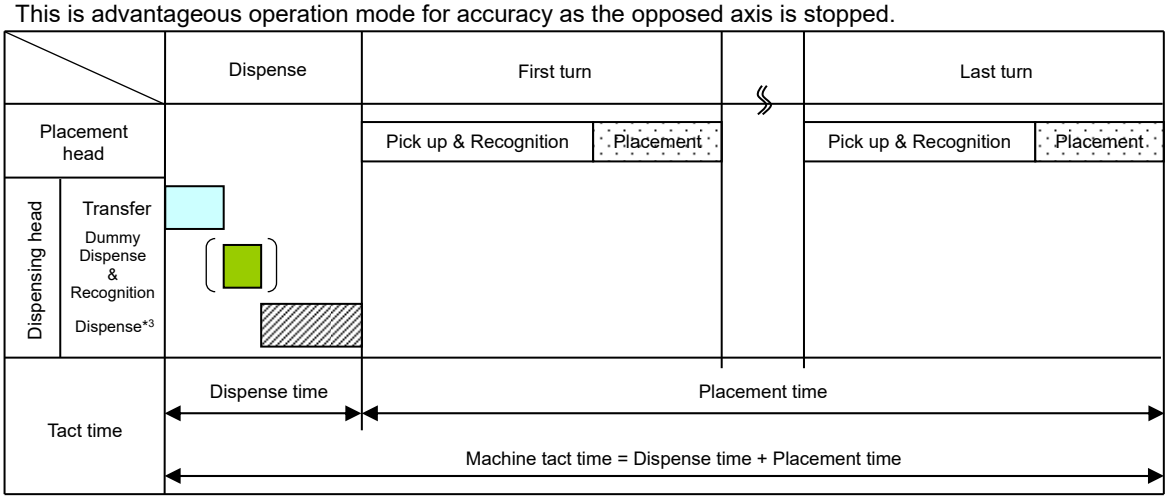
Component		Appear-ance	Dimensions*1 (mm)			Nozzle L = 4 point dispense	Dot Size*2 (mm)
			X	Y	T		
SOP	8 P		5.0	4.2	1.5	L	φ1.4
SOP	16 P		10.1	4.2	1.5	L × 2	
SOP	28 P		21.25	9.5	2.0	L × 3	
QFP	7 × 7		7.0	7.0	2.5	L	
QFP	14 × 14		14.0	14.0	2.8	L × 3	
QFP	18 × 18		18.0	18.0	3.3	L × 4	
BGA, CSP			33.0	33.0	2.15	Drawing nozzle*3	Line width 1.0

*1 Component dimensions above are given for reference purposes only.
Be sure to check dimensions and shapes of all components, which may differ per manufacturer.
*2 Specifications of some components may differ from those listed above.
*3 Advance proof must be necessary.

■ Dispense Time (Dot dispense and draw dispense*1)

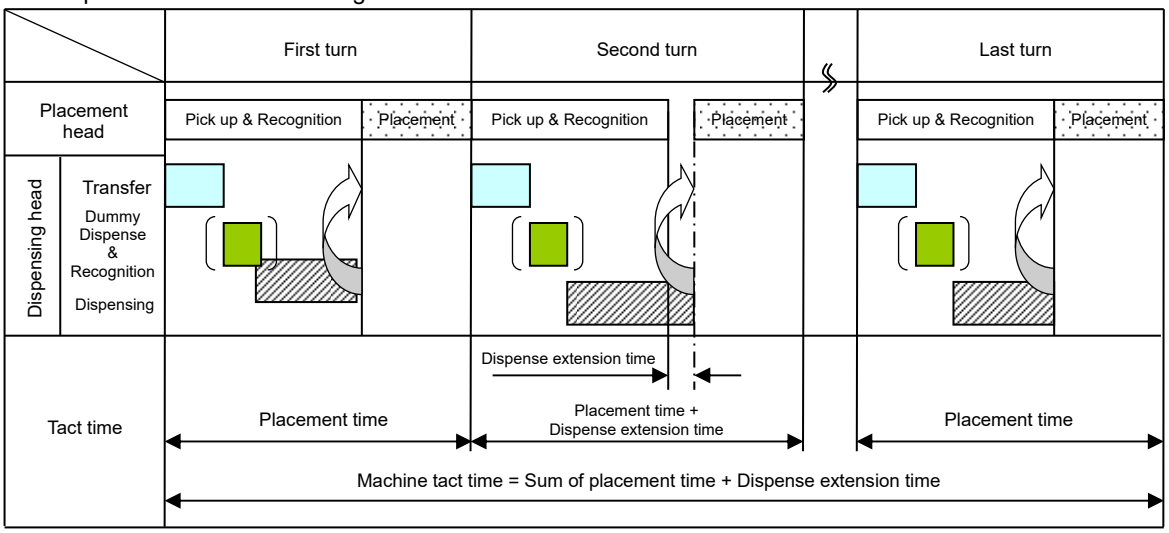
・Standard case examples of dispensing tact time

[Accuracy priority mode]*2
Operation moves to the placement process after all dispensing actions are finished.
This is advantageous operation mode for accuracy as the opposed axis is stopped.



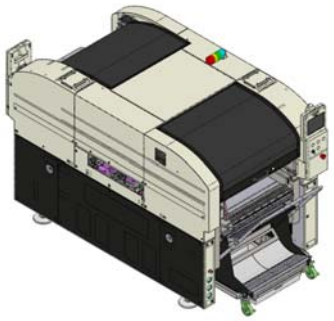
*1 For drawing dispense (non-contact dispense), the height sensor (option) is required.
*2 When correction is performed by the height sensor (option), only the accuracy priority mode is available.
*3 For drawing dispense (non-contact dispense), the PCB height measurement time (approx. 0.5 s) is included.

[Tact priority mode]
Dispensing and placement operations are executed alternately.
This operation mode is advantageous for tact time.



* Demonstration is necessary for possible placement misalignment to be introduced depending on the placed component.

4. Machine Configuration

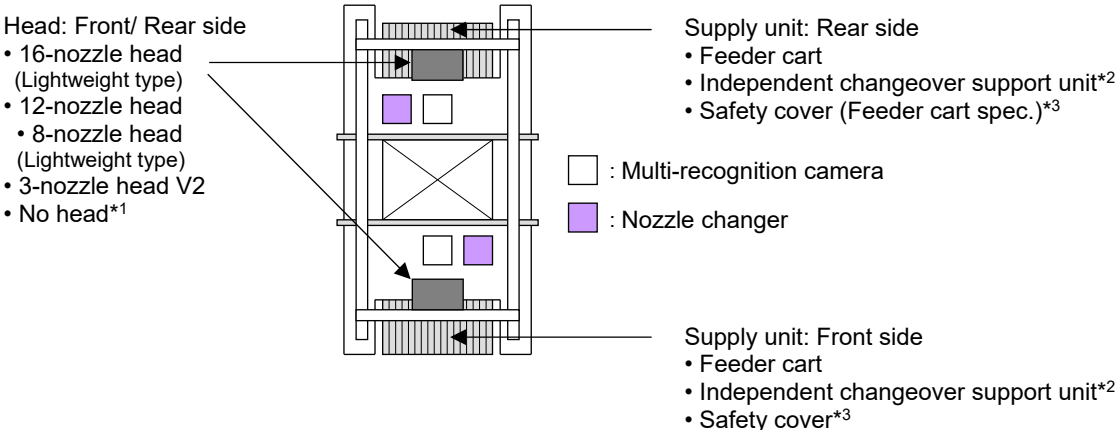


Front side \ Rear side	Placement head	Dispensing head	No head
Placement head	NM-EJM7D	NM-EJM7D-MD	NM-EJM7D
Dispensing head	NM-EJM7D-MD		NM-EJM7D-D
Inspection head	NM-EJM7D-MA		NM-EJM7D-A
No head	NM-EJM7D	NM-EJM7D-D	

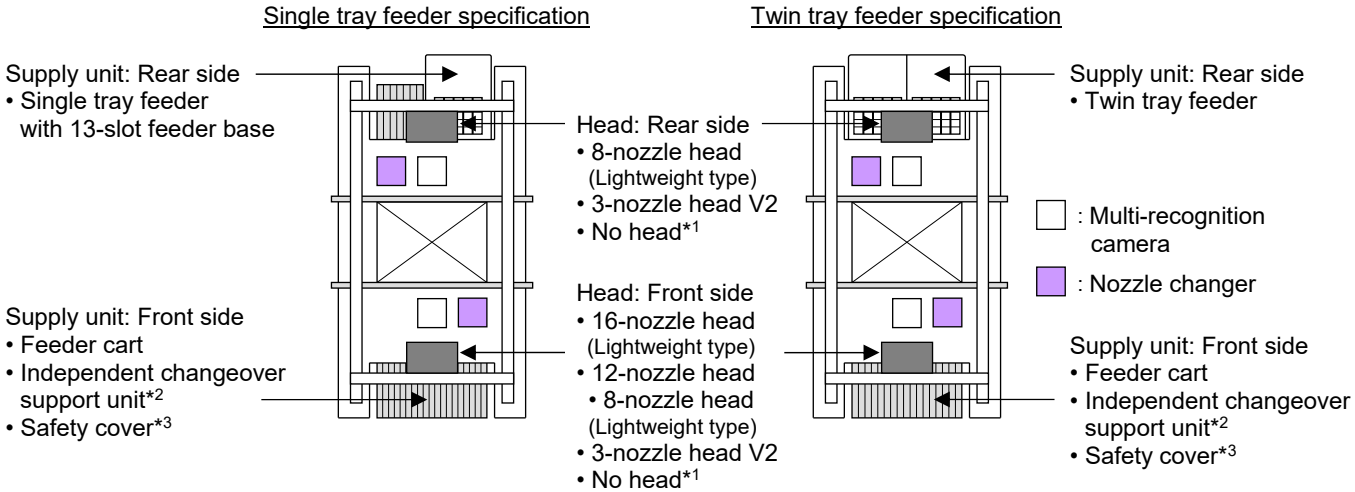
Model numbers are different depending on the location of where each Head is configured.

■ Placement specification

・**Feeder cart specification** (tray feeder cannot be installed on the rear side)



・**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 It is option for the dual conveyor specification. (It cannot select the rear side only.)
Please refer to “9. Options: Independent changeover support unit” for details.
*3 The safety cover is not required when “Feeder cart” is attached.

■ Data creation

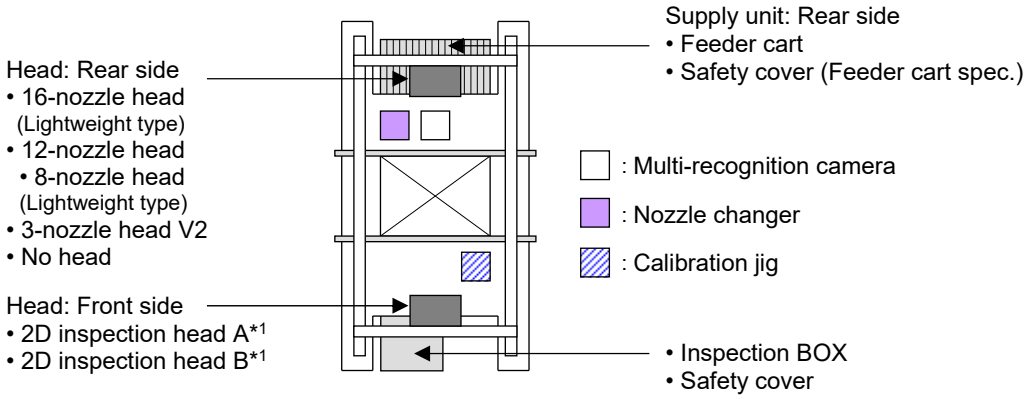
All data are created on NPM-DGS, the data creation system. (NPM-DGS is a separate product.)
The hardware for NPM-DGS should be prepared by yourself.

**** Remarks ****

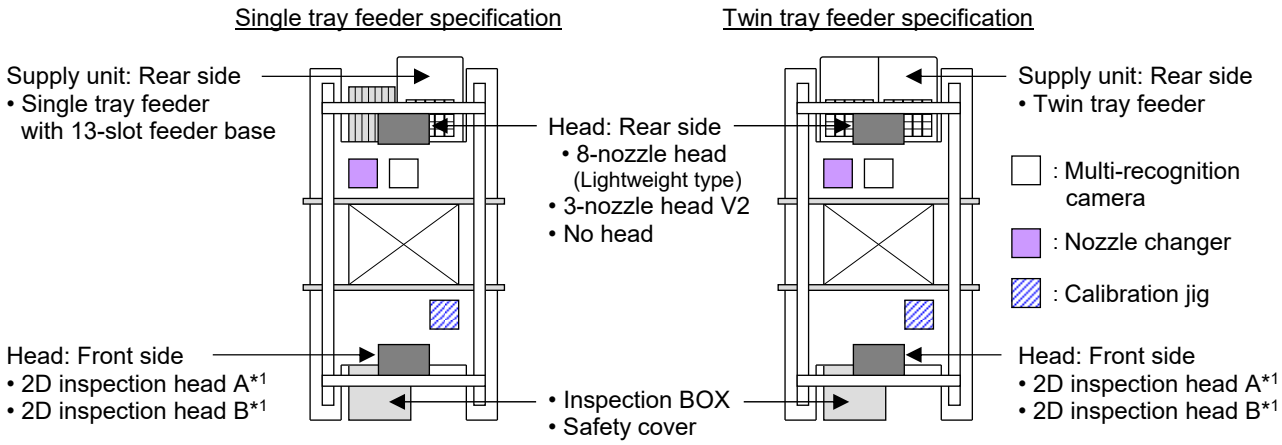
- The special specifications may potentially not comply with the CE mark specifications.
- The floor slope in the feeder cart installation area needs to be 6 mm or less in the right/left direction and 11 mm or less in the forward/backward direction. If the floor slope is beyond the above limit, the feeder cart cannot be taken in and out.

■ Inspection specification

・**Feeder cart specification** (tray feeder cannot be installed on the rear side)



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



*1 Inspection head can be selected for front side only.
One inspection head cannot handle solder inspection and component inspection at the same time.

* In case of solder inspection, set it at the upmost stream of NPM-W2 line.
* Please consult us separately for replacement of inspection head after delivery.

■ Data creation

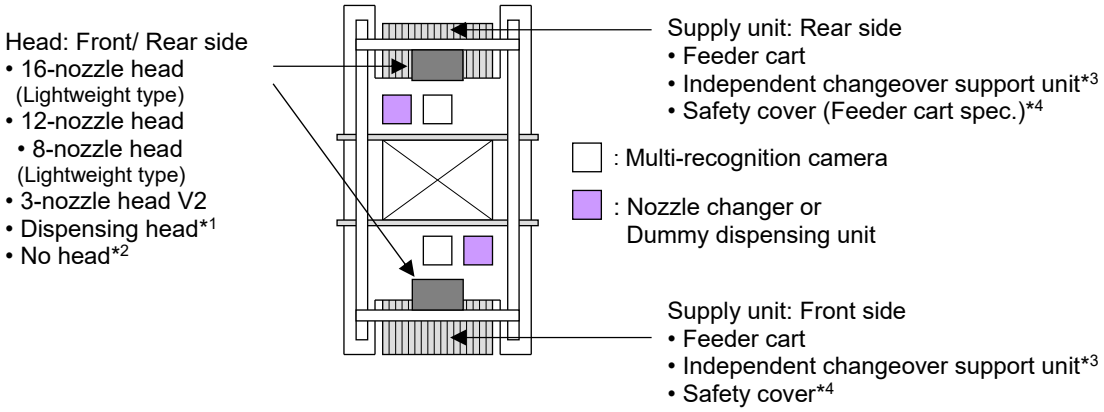
All data are created on NPM-DGS, the data creation system. (NPM-DGS is a separate product.)
The hardware for NPM-DGS should be prepared by yourself.

**** Remarks ****

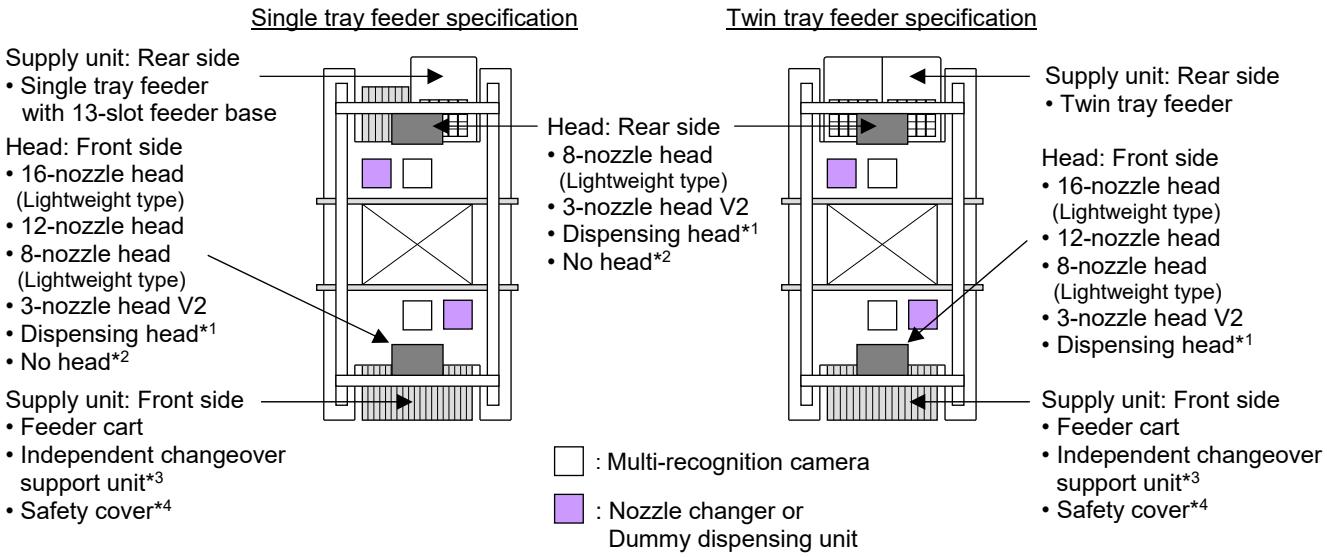
- The special specifications may potentially not comply with the CE mark specifications.
- The floor slope in the feeder cart installation area needs to be 6 mm or less in the right/left direction and 11 mm or less in the forward/backward direction. If the floor slope is beyond the above limit, the feeder cart cannot be taken in and out.

■ Dispense specification

・**Feeder cart specification** (tray feeder cannot be installed on the rear side)



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



*1 For Dispensing head, both front and rear cannot be selected together.
*2 For “No head”, both front and rear cannot be selected together.
*3 It is option for the dual conveyor specification. (It cannot select the rear side only.)
Please refer to “9. Options: Independent changeover support unit” for details.
*4 The safety cover is not required when “Feeder cart” is attached.

* Only a single dispensing head can be selected per line.
If you have to select 2 or more dispensing heads for a line, consult us, separately.
* Please set at the upmost stream of NPM-W2 line when executing dot dispensing.
* For dot dispensing, it is recommended to place components after dispensing (configurable by NPM-DGS).

■ Data creation

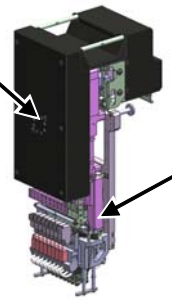
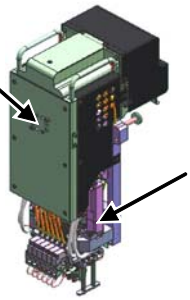
All data are created on NPM-DGS, the data creation system. (NPM-DGS is a separate product.)
The hardware for NPM-DGS should be prepared by yourself.

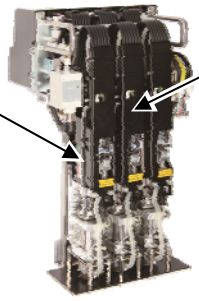
⁎⁎ Remarks ⁎⁎

- 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.

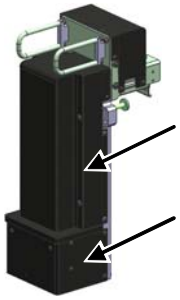
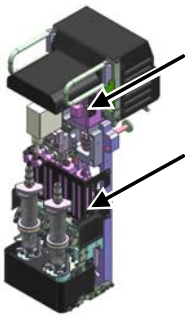
4.1 Head Configuration

■ Placement head

16-nozzle head (Lightweight type)	12-nozzle head
Motor for vertical motion (Z-axis) (Inside the cover)  Motor for rotary motion (θ-axis)	Motor for vertical motion (Z-axis) (Inside the cover)  Motor for rotary motion (θ-axis)
Accessories: Nozzle changer (For 16-/ 12-nozzle head)	Accessories: Nozzle changer (For 16-/ 12-nozzle head)

8-nozzle head (Lightweight type) ※1	3-nozzle head V2
Motor for vertical motion (Z-axis) (Inside the cover)  Motor for rotary motion (θ-axis)	Motor for rotary motion (θ-axis)  Motor for vertical motion (Z-axis) (Inside the cover)
Accessories: ・ Nozzle changer (For 8-nozzle head) ・ Nozzle changer (Large type) (For 8-nozzle head) *One of the above nozzle changers comes with the 8-nozzle head (Lightweight type).	Accessories: ・ Nozzle changer (For 3-nozzle head)

■ Process head

2D inspection head (A/ B)	Dispensing head
A: Resolution 18 μm B: Resolution 9 μm  CCD camera (Inside the cover) LED lighting (Inside the cover)	 Motor for vertical motion (Z-axis) Motor for rotary motion (θ, SC-axis)
Accessories: Inspection head support unit (Inspection BOX, Calibration jig)	Accessories: ・ Dummy dispensing unit ・ Wiping station
Please be sure to select the safety cover.	Please be sure to select the safety cover. (Not required when Feeder cart is attached.)

∗1A nozzle holder for lightweight 8-nozzle head is a dedicated nozzle holder.

∗∗ Remarks ∗∗

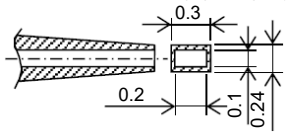
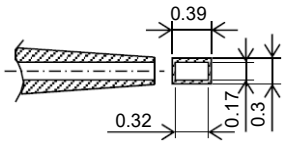
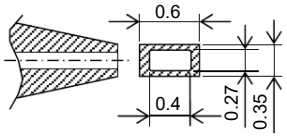
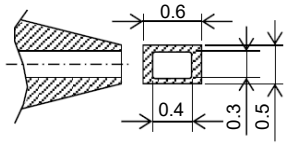
- The above accessories do not come together with spare head.
  When you select spare head, be sure to select options according to each head as well.
  Please refer to “9. Options” for details.

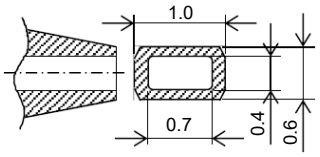
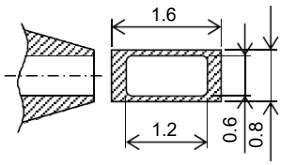
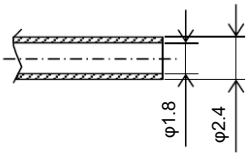
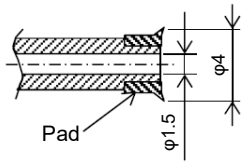
4.2 Nozzle Configuration

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

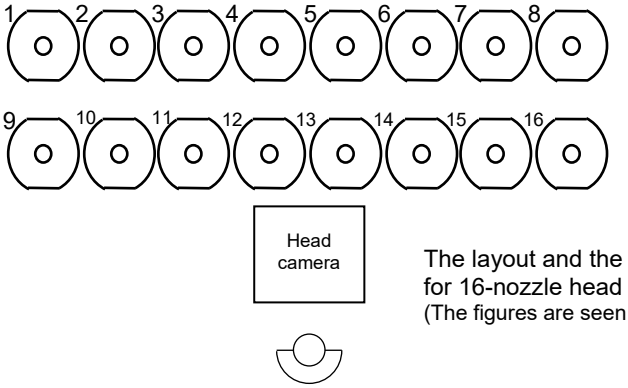
- All the shapes of holes shown here are maximized. Therefore the actual shapes are different.
- The tips of nozzles which include “C” in their No. are made from the ceramic.
- The nozzles which include “N” in their No. are exclusively made for NPM series with 2D code applied on flange area. Wrong nozzle 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 16-nozzle head and 12-nozzle head

No.	Shape (Unit: mm)	Applicable component (Typical examples)
276CS 276CSN	Exclusive to 16-nozzle head (Lightweight type) 	03015R
256CS 256CSN		0402R/C (01005”R/C)
225CS 225CSN		0603R/C (0201” R/C)
226CS 226CSN		0603R/C (0201” R/C) 1005R/C (0402” R/C)

No.	Shape (Unit: mm)	Applicable component (Typical examples)
230CS 230CSN		1005R/C (0402” R/C) 1608R/C (0603” R/C)
235CS 235CSN		1608R/C (0603” R/C) 2012R/C 3216R/C SS-Mini Tr/Di S-Mini Tr/Di
240CS 240CSN		3216R/C 4532R/C TAN-X
140S 140SN		Al electrolysis SOP

■ Nozzle layout for 16-nozzle head



The layout and the maximum number of attachable nozzles for 16-nozzle head
(The figures are seen from above.)

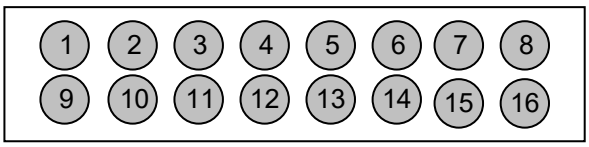
* Although the above eight types are the standard nozzles for 16-nozzle head, nozzles for 12-nozzle head for CM series can also be used.
* Nozzles for 8-nozzle head cannot be used.
* Nozzles for AM100 cannot be used.

■ Pickup-ready component size and nozzle arrangement

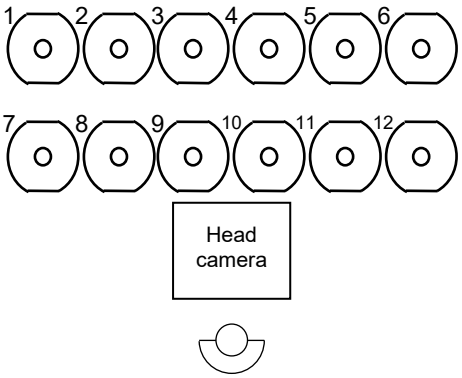
The sizes of components that 16-nozzle head can pick up are as follows.

(●: Can pick up, ○: Cannot pick up)

Components of 6 × 6 mm or less



■ Nozzle layout for 12-nozzle head



The layout and the maximum number of attachable nozzles for 12-nozzle head
(The figures are seen from above.)

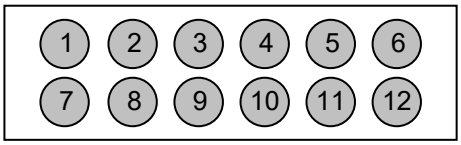
* Although the previous page seven types are the standard nozzles for 12-nozzle head, nozzles for 12-nozzle head for CM series can also be used.
* Nozzles for 8-nozzle head cannot be used.
* Nozzles for AM100 cannot be used.

■ Pickup-ready component size and nozzle arrangement

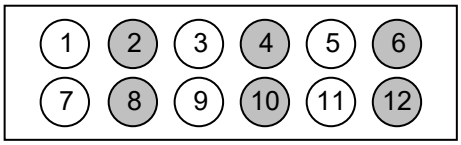
The sizes of components that 12-nozzle head can pick up are as follows.

(●: Can pick up, ○: Cannot pick up)

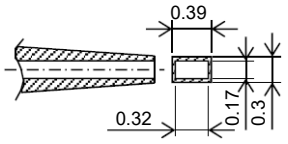
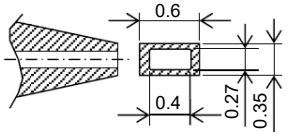
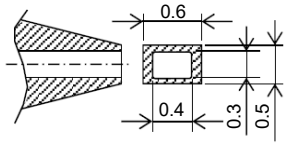
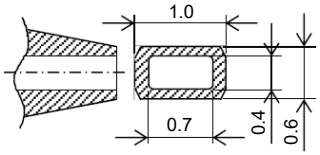
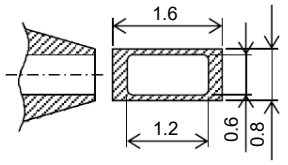
Components of 6 × 6 mm or less

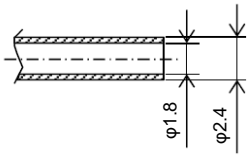
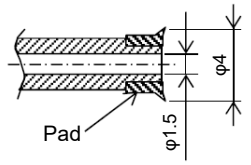
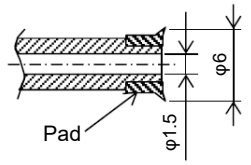
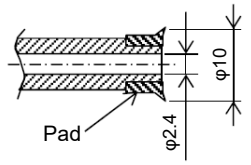


(Reflecting recognition only)
Exceeding 6 × 6 mm ~ 12 × 12 mm
(6 × 6 < A × A ≦ 12 × 12)



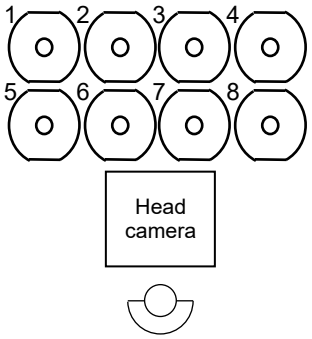
■ Nozzles for 8-nozzle head

No.	Shape (Unit: mm)	Applicable component (Typical examples)
256C 256CN		0402R/C (01005" R/C)
225C 225CN		0603R/C (0201" R/C)
226C 226CN		0603R/C (0201" R/C) 1005R/C (0402" R/C)
230C 230CN		1005R/C (0402" R/C) 1608R/C (0603" R/C)
235C 235CN		1608R/C (0603" R/C) 2012R/C 3216R/C SS-Mini Tr/Di S-Mini Tr/Di

No.	Shape (Unit: mm)	Applicable component (Typical examples)
240C 240CN		3216R/C 4532R/C TAN-X/B/C/D Al Electrolytic -A/B/C
140 140N		TAN-D Al Electrolytic-D SOP, SOJ PLCC, CSP
185 185N		SOP, QFP PLCC, BGA ≀ 18 × 18 mm
199 199N		SOP, QFP PLCC, BGA ≀ 32 × 32 mm

■ Nozzle layout for 8-nozzle head

Small nozzles (all nozzles listed in the above chart) which support within □12mm components can be attached to all positions.



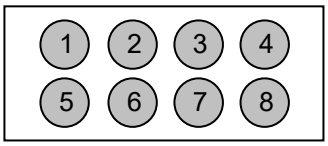
The layout and the maximum number of attachable nozzles for 8-nozzle head
(The figures are seen from above.)

* Although the above nine types are the standard nozzles for 8-nozzle head, nozzles for 8-nozzle head for CM series can also be used. (#450 nozzle and #460 nozzle cannot be used.)
* Nozzles for 16- or 12-nozzle head cannot be used.
* Nozzles for AM100 cannot be used.

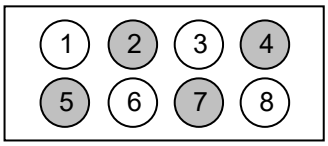
■ Pickup-ready component size and nozzle arrangement

The sizes of components that 8-nozzle head can pick up are as follows. (●: Can pick up, ○: Cannot pick up)
Pickup-ready component size for transmission recognition is 12 × 12 mm or less.

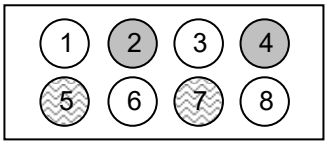
Components of 12 × 12 mm or less
(A × A ≦ 12 × 12)



Exceeding 12 × 12 mm ~ 18 × 18 mm
(12 × 12 < A × A ≦ 18 × 18)



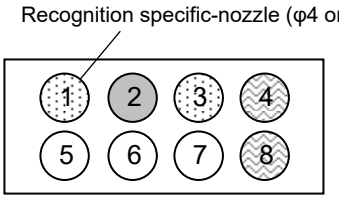
Exceeding 18 × 18 mm ~ 24 × 24 mm
(18 × 18 < A × A ≦ 24 × 24)



(5) and (7) can be picked up a component of less than 12 × 12 mm

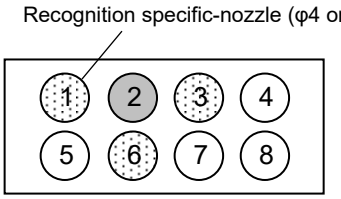
*To pick up a component over 24 × 24 mm, adjacent heads need the recognition-specific nozzles whose diameter is 4 mm or less.

Exceeding 24 × 24 mm ~ 28 × 28 mm
(24 × 24 < A × A ≦ 28 × 28)



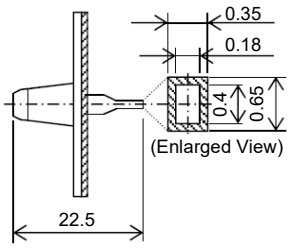
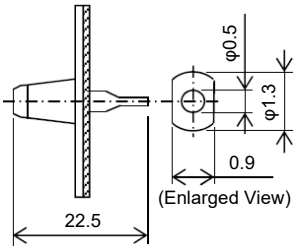
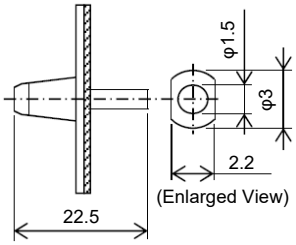
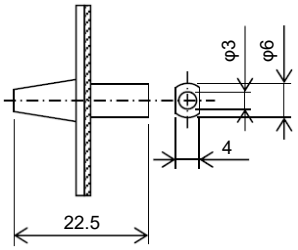
(4) and (8) can be picked up a component of less than 12 × 12 mm

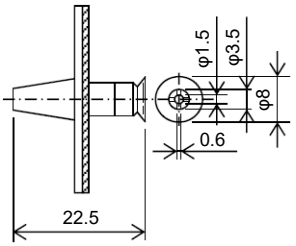
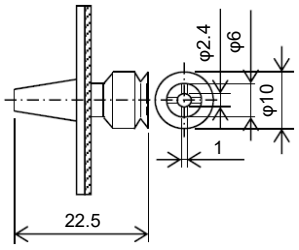
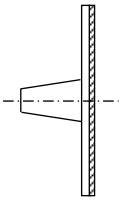
Exceeding 28 × 28 mm ~ 32 × 32 mm
(28 × 28 < A × A ≦ 32 × 32)



■ Nozzles for 3-nozzle head

The special nozzles can support the components whose vacuum pick up surface's shape is special such as irregular shaped chips. For details, please consult us.

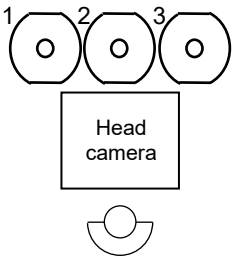
No.	Shape (Unit: mm)	Applicable component (Typical examples)	Max. component mass
1599 1599N		0603R/C (0201" R/C)	0.007 g
1001 1001N		1005R/C (0402" R/C) 1608R/C (0603" R/C) 2012R/C (0805" R/C) SS-Mini Tr/Di S-Mini Tr/Di Mini Tr/Di	0.021 g
1002 1002N		3216R/C (1206" R/C) 4532R/C (1812" R/C) TAN-X/B/C/D Al electroly-sis- A/B/C	0.192 g
1003 1003N		Al electroly-sis- D/E/F SOP, SOJ PLCC BGA, CSP	0.768 g

No.	Shape (Unit: mm)	Applicable component (Typical examples)	Max. component mass
1004 1004N		SOP, SOJ QFP, PLCC BGA	23.4 g
1005 1005N		SOJ QFP, PLCC BGA	36.6 g
1006 1006N	 This is a nozzle (reflector) to be attached to the head that will not pick up owing to the combination of pick up components. That will enhance the stability of recognition for the head that picks up.		

Components over 35 × 35 mm	Components over 63 × 63 mm
One needs to be attached to the one (NP2) at the middle of 3-nozzle heads.	Two needs to be attached to the ones (NP1, 3) at both sides of 3-nozzle heads.

* From a productivity viewpoint, 0603 chips are recommended to be placed with the 16-/ 12-nozzle head or the 8-nozzle head.

■ Nozzle layout for 3-nozzle head

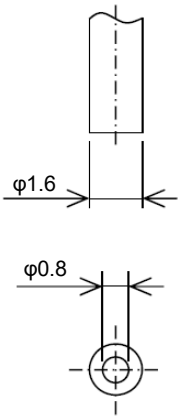
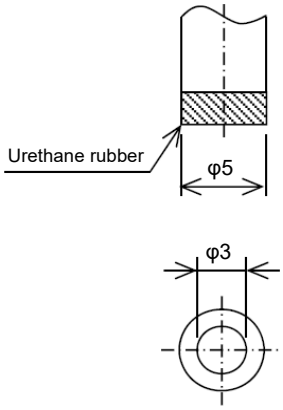
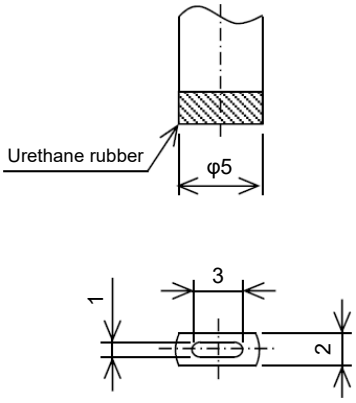


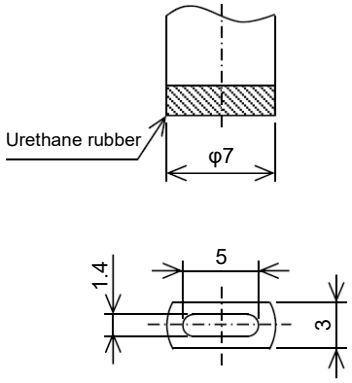
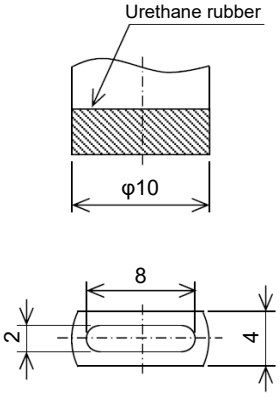
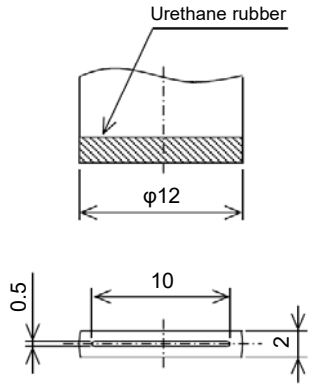
The layout and the maximum number of attachable nozzles for 3-nozzle head
(The figures are seen from above.)

* Nozzles for AM100 cannot be used.

■ Nozzles for 3-nozzle head (For odd-shaped components)

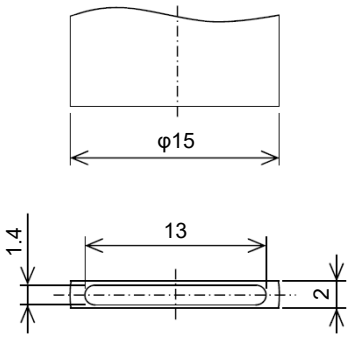
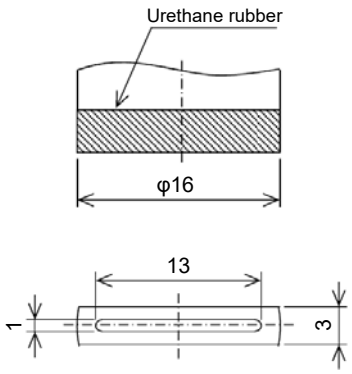
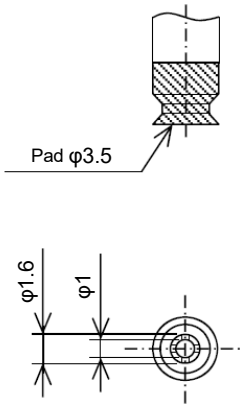
* The product number should be used for order placements.

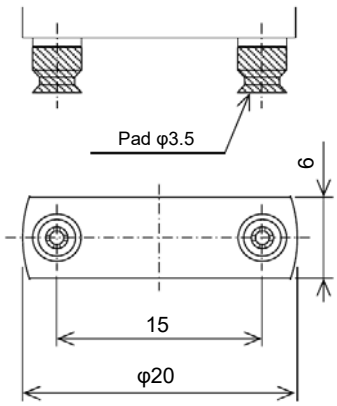
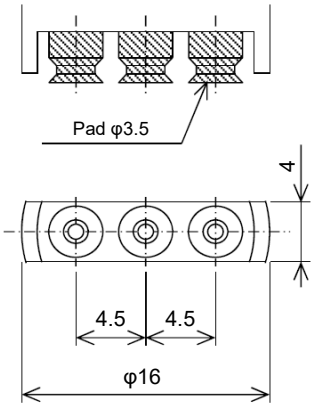
Nozzle No.	1551 / 1551N	1479 / 1479N	2405 / 2405N
Product number	KXFX05J7A00 N610127747AA (With 2D code)	KXFX05ASA00 N610117226AA (With 2D code)	KXFX05BVA00 N610117223AA (With 2D code)
Shape (Unit: mm)			
Max. component mass	0.12 g	3.5 g	1.5 g
Max. component height	30 mm	27.5 mm	30 mm
Remarks	Nozzle length: 22.5 mm	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
Max. component height	30 mm	30 mm	30 mm
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-nozzle head (For odd-shaped components)

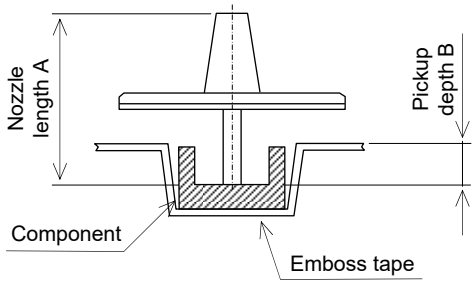
* The product number should be used for order placements.

Nozzle No.	1115 / 1115N	2418 / 2418N	1424 / 1424N
Product number	KXFX04PJA00 N610117221AA (With 2D code)	KXFX05CMA00 N610117211AA (With 2D code)	KXFX056PA00 N610127619AA (With 2D code)
Shape (Unit: mm)			
Max. component mass	2.0 g	6.5 g	4.8 g
Max. component height	30 mm	30 mm	30 mm
Remarks	Nozzle length: 22.5 mm	With a urethane rubber Nozzle length: 22.5 mm	With a urethane pad 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
Max. component height	30 mm	30 mm
Remarks	With a urethane pad Nozzle length: 22.5 mm	With a urethane pad Nozzle length: 22.5 mm

■ 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 embossed tape to pickup surface) of electronic component to be placed.



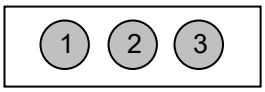
Pickup depth B	0 mm to below 3 mm	3 mm to below 8 mm	8 mm to below 13 mm
Nozzle length A	22.5 mm	27.5 mm	32.5 mm

* The list above is limited to 3 nozzle heads.

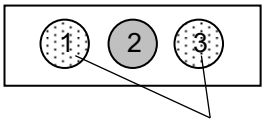
■ Pickup-ready component size and nozzle arrangement

The sizes of components that 3-nozzle head can pick up are as follows. (●: Can pick up, ○: Cannot pick up)

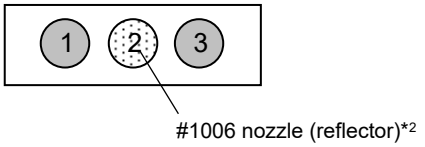
- Component of diagonal 41 mm (29 × 29 mm)*1 or less and 35 mm or less in length (L).
- Component of 47 mm (33 × 33 mm)*1 or less, 38 mm or less in L and t ≦14 mm or less.



- Component of diagonal 152.1 mm or less, 150mm or less in L and 90 mm or less in W.



- Component of diagonal 76 mm (54 × 54 mm)*1 or less and 65 mm or less in L.



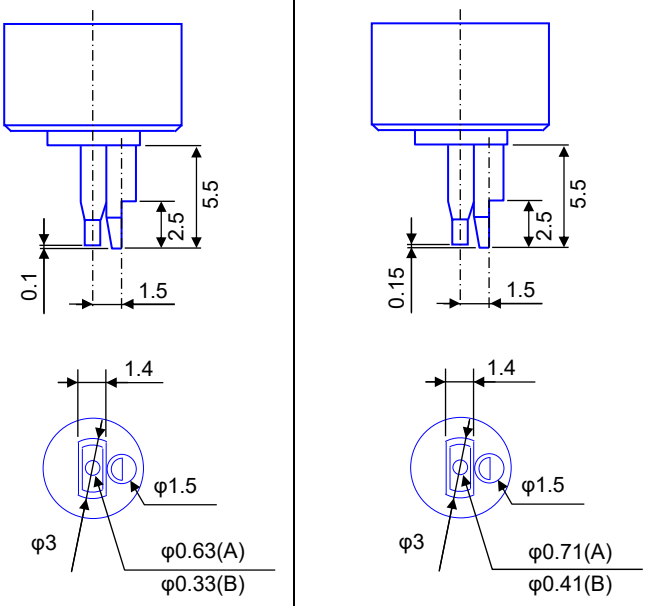
*1 The numerical value inside ( ) is an example of L=W. Component dimensions are subject to constraints if the pickup position is offset from the center of a component. For details, please contact us.

*2 Attach #1006 nozzle (reflector) depending on the component size or shape.

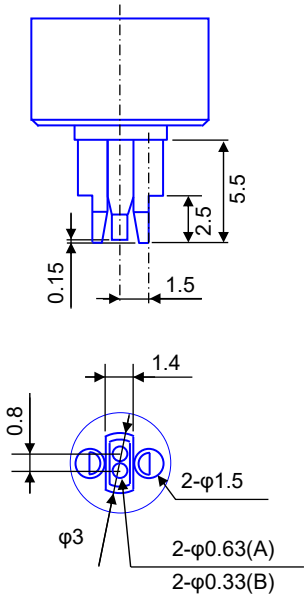
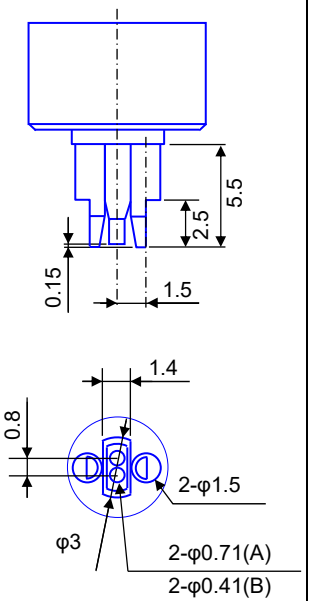
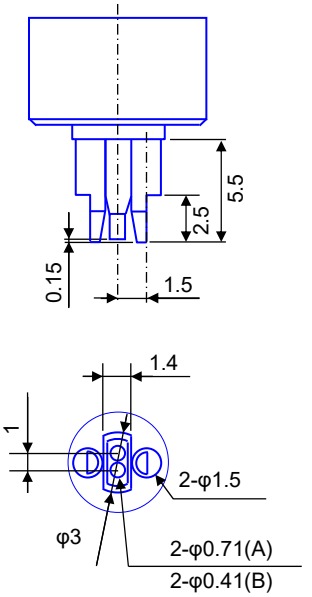
4.3 Dispense Nozzle Configuration

Mainly three types of nozzles are prepared based on the component.
Nozzles are for intended for use on NPM series only. Please consult with Panasonic for special nozzles.

■ Dispense Nozzle

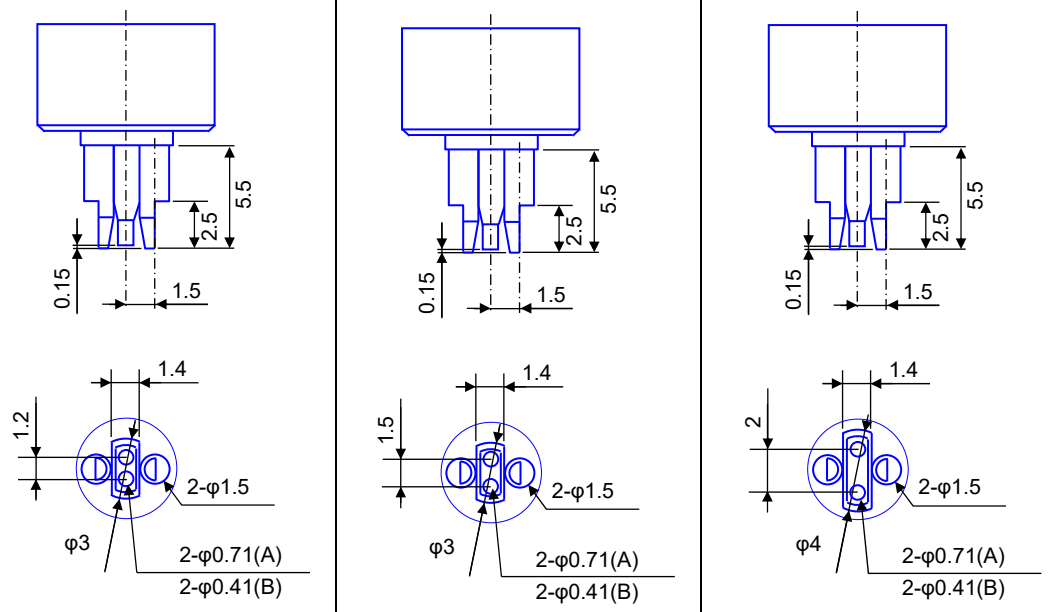
Nozzle Type	1 point nozzle (VS)	
Nozzle No.	7030*	7001*
Product number	N610107177AA	N610105001AA
Shape (Unit: mm)		
Dot size	φ0.6 mm ~ φ1.0 mm	φ0.7 mm ~ φ1.1 mm
Applicable components	1608, Dispense near railing	1608, Dispense near railing

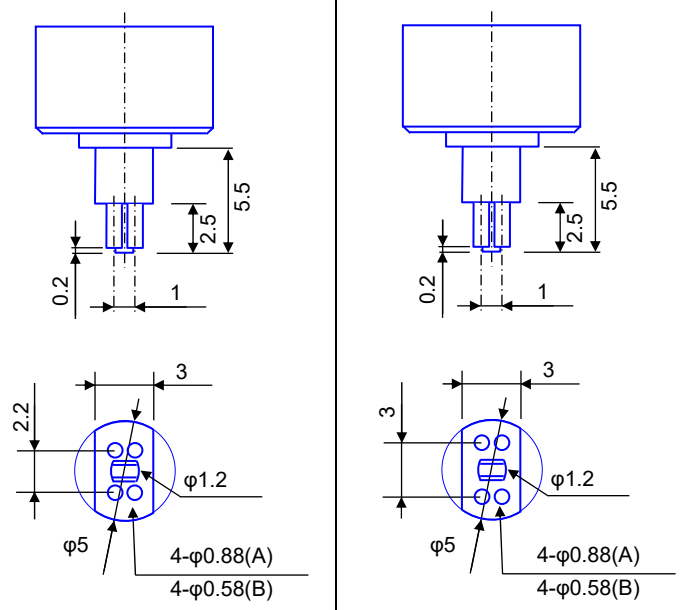
A: Outer Diameter
B: Inner Diameter

Nozzle Type	2 point nozzle (S)		
Nozzle No.	7201	7204*	7236*
Product number	N610105003AA	N610104651AA	N610107179AA
Shape (Unit: mm)			
Dot size	φ0.6 mm ~ φ1.0 mm	φ0.7 mm ~ φ1.1 mm	φ0.7 mm ~ φ1.1 mm
Applicable components	1608 ~ 3216	1608 ~ 3216	2125 ~ 3216

* Advance proof may be necessary. Please ask us for details.

■ Dispense Nozzle

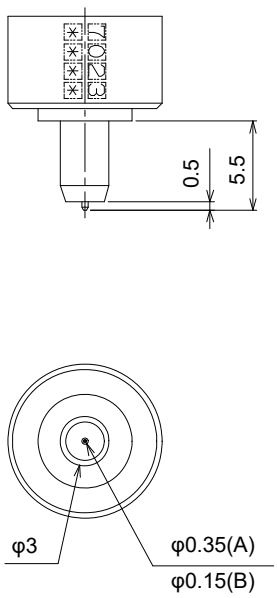
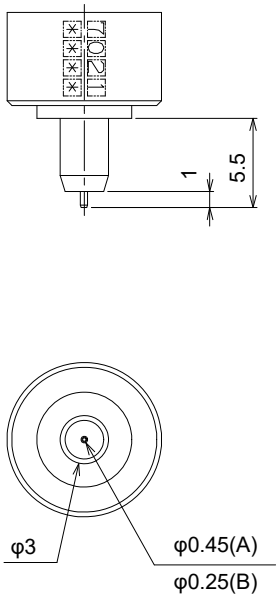
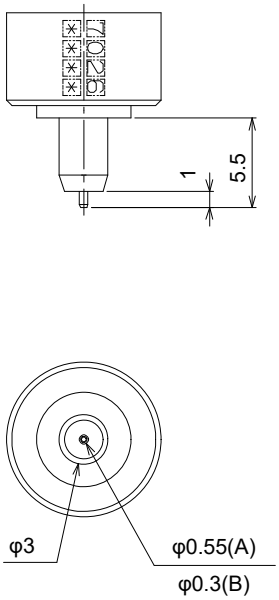
Nozzle Type	2 point nozzle (S)		
Nozzle No.	7222*	7223*	7224*
Product number	N610107149AA	N610107150AA	N610107151AA
Shape (Unit: mm)			
Dot size	φ0.7 mm ~ φ1.1 mm	φ0.7 mm ~ φ1.1 mm	φ0.7 mm ~ φ1.1 mm
Applicable components	2125 ~ 3216	3216 ~ 4 × 4 mm	2 × 2 mm ~ 4 × 4 mm

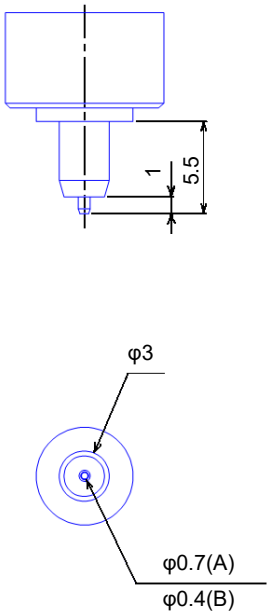
Nozzle Type	4 point nozzle (L)	
Nozzle No.	7606*	7601
Product number	N610107148AA	N610105004AA
Shape (Unit: mm)		
Dot size	φ0.8 mm ~ φ1.2 mm	φ0.8 mm ~ φ1.2 mm
Applicable components	Large Components	Large Components

A: Outer Diameter
B: Inner Diameter

* Advance proof may be necessary. Please ask us for details.

■ Drawing Nozzle (Custom specification)*

Nozzle Type	Drawing nozzle (1 point)		
Nozzle No.	7023	7021	7026
Product number	N610107153AA	N610107145AA	N610107161AA
Shape (Unit: mm)			
Line width	0.4 mm ~ 0.8 mm	0.6 mm ~ 1.0 mm	0.7 mm ~ 1.1 mm
Applicable components	BGA, CSP corner dispensing	BGA, CSP corner dispensing	BGA, CSP corner dispensing

Nozzle Type	Drawing nozzle (1 point)
Nozzle No.	7015
Product number	N610104668AA
Shape (Unit: mm)	
Line width	0.8 mm ~ 1.2 mm
Applicable components	BGA, CSP corner dispensing

A: Outer Diameter
B: Inner Diameter

* The above drawing nozzle is an example.
For the drawing nozzle, individual discussion is required according to dispensing materials and shapes. Please ask us for details.
For drawing dispense (non-contact dispense), the height sensor (option) is required.

■ Dispensing area limitations

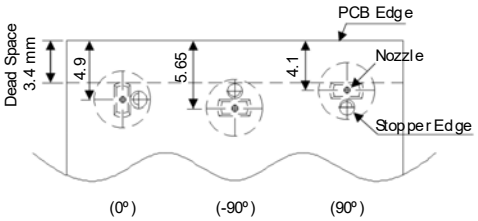
Areas not available for dispense (From PCB edge, measured from far end, Y axis)

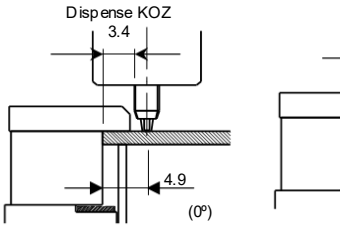
Orientation	0°	-90°	90°
1 point nozzle Drawing nozzle *1	4.9 mm	5.65 mm	4.1 mm
2 point nozzle	4.9 mm (some at 5.4 mm)	5.65 mm	5.65 mm
4 point nozzle	4.9 mm	5.9 mm	5.9 mm

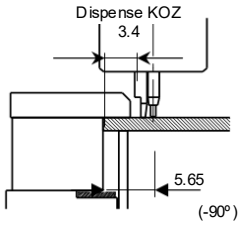
(Note) The front side stopper is inverted, and above figures for -90° and 90° should be inverted.
*1 The drawing nozzle is identical with "0°" of 1 point nozzle.

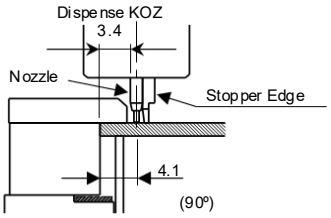
1) 1 point nozzle/ Drawing nozzle *1

(Unit: mm)



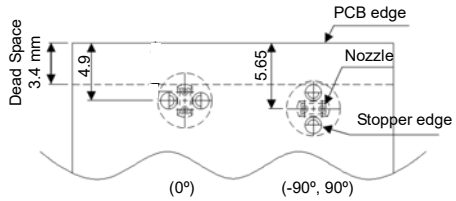


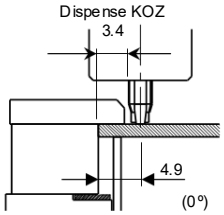


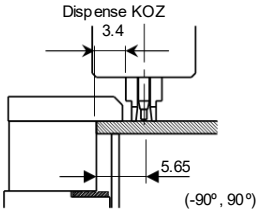


2) 2 point nozzle

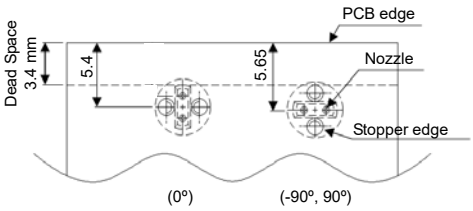
7201/ 7204/ 7236/ 7222/ 7223 nozzle

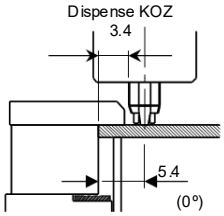


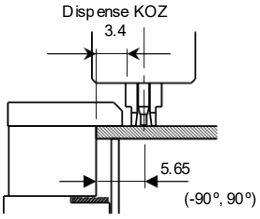




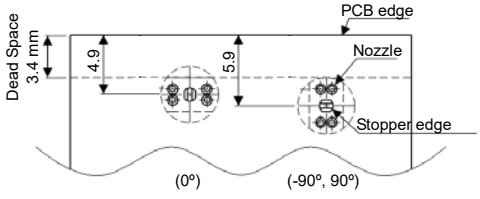
7224 nozzle

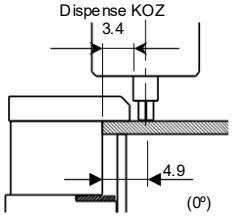


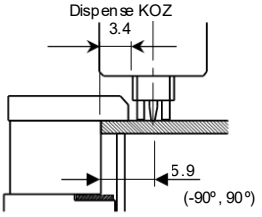




3) 4 point nozzle







* KOZ : Keep Out Zone – Area not possible for dispense
* Above Dispense KOZ is when the correction with recognition as well as the nozzle offset is "0"
* KOZ may increase with correction with recognition as well as offset values.

4.4 Feeder Carriage Configuration

■ 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 verification 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.

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
4 mm thin type single*2 (No detection sensor)		Emboss	10.5 mm	0.5 mm	Small	120	○ 1 mm															
8 mm thin type single*2		Paper/ Emboss		3 mm	Small	120	○ 1 mm	○	○													
					Large	60																
8 mm double*3			21 mm		Small	120	○ 1 mm	○	○													
					Large	60																
8 mm double for 0402 (01005")*3					Small	120		○	○													
					Large	60																
8 mm single					Small	60	○ 1 mm	○	○													
					Large																	
8 mm single for 0402 (01005")					Small	60		○	○													
					Large																	
12/ 16 mm	12 mm		21 mm	15 mm	Small	60			○	○	○	○										
					Large																	
	16 mm				Large	60*4																
24/ 32 mm			42 mm	26 mm*5	Large	30			○	○	○	○	○	○	○	○						
44/ 56 mm			63 mm			20				○	○	○	○	○	○	○	○	○	○	○	○	○
72 mm			84 mm	15 mm		14				○	○	○	○	○	○	○	○	○	○	○	○	○
				21 mm																		
88 mm (With detection sensor)			105 mm	21 mm		12				○	○	○	○	○	○	○	○	○	○	○	○	○
104 mm (With detection sensor)			126 mm			10				○	○	○	○	○	○	○	○	○	○	○	○	○

*1 Small reel: φ178 mm, Large reel: φ178 mm ~ φ382 mm
*2 When thin type tape feeders are installed, “Attachment for thin type tape feeder” is required for each feeder slot.
It is not possible to set a small reel and a large reel to the reel holder in the same slot.
*3 The 8 mm double tape feeder holds two small reels.
It is not possible to set a small reel and a large reel to the reel holder in the same slot.
*4 Depending on the width of reel, the maximum setting count may be reduced.
*5 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 8 mm emboss tape, the emboss depth is possible to up to 3 mm.
  If you want to use the “paper/ embossing shared block” which is included with the feeder, the emboss depth is limited to 1.2 mm or less.
- 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.

■ Auto Load Feeder*

This is a thin type feeder materialized automatic component tape setup.
The off-line setup time can be drastically reduced by the simple work of inserting a tape, then pressing the "Send" button. (Approx. 30s/reel ⇒Approx. 15s/reel)
If insert a following component in advance, this feeder can detect the tape end of preceding component and automatically supply the following component during production.
Because you don't need a tape splicing work, the error stop of splice mistake can be prevented.
This auto load feeder can also use a short cut tape (longer than 120mm).

* Not available for emboss tape.

Feeder type	Tape	Setting pitch	Reel 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
8 mm thin type auto load feeder*1*2*3	Paper	10.5 mm	Small	120	● 1 mm	●	●												
			Large	60															

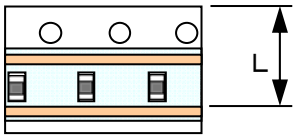
*1 When auto load feeders are installed, "Attachment for thin type tape feeder" is required for each feeder slot.
*2 If you want use IFCU to check auto load feeder, please contact us for details.
*3 To make good use of it, we suggest setting two reels on one auto load feeder.
One preceding component reel and one following component reel.
In this case, the maximum setting reel of auto load feeder is
Small reel: 60 reels (preceding component 60 reels, following component 60 reels)
Large reel: 30 reels (preceding component 30 reels, following component 30 reels)
If you want more reels, please contact us.

Restrictions

The auto load feeder is not available for the reels or utilizations below.

1. The tape end is fixed on the reel by adhesive tape etc. (Taping spec.)
（If reel and tape are hard to be separated, by cutting the end of tape will be available.）
2. The tape which is be spliced.
3. Availability by taping spec. from the last component to the tape end:
280 mm or below: Available without restrictions
Over 280 up to 680 mm: Available depending on the machine setting
Over 680 mm: Component exhaustion error will result.
4. When either of the following requirements for the cover tape sticking specification is not satisfied:

Tape guide type	Target components	L (mm)
Tape guide S	0402	5.85mm or over
Tape guide A	0603	5.85mm or over
Tape guide B	1005	6.00mm or over
Tape guide C	1608	6.30mm or over



When the dimension L does not satisfy (shorter than) the above requirement, peeling mistake would happen.
*If need the tape guide for 2012 or 3216, please contact us.

5. The tape end is cut obliquely. New and old tape may not be replaced automatically.

6. Tape length.
Usable tape length is 120 mm or more.
Insertion slot to be used and available functions differ with the tape length as follows:

・ Tape of 120 or more but less than 500 mm in length should be inserted through the slot dedicated to short tape.
In this case, the automatic sending/replacement function and the component verification function cannot be used.

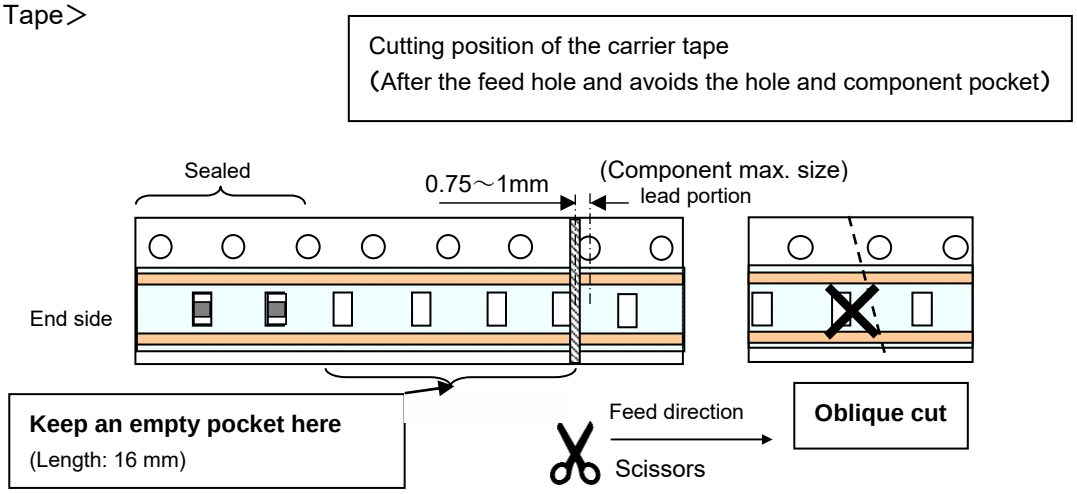
・ When 500 mm is exceeded, insert the tape through the tape slot on the rear of the feeder.
In this case, the automatic sending and replacement are available. A reel is required to use the component verification function.

7. Conditions of automatic replacement.
The following condition is not available for automatic replacement.
・ When "pickup error stop" is setting in "one time" and component remaining number has not been input or wrong number, automatic replacement is not available.

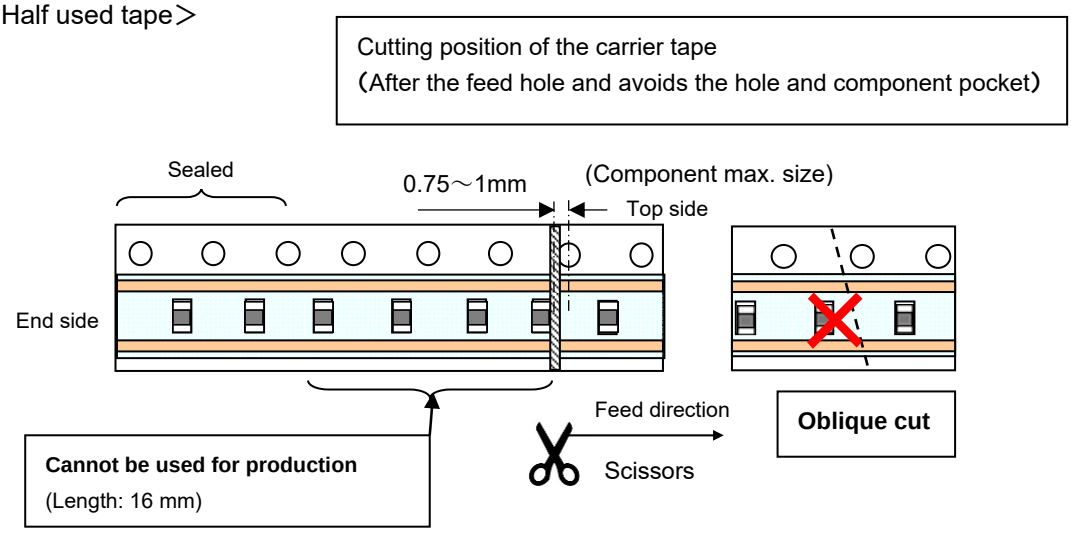
Top portion (Lead portion) processing

The lead portion processing of auto load feeder should satisfy the following conditions.
(The cutting position of lead portion)
Before you insert tape to the auto load feeder, please cut the lead portion with a scissors as the picture below. (To prevent a peeling mistake and tape replacement mistake, please cut perpendicularly.)

＜New Tape＞

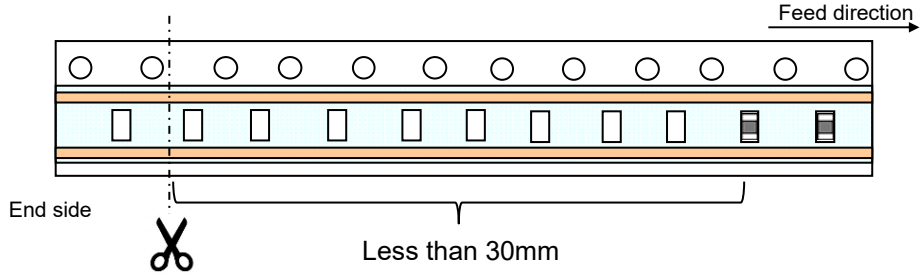


＜Half used tape＞



End portion (Trailer portion) processing

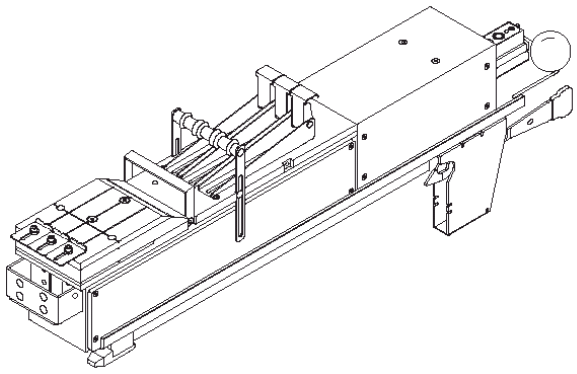
Please cut the empty tape less than 30mm.
The replacement time will be longer if over 30mm.
When the length of empty pocket positions is between 280 and 680 mm, machine setting is required.
However, when it is longer than 680mm, a shortage error will happen.



■ Intelligent Stick Feeder

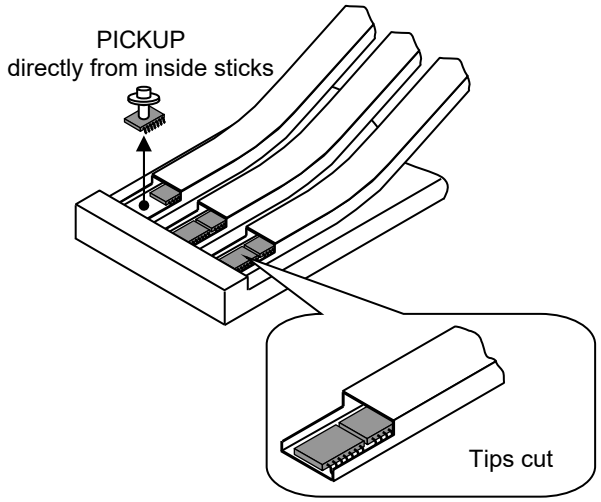
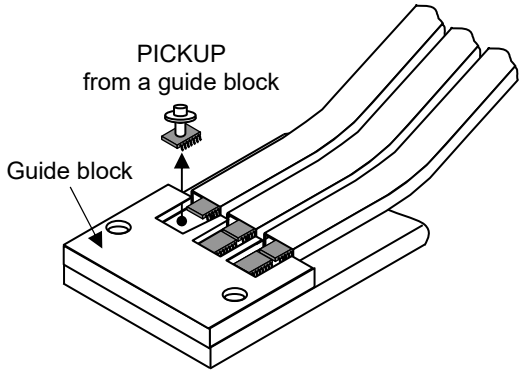
The stick feeder supplies components through the stick by vibration.
The intelligent stick feeder has improved its ability to support large-sized components, in addition to the traditional merits such as high versatility*1, quick delivery*2, and maintenance-free*3.
(Supporting only 8-nozzle head and 3-nozzle head)

*1 It supports not only SOP, SOJ, and PLCC but also odd-shaped components such as the connector.
*2 With the feeding method that cuts out stick tips (see below), it can feed components as soon as you get them.
*3 It needs no particular maintenance except for such cleaning as dust removing.



	Single stick feeder	3-lot stick feeder
Setting pitch	42 mm	84 mm
Maximum number of setting feeders	30 inputs	14inputs

Component feeding methods

Feeding with stick tips cut out	Feeding with a guide block (Option)
When components in sticks are level and stable while the sticks are placed in a horizontal position, cut out the stick tips so that the components will be picked up directly from inside the sticks. 	When components in sticks are not level and not stable while the sticks are placed in a horizontal position, attach a block (called a guide block) to solve those problems so that the components will be picked up from the guide block. The guide block is created separately according to the component dimensions to be used. How to design the guide blocks is open to the public, so the users can make them. 

Applicable components

Standard

SOP, SOJ, PLCC

(All dimensions in mm)

	W	L	H
Min	8	9	2.5
Max	31	31	6

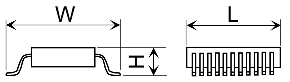
Special

Except for the standard component types and dimension range, depending on the component and stick shapes, components of up to the following dimensions may also be used.
If using such components, you need to flow them actually to check of feeding conditions or consult us.

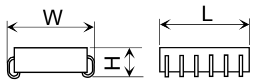
(All dimensions in mm)

	W	L	H
Min	-	-	-
Max	31	60	25

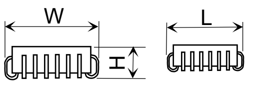
SOP



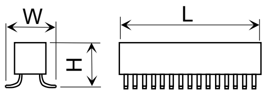
SOJ



PLCC



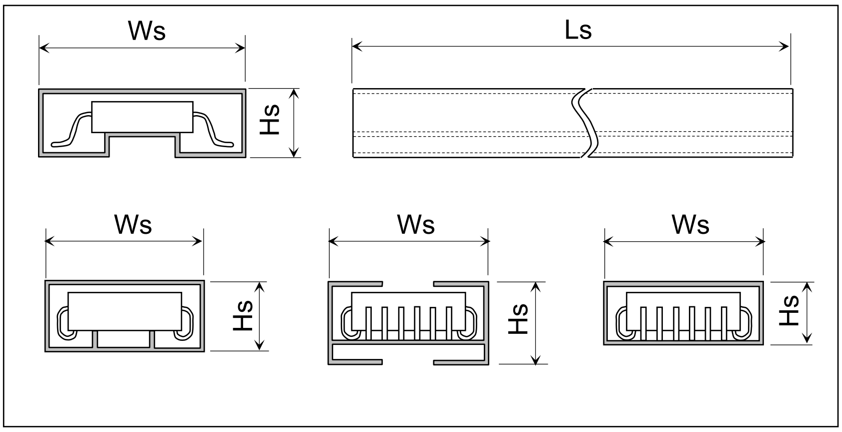
Connector



Applicable sticks

(All dimensions in mm)

	Ws	Ls	Hs
Min	-	300	-
Max	34	600	28



Number of attachable sticks

Feeding with stick tips cut out	Feeding with a guide block
See Table 1 for the number of attachable sticks.	See either Table 1 or 2, whichever has less number, for the number of attachable sticks.

Table 1

	Stick width Ws (mm)	Number of attachable sticks
Single Stick Feeder	Ws ≦ 34	1
3-lot Stick Feeder	Ws ≦ 19	3
	19 < Ws ≦ 28	2
	28 < Ws ≦ 34	1

Table 2

	Component width W (mm)	Number of attachable sticks
Single Stick Feeder	W ≦ 31	1
3-lot Stick Feeder	W ≦ 16	3
	16 < W ≦ 25	2
	25 < W ≦ 31	1

* In principle, production must be limited only for one type product when you attach multiple sticks on 3-lot stick feeder..
Production for different type products is available with limitations of the shape and dimension of the stick. For details, please consult us.

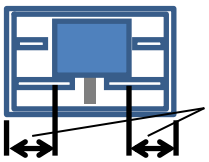
■ Stackable Stick Feeder

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.
In addition to common type, there is another type applying to component verification.
Therefore, with the combination of above 2 types of specification, there are total 4 types which can be selected.

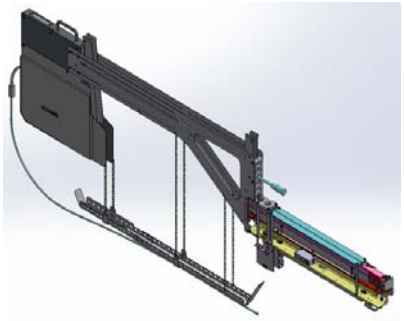
Feeder type	Type		Feeding pitch	Max load *1	Component dimension	Max component mass	Packing Dimension	
Stackable Stick Feeder *2	S	Standard	No step (adjustable)	8pcs	W 4mm～20mm L 5mm～70 mm H 2.5mm～20mm	2kg (Total mass of components set in feeder,)	Stick length 380 mm～700 mm	Stick width 8～24mm Stick height 10～29mm
		Traceability						
	L	Standard		8pcs	W 4mm～60mm L 5mm～70 mm H 12mm～30 mm			Stick length 8～64mm Stick height 21～39mm
		Traceability						

*1 When front and rear side is feeder cart (Excluding when tray is attached)
*2 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 with leads protruding from the side of the part body and parts with steps and protrusions on the bottom and sides of the body, please consult us separately.
In addition, when pushing components in the stick, the components that overlap or ride up will not be applicable.

* When both sides of length between the side surface of a component and the side surface of stick is 3mm or larger than 3mm, special support is needed.
Contact us for the details.



* The use of stackable stick feeders requires “Air Supply Unit for Feeder”.



*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.

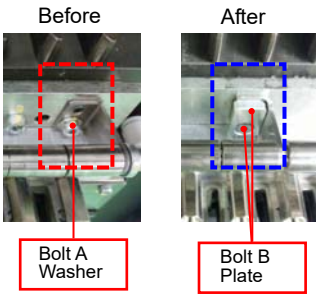
*We do not recommend daily changeover work. We recommend stackable stick feeder changeover for per component

*The stackable height is 216mm + H （H：stick height.）
Below is an indication of attachable sticks.
S type 22 pcs （When stick height is minimum of 10mm）
L type 11pcs （When stick height is minimum of 21mm）

*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.
Stackable stick feeder is used in individual verification, it can attach up to 4 sticks.

*Components to be set in the stick should be the quantity that can be pushed from the rear where 10N or less is applied with the stick held horizontally.

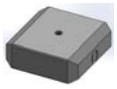
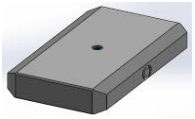
*Be sure to attach and detach stackable stick feeder to and from the cart only when the machine is equipped with the cart.
Operation is impossible in the following situations.
1. Attach and detach the cart to and from the machine while it is attached to the cart
2. Move the stick feeder with it attached to the cart.
3. Store the stackable stick feeder on the cart.



* Mounting stackable stick feeder on a feeder requires to add reinforcing plate in order to prevent deformation of a clamp part of a feeder.
（Deformation may cause attaching/detaching defect）
（Reinforcing plate is packed with stackable stick feeder）
When reinforcing plate runs short, arrange them individually.
（Model No.：MTKP009217AA（one set consists of six plates））

■ 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×L30 mm	30mm (20mm for stick feeder S)	Option	Option
LL size		W30×H10×L30 mm	50mm	—	Option
LLL size		W50×H10×L30 mm	60mm	—	Option

* S size pusher is included as standard with S size 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.

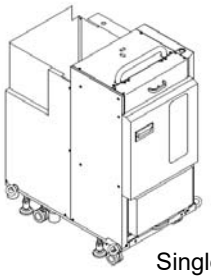
■ Tray Feeder

When the NPM-W2 main unit is for tray feeder specification, it can be connected to the rear side. It cannot be installed to the front side.

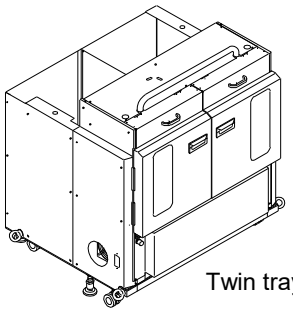
- Single tray feeder (Max. 20 product types)*
- Twin tray feeder (Max. 40 product types)

Applicable head: 8-nozzle head, 3-nozzle head

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

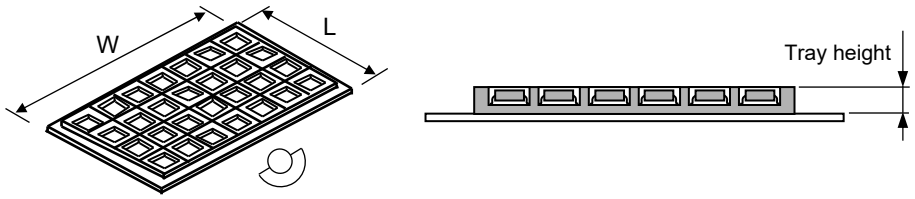
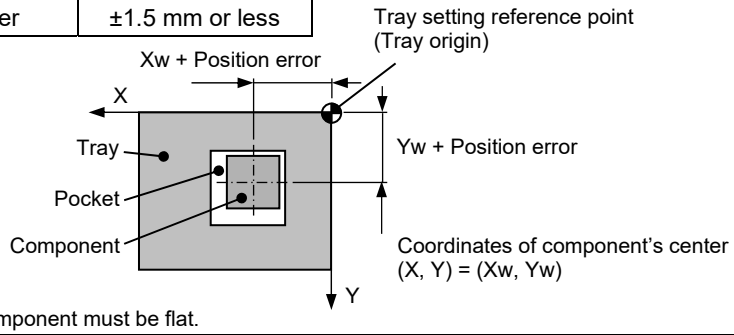


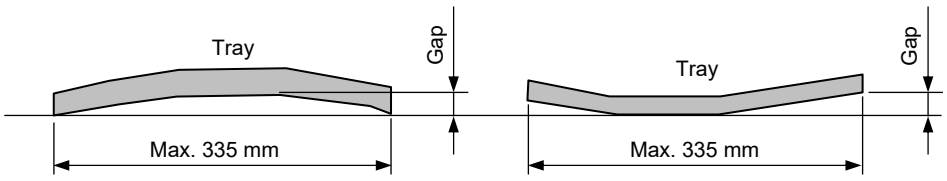
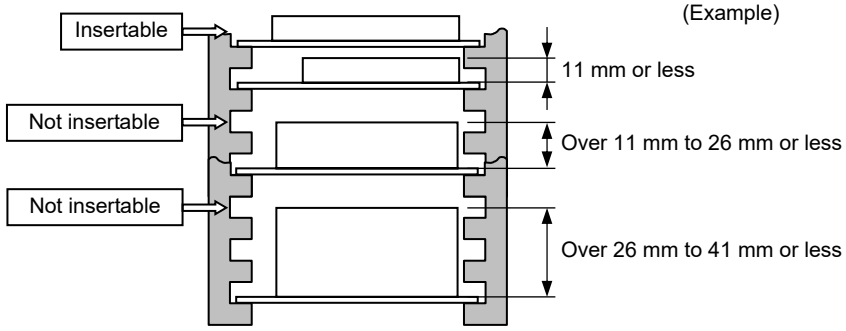
Single tray feeder



Twin tray feeder

Tray Conditions

<table>
<tr><th>Item</th><th colspan="2">Specification</th></tr>
<tr><td rowspan="3">Tray dimensions</td><td>Tray dimensions</td><td>L 85 × W 100 mm ~ L 230 × W 335 mm</td></tr>
<tr><td>Tray height</td><td>2 mm ~ 56 mm (3 nozzle head)
2 mm ~ 17 mm (8 nozzle head)
* When trays higher than 30mm are included, the supply part of the trays cannot be used.</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>Component position error</td><td colspan="2">
<table>
<tr><th>Pick up face of components</th><th>Position error</th></tr>
<tr><td>Under 10 × 10 mm</td><td>±1.0 mm or less</td></tr>
<tr><td>10 × 10 mm or over</td><td>±1.5 mm or less</td></tr>
</table>


* The pick-up face of a component must be flat.
</td></tr>
<tr><td rowspan="2">Permissible tray warpage (Gap)</td><td colspan="2">Warpage (Gap): Max. 0.5 mm</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>Type</td><td colspan="2">・Use an injection molded tray of sufficient strength and dimension accuracy.
・If you use any tray other than the above, consult us, separately.</td></tr>
<tr><td>Mass</td><td colspan="2">・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</td></tr>
<tr><td>Pallet insertion limitations</td><td colspan="2">・There must be a space of minimum 4mm between tray pallets. Which slot to occupy and insert will be determined based on that.
 
</td></tr>
</table>

4.5 Line Configuration

Regardless of stand-alone installment or line connection, PC designed for FA is always needed to set up NPM-W2.

・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.

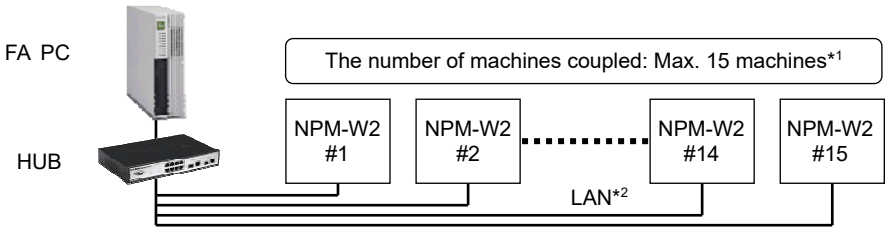
・LNB
LNB (Line Network Box) is a relay system connecting the machine and NPM-DGS (Data Creation System), being installed on the FA PC.
It handles multiple machines as a line; thereby centrally managing information, downloading production data, and compiling production management information.
(This software is included in the NPM-W2 system software DVD-ROM.)

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

・LWS (Line Work Station)
LWS can display the result data retained in LNB by accessing to LNB through the use of PC*.

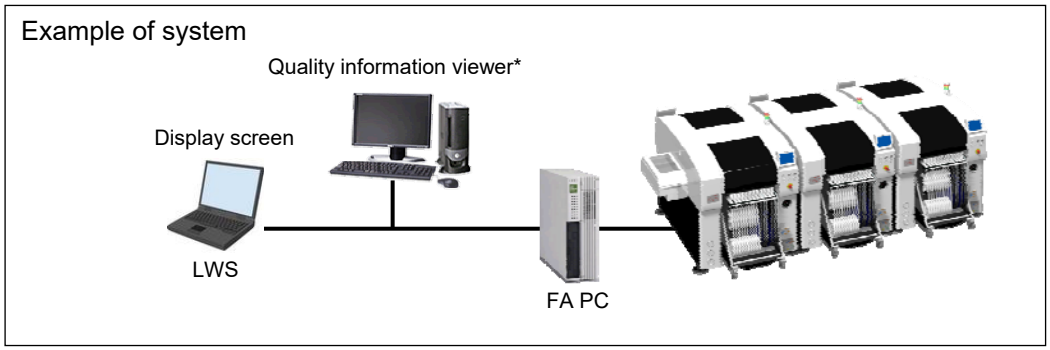
* A PC is to be prepared by the customer. There is no need to install the special software etc.
Please refer to “NPM-DGS Specification booklet” for details.

■ Examples of system configuration (Line configuration of NPM-W2 only)



*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

・ Quality information viewer
Comprehension of changing points and analysis of defect factors are supported by displaying the information on quality (the position of the feeder used, recognition compensation value, parts data and others) per PCB and per mounting point.
Main features:
Gathers/Stores weekly quality information
Displays quality information to LWS



* Please prepare PC on your own. It cannot be shared with the NPM-DGS.
This software is included in the NPM-W2 system software DVD-ROM.

Operating environment of quality information viewer

・ Hardware Specifications

Item		Specification	Required or Recommended
Main body		IBM PC/AT compatible machine (A desktop PC is strongly recommended.)	Required
	CPU	Intel® Core™2 Duo E6700 equivalent or greater	
	Mother board	IBM-fully-compatible machine	
	Serial I/O	I IBM-fully-compatible machine	
	Graphic board	SXGA or higher Desk top region: 1 280 × 1 024 dot or more	
	Memory	4 GB or more	
	HDD	500 GB or more of available space (NTFS file system)	
	Optical drive	DVD drive To be used in installation	
Keyboard		English version: 101English keyboard Japanese version: 106 Japanese keyboard	
Mouse		Supported by your OS as standard	
Monitor		SXGA-compliant	
Network card		For 100/1000BASE-T	
Uninterruptible power supply (UPS)		Supported by your OS as standard	Recommended

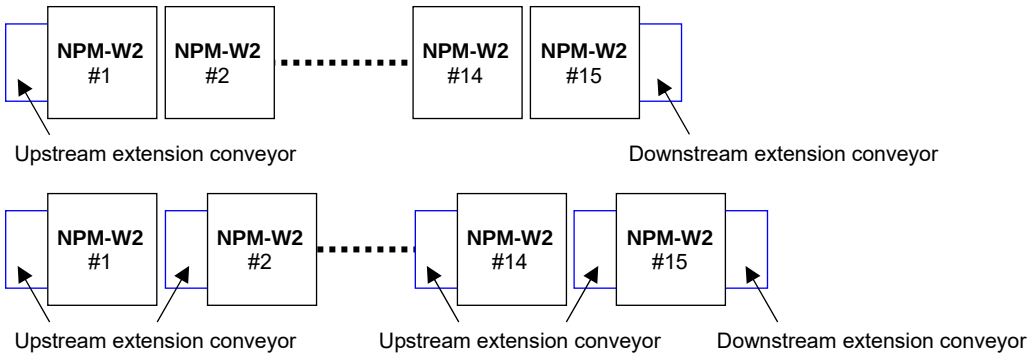
・ Software Specifications

Item		Specification	Required or Recommended
OS		Microsoft® Windows® 10 Pro (32-bit/ 64-bit version)	Required
	Support language	English, Chinese, Japanese	
	Framework	Microsoft® .Net Framework 3.5	
Virus check		Virus Buster™ Program version 7.0	Recommended

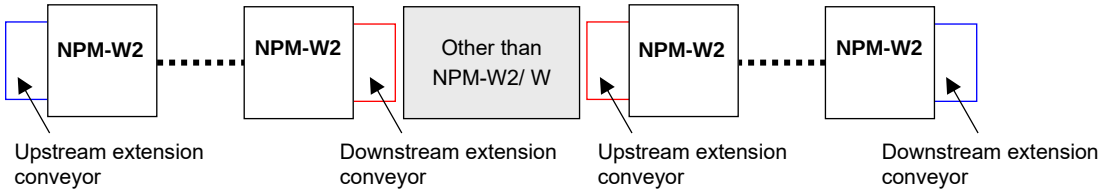
■ Examples of line configuration (Transfer direction: left to right flow sample).

The line configuration of NPM-W2 and the location of the extension conveyors and others are as follows.
It is required for the first and last equipment of the NPM-W2 to ensure the safety of the transfer opening.
When the extension conveyor is installed between the NPM-W2s please select the conveyor for upstream side.

1. For the line of NPM-W2 alone (Coupled machines: 15 or less)



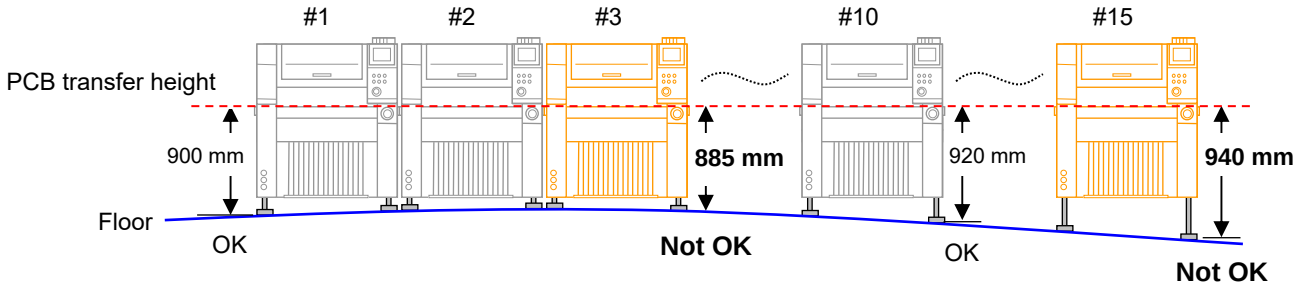
2. For the line of NPM-W2/ W combined with other systems
   Make sure to select an extension conveyor at the point where NPM-W2/ W lies next to another system.



* The above line configuration is a sample.
It may differ depending on your system configuration and the like. For details, please contact us.
* Connecting to NPM-DX/ D3/ D2/ D requires a traverser between them. The machine cannot be connected to NPM-TT or NPM.

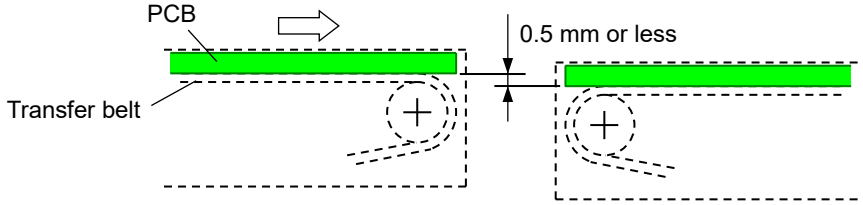
■ PCB transfer height

The standard NPM-W2 PCB transfer height is 900 mm to 920 mm.
The PCB transfer height of 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 #3 and #15 cannot connect with the equipment as usual.
Please contact us if all of the NPM-W2 transfer heights in a production line are not 900 mm to 920 mm.



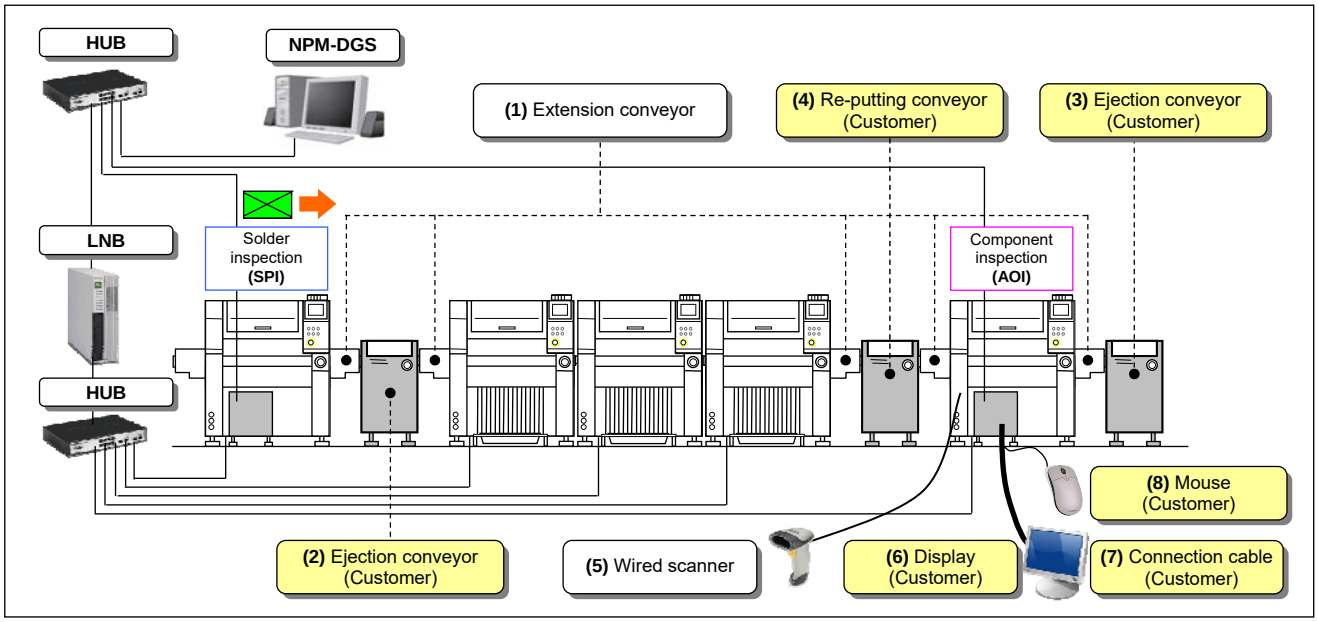
■ Height difference between PCB transfer units

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



4.6 Line configuration that includes a machine equipped with an inspection head

■ Standard line configuration

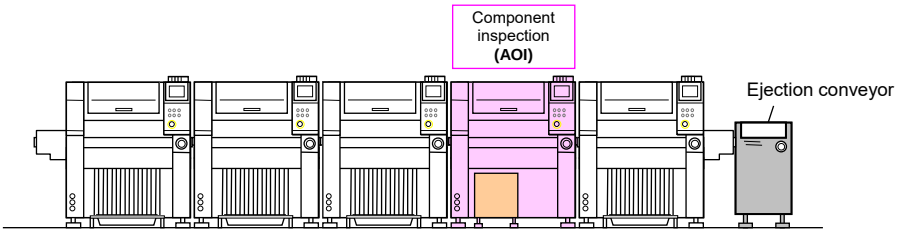


■ Other line configurations

Position of inspection head or conveyor can be allocated flexibly depending on purpose.

1) To shorten length of line
Allow all NG PCBs from Solder Inspection (SPI) and Component Inspection (AOI) to stop altogether at Ejection conveyor which is located at the end of a line. Placement points or patterns judged as NG at Solder Inspection shall be automatically skipped through placement and Component Inspection.

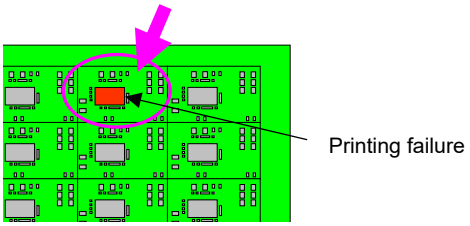
2) To execute foreign object inspection for two types of components in Reel and on Tray.
Foreign object inspection is carried out to inspect presence of such object under specified components. When an object is found, the specified components are not mounted. Therefore, the components need to be placed on the table opposite from inspection head or in a downstream process. When Reel and Tray types are mixed, please arrange as follows. However, please note that it is not possible to execute component inspection after placement of components in a downstream process.

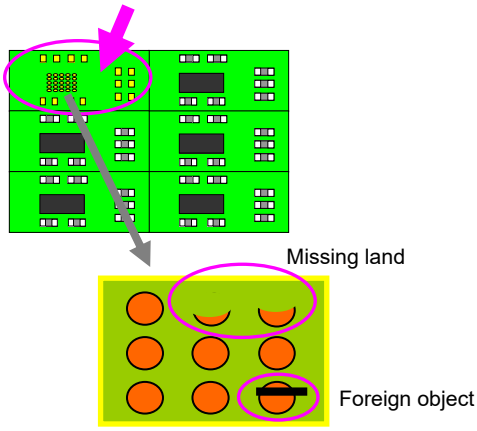


* The above line configuration is a sample.
It may differ depending on your system configuration and the like. For details, please contact us.

■ List of optional functions and required peripheral equipment

When using the following options, it is required to prepare peripheral equipment according to each function.

<table>
<tr><th>Optional function</th><th>Description</th><th>Peripheral equipment</th></tr>
<tr><td>Solder inspection NG ejection function</td><td rowspan="2">Based on inspection results of PCBs that are ejected from NPM-W2, OK/NG signals are output so that NG PCBs are stopped on the ejection conveyor and OK PCBs are passed through.
Also once a PCB is removed from conveyor to repair or to re-check, a function is needed to output a request signal to eject the next PCB to NPM-W2.</td><td>(1) Extension conveyor
(2) Ejection conveyor (Customer)</td></tr>
<tr><td>Component inspection NG ejection function</td><td>(1) Extension conveyor
(3) Ejection conveyor (Customer)</td></tr>
<tr><td>Re-putting function</td><td>It operates together with “Component inspection NG ejection function” as a set. This function allows you to put a repaired NG PCB, inspect, and mount again which failed to mount with the opposed head.
In addition, the PCB removed with NG is managed by the barcode. Reading the barcode during the re-putting enables tracking management.</td><td>(1) Extension conveyor
(4) Re-putting conveyor (Customer)
(5) Wired scanner</td></tr>
<tr><td>NG map display function</td><td>Although NG position can be confirmed on equipment screen, this function enables to display it on a PC screen also for component inspection.</td><td>(6) Display (Customer)
(7) Connection cable (Customer)
(8) Mouse (Customer)</td></tr>
<tr><td>Pattern information communication function</td><td>When a defect is found during solder inspection, skip placement to the defective pattern to minimize cost of component loss.
<u>Defective pattern</u>
Skip all component placement in the patterns where printing failure occurred.
 

Also, when a defect is found during land inspection, skip the defective patterns can minimize cost of component loss similarly.
<u>Defective pattern</u>
Skip all component placement in the patterns where land failure occurred.
 
</td><td></td></tr>
</table>

* You are kindly requested to prepare the peripheral equipment noted as (Customer).

■ Detailed specification of peripheral equipment requested to prepare by customer

<table>
<tr><th>Function</th><th>Peipheral equipment</th><th>Specifications</th></tr>
<tr>
<td>Solder inspection NG ejection function

Component inspection NG ejection function</td>
<td>(2) Ejection conveyor (Customer)

(3) Ejection conveyor (Customer)</td>
<td>
With OK signal control of inspection result from pre-process NPM-W2, only one PCB shall be stocked.
Also, the following transfer operation specifications must be satisfied.

(1) PCB loading wait operation
During stand-by status without NG PCB in stock, transmit Board Available (BA) status signal from pre-process to post-process, and Ready status signal from post-process to pre-process.

(2) NG PCB stock operation
1) When OK signal is ON at the loading of PCB
At the start of PCB loading, turn OFF Ready signal to pre-process and unload the PCB as it is without stopping.
2) When OK signal is OFF at the loading of PCB
At the start of PCB loading, turn OFF Ready signal to pre-process, and after placing PCB on conveyor as a stock, turn OFF BA signal.

(3) Transfer restart operation after stocking NG PCB
Execute the following operations by inputting foot switch etc.
1) When NG PCB is present
As it becomes unloading stand-by status, turn ON BA signal to post-process.
After confirming the Ready signal is ON, unload the PCB to post-process.
After completing the unloading (confirm Ready signal of post-process to turn from ON to OFF), return to operation # (1).
2) Where there is no NG PCB (removed).
Return to operation # (1).

Connector pin layout of the conveyor control
[XS connector]
<table>
<tr><th>Pin No.</th><th>Signal</th><th>Signal direction</th></tr>
<tr><td>1</td><td>Ready1+ (loading request)</td><td>from conveyor to NPM-W2</td></tr>
<tr><td>2</td><td>Ready1- (input common)</td><td>from conveyor to NPM-W2</td></tr>
<tr><td>3</td><td>Board Available1 (unloading available)</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>4</td><td>Board Available1 Return</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>5</td><td>N.C.</td><td></td></tr>
<tr><td>6</td><td>N.C.</td><td></td></tr>
<tr><td>7</td><td>OK1 Return</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>8</td><td>N.C.</td><td></td></tr>
<tr><td>9</td><td>Ready2+ (loading request)</td><td>from conveyor to NPM-W2</td></tr>
<tr><td>10</td><td>Ready2- (input common)</td><td>from conveyor to NPM-W2</td></tr>
<tr><td>11</td><td>Board Available2 (unloading available)</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>12</td><td>Board Available2 Return</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>13</td><td>N.C.</td><td></td></tr>
<tr><td>14</td><td>OK1 (inspection result)</td><td>from NPM-W2 to conveyor</td></tr>
</table>
[CNDUS connector]
<table>
<tr><th>Pin No.</th><th>Signal</th><th>Signal direction</th></tr>
<tr><td>A1</td><td>N.C.</td><td></td></tr>
<tr><td>A2-A4</td><td>N.C.</td><td></td></tr>
<tr><td>A5</td><td>OK2 (inspection result)</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>A6</td><td>OK2 Return</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>B1-B6</td><td>N.C.</td><td></td></tr>
<tr><td>C1-C6</td><td>N.C.</td><td></td></tr>
<tr><td>D1-D6</td><td>N.C.</td><td></td></tr>
<tr><td>E1-E5</td><td>N.C.</td><td></td></tr>
<tr><td>E6</td><td>N.C.</td><td></td></tr>
</table>
* Please do not connect with “N.C.”.
* In using the single conveyor, XR connector of the main body of NPM-W2 is connected.
* In using the dual conveyor, not only XR connector but also CNDUR connector is connected.
* Please consult us separately about details such as model No. of connectors, control inside of the conveyor, and etc.
* When the ejection conveyor is connected, the extension conveyor must be installed between NPM-W2’s main body and the ejection conveyor.
</td>
</tr>
</table>

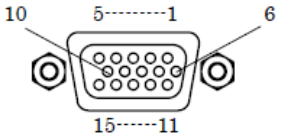
<table>
<tr><th>Function</th><th>Peipheral equipment</th><th>Specifications</th></tr>
<tr><td>Re-putting function</td><td>(4) Re-putting conveyor (Customer)</td><td>
・When the re-putting switch is pressed, PCB transfer is stopped by receiving an order from NPM-W2. The PCB ejection stop signal is transmitted to the NPM-W2 in the upstream via FA PC (LNB).
・Required information of PCBs is scanned by the barcode reader ,and then the PCBs are placed on the conveyor prompting them to be sensed to implement their loading to NPM-W2.
・The following transfer operating specifications must be satisfied.

(1) PCB loading wait operation
During stand-by status without NG PCB in stock, transmit Board Available (BA) status signal from pre-process to post-process and Ready status signal from post-process to pre-process.
(2) PCB stock operation
Placing PCB at stand-by position brings the machine to PCB stock status, turning OFF Ready signal to pre-process and BA signal to post-process. Other than the above, at the start of PCB loading, turn OFF Ready signal to pre-process and unload the PCB as it is without stopping.
(3) Transfer restart operation after stocking PCB
As it became unloading stand-by status by input of foot switch etc., turn ON BA signal to post-process.
After confirming Ready signal of post-process is ON, unload PCB to post-process.
After completing the unloading (confirm Ready signal of post-process is turned from ON to OFF), return to operation # (1).

Connector pin layout of the conveyor control
[XP connector]
<table>
<tr><th>Pin No.</th><th>Signal</th><th>Signal direction</th></tr>
<tr><td>1</td><td>Ready1 (loading request)</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>2</td><td>Ready1 Return</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>3</td><td>Board Available1+
(unloading available)</td><td>from conveyor to NPM-W2</td></tr>
<tr><td>4</td><td>Board Available1-
(input common)</td><td>from conveyor to NPM-W2</td></tr>
<tr><td>5</td><td>N.C.</td><td></td></tr>
<tr><td>6</td><td>N.C.</td><td></td></tr>
<tr><td>7</td><td>N.C.</td><td></td></tr>
<tr><td>8</td><td>N.C.</td><td></td></tr>
<tr><td>9</td><td>Ready2 (loading request)</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>10</td><td>Ready2 Return</td><td>from NPM-W2 to conveyor</td></tr>
<tr><td>11</td><td>Board Available2+
(unloading available)</td><td>from conveyor to NPM-W2</td></tr>
<tr><td>12</td><td>Board Available2-
(input common)</td><td>from conveyor to NPM-W2</td></tr>
<tr><td>13</td><td>N.C.</td><td></td></tr>
<tr><td>14</td><td>N.C.</td><td></td></tr>
</table>
* Please do not make connection to “N.C.”.
* This is used with the XL connector of the main body of NPM-W2 being connected.
* For further details, such as connector model numbers and control inside the conveyor, please consult us.
* When the re-putting conveyor is connected, the extension conveyor must be installed between NPM-W2’s main body and the ejection conveyor.
</td></tr>
<tr><td></td><td>(5) Wired scanner</td><td>
・Please purchase the optional wired scanner.
・Please prepare the barcode for re-putting by yourself.
Any numbers are available if they are corresponding codes with our wired scanner.
It is recommended that you attach the barcode to the box or rack, in which PCBs are stored, not directly to PCBs, and scan the barcode on the box or rack.
As for the PCBs that have the barcode, which corresponds with our wired scanner, already being attached, it is possible to scan the attached barcode.
</td></tr>
</table>

<table>
<tr><th>Function</th><th>Peipheral equipment</th><th>Specifications</th></tr>
<tr><td rowspan="3">NG map display</td><td>(6) Display
(Customer)</td><td>This displays NG part image on PCBs that are judged as NG by inspection and NG maps which show at where on PCBs NG occurred.
・Resolution: 1 024 × 768 or higher
・Display colors: about 16.77 million or more
・Image input signal: Analog RGB</td></tr>
<tr><td>(7) Connection cable
(Customer)</td><td>A cable that connects the display, which shows the NG map, and the inspection box. For each signal wire, R, G, and B, we recommend the 75 Ω coaxial cable.
Cable length: 5 m or less

We show below the shape and pin layout of “MONITOR”, which is a connector for the inspection box.

[Connector: Mini D-sub 15 pin (Female)]
<table>
<tr><th>Terminal No.</th><th>Signal name</th><th>Pin connection</th></tr>
<tr><td>1</td><td>GRED</td><td rowspan="15"> 
</td></tr>
<tr><td>2</td><td>GREEN</td></tr>
<tr><td>3</td><td>GBLUE</td></tr>
<tr><td>4</td><td>NC</td></tr>
<tr><td>5</td><td>GND</td></tr>
<tr><td>6</td><td>GND</td></tr>
<tr><td>7</td><td>GND</td></tr>
<tr><td>8</td><td>GND</td></tr>
<tr><td>9</td><td>VP50</td></tr>
<tr><td>10</td><td>GND</td></tr>
<tr><td>11</td><td>NC</td></tr>
<tr><td>12</td><td>SDA-10</td></tr>
<tr><td>13</td><td>GHSYNC+10</td></tr>
<tr><td>14</td><td>GVSYNC+10</td></tr>
<tr><td>15</td><td>SCL-10</td></tr>
</table></td></tr>
<tr><td>(8) Mouse
(Customer)</td><td>This is used for displaying enlarged NG maps, clicking the completion button after checking NG maps, and etc.
・Required OS: Windows XP
Windows Embedded Standard 7
・Connection interface: USB 1.1/ 2.0
・Connection cable: Ones that are certified for USB specification of the mouse which is used by you.
Length 5 m or less
・Connection terminal: Type A
* Maximum electric source/current which we can take out from the USB connector of the inspection box is 500 mA (DC + 5 V).</td></tr>
</table>

4.7 Recognition Unit Configuration

■ Head camera

• Field of view: 7.68 × 7.68 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 chip are corrected.
In addition, the presence of solder balls can be detected * for BGA/ CSP through the side lighting (option).

Recognition method	Recognition speed	Applicable Component
Batch recognition	High	General chip components including the square chips measuring 03015* or over. BGA, CSP, QFP, SOP, and connector etc. * When "03015 placement support" is selected.

* There are limitations on the components for which the ball detecting is available.
Please refer to the item describing the recognition condition of BGA/ CSP.
* 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 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.)

	8-nozzle head (Lightweight type)	3-nozzle head V2
Outside dimensions	2 × 2 mm ~ 32 × 32 mm	2 × 2 mm ~ 80 mm × 80 mm*1
Thickness	1.0 mm ~ 12 mm	1.0 mm ~ 28 mm
Lead pitch	0.5 mm, 0.65 mm, 1.0 mm, 1.27 mm, 1.5 mm	0.4 mm, 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.)

	8-nozzle head (Lightweight type)	3-nozzle head V2
Outside dimensions	2 × 2 mm ~ 32 × 32 mm*1	2 × 2 mm ~ 90 × 90 mm*1*2
Thickness	0.3 mm ~ 12 mm	0.3 mm ~ 28 mm
Ball pitch	0.4*1 ~ 1.5 mm	0.3*1 ~ 1.5 mm
Ball diameter	φ0.15 mm ~ φ0.9 mm	
Ball shape	Globular or cylindroid*3	
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 Consult us regarding large-sized, minimal pitch components.
*2 When the outside dimensions exceed 45 × 45 mm, split recognition comes into use.
(recognition range: 80 × 80 mm)
*3 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.)

	8-nozzle head (Lightweight type)	3-nozzle head V2
Outside dimensions	32 × 32 mm or less	L 120 × W 90 mm or less*1*2 L 150 × W 25 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.

■ Component thickness measurement function (Multi-recognition camera: Type 2)

Based on the functions of type 1, type 2 has been added a component thickness measuring function and a top/bottom detecting function, to improve placement quality.

Item	Description		
Applicable component	03015R*1 ~ Mini Tr/ Di (Max: 6 × 6 mm)		
	Minimum component thickness: 0.1 mm (For standing/tilted standing detection at the time of pickup, 50 μm or more is required as difference between any two of thickness, width, or length of components.)		
Functions	Measurement function of component thickness	Every time	Component thickness is measured every time, reflecting the result on placement height. Micro components' standing/tilted standing and flip of Tr/ Di at the time of their pickup can also be checked simultaneously.
		First time of parts exchange	The part detection will be done at the first part after the following operations: "Automatic operation starts", "Parts replenishment", "Tape splicing detection", "Chip data correction".
		Component teaching	Thickness measurement and chip data registration are possible for respective components.
	Check function of nozzle tip	A check is done for nozzle tip height's abnormality (break or nozzle holder sliding defect).	
	Ejection detecting function	After component ejection following recognition errors or etc., a check is done to make sure there's no adhesive material on the nozzle tip.	

* This detection is not applicable when you use the nozzle with pad or the nozzle with steps on its tip. ([e.g.] 205A)
* Please make purchase for each table at the front/ rear sides.
* 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.)

*1 When "03015 placement support" is selected.

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

Based on the functions of type 2, the added functions on type 3 are as follows.

- 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	0.4 mm*1	0.12 mm	—
		BGA, CSP	0.5 mm*2	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.)

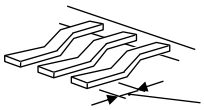
*1 For QFP/ SOP of a lead pitch less than 0.4 mm, please consult us.
*2 For CSP of a ball pitch less than 0.5 mm, consult us.

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.)

	8-nozzle head (Lightweight type)	3-nozzle head V2
Outside dimensions	2 × 2 mm ~ 32 × 32 mm	2 × 2 mm ~ 80 × 80 mm*
Thickness	1.0 mm ~ 12 mm	1.0 mm ~ 28 mm
Lead pitch	0.4 mm, 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.



Lower plane of the lead is 0.2 mm or over.

- 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.)

	8-nozzle head (Lightweight type)	3-nozzle head V2
Outside dimensions	2 × 2 mm ~ 32 × 32 mm	2 × 2 mm ~ 90 × 90 mm*
Thickness	0.3 mm ~ 12 mm	0.3 mm ~ 28 mm
Min. ball pitch	0.5 mm	0.4 mm
Min. ball diameter	φ0.3 mm	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)

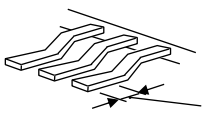
Recognition conditions of connector (Type 3)

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.)

	8-nozzle head (Lightweight type)	3-nozzle head V2
Outside dimensions	32 × 32 mm or less	L 120 × W 90 mm or less*1*2 L 150 × W 25 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.

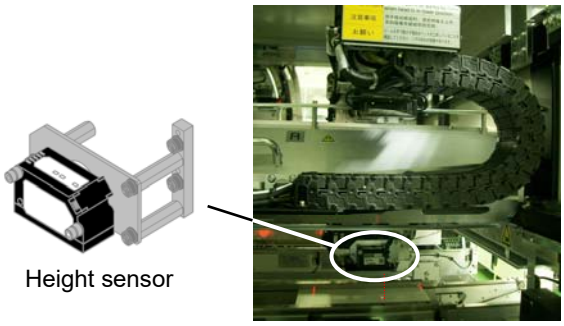
- The measuring range of lead coplanarity is up to ±0.5 mm.
- 0.2 mm-or-more flat part is needed on the lead underside.



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

■ Height sensor

It controls the placement/dispensing height of the nozzle by measuring the height (warpage) of PCB.
If a measurement result exceeds the acceptable value, a warning is issued prior to placement or dispensing to prevent the occurrence of quality defects.
There are two independent functions; local PCB height correction (for the dispensing head) and PCB warpage correction (for the placement head).



Local PCB height correction (for the dispensing head)

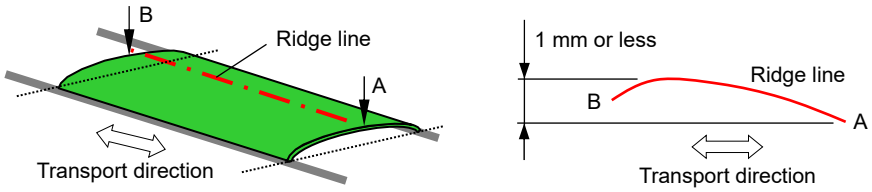
Adjusts to the optimal nozzle height by measuring several PCB heights (warps) near the draw dispensing (non-contact dispensing) positions.

Item		Description
Applicable PCB	Thickness	0.3 mm ~ 8.0 mm
	Material	Glass epoxy, Paper Phenolic
	Measuring surface material	The area of 1.5 × 1.5 mm or larger on the copper foil + the resist surface, the copper foil surface or the silk surface. Transparent and translucent area are excluded. (e.g., glass epoxy material face)
Functions	Height control	Adjusts to the optimal nozzle height by measuring several PCB heights (warps) near the draw dispensing (non-contact dispensing) positions.
	PCB warpage acceptable value detecting	If the difference equal to the measurement results of plural points exceeds the acceptable value, the occurrence of defects in quality is prevented by detecting the error before drawing.
Measurement condition	Measurement height	PCB upper surface ±4 mm (A measurable range but not a PCB warpage acceptable range.)
	Measurement area	You need to set a measurement point at 5 mm inside from a slit in the edge of a PCB.
Measurement time		0.5 s (30 × 30 mm in an optimal condition, with 4-point measurement)

* Install to the beam mounted with the dispensing head.
* Measurement information is not communicated between machines.
* Only the dispensing height of the dispensing head can be corrected.

PCB warpage correction (for the placement head)

Controls the placement height by measuring the height (warpage) of the whole PCB.

Item		Description
Applicable PCB*1	Thickness	1.6 mm ~ 8.0 mm
	Material	Glass epoxy
	Measuring surface material	The area of 1.5 × 1.5 mm or larger on the copper foil + the resist surface, the copper foil surface or the silk surface. Transparent and translucent area are excluded. (e.g., glass epoxy material face)
	Warpage	Upward warp: 2 mm or less, downward warp: 2 mm or less, a warping gradient of 0.5 % or less, and a ridge line (in the transfer direction) with a height difference less than 1 mm. 
Functions	PCB warpage acceptable value detecting	If a measurement result exceeds the acceptable value, a warning is issued prior to placement to prevent the occurrence of quality defects. Acceptable warping gradient (%) can also be checked.
	Height control	Controls the placement height by measuring the height (warpage) of the whole PCB.
	Measurement data passing	The data measured by the first NPM-W2S/ W2 in line is passed to the downstream NPM-W2S/ W2*.  * If any machine other than NPM-W2S/ W2 is coupled together, no data passing is allowed. * For any PCB whose warp shape changes each time it is clamped, please consult us separately.
Measurement condition	Measurement height	PCB upper surface ±4 mm (A measurable range but not a PCB warpage acceptable range.)
	Measurement area	You need to set a measurement point at 5 mm inside from a slit in the edge of a PCB.
	Measurement points*3	Whole warp correction: more than 9 points (Up to 25 points/PCB) Pattern warp correction: more than 9 points/pattern (Up to 25 points/pattern)
Measurement time		3.0 s (750 × 510 mm in an optimal condition, with 9-point measurement)

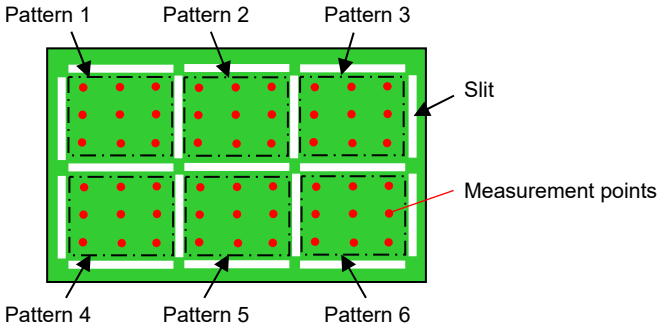
*1 PCB warpage correction can correct only simple curved surfaces with a U-shaped cross-section.
Complicated warp geometry can be corrected as a combination of simple curved surfaces with the use of the pattern warp correction.
You are recommended to use the pattern warp correction for PCBs with a slit or thin PCBs since they tend to have a complicated warp shape. (See the next page)

*2 Select the height sensor for the first NPM-W2 in line.
Select only the front side for single conveyor specifications and, both the front and rear side, for dual conveyor specification.
The head configuration except for [placement head + placement head], PCB warpage correction does not function.

*3 For the maximum number (total number of settings) of measurement points that can be set, please refer to “3.1 Basic specifications Production data.”

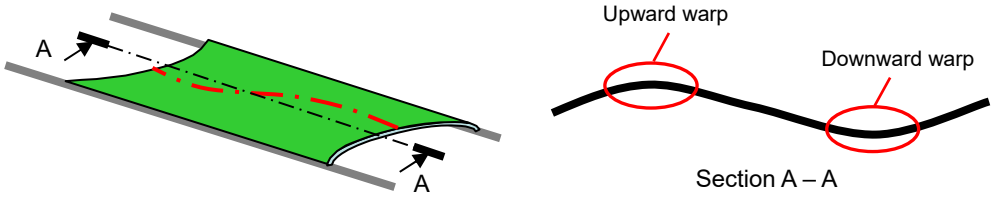
■ PCB with a slit

It is unlikely that PCBs with a slit have smooth (even) curved surfaces because of their complicated warp geometries. In such a case, you are recommended to use the pattern warp correction.
Pattern warp correction: corrects a warp at the measurement per pattern. (see the following figure)



■ Uncorrectable warp shape

e.g.) PCB with an undulating surface

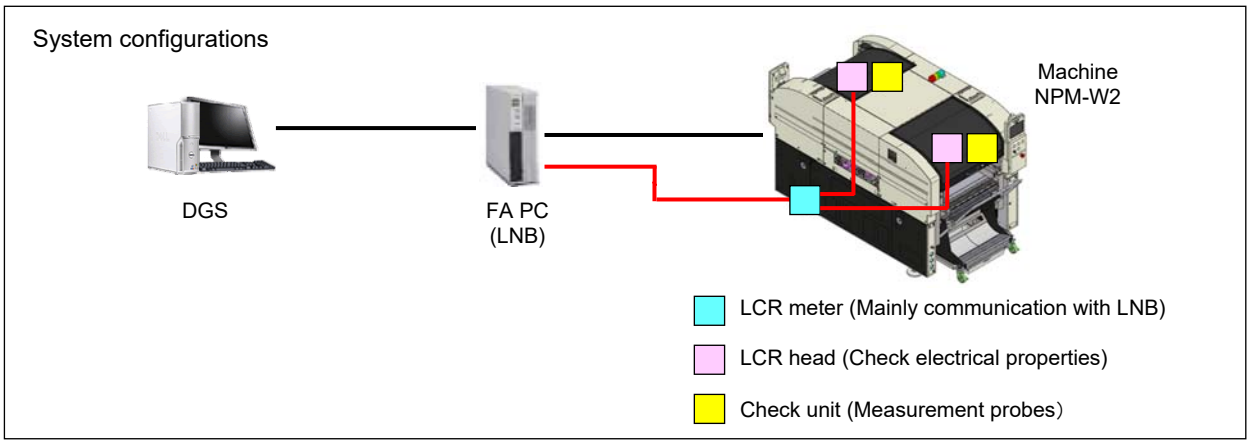


4.8 LCR checker(Built-in type)

LCR checker (Built-in type) measures electrical properties of chip components to prevent error mounting caused by erroneous picking up of chip components.

■ Standard configuration

LCR checker (Built-in type) measures electrical properties of chip components and FA PC obtains the values; then NPM-W2 machine checks whether they are within normal limits.
FA PC manages execution logs.
When you use LCR checkers, you need to enter settings with DGS.



■ Overviews

Check

- Measures electrical properties of chip components and checks whether the values are within the set range.

Production stop

- When judged as NG, i.e. when electrical properties of chip components are out of the set range, productions will go in to error stop.

■ Standard specifications (1)

Items	Descriptions
Applicable heads	・Lightweight 16-nozzle head V2 ・12-nozzle head ・Lightweight 8-nozzle head
Components	L:0.4 mm x W:0.2 mm ～ L:6.0 mm x W:6.0 mm, H:5.0 mm or lower ・The conditions must be: In Dimension “L”, chip components have electrodes on both sides and both sides have electrodes underside.
Measurable parameter range	Resistance(R : 0 Ω ～ 100 MΩ Condenser(C) : 1 pF ～ 100 μF (Polar capacitor are not included) Inductor(L) : 4.7 nH ～ 1 mH Diode/Zener diode : 0 V ～ 3.4 V * Polarity evaluation only
Measurement accuracy	Resistance(R) : 0 Ω ～ 0.999 Ω ±0.05Ω 1 Ω ～ 9.999 MΩ ±3 % 10 MΩ ～ 100 MΩ ±5 % Condenser(C): 1 pF ～ 99.99 pF ±5 % 100 pF ～ 4.699 μF ±10 % 4.7 μF ～ 100 μF ±40 % (±10 % *) Inductor(L) : 4.7 nH ～ 1 mH ±20 % (±10 % *) Diode/Zener diode : 0 V ～ 3.4 V ±10 % * The values (in brackets) are the accuracy range of electrical capacitance, frequency response considered. (For details on how to calculate the percentage, refer to operational manuals)
Measurement tact	Less than 5 seconds / points (Picking up and collecting chip components are included)

■ Standard specifications (2)

Item	Description
Eligible nozzles	Standard-specification nozzles that match targeted measurement component size. * Nozzles that are used for LCR Checker Electrical Correction Lightweight 16-nozzle head V2, 12-nozzle head：230CS nozzle Lightweight 8-nozzle head：230C nozzle
Supply unit rules	・Feeders are subject to LCR checks. When the rear of the supply unit is single tray feeder＋13-slot feeder base, only 13-slot feeder base is subject to LCR checks. LCR checks do not work when the rear of the supply unit is twin tray feeder specifications.
Placement mode	・Share mode ・Independent mode * When a measurement unit is only on one table, chip components on the other table that does not have a measurement unit are NOT subject to LCR checks.
Determine electrical property constants (Resistance, Capacitance Inductance, Forward voltage, Zener voltage)	This is a function that checks electrical property constants with LCR checkers in the process of production and that the constant values will be showed on the machine’s screen or LNB. (constant check timing is as follows) ・When picking up is for the first time after production start* ・When picking up is for the first time after splicing is detected to go to a next tape ・When picking up is for the first time after feeders are disconnected ・When picking up is for the first time after chip components run short and production restarted ・When teaching is ongoing and you are manually measuring values * When chip components are the same before and after changeover and went through electrical property checks at the previous production, the tests at this time are not performed.
Judge the measurement values	・This is a function to detect whether the values are not in acceptable range when the values are exceeded “Value Maximum Limit” or when the values are lower than “Value Minimum Limit”, based on the values you defined for each chip component with DGS. ・When the values are not in acceptable range, detection will be repeated until the maximum number of trials is reached to the entered “the number of attempts to retry”. When the re-tried values are in acceptable range, measuring continues. ・When all of the retrials are not in acceptable range, measuring will go in to error stop.
LCR checker Calibration features	・Placement position calibrations The NPM-W2 machine corrects coordinate axes of LCR checkers in X-direction and Y-direction with its head camera recognition functions, and coordinate axes in Z-direction with its nozzle height measuring functions. ・Electrical Corrections There are two corrections to maintain measurement accuracy; Short Corrections and Open Corrections.
Storing measurement values	The values measured in the process of productions will be kept on LNB for 7 days; you can see the data and output them in a CSV format.

■ Preparations on your end

Items	Descriptions	Specifications
USB cables	USB cables are used for LAN settings of LCR meters.	USB 2.0 A-A Type A  Type A
0 Ω Resistance	0 Ω Resistance is used for LCR Checker Electrical Corrections.	Dimensions : L x W = 1.6 mm x 0.8 mm, t = 0.5 mm Resistance : 50 mΩ or lower *Recommended resistance Manufacturer model number : TLRZ1JTTD Manufacturer : KOA Speer (Model number : D0YBR0000045)

5. System software

5.1 Component Verification*1

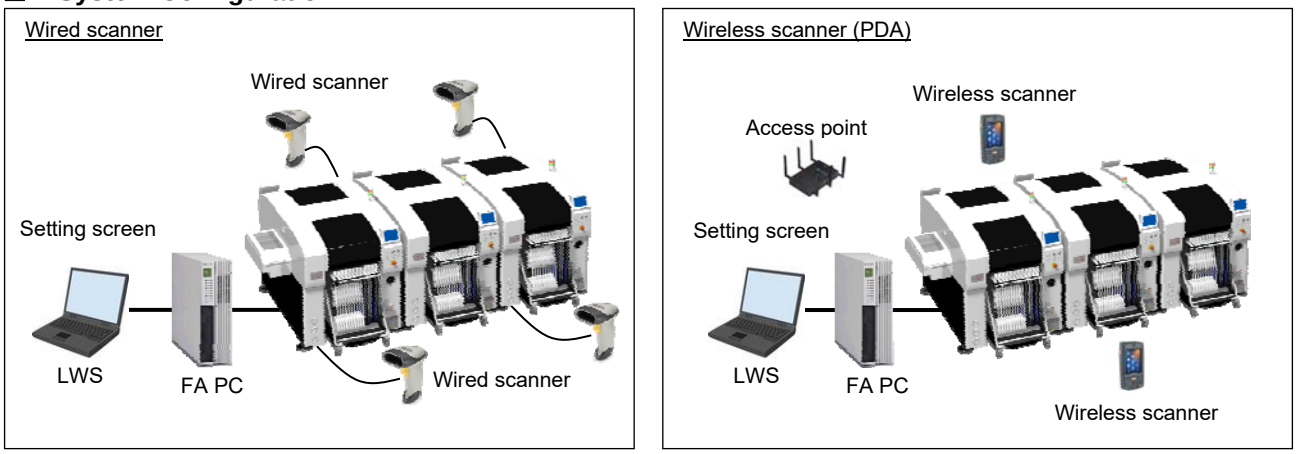
This prevents components from being put wrongly. If you set components that are inconsistent with production data that are downloaded to the machine, interlock function of the machine operates to create automatically the mode where production cannot be continued. It is possible to customize order of barcode scanning and/or barcode definition, according to customers' operation.
Regarding the main body of the scanner, please choose between the wired scanner and the wireless scanner (PDA).
Purchase of this option is required for the optional "Feeder Anywhere" feature.

*1 This is an option list of Component Verification.
When NPM-DX is in production line, please select "Material Verification" from "PanaCIM-EE"

Option		Hardware	Floor level control*2
Equipment	Component Verification : Wired scanner type	Wired scanner	Unsupported
	Component Verification : Wireless scanner (PDA) type	Wireless scanner (PDA) , Access point	
PanaCIM-EE	Material verification : No-server type	Wireless scanner (PDA) , Access point	Available
	Material verification : (Server PC type)	Wireless scanner (PDA) , Access point PanaCIM server PC	(Floor level control)

*2 It is impossible to control multiple lines in the floor and use modules like Material Control Module, Traceability Module, etc.

■ System Configuration



* It is impossible to implement operation where the wired and wireless scanners (PDA) are used in combination.

■ Function List

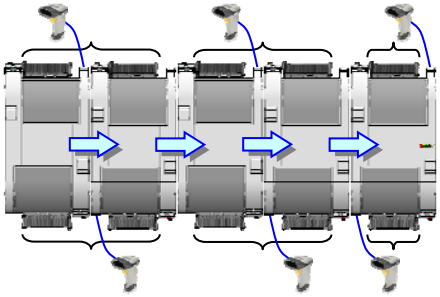
Item		Description
Feeder Verification*1	Component verification at the time of preparation	Components are verified at the time of preparation.
	Component verification at the time of component exhaustion	Components are verified when they are replenished at the time of component exhaustion
	Component verification 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 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		For the wireless scanner (PDA), line selections by the GUI are possible. The wireless scanners (PDA) on other lines can also be used.
Setting function	Defining verification flow (*This is a function that optionally defines scanning order of some 1D/ 2D codes which are attached to reels.)	Verification flow can be defined according to customers' operation. By entering code, which indicates type, into barcode, you can make setting for two modes: random mode which does not specify scanning order or sequential mode which specifies scanning order.
	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.)

*1 It does not support the component verification of the stick feeder.

■ Standard Specifications

Item	Description
Scan code	 1D code(Barcode): UPC/EAN/JAN, UCC/EAN 128, Code 39, Code 128, etc.
	 2D code: 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) Applicable for the display screen of the setting terminal on LWS 2) Applicable for the display screen on the wireless scanner (PDA)

■ Standard Configuration

Item	Description	
Wired scanner	Main body of wired scanner	This is a unit for reading barcodes. Operation on two tables is made possible by one scanner. We recommend the main body of scanner to be installed alternately at both sides of front and rear. Please make purchase in accordance with your line configurations. 
	Scanner holder	This is a unit which holds scanner onto the machine.
Wireless scanner (PDA)	Wireless scanner (PDA) Main body*1*2 	Product name: MC55 Manufacturer: Motorola, Inc.
	Access point*1 	This is an antenna that communicates with the wireless scanner (PDA). Installation of one antenna for one line is recommended. Product name: AP6532 Model number: AP-6532-66040-WR (Main body) ML-2452-APA2-01 (Three antennas are required.) AP-PSBIAS-2P2-AFR (Power injector)*3 Manufacturer: Motorola, Inc.
License	A license is required for each machine. Please refer to “14. Regarding Licenses.”	

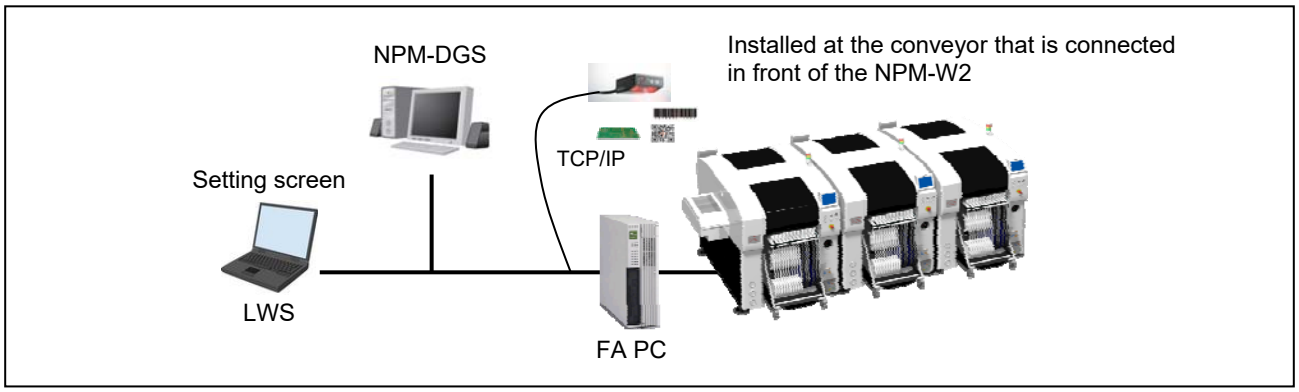
*1 Please prepare the wireless scanner, related accessories, and table yourself.
*2 Software for the main body of wireless scanner (PDA) is included in NPM-W2 system software DVD-ROM.
*3 Please prepare power cables and related equipment that are suitable for use in your local area.

5.2 Automatic Changeover

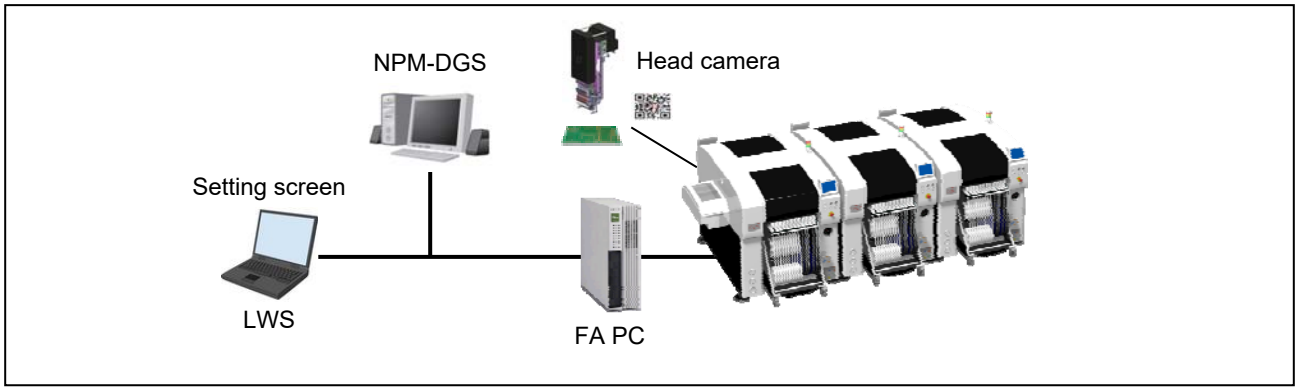
This supports changeovers (production data change and rail width change), minimizing the time loss of operation caused by product changes. In accordance with each customer's operation, selection can be made from following three types, "External scanner read type", "Head read type", and "Planned form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

■ System Configuration

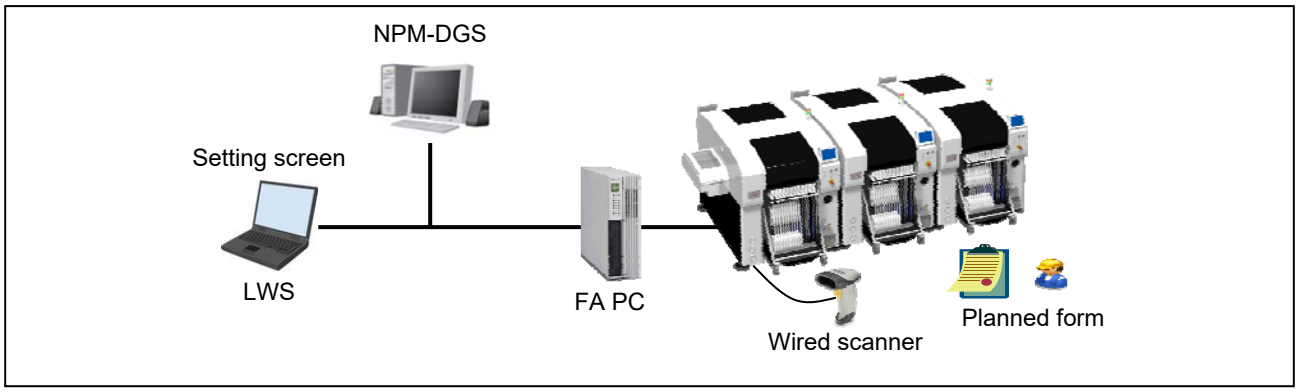
External scanner read type



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-W2, 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 wired 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. ・Method of specifying character string Method in which data extracted from barcode is character string, which corresponds to production data name on a one-to-one level. ・Method of specifying range 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 splitable board, there's no need for the commonality.)

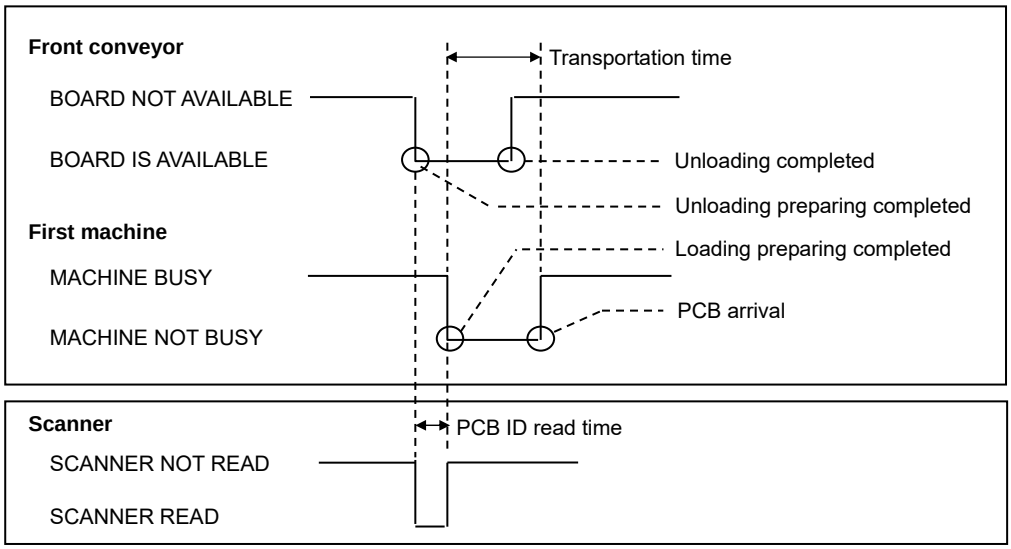
■ Standard Specifications

Item	Description
Readable code	External scanner read type  1D code (Barcode): CODE39, ITF, Industrial2of5, COOP2of5, NW-7, CODE128, EAN128, CODE93, JAN/EAN/UPC (supporting add-on), TriopticCode39, etc.  2D code: QR code, MicroQR, Data Matrix (ECC200), PDF417, MicroPDF, Maxicode, etc.
	Head read type  2D code: QR code, MicroQR, Data Matrix (ECC200) Max. dimension: 5 mm × 5 mm
	Planned form read type  1D code (Barcode): UPC/EAN/JAN, UCC/EAN 128, Code 39, Code 128, etc.  2D code: 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 ・External scanner unit 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) ・Conveyor 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 ・Main body of wired scanner This is for reading barcode, and connected to first machine. One device is required for a line. Common use with component verification option (wired) is possible. ・Scanner holder This is for placing the scanner on the machine. Common use with component verification option (wired) 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.

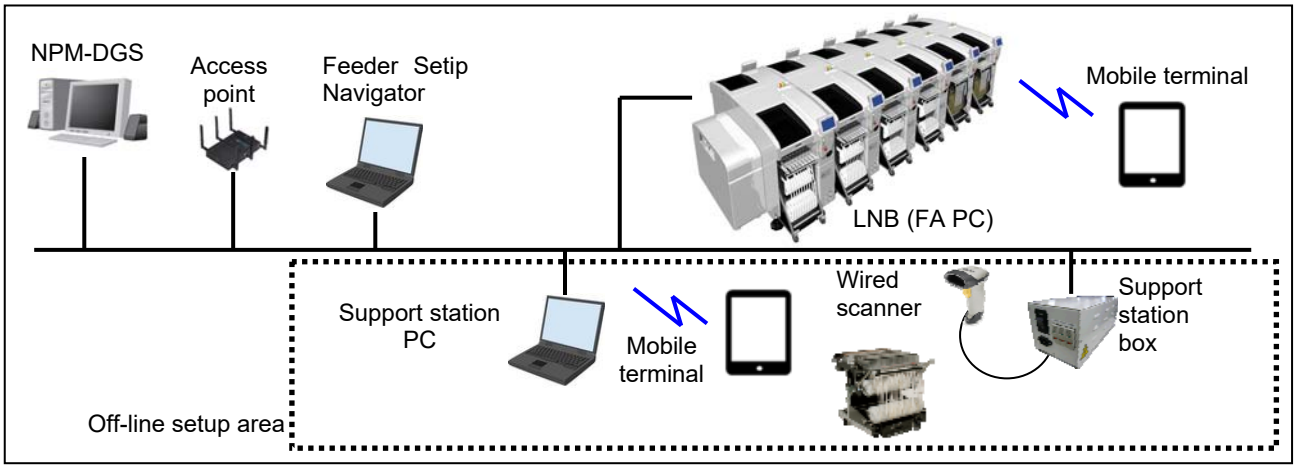


5.3 Feeder Setup Navigator

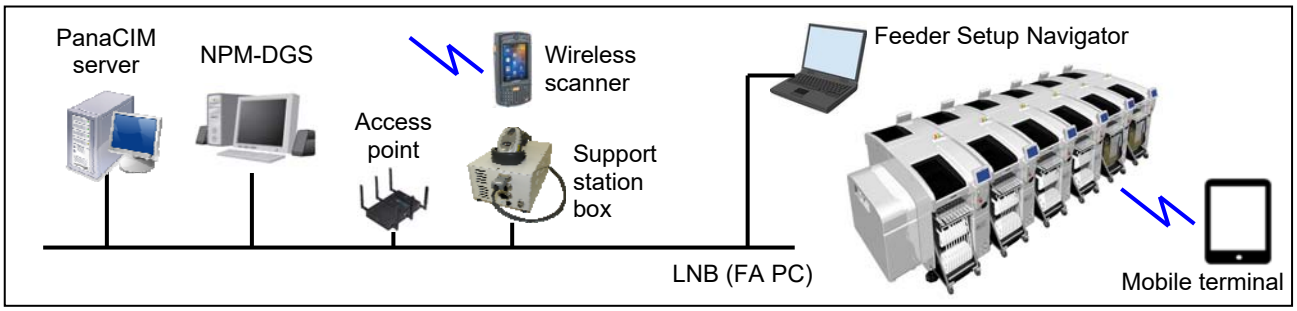
It is a support tool to navigate efficient setup procedure. The tool factors in the amount of time it takes to perform and complete setup operations when estimating the time required for production and providing the operator with setup instructions. This will visualize and streamline setup operations during setup for a production line.

■ System Configuration

For support station (Component verification type)



For PanaCIM-EE (Material verification)



■ Function List

Item	Description
Production plan creation function	Based on the specified model, production volume and number of workers involved in the setup task, it creates a production plan that factors in the amount of time it takes to perform and complete the setup is created. The estimated time of completion of production can also be confirmed on a per-model basis.
Setup instruction display function	It displays setup tasks necessary for production of the next and following models. It permits you to check the status of the feeders being mounted on the machine in real time and the progress on the ongoing setup task, and also to perform a setup task on the machine in operation. In addition, one and the same view can be displayed in web browser on several different PCs or mobile terminals.

■ Standard Configuration

Item	Description
License	A license is required for each machine. Together with the license, select the options below. Required Support station box (Component verification type) Choice (Select any of the following options) 1) Component verification (License) + Support station: Component verification type (License) 2) PanaCIM-EE ready (License) Please refer to “14. Regarding Licenses”.
PC	It is a PC used to display production plans and setup instructions. * Please prepare on your own. Can also be shared with NPM-DGS and support station PCs.

■ System Requirements

・Hardware specifications

Item		Specifications	Class
Main body		IBM PC/AT-compatible machine	Required
	CPU	Intel® Core™2 Duo E6700 equivalent or greater	
	Mother board	Fully compatible with IBM	
	Graphic board	SXGA or higher Desk top region: 1 280 × 1 024 dot or more	
	Memory	4 GB or more	
	HDD	20 GB or more (NTFS file system)	
	Optical drive	4x speed or faster of DVD drive To be used in installation	
Keyboard		English version: 101 keyboard Japanese version: 106 keyboard	Required
Mouse		Supported by your OS as standard	
Monitor		SXGA ready	
Printer		Supported by your OS	Recommended
Network card		100BASE-TX network card	Required
Display terminal		iOS11.0 or later、or、Android™ 4.3 or later Resolution：WUXGA or later	Recommended

・Software specifications

Item		Specifications	Class
OS		<PC> Microsoft® Windows® 10 Pro (64-bit version) Microsoft® Windows® 8.1 Pro (64-bit version) Microsoft® Windows Server® 2012 (64-bit version)	Required
		< Mobile terminal> iOS Safari：11.0 and later versions (e.g.：since iOS 11.0) Android Chrome：56 and later versions (e.g.：since Android™ 4.3)	Recommended
	Support Language	English, Chinese, Japanese	Required
	Framework	.Net Framework 4.7.2 or later	
Virus check		Virus Buster™ Program version 12.0 or later	Recommended

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・ Virus Buster is a registered trademark or trademark of Trend Micro Incorporated.
・ iOS is a registered trademark or trademark of Cisco Corporation
・ Android is a registered trademark or trademark of Google Inc.

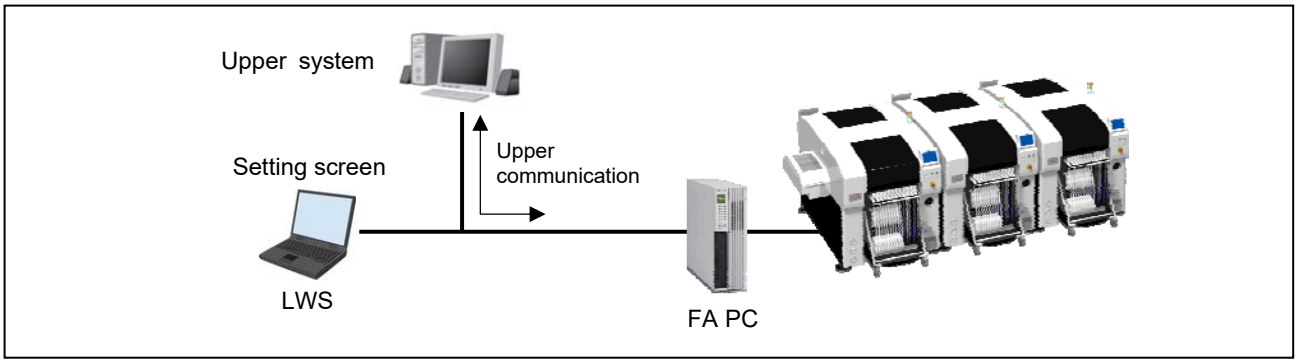
■ Constraint condition

Item	Description
Target feeder	Intelligent tape feeder, thin type single tape feeder, tray feeder *Only can display the setup instructions on tray feeder. Cannot check the status of the feeders in real time.
Target area	In-line setups (Setups or preparations inside the machine) Off-line setups (Feeder cart setups or preparations)
Other	When a product changeover is performed on one lane during the independent mode, both the first machine in line and the other lane in operation need to temporarily stop production.

5.4 Upper Communication

This is an 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.

■ System Configuration

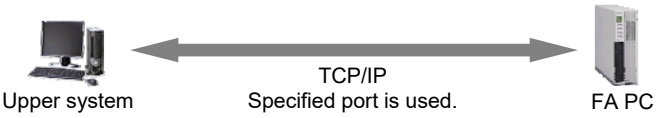
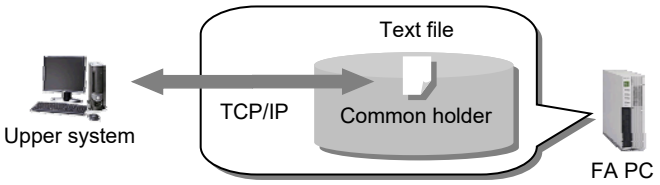


■ Function List

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)	

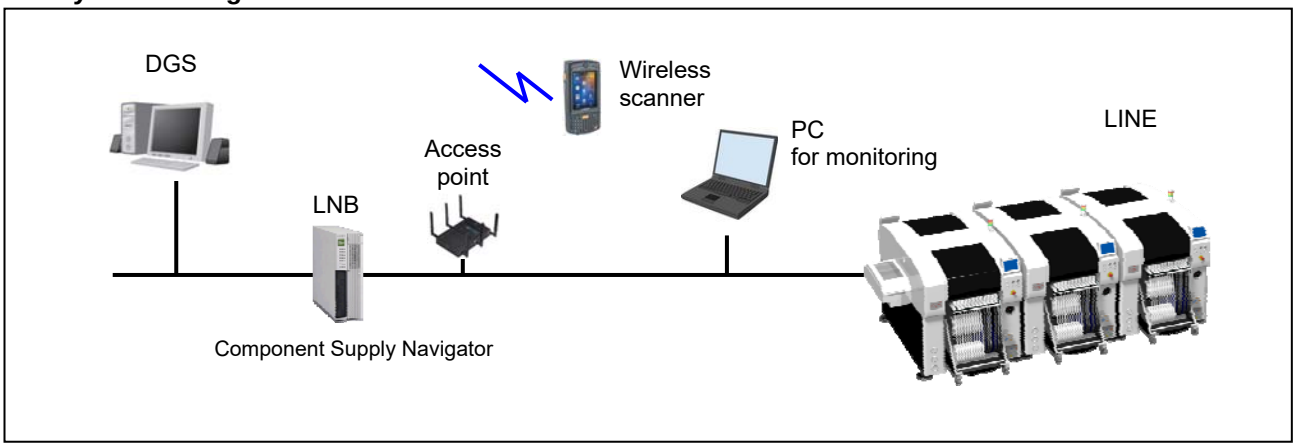
■ Standard Configuration

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

5.5 Component Supply Navigator

This navigator can prevent short time breakdown in the production line and contribute to manpower saving.
It optimizes the supply sequence to provide a shortest route without component shortage.
The optimized supply sequence will be displayed as a best supply route on wireless scanner or the monitoring PC for each operator.

■ System Configuration



■ Function List

Item	Description	
Component Supply Navigator	Supply sequence optimizes	Optimizes the supply sequence to provide a shortest route without component shortage in a certain period of time. The following supply units are available. ・Intelligent Tape Feeder ・Auto Load Feeder ・Direct tray
	Supply route instructions	The optimized supply sequence will be displayed as a best supply route on wireless scanner or the monitoring PC for each operator.

■ Standard Configuration

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

■ Restrictions

It is not available for the Intelligent Stick Feeder which without component remaining management function.

■ Remarks

① We recommend using the Component verification (License)-Wireless scanner (PDA) type together.
② This option is used for one line. If you want to use the navigator in multiple lines, please buy the component supply navigator of PanaCIM-EE.

5.6 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 required for the optional “Feeder Anywhere” feature.

Material preparation

①Power supply type
②Component verification type

Production area

①Power supply type
②Component verification type

Station type
You can choose between power supply or component verification types.

①Power supply type:
Power is supplied to feeder carts and feeders.

②Component verification type:
Power supply and component verification can be done for feeder carts and feeders.
1D/ 2D codes of components are read by the scanner.

* This does not support stackable stick 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. This has a navigation function like pointing out positions that require preparation.
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. This has a navigation function like pointing out positions that require preparation.
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

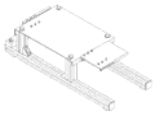
Power supply type

Item	Description
Power supply unit*1 *2 	This supplies power 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

Component verification type

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*3 	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 Software for the support station PC is included in NPM-W2 system software DVD-ROM.

Item	Description
Feeder setting Jig 	This is a jig dedicated for the purpose of setting feeders. Setting of one tape feeder of 8 mm to 104 mm is possible. (Two 8 mm or 12/ 16mm tape feeders or four thin type tape feeders* can also be set at a time.) * “Attachment for thin type tape feeder” is required to install thin type tape feeders.

■ Component verification type－Standard Specifications

Item	Description
Readable code	 1D code (Barcode): UPC/EAN/JAN, UCC/EAN 123, Code 39, Code 128, etc.  2D code: 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)

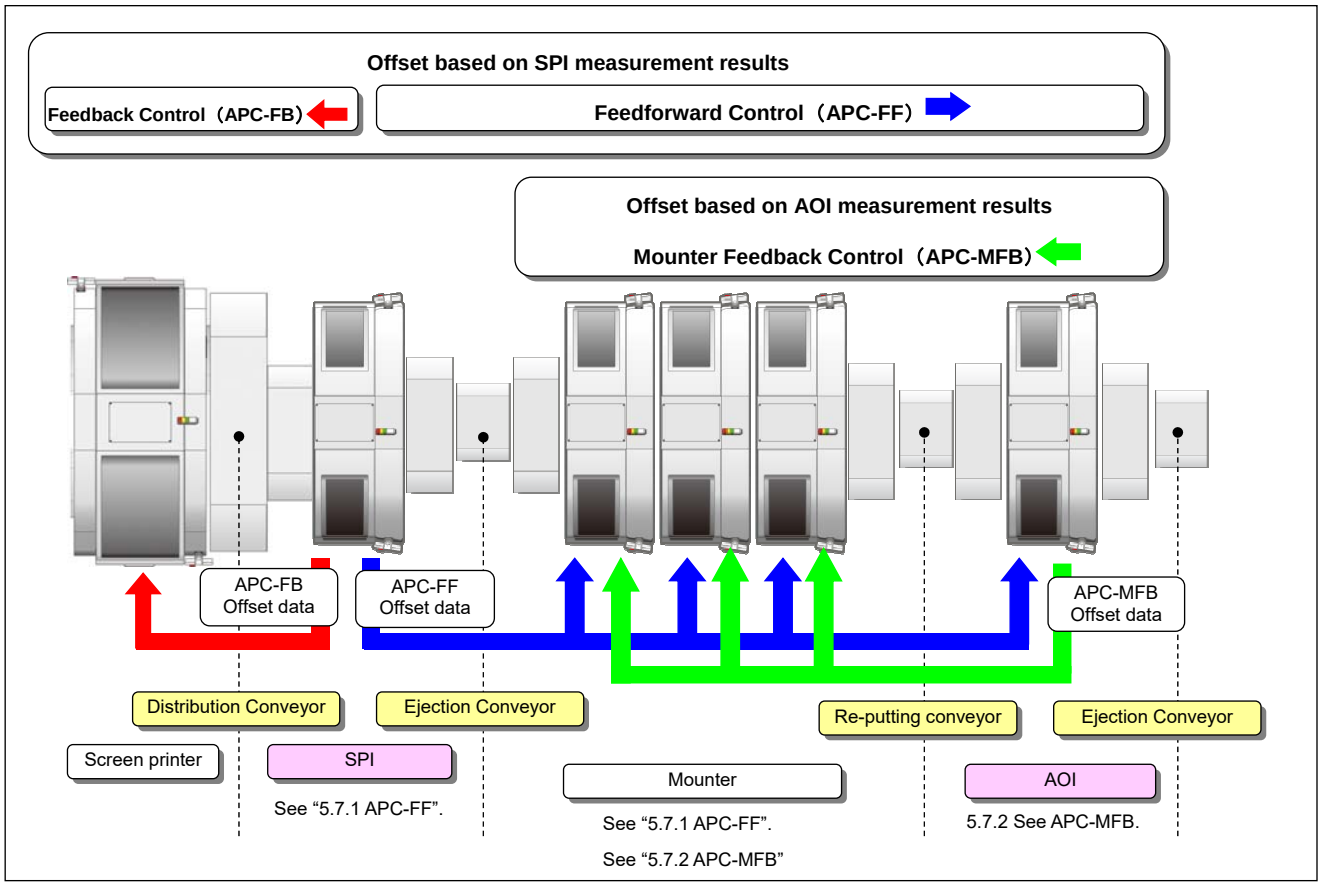
Item		Specification
OS		Microsoft® Windows® 10 Pro (32-bit/ 64-bit version) * IE (Internet Explorer) is necessary.
	Support language	English, Chinese, Japanese

・ 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.

5.7 APC system

With miniaturization of component size and high density packaging, variations in PCB size or solder printing position might cause misalignment between the positions of solder printing and the positions for components to be placed on a mounting machine, which will be a factor for defective placement or degradation of placement accuracy.
APC (Advanced Process Control) system reduces mounting defects arising from such misalignments of solder printing or part placement.

■ Overall configuration of APC system



■ Circles[○] indicate necessary licenses for APC system ready.

Function	License	Printer	Mounter (you need as many licenses as machines)
APC-FB	Inspection results feedback ready	○*	
APC-FF	APC system ready		○*
APC-MFB	APC-MFB2 system ready		○

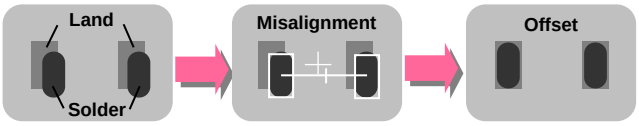
* When solder inspection is conducted with SPI of inspection machines from other companies, you need as many “Interface software of the inspection machine from other companies” licenses as machines.
See ”5.7.1.1 When you use SPI of inspection machine from other companies” for details.

The existing “APC-MFB system ready” supports to compensate only chip components having a size of ≦1005.
“APC-MFB2 system ready” has expanded the scope of the components to be compensated.
See “5.7.2 APC-MFB” for details.

■ Feedback control（APC-FB）See specifications of printers for details.

Print position correction (Target machine: SP series connected with LNB)

- It analyzes measurement data of solder inspection and offset printing positions (X, Y, θ).



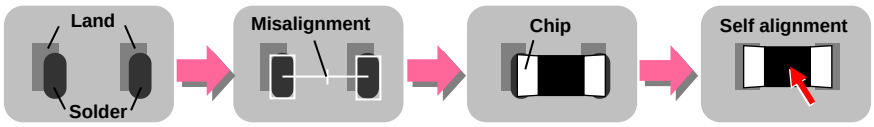
Mask cleaning (Target machine: SP series connected with LNB)

- According to the solder inspection result (blur, oozing, bridging, etc.), mask cleaning is performed.

■ Feed-forward control（APC-FF）See “5.7.1 APC-FF” for details.

Placement position correction (Target machine: NPM series, NPM-X series)

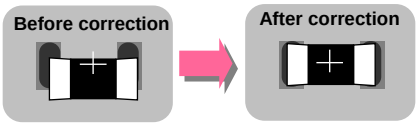
- Places components in the optimal positions based on the measured location of solder paste.
  Mounting to appropriate position allows to make good use of self alignment effect in achieving high quality placement.



■ Mounter feedback control（APC-MFB） See “5.7.2 APC-MFB” for details.

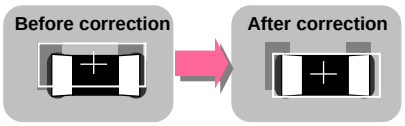
Component placement position correction (Target machine: NPM series, NPM-X series)

- Compensate misalignments based on the AOI measurement results to place components.
  Appropriately positioned placement provides stable quality after placed.



When APC-MFB is used with APC-FF, placement positions can be controlled and compensated before component inspections. (Target machine: Other companies’ MFB-authorized AOI)

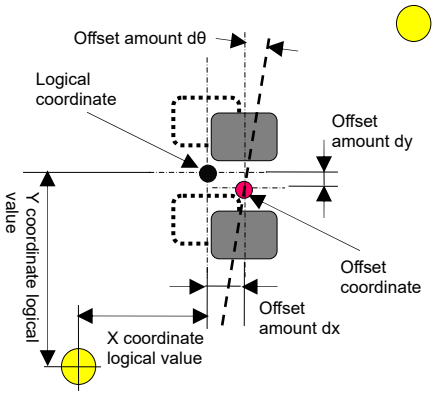
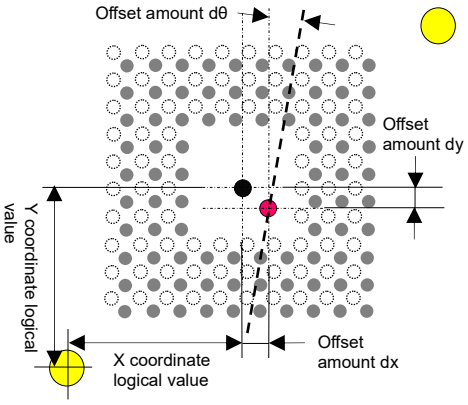
- Components are inspected based on compensated placement positions.



5.7.1 APC-FF

APC-FF ability to place components at appropriate positions based on SPI measurement results improves the quality after placed.

■ Basic specification

Items	Description	
Communication method	Ethernet communication	
Supported head	Lightweight 16-nozzle head V2, Lightweight 16-nozzle head, 12-nozzle head, Lightweight 8-nozzle head, 3-nozzle head V2, 16-nozzle head, 8-nozzle head, 3-nozzle head, 2D inspection head	
Feed-forward control	Solder	Measure solder position and feed forward the offset amount of X direction (offset dx), Y direction (offset dy), and angle direction (offset dθ).
	Land	Measure land position and feed forward the offset amount of X direction (offset dx), Y direction (offset dy), and angle direction (offset dθ).
	Chip component 	Package component 

You can select SPI solder inspections for feedforward control (APC-FF) from the following options.

- When you use SPI of inspection machine from other companies : See 5.7.1.1 section
- When you use inspection heads : See 5.7.1.2 section

■ Effects

Mounting quality improvement*1

- Bonding strength will be improved through reduction in defects, such as lifted, misaligned and missing, in miniature components (0402 or 0603 chips, etc.).
- Mounting defects arising from variations in the positions of the lands can be reduced. (Flexible or ceramic boards, PCBs to be transported via a carrier, etc.)
- Reduce the occurrence of voids on BGA/CSP to improve bonding reliability.
- The impact during component placement can be reduced so that cracking or chipping tendency of components will be decreased.

Cost reduction*1

- Skipping the placement of components to NG coordinates or patterns will cut the cost associated with the loss of components. (2D inspection head standard feature)
- Land inspections before placement will cut the costs involved in prior PCB inspections or the process for marking NG patterns. (2D inspection head standard feature)

Enhanced productivity*1

- For a PCB having a number of patterns, the PCB recognition time will be extended in proportion to the number of patterns.
  Owing to the use of APC system, high precision placement of components can be achieved only by using the standard PCB recognition (AB-point recognition), thereby leading to enhanced productivity.

*1 We cannot assure you that these effects will work on all your product placements.

5.7.1.1 When you use SPI of inspection machine from other companies

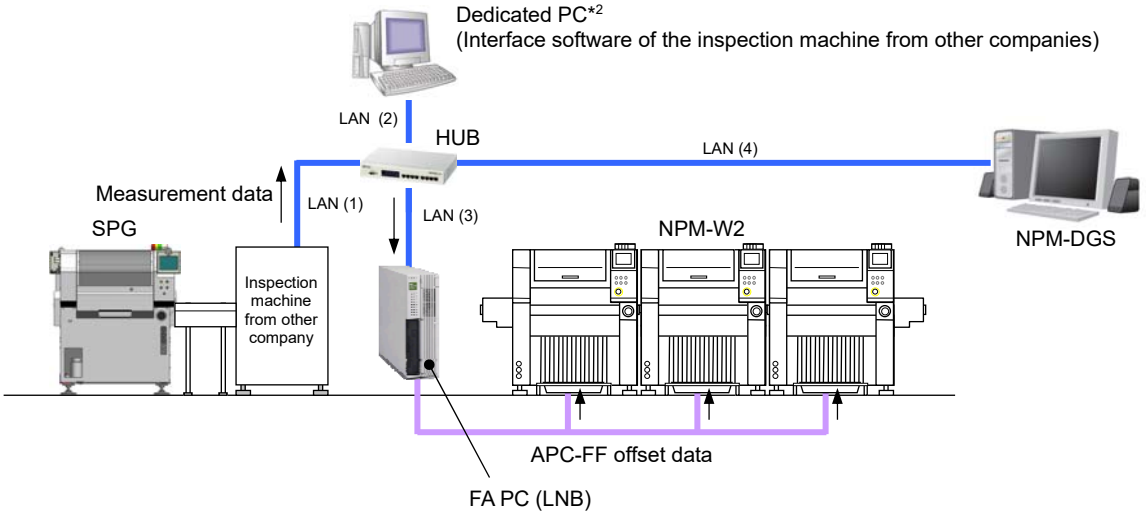
This section explains basic specifications for the use of SPI of inspection machines from other companies.

■ Basic specification

Items	Descriptions
What to be compensated : Solder, Component	Depends on the functions of inspection machines from other companies
Number of components	Depends on the functions of inspection machines from other companies

■ Interface software of the inspection machine from other companies

This is interface software to enable APC system using a measurement data of inspection machine*1 (solder inspection) from other companies.
This option (License) is required per equipment that receives APC-FF offset data. (In case of below, 3 licenses are required.)
Select this option, together with “APC system-ready (License)” for the same number.



*1 Target inspection machines need to satisfy the requirements of our specifications. For details, please contact us.
*2 A dedicated PC needs to be placed between the inspection machine from other company and FA PC (LNB).
Please prepare a PC, a HUB and LAN cables (LAN (1)-(4) shown in the figure above) by customers.

■ Inter-machine connection conditions

- SMEMA connection (BA and Ready signals) is essential for inter-machine connection.
  (NPM turns ON the Ready signal to the upstream machine (inspection machine or conveyor made by other company) after confirming the BA signal from the upstream machine.)
- Up to one conveyor can be placed between other company's inspection machine and NPM.
  Additionally, the number of PCBs that can wait on the conveyor is not more than one.
  Barcode operation control is required if you are likely to have more than two PCBs waited on the conveyor.
  For details, please contact us.
- When NPM are connected via a machine, such as other company's inspection machine or conveyor, APC communication will fail to work properly.

In case of using interface software of the inspection machine from other companies, please prepare the following hardware and software at customer side.

■ Hardware specifications

・ Dedicated PC

Item		Specifications	Class
Main body		IBM PC/AT-compatible machine	Indispensable
	CPU	Intel® Core™2 Duo E6700 equivalent or greater	
	Mother board	Fully compatible with IBM	
	Serial I/O	Fully compatible with IBM	
	Graphic board	SXGA or higher Desk top region: 1 280 × 1 024 dot or more	
	Memory	2 GB or more	
	HDD	20 GB or more of available space (NTFS file system)	
	Optical drive	DVD drive To be used in installation	
Keyboard		English version: 101 keyboard Japanese version: 106 keyboard	Indispensable
Mouse		Supported by your OS as standard	
Monitor		SXGA or higher ready	
Network card		100BASE-T or greater	
Uninterruptible power supply (UPS)		Supported by your OS as standard	Recommended

・ HUB and LAN cable

Item		Specifications	Class
HUB	Transfer rate	100BASE-T or greater	Indispensable
	Number of port	4 ports or more	
LAN cable		100BASE-T: UTP Cat 5 or larger (4 pieces)*	

* Please arrange appropriate length of LAN cables according to your installation environment as it varies depending on factory layout.

■ Software specifications

Item		Specifications	Class
OS		Microsoft® Windows® 10 Pro (32-bit/ 64-bit version) Microsoft® Windows® 8.1 Pro (32-bit/ 64-bit version) Microsoft® Windows® 7 Professional (32-bit/ 64-bit version) SP1 or later	Indispensable
	Support language	English, Chinese, Japanese	
	Framework	Microsoft® .Net Framework 2.0, 3.0, or 3.5 shall be installed.	
Virus check		Virus Buster™ Program version 7.0 or later	Recommended

**** Remarks ****

- The hardware/OS should be prepared and installed by yourself.

5.7.1.2 When you use inspection heads

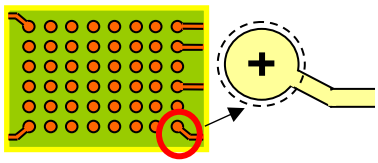
This section explains basic specifications for the use of inspection heads.

■ **Basic specification**

Items		Description	
Offset target		2D inspection head A (18 µm)	2D inspection head B (9 µm)
	Solder paste	Chip components: 0.1 × 0.15 mm or more (0603 [0201"] or more) Package components: φ0.15 mm or more	Chip components: 0.08 × 0.12 mm or more (0402 [01005"] or more) Package components: φ0.12 mm or more
	Com-po-nents	Chips (0603 [0201"] or more), SOP, QFP (Larger than 0.4 mm pitch), BGA, CSP, aluminum electrolytic capacitors, trimmer potentiometers, trimmers, coils, connectors, network resistor, transistors, diodes, inductors, tantalum capacitors, cylindrical chip	Chips (0402 [01005"] or more), SOP, QFP (Larger than 0.3 mm pitch), BGA, CSP, aluminum electrolytic capacitors, trimmer potentiometers, trimmers, coils, connectors, network resistor, transistors, diodes, inductors, tantalum capacitors, cylindrical chip
Number of offset compo-nent		Max. 10 000 points/line (number of measuring solder: Max. 30 000 points/line)	

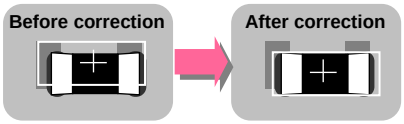
Component inspection position correction

Direct recognition of land positions where components are placed upon can support deformed PCB enabling components to be placed with high accuracy.
It is effective for flip chip which is placed with flux or solder transfer.



Land position is accurately measured through dedicated processing to seek the center of shape and dimension specified.

- Inspects components in the position based on the component placement position after offset.



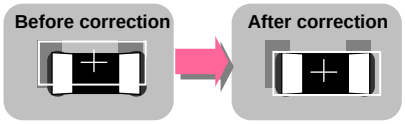
* For details, refer to "4.6 Line configurations that includes a machine equipped with an inspection head."
* "APC system ready" licenses are required per equipment.
  The applicable machines are the first one installed in line equipped with inspection head to generate APC-FF offset data and the one receives the APC-FF offset data.
  * APC-FF ready equipment: NPM series, NPM-X series (mixed line supported)
    If a line is made up with other equipment than the above, please contact us.
* Provide a distribution conveyor whose number of PCB stocks is ≦1. Contact us for more details.
* 03015 components are not eligible.

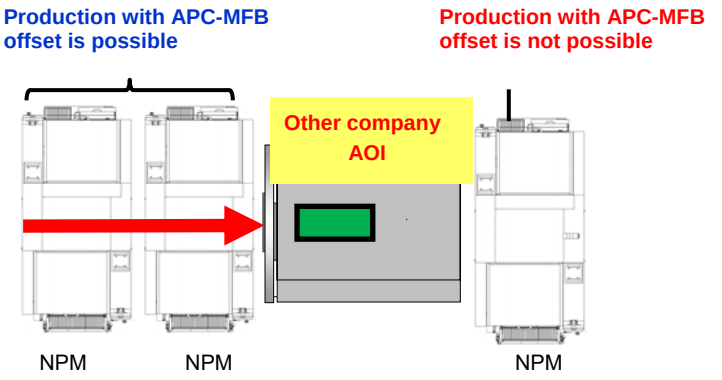
5.7.2 APC-MFB

APC-MFB (Advanced Process Control-Mounter Feed Back) compensates for misalignment based on the results of AOI inspection to stabilize the post-mounting quality.
Divided into categories focusing on nozzles, feeders, components, and mounting positions, the results of AOI inspection are presented as a process capability index. This helps variation management and supports appropriate response when the process varies.

■ Basic specification

<table>
<tr><th colspan="3">Items</th><th>Description</th></tr>
<tr><td rowspan="6"></td><td colspan="2">Communication method</td><td>Ethernet communication</td></tr>
<tr><td colspan="2">Supported head</td><td>Lightweight 16-nozzle head V2, Lightweight 16-nozzle head, 12-nozzle head,
Lightweight 8-nozzle head, 3-nozzle head V2,
16-nozzle head, 8-nozzle head, 3-nozzle head,</td></tr>
<tr><td colspan="2">AOI</td><td>Applicable AOI for “APC-MFB2 system ready”
・Please contact us to confirm the applicable makers. (NPM inspection head is excluded)
・The AOI should be installed in line.

・When APC-MFB is used with APC-FF, placement positions can be controlled and compensated before component inspections, and components are inspected based on the compensated placement positions.
 
</td></tr>
<tr><td colspan="2">System</td><td>About the applicable system version of NPM and AOI which support APC-MFB2 system ready, please contact the AOI maker or us.</td></tr>
<tr><td colspan="2">Placement mode</td><td>・Independent mode / Share mode
・Single lane / Dual lane
* When using the Automatic Changeover line,
Update of MFB offset starts after production model agrees between NPM and AOI.</td></tr>
<tr><td colspan="2">Remarks</td><td>Production with APC-MFB offset is not applicable to NPM placed at the downstream process of AOI from other company because the system cannot receive mounting positions.

(Example) Line configuration: Some equipment is not applicable for Production with APC-MFB offset
 
</td></tr>
<tr><td rowspan="3">Components</td><td rowspan="2">Type</td><td>APC-MFB2 Inspection target*</td><td>Chip components, lower electrode components, lead components (electronic components with a lead drawn out from one side are not included）
(depend on the specification of AOI)</td></tr>
<tr><td>APC-MFB Offset target</td><td>When there are AOI measurement results and component placement uses nozzles, APC-MFB compensates for the placement positions of the targeted components for offset.</td></tr>
<tr><td colspan="2">Number of offset component</td><td>Number of offset components depends on the specification of machines</td></tr>
</table>

*Differences in components to be measured under APC-MFB licenses（depend on the specification of AOI）

License	Components to be measured
「APC-MFB system ready」	Chip components having a size of ≦1005
「APC-MFB2 system ready」	chip components, lower electrode components, and lead components (electronic components with a lead drawn out from one side are not included)

・Licenses are necessary per equipment.
・“APC-MFB system ready” supports only NPM-D3.
・When you have equipment for “APC-MFB system ready” and have purchased its license, compensation of chip components having a size of ≦1005 is supported even if equipment for “APC-MFB2 system ready” for which you have purchased the license exist in a line.
・New purchase is available only for”APC-MFB2 license ready”.

* AOI recognition level and type of components where MFB could be applied

Type of components where MFB could be applied depends on the AOI recognition level of inspection machine manufactures.

AOI recognition level	Type of components where MFB could be applied
Not yet recognized	None(Cannot use MFB)
MFB-recognition	1005 chip components or chip components having size of under 1005
MFB2-recognition	All components (components with leads drawn out from one side, odd-shaped components, components with unmeasurable AOI leading position are not included)

■ Programming specification

This programming specification is for production data of NPM and AOI.

(NPM) : When using DGS, please put the circuit code (like R123) which is used in the AOI into the comments section of placement coordinate setting. Make sure there is no duplicate code in the same pattern.
(AOI) : Make sure the circuit code for component on PCB board is the same code which is set in the DGS. (Including space, " - ", etc.)

The numbering rule of pattern is same as NPM.
(Make sure the combination of pattern code and circuit code is the same one between NPM and AOI.)

■ System specification

<table>
<tr><th colspan="2">Item</th><th colspan="2">Description</th></tr>
<tr><td colspan="2">Increased line tact time
of production
(VS normal production)</td><td colspan="2">・Line tact time under 50 s ： less than 1.0 s
・Line tact time over 50 s ： less than 2%</td></tr>
<tr><td rowspan="3">Functions</td><td>Mounting position
MFB offset function*</td><td colspan="2">Offset functions for mounter.
・An offset function to correct the machine variation of each XY shaft, recognition unit, and nozzle angle.
・An selection function to pick-up the components for calculating offset data.</td></tr>
<tr><td rowspan="2">Process variation
management
function</td><td>APC-MFB offset monitor display function</td><td>（１）Mounting points
・Display the Cp/Cpk of each head.
・Display the correction factor of each mounting point. (Top 20)
（２）Unit
・Cp/Cpk of each nozzle or angle. Correction factors
・Cp/Cpk of each feeder, Correction factors
・Cp/Cpk of each component, Correction factors
・Cp/Cpk of each area, Correction factors
（３）The correction factor of each nozzle of multi-recognition camera position.
（４）The correction factor of XY shaft.</td></tr>
<tr><td>Process variation warning function</td><td>（１）Manage CPk value of each head.
（２）Check for Cp value falling of each unit.</td></tr>
</table>

* When using the mounting position MFB offset function, the effect of placement accuracy depends on solder conditions, chip shapes, and/or other conditions.

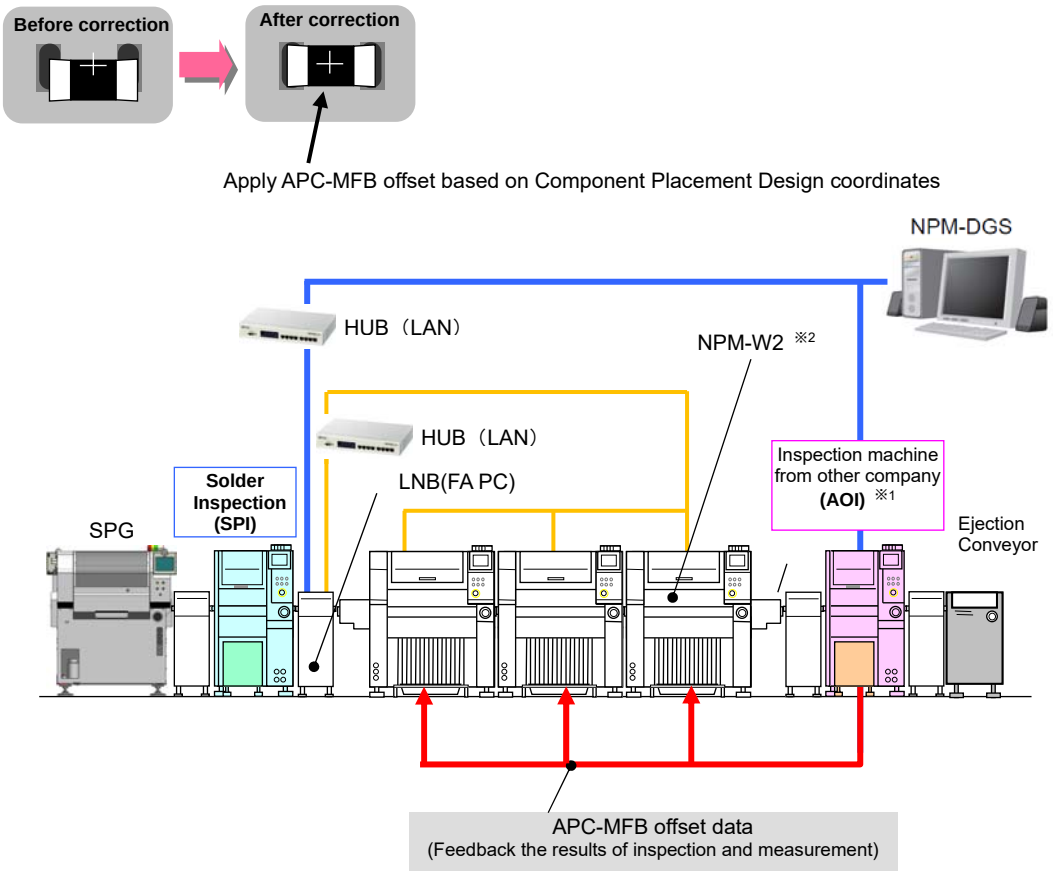
**** Remarks ****

- When using licenses for "APC-MFB2 system ready", placement accuracy, applicable PCB size, the number of offset component and etc. are depend on the performance of AOI from other company.

■ Example of system configuration

When using APC-MFB system only

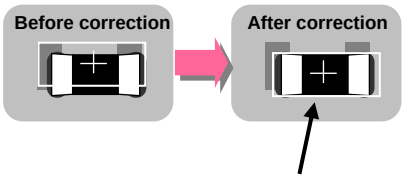
AOI takes misalignment measurements based on Component Placement Design coordinates.
Misalignments are compensated through the AOI measurement results.



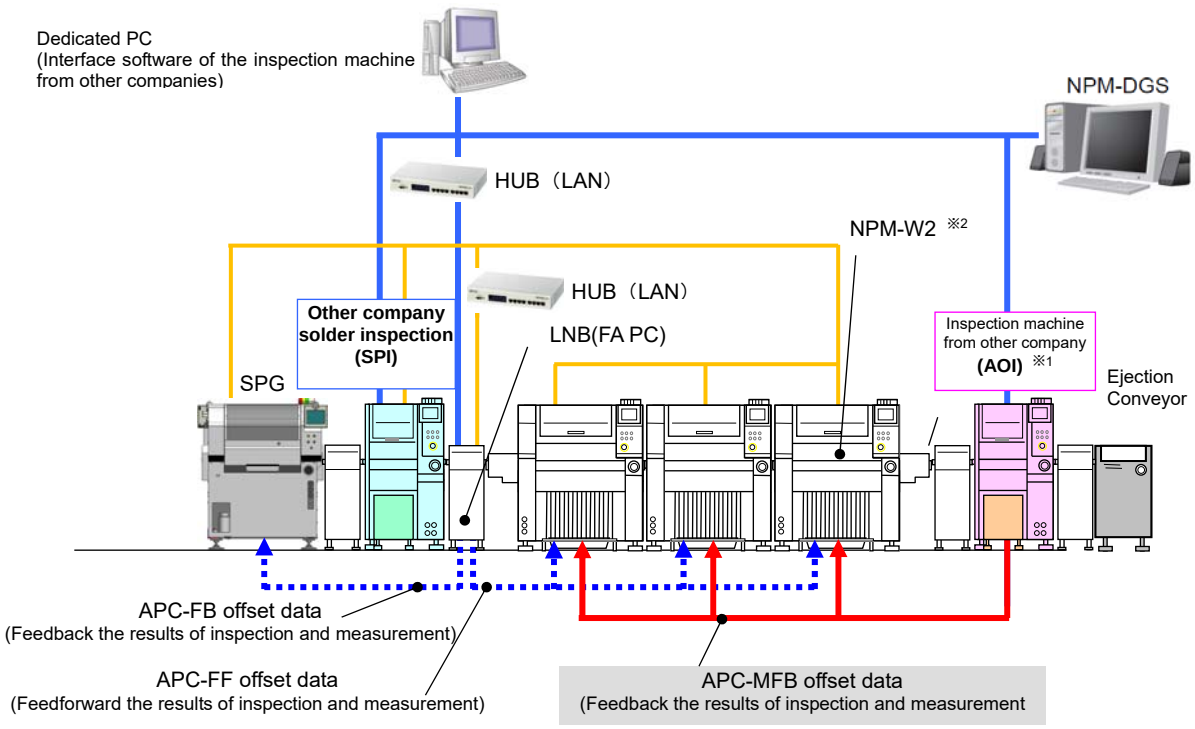
※1 Contact us for inspection machines (AOI) that support “APC-MFB2 system ready” licenses.
※2 ”APC-MFB2 system ready” licenses are necessary per equipment.

When using APC-MFB in APC-FF Line.

AOI takes misalignment measurements based on Component Placement coordinates in light of the misalignments of printing positions. Misalignments are compensated through the AOI measurement results.



Apply APC-MFB offset based on Component Placement coordinates
in light of the misalignments of printing positions



※1 Contact us for inspection machines (AOI) that support “APC-MFB2 system ready” licenses.
※2 Licenses for APC-FF or APC-MFB are necessary per equipment.

- When using APC-FF/ FB functions in solder inspections with SPI from other companies, a dedicated PC (NIP: Interface software of the inspection machine from other companies described in “5.7.1.1”) is required.
- There is no need to prepare NIP if the equipment has our inspection head.

■ Effect

Maintain placement quality※

- Compensation based on AOI measurement results helps maintain the initial accuracy of facilities and provide stable quality after placed.
- Maintenance of placement accuracy reduces lifted electrodes or misalignments of small components.
- Maintenance of placement accuracy contributes to SMT with narrow pitches.
- Placement accuracy management divided into nozzles, feeders, components, and areas using Cp/Cpk helps observe the changes of Cp/Cpk, and a warning is shown when Cp exceeds the control value.
- Showing placement accuracy divided into nozzles, feeders, components, and areas using Cp/Cpk helps identify failures of nozzles, feeders, components, and/or areas.

Reduce cost※

- Maintenance of initial accuracy of facilities reduces failures arising from misalignments and offers loss cost savings and/or repair cost savings.
- Managing the changes of Cp/Cpk of nozzles provides maintenance at appropriate timing suitable for production lines.

* We cannot assure you that these effects will work on all your product placements.

**** Remarks ****

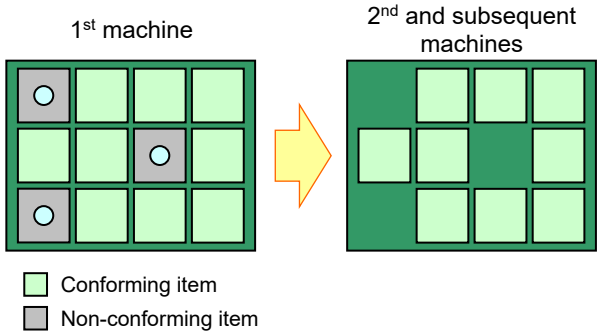
- APC-MFB offset is a function to feedback the mounting position of mounted parts measured with AOI to mounting machine, and does not guarantee placement accuracy.
- For APC-MFB offset, mounting machine and AOI from other company will do a network communication. It's necessary to establish the network connection of LNB and AOI and change a signal cable for APC-MFB offset when delivering the system.
  *The signal cable between mounting machine and AOI uses the Board Available (BA) signal including a board request signal.

5.8 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.

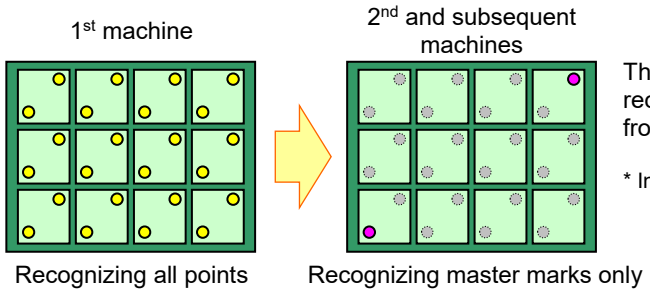


The 2nd and subsequent machines will skip bad mark recognition based on the mark recognition data or information transferred from the upstream machine.

* Intended machine: NPM-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-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.

5.9 Automatic recovery function for pickup error

This function recovers the pickup / recognition error automatically in order to continue production without stoppage.

■ Function Summary

Pickup position teaching when pickup error occurs

This function enables the machine to automatically teach the pickup position when an error is detected.
After teaching is complete, machine will continue production.
With this function, line stop times will be reduced and the utilization can be improved.

The re-pickup of pickup error components

The most of large components are not available to automatically teach the pickup position, that the function “Pickup position teaching when pickup error occurs” is not applicable.

This function enables the machine to automatically re-pick up the error components without transferring.
If pickup is complete, machine will continue production.
With this function the pickup error times and line stop times will be reduced, the machine utilization can be improved.
Available components: 12 mm ～ Embossed tape.

1 mm ⇔ 2 mm Automatic pitch switching

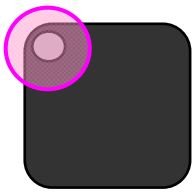
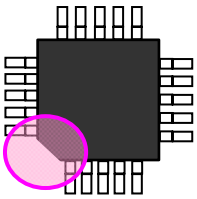
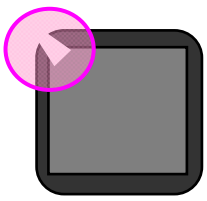
There are situations where the same components have a random mix of 1mm and 2mm-pitch reels are supplied.
This function detects the tape pitch during automatic pickup position teaching by every refresh time, and changes the feed data automatically without production stoppage.
(Automatic refresh timing: during parts supplying, splicing position, when error occurs)

Automatic pitch switching conditions

Items	Description
Component data	With pickup position automatic teaching
Tape width	8 mm
Applicable tape	Paper
Supply pitch	1 mm or 2 mm （not applicable on 4 mm or more）

5.10 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 or tape feeder, in order to prevent possible misloading through the polarity checks.

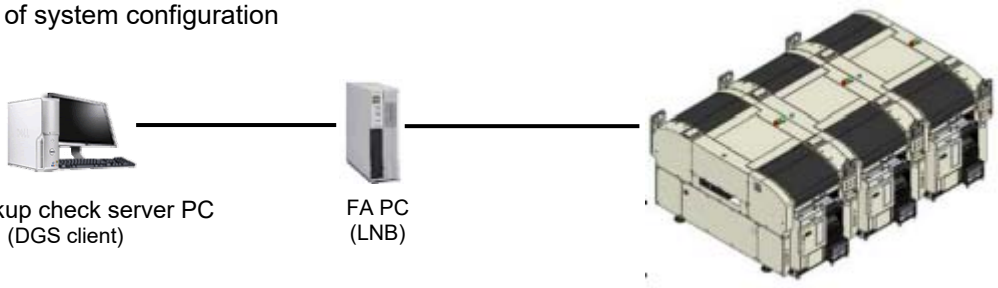
Misloading prevention This function detects the orientation of the components by recognizing any of the following features on the components to prevent misproduction.		
Polarity mark	Chamfering	Feature of luminosity
		

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.)

Example of system configuration



*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”, and “Specified interval”. Feeders capable of detecting the joint of taper components can perform component inspection of the joint position.
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, 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		Tray components, Tape feeder components			
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 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 polarity 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.

5.11 Message board

This function can display different images*2for a certain period of time*1on touch panels that are not in active use.
By using the inactive time of touch panels to display training information, work instructions and etc., training and handoff can be conducted smoothly.

*1 Display time can be changed for each equipment by customer.
*2 By downloading the images from LNB, the display content can be changed for each equipment.

■ Function Summary

The number of images

Each machine can display up to 10 different images.
The images can be set during production.

Error messages display first

If an error occurred in message board images displaying, the error messages will be displayed first.

5.12 Head diagnosis

With this function, errors can be prevented in advance, and a stable production can be ensured.

■ Function Summary

Air Leak Check (※3)

Under closed state, this function measures air- flow value when turn ON/OFF the valve.

Flow Sensor Zero Check

Measure the range of flow sensor.

Air Stuff Check

Under open state, this function measures air- flow value when turn ON/OFF the valve.

Z-axis /θ-axis Action Check

Measure the motor torque of Z-axis /θ-axis at high speed and low speed.

*3 Air leak checks require nozzle setting jigs (nozzles).
A nozzle setting jig and its quantities required on air leak checks depend on the types of nozzle heads. See the list below.
Nozzle setting jigs for 2 nozzles, 3 nozzles, and 4 nozzles are the jigs dedicated for head diagnosis; they do not have nozzle barcodes.

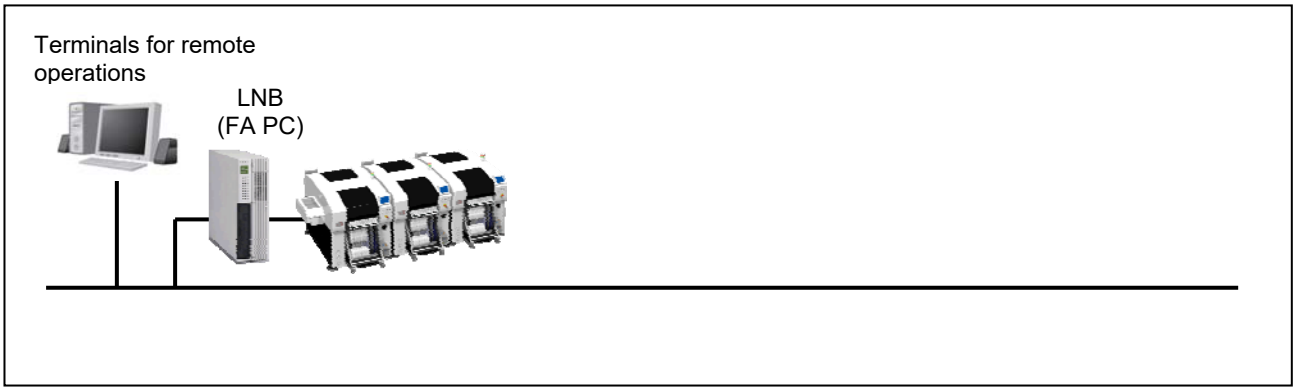
	Required quantity	No barcodes		With barcodes	
		Parts No.	Nozzle No.	Parts No.	Nozzle No.
Lightweight 16 nozzle head V2	16	N610148258AA	256CS	N610148260AA	256CSN
12 nozzle head	12				
Lightweight 8 nozzle head	8	N610140967AB	256C	N610140968AB	256CN
3 nozzle head V2	3	MTKU002588AA	DIAG	—	—

5.13 Remote operation

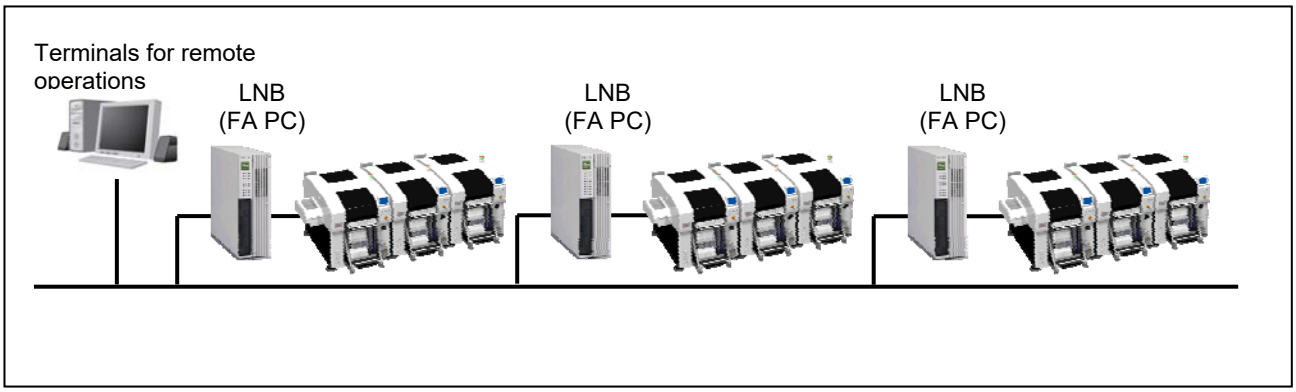
Remote operation function allows centralized collection of errors generated in the machines and offers remote-controlled recovery, reducing error recovery time and contributing to efficient capacity utilization and labor-saving.
This provides a system where it detects errors when they occur and allows remote-controlled recovery. This centralized recovery system helps reduce “the need for operators to notice errors” and “the travel time to the targeted error machine”, thereby reducing error recovery time.

■ System configuration

Standard configuration



Centralized control



■ Function List

Item	Description
Remote operation function	Remote operation function offers remote-controlled operations to the screens and operation switches. This allows remote-controlled recovery operations of errors generated in the machine to resume productions. The function works only when the machine is in an automatic operation state.
Remote access function	Remote access function offers remote access to the screens. You can get the actual screen that shows how the machines are working and how on-site workers are operating.
Status monitor function	Status monitor function shows present errors that are subject to remote recovery of controlled lines. With this function, you can open the remote panel on which you can get the screen from a status monitor and operate it.
Event list function	Event list function lists the present error events of the controlled lines and shows whether those errors are subject to remote recovery. Present error event information contains when it happened and what it's like. You can open or close the remote panel on which you can get the screen from event lists and operate it.

■ Standard Configuration

Item	Description
License	Licenses are necessary per machine. For more details for licenses, see “14. License”.
PC	This is for remote access. Install remote access client software before use * We ask you to prepare it

■ System requirements

・Hardware specifications

Item		Specification	Class
Unit		IBM PC/AT compatible machine	Required
	CPU	Operational frequency minimum 2.4 GHz	
	Mother board	Fully compatible with IBM	
	Graphic board	XGA or higher Desk top region: 1 024 × 768 dot or more	
		QVGA (1 280 × 960) or higher	Recommended
	Memory	4 GB or more	Required
	HDD	100 GB or more	
	Optical drive	4x speed or faster of DVD drive To be used in installation	
Keyboard		English version: 101 keyboard Japanese version: 106 keyboard	Required
Mouse		Supported by your OS as standard	
Monitor		XGA supported	
		QVGA supported	Recommended
Network card		100BASE-TX network card	Required

・Software specifications

Item		Specification	Class
OS		<PC> Microsoft® Windows® 10 Pro (64-bit version) Microsoft® Windows® 7 Professional (32-bit/ 64-bit version) SP1 or later	Required
	Support language	English, Chinese, Japanese	Required
	Framework	Microsoft® .Net Framework 4.5.1 or later	

・Microsoft and Windows are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

■ Constraints

Machine status		Remote access activation	Constraints and other notes	Notes
When machine is in an automatic operation state		Can activate	Working on machines always has priority.	When remote access is active and at the same time you operate a machine, working on the machine always has priority and is effective. You cannot resume remote access operations until working on the machines is finished. When safety covers were open, remote access operations are disabled until on-site workers resume productions.
	When there are errors			
When machine is NOT in an automatic operation state		Cannot activate	Read only Only on-site workers can operate machines, including start-up of the machines.	Before the start-up of machines, on-site workers must visually check whether the machines are operational.

5.14 Biometric authentication

With biometric authentication, you can connect it with external authentication devices that accept biometrics such as iris recognition or facial authentication and can access to a machine without having to enter a password with a keyboard.

■ Overviews

Authenticate

- Authenticates users with an external authentication device.
- （External authentication management system manages users）

Operation constraints

- Prevents access from unauthorized users.
- With an operator customized tool, you can set limitations by the user.

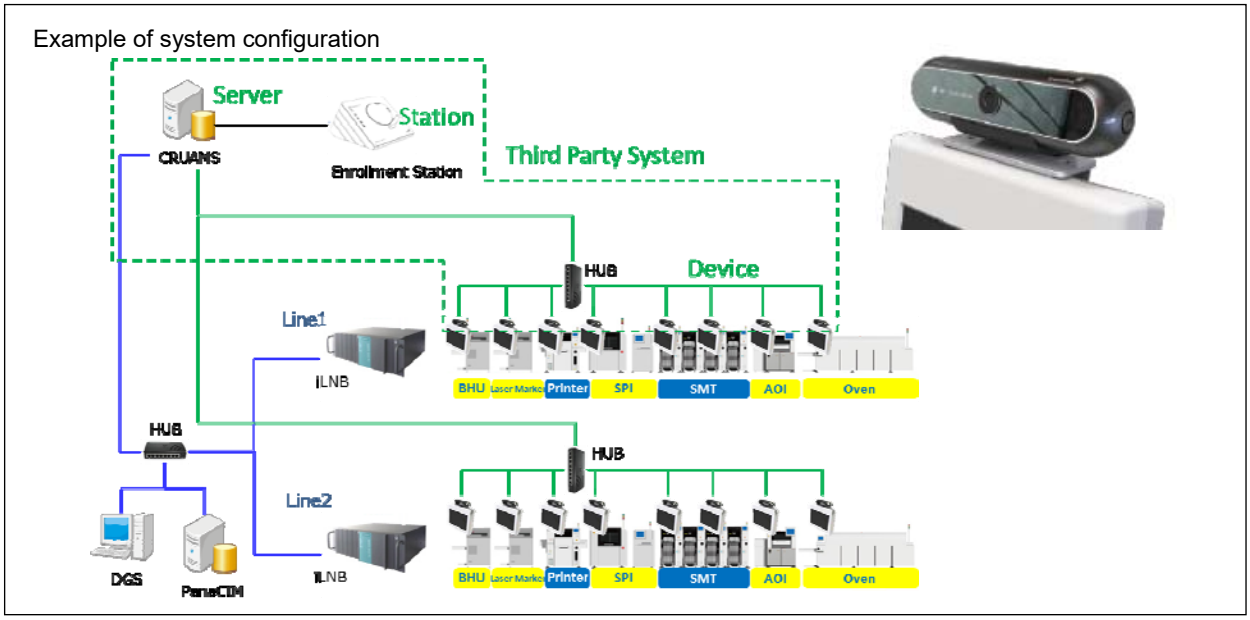
Trace

- Collects operation logs.

■ System configuration

Biometric authentication function checks who is using the machine with an external authentication management system, and send user information to iLNB.
iLNB changes authority for access based on user information.

Example of system configuration



■ Standard configuration

Item	Description
Machine software	Switches access authority based on user information identified with an external authentication system.
iLNB	FA PC (iLNB) *LNB needs individual basis supports.
Biometric authentication license	Licenses are necessary per machine.
External authentication management system (external authentication device)	We ask you to prepare authentication management system capable of linking with our authentication system Connectivity-checked device：BACS Tube CrucialTrak Inc.(Sales company DJK) *Other devices need individual basis supports. We do not take any responsibility or liability for personal information management on other company's biometric authentication system.

5.15 Mount complete position recognition

This option contains the following two functions.

Section	Functions
5.15.1	Mount complete position recognition function
5.15.2	Shield case warping inspection function before mounting

5.15.1 Mount complete position recognition function

Mount complete position recognition function measures the brightness of two areas of shielded components with a head camera and detects improper mountings from the brightness.
When detected an improper mounting, machine gets into single stop.

■ Overviews

Detect improper positions

- After all components were mounted, the head camera measures two areas' brightness per one component.
- When detected as a NG component, machine gets into single stop.

Show NG components

- When the function detected as a NG component, it lists NG components and automatically shows the list.

Teaching

- You can adjust the instructions of lamp value, areas, and threshold by the component about recognition points set on each component.

■ Standard specifications

Item	Description
PCB constraints	When PCB needs separate mounting, it does not activate this option.
PCB height constrains after mounting	When PCB has mounted tall components, it does not activate this option because the tall components may be the cause of interference.

■ Standard configuration

Item	Description
Mount complete position recognition option license	Licenses are necessary per machine.

5.15.2 Shield case warping inspection function before mounting

The machine checks shield case warping. When it detects components as warping, the components become disposal. The inspection before mounting prevents improper shield components from being mounted.

■ Overviews

Warping detection

- This function measures the characteristic points of shield cases and detects warped components. NG components become disposal.

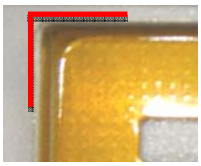
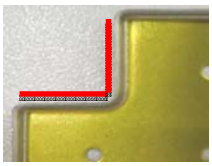
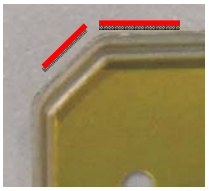
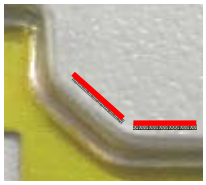
Teaching

- Component recognition teaching function also detects warped components. When NG components were detected, it shows an error.

■ Components to be measured

In order to measure the floats or warping of shield cases, at least four heights of characteristic points must be measured.

Here are measurable characteristic points.
*Set a point on the same height surface to a characteristic point.
(About this function, however, when we have got samples, we will decide whether detection has no trouble through trials and experiments with them)

Item	Description
Corners (Max 8 corners)	Size must be 2 mm or less and its corner R, roundness, must be maximum 0.8 mm. (e.g.)  
Pair lines * Non-parallel two lines combination (Max.8 pairs)	Size must be maximum 2 mm and its corner R, roundness, must be maximum 0.8 mm. (e.g.)  
Circles (Max 20 circles)	Size must be 2 mm or less.
Lead groups (Max 16 lead groups)	Lead group size must be 2 mm or less.

*When you would like to make sure of shield-warping detectable components, contact us at any time.

■ Standard configuration

Item	Description
Mount complete position recognition option license	Licenses are necessary per machine.
Multi recognition camera Type3	Multi recognition camera Type3 is necessary.

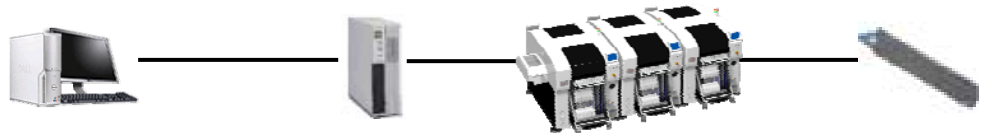
5.16 LCR checker(Feeder shaped type)

LCR checker (Feeder shape type) measures electrical properties of chip components to prevent improper mounting caused by erroneous picking up of chip components.

■ Standard configuration

LCR checker measures electrical properties of chip components and FA PC checks whether the values are within normal limits. FA PC manages execution logs.
When you use LCR checkers, you need to enter settings with DGS

System configuration



■ Overviews

Check

・Measures electrical properties of chip components and checks whether the values are within the set range.

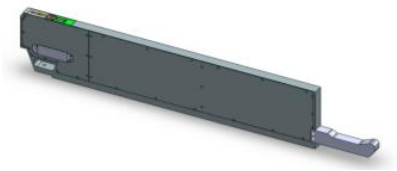
Production stop

・When judged as NG, i.e. when electrical properties of chip components are out of the set range, productions will go in to error stop.

■ Standard specifications

Item	Description
Components	L:0.6mm x W:0.3mm x H:0.23mm ～ L:3.2mm x W:1.6mm x H:1.5mm ・Square chip components (The conditions must be a state that conducts electricity; i.e. In Dimension “L”, chip components have electrodes on both sides and both lateral faces have electrodes)
Measurable parameter range	Resistance(R) : 10 Ω ～ 100 MΩ Capacitors(C) : 10 pF ～ 100 μF Inductors(L) : 1 μH ～ 47 μH * The above is a measurable range that has taken into account the use of LCR checker and variations in measurement accuracy. (For measurable range based solely on LCR checker, see the checker specifications)
Measurement accuracy	Resistance(R) : ±10 % Capacitors(C):±10 % Inductors(L) : ±10 % * The above accuracy is the maximum measurement accuracy variations when a machine installs and operates LCR checker. (For measurable range based solely on LCR checker, see the checker specifications) * In some cases, depending on electrical properties of components, they may not be eligible for measurement even measurement accuracy is within the values indicated above,
Eligible nozzles	Standard-specification nozzles that match targeted measurement component size * Nozzles for calibration when LCR checker is installed Lightweight 16 nozzle head, 16 nozzle head, 12 nozzle head, : 230CS nozzle Lightweight 8 nozzle head, 8 nozzle head : 230C nozzle 3 nozzle head V2, 3 nozzle head, 2 nozzle head : 1001 nozzle
Where to install checker	・You can install LCR checker on a place where tables have feeder supply units and tables have component recognition camera. (Installation fills up one slot of supply place)
Placement mode	・Share mode ・Independent mode * When LCR checker is installed on one table of a 2-table beam machine, components supplied on the table not installing LCR checker are not eligible for LCR checking.

■ Standard configuration

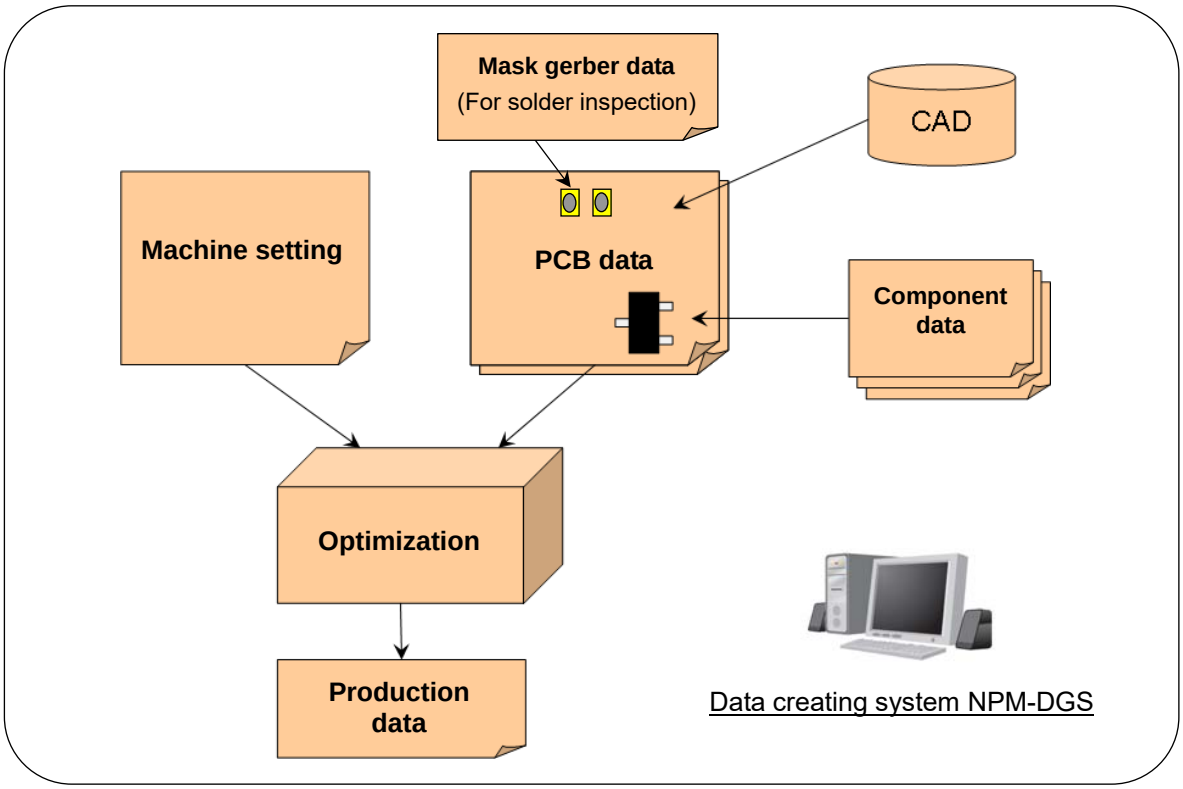
Item	Description
LCR checker (Feeder shaped type) 	LCR checker (Feeder shaped type) is a tool that measures electrical properties of chip components.
LCR checker license	Licenses are necessary per machine.

6. Other Standard Functions

6.1 Programming Functions

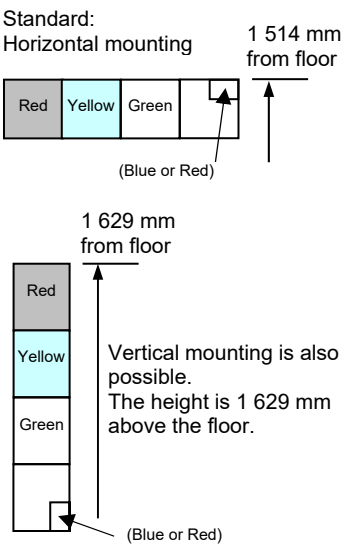
Data are created on NPM-DGS, the data creating system. The production data created on NPM-DGS will be downloaded to the machine via FA PC. Some data, however, can be modified on the machine.
The data modified on the machine and what was taught will be retained and reusable.

* 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



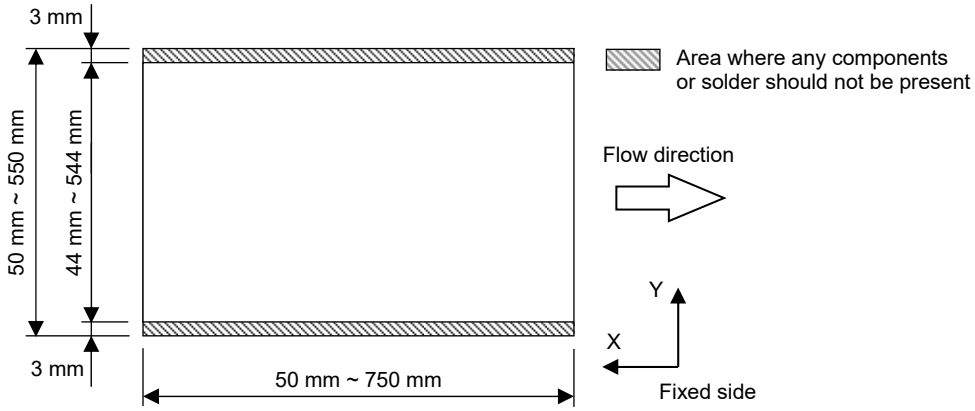
Signal Color	Classification	Lighting Standard
Red	Emergency stop error	・Trouble in shafts of motors, etc. ・Drop in air pressure ・Trouble in PCB supports ・Head trouble ・Tape trouble ,and etc.
Yellow	Single stop error	・Pickup error ・Placement error ・PCB transfer error ・Component run out ・Nozzle change 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.	

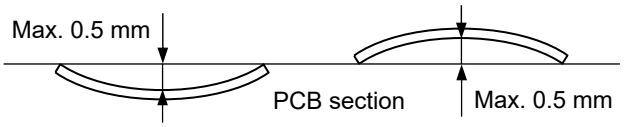
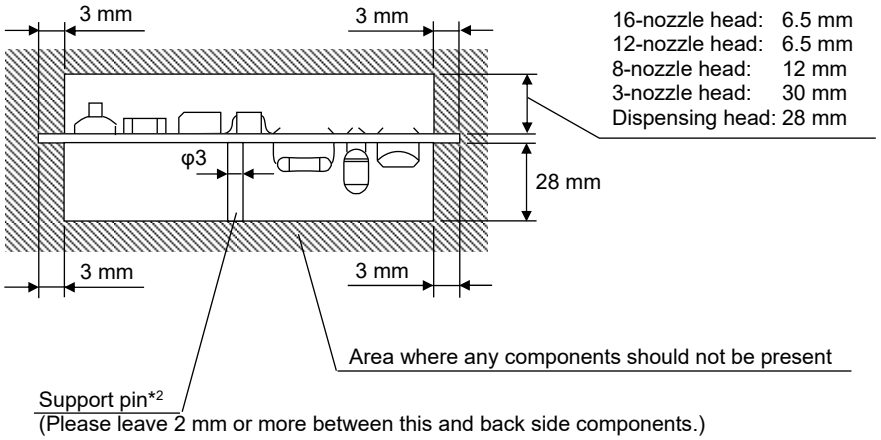
* Lighting specifications are programmable.

7. PCB Design Standard

7.1 PCB Specifications

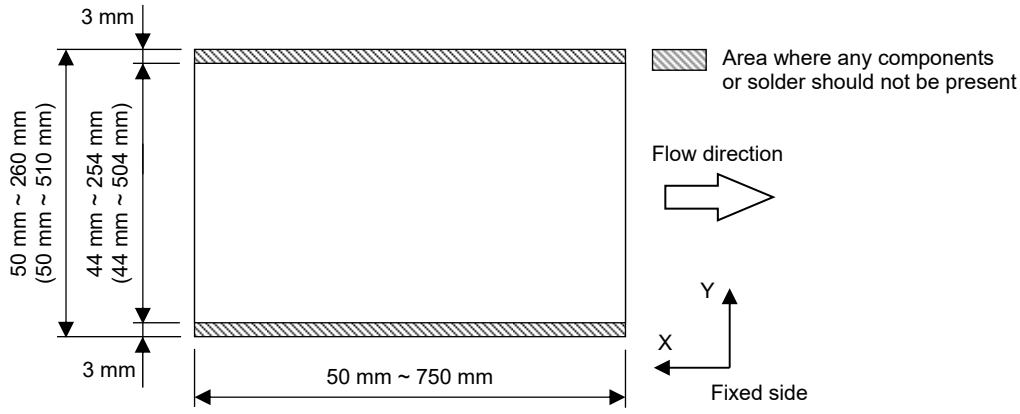
■ Single conveyor specification



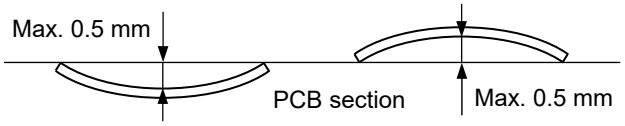
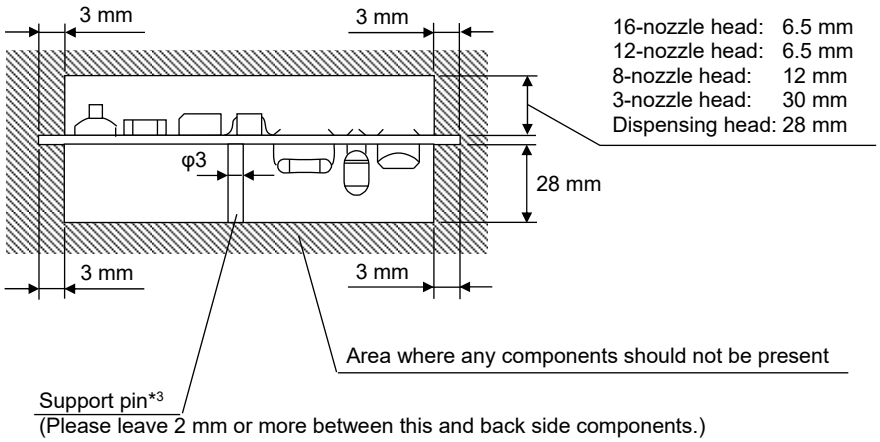
Item	Specifications
PCB dimensions	50 × 50 mm ~ 750 × 550 mm * Two PCBs can be clamped when PCB length is up to 350 mm.
Placement and inspection area	50 × 44 mm ~ 750 × 544 mm * For more information on the dispensing area, see “4.4 Dispensing area limitations.”
PCB thickness	0.3 mm ~ 8.0 mm
PCB mass	3.0 kg or less*1
Permissible PCB warpage	
Conditions of PCB before placement	

*1 When mass of PCB (including carrier mass) exceeds 3.0 kg, please consult us separately.
*2 When an “automatic replacement of the support pins” is used, the support pin shape and pin configuration conditions are differ. For details, please refer to “9. Option: Automatic replacement of the support pins.”
* For ceramic PCBs, please consult us.

■ Dual conveyor specification

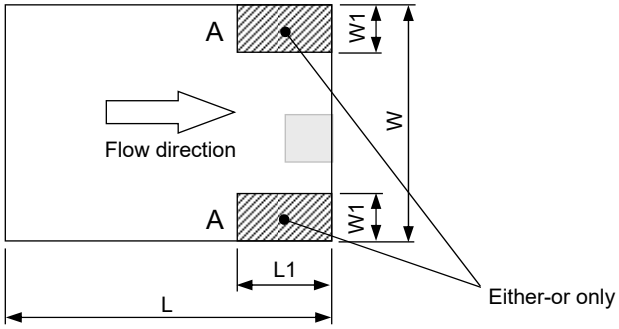


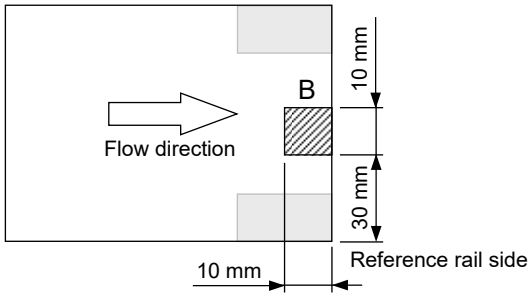
Numerical value in ( ) : For single lane mode

Item	Specifications
PCB dimensions	Dual lane mode : 50 × 50 mm ~ 750 × 260 mm Single lane mode*1 : 50 × 50 mm ~ 750 × 510 mm * Two PCBs can be clamped when PCB length is up to 350 mm. (The two PCBs clamping is not done when share mode is selected in dual lane mode.)
Placement and inspection area	Dual lane mode : 50 × 44 mm ~ 750 × 254 mm Single lane mode*1 : 50 × 44 mm ~ 750 × 504 mm * For more information on the dispensing area, see "4.4 Dispensing area limitations."
PCB thickness	0.3 mm ~ 8.0 mm
PCB mass	3.0 kg or less*2
Permissible PCB warpage	
Conditions of PCB before placement	

*1 When production is implemented in a single lane mode, the optional PCB support block that supports single lane mode is needed.
*2 When mass of PCB (including carrier mass) exceeds 3.0 kg, please consult us separately.
*3 When an "automatic replacement of the support pins" is used, the support pin shape and pin configuration conditions are differ. For details, please refer to "9. Option: Automatic replacement of the support pins."

* For ceramic PCBs, please consult us.

<table>
<tr><th colspan="2">Item</th><th>Specifications</th></tr>
<tr><td colspan="2">PCB notch condition</td><td>PCB notch dimensions should meet the following two conditions.</td></tr>
<tr><td></td><td>Condition A</td><td>PCB notch dimensions should meet the following conditions.
 

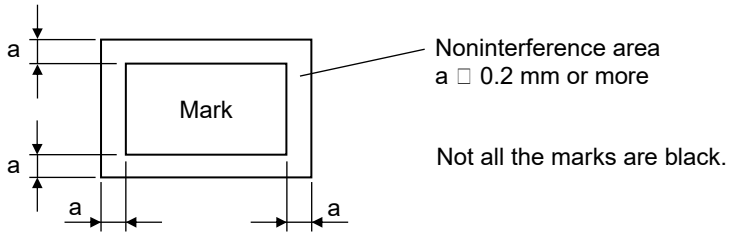
<table>
<tr><th>L</th><th>L1</th></tr>
<tr><td>50 mm ≦L ≦ 350 mm</td><td>Less than L/4</td></tr>
<tr><td>350 mm < L ≦ 750 mm</td><td>Whichever is smaller, L/4 or 100 mm.</td></tr>
</table>
<table>
<tr><th>W</th><th>W1</th></tr>
<tr><td>50 mm ≦ W ≦ 260 mm</td><td>Whichever is smaller, W/3 or 30 mm.</td></tr>
<tr><td>260 mm < W ≦ 550 mm</td><td>Please consult us.</td></tr>
</table>
* The above cases show PCBs of 1.6 mm or less in thickness.
For PCBs over 1.6 mm, consult us.</td></tr>
<tr><td></td><td>Condition B</td><td>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.</td></tr>
<tr><td colspan="2">Condition for component protruding from the edge face of PCB</td><td>Please consult us.</td></tr>
</table>

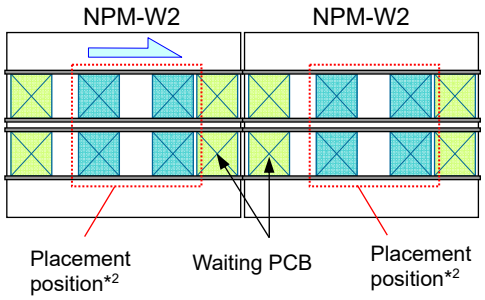
7.2 Recognition Mark

PCB needs two PCB recognition marks at its opposite corners.

■ **PCB Recognition Mark Specifications**

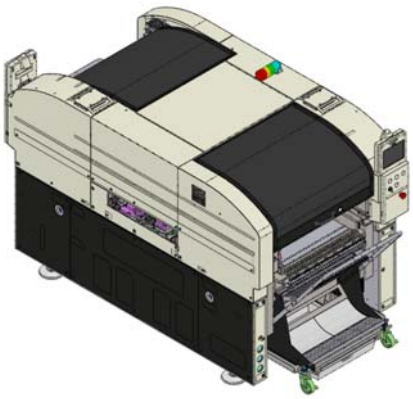
<table>
<tr><td rowspan="5">Standard Mark Shapes and Dimensions</td><td>Standard Mark Shapes</td><td>Dimensions</td></tr>
<tr><td>○</td><td>φ0.5 mm ~ φ1.6 mm</td></tr>
<tr><td>△ (Equilateral triangle)</td><td>Length of one side: 0.5 mm ~ 1.6 mm</td></tr>
<tr><td>□</td><td>Length and width: 0.5 mm ~ 1.6 mm</td></tr>
<tr><td>✚</td><td>Length and width: 0.5 mm ~ 1.6 mm
(Line width: 0.3 mm or more)</td></tr>
<tr><td colspan="2">Length and width means the dimensions of the quadrangle circumscribing the mark.</td></tr>
<tr><td>Mark Materials and Circuit Pattern</td><td colspan="2">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.</td></tr>
<tr><td>Image Conditions of Mark Materials and PCB Base</td><td colspan="2">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.</td></tr>
<tr><td>Mark Dimensions and Background</td><td colspan="2">Noninterference area of larger than a certain dimension is required outside of the mark.
 
</td></tr>
</table>

7.3 PCB waiting condition

<table>
<tr><td>PCB length: L</td><td>Description</td></tr>
<tr><td rowspan="2">50 mm ≦ L ≦ 220 mm*1</td><td> 
</td></tr>
<tr><td>A piece of PCB can wait in both the upstream and downstream (total of two pieces).</td></tr>
</table>

*1 If the PCB length exceeds 220 mm, please contact us.
*2 When doing the independent mounting in dual lane mode.
In the alternate mounting mode, the upstream mounting position will be PCB's waiting position.

8. Standard Machine Configuration

Item	Description	Quantity
Main body		1 set
Accessories	System disk • Machine system, Recognition system, and 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

9. 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 table	Whole machine
	Can be supported for each table.	Supported as a whole of 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.	• FA PC • HUB	**On-site**	-
			• Single conveyor • Dual conveyor	**Factory**	Whole machine
			• Upstream extension conveyor (L=300 mm) • Downstream extension conveyor (L=300 mm)	**On-site**	-
	2	To select a component recognition unit suitable for the intended use.	• Multi-recognition camera: Type 1/ 2/ 3 • Side lighting	**On-site**	By table
	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**	-

No.		Purpose / Feature	Option name	Category	
B	1	To select the nozzle in accordance with the production pattern.	• Nozzle • Storage nozzle case	Customer	-
	2	To select the tape feeder in accordance with the production pattern.	• Intelligent tape feeder	Customer	-
	3	To use thin type tape feeder.	• 4 mm thin type single tape feeder • 8 mm thin type single tape feeder • Attachment for thin type tape feeder • Power connector for thin type tape feeder • Handle for 4 mm thin type tape feeder • Reel holder for 4 mm thin type tape feeder	Customer	-
	4	To eliminate the tape splicing work. To reduce the feeder setup time.	・ 8 mm thin type auto load feeder ・ Auto load feeder common attachment	Customer	-
	5	To select the stick feeder in accordance with the production pattern.	•Single stick feeder • Guide block （For Single stick feeder） • 3-lot stick feeder •Guide block （For 3-lot stick feeder）	Customer	-
	6	To select the stackable stick feeder in accordance with the production pattern.	・ Stackable stick feeder (S) ・ S, M, L size pusher for S type ・ Stackable stick feeder (L) ・ S, M, L, LL, LLL size pusher for L type	Customer	-
			・ Air Supply Unit for Feeder	On-site	By table
	7	To manage and store tape feeders.	• Tape feeder stand	Customer	-
	8	To manage and store stackable stick feeder. To prepare in advance.	・ Feeder stand ・ Power and air supply unit (For stand)	Customer	-
	9	To prepare for the replacement of a support pin.	• PCB support block • Support pin setting jig • Additional support pins	Customer	-
	10	To replace the support pins automatically.	• Automatic replacement of support pins	On-site	Whole machine
			• Nozzle for support pin changeover • Support pin (For automatic replacement)	Customer	-
	11	To prepare feeders in advance and change them collectively.	• Feeder cart	Customer	-
	12	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	-
	13	To improve the workability of tape splicing.	• Splicing cart • Component Supply Navigator (License)	Customer	-

No.		Purpose / Feature	Option name	Category	
C	1	To replace the placement head.	• Spare placement head • Spare nozzle changer	Customer	By table
			• Spare multi-recognition camera: Type 1/ 2/ 3 • Spare side lighting	On-site	By table
	2	To correct the PCB height (warp) and improve placement/dispensing quality.	• Height sensor	On-site	By table
			• Height sensor teaching jig	Customer	-
	3	To exchange the feeder carts in the independent changeover.	• Independent changeover supporting unit	Factory	By table
	4	Improve a 16-nozzle head function.	• ±0.025 mm placement support • 03015 placement support	Factory	By table
	5	To align and eject the NG components onto the conveyor.	• NG-components ejection conveyor	Customer	By table
	6	To implement production with a Head/Heads removed.	• No Head attachment • Safety cover	Customer	-
	7	To manage and store the removed Heads.	• Head stand (For two Heads)	Customer	-
	8	To reduce time for changeovers.	• Support station	On-site	-
			• Feeder setting jig • Attachment for thin type tape feeder • Power connector for thin type tape feeder	Customer	-
	9	Wishes to use all sorts of function modules of PanaCIM-EE.	• PanaCIM-EE ready (License)	On-site	-
	10	Wishes to use all sorts of function modules of iLNB.	• iLNB ready (License)	On-site	-
	11	To implement changeover efficiently.	• Automatic changeover (License)	On-site	-
	12	To prevent setting error at the time of component change.	• Component verification (License)	On-site	-
			• Wired scanner	Factory	By table
			• Scanner holder	On-site	Whole machine
	13	To streamline setup operations during a changeover.	• Feeder Setup Navigator (License)	On-site	-
	14	To use existing system effectively.	• Upper communication (License)	Customer	-
	15	To make use of the location-independent tape feeder function.	• Component verification (License) • Support station: Component verification type	On-site	-
	16	To change to inspection head. To execute solder inspection and component inspection.	• Spare 2D inspection head • Inspection head support unit	On-site	-
			• Safety cover	Customer	-
	17	To improve placement quality by controlling process by process measurement data of inspection head (solder inspection).	• APC system ready (License)	Customer	-
	18	To enable APC system using SPI.	• Interface software of the inspection machine from other companies (License)	On-site	-
			• APC system ready (License)	Customer	-
	19	To maintain placement quality by using the AOI measurement data of mounting process	・ APC-MFB2 system ready (License)	Customer	
	20	To change to dispensing head.	• Spare dispensing head	Customer	By table
			• Dispensing Nozzle	Customer	-
			• Spare dummy dispensing unit • Spare wiping station • Safety cover	Customer	By table
			• Jig kit for accuracy verification • Spare screw unit	Customer	-
	21	To perform transfer.	• Multi-functional transfer unit • Coating thickness gauge	Customer	-
			• Air supply unit for the feeder	On-site	By table
	22	To enable remote operation	・ •Remote operation (License)	On-site	
	23	To login to a machine using biometric information	・ •Biometrical authentication (License)	On-site	-
	24	To keep the placement push-in load of the light-weight 16-nozzle head constant	• 16-nozzle head constant mount load control (Lightweight type)	On-site	-
	25	To enable bonding involving paste transfer with lightweight 16-nozzle head	• 16-nozzle head transfer (Lightweight type)	On-site	-
	26	To measure the push-in load or impact load during placement and display the results on the monitor of the machine or on the LNB	• Load checker	Factory	-
	27	To recognize the characters or 2D codes on the surface of a component before picking it up from the tray or tape feeder	• Pre-pickup Inspection (Char/2D)	Factory	-
	28	To recognize the lead pins of the leaded components to be inserted	• Multi-recognition camera PIP lighting	Factory	-
	29	To reduce the time required for checking the positions judged as NG by AOI	• AOI info display function	On-site	-

No.		Purpose / Feature	Option name	Category	
C	**30**	To see whether electrical properties of components is within a predefined range before they are going to be mounted	•LCR Checker(Feeder shaped type) (License) •LCR Checker(Built-in type)	On-site	-
	31	To do simple check before reflow of how shield components are mounted	•Mount complete position recognition (License)	Customer	-
	32	To prevent improper mounting because of wrong component setting	•Mount complete position recognition (License)	Customer	-
	33	To connect the factory-side plumbing to equipment to enable primary air connecting	• Primary air hose unit	Customer	-
	34	To use large reels	• Separator for feeder cart	Customer	-

No.		Purpose / Feature	Option name	Category	
D	1	To keep the machine condition in regular maintenance.	• Greasing set • Maintenance jig • Nozzle holder cleaning jig	Customer	-
	2	To calibrate as needed.	• Jig kit for accuracy verification • Standard calibration jig kit • Jig kit for adjusting the main body • Plane calibration jig	Customer	-
	3	Required for exchanging/removing the Head.	• Unit exchanging tool	Customer	-
	4	To maintain the nozzle head automatically.	• Head maintenance unit • Air supply connection kit • Side filter • Bottom filter • Additional nozzle holder pallet	Customer	
	5	To splice the parts tape automatically	• Automatic tape splicing unit • Splicing tape • Battery box (Including connection cable) • Charge Terminal • Rubbish box • Tape cutting jig	Customer	
			• Battery・Battery Charger	Customer	
	6	To maintain the tape feeder automatically	・ Feeder maintenance unit ・ Master jig ・ Attachment for thin type single feeder ・ Thin type single feeder master jig ・ Auto load feeder jig tapes	Customer	-

A-1	Selection of required options

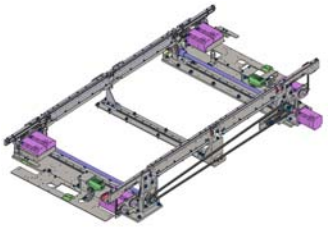
On-site

FA PC
HUB

- Always required for the NPM-W2 line. (a type/line)
- For more information, please refer to “4.5 Line configuration.”

Factory Whole machine

Single conveyor

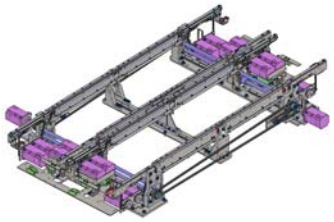


- This is a single lane conveyor that transfers PCBs and fixes them at each stop position.

* PCB support block and support pin is not attached.

Factory Whole machine

Dual conveyor



- This is a dual lane conveyor that transfers PCBs and fixes them at each stop position.
- In dual conveyor specification, you can exchange PCBs at one lane while continuing component placement at another lane, eliminating the PCB exchange time, resulting in enhanced productivity.
- You can produce one product type PCBs using both lanes and also produce two different product types PCBs using two lanes for the different production from one another.

* PCB support block and support pin is not attached.

On-site

Upstream extension conveyor (L=300 mm): Single lane
Upstream extension conveyor (L=300 mm): Dual lane

- Please be sure to select it for the first equipment of the NPM-W2 to ensure the safety of the transfer opening.
- The PCB of 220 mm or more in length is allowed to standby. (Max. L 510 mm)
- If the extension conveyor is installed between the NPM-W2s, the PCB of max. 750 mm in length is allowed to standby.

On-site

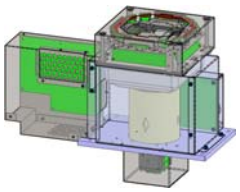
Downstream extension conveyor (L=300 mm): Single lane
Downstream extension conveyor (L=300 mm): Dual lane

- Please be sure to select it for the last equipment of the NPM-W2 to ensure the safety of the transfer opening.
- The PCB of 220 mm or more in length is allowed to standby. (Max. L 510 mm)

A-2	To select a component recognition unit suitable for the intended use.

On-site By table

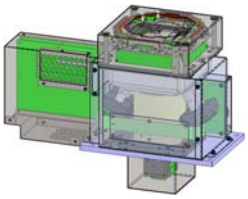
Multi-recognition camera: Type 1



- 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 “4.7 Recognition Unit Configuration” for details.

On-site By table

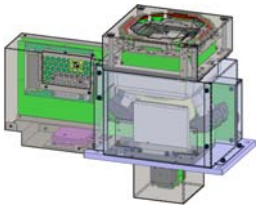
Multi-recognition camera: Type 2
(Type 1 + Component thickness measurement)



- A component thickness measurement function will be added to “Type 1.”
- This provides component thickness measurement (added to chip data entry and reflected in placement height), component's standing/tilted standing is detected, flip of Tr/ Di is detected, and nozzle tip is checked.
- This supports each Placement head.
- Please refer to “4.7 Recognition Unit Configuration” for details.

On-site By table

Multi-recognition camera: Type 3
(Type 2 + 3D-measurement function)



- A 3D-measurement function will be added to “Type 2.”
- 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. (Multi-recognition camera Type3 comes with side lighting)
- Please refer to “4.7 Recognition Unit Configuration” for details.

On-site By table

Side lighting

- This is required for bump recognition of the BGA/ CSP. (Exclusive to multi-recognition camera)
- Multi-recognition camera Type3 comes with side lighting.

* Multi-recognition camera is exclusive to NPM-W2S/W2, NPM-D3 and NPM-TT2.

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 to 920 mm above the floor.

B-1	To select the nozzle in accordance with the production pattern.

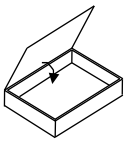
Customer

Nozzle

- Please refer to “4.2 Nozzle Configuration” for details.
- Wrong nozzle setup can be detected by nozzle No. verification with 2D code for the nozzles which include “N” in their nozzle No.
- For information about the special nozzles, please contact us.
- The nozzles are compatible with CM602, CM402/ DT401 series, CM232, CM212, CM101, and NPM series.

Customer

Storage nozzle case



- This case, which is made of plastic, is manageable because it can be checked for its contents from outside.
- The one for 16-/ 12-nozzle head, for 8-nozzle head (Less than nozzle diameter φ5 mm) can accommodate 50 nozzles.
- The one for 8-nozzle head, for 3-/ 2-nozzle head (Nozzle diameter φ5 mm or more) can accommodate 21 nozzles.
- The nozzle case is compatible with AM100, CM602, CM402/ DT401 series, CM232, CM212, CM101, and NPM series.

B-2	To select the tape feeder in accordance with the production pattern.

Customer

Intelligent tape feeder

- Please refer to “4.4 Feeder Carriage Configuration” for details.
- The tape feeder is compatible with AM100, CM602, CM402/ DT401 series, CM232, CM212, CM101, and NPM series.

B-3	To use thin type tape feeder.

Customer

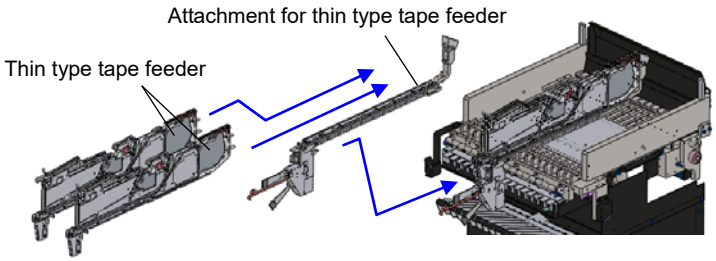
4 mm thin type single tape feeder (No detection sensor)
8 mm thin type single tape feeder

- Please refer to “4.4 Feeder Carriage Configuration” for details.
- Not available for CM602, CM402/ DT401 series, CM232, CM212, and CM101.

* As for the inspection of a thin type tape feeder by IFCU, "Master attachment for thin type tape feeder (option)" is required.

Customer

Attachment for thin type tape feeder

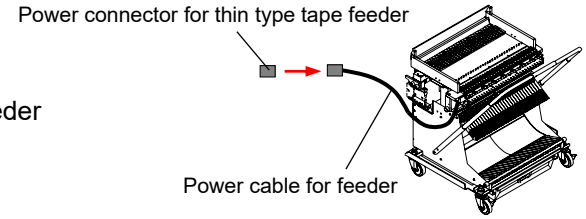


- One piece is required per slot when you attach a thin type tape feeder.
  Two thin type tape feeders can be attached to each slot.
- This is required even when you use a “Feeder setting jig” in offline setting.

* A dedicated attachment for 4mm/ 8mm thin type tape feeder. (This attachment cannot be used on auto load feeder.)

Customer

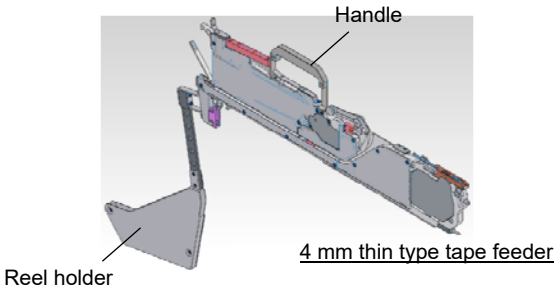
Power connector for thin type tape feeder



- Required to directly supply electricity to thin type tape feeders (at the time of preparation, etc.).
- Used by connecting to the power cable for feeders, which comes with feeder carts (or 13-slot feeder base).
  It can also be connected to the feeder power cable of the support station.
- When power to thin type tape feeders is supplied through “Attachment for thin type tape feeders”, this option is not required.
  (Use a standard type power cable for feeders.)

Customer

Handle for 4 mm thin type tape feeder
Reel holder for 4 mm thin type tape feeder



- Handle for 4 mm thin type tape feeder
  This handle is attached to tape feeder.
  To improve the usability of setting and carrying.
- Reel holder for 4 mm thin type tape feeder
  This reel holder is integrated in tape feeder. One reel can be set in.

B-4	To eliminate the tape splicing work. To reduce the feeder setup time.

Customer

8 mm thin type auto load feeder

- This is a thin type feeder materialized automatic component tape setup.
  The off-line setup time can be drastically reduced by the simple work of inserting a tape, then pressing the " Send " button. (Approx. 30s/reel ⇒Approx. 15s/reel)
- This auto load feeder can also use a short cut tape (longer than 120mm).
- The 'Tape guide' is different in each size. (Same feeder body)
  Depending on the component size, please select from the following types.

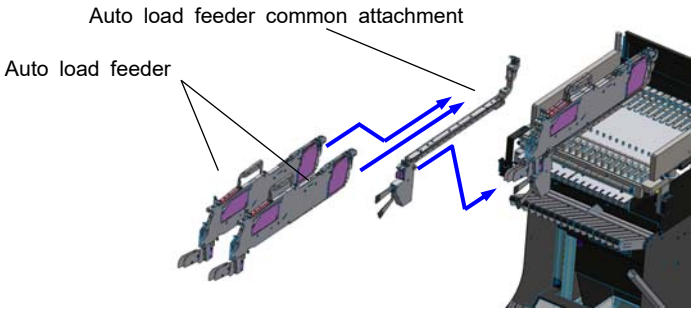
Type	Target components	Remarks
Type S	0402R/C	・It is possible to purchase the tape guide only. ・The service life of cover tape peeling blade: about 3 000 h Equivalent to 1500 times of peeling * Not available for emboss tape. * If need the tape guide for 2012 or 3216, please contact us.
Type A	0603R/C	
Type B	1005R/C	
Type C	1608R/C	

- Please refer to "4.4 Feeder Carriage Configuration" for details.
- Not available for CM602, CM402/ DT401 Series, CM232, CM212, CM101.

* If you want use IFCU to check auto load feeder, please contact us for details.
* When the auto load feeder is used, a reel holder for setting the reel to be used up and a newly supplied reel is required. Please consult us separately.

Customer

Auto load feeder common attachment



- One piece is required per slot when you attach an auto load feeder.
  Two auto load feeders can be attached to each slot.
- This is required even when you use a "Feeder setting jig" in offline setting.

* This attachment can also be used on 4 mm/ 8 mm thin type tape feeder.

B-5	To select the stick feeder in accordance with the production pattern.

Customer

Single stick feeder

- Please refer to “4.4 Feeder Carriage Configuration” for details.
- Supporting only 8-nozzle head and 3-nozzle head.
- Single stick feeder cannot be used in CM602, CM402/ DT401 series, CM232, CM212, CM101.

Customer

3-lot stick feeder

- Please refer to “4.4 Feeder Carriage Configuration” for details.
- Supporting only 8-nozzle head and 3-nozzle head.
- The intelligent stick feeder is compatible with AM100, CM602, CM402/ DT401 series, CM232, CM212, CM101, and NPM series.

Customer

Guide block （For Single stick feeder, 3-lot stick feeder）

* Guide block is used when components are difficult to be picked up by the machine in the feeding method with the tip-cut sticks because the transfer state of components and the components posture at the pick-up position are not good depending on the component/stick shape, etc.

B-6	To select the stackable stick feeder in accordance with the production pattern

Customer

Stackable Stick feeder
Stackable stick feeder (S)
S, M, L size pusher for S type
Stackable stick feeder (L)
S, M, L, LL, LLL size pusher for L type

- Please refer to “4.4 Feeder Carriage Configuration” for details

On-site By table

Air Supply Unit for Feeder

- Air Supply Unit for Feeder is necessary when using stackable stick feeders.
  (13-slot feeder base comes with “Air supply unit for the feeder”.)

B-7	To manage and store tape feeders.

Customer

Tape feeder stand

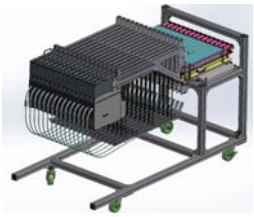
- This is a stand for intelligent tape feeders.
- For the 8 mm double tape feeder, for example, up to 90 ones can be stocked.

* Please contact us for stocks of thin type tape feeders.
  (Enables to stock thin type tape feeders if it is installed to “Thin type feeder attachment.”)

B-8	To manage and store stackable stick feeders. To conduct advance preparation

Customer

Feeder stand



- This is a stand for stackable stick 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.
- This is used when to pull the stackable stick feeder off a machine and when to move the stackable stick feeder.
- When there are 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. Air connector

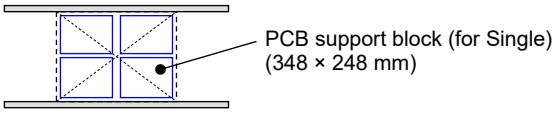
* Please prepare power supply source, cable, air supply source and air hose by yourself.

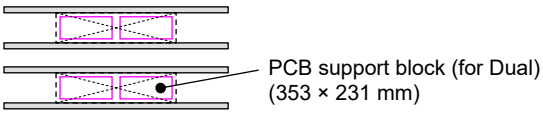
B-9	To change the positions of PCB support pins externally in order to reduce the changeover time.

Customer

PCB support block (For single conveyor)
PCB support block (For dual conveyor)

- PCB support blocks (4) 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.
- Common with NPM-W



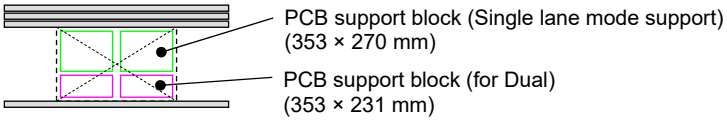


* This is not used with “Automatic replacement of support pins.”

Customer

PCB support block that supports single lane mode (For dual conveyor)

- 2 blocks are required in the single lane production mode.
  It is used in combination with the support blocks for dual conveyor. (See the following figure)
- It can be additionally purchased by the block.
- No support pin is included. 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 (for Dual conveyor)” separately.
- Common with NPM-W



* This is not used with “Automatic replacement of support pins.”

Customer

Support pin setting jig (For single conveyor)
Support pin setting jig (For dual conveyor)

- To prepare the support pins externally, please select the “PCB support block” separately.
- Common with NPM-W

Customer

Additional support pins

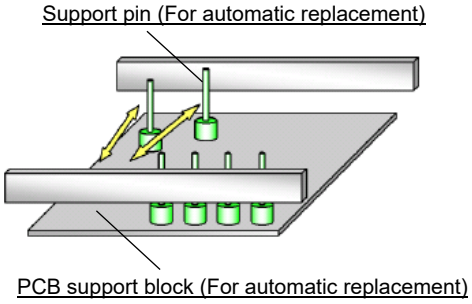
- Please select when needed in addition. (20 pieces are included in 1 set.)
- For single/dual use.
- This is common with the one for NPM-W, NPM-D3/ D2/ D, NPM-TT, AM100 and NPM (dual conveyor specification).

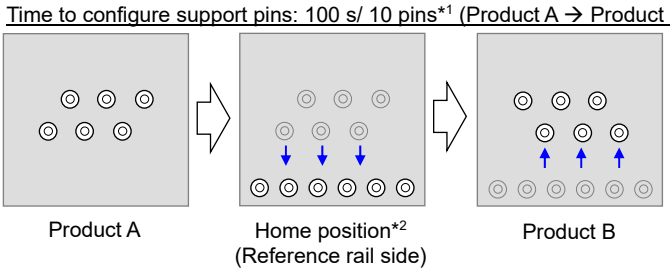
B-10	To replace the support pins automatically.

On-site Whole machine

Automatic replacement of support pins

A function to automatically set up the support pin using the placement head.
Up to 40 support pins can be automatically configured per a piece of PCB. (Standard support pins cannot be used.)
For process-plus-placement head (or no head-plus-placement head) specifications, the placement head on one side copes with pin configurations in the front and rear lanes.
Support pin configuration data is created by NPM-DGS. You can check pin configuration on the PC screen.



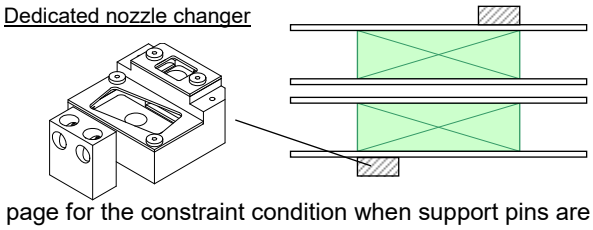


*1 For a PCB of 350 × 260 mm
(It does not include time to change the width of the transfer rail.)
*2 Under some conditions, the pin configuration of product A will be directly switched to the one of product B.

Accessory	Description	Remarks
PCB support block (For automatic replacement): Select either one according to the conveyor specifications.		Common with NPM-W
For single conveyor	1 set (four blocks)	
For dual conveyor	1 set (two blocks each of Front/Rear)	
Dedicated nozzle changer	1 pair (one each of Front /Rear)	Common with NPM-W/ D3/ D2/ D/ TT

Selection option	Description	Remarks
Support pin (For automatic replacement)		Common with NPM-W/ D3/ D2/ D/ TT, AM100
Nozzle for support pin changeover	100 nozzle: For 16-/ 12-/ 8-nozzle head 1100 nozzle: For 3-nozzle head	Common with NPM-W/ D3/ D2/ D/ TT

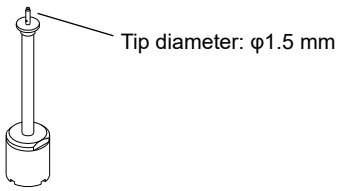
The nozzle for support pin changeover is stored in the dedicated nozzle changer.
Each one of #100 nozzles and #1100 nozzles can be stored in the dedicated nozzle changer.



See the next page for the constraint condition when support pins are automatically replaced.

Customer

Support pin (For automatic replacement)



- Up to 40 pieces can be configured per a piece of PCB. (For PCBs whose size is L= 350 mm or less: up to 20 pieces)
  (Dual conveyor specifications: Max. 80 pieces with front lane and rear lane)

Customer

Nozzle for support pin changeover

100 nozzle
(For 16-/ 12-/ 8-nozzle head)

1100 nozzle
(For 3-nozzle head)

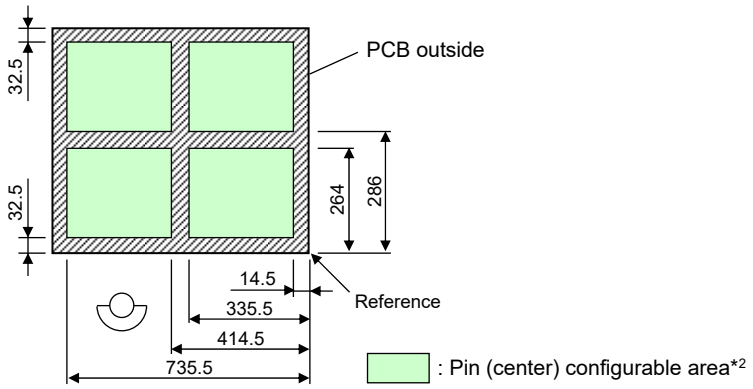
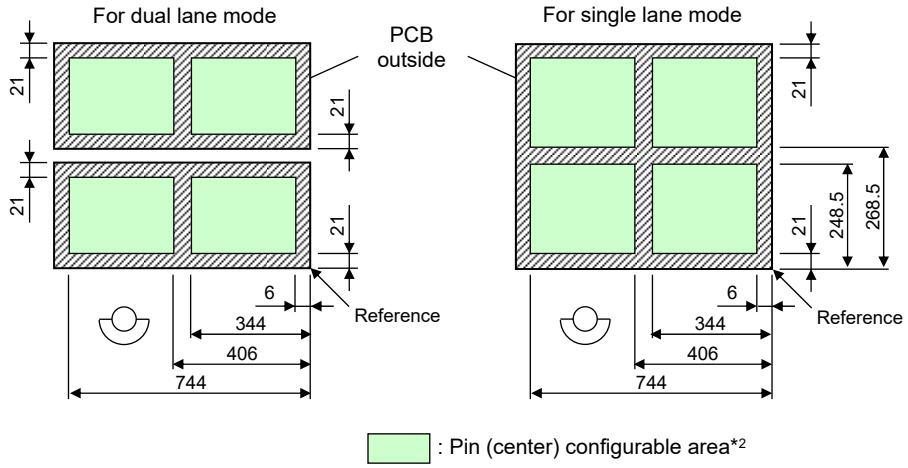
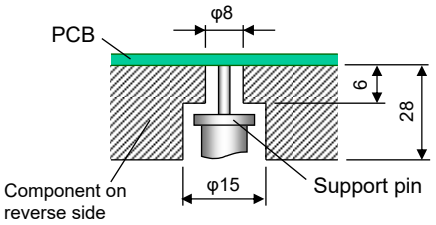
- Please select according to head configuration. (One nozzle is used for each placement head.)

B-10	To replace the support pins automatically.

The following constraint conditions are required when support pins are automatically replaced.

Constraint condition

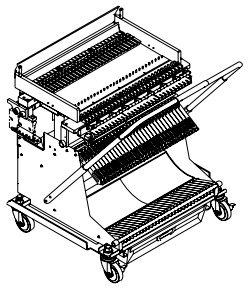
(Unit: mm)

Item	Description
Minimum PCB size capable to set up pins	Single conveyor specifications: L 50 × W 90 mm Dual conveyor specifications: L 50 × W 70 mm
Pin configuration pitch	16 mm or more (X, Y direction)
Pin configuration area (Left-to right flow)*1	・ Single conveyor specifications  ・ Dual conveyor specifications  *1 If PCB flow is from right to left, the above dimensions are symmetrically situated. *2 Visible outline is included in the pin (center) configurable area.
Pin arrangement condition	 Please configure support pins to the location where the dimensions shown on the left can be secured. Keep away from slit on a PCB when pins are configured.

B-11	To prepare feeders in advance and change them collectively.

Customer

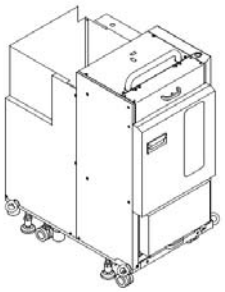
Feeder cart (30-slot)



- 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.
- Common with NPM- W

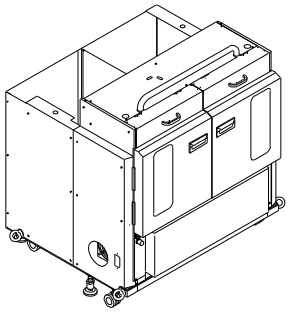
B-12 To place tray-feeding components.

Factory



Max. 20 products

Single tray feeder
with 13-slot feeder base



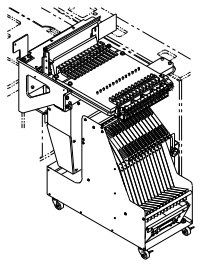
Max. 40 products

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-W, NPM-D3/ D2/ D, NPM-TT, NPM and AM100.
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

4 mm tape	Max. 26: Thin type tape feeder
8 mm tape	Max. 26: Duble/ Thin type tape feeder (Small reel) Max. 13: Single tape feeder
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
Stick	Max. 3
NG-components ejection conveyor	1
Multi-functional transfer unit	1

Customer

Additional tray magazine (15 mm pitch × 10 stages)
Additional tray pallet
Additional components-ejection tray

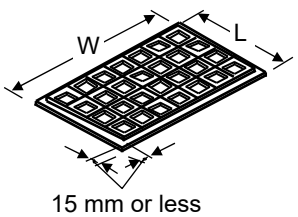
- Please select this option when needed additionally.

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 × W = Max. 230 × 318 mm

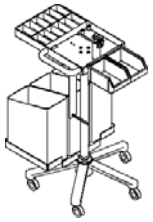


15 mm or less
(Magnet fixed type: 10 mm or less)

B-13	To improve the workability of tape splicing.

Customer

Splicing cart



- This cart improves the workability of tape splicing. (For Intelligent tape feeder)

Customer

Component Supply Navigator (License)

- This navigator can prevent short time breakdown in the production line and contribute to manpower saving.
  It optimizes the supply sequence to provide a shortest route without component shortage.
  The optimized supply sequence will be displayed as a best supply route on wireless scanner or the monitoring PC for each operator.
- It can optimize the supply sequence including tray components.
- We recommend using the Component verification (License)-Wireless scanner (PDA) type together.
- This option is used for one line. If you want to use the navigator in multiple lines, please buy the component supply navigator of PanaCIM-EE.
- Please refer to “5.5 Component Supply Navigator” for details.

C-1	To replace the Head.

Customer By table

Spare
16-nozzle head
(Lightweight type)*

Spare
12-nozzle head

Spare
8-nozzle head
(Lightweight type)

Spare
3-nozzle head V2

Head case

- Head case comes together with spare head.
- It should be replaced for each table. Different Heads can be installed to the front and rear tables.
- Since nozzle changer and side lighting do not come together, pelase select them separately as options.
- This is exclusively for NPM series. (3-nozzle head V2 is used exclusively for NPM-W2S/ W2/ W and NPM-TT2/ TT)

* In an emergency, is possible to use the conventional 16-nozzle head. (4 point fixation type only)
In that case, placement tact time and accuracy are the same as NPM-W (70 000 CPH, ±0.04 mm (Cpk≧1)).
The lightweight type 16-nozzle head may only be used in NPM-D3 and NPM-W2S/ W2.

Customer By table

Spare nozzle changer
(For 16-/ 12-nozzle head)

Spare nozzle changer
(For 8-nozzle head)

Spare nozzle change
Nozzle changer large type
(For 8-nozzle head)

Spare nozzle changer
(For 3-nozzle head)

- This is exclusively for NPM series. (For 3-nozzle head is used exclusively for NPM-W2S/ W2/ W and NPM-TT2/ TT)

On-site By table

Spare multi-recognition camera: Type 1
Spare multi-recognition camera: Type 2
Spare multi-recognition camera: Type 3 (With side lighting)

On-site By table

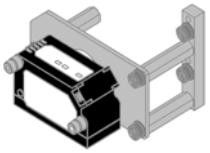
Spare side lighting

- This is required for bump recognition of the BGA/ CSP. (Exclusive to multi-recognition camera)

C-2	To correct the PCB height (Warp) and improve placement/dispensing quality.

On-site By table

Height sensor



・ The height sensor supports the placement/the dispensing heads.
The sensor functions change depending on whether it supports the placement head or the dispensing head. (The functions cannot be used together)

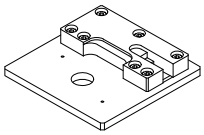
<PCB warpage correction (Placement head)>
・ Controls the placement height of a PCB by measuring the height (warp) of the whole PCB.
Measurement time: 3.0 s (750 × 510 mm in an optimal condition, with 9-point measurement)
・ Select the height sensor for the first NPM-W2 in line.
Select only the front side for single conveyor specifications and, both the front and rear side, for dual conveyor specifications.
The head configuration except for [placement head + placement head], PCB warpage correction does not function.
・ Measurement data is passed to the downstream NPM-W2.
* For any PCB whose warp geometry changes each time it is clamped, please consult us separately.

<Local PCB height correction (Dispensing head)>
・ The PCB height (warpage) adjacent to the drawing position (non-contact) is measured in order to correct and optimize the nozzle height.
Measurement time: 0.5 s (30 × 30 mm in an optimal condition, with 4-point measurement)
・ Nozzle height correction during dot dispense is also enabled. (local range)
・ Select the height sensor for the dispensing head mount beam.
・ No data passing is allowed.

・ Please refer to “4.7 Recognition Unit Configuration” for details.

Customer

Height sensor teaching jig



・ It calibrates linearity and offset of the height sensor.
・ It is necessary if you purchase the height sensor for the first time.
・ It is shared with NPM-W, NPM-D3/ D2/ D, NPM-TT and AM100.

C-3	To exchange the feeder carts in the independent changeover.

Factory By table

Independent changeover supporting unit: Front side
Independent changeover supporting unit: Rear side

・ It is option for the dual conveyor specification.
・ Feeder cart can be changed in the Independent changeover. Please select for the stage which uses a feeder cart.
(It cannot select the rear side only.)

* The safety cover cannot be attached, when you select this option for the table.
* The feeder carts are required when installed in the dispensing head table.
* These cannot be installed in the inspection head table.

C-4 Improve a 16-nozzle head function

Factory By table

±0.025 mm placement support

- It improves placement accuracy. (±0.025 mm (Cpk≧1): Under below conditions)
- Make ±0.025 mm placement-specific parameter settings.
- Possible to simultaneously select “03015 placement support”, but the placement accuracy is ±0.03 mm (Cpk≧1).

<Placement condition>

Target head	16-nozzle head (Lightweight type)
Production mode	High production mode: OFF
Applicable components	Jig chips (1005)
Placement angle	0°, 90°, 180°, 270° only
Recognition	Placement angle recognition

Factory By table

03015 placement support

- 03015 placement is possible. (±0.03 mm (Cpk≧1): Under below conditions)
- Make 03015-specific parameter settings.
- For 03015 chip placement, “276CS (or 276CSN) nozzle” and 4mm thin type tape feeder (4W1P) is required.
- 03015R is out of 2D inspection.

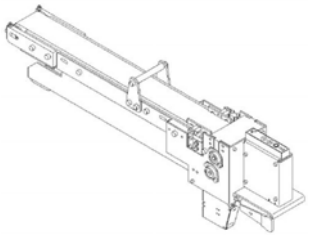
<Placement condition>

Target head	16-nozzle head (Lightweight type)
Production mode	High production mode: OFF
Applicable components	03015R (By Panasonic)
Placement angle	0°, 90°, 180°, 270° only
Recognition	Placement angle recognition

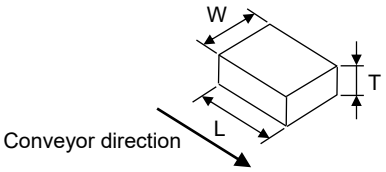
C-5 To align and eject the NG components onto the conveyor.

Customer By table

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

- This is used for ejecting recognition NG components.
- Usable only for 8-nozzle head and 3-nozzle head.
- This option will occupy four feeder setting slots.
- 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-6	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 (Feeder cart specification)

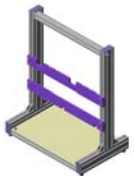
- Please be sure to select the safety cover. (Not required when Feeder cart is attached.)
- This is exclusively for NPM-W2.

* The safety cover cannot be attached when the independent changeover support unit is installed in the table. Please mount the feeder cart.

C-7	To manage and store the removed Heads.

Customer

Head stand (For two heads)



- This is used to store the removed heads after exchanging.
- One stand can store two heads.
- This is exclusively for NPM series.

C-8	To reduce time for changeovers.

On-site

Support station (Power 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 electric source to feeder carts and feeders, and another one implements component verification in addition to the electric source supplying.
- To use PanaCIM-EE for off-line setup, “Support station box (Component verification type)” is required.
- Please refer to “5.5 Support Station” for details.

* 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.
* This does not support stackable stick feeder.

Customer

Feeder setting jig

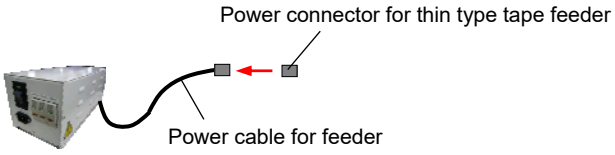
- The feeder setting jig is used as a feeder holder to set components on the feeder and to verify components.
- “Attachment for thin type tape feeder” is required to install thin type tape feeders.

Customer

Attachment for thin type tape feeder

Customer

Power connector for thin type tape feeder



- Required to directly supply electricity to thin type tape feeders (at the time of preparation, etc.).
  Used by connecting to the power cable for feeders, which comes with the support station.
- When power to thin type tape feeders is supplied through “Attachment for thin type tape feeders”, this option is not required.
  (Use a standard type power cable for feeders.)

C-9	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-10	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-11 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-12 To prevent setting error at the time of component change.

On-site

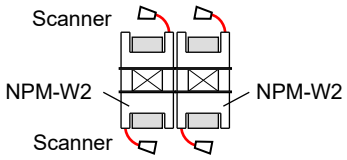
Component verification (License)

- 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.
- There are the wired scanner type and the wireless scanner type.
- It is not available to select with "PanaCIM-EE ready (License)" at the same time. (It is included in "PanaCIM-EE ready (License).")
- Please refer to "5.1 Component Verification" for details.

Factory By table

Wired scanner

- Required when "Component verification (wired scanner type) is selected.
- Operation on two tables is made possible by one scanner.



On-site Whole machine

Scanner holder

- Holders, which are for fixing wired scanners, are equipped at the front and rear of the machine.

C-13 To streamline setup operations during a changeover.

On-site

Feeder Setup Navigator (License)

- It is a support tool to navigate efficient setup procedure.
  The tool factors in the amount of time it takes to perform and complete a setup when estimating the time required for production and providing the operator with setup instructions.
- Together with this license, select the following options.
  Required
  Support station box (Component verification type)
  Choice (Select any of the following)
  1) Component verification (License) + Support station: Component verification type (License)
  2) PanaCIM-EE ready (License)
- Please refer to "5.3 Feeder Setup Navigator" for details.

C-14 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 "5.4 Upper Communication" for details.

C-15	To make use of the location-independent tape feeder function.

- The tape feeder can be located flexibly within the same table.
- You can locate components alternately and the feeder for the next product at an empty slot.

* Using the “Support station box (Component verification type)”, you need to write data to tape feeders in advance.
“Component verification (license)” is also needed.

On-site

Component verification (License)

On-site

Support station box (Component verification type)
Support station: Component verification type (License)

- It is necessary to write information to the memory of tape feeders.

C-16	To change to inspection head (to execute solder or component inspection)

On-site

Spare 2D inspection head A (Resolution: 18 µm)
Spare 2D inspection head B (Resolution: 9 µm)

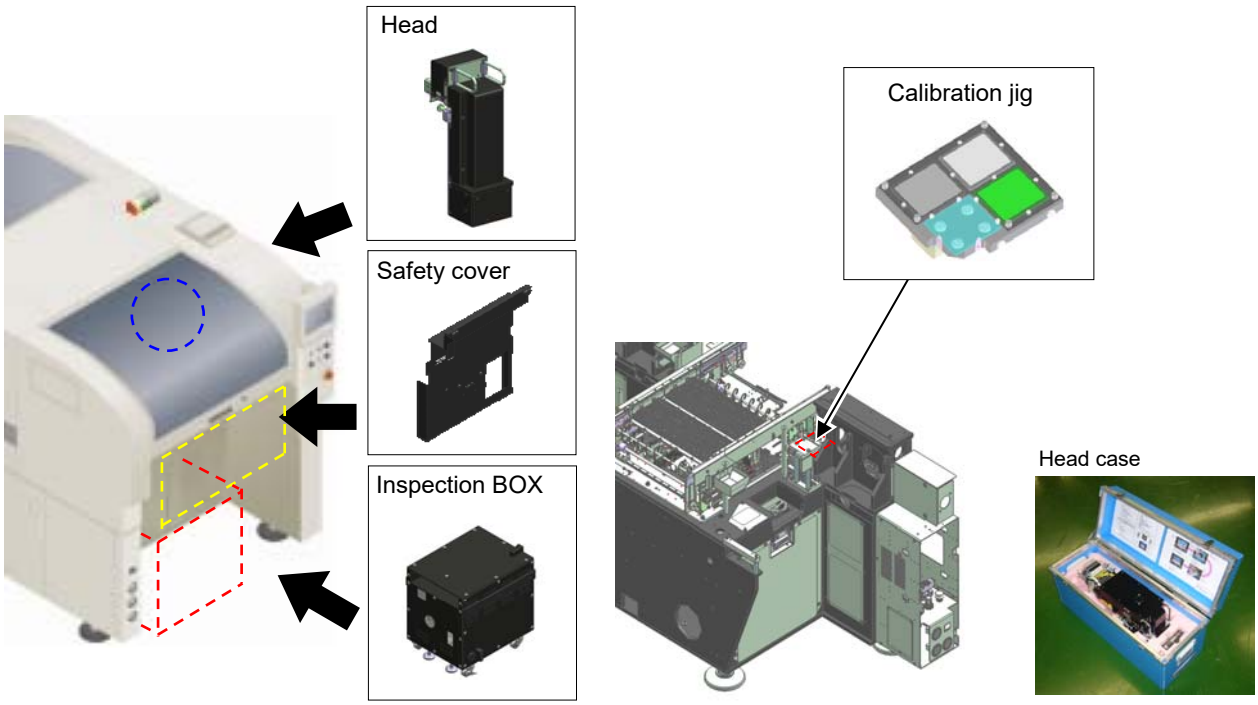
On-site

Inspection head support unit (Inspection BOX and calibration jig)

Customer

Safety cover: Front side

* Exclusive to NPM-W2



- Regarding resolution of the 2D inspection Head, there are two types, 18 µm and 9 µm.
- One inspection head cannot handle solder inspection and component inspection at the same time.
- Inspection head support unit (Inspection box and Calibration jig) are necessary for each inspection head installed stage.
(Inspection head A/ B can be commonly used.)
- Please be sure to select the safety cover.
- Head case is accompanied to spare 2D inspection head.

C-17	To improve placement quality by controlling process through process measurement data of inspection head (solder inspection).

Customer

APC system ready (License)

- APC system can help improve placement quality by feed forwarding solder measurement data of inspection head to placement head which enables component placement at the optimum and highly accurate positions.
- With component inspection, misalignment can be inspected against controlled reference position of placement.
- This option is required for each of the following equipment:
  1) First NPM-W2 in line which has 2D inspection head installed.
  2) NPM-W2 which receives APC-FF offset data.
- Please refer to “5.7 APC system” for details.

* APC system-ready equipment: NPM X / NPM series (mixed line supported)
  If line is made up with other equipment than the above, please contact us.
* 03015 components are not eligible.

C-18	To enable APC system using SPI

On-site

Interface software of the inspection machine from other companies (License)

- This is interface software to enable APC system using a measurement data of inspection machine (solder inspection) from other companies.
- This option is required per NPM-W2 that receives APC-FF offset data.
- Select this option, together with “APC system-ready (License)” for the same number.
- Please refer to “5.7.1.1 When you use SPI of inspection machine from other companies” for details.

* Target inspection machines need to satisfy the requirements of our specifications. For details, please contact us.
* A dedicated PC needs to be placed between the inspection machine from other company and FA PC (LNB).
  Please prepare a PC, a HUB and LAN cables by customers.
* 03015 components are not eligible.

Customer

APC system ready (License)

- This is required when using “Interface software (License) of inspection machine from other companies”.
- This option is required per NPM-W2 that receives APC-FF offset data.

C-19	To maintain placement quality by using the AOI measurement data of mounting process.

Customer

APC-MFB2 system ready (License)

- APC-MFB, based on the results of AOI, compensates for the discrepancy between component mounting coordinates and the actual mounting position to maintain the accuracy of an initial mounting to achieve stable mounting quality.
- Divided into categories focusing on nozzles, feeders, components, and mounting positions, the results of AOI inspection is presented as a process capability index. This is helpful for process variation management and appropriate response when the process varies.
- This option is required per NPM-W2 that receives APC-MFB offset data.
- This option supports NPM X/ NPM series.
- Please refer to”5.7.2 APC-MFB system” for details.

C-20	To change to dispensing head.

Customer By table

Spare dispensing head

Customer

Dispense nozzle

- For information about the dispense nozzle types, please refer to “4.3 Dispense Nozzle Configuration.”
- For information about the special nozzles, please contact us.
- This is exclusively for NPM-W2/ W, NPM-D3/ D2/ D and NPM.

Customer By table

Spare dummy dispensing unit
Spare wiping station

- You may need to exchange the bracket when install the wiping station in the existing NPM-W*.
  Please contact us for details.

* Applicable: NPM-W with the serial No. 1C7V0517 or earlier

Customer By table

Safety cover: Front side
Safety cover: Rear side (Feeder cart specification)

* This is exclusively for NPM-W2

Customer

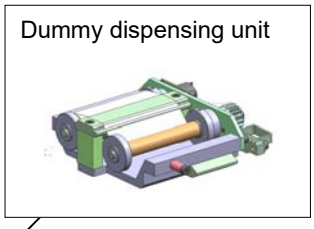
Jig kit for accuracy verification

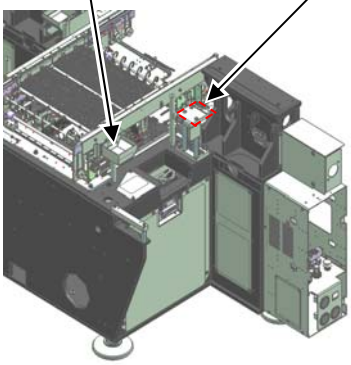
- It is a set of the calibration nozzle and the PCB for accuracy verification.
- It is necessary in purchasing the first machine.

Customer

Spare screw unit

- Two pieces are accompanied to dispensing head. Please select when needed additionally.
- It allows you to continue production even while cleaning a screw unit.





Head case

- Please be sure to select the safety cover. (Not required when Feeder cart is attached.)
- Head case is accompanied to spare dispensing head.

* The safety cover cannot be attached when the independent changeover support unit is installed in the table.
  Please mount the feeder cart.

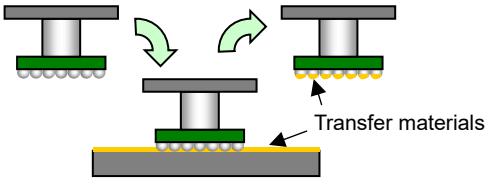
C-21	To perform transfer.

Customer

Multi-functional transfer unit

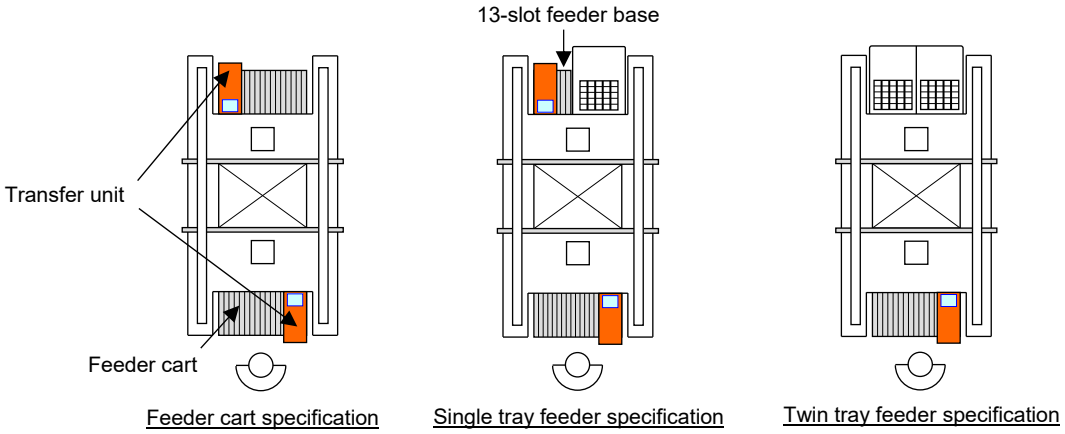
1. Outline

The multi-functional transfer unit is a device to form the coating of transfer materials in the process, such as PoP top package mounting, requiring transfer of flux etc.
The transfer process will be done when a component picked up by the placement machine is pressed against the coating formed by this unit.



2. Features

The squeegee gap is programmable for each chip data. This makes it available to finely select the coating thickness to be transferred according to the size of bumps. (Programmable squeegee gap)
This unit can be installed on the feeder cart and 13-slot feeder base in the same way as that of the intelligent tape feeder.
The feeder address numbers 23 to 30 (8 slots) are occupied.



3. Specifications

Item	Specifications
Electric source	DC 24 V (to be supplied from main body)
Outside dimension	W 165 × D 676 × H 285 mm
Mass	21 kg (including 1 kg of a transfer table)
Environmental condition	Temperature: 20 °C ~ 30 °C (coating-formable temperature*) Humidity: 25 %RH ~ 75 %RH (No condensation)
Exportation/Storage conditions	Temperature: -20 °C ~ 60 °C Humidity: 75 %RH or below (No condensation)

* If the temperature range of target transfer materials is narrower than the above range, the former range should be followed.

4. Availability of transfers based on the feeding method of applicable components

	Applicable head	
	8-nozzle head (Lightweight type)	3-nozzle head V2
Feeding method	Taping and tray*	
Component dimension	~ 20 × 20 mm	~ L40 × W30 mm
Applicable component	BGA, CSP	

* Components supplied by the tray can be supported only for the single tray feeder specification.

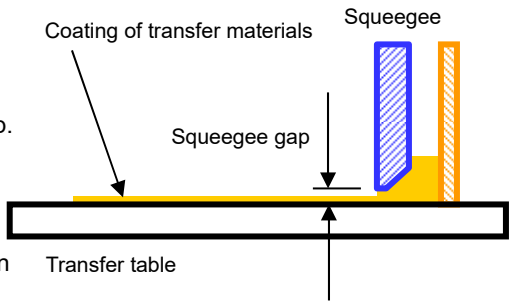
5. Automatic supply of transfer materials

The multi-functional transfer unit has a function to supply transfer materials automatically.
This function is used by specifying the supply frequency parameter. The amount of one supply can be adjusted by specifying the parameter of the discharging time from syringe.
We recommend “Automatic supply” as a supply method of the transfer materials. (“Automatic supply” makes the amount of use of the transfer material a minimum.) To use this function, the optional air supply unit needs to be installed on the feeder cart on which the multi-functional transfer unit is installed. (For 13-slot feeder base, the air supply unit for a feeder is included.)
To use this function, the materials should be set in the multi-functional transfer unit while being encapsulated in the MUSASHI-ENGINEERING-manufactured φ26 mm syringe (PSY-30E, PSY-50E, PSY-70E, etc.) or its equivalent*.
The customer needs to specify that when purchasing from a materials manufacturer, or to prepare the syringe by yourself and refill it.

* Equivalent: The one that can be used in combination with the MUSASHI-ENGINEERING-manufactured adapter tube AT50-E.
The one that can be used in combination with the MUSASHI-ENGINEERING-manufactured joint J-R-3.

6. Programmable squeegee gap

The multi-functional transfer unit determines the coating thickness of transfer materials by controlling the gap (space) between the transfer table forming the coating of transfer materials and the squeegee smoothing them.
This space is called a squeegee gap, and programmable for each chip.
The setting range is as follows.



Squeegee gap setting range: 0.015 mm to 0.35 mm

The thickness of the coating to be actually formed varies depending on transfer materials; however, it is generally 50 % to 70 % of the squeegee gap.

Coating-formable materials verified
- By Panasonic MSP511 Flux, MSP513 Flux
- By Indium TACFlux023 (Flux)
- By Senju Metal Industry M705-TVA03.9-F (Solder paste for transfer)

* These materials should not be viewed as our recommendation.

The multi-functional transfer unit does not guarantee to form the coating of every transfer material. It may not be able to form the coating of even the coating-formable materials verified above, depending on their storage condition, replacement frequency, and so on.

7. Transfer materials

As for the usage of transfer materials, the specifications and instruction manuals provided from their respective manufacturers should be followed. And also, it is necessary to obtain the chemical substances safety data sheets (MSDS) of the transfer materials, and follow their descriptions.

8. Transportation and carry

The mass of the multi-functional transfer unit is 21 kg.
As to the transportation and carry, the precautions described in the instruction manuals should be followed.

* This option is compatible with AM100, CM602, CM101, and NPM series.

Customer

Coating thickness gauge (0 µm to 250 µm, in 10 µm increments)
Coating thickness gauge (0 µm to 500 µm, in 20 µm increments)

- This is the gauge for measuring the thickness of the coating formed by the multi-functional transfer unit.
- Please select the one with the appropriate measurement range.
- Recommended manufacturer and type

Manufacturer	Type (identical)
Sanko Electronic Laboratory Co., Ltd. (in Japan)	234R/Ⅳ: 0 µm - 250 µm (10 µm) 234R/Ⅴ: 0 µm - 500 µm (20 µm)
ERICHSEN (outside Japan)	

* This option is compatible with AM100, CM602, CM101, and NPM series.

On-site By table

Air supply unit for the feeder

- It is necessary when using the automated transfer material supply function.
(For 13-slot feeder base, the “Air supply unit for the feeder” is included.)

C-22	To enable remote operation

On-site

Remote operation option

- Remote operation function allows centralized collection of errors generated in the machines and offers remote-controlled recovery, reducing error recovery time and contributing to efficient capacity utilization and labor-saving.
- This provides a system where it detects errors when they occur and allows remote-controlled recover. This centralized recovery system helps reduce “the need for operators to notice errors” and “the travel time to the targeted error machine, thereby reducing error recovery time.
- For details, see”5.13 Remote operation”.

C-23	To login to a machine using biometric information

On-site

Biometric authentication(License)

- Biometric authentication uses biometric information and enables login to a machine.
  （Helps improve security; preventing to someone from steeling passwords and preventing passwords to be shared）
- For details, see ”5.14 Biometric authentication”.

C-24 To keep the placement push-in load of the lightweight 16-nozzle head constant

On-site

16-nozzle head constant mount load control (Lightweight type) (License)

1. Overview

This function keeps the placement push-in load of the lightweight 16-nozzle head constant.

2. Features

Keeps the push in the load constant by controlling the motor current of the Z axis.
This provides the stable mounting without over-pushing the board even when the board has upward warp.

3. Specifications

Item	Specification
Placement load (N)	≤ 1.0 N
Productivity	This function does not decrease the productivity
Setting method	- Setting for each table is possible.

4. Reference information

This function controls the push in load.
Use “Placement 2-head Down” in the standard function together when you want to control the contact load of the board.

C-25 To enable bonding involving paste transfer with lightweight 16-nozzle head

On-site

16-nozzle head transfer (Lightweight type) (License)

1. Overview

It enables transfer operation even with a lightweight 16 nozzle transfer head.

2. Features

It increased the production efficiency by making the transfer operation possible of using the lightweight 16 nozzle transfer head.

3. Specifications

Item	Specification
Applicable components	Dimensions: Up to 6x6 mm Thickness: Max. 3 mm
Required condition	The top surface of component picked up by the nozzle must be flat and larger than the pickup nozzle. * However, some restrictions are placed by the transfer process condition.

C-26	To measure the push-in load or impact load during placement and display the results on the monitor of the machine or on the LNB

Factory

Load checker

1. Overview

This function measures the “push-in load” of the placement head and displays the results on the monitor of the machine or on the LNB.

2. Definition of loads

Impact load: The load that occurs momentarily when the nozzle touches the load cell during placement.
Push-in load: The load that occurs when the nozzle is pushed onto the load cell by 0.3 mm.

3. Main features

Item	Specification
Push-in load measurement	Measures the push-in load of the placement head nozzle by the load checker during maintenance or production, and displays the results on the screen of the machine or on the LNB. * Push-in load measurement: Placement 100% and Place gap 0.3 mm * Measured load is expressed as the deviation from the standard value.
Measured push-in load judgment	(1) Load Warning Range Displays a warning message if the measured load exceeds the preset range. Measurement range: ±0 ~ 3,000% (Default: ±40%)
	(2) Load NG Range Displays ”NG” if the measured load exceeds the preset range. The axis detected as NG will be set as ”Bad nozzle” automatically. Measurement range: ±0 ~ 3,000% (Default: ±60%) * Set a value greater than “Load Warning Range”.
Stop production if push-in load is NG	Stops production if “NG” is detected in the loads measured during production.
Measure push-in load storage	Stores the push-in loads measured during maintenance or production to be stored in the LNB for 30 days so that they may be checked as necessary.
Applicable heads	Lightweight 16-nozzle head, 12-nozzle head, lightweight 8-nozzle head * Multifunctional head are not supported.
Requirements of applicable nozzles	- Nozzle tip size: ≤ 4.0x4.0 mm (Tx, Ty in nozzle library) - Total nozzle length: 13.8 mm (TUPH in nozzle library) * Nozzles with non-flat end is not supported. (Special nozzle, bad nozzle, etc.)
Load display	Represents the measured push-in load as the deviation from the standard value in percent. Least increments: 0.1%
Push-in load Measurement count	Sets how many times push-in load is to be measured per nozzle axis. 1 ~ 9 times per nozzle * Default: 3 times
Load measuring interval by board count	Sets the interval of push-in load measurement during production in terms of board count. 0 ~ 9,999 pcs. * Default: 0
Push-in load measure-ment accuracy	≤ ±0.2 N (Common to all heads)
Load checker calibration time	≤ 15 s per head (Common to all heads)
Push-in load measurement time	Lightweight 16-nozzle head: ≤ 40 s 12-nozzle head: ≤ 30 s Lightweight 8-nozzle head: ≤ 20 s

C-27	To recognize the characters or 2D codes on the surface of a component before picking it up from the tray or tape feeder

Factory

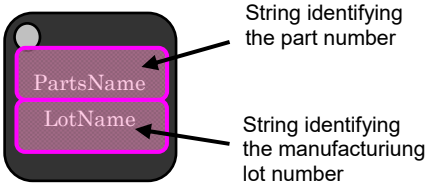
Pre-pickup Inspection (Char/2D) (License)

1. Overview

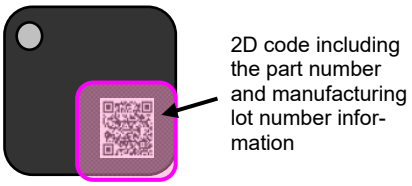
Recognizes the characters or 2D code on the surface of a component captured by the head camera immediately before picking it up from the tray or tape feeder, in order to prevent possible misloading and to support traceability.

Misloading prevention	Recognizes the part number to detect any wrong number, thus preventing wrong model from being produced.
Traceability support	Recognizes the manufacturing lot number to Help ensure traceability.

Character recognition



2D code recognition

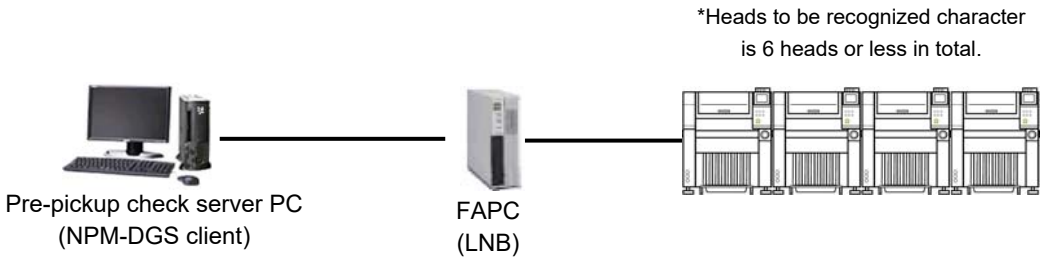


2. System configuration

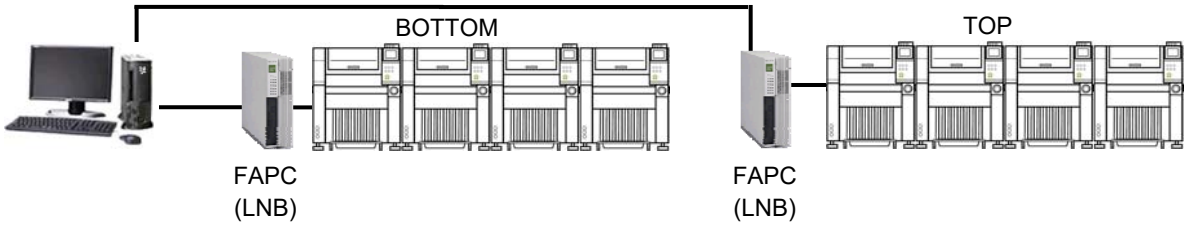
Recognition images are captured by the machine, and characters or 2D codes are recognized by the pre-pickup check server PC.
Pre-pickup check PC is to be connected to one line (1 FA PC). (Recommended*1)
Besides, the pre-pickup check server PC can also be served as NPM-DGS client PC.)

System configuration example

1. When check server PC is connected to one line



2. When check server PCs are connected to two line



*1 The following conditions should be met.
- Heads to be checked connectable to 1 check PC should be 6 heads or less in total.
- FA PC (LNB) connectable to 1 check server PC should be 2 FA PCs (2 lines) or less in total.

C-27	To recognize the characters or 2D codes on the surface of a component before picking it up from the tray or tape feeder

Factory

Pre-pickup Inspection (Char/2D) (License)

3. Function list

Item	Specification
Component verification (Misloading prevention)	Recognizes the string identifying the part number in the characters or 2D code in the preset area on the surface of the component, and compares it with the preset string to detect any wrong number.
Trace check (Traceability support)	Recognizes the string identifying the manufacturing lot number in the characters or 2D code in the preset area on the surface of the component.*1
Setting when to check	Selectable from among “First component”, “All components”, and “Specified interval”. Feeders capable of detecting the joint of taper components can perform component inspection of the joint position.
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, replace it, or change it to a correct one, and make check again.

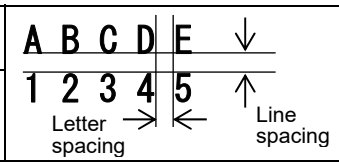
*1: Manufacturing lot numbers can be traced and managed by PanaCIM-EE. Contact us for details.

C-27	To recognize the characters or 2D codes on the surface of a component before picking it up from the tray or tape feeder

Factory

Pre-pickup Inspection (Char/2D) (License)

4. Basic specifications

Item			Description	
Applicable components			Tray components, Tape feeder components	
Verifiable characters			Max. 30 characters	
Traceable characters			Max. 30 characters	
Inspection processing time*1 (component verification) +Trace check)	1 FOV		1.5 s or less	
	4FOV		2.5 s or less	
Recognition requirements *2				
Characters	Recommended fonts		Sans-serif *3 * Italic, dotted, and underlined characters are not supported.	
	Applicable characters		Numbers (0-9), upper-case (A-Z) and lower-case (a-z) letters * Following lower-case letters are not supported: "I", "j". "l"	
	Printing conditions	Printing method	Laser marking	
		Sizes (Width x Height)	≥ 0.5 x 0.8 mm	
		Letter thickness	≥ 0.1 mm	
		Letter spacing	≥0.1 mm	
		Line spacing	≥ 0.1 mm	
2D code	Applicable codes		QR code, Micro QR code、Data Matrix (ECC200)	
	Printing conditions	Printing method	Laser marking	
		Cell size	≥ 0.15 mm	

*1: Inspection processing time may vary due to the following situations
1) Communication load on network
2) Running state of other applications on check server PC

*2: Recognition performance may decrease due to the following reasons:
1) Dirt, scratches, or foreign matter on the surface of the component.
2) Printing defects such as fading or dropouts
3) Captured image affected by the use environment of equipment, pocket shape design, etc.
4) Number of characters is fixed and similar letters may be printed on the same position:
(For example, letter "O" and number "0")

*3: Fonts have not been defined clearly since there are many similar fonts, and original fonts by laser marker manufacturers also exist.
The proven samples of recognizable fonts are shown below for your reference.

We can evaluate the recognizability of fonts in advance. Contact us for details.

C-27	To recognize the characters or 2D codes on the surface of a component before picking it up from the tray or tape feeder

Factory

Pre-pickup Inspection (Char/2D) (License)

5. Basic configuration

Item	Description
Head camera LED light 2 	LED lighting for the head camera provided with additional LED for recognizing characters or 2D codes.
Tray feeder installation kit	Adjust bolt dedicated for pre-pickup check (Character・2D recognition) Installation of the tray feeder uses adjust bolt.
Pre-pickup check (character/2D code recognition) license	License is required machine by machine.
Pre-pickup check server PC	PC used to run the pre-pickup check server software for polarity recognition. Hardware and software specification comply with those of the NPM-DGS. * To be prepared by the customer. * Can also be served as NPM-DGS client PC (Recommended). Note that it cannot be used as NPM-DGS server PC.
Image processing software license	License required to use the image processing software for character/2D code recognition. Must be installed on the pre-pickup check server PC. Insert the included USB dongle into the USB port to enable recognition. * Please purchase one license for the major equipment of the line.

C-28	To recognize the lead pins of the leaded components to be inserted

Factory

Multi-recognition camera PIP lighting

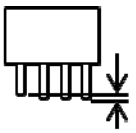
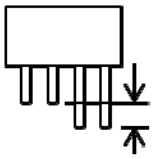
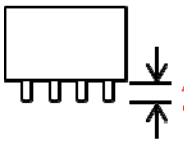
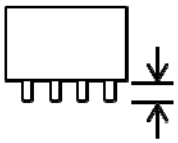
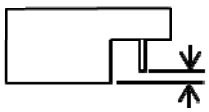
1. Overview

Multi-recognition camera PIP lighting is intended to be used for recognizing only the lead pins of the leaded components to be inserted.
Multi-recognition camera PIP lighting is for 3-nozzle head V2.

2. Main functions

Item	Specification
PIP lighting	Used to extract/recognize only the inserted leads by concentrating the light.
Side lighting	Used when recognizing the solder balls on BGA / CSP (equivalent to existing side lighting).

3. Basic specifications

Item		Description
Component conditions	Overall dimensions	Depend on the placement head used.
	Lead pitch	≥ 0.5 mm
	Lead sizes	≥ 0.2 x 0.65 mm
	No. of leads/ group	Lead group: Max. 32 groups per component No. of leads: Max. 255 leads per group
	Difference in lead length	≤ ±0.5 mm (Example) In-spec.: ≤ 0.5 mm  ≤ 0.5 mm Off-spec.: > 0.5 mm  > 0.5 mm
	Lead protrusion	≥ 2.0 mm (Example) In-spec.: ≥ 2.0 mm  ≥ 2 mm Off-spec.: < 2.0 mm  < 2 mm  Must be higher than bottom of body
	Lead tip	Must have an inclined part (chamfered).
	Lead material	Metallic

NOTE
Dedicated jig is required for luminosity calibration.
Part name: Luminosity calibration jig for PIP lighting unit

C-29	To reduce the time required for checking the positions judged as NG by AOI

On-site

AOI info display function (License)

1. Overview

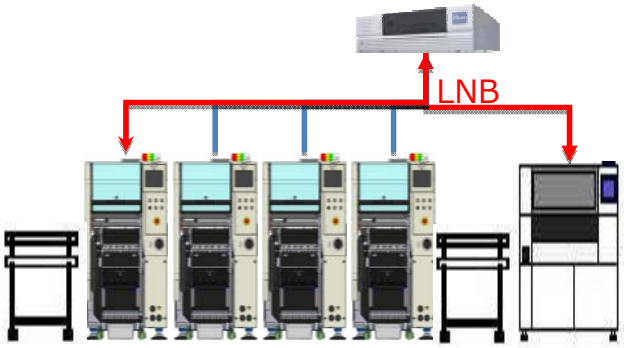
This function provides automatic two-way information display between the AOI and mounters (NPM).
It automatically identifies the NG positions so as to save labor.

* Effect 1: Reduce the time required after NG judgment by AOI until feeder positions are identified.
* Effect 2: Allows the feeder positions to be identified even by operators with less NPM/DGS skills.

2. System Configuration

AOI exchanges information with the mounters (NPM) through communication via the LNB.

System configuration example



3. Main functions

Item	Specification
Displaying NPM information on AOI	Displays the information on the NG component feeder position information automatically on the AOI screen if inspection NG has occurred. Display example: Machine No., Feeder address, Nozzle No. * Displayed information differs with the inspection machine manufacturer.
Displaying AOI information on NPM	Notifies the AOI information with the inspection image to the NPM that mounted the component concerned through the operation via the AOI screen. At this time, a warning message is displayed on the NPM, and information can be checked while continuing production.

C-30	To see whether electrical properties of components is within a predefined range before they are going to be mounted

On-site

LCR checker (Feeder shaped type) (License)

・For details, refer to ”5.16 LCR checker (Feeder shape type).

On-site

LCR checker (Built-in type)

1. Common specifications between Feeder-shaped type LCR checker and Built-in type LCR checker

・Checks electrical properties of chip components and judges whether they are within the specified limits.
・When judged as NG components, productions will go in to error stop to prevent error mounting.
・This function detects and prevent erroneous picking up of chip components that shape recognition cannot detect; the shape of chip components is the same but are different. (effective to reduce error mounting due to improper chip components being set on feeders)

2. Comparing main points between Feeder-shaped type LCR checker and Built-in type LCR checker

Items	Feeder-shaped type LCR checker	Built-in type LCR checker
Component size	0603 ~ 3216 , thickness is up to 1.5 mm	0402 ~ □6.0 mm, thickness is up to 5.0 mm
Type and property range	Resistance : 10 Ω ～ 100 MΩ Condenser : 10 pF ～ 100 μF Inductor : 1 μH ～ 47 μH	Resistance : 0 Ω ～ 100 MΩ Condenser : 1 pF ～ 100 μF Inductor : 4.7 nH ～ 1 mH Diode : 0 V ～ 3.4 V ※ Polarity evaluation only
Occupied slots(Feeder cart)	1 slot	None
License	Need	No Need

・For details, refer to”4.8 LCR Checker (Built-in type)”.

C-31	To do simple check before reflow of how shield components are mounted

Customer

Mount complete position recognition (License)

・Measures the brightness of two areas of shielded components with a head camera and detect improper mountings from brightness.
When detected an improper mounting, machine gets into single stop state.
(Detection of improperly mounted shield components before reflow process reduces repair time)
・For details, see “5.15.1 Mount complete position recognition function”.

C-32	To prevent improper mounting because of wrong component setting

Customer

Mount complete position recognition (License)

・Checks shield case warping with the machine. When detected components as warping, the components become disposal.
（Prevent improper shield components from being mounted）
・For details, see “5.15.2 Shield case warping inspection function before mounting”.

C-33	To connect the factory-side plumbing to equipment to enable primary air connecting

Customer

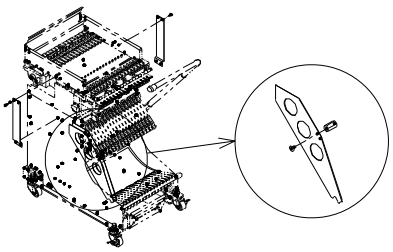
Primary air hose unit

・Primary air hose unit is used for primary air connecting where factory-side plumbing is connected to equipment.

C-34	To use large reels

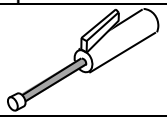
Customer

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 Greasing set	Greasing the specified parts of machine	Grease gun Nozzle 	Common with NPM series, AM100, CM602, CM402, CM401, CM400, DT401, DT400, CM232, CM212 and CM101.
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.

Customer

Nozzle holder cleaning jig: For 16-nozzle head*1
Nozzle holder cleaning jig: For 12-/ 8-nozzle head*2

・ A set of nozzle holder cleaning jigs is required per line. Please select according to head configuration.

*1 Exclusive to NPM series.
*2 Common to 12-/ LS 8-nozzle head for the CM series. (Not available for High-flexibility head (8-nozzle)).

Nozzle holder cleaning jig	Applicable head				Diameter of hole and shaft
	NPM series	CM602-L	CM101-D	CM232-M	
For 16-nozzle head	Lightweight 16/ 16				φ2 mm
For 12-/ 8-nozzle head	12/ 8	12/ LS 8	12/ LS 8	12	φ3 mm

D-2 To calibrate as needed.

・Placement head jig kits for various adjustments.
・They are all shared with NPM-D3/ D2/ D and NPM-TT2/ TT, except for plane calibration jig

Option name	Usage	Description	Recommended set		
			Recommended	Calibration after Head exchange	All calibration
Customer (1) Jig kit for accuracy verification	For teaching placement position of chip component and for verifying accuracy	Placement position teaching jig (Glass PCB, Jig chip parts)	(1)	(1) + (2)	(1) + (2) + (3) + (4)
	For teaching placement position of QFP placement and for verifying accuracy	Jig parts, Jig parts supplier, Jig parts supply pallet, Nozzle for each Head (153AS × 2, 153 × 2, 184 × 2, 1001 × 2, 1003 × 2)			
Customer (2) Jig kit for standard calibration	For calibration in changing Heads	Jig station, Jig parts			
	For pickup position calibration	Pickup position height teaching jig			
Customer (3) Jig kit for adjusting the main body	For placement height calibration	Placement height jig (not used with NPM-W2)			
	For line-camera-related calibration	Line camera jig			
	For placement load calibration	Placement load measuring jig			
Customer (4) Plane calibration jig	For plane calibration	Common with NPM-W, AM100			

The following nozzles are separately needed for placement position teaching. (requisite minimum number)

	For jig chip (1005) calibration (required)		For 0402R calibration (recommended)*2	
16-nozzle head	230CS (or 230CSN) nozzle	16 pcs./ head	256CS (or 256CSN) nozzle	16 pcs./ head
12-nozzle head		12 pcs./ head		12 pcs./ head
8-nozzle head	230C (or 230CN) nozzle	8 pcs./ head	256C (or 256CN) nozzle	8 pcs./ head
3-nozzle head	1001 (or 1001N) nozzle*1	3 pcs./ head		

*1 1001 nozzles (2 pcs.) are included with (1) jig kit for accuracy verification.
*2 For 0402 chip placement, tape feeder for 0402 or thin type tape feeder is required.

・The following carry case is included in each jig kit.

Case for jig kit for accuracy verification

Case for standard calibration jig kit

Case for jig kit for adjusting the main body

D-3 Required for exchanging/removing the Head.

Option name	Usage	Description
Customer Unit exchanging tool	Replacement or removal of head unit	Torque wrench Long bit

・This is exclusively for NPM series.

D-4	To maintain the nozzle head automatically.

Customer

Head maintenance unit

1. Summary

Attachment / Detachment of nozzle holder & cleaning and inspection of spline shaft can be done automatically by this unit.

Not only reducing man-hours, but also eliminating inconsistent manual maintenance, the consistency of mounting quality can be controlled.

This unit is Installed on feeder cart of NPM- Series, or 13-slot feeder base. (Use the 8-slot right edge)

* When target head is 8-nozzle head, you need to select the Side lighting option.

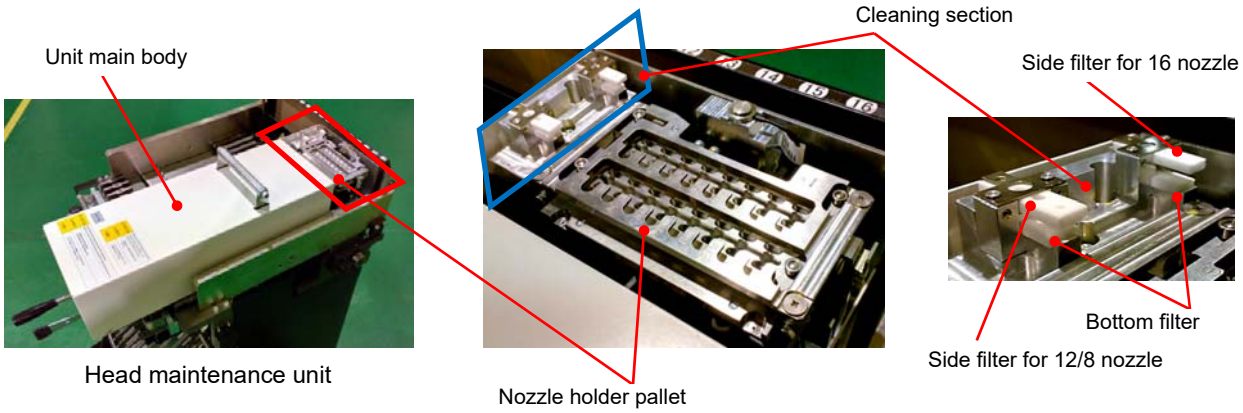
2. Specifications

Item	Specification
Mountable Model	NPM-W2S/ W2/W, NPM-D3/D2/D, NPM-TT2/ TT *1
Target Head	16-/ 12-/ 8-nozzle head
Function	①Nozzle holder attachment / detachment*2 ②Nozzle holder shaft cleaning ③Nozzle holder shaft bending inspection ④Nozzle holder sliding inspection
Operation Mode	・Full inspection mode ・Function selection mode (Individual execution ① ~ ④)
Operation Time	・16-nozzle head (Full inspection model): About 10 min. / 1 head
External Dimensions	W 166 × D 640 × H 240 mm
Weight	About 9 kg
Electric Source	DC 24 V (Supply form main body)
Pneumatic Source	Supply form main body*3
Environment	Temperature: 10 ℃ ~ 35 ℃ (No condensation)
Accessory	・Nozzle holder pallet × 1 ・Side filter for 16-nozzle head × 30 ・Side filter for 12-/ 8-nozzle head × 30 ・Bottom filter × 30

*1 When Install the head maintenance unit on an existing line, may need to update the software of equipment, NPM-DGS(Data generation system), LNB(Line Network Box) and so on. Please consult us separately for details.

*2 Nozzle holder cleaning cannot be performed.
If the nozzle holder of 12/8 nozzle head is N610067607AD or before, will be available by exchange to N610067607AE or later.

*3 When using this unit on a “30-slot feeder car with the air supply unit for feeder” or “13-slot feeder base”,
The “Air supply connection kit(option)” is required.



3. Important Points

・When recovery from an error during operation, must make a visual confirmation before continuing the operation.

D-4 To maintain the nozzle head automatically.

On-site

Air supply connection kit

・This air supply connection kit is used for feeder cart.
・Please refer to the following information and select the kit for each cart.

■ When using this unit on the feeder cart without an “Air supply unit for feeder”*

Item name	Item No.	Remodeling target
Air supply connection kit （For 30 slot feeder cart）	N610167970AA	30 slot feeder cart

・This option is used for feeder cart remodeling.
・The removability of air supply section can be improved after remodeling by this option.

■ When using this unit on the feeder cart with an “Air supply unit for feeder”*

Item name	Item No.	Remodeling target
Air supply connection kit （With the air supply unit for feeder：30 slot）	MTKA001661AA	30 slot feeder cart
Air supply connection kit （For 13-slot feeder base）	N610167971AA	13-slot feeder base

・This option is used for the remodeling of feeder cart and feeder base.
・When using this unit on the feeder cart and feeder base which with an “Air supply unit for feeder”, will need this option to remodel.

* The “Air supply unit for feeder” is a supply port to supply air from a feeder cart or feeder base to bulk feeders, stamp unit and etc..

Customer

Additional cleaning filter
① Side filter : for 16-nozzle head (100 pcs./1 set)
② Side filter : for 12-/ 8-nozzle head (100 pcs./1 set)
③ Bottom filter (100 pcs./1 set)

・Side filter is used for side cleaning of spline shaft.
(Each filter can be used to clean 2 heads.)
・Bottom filter is used for tip cleaning of spline shaft.
(Each filter can be used to clean 4 heads.)

Customer

Additional nozzle holder pallet

・It is a palette for the nozzle holder storage.
By setting up the clean nozzle holders, you can exchange them by a palette.

D-5	To splice the parts tape automatically

Customer

Automatic tape splicing unit (Model ID : ATSU Model No: NM-EJW7A)

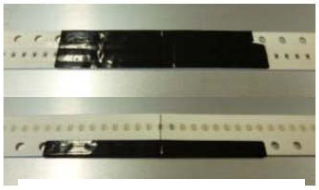
1. Summary

This unit can splice 8 mm tape automatically.
By eliminating inconsistent manual splicing, this can avoid the low pick up rate and can suppress cuts or out of line of splicing areas. As a result, the operation efficiency can be enhanced.

2. Specifications

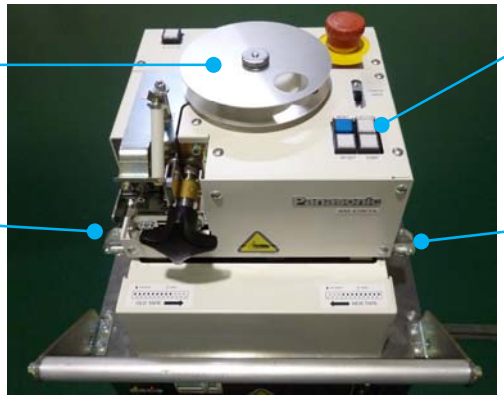
Item	Specification
Applicable tape	8 mm Paper/ Embossed *1
Splicing tape	Common to Paper/ Embossed (This unit only)
Empty pockets of splice junction	・8mm × 4P(Paper/Embossed)= 4pocket *2 ・8mm × 2P(Paper/Embossed)= 8～9 pockets
Operation Time	・Paper tape/ Embossed tape About 10 sec
External Dimensions	W 500 × D 500 × H 1 160 mm
Weight	Approx. 45 kg (Without battery)
Electric Source	DC12 V (Lead–acid battery) Continuous working time: About 16～20hours (With 2 batteries) *3
Environment	Temperature: 10 ℃ ~ 35 ℃ (No condensation)
Accessory	・Splicing tape (500 pcs./reel) × 1 pc. ・Battery box × 2 pcs. (Including 2 connection cables) ・Charging terminal × 2 pcs. ・Rubbish box × 1 pcs. ・Tape cutting jig × 1 pc
Main body operation (Setting)	Splicing part Recommended setting available

Automatic tape splicing unit



Paper tape complete example

*1) 8 mm × 1P （Paper）: Prior confirmation will be needed.
*2) Empty pockets in 8mm × 4P can become zero by changing pretreatment conditions
*3) This is estimated time in the situation where 28Ah deep cycle battery is used. Working time may vary depending on battery's capacity.



Embossed tape complete example

Splicing tape

3. Important Points

・Exclusive splicing tape required. (Can purchase the splicing tape from the maker directly)
・We recommend to treat the [parts tape cut blade] and the [splicing tape cut blade] as service parts.
Our servicemen will do the replacement work.

Customer

Splicing tape (500 pcs./reel)
Battery box (Including connection cable)
Charging terminal
Rubbish box
Tape cutting jig

D-5	To splice the parts tape automatically

Customer

Battery・Charger

1. Summary

Battery and charger are prepared by customers.
Specifications are as the table below.

2. Battery specification

Item	Specification
Type	Lead–acid battery
Nominal Voltage	DC 12V
Nominal Capacity	More than 20 Ah (Recommended capacity is 25Ah or more) *1 *2
External Dimensions	W 185 mm or less × D 125 mm or less × H 175 mm or less
Weight	Below 10 kg
Battery Type	Deep cycle battery (For EV)
Cycle Durability （Charge1 time/Discharge1 time）	More than 300 cycles*1
Terminal Shape	Screw (M5) *3
Others	Maintenance free*1

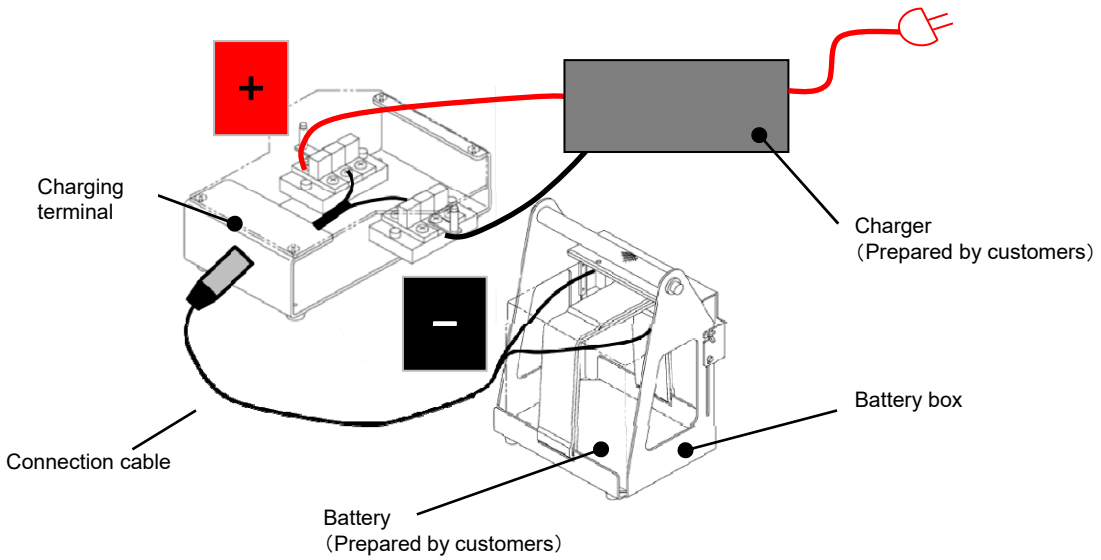
*1 Recommendation, not necessary.
*2 Time to run on one time charge becomes shorter though it runs on 12Ah capacity battery.
*3 The terminal shape of connection cable on Battery box is M5 Ring Terminal. Please make sure the battery is available.

3. Charger specification

Item	Specification
Specification	Adapted to the battery above. Maximum current should be 10A or less when using charging terminal.*4
Others	With protective functions (Reverse-connection protection, Overcharge protection)

*4 Do not use the charging terminal when maximum current is more than 10A, causing the damage of the cable.

4. Constitution （Battery charging）



D-6	To maintain the tape feeder automatically.

Customer

Feeder maintenance unit (Model ID : IFMU Model No. : NM-EJW8A)

1. Overview

This unit is able to maintain the intelligent feeder and to calibrate the pickup position automatically.
You can do the inspections are the same as our shipment inspections for quality control.

2. Specifications

Item	Specifications						
Applicable feeder	8 mm W~ 72 mm (including deep groove) ※8 mm single tape feeder, 88 mm tape feeder, 104 mm tape feeder, 8mm double tape feeder and 12/16 mm tape feeder manufactured before 2004 are not included.						
Function	Feeder / Item	Tape width(mm)					
		8W	12/ 16	24/32	44/ 56	72	
	Motor torque inspection※1	○	○	○	○	○	
	Accuracy measurement of tape feeding (X・Y)※2	○	○	○	○	○	
	Height detection of tape hold cover※3	○	—	—	—	—	
	Clear the maintenance calculation※4	○	○	○	○	○	
	Inspection results storage※5	○	○	○	○	○	
	Adjustment support of pickup position in X direction※6	○	○	○	○	○	
	Switch & I/O inspection※7	○	○	○	○	○	
	Feeder firmware update※8	○	○	○	○	○	
Number of attachable feeder	Up to 10 tape feeders (It is possible to attach different types.) 8 mmW：10 feeders 12/ 16 mm：10 feeders 44/ 54mm：3 feeders 24/ 32mm：5 feeders 72mm：2 feeders						
Operating time	Up to 60 sec / tape feeder						
Dimensions	W 769±5mm × D720±5mm × H 1 407±5 mm(without feeder & safety cover)						
Mass	Approx. 155 kg (without feeder)						
Electric Source	Single-phase, AC 100 V ~ 240 V 50/ 60 Hz ※The power cable (Inlet type) should be prepared by customer. ※ Please use the power plug which measure up to the specification of "AC plug (IEC 60320 C13: 10 A/ 250 V)".						
Pneumatic Source	Supply air pressure	0.5 MPa ～ 0.8 MPa					
	Supply air amount	15 L/min (A.N.R.)					
	Please install moisture and oil separators on the compressor to ensure the supply of cleaned, dried and compressed air.						
Environment	Temperature: 10 ℃ ~ 35 ℃(No condensation)						

※1 A function to determine the quality by confirming motor torque.
※2 A function to measure accuracy verification of sprocket pin (X,Y), and register the offset of start point.
※3 A function to detect the height of tape hold cover.
※4 A function to clear the maintenance calculation.
※5 A function to store the comprehensive judgment and detailed results in feeder memory or PC hard disk.
※6 A function to support the adjustment of pickup position in X direction.
It is a manual adjustment by using the tool.
※7 A function to inspect the sensor, operating switch, LED, etc..
Sensor & Operating switch are manual inspection.
The NG results will be stored in feeder memory or PC hard disk.
※8 A function to update the feeder firmware.

3. Notice

・ Please use the master jig (option) to adjust the offset of starting point regularly.

D-6	To maintain the tape feeder automatically.

Customer

Master jig

To customers who are going to buy the IFMU (Feeder maintenance unit) :
This unit requires a master jig for calibration (a regular offset adjustment of start point).

- The Item No. of master jig is MTKA008066AA.
- If you have an IFCU (Intelligent Feeder Check Unit), only need to buy a remodeling kit (MTKA007514AA).

(The case when you are using a master jig which Item No. is N610005354AA or N610005354AB)

D-6	To maintain the tape feeder automatically

Customer

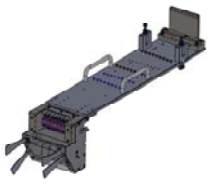
Attachment for thin type single feeder

Required for thin type single feeder and ALF.

1. Specifications

Item	Specifications					
Applicable feeder	When selecting thin type single tape feeder options : 8/4 ㎜ thin type single tape feeder, ALF(Auto Load Feeder)					
Number of attachable feeder	For thin type single tape feeders, up to 8 / (16) feeders ※When installing 1 / (2) pcs of attachment ※ It is possible to attach different types.					
Function	Feeder / Item	Tape width (mm)				
		8mm Thin type	4mm Thin type	ALF		
	Motor torque inspection※1	○	○	○		
	Accuracy measurement of tape feeding(X,Y)※2	○	○	○		
	Height detection of tape hold cover※3	○	○	○		
	Clear the maintenance calculation ※4	○	○	○		
	Inspection results storage※5	○	○	○		
	Adjustment support of pickup position in X direction※6	○	○	○		
	Switch & I/O inspection※7	○	○	○※8		
	Feeder firmware update ※9	○	○	○		
	※1 A function to determine the quality by confirming motor torque. When feeder is thin type single tape feeder, quality determination by current is performed. ※2 A function to measure accuracy verification of sprocket pin (X,Y), and register the offset of starting point. ※3 A function to detect the height of tape hold cover. ※4 A function to clear the maintenance calculation. ※5 A function to store the comprehensive judgment and detailed results in feeder memory or PC hard disk. ※6 A function to support the adjustment of pickup position in X direction. It is a manual adjustment by using the tool ※7 A function to inspect the sensor, operating switch, LED, etc.. Sensor & Operating switch are manual inspection. The NG results will be stored in feeder memory or PC hard disk. ※8 ALF inspection uses two rolls of jig tapes ※9 A function to update the feeder firmware.					
Operating time	Up to 60 sec / tape feeder(8 mm thin type single tape feeder, ALF) Up to 90 sec / tape feeder(4 mm thin tape single tape feeder)					

・If you have unsupported IFMU (Feeder Maintenance Unit) which does not support thin type single feeder, remodeling to support thin type single feeder and ALF is required. Please contact us.



D-6	To maintain the tape feeder automatically

Customer

Master jig for thin type single feeder

Jig to calibrate attachment for thin type single feeder
(a regular offset adjustment of start point).
Item No. of master jig (with case) for thin type single feeder
(8 mm thin type, 4 mm thin type, and ALF) is MTKA015403AA.

Customer

Auto load feeder jig tapes

This is a jig used only for switch monitoring of auto load feeder and Input/Output status inspection.
Product number is MTKP016406AA and this is sold in a set of two jig tapes.

* In order to perform switch monitoring of auto load feeder and/or Input/Output status inspection,
you will need “Attachments for thin type single feeders”

D-6 To maintain the tape feeder automatically.

Customer

When using the Feeder maintenance unit (IFMU), the following hardwares & softwares should be prepared by customer.

1. The following items should be prepared by customer.

Item	Specifications	Quantity
PC	IBM PC/AT-compatible machine (including monitor, keyboard, mouse)	1 set
Cable	RS232C cable(crossover cable) ・Connector : Dsub-9 Pin ・Connector screw : #4-40 Inch ・Connector pin layout (refer to the figure below) Pin No. / Signal 1 Not used 2 RXD 3 TXD 4 Not used 5 GND 6 Not used 7 RTS 8 CTS 9 Not used	1 pc.
Conversion cable	USB-RS232C conversion cable ※Required when there is no RS232C port on the PC.	1 pc.
Power cable	Inlet type	1 pc.

2. PC(Hardware/OS)Requirements

Item	Specifications
Main body	IBM PC/AT-compatible machine(A desktop PC is strongly recommended)
CPU	Intel® Core™2 Duo 2.4GHz equivalent or greater
Graphic board	SXGA or higher 1280 × 1024 or more
Memory	2GB or more
HDD	80 GB or more
Optical drive	DVD-ROM
Keyboard	English version: 101 keyboard Japanese version: 106 keyboard
Mouse	Supported by your OS as standard
Monitor	SXGA ready
Network card	1000BASE-T × 1 Port or more (PCI Express network card is recommended) Jumbo Packet (Jumbo Frame) supported *1000BASE-T × 2 Port or more when connecting PanaCIM
RS232C Port	1 Port or more *RS232C card is recommended. When there are no RS232C cards, please prepare an USB-RS232C conversion cable.
OS	Microsoft® Windows® 10 Pro (64-bit)

10. Paint Color

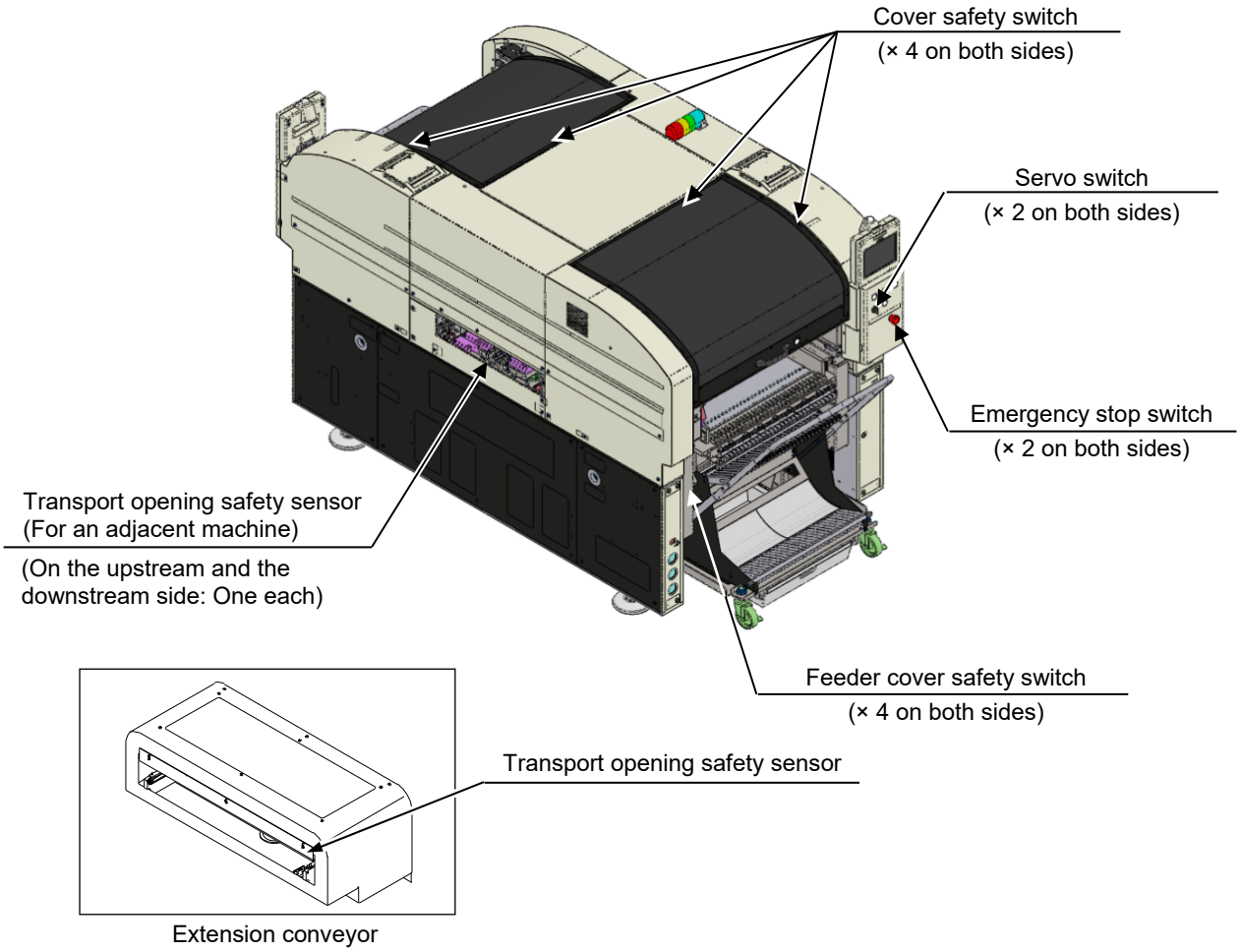
■ **Standard color**

White W-13 (G50)

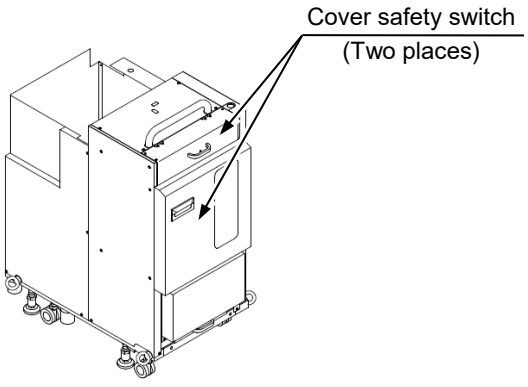
* The paint color cannot be designated.

11. Safety Devices

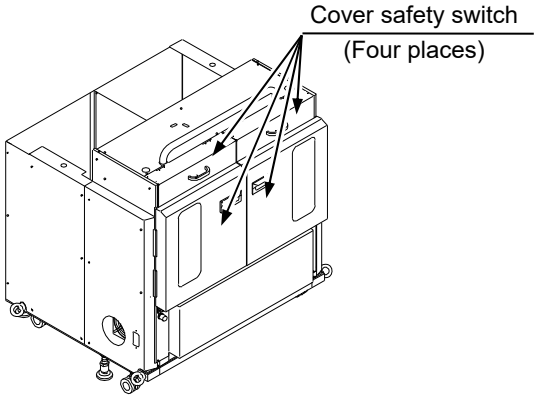
NPM-W2 has the following safety devices for the safety use of machine.
When an emergency stop switch is pressed or the cover is opened while the machine is operating, the operation is forcibly stopped.



Extension conveyor



Single tray feeder



Twin tray feeder

**** Remarks ****

- Please check enough 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.

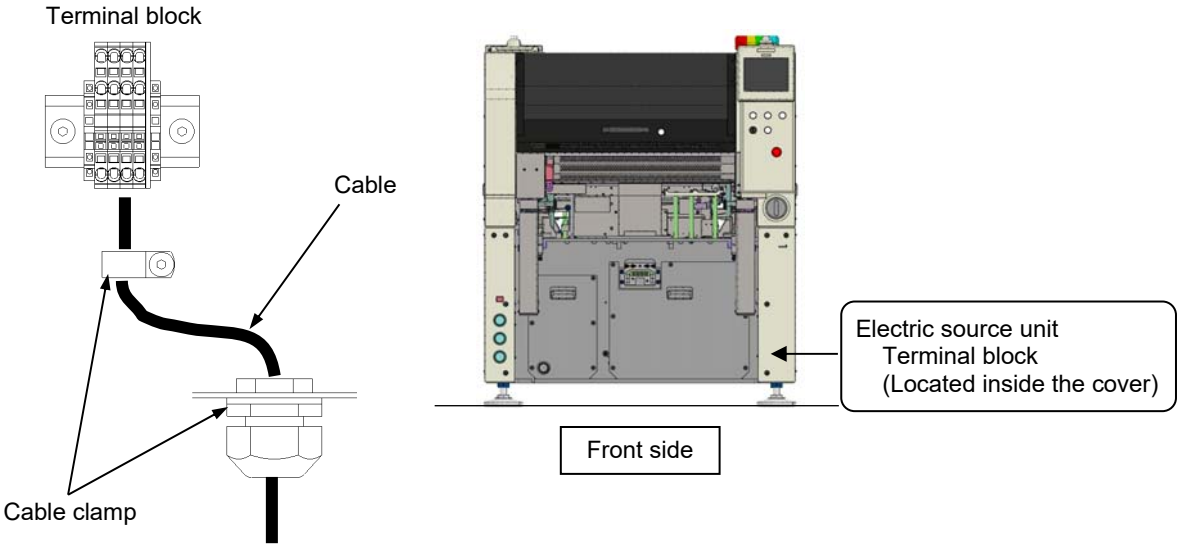
12. Electric / Pneumatic

12.1 Electric Source Unit

■ The power source should be connected with four-conductor cable ranging from 3.5 mm^2 to 5.5 mm^2, by using the exclusive tool.

■ The cable should be clamped in two points as the lower-left figure shows.

1. Outside diameter dimensions of the cable: φ13.5 mm ~ φ18.0 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.

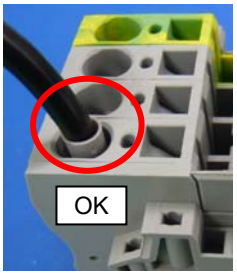


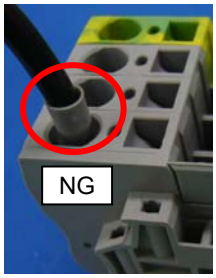
■ **Precautions in terminal block connection**

Terminal connecting pin (Recommended)
Manufacturer: Phoenix Contact
Type: 3.5 mm^2 ~ 4.0 mm^2 AI 4-12 GY
5.5 mm^2 ~ 6.0 mm^2 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.





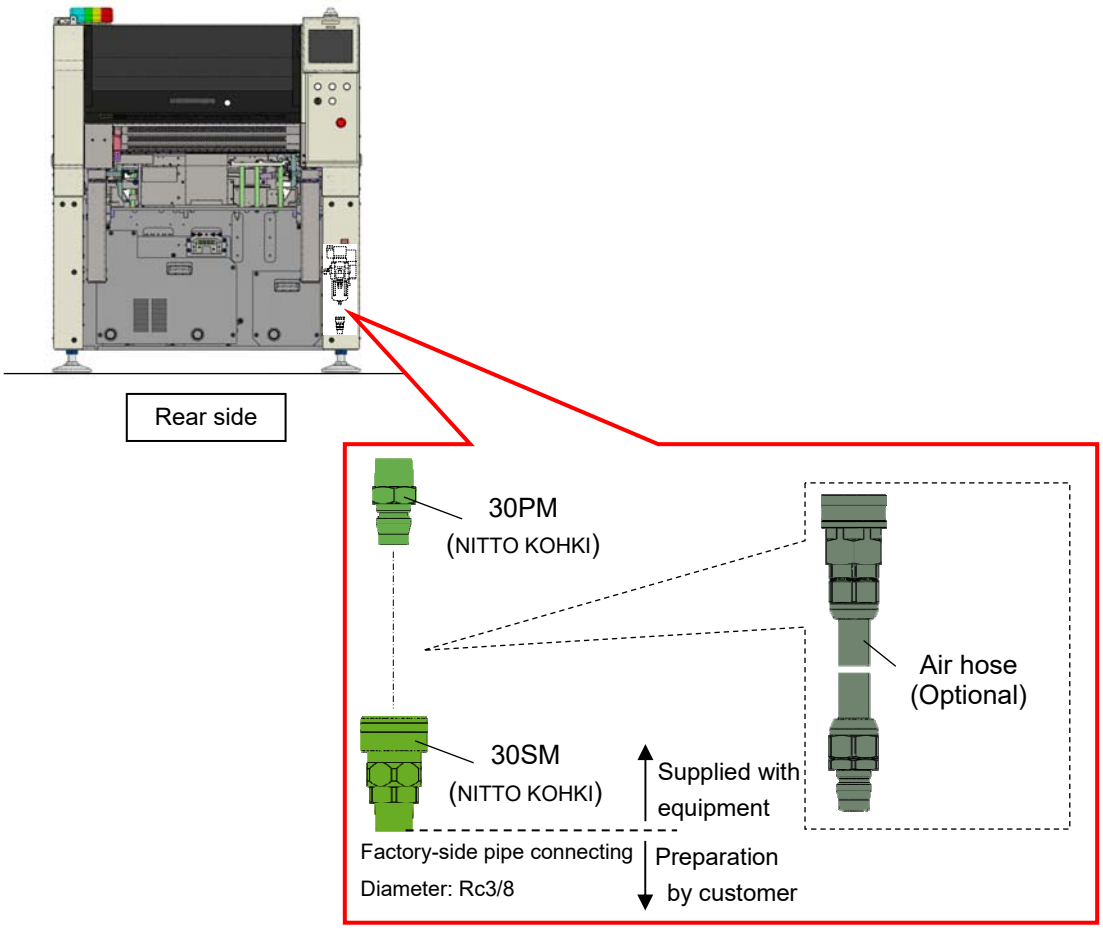
3. Use a tool like that shown below.

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.

12.2 Pneumatic Source Unit

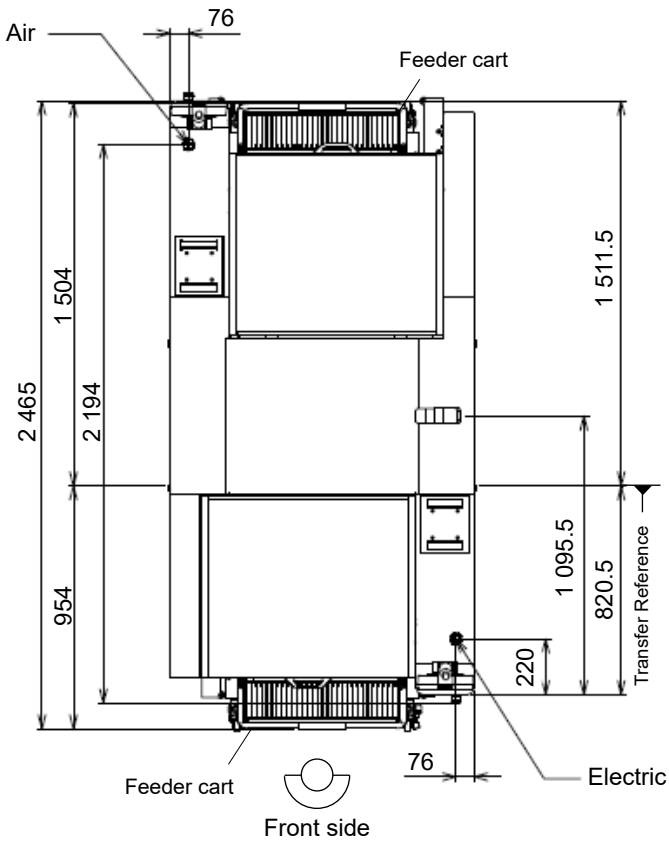


13. Dimensions

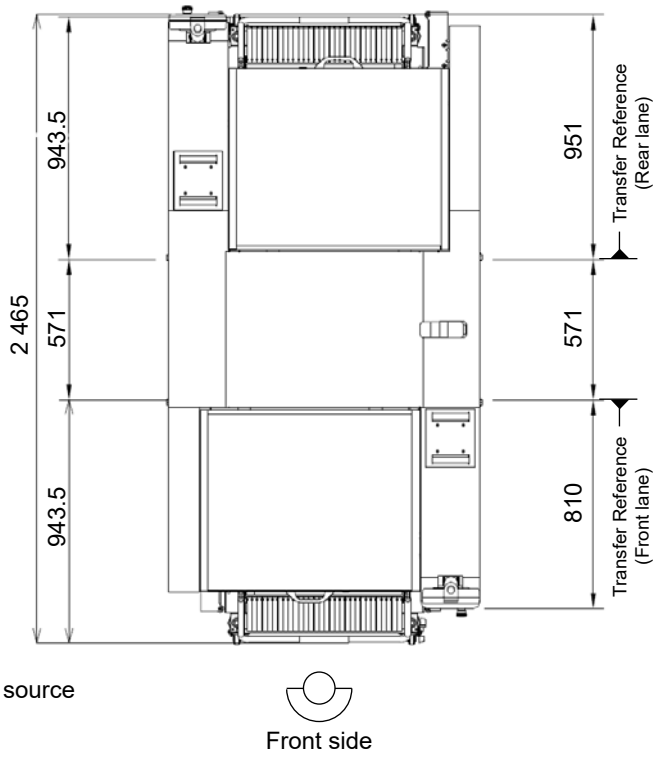
(Unit: mm)

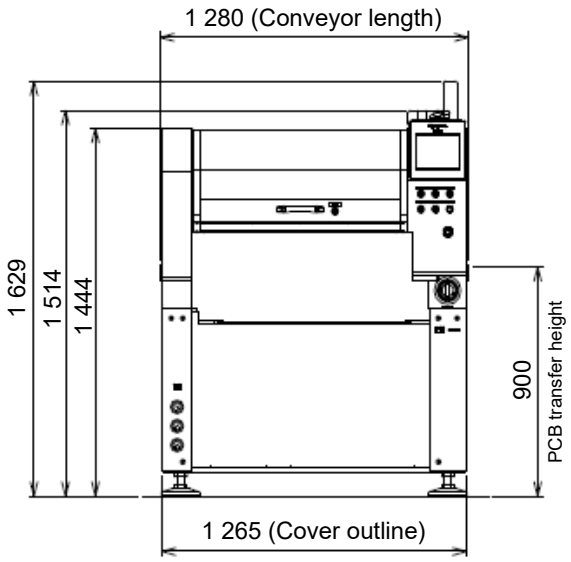
■ **When connecting feeder carts**

Single conveyor specification



Dual conveyor specification





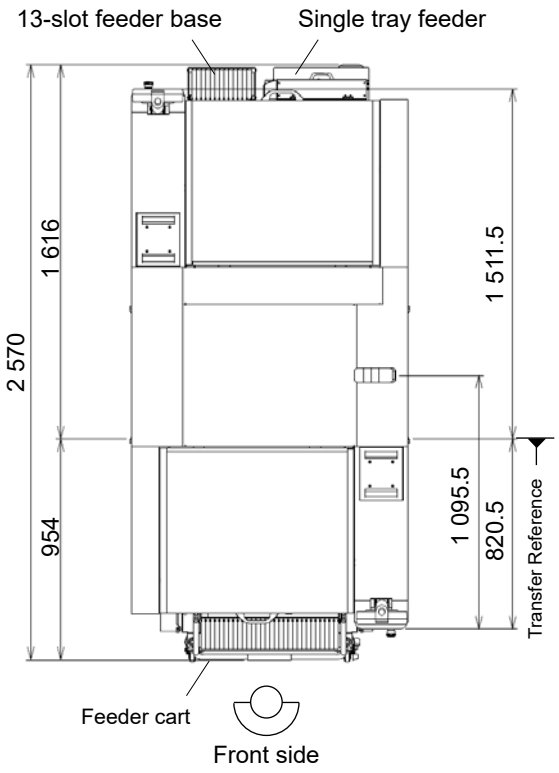
**** Remarks ****

- 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 40 mm or more space between them.

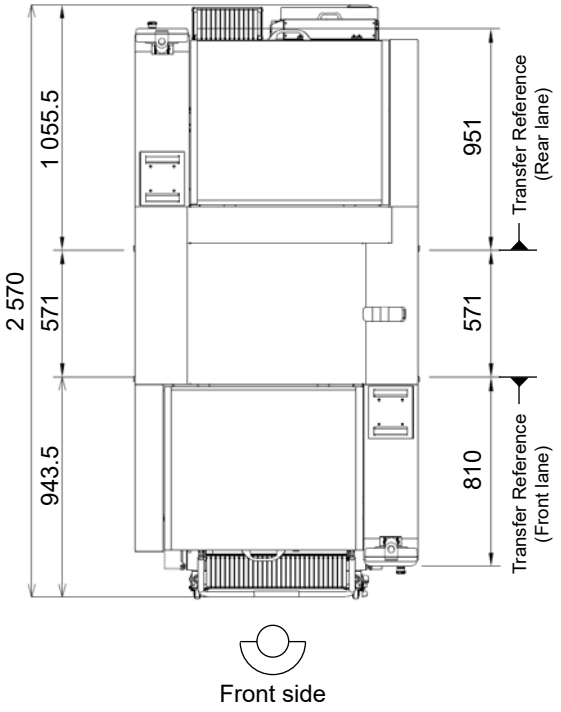
(Unit: mm)

■ When connecting single tray feeder

Single conveyor specification

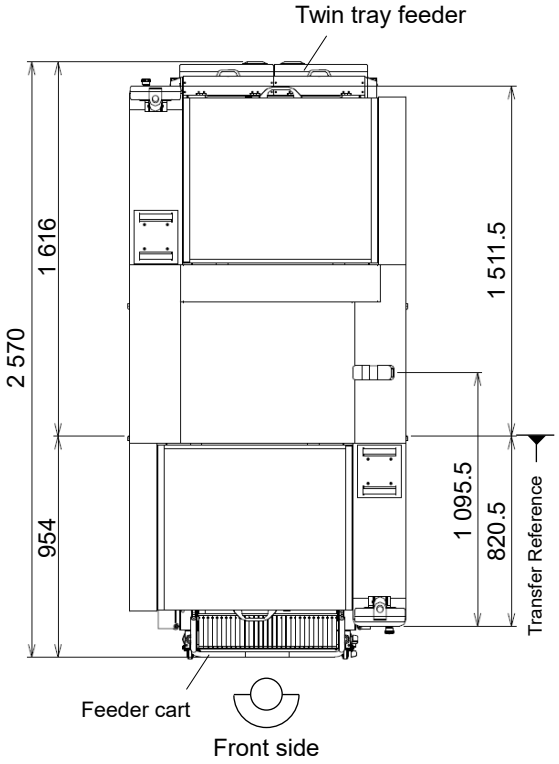


Dual conveyor specification

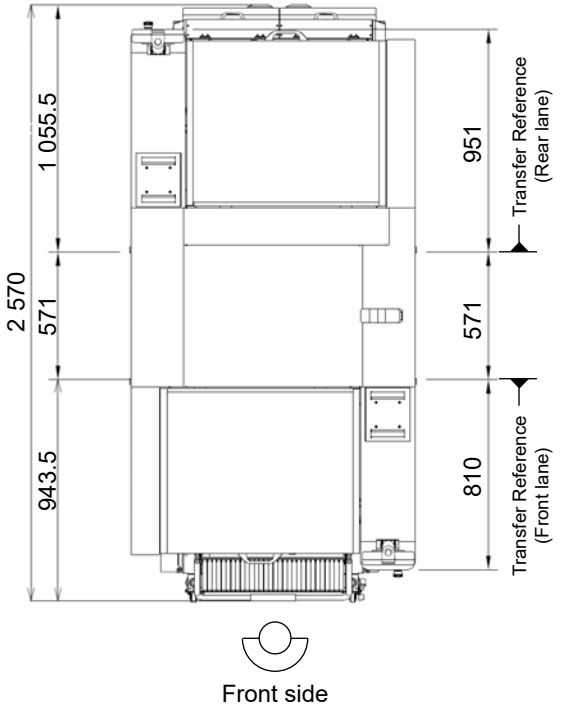


■ When connecting twin tray feeder

Single conveyor specification



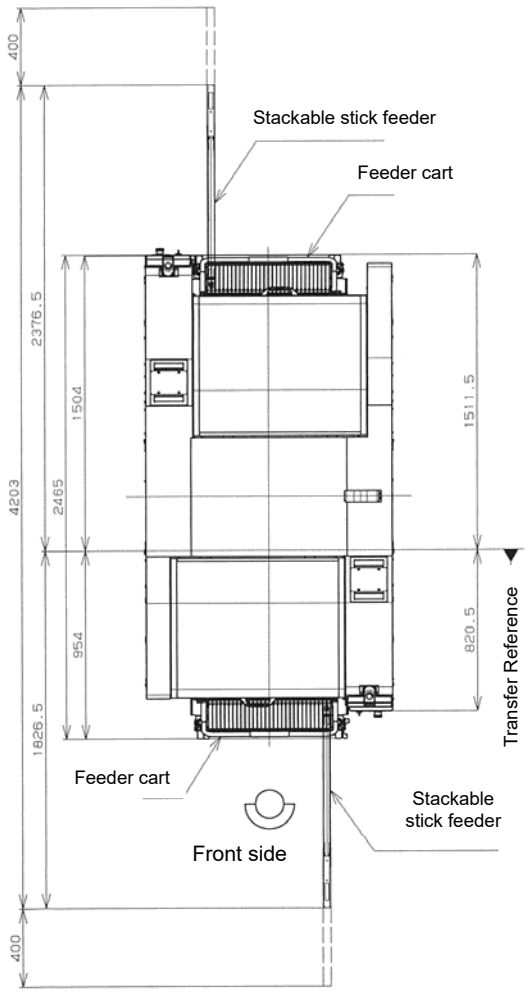
Dual conveyor specification



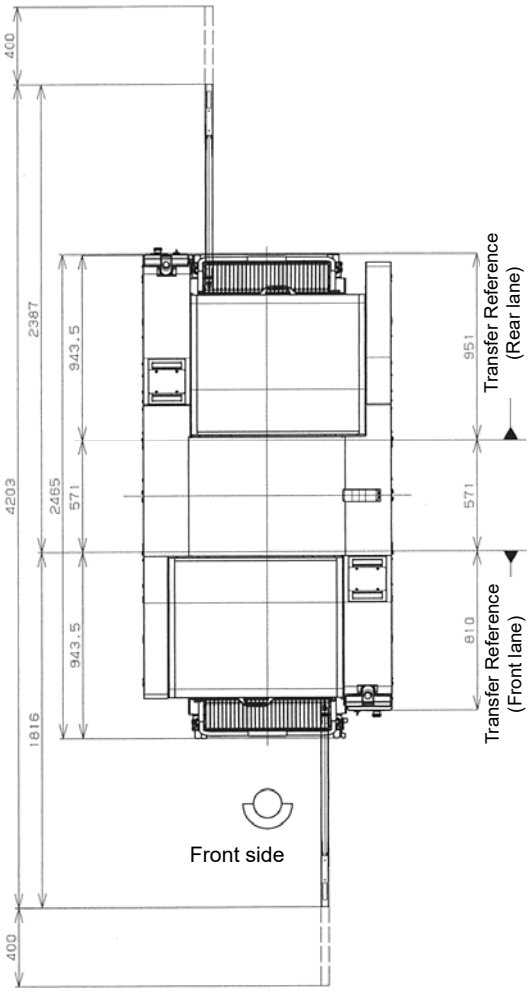
(Unit: mm)

■ When connecting to feeder cart （Including stackable stick feeder）

Single conveyor specification



Dual conveyor specification

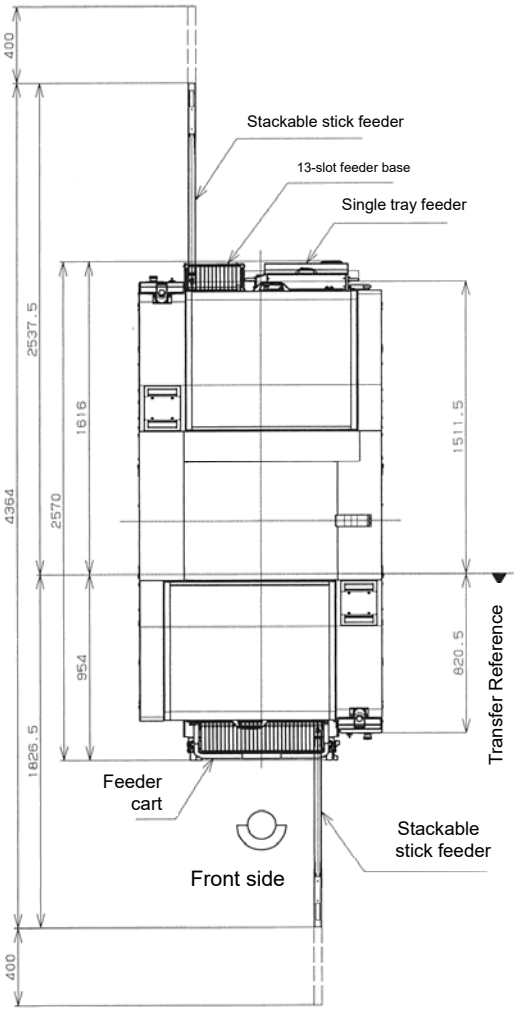


* When exchanging the feeder, the space required is as the following.
  - When removing feeders from the side, a space of 400mm as in the figure above is required
  - In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required.

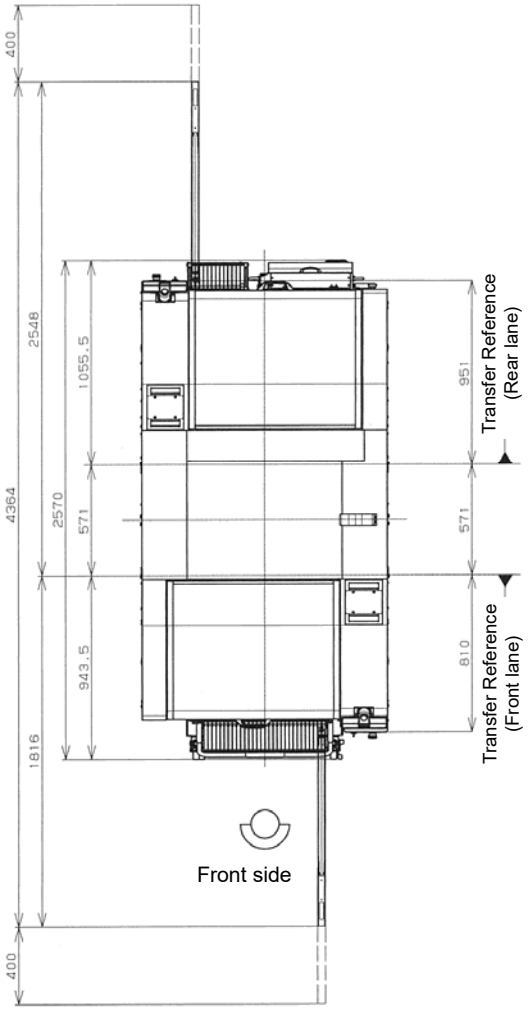
(Unit: mm)

■ When connecting to single tray feeder（Including stackable stick feeder）

Single conveyor specification



Dual conveyor specification

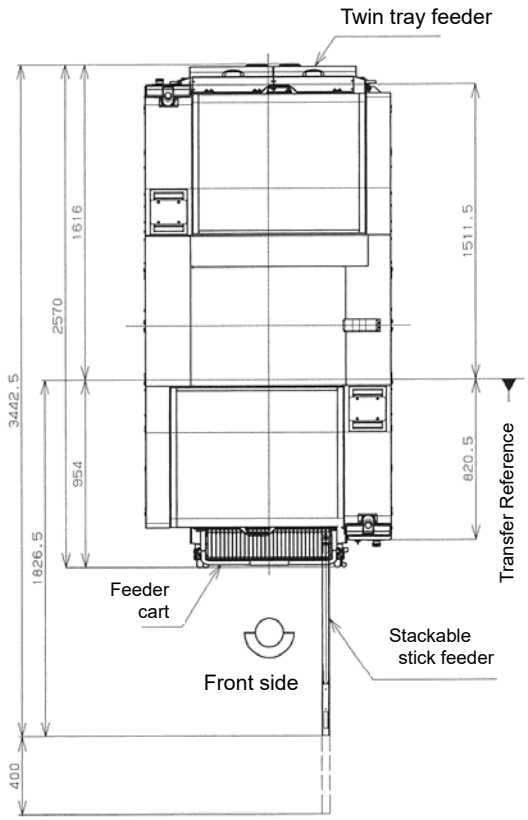


* When exchanging the feeder, the space required is as the following.
  - When removing feeders from the side, a space of 400mm as in the figure above is required
  - In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required

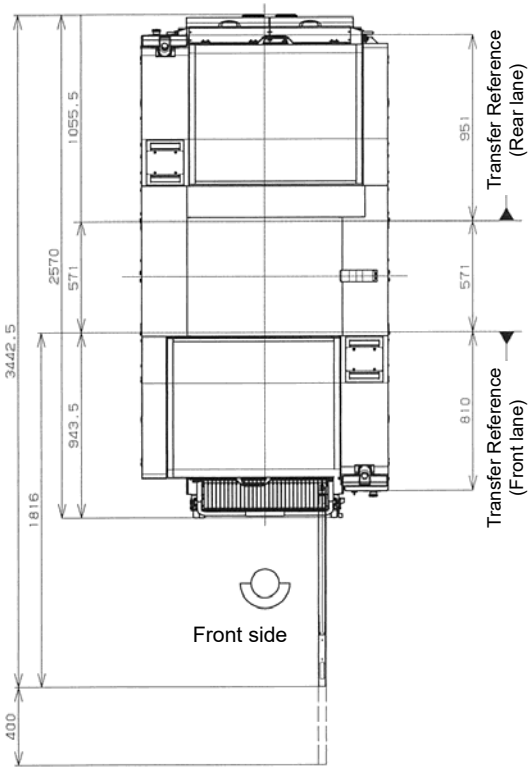
(Unit: mm)

■ When connecting to twin tray feeder (Including stackable stick feeder)

Single conveyor specification



Dual conveyor specification

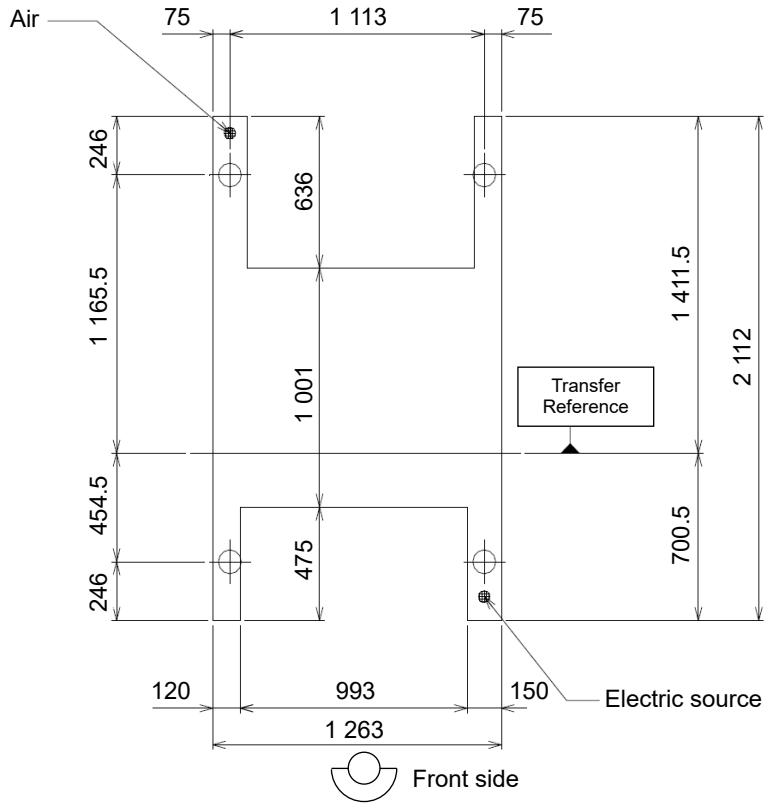


* When exchanging the feeder, the space required is as the following.
  - When removing feeders from the side, a space of 400mm as in the figure above is required
  - In order to remove a feeder in a middle position with feeders at both sides, space of total feeder length (max. 1 600mm) is required

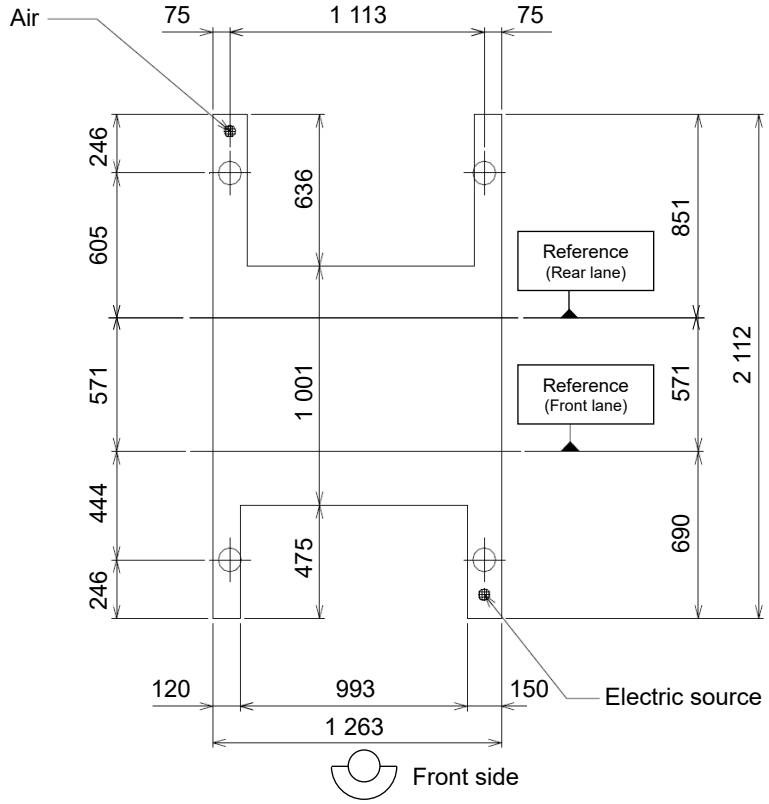
(Unit: mm)

■ Adjust Bolt Diagram

Single conveyor specification

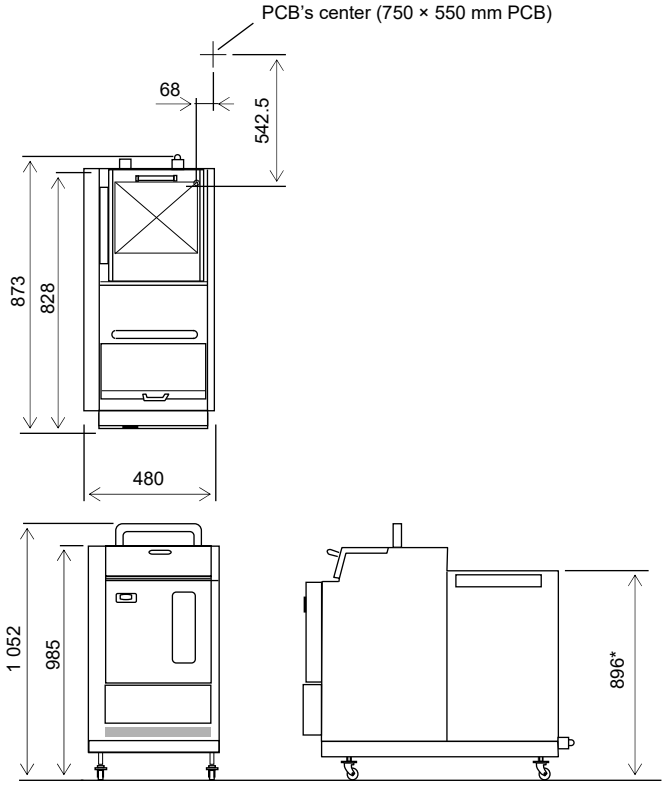


Dual conveyor specification



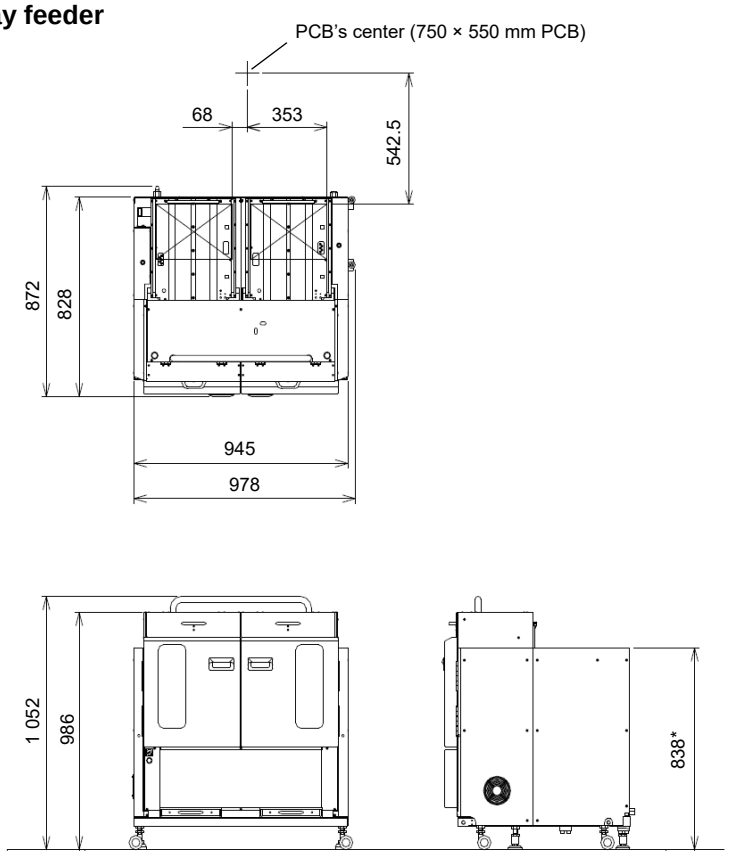
(Unit: mm)

■ Single tray feeder



* The tray feeding height of 896 mm is a standard value when the PCB transport height of NPM-W2 is 900 mm.
The adjustable range: 896 $^{+65}_{-16.5}$ mm

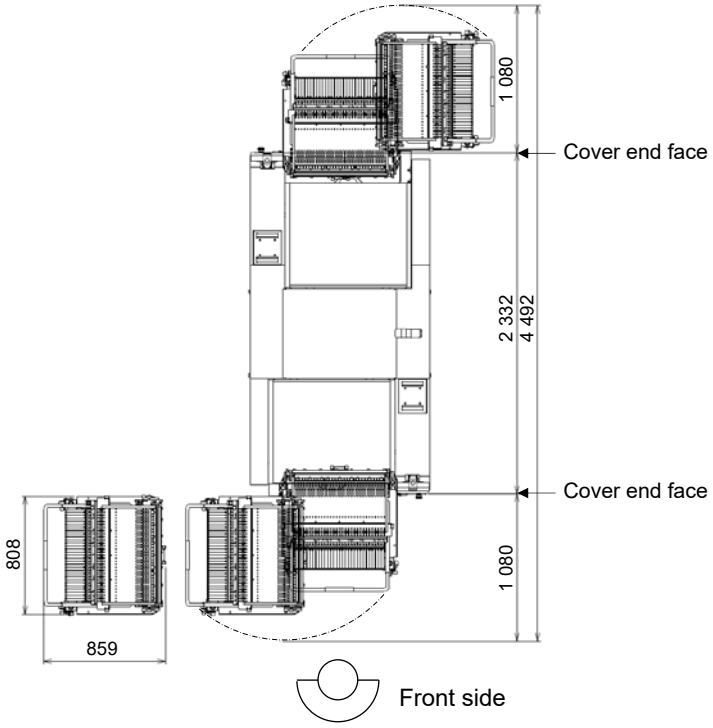
■ Twin tray feeder



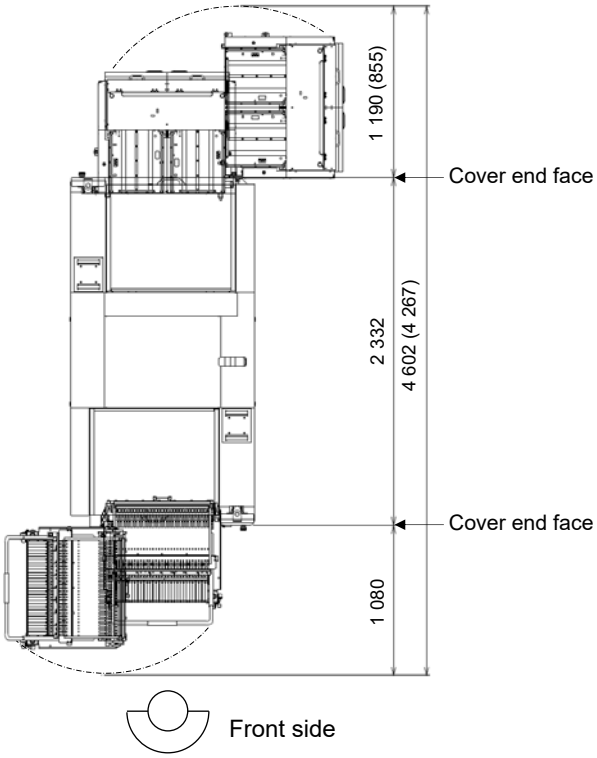
* The tray feeding height of 838 mm is a standard value when the PCB transport height of NPM-W2 is 900 mm.
The adjustable range: 838 $^{+65}_{-16.5}$ mm

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 ****

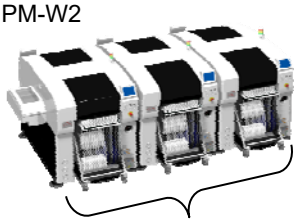
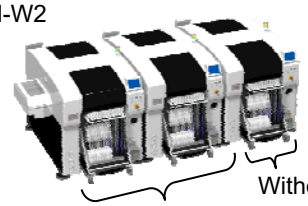
- The floor slope in the feeder cart installation area needs to be 6 mm or less in the right/left direction and 11 mm or less in the forward/backward direction. If the floor slope is beyond the above limit, the feeder cart cannot be taken in and out.

14. 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*
- Feeder Setup Navigator*
- Upper Communication*
- APC system ready
- Interface software of the inspection machine from other companies
- APC-MFB2 System ready
- Support station box (Component verification type)*
- Component Supply Navigator
- Automatic recovery function for pickup error
- Component inspection before pickup (Polarity)
- Message board
- Head diagnosis
- Remote operation *
- Biometric authentication
- Mount complete position recognition
- LCR checker(Feeder shape type)
- 16-nozzle head constant mount load control (Lightweight type)
- 16-nozzle head transfer (Lightweight type)
- Pre-pickup Inspection(Char/2D)
- AOI info display function

A license is required for each machine that is intended for the operation.
*The choices of 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.

A correct case	**A wrong case**
Automatic changeover × 3 NPM-W2  With licenses	Automatic changeover × 2 NPM-W2  Without licenses With licenses

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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.
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   (b) Incidental damage (e.g. loss of profits or the interruption of business) arising from the use of or inability to use the Product
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   (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

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   (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.

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