Panasonic

Ver. 2025.0516

Specification

【 Electronic Component Mounting System 】

Modular Placement machine

Model ID : NPM-GH

Model No. : NM-EJM8E

Panasonic Connect Co., Ltd.

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

Revision History

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

Revision date	Version	Revised page	Revisions
Feb. 28, 2023	Ver. 2023.0228	---	First edition
Jun. 15, 2023	Ver. 2023.0615	----	Full review and modified
Jul. 10, 2023	Ver. 2023.0710	P. 74	・APC-FF other company inspection machine interface software (Added Microsoft® Windows® 11 Pro) (Deleted Microsoft® Windows® 8.1 Pro / 7 Pro)
Jul. 31, 2023	Ver. 2023.0731	P. 43, 44, 63, 69, 86	Revised supported OS and other revisions ・LWS(Access Browser) ・Quality Information Viewer ・Feeder Setup Navigator ・Support Station ・Remote Operation
Nov. 30, 2023	Ver. 2023.1130	P. 1, 12, 13, 16, 36, 42, 55, 73, 96, 98, 107 ~ 109, 113 ~ 115, 120, 125, 132, 136, 138, 139, 153, 157 ~ 159	・Modifications on the constant load control and other changes
Jun. 01, 2024	Ver. 2024.0601	----	・Auto Setting Feeder(ASF) support
Aug. 19, 2024	Ver. 2024.0819	P. 38, 117, 122, 123, 124, 142, 144, 156	Full review and modified
Jan. 17, 2025	Ver. 2025.0117	P. 16, 17, 27, 51, 104, 105, 108 ~ 112 123, 158	Evolutionary Development ・Extended the range of component height of 16 nozzle head(Short nozzle) ・Mount complete position recognition ・Single Tray 1 Pallet 10 Kind ・Biometric authentication ・Component Bottom-Side 2D code Reading ・Vacuum and mount detect enhancement nozzle for micro components ・Pneumatic equipment diagnosis feature
May. 16, 2025	Ver. 2025.0516	P. 2, 16, 39, 55 ~ 58, 71, 110, 114 ~ 116	Full review and modified ・Features (Corrected CPH) ・Maximum tact (Added note) ・Intelligent Feeder 72 mm (Modified emboss maximum depth 15 mm) ・Modified Recognition Unit Configuration ・Upper Communication (Added note) ・Modified phrase about ”Tray 1 Pallet 10 Kind” ・About PCB warpage dimension that can be transferred (Added detailed description)

Contents

1. General Description

■ **Evolution of Edge Devices**

① Concepts Handed Down From NPM
While renewing core units such as placement heads and recognition camera and enhancing basic performance, NPM series and NPM-X series concepts are handed down to consistently meet customer needs.

② High Productivity
Adopts smaller and lighter placement heads, smaller recognition cameras and newly developed high rigid XY platform, leading to even greater productivity.

③ High Accuracy
Advancement of placement head θ accuracy, heightened sensitivity of Component Detection Sensor, lighting performance strengthened recognition camera to robustness enhancement, and damping control algorithms in XY movable axis bring both high productivity and high accuracy.

④ Compatible Component Scope Has Extended
Adopts new placement heads; FC16 head, FC08 head and FC03 head, to extend compatible component scopes, enabling more efficient productions.

⑤ Flexible Supply Unit According to the Component Feeding
We have newly added Auto Setting Feeder(ASF). Furthermore,
you can choose Tray, the number of whose pallets has increased, in the Rear Supply Unit, and that responds to a various range of component feeding.

■ **Operability/ Labor-saving/ Advancement in Automation**

① Big Operation Screen
12.1-inch touch panel monitor reduces screen transitions and enables more intuitive operations.

② ASF Supported Models
We have a lineup that caters to all feeder width of paper tapes and embossed tapes whose width is from 8 mm to 104 mm.
When you install a LU appropriate for each width, tape splicing is not necessary.

■ **Multipurpose**

Units and features are handed down from NPM series and NPM-X series.

2. Features

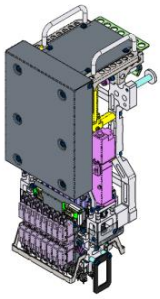
Evolution of Edge Devices

Concepts Handed Down From NPM

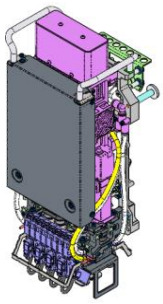
While renewing core units such as placement heads and recognition cameras and enhancing basic performance, Panasonic modular mounter basic concepts: ”Modular Ideas”, “Line Control System”, “Dual Lane/Multi Production” and Extensibility, are handed down from NPM series and NPM-X series to consistently meet customer needs.

High Productivity

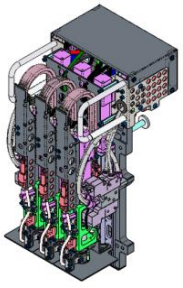
NPM-GH is loaded with reformed smaller and lighter placement heads: FC16 head, FC08 head and FC03 head, advanced X-axis acceleration, a newly developed high rigid XY platform and a smaller recognition camera, leading to even greater productivity.
Maximum placement tact with FC 16 head is 55,500 CPH(per 1 head) at placement accuracy of ±0.025 mm: Cpk ≧1, and 51,000 CPH(per 1 head) at placement accuracy of ±0.015 mm: Cpk≧1.



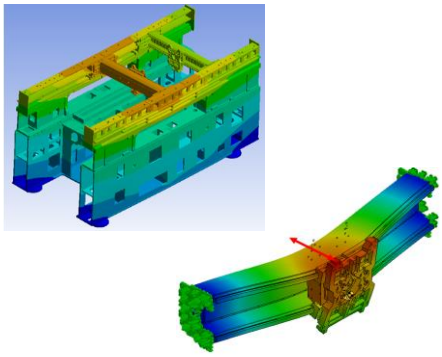
FC16 Head



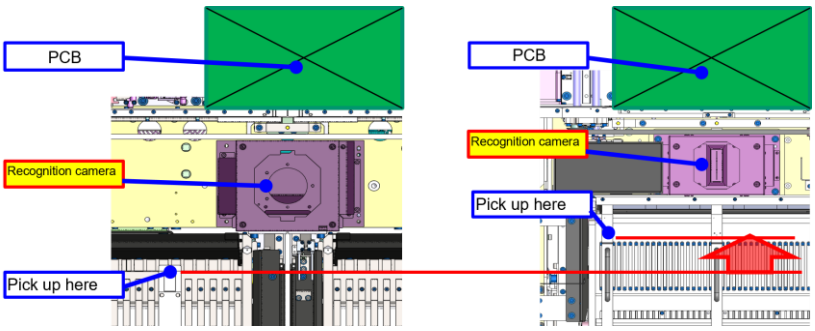
FC08 Head



FC03 Head



Newly Developed High Rigidity XY Platform

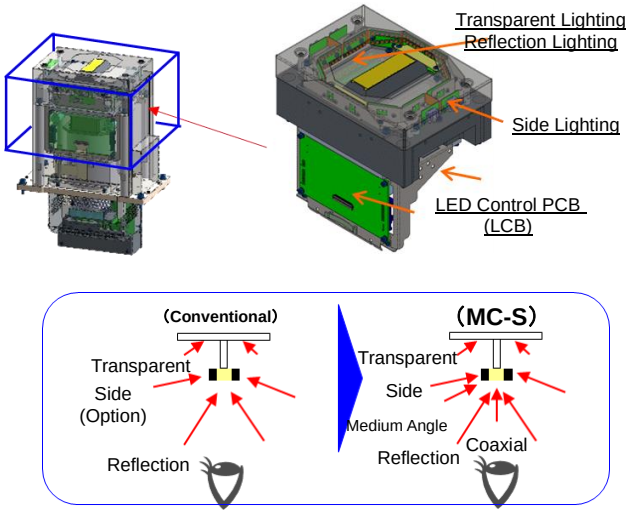


NPM-X Series Head　　NPM-GH

Reducing distance traveled at pickup and mounting

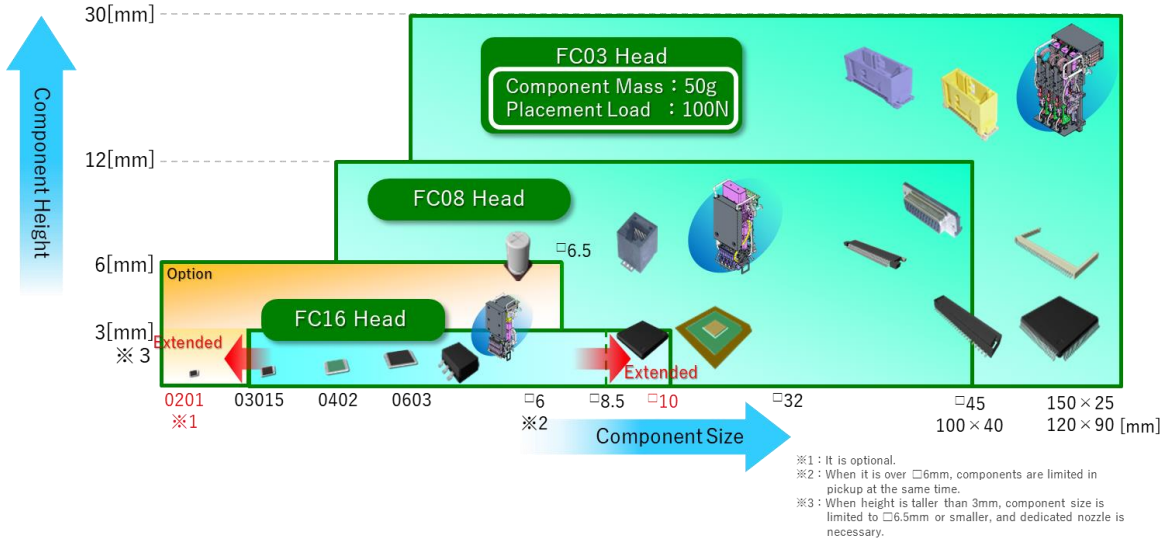
High Accuracy

To advance accuracy in new placement heads, we have reviewed the structure, leading to fewer up-and-down nozzle stroke, advancement in θ accuracy and higher sensitivity in Component Detection Sensor to enhance micro component detection performance. In addition, lighting performance strengthened recognition camera enhances robustness, and damping control algorithms in XY axis at pickup and mounting brings both high productivity and high accuracy.



Compatible Component Scope Has Extended

Adopts new placement heads, FC16 head, FC08 head and FC03 head, and compatible component scope is equivalent to or greater than conventional heads.



**** Remarks ****

●Optimized conditions mean placement conditions defined by our own standards.

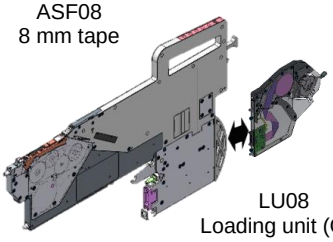
Flexible Supply Unit According to Component Feeding

In addition to the conventionally used Intelligent Feeder(ITF),
We have newly added Auto Setting Feeder(ASF). Furthermore,
you can choose Tray, the number of whose pallets has increased*, in the Rear Supply Unit, and that responds to a various range of component feeding.

* Comparing with NPM-D3

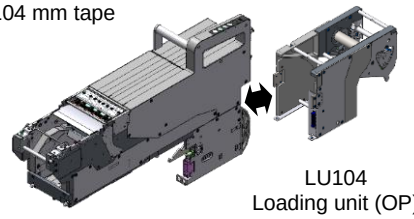
Auto Setting Feeder(ASF)

ASF08
8 mm tape



LU08
Loading unit (OP)

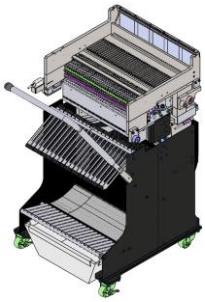
ASF104
104 mm tape



LU104
Loading unit (OP)

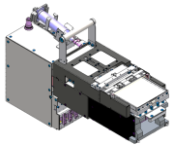
ASF Feeder Cart (C-Cart)

C-Cart34C
(34-slot Cart
Common among the existing mounters)

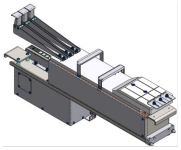


C-Cart40C
(40-slot Cart
For ASF only)

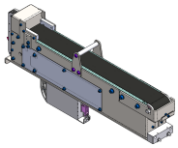
Feeder Accessories Lineup



DPU
(Transfer Unit)



SF3
(Stick F)

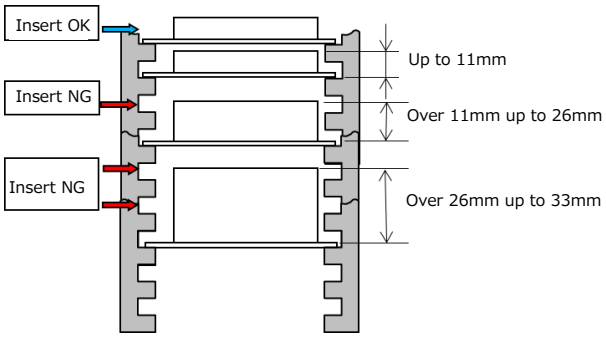


CEC
(Component Ejection Conveyor)

Single Tray Feeder

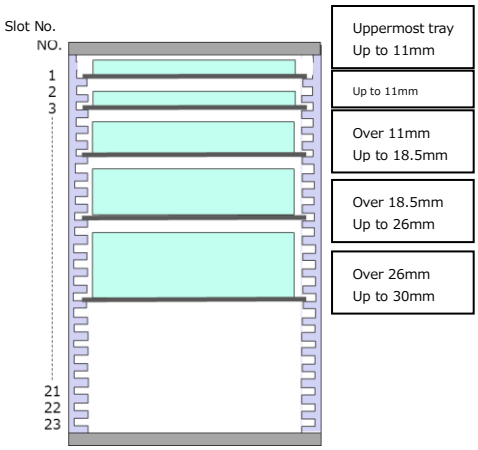
Conventional Tray

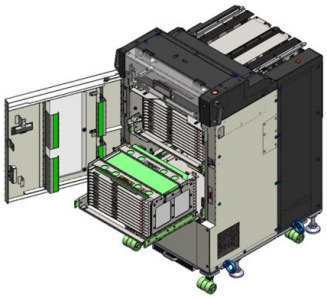
・When tray height is over 11 mm,
you cannot put a pallet in the slot above it in the magazine.
・When tray height is over 26 mm,
you cannot put a pallet in the slot above it or in the slot two steps above it in the magazine.



NPM-G Tray

・After reviewing slot pitches, tray insertion is more efficient.





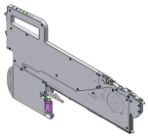
Single Tray Feeder

Operability/ Labor-saving/ Advancement in Automation

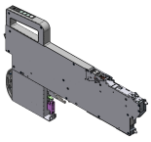
ASF Supported Models

With a newly developed ASF*[1], tape splicing is not necessary in all of the feeder width from 8mm to 104mm of paper tapes and embossed tapes when you installed LU.
Tape feeding is controlled with servo motor drive, and you can adjust feeding pitch and feeding speed by the component type. Parameter setting is controlled based on data sent from main unit.

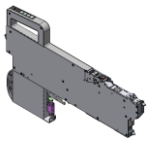
*1 It is compatible with NPM-X series C-Cart supported ASF.
*2 ASF is for C-Cart only. (You cannot use with conventional feeder carts)



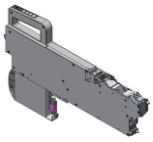
ASF08[*2]



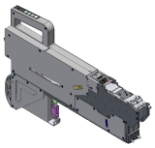
ASF12[*2]



ASF16[*2]



ASF24[*2]



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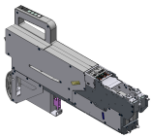

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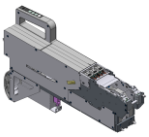
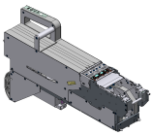
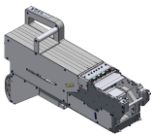


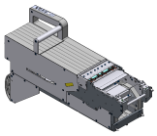
ASF56[*2]



ASF72[*2]



ASF88[*2]

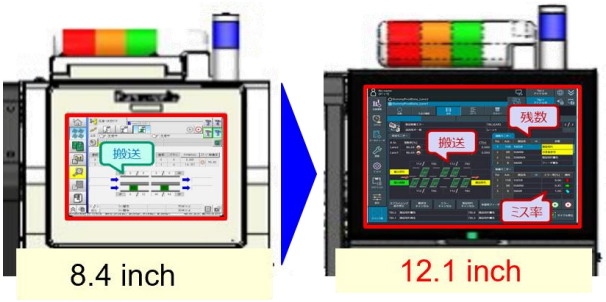


ASF104[*2]

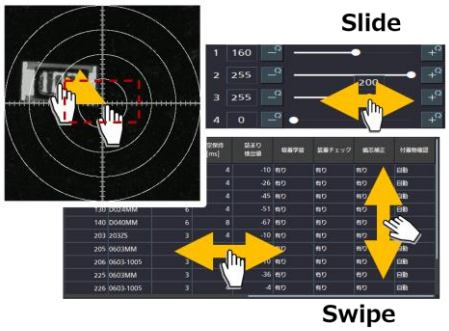
Big Operation Screen

NPM-GH has a larger operation screen, and we modified GUI and operation icons accordingly.
Before was not much information is displayed on one screen, and you need to move screens to get information you want to know. Big screen collects data into one. It uses drag feature and swipe feature for more intuitive operations.

GUI Renewal



Intuitive Operation



Operation Icon Renewal

Hierarchy Icons

Machine	Conveyor
Feeder	Softswitch
Multicamera	Pickup

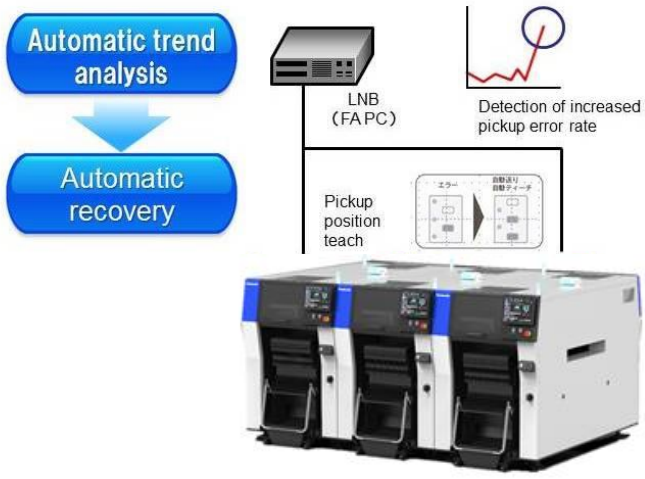
Remaining Quantity Monitoring Icons

Component Shortage (Feeder)	Component Shortage (Tray)
Stock Shortage (Feeder)	Stock Shortage (Tray)
Stock Shortage Warning(Feeder)	Safe to Pull out Feeder
Verification Error (Feeder)	Feeder Maintenance

Automatic Recovery

When an error occurs, a machine automatically recovers*1 from the error and it continues production. In addition, it automatically analyzes the trend such as pickup conditions during machine operation and takes measures to prevent an error from occurring again. These automatic recovery functions achieve stable machine operation and maximization of throughput.

*1 Automatic recovery function cannot be used for some errors depending on the type or condition of an error.

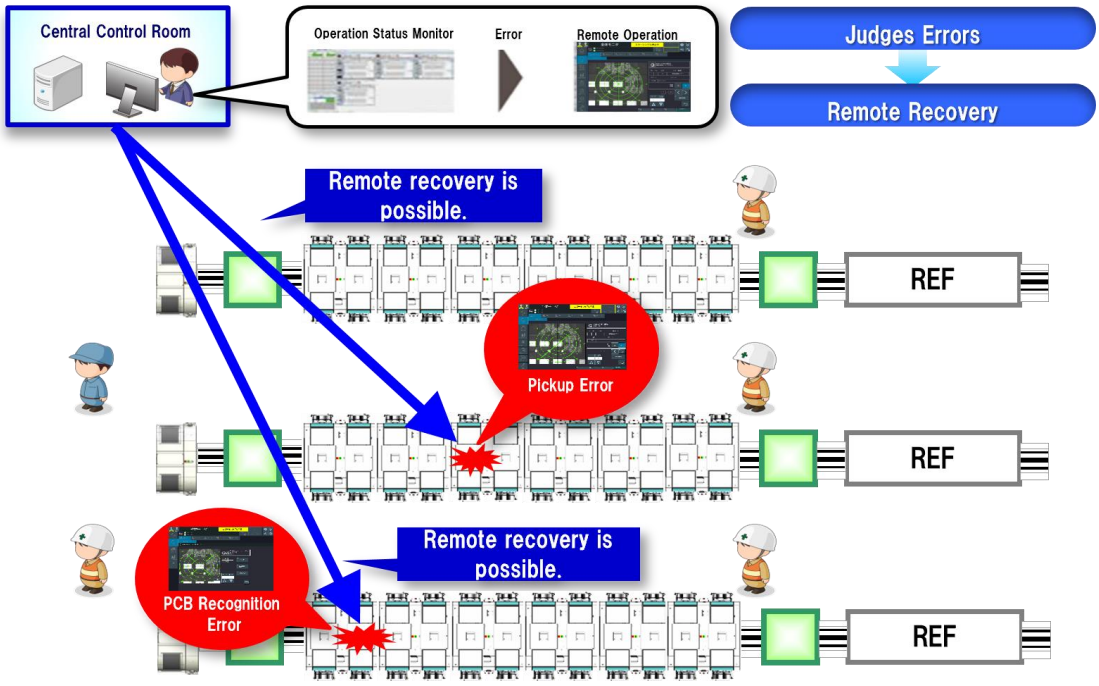


Non-stop data modification

Reference and modification of production data is enabled without stopping a machine.
The data can be automatically reflected without stopping production in line. This function achieves high operability.

Remote operation

Recovery by remote operation is possible for the error of which recovery can be made based on human judgment alone. This enables eliminating the time lost for the operator to detect error and take appropriate action, reducing the error recovery time, and thus achieving labor saving and improved operating rate.



Navigation function

1) Feeder setup navigation
This is a setup support tool which helps you navigate an effective setup procedure. Estimation of the production time including the setup time and instruction of the setup procedure to an operator are available. This enables visualization of the setup time and improvement of the efficiency.

2) Component supply navigation
This is a component supply support tool which helps you navigate an effective component supply order. It directs a component supply order to an operator considering the time taken for exhausting a component and finds the shortest route for supplying the component.
This allows improvement of the component supply efficiency.

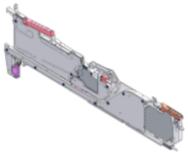
Versatility

Compatibility with the NPM/NPM-X series

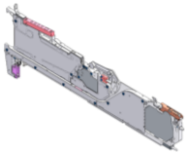
NPM-GH uses feeders and nozzles that have provided reliable performance in NPM/NPM-X series and ensures compatibility. As for production data, libraries are compatible with NPM/NPM-X series so that you can configure a mixed line with NPM/NPM-X series.

Versatility of feeders

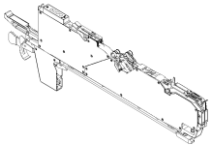
Feeders are compatible with NPM/NPM-X series and AM100 series, and support 4-mm up to 104-mm paper/ embossed tapes. Tape feeding is driven with a servomotor; feed pitch and feed speed are set according to the components. These parameters are set by the data sent from the main body.



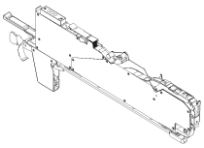
4 mm thin type
single tape feeder*



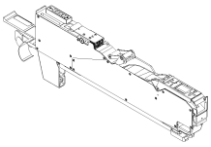
8 mm thin type
single tape feeder*



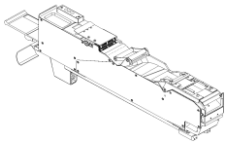
8 mm
double tape feeder



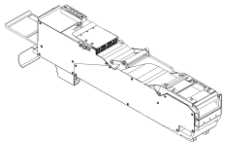
12/ 16 mm
tape feeder



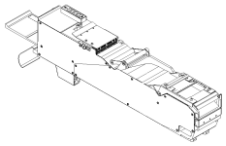
24/ 32 mm
tape feeder



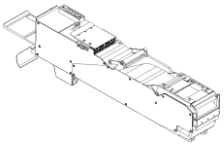
44/ 56 mm
tape feeder



72 mm
tape feeder



88 mm
tape feeder



104 mm
tape feeder

* NPM-GH cannot use Auto Load Feeder.

Head exchange function

Heads (FC16 head, FC08 head, FC03 head) in NPM-GH are selectable for each table. *1

*1 Please select a 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 FC08 head or FC03 head are available.

Flexible location of the tape feeder*

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

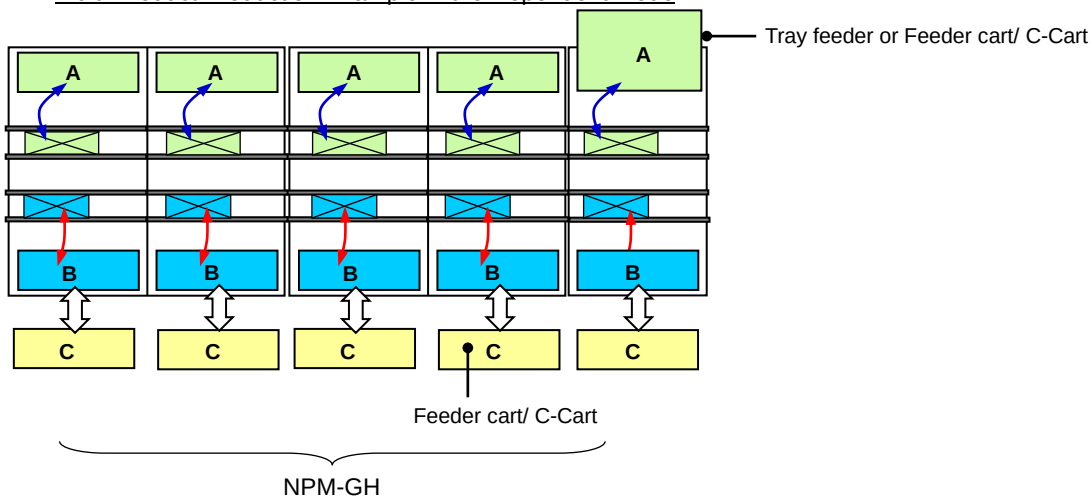
* Using the “Support station: Component verification type”, you need to write data to tape feeders in advance.
“Component verification (license)” is also needed.

Independent changeover

In an independent mode, as well as NPM/NPM-X series, you can perform changeover(product data change and feeder cart/ C-Cart replacement) on one lane while production continues at the other lane.*

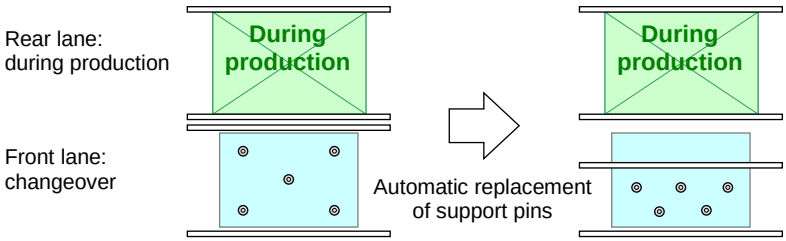
* It is not possible to do works by opening safety covers (such as manual replacement of support pins).

Multi-Product Production Example in the Dependent Mode



Automatic replacement of support pins

A function to automatically set up support pins using a placement head.
Operators do not need to access inside a machine, contributing manpower saving for changeover and prevention of human errors. It also realizes non-stop changeover during production in dual lane mode.
Support pins are compatible with NPM/NPM-X series.



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 two types, "External scanner read type", and "Head read type".

Multi job production

You can set up the maximum of 80 types* of components(converted to 8mm tapes) for one NPM-GH mounter. Even while the machine is running, it is possible to set taped components for another model to vacant slots in advance, increasing the efficiency of changeovers. The data creating system NPM-DGS can sort placement data for each stage, taking this multi-job production system into consideration.
* When both Front Supply Unit and Rear Supply Unit are C-Cart40C.

Multicamera MC-S

Multicamera MC-S loaded with NPM-GH is not compatible with muti recognition camera used in NPM/NPM-X series. As to performance and functionality, however, advancement in lighting performance enhances robustness and unit concepts and measurement technologies for high-quality component mounting are handed down.

■ **Component thickness measurement function (Multicamera MC-S: Type 2/ Type 3)**

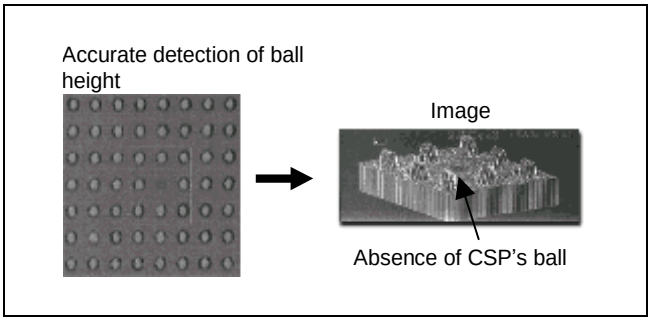
Two functions provide high quality placement. These are applicable for each Placement head.

・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 (Multicamera MC-S: Type 3)**

Detects coplanarity of all the leads in QFP/SOP and other packages, and presence or absence of all the balls, and partially broken balls in its shape in BGA/CSP and other packages.



APC 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.
In NPM-GH, the APC-FF offset data (placement position offset) can be received if NPM-DX is coupled with the NPM series' machine equipped with the inspection head or the inspection (solder inspection) machine manufactured by other company.

■ **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.

Height Sensor

It controls the placement 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 to prevent the occurrence of quality defects.

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 2.1 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 60 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.
Pneumatic source	・Supply air pressure 0.5 MPa ~ 0.8 MPa (Working air pressure: 0.5 MPa ~ 0.51 MPa) ・Supply air amount 100 L/min (A.N.R.)
Dimensions	When Feeder cart is installed on the front and on the rear: W 975 × D 2 473 × H 1 444 mm When Feeder cart installed on the front / Tray Feeder connected on the rear: W 975 × D 2 453 × H 1 444 mm When C-Cart installed on the front and on the rear or when Tray Feeder connected on the front and on the rear: W 975 × D 2 315 × H 1 444 mm The above dimensions do not include signal tower or touch panel.
Mass	・Main body 2 110 kg ・Feeder cart 110 kg ・Single Tray Feeder 270 kg ・C-Cart34C 95 kg ・C-Cart40C 100 kg ・Standard structure mass 2 330 kg (Main body, Feeder cart × 2) 2 300 kg (Main body, C-Cart34C × 2) 2 310 kg (Main body, C-Cart40C × 2)
Environment	・Temperature 10 ℃ ~ 35 ℃ (Placement 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-3, Blue: B-3 * The paint color cannot be designated.

Control System	・Microcomputer system Full closed-loop system (Linear servomotor) [X axis, Y axis, Z axis (FC16 head, FC08 head)] Semi closed-loop system (AC servomotor) [Z axis(FC03 head, θ axis(all heads), TL axis, TP axis]	
Command System	・Designation of X, Y, Z and θ coordinates	
Production data	・No. of placement points	Max. 50 000 points/machine, Max. 50 000 points/line*1 (Mounting coordinates, recognition mark coordinates, bad mark coordinates and PCB warp measurement points are included)
	・No. of Patterns (Blocks)	Max. 4 000 patterns/machine, Max. 4 000 patterns/line (If PCB warpage measurement points are included, it shall be Max. 100 patterns/machine)
	・No. of Mark settings*	Max. 4 000 patterns/machine, Max. 4 000 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 50 000 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><th rowspan="2">Items</th><th colspan="3">Specifications</th></tr>
<tr><th>FC16 head</th><th>FC08 head</th><th>FC03 head</th></tr>
<tr><td>Maximum Tact
(It is tact obtained by conducting multiple mounting operations under favorable conditions)</td><td>・ITF/ ASF Common Specification
111 000 CPH*2
(Chip：0.032 s/chip)
・ITF/ ASF Common Specification
102 000 CPH*3
(Chip：0.035 s/chip)
・ASF Specification
40 000 CPH*4
(Chip：0.090 s/chip)

IPC9850 (1608C)
77 000 CHP*2
65 000 CHP*3</td><td>・ITF/ ASF Common Specification
61 000 CPH*2
(Chip：0.059 s/chip)

・ITF/ ASF Common Specification
56 000 CPH*3
(Chip：0.064 s/chip)</td><td>・ITF/ ASF Common Specification
22 600 CPH*2*3
(Chip：0.159 s/chip)

・ITF/ ASF Common Specification
21 600 CPH
(QFP：0.167 s/QFP)</td></tr>
<tr><td colspan="3">* It depends on components.
* Tact is in the dual lane specification and under optimal conditions. It varies depending on conditions.</td></tr>
<tr><td>Placement Tact
(It is tact under our test conditions)</td><td>・ITF/ ASF Common Specification
105 000 CPH*2
(Chip：0.034 s/chip)
・ITF/ ASF Common Specification
92 000 CPH*3
(Chip：0.039 s/chip)
・ASF Specification
34 000 CPH*4
(Chip：0.106 s/chip)</td><td>・ITF/ ASF Common Specification
56 000 CPH*2
(Chip：0.064 s/chip)

・ITF/ ASF Common Specification
45 000 CPH*3
(Chip：0.080 s/chip)</td><td>・ITF/ ASF Common Specification
21 600 CPH*2*3
(Chip：0.167 s/chip)

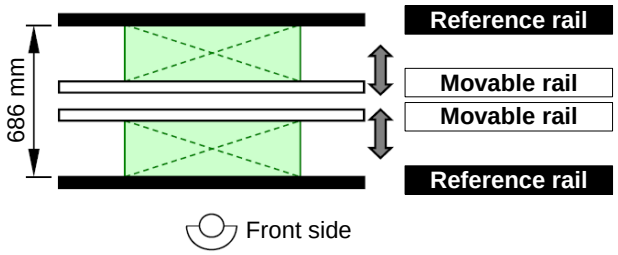
・ITF/ ASF Common Specification
18 000 CPH
(QFP：0.200 s/QFP)</td></tr>
<tr><td rowspan="2">Placement accuracy</td><td rowspan="2">0201*1, 03015, 0402, 0603, 1005 Placement
±0.025 mm*2, Cpk≧1
0201*1, 03015, 0402, 0603, 1005 Placement
±0.015 mm*3, Cpk≧1
0201*1, 03015, 0402, 0603, 1005 Placement
±0.010 mm*4, Cpk≧1</td><td>0402, 0603, 1005 Placement
±0.025 mm*2, Cpk≧1
0402, 0603, 1005 Placement
±0.015 mm*3, Cpk≧1

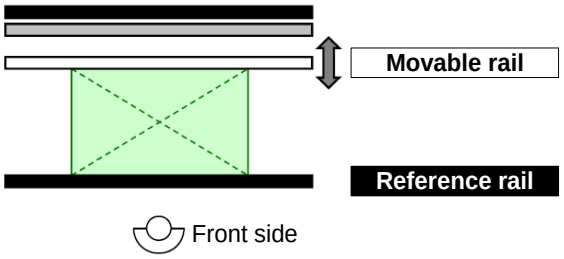
QFP Placement
±0.04 mm, Cpk≧1
(12 x 12 mm or smaller)
±0.025 mm, Cpk≧1
(over 12 x 12 mm
～45 x 45 mm or smaller)</td><td>0603, 1005 Placement
±0.025 mm*2, Cpk≧1
0603, 1005 Placement
±0.015 mm*3, Cpk≧1

QFP Placement
±0.02 mm:
Cpk≧1</td></tr>
<tr><td colspan="3">* It depends 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 “0201 component placement support” is selected. (Panasonic specified requirements)
*2 When High-accuracy mode is [ON].
*3 When you choose High-accurate Mode1 (±15 μm)
*4 When you choose High-accurate Mode2 (±10 μm)</td></tr>
</table>

<table>
<tr><td colspan="2" rowspan="2">Items</td><td colspan="3">Specifications</td></tr>
<tr><td>FC16 head</td><td>FC08 head</td><td>FC03 head</td></tr>
<tr><td colspan="5">Applicable components</td></tr>
<tr><td rowspan="2"></td><td>Component dimensions</td><td>0201 Chip*1,
03015 Chip
~ 10 × 10 mm</td><td>0402 Chip
~ 45 × 45 mm
or 100 mm × 40 mm*2
(When component is over 12 × 12 mm, pickup is limited)</td><td>0603 Chip
～ 120 × 90mm
or 150 × 25mm</td></tr>
<tr><td colspan="3">*1 When “0201 component placement support” is selected. (Panasonic specified requirements)
*2 When a large-type connector is placed, there may be another restriction of the component size besides this because of relationship between the pickup position and recognition area.
If a component outline exceeds 45 mm x 45 mm, split recognition will be applied
For details, please ask us.</td></tr>
<tr><td rowspan="2"></td><td>Component height</td><td>Max. 6 mm*1*2</td><td>Max. 12 mm*1</td><td>Max. 30 mm</td></tr>
<tr><td colspan="3">*1 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)
*2 When component is taller than 3 mm, component size is limited to ☐6.5 mm and dedicated nozzle(101GS, 101GSN, 102GS, 102GSN) is necessary.</td></tr>
<tr><td></td><td>Mass</td><td>---</td><td>---</td><td>Max. 50 g</td></tr>
<tr><td rowspan="2">Placement load control</td><td colspan="2">1.0 N/ 0.5N*1</td><td>1.0 N*1</td><td>0.5 N ~ 100 N
(increments of 0.01 N)</td></tr>
<tr><td colspan="4">*1 Constant Load Control is optional.</td></tr>
<tr><td>Placement Angle</td><td colspan="4">-180° ~ 180° (In increments of 0.01°)</td></tr>
<tr><td>Recognition</td><td colspan="4">Head camera
Offset of PCB position and orientation by using recognition mark
Multicamera MC-S : Type 1
Recognition and offset of all applicable components.
Multicamera MC-S : Type 2 (Type 1 + Component thickness measurement)
Measurement of component thickness (component data registration, placement height control), detection of standing/tilted standing of components at the time of pickup, nozzle tip check.
Multicamera MC-S : Type 3 (Type 2 + 3D-measurement function)
Detects coplanarity of all the leads and XY-direction positions in QFP/SOP and other packages.
Detects presence or absence of all the balls, and partially broken balls in its shape in BGA/CSP and other packages.</td></tr>
</table>

<table>
<tr><td>Item</td><td colspan="3">Specifications</td></tr>
<tr><td rowspan="3">PCB exchange time

*This may vary depending on PCB specifications.</td><td colspan="2">Dual Lane Mode</td><td>Single Lane Mode</td></tr>
<tr><td colspan="2">・Share Mode
0 s
・Independent Mode
2.3 s (L 350 mm or shorter)
5.0 s (Over L 350 mm
～ L 510 mm or shorter) *1</td><td>2.3 s (L 350 mm or shorter)
5.0 s (Over L 350 mm ～ L 510 mm or shorter) *1</td></tr>
<tr><td colspan="3">*1 When Slide Mount Option is enabled.</td></tr>
<tr><td colspan="4">Applicable PCB</td></tr>
<tr><td></td><td>Dimension</td><td>50 × 50 mm ~ 350 × 300 mm</td><td>50 × 50 mm ~ 350 × 590 mm</td></tr>
<tr><td></td><td rowspan="2">Placement area</td><td>50 × 44 mm ~ 350*× 294 mm</td><td>50 × 44 mm ~ 350*× 584 mm</td></tr>
<tr><td colspan="2">* PCB with 350 mm ＜ L ≦ 510 mm is handled in the Slide Mount (Option).</td></tr>
<tr><td></td><td>Thickness</td><td colspan="2">0.3 mm ~ 8.0 mm</td></tr>
<tr><td></td><td>Mass</td><td colspan="2">3 kg or less (After mounting, including carrier mass)</td></tr>
<tr><td>Flow direction</td><td colspan="3">Left → Right, Left ← Right (Selectable)</td></tr>
<tr><td>Reference</td><td colspan="3">Dual lane mode
 

Single lane mode*1
 

*1 The rear reference is available when the machine is reversed. (For single lane mode production only)

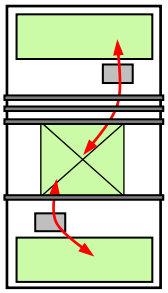
* When you connect to a dual lane conveyor mounter, it is limited to single lane mode NPM mounters.
Transferable PCB dimensions is different depending on the mounter.
The maximum width described here is the smallest one.
* You can connect to NPM-D/ D2/ D3/ D3A/ TT/ TT2/ DX/ WX/ WXS: PCB widthwise is the same.
* You cannot connect to NPM-W/ W2/ W2S directly when it is the Dual Conveyor Specification since PCB widthwise is 260 mm. We will respond as Individual Specification.</td></tr>
<tr><td>PCB transfer height</td><td colspan="3">900 mm ~ 920 mm</td></tr>
</table>

Item	Specifications
Component Supply Unit (Intelligent Feeder：ITF)	・Taping 4 mm Max. 68 inputs*1 : 8 mm Max. 68 inputs*1 : Small reel Max. 34 inputs*1 : Large reel 12/ 16 mm Max. 34 inputs*1 24/ 32 mm Max. 16 inputs*1 44/ 56 mm Max. 10 inputs*1 72 mm Max. 8 inputs*1 : FC08 head and FC03 head are applicable. 88 mm Max. 6 inputs*1 : FC08 head and FC03 head are applicable. 104 mm Max. 4 inputs*1 : FC08 head and FC03 head are applicable. ・3-slot Stick Feeder Max. 8 inputs*1 : FC08 head and FC03 head are applicable. *1 When it is Feeder cart both at front and rear. (You cannot use ITF with C-Cart Cart)
Single Tray Feeder	・Tray Pallet Max. 24 pallets : FC08 head and FC03 head are applicable.

Item		Specifications
Component Supply Unit (Auto Setting Feeder : ASF)	C-Cart34C*1	・Taping 8 mm Max. 68 inputs : Small reel Max. 34 inputs : Large reel 12 mm Max. 34 inputs 16 mm Max. 34 inputs 24 mm Max. 22 inputs 32 mm Max. 16 inputs 44 mm Max. 12 inputs 56 mm Max. 10 inputs 72 mm Max. 8 inputs : FC08 head and FC03 head are applicable. 88 mm Max. 6 inputs : FC08 head and FC03 head are applicable. 104 mm Max. 4 inputs : FC08 head and FC03 head are applicable. ・SF3 (Stick Feeder 3) Max. 8 inputs : FC08 head and FC03 head are applicable.
	C-Cart40C*1	・Taping 8 mm Max. 80 inputs : Small reel Max. 40 inputs : Large reel 12 mm Max. 40 inputs 16 mm Max. 40 inputs 24 mm Max. 26 inputs 32 mm Max. 20 inputs 44 mm Max. 16 inputs 56 mm Max. 12 inputs 72 mm Max. 10 inputs : FC08 head and FC03 head are applicable. 88 mm Max. 8 inputs : FC08 head and FC03 head are applicable. 104 mm Max. 6 inputs : FC08 head and FC03 head are applicable. ・SF3 (Stick Feeder 3) Max. 10 inputs : FC08 head and FC03 head are applicable.
	*1 When it is C-Cart at both front and rear. (You cannot use ASF with Feeder Cart) * You cannot choose the combination of C-Cart34C and C-Cart40C for the front and rear Supply Unit.	

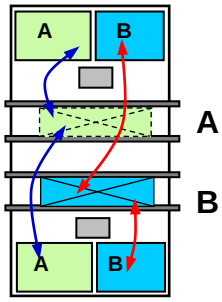
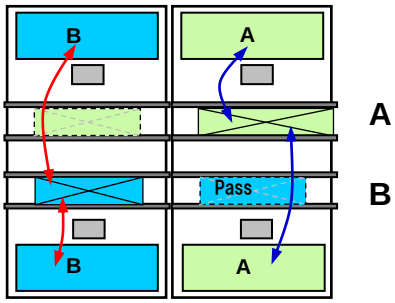
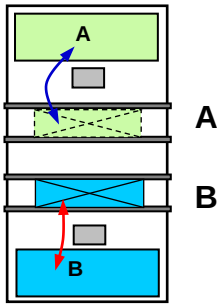
3.3 Placement mode

■ Single Lane Mode

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

■ Dual Lane Mode

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

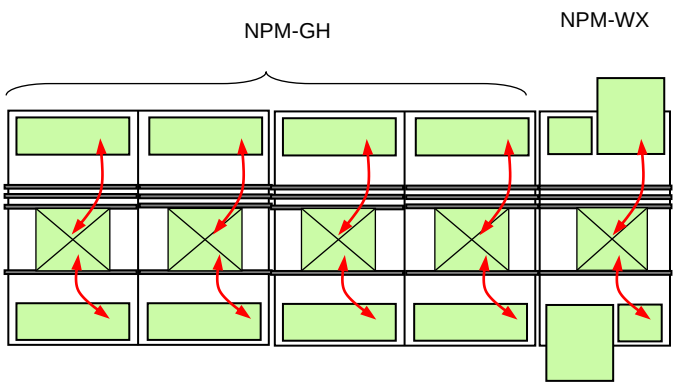
	Share mode	Share mode (front/rear)	Independent mode
Pattern			
Motion	Each head works on boards in both lanes. The heads, moving alternately, handle boards in one lane once completing production in the other lane.	< Share mode (front) > The front and rear heads are used to handle boards in the front 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 and feeder cart 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. *3

*1 It is not possible to work involving opening safety cover(operations such as support pin replacement manually).

The combination of placement modes allows NPM-GH to respond to the needs of your various production patterns. The following is an example when coupling with NPM-WX.

■ Large size PCB mounting line

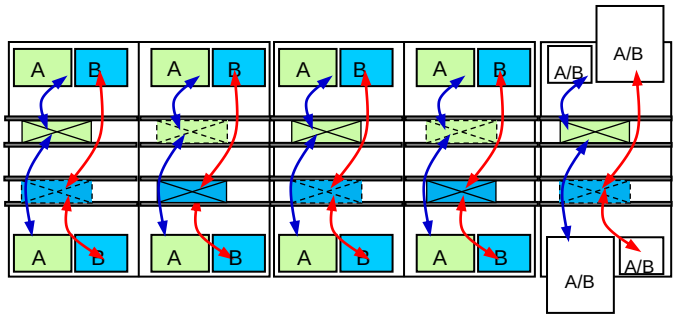
Share mode (Single lane)



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

■ High-efficiency mounting line

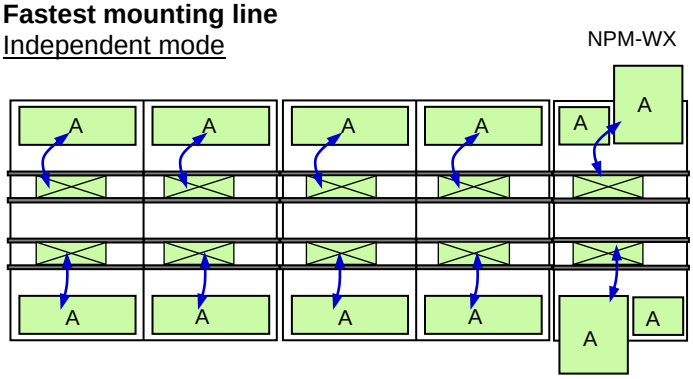
Share mode (Dual Lane Mode)



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

■ Fastest mounting line

Independent mode

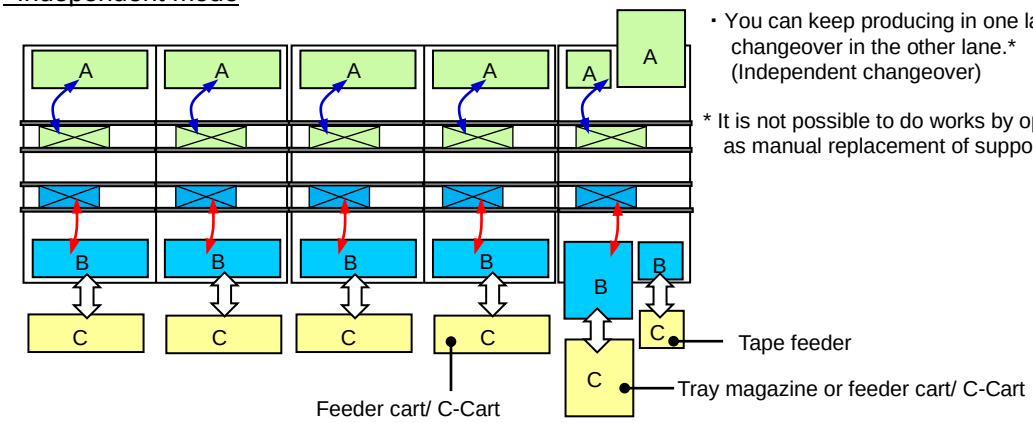


・Realizes the fastest placement of PCBs of a pattern at the fastest rate.

■ Non-stop changeover line

Independent mode

NPM-WX



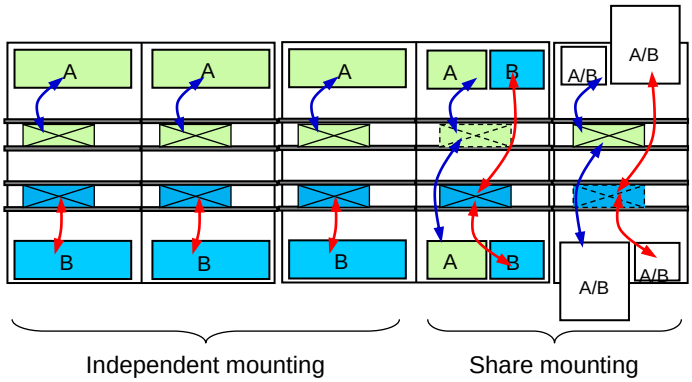
・You can keep producing in one lane while conducting a changeover in the other lane.*
(Independent changeover)

* It is not possible to do works by opening safety covers (such as manual replacement of support pins).

■ High-speed/High-efficiency mounting line

Independent mode plus Share mode

NPM-WX

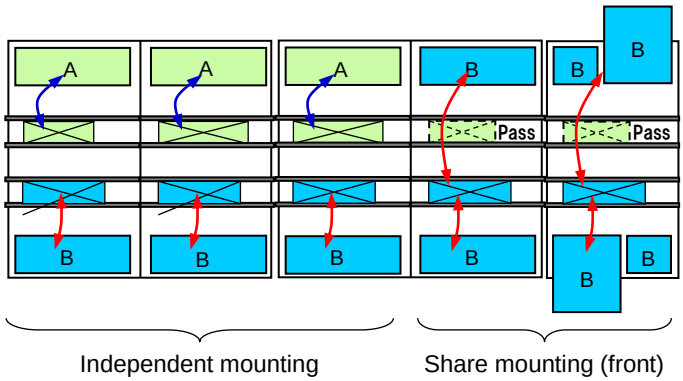


・Line configuration that utilizes the merits of Independent and alternate modes.
・Square chip components can be mounted faster, and atypical or tray components, more efficiently.

■ Imbalanced mounting line

Independent mode plus Share mode (front/ rear)

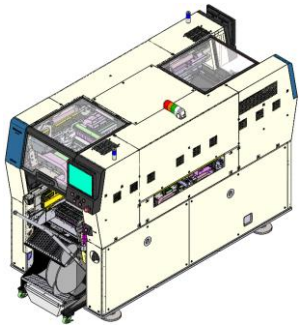
NPM-WX



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

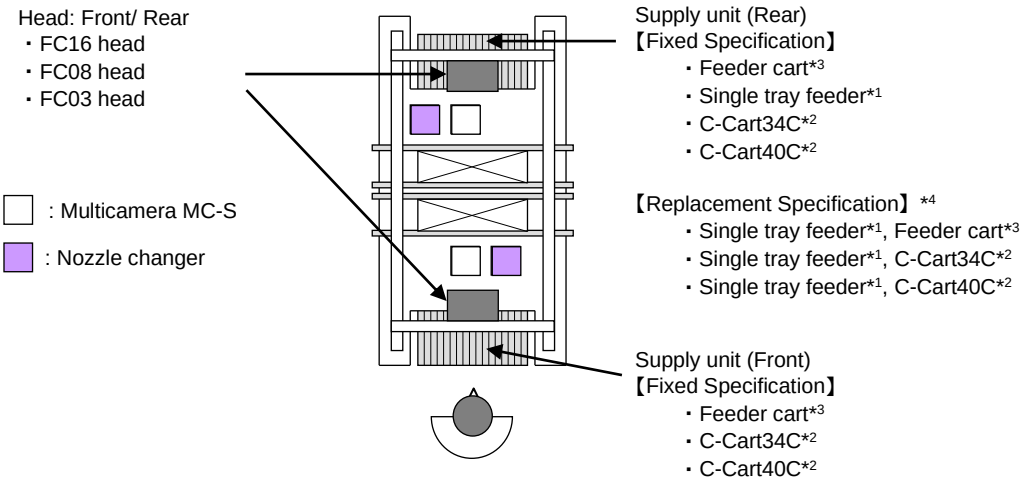
e.g.) PCB A: 300 placement points (Square chip components only)
PCB B: 600 placement points (Square chip components plus atypical components)

4. Machine Configuration



■ Placement configuration

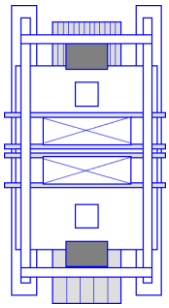
・Supply Unit



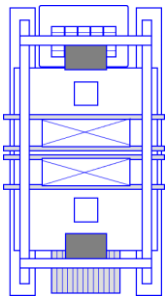
*1 Single tray feeder is for NPM-GH.
You cannot use already-existing NPM tray feeder or NPM-WX tray feeder.
*2 C-Cart is for ASF, Auto Setting Feeder.
You cannot use ITF, Intelligent Feeder.
*3 Feeder Cart is for ITF, Intelligent Feeder.
You cannot use ASF, Auto Setting Feeder.
*4 You can choose Feeder Cart, C-Cart34C, or C-Cart40C.
* Regardless whether in the front or in the rear, when you choose the Feeder Cart/ C-Cart34C specification, both Intelligent Tape Feeder, ITF, Feeder Cart and Auto Setting Feeder, ASF, C-Cart34C are connectable.

・Examples

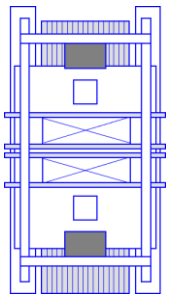
【Fixed Specification】*1*2
<Rear>C- Cart34C/ Feeder Cart
<Front>C- Cart34C/ Feeder Cart



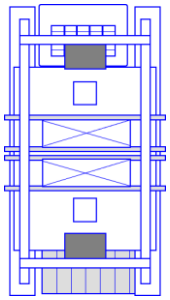
【Fixed Specification】
< Rear >Single Tray Feeder
< Front>C- Cart34C/ Feeder Cart



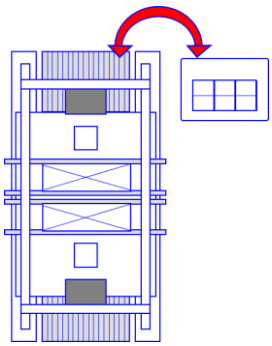
【Fixed Specification】*1
< Rear>C- Cart40C
< Front>C- Cart40C



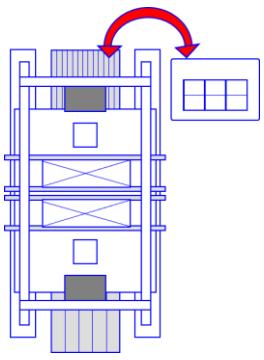
【Fixed Specification】
< Rear> Single Tray Feeder
< Front>C- Cart40C



【Replacement Specification】*1
< Rear> Single Tray Feeder
or C- Cart40C
< Front>C- Cart40C



【Replacement Specification】*1*2
< Rear> Single Tray Feeder
or C- Cart34C/ Feeder Cart)
< Front>C- Cart34C/ Feeder Cart)



*1 For the front and rear of the Supply Unit, Feeder Cart/C-Cart combination specification that the width is not the same does not exist.
(Front：C-Cart40C / Rear：Feeder Cart or C-Cart34C, etc.)
*2 Production with a different kind of feeders mixed for the front and rear, the combination of C-Cart34C and Feeder Cart, is acceptable.

■ Data creation

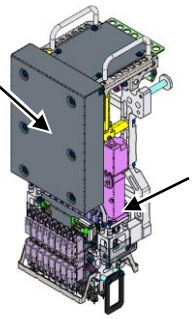
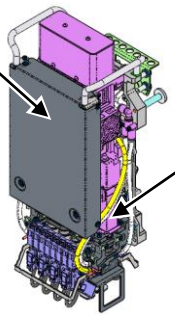
All data are created on NPM-DGS, the data creation system. (NPM-DGS is a separate product.)
The hardware for NPM-DGS should be prepared by yourself.

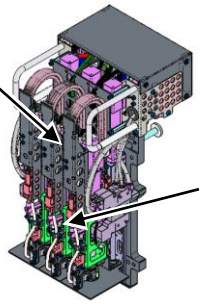
⁎⁎ Remarks ⁎⁎

- The special specifications may potentially not comply with the CE mark specifications.
- Floor slope in the feeder cart/ C-Cart installation area needs to be 6 mm or less on the left and right of a cart, and 11 mm or less in front of and behind of a cart. When floor slope is beyond the above limit, feeder cart/ C-Cart cannot be taken in or out.

4.1 Head Configuration

■ **Placement head**

FC16 head*1	FC08 head*1
Motor for vertical motion (Z-axis) (Inside the cover)  Motor for rotary (θ-axis)	Motor for vertical motion (Z-axis) (Inside the cover)  Motor for rotary (θ-axis)
Accessories: Nozzle changer unit (FC16) *2	Accessories: Nozzle changer unit (FC08) *2

FC03 head*1
Motor for vertical motion (Z-axis) (Inside the cover)  Motor for rotary (θ-axis)
Accessories: Nozzle changer unit (FC03) *2

*1 FC16 head, FC08 head and FC03 head are for NPM-G series only.
(You cannot load NPM series heads and NPM-X series heads onto NPM-G series)
*2 Nozzle changer is for NPM-G series only.
(You cannot load NPM series nozzle changer and NPM-X series nozzle changer onto NPM-G series).

**** Remarks ****

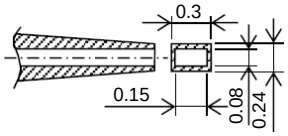
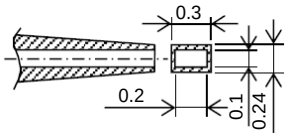
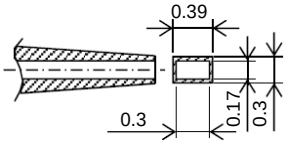
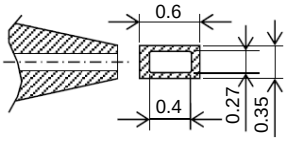
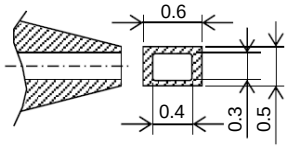
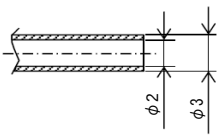
- The above accessories do not come together with spare head.
  When you select spare head, be sure to select options according to each head as well.
  Please refer to “9. Options” for details.

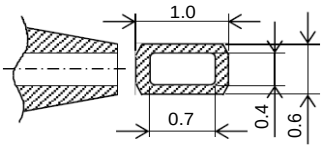
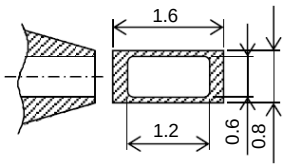
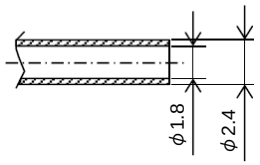
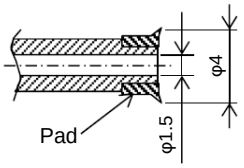
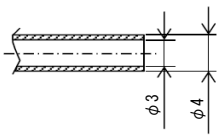
4.2 Nozzle Configuration

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 ceramic.
- The nozzles which include “N” in their No. are exclusively made for NPM series and NPM-X series with 2D code applied on flange area. 2D code nozzles verify nozzle No. and detect wrong nozzle setups.
- 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 FC16 head

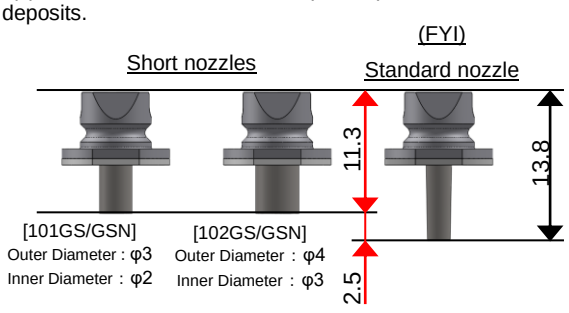
No.	Tip shape (Unit: mm)	Applicable component (Typical examples)
766CS 766CSN 150GCS 150GCSN*1		0201C
276CS 276CSN 151GCS 151GCSN*1		03015R
256CS 256CSN 152GCS 152GCSN*1		0402R/C
225CS 225CSN		0603R/C
226CS 226CSN		0603R/C 1005R/C
101GS 101GSN*2		Inductor 4532R/C 5848R/C Al electrolysis

No.	Tip shape (Unit: mm)	Applicable component (Typical examples)
230CS 230CSN		1005R/C 1608R/C
235CS 235CSN		1608R/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
102GS 102GSN*2		Inductor 4532R/C 5848R/C Al electrolysis

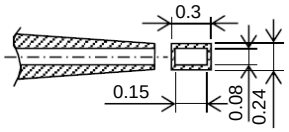
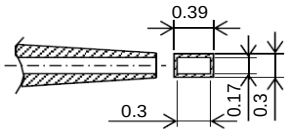
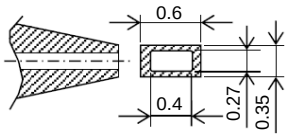
*1 150G/ 151G/ 152G are nozzles that O-rings are added to 766/ 276/ 256 nozzles respectively for enhancement of vacuum and mount detection. They are dedicated nozzles for FC16 nozzle head only. You cannot use with NPM or NPM-X series.

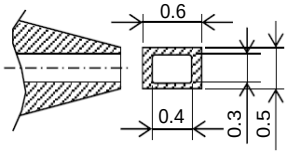
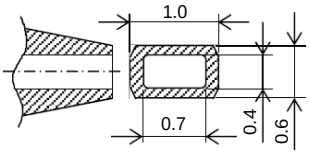
*2 101GS/GSN and 102GS/GSN are for FC16 nozzle head and are short nozzles.
When you use a short nozzle, there are restrictions, including the following (1) to (7). For the details, see the Chapter, Options.

(1) Measurement by nozzle recognition is not available, Unable to check for deposits.
(2) Pickup on concave surface is not allowed
(3) Short nozzle length is fixed to 11.3 mm
(4) Pressing force is ≦ 0.3 mm when components are picked up.
(5) Transparent recognition does not work
(Transparent recognition components are not available)
(6) LCR checker does not work.
(7) It is not compatible with FC16 nozzle head constant load control(License).



■ Nozzles for FC16 head（Low-load nozzles）

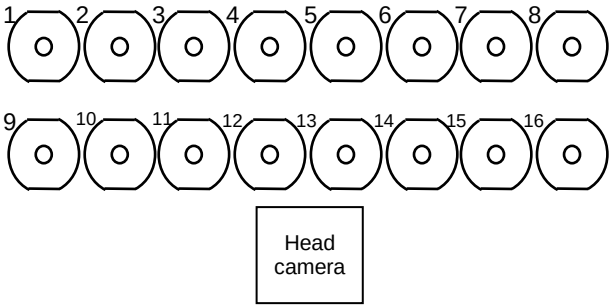
No.	Tip shapes (units: mm)	Applicable components (typical examples)
769CS 769CSN		0201C 03015R
281CS 281CSN		0402R/C
291CS 291CSN		0603R/C

No.	Tip shapes (units: mm)	Applicable components (typical examples)
275CS 275CSN		0603R/C 1005R/C
286CS 286CSN		1005R/C 1608R/C

* Notes.

- Low load nozzles are compatible with NPM-X series and NPM-G series.
- Accuracy inspections for low-load nozzles are necessary for machines that use low-load nozzles.

■ Nozzle layout for FC16 head



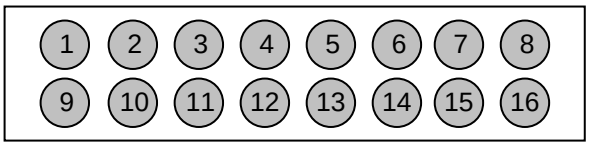
The layout and the maximum number of attachable nozzles for FC16 head
(The figures are seen from above.)

* Nine types of nozzles described in the previous page are standard nozzles for FC16 head.
  You can also use NPM series, NPM-X series Lightweight 16/ 16/ 12 nozzle head nozzle or CM series 12-nozzle head nozzle.
* You cannot use FC08 head nozzle, NPM series, NPM-X series Lightweight 8/ 8 nozzle head nozzle or CM series 8-nozzle head nozzle.
* Nozzles for AM100 cannot be used.

■ Pickup-ready component size and nozzle arrangement

The sizes of components that FC16 head can pick up are as follows. (●: Can pick up,○: Cannot pick up)

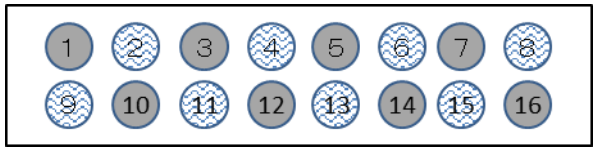
Components of 6 × 6 mm or less



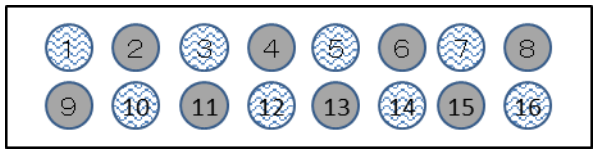
Here are examples of pickup patterns.
For more details about pickup patterns, contact us.

Components over 6 × 6 mm ～ up to 8.5 × 8.5 mm

Staggered Pickup

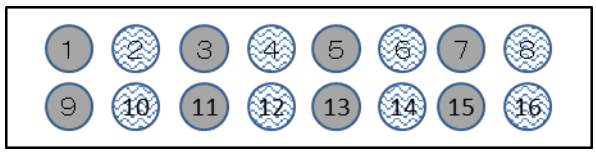


Component pickup dimension at ②, ④, ⑥, ⑧, ⑨, ⑪, ⑬, ⑮ is up to 3 × 3 mm.

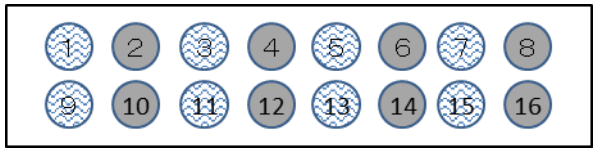


Component pickup dimension at ①, ③, ⑤, ⑦, ⑩, ⑫, ⑭, ⑯ is up to 3 × 3 mm.

When pickup is at the front and at the back

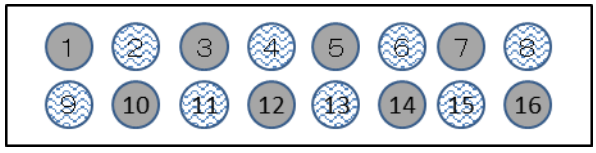


Component pickup dimension at ②, ④, ⑥, ⑧, ⑩, ⑫, ⑭, ⑯ is up to 3 × 3 mm.

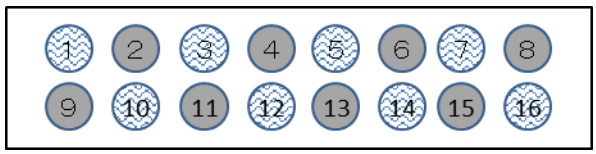


Component pickup dimension at ①, ③, ⑤, ⑦, ⑨, ⑪, ⑬, ⑮ is up to 3 × 3 mm.

Components over 8.5 × 8.5 mm ～ up to 10 × 10 mm (Staggered Pickup)

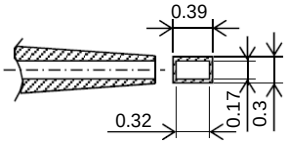
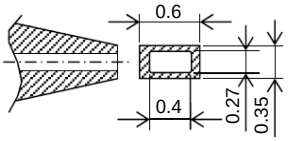
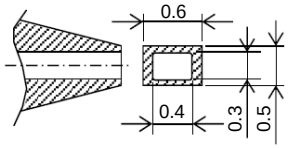
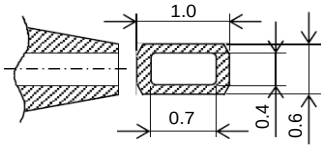
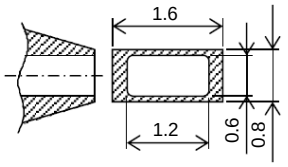


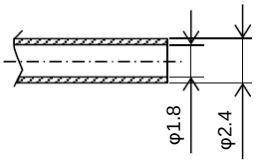
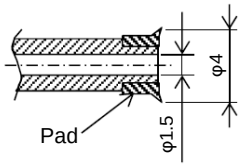
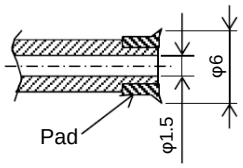
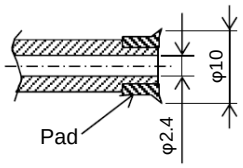
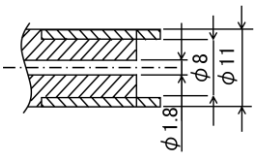
②, ④, ⑥, ⑧, ⑨, ⑪, ⑬, ⑮ do not pick up components.



①, ③, ⑤, ⑦, ⑩, ⑫, ⑭, ⑯ do not pick up components.

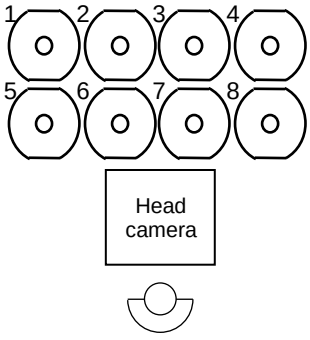
■ Nozzles for FC08 head

No.	Shape (Unit: mm)	Applicable component (Typical examples)
256C 256CN		0402R/C
225C 225CN		0603R/C
226C 226CN		0603R/C 1005R/C
230C 230CN		1005R/C 1608R/C
235C 235CN		1608R/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 ≀ 45 × 45 mm
360 360N		32 × 32 mm ≀ 45 × 45 mm

■ Nozzle layout for FC08 head

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



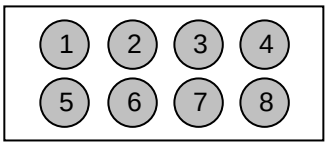
The layout and the maximum number of attachable nozzles for FC08 head
(The figures are seen from above.)

* Although the above ten types are standard nozzles for FC08 head, nozzles for 8-nozzle head for CM series can also be used. You can also use NPM series, NPM-X series Lightweight 8/ 8 nozzle head nozzle or CM series 8 nozzle head nozzle. (#450 nozzles and #460 nozzles cannot be used.)
* You cannot use FC16 head nozzle or NPM series, NPM-X series Lightweight 16/ 16/ 12 nozzle head nozzle.
* Nozzles for AM100 cannot be used.

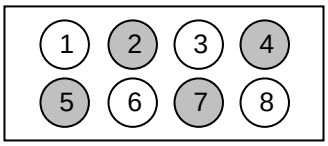
■ Pickup-ready component size and nozzle arrangement

The sizes of components that FC08 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.

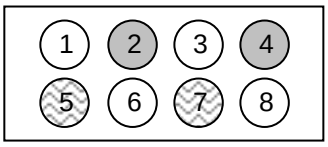
Components of 12 × 12 mm or less



Exceeding 12 × 12 mm to 18 × 18 mm

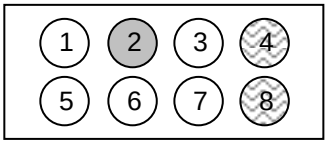


Exceeding 18 × 18 mm to 24 × 24 mm



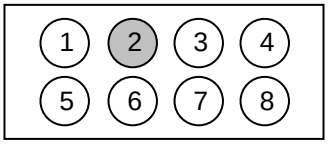
(5) and (7) can be picked up a component of less than 12 × 12 mm

Exceeding 24 × 24 mm to 28 × 28 mm



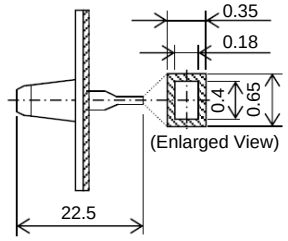
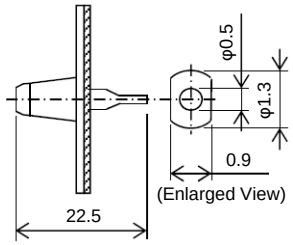
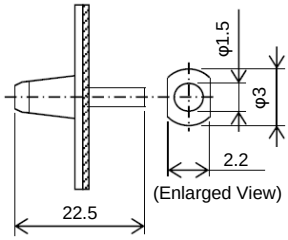
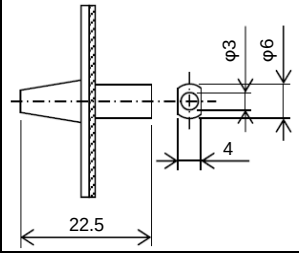
(3) and (8) can be picked up a component of less than 12 × 12 mm

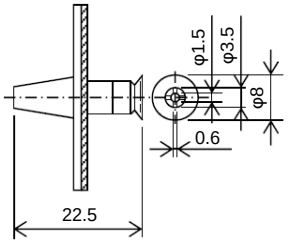
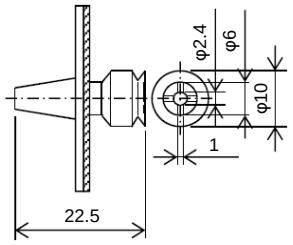
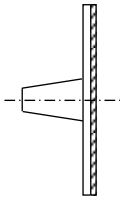
Exceeding 28 × 28 mm to 45 × 45 mm or 100× 40 mm



■ Nozzles for FC03 head

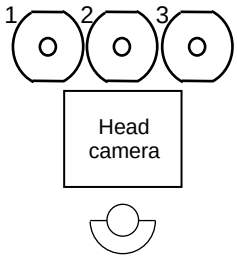
Special nozzles can support the components whose pickup surface's shape is special such as irregular shaped chips. For details, please consult us.

No.	Shape (Unit: mm)	Applicable component (Typical examples)	Max. component mass
1582 1582N		0603R/C (0201" R/C)	0.007 g
1001 1001N 4528*1 4528N *1		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 1385*1 1385N *1		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. *For details, see the Pickup-ready component size and nozzle arrangement.	

* From the perspective of productivity, we recommend using FC16 head or FC08 head for 0603 components.
*1 Nozzle tip is metal processed, and it achieves highly accurate nozzle height detection.

■ Nozzle layout for FC03 head

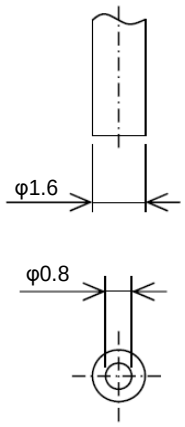
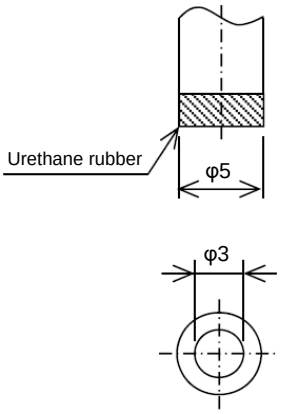
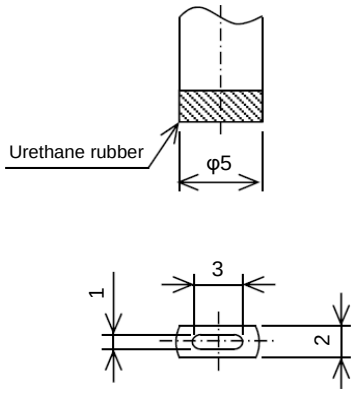


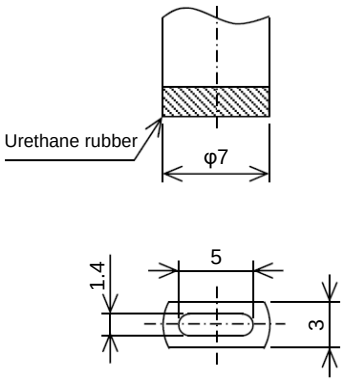
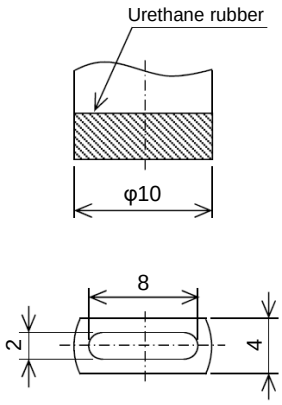
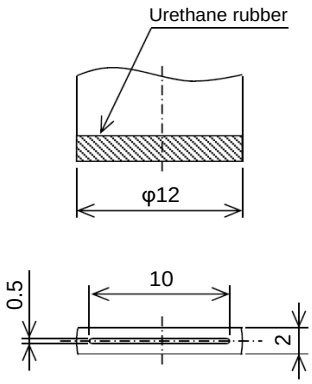
The layout and the maximum number of attachable nozzles for FC03 head
(The figures are seen from above.)

* Nozzles for AM100 cannot be used.

■ Nozzles for FC03 head (For odd-shaped components)

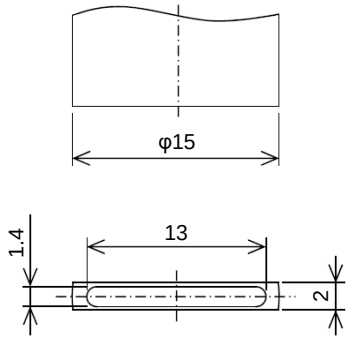
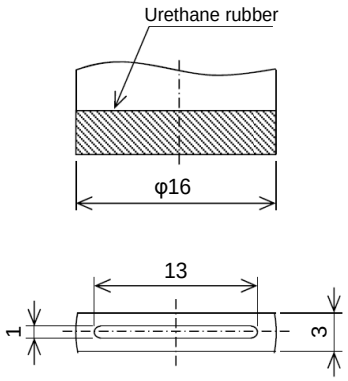
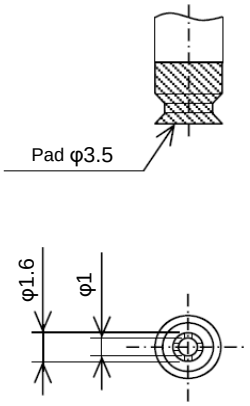
* The product number should be used for order placements.

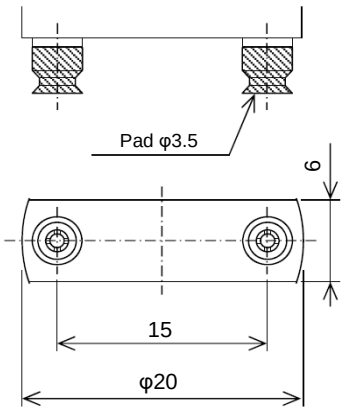
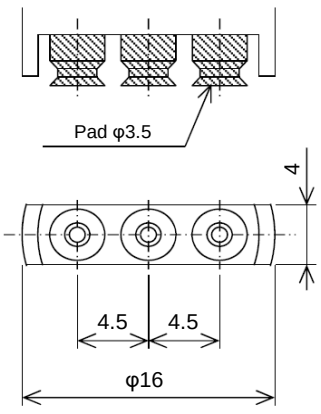
Nozzle No.	1551 / 1551N	1479 / 1479N	2405 / 2405N
Product number	KXFX05J7A00 N610127747AA (With 2D code)	KXFX05ASA00 N610117226AA (With 2D code)	KXFX05BVA00 N610117223AA (With 2D code)
Shape (Unit: mm)			
Max. component mass	0.12 g	3.5 g	1.5 g
Max. component height	28 mm	25.5 mm	28 mm
Remarks	Nozzle 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	28 mm	28 mm	28 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 FC03 head (For odd-shaped components)

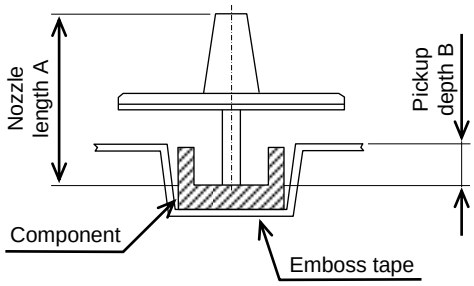
* The product number should be used for order placements.

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	28 mm	28 mm	28 mm
Remarks	Nozzle length: 22.5 mm	With a urethane rubber Nozzle length: 22.5 mm	With NBR 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	28 mm	28 mm
Remarks	With NBR pad Nozzle length: 22.5 mm	With NBR pad Nozzle length: 22.5 mm

■ **Correspondence between the pickup depth of electronic components and nozzle length**

Necessary nozzle length varies according to the pickup depth (distance from top of embossed tape to pickup surface) of electronic component to be placed.



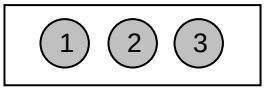
Pickup depth B	0 mm to below 3 mm	3 mm to below 8 mm	8 mm to below 13 mm
Nozzle length A	22.5 mm	27.5 mm	32.5 mm

* The list above is limited to 4/ 3 nozzle head.

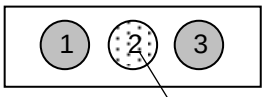
■ Pickup-ready component size and nozzle arrangements

The sizes*1 of components that FC03 head can pick up are as follows. (●: Can pick up, ○: Cannot pick up)

- Component of diagonal 41 mm (29 × 29 mm)*2 or less and 35 mm or less in length (L).
- Component of diagonal 47 mm (33 × 33 mm)*2 or less, 38 mm or less in L and t ≦18.5 mm or less.

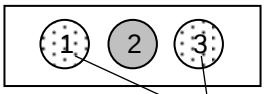


- Component of diagonal 76 mm (54 × 54 mm)*2 or less and 65 mm or less in L.



#1006 nozzle (reflector)*3

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



#1006 nozzle (reflector)*3

*1 Applicable component size in the recognition using transillumination is limited to ☐30 mm or smaller.
For components larger than ☐30 mm, contact us.

*2 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.

*3 At transparent recognition, install #1006 nozzle(reflector).

4.3 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 traceability and etc. According to the tape width, each group is classified as shown below.

Feed pitch is automatically set according to production data.

Feeder Type		Type	Setting Pitch	Emboss Maximum Depth	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*3 (No detection sensor)		Emboss	10.5 mm	0.5 mm	Small	68*7	○ 1 mm															
8 mm thin type single*2*3		Paper/ Emboss		3 mm	Small	68*7	○ 1 mm	○	○													
					Large	34*7																
8 mm double*2*4			21 mm		Small	68*7	○ 1 mm	○	○													
					Large	34*7																
8 mm double for 0402 *2*4					Small	68*7		○	○													
					Large	34*7																
12/ 16 mm*7	12 mm	Emboss	21 mm	15 mm	Small	34*7			○	○	○	○										
					Large																	
	16 mm				Large	34*5*7																
24/ 32 mm			42 mm	26 mm*6	Large	16*7			○	○	○	○	○	○	○	○						
44/ 56 mm			63 mm			10*7				○	○	○	○	○	○	○	○	○	○	○	○	○
72 mm			84 mm	21 mm		8*7				○	○	○	○	○	○	○	○	○	○	○	○	○
88 mm (With detection sensor)			105 mm	21 mm		6*7				○	○	○	○	○	○	○	○	○	○	○	○	○
104 mm (With detection sensor)			126 mm			4*7				○	○	○	○	○	○	○	○	○	○	○	○	○

*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.
Use thin feeder attachment released after 2016 July as well as NPM-X series.
For further details, please refer to “9. Options B-3”.
*3 If you want to use IFCU to check thin type tape feeders, please contact us for details.
*4 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.
*5 Depending on the width of reels, the maximum setting count may be reduced.
*6 When emboss depth of components is over 21 mm, you need to make modifications to the feeder cart. (Custom specifications)
Applicable emboss depth after modification: Max. 26 mm
*7 It is the maximum number of setting reels when cart(Optional) is connected at both front and rear.

⁎⁎ 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.

■ ASF（Auto Setting Feeder）

This is a feeder that has auto setting of tape components.
When you want to set components, all you need is to put components(tapes) in and press the Feeding button, and that reduces changeover time significantly. (Reduced 30 seconds approximately per one feeder to 15 seconds approximately) In addition, you can connect an optional LU(Loading Unit) to insert the next tape components beforehand while production running. It is possible to detect the current tape end and feed the next tape components automatically.
You do not have to splice tapes, and that prevents error stop caused by mistakes associated with splicing.
LU differs by the tape width as well as ASF.

Feeder Type	Type	Setting Pitch (mm)	Emboss Maximum Depth (mm)	Reel Diameter*1	Maximum Setting Reel*2		Feed Pitch (1 pitch = 4 mm)																	
					C-Cart34 C	C-Cart40 C	0.25	0.5	1	2	3	4	5	6	7	8	9	10	11	12	13	14
ASF08*3	Paper Embossed	10.5	3	Smal	68	80	○ 1 mm	○	○													
				Large	34	40																
ASF12	Embossed	21	21	Smal	34	40			○	○	○											
				Large																		
ASF16				Large	34*4	40*4			○	○	○	○										
ASF24		31.5			22	26			○	○	○	○	○	○								
ASF32		42	26		16	20				○	○	○	○	○	○	○						
ASF44*5		52.5			12	16				○	○	○	○	○	○	○	○	○	○			
ASF56*5		63			10	12				○	○	○	○	○	○	○	○	○	○	○	○	○
ASF72*5		84			8	10				○	○	○	○	○	○	○	○	○	○	○	○	○
ASF88*5		94.5			6	8				○	○	○	○	○	○	○	○	○	○	○	○	○
ASF104*5		115.5			4	6				○	○	○	○	○	○	○	○	○	○	○	○	○

*1 Small Reel: ϕ178 mm, Large Reel: ϕ178 mm - ϕ382 mm
*2 It is the maximum number of setting reels when C-Cart (Optional) is connected at both front and rear.
*3 You cannot set both small reels and large reels in the same slot reel unit.
*4 Depending on the reel width, the maximum setting count may be reduced.
*5 When feed pitch is 9 pitch and over, you need to replace a tape press cover.

Constraints 1

Here is constrains about ASF.

ASF Common

Item		Constraint Description
1	Tape Thickness	0.2 mm and thicker
2	Embossed Tape Boss Thickness	3.0mm and thinner ：8mm width 21mm and thinner：12-24mm width 26mm and thinner：32mm width and wider
3	Carrier Tape Minimum Bend Radius	For smooth carrier tape feeding, use the following reference: Carrier tape surface circumradius is smaller than 80 mm. ・Even when boss thickness for carrier tape dimensions is within specification, due to the length on the front and back of the pockets, and their pitch, it may not have necessary minimum bend radius. ・When minimum bend radius is large, components become unstable at the pickup position, and that affects picking up. In that case, we will suggest nozzles separately.
4	Loss Chip	When you remove a tape being used from a feeder, peel area that is from the point where cover tape was peeled to pickup position is target for cover tape peeling. It is difficult to reuse components.
5	Sticky Type Cover Tape	Not Available (Causes clogging of the cover tape storage box. Continuous production is not available)
6	Tape Pull Force	Up to 5 N (Sliding in delivering usable tapes)
7	Tape Front End Processing	When tape front end processing applies to the following conditions, auto peeling may not be available. ・Cover tape front end is extremely warped. ・Cover tape is peeled off from carrier tape front end. ・When inserted to a feeder with cover tape front end folded upward or folded downward
8	Cover Tape Rigidity	When cover tape rigidity is too strong or too weak, auto peeling may not be available.
9	Component Packaging Material Quality	When carrier tape applies to the following, it may reduce absorption rate. ・Components are stuck to carrier tape. ・Paper carrier tapes with a lot of fuzzies when removing cover tape
10	How To Fix Back End of Carrier Tape	When tape back end is stuck to a reel with sticky tape or another tape, error may occur.(You can avoid error if you cut off back end)
11	Carrier Tape Back End Shape	・On the tape back end, when cover tape is longer than carrier tape, it is necessary to cut cover tape to the same length as carrier tape. ・When it has a strong curl, that becomes a clogging factor to C-Cart tape chute. It is necessary to separate by cutting off the trailer of tape back end.

Constraints 2

Here is constrains about ASF.

ASF：Standard Specification(LU Not Added), Auto Set Specification(LU Added)

Item		Constraint Description	
		Standard Specification(LU Not Added)	Auto Set Specification(LU Added)
1	Tape Length	At least 330 mm *When you use the Component Verification feature, you need a reel.	At least 480 mm Spliced tapes are not available. *When you use the Component Verification feature, you need a reel.
2	Splicing Position Detection	Dedicated splicing tape(Blue) is necessary.	* Spliced tapes are not available.
3	Constraints When Using Splicing Tapes	When component color is the same as splicing tapes, component length is limited to 20 mm and shorter.	
4	Tape Splicing with Caulking Jig	Metal caulking jig is not available for ASF08-24 mm feeder	
5	Back End Length		・Trailer length needs at least 60 mm. ・No constraints when the last component to tape back end is the Taping Specification with equal to or shorter than 360 mm. ●ASF08 In the Taping Specification with over 360 mm to equal to or shorter than 760 mm, availability depends on the machine setting. In the Taping Specification with over 760 mm, Component Shortage Error occurs. ●ASF12-ASF104 In the taping Specification with over 360 mm, Component Shortage Error occurs.
6	Old and New Tapes Automatic Replacement		Automatic replacement is not available in the following conditions. ・”Pickup Error Stop” is set to “1” as Mount Condition data, and you do not enter Remaining Component Quantity ・When you entered the value not equal to actual Remaining Component Quantity
7	Next Reel Arrangement		・For the next reel arrangement, you need to expand a reel holder. (Individual Basis) ・Needs to place the next reel on the same slot as LU. (When you place the next reel and the current reel side by side) *In the operation that you replace the current reel with the next reel, holder installation is not necessary.

Tape End Processing(Leader)

Tape leader processing must meet the following conditions for tape component auto setting with ASF.

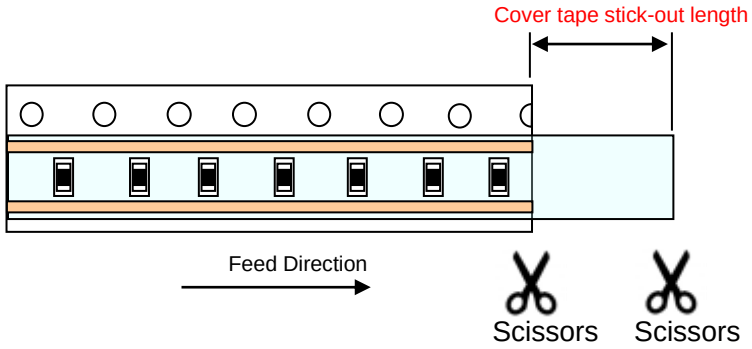
(Where to cut at the leader)
Before putting tapes in ASF, cut it at the leader with scissors as shown below.
(Cut a 90-degree angle for preventing peeling mistakes and tape replacement errors)

＜Equal to or Narrower Than 1 pitch and odd-numbered pitch＞

(Pitch of 1 mm, 2 mm, 4 mm, 12 mm, 20 mm, 28 mm, 36 mm, 44 mm, 52 mm)

① Cut at a centered feeding hole between carrier tape pockets. Do not cut off cover tape.

② Cut from carrier tape end with cover tape sticking out as shown below.
See ASF Specifications for cover tape stick-out length.

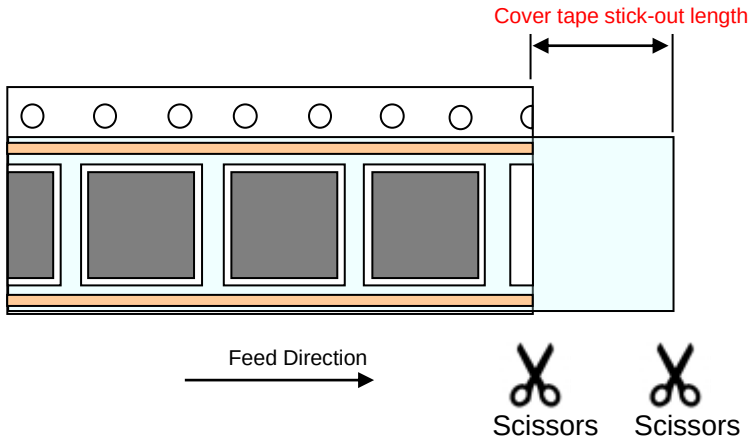


＜Even-numbered pitch＞

(Pitch of 8 mm, 16 mm, 24 mm, 32 mm, 40 mm, 48 mm, 56 mm)

① Cut from the center of carrier tape pocket, along the feeding hole right in front of it.
Do not cut off cover tape.

② Cut from carrier tape end with cover tape sticking out as shown below.
See ASF Specifications for cover tape stick-out length.

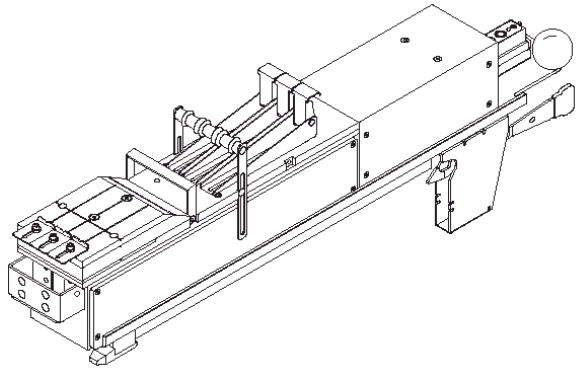


■ Stick Feeder

Stick feeders supply components by vibration.
Stick feeders have 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 FC08 head・FC03 head)

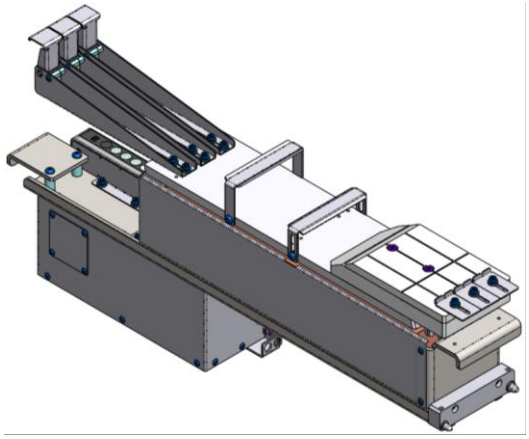
*1 It supports not only SOP, SOJ, and PLCC but also odd-shaped components such as connectors.
*2 With the feeding method that cuts out stick tips (see below), it can feed components as soon as you get them.
*3 It needs no particular maintenance except for cleaning such as dust removing.

・3-slot Stick Feeder[*4]



	3-slot Stick Feeder
Setting pitch	84 mm
Maximum number of setting feeders	8 inputs

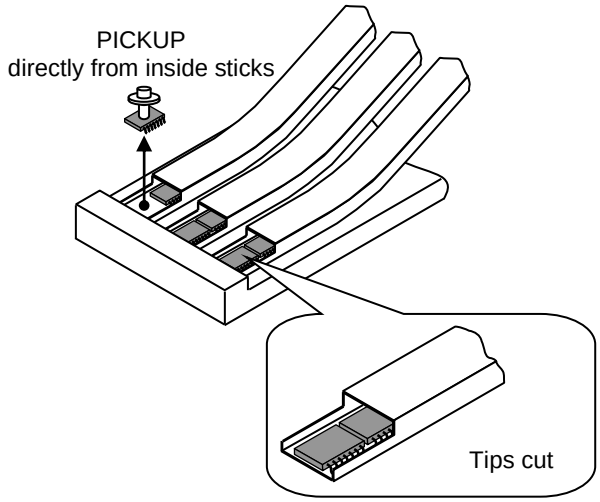
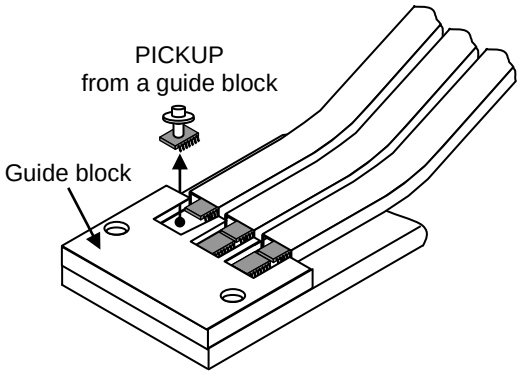
・SF3 (Stick Feeder3)[*5]



	SF3 (Stick Feeder 3)
Setting pitch	84 mm
Maximum number of setting feeders	10 inputs (When C-Cart40C installed) 8 inputs (When C-Cart34C installed)

*4 3-slot stick feeder is for Feeder Cart only. Use SF3 when cart is C-Cart.
*5 SF3 is for C-Car only. Use 3-slot stick feeder cart when cart is Feeder Cart.

Component feeding methods

Feeding with stick tips cut out	Feeding with a guide block (Individual Specification)
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. Guide blocks are created separately according to the component dimensions to be used. Guide block design method is open to the public, and you can design on your end. For details, contact us. 

Applicable components

Standard	Special
SOP, SOJ, PLCC	Except for the standard component types and dimension ranges, 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.

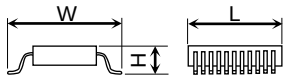
(All dimensions in mm)

	W	L	H
Min	8	9	2.5
Max	31	31	6

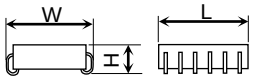
(All dimensions in mm)

	W	L	H
Min	-	-	-
Max	31	60	25

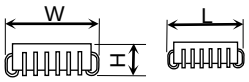
SOP



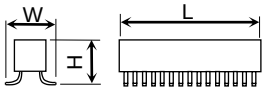
SOJ



PLCC



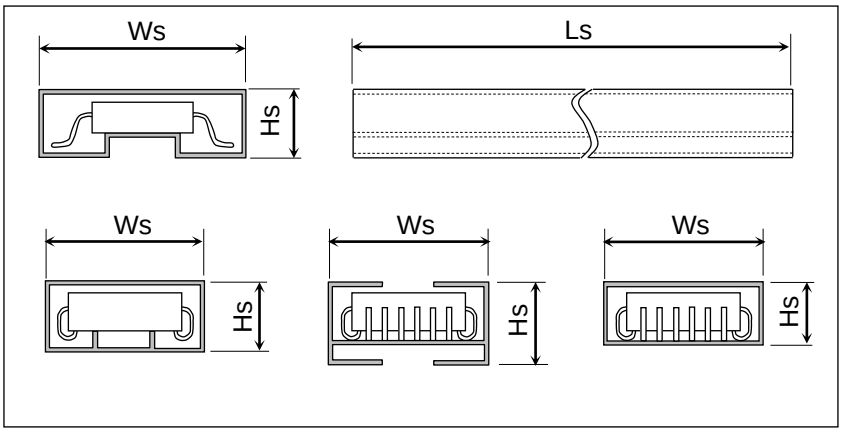
Connector



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 Table 2, whichever has less number, for the number of attachable sticks.

Table 1

	Stick width Ws (mm)	The Number of attachable sticks
3-slot Stick Feeder	Ws ≦ 19	3
	19 ＜ Ws ≦ 28	2
	28 ＜ Ws ≦ 34	1
SF3	Ws ≦ 19	3
	19 ＜ Ws ≦ 28	2
	28 ＜ Ws ≦ 34	1

Table 2

	Stick width W (mm)	The Number of attachable sticks
3-slot Stick Feeder	W ≦ 16	3
	16 ＜ W ≦ 25	2
	25 ＜ W ≦ 31	1
SF3	W ≦ 16	3
	16 ＜ W ≦ 25	2
	25 ＜ W ≦ 31	1

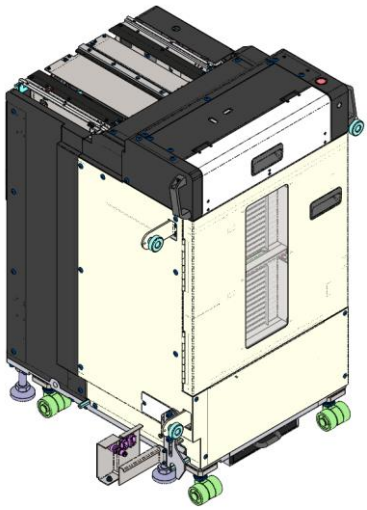
* In principle, production must be limited only for one type product when you attach multiple sticks on 3-lot stick feeder or SF3. Production for different type products is available with limitations of the shape and dimension of sticks. For details, please consult us.

■ Tray Feeder

Tray feeder can be connected to the rear side of NPM-GH.

• Single tray feeder (Max. 24)

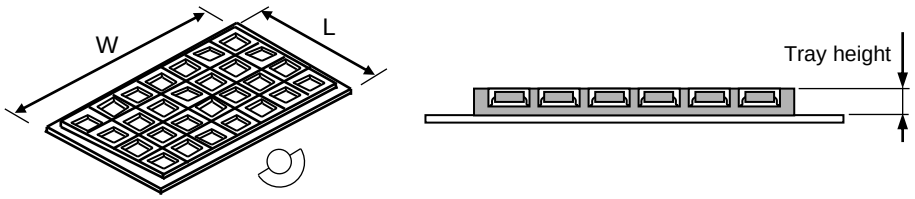
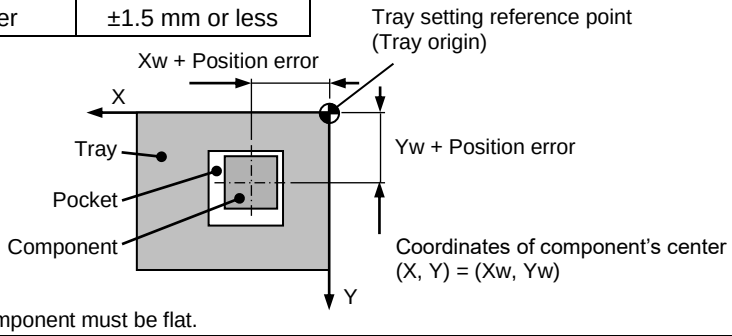
Applicable head: FC08 head, FC03 head

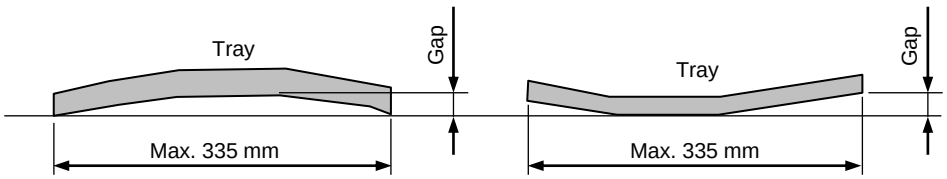


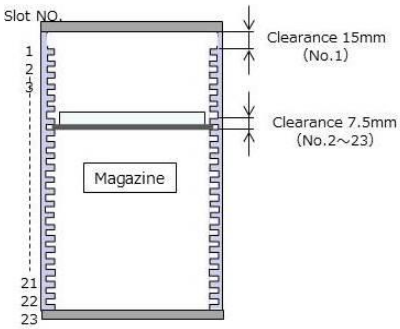
Single tray feeder*

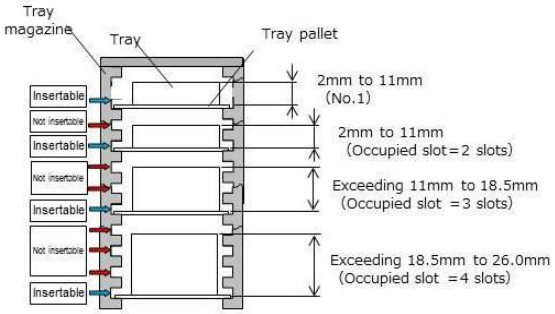
* NPM-GH single tray feeder is for NPM-GH only, and is not compatible with NPM series or NPM-X series.
* You can use pallets and magazine used in NPM-WX single tray feeder, but you cannot use ones used in NPM series single tray feeder.

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 ~ 50 mm
* When trays higher than 33mm 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">Tray + components = Max. 1.0 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>
</table>

<table>
<tr><th colspan="2">Items</th><th>Specifications</th></tr>
<tr><td>Pallet in-sertion limitations</td><td>Single tray feeder</td><td>




Slot pitch of 7.5mm
However, slot No.1 has clearance of 15mm.

Relation between insertable tray thickness and and necessary quantity of slots
<table>
<tr><th>Occupied slot quantity</th><th>Insertable tray thickness</th></tr>
<tr><td>2</td><td>2mm to 11.0mm</td></tr>
<tr><td>3</td><td>Exceeding 11.0mm to 18.5mm</td></tr>
<tr><td>4</td><td>Exceeding 18.5mm to 26.0mm</td></tr>
<tr><td>5</td><td>Exceeding 26.0mm to 33.5mm</td></tr>
<tr><td>6</td><td>Exceeding 33.5mm to 41.0mm</td></tr>
<tr><td>7</td><td>Exceeding 41.0mm to 48.5mm</td></tr>
<tr><td>8</td><td>Exceeding 48.5mm to 56.0mm</td></tr>
</table>

See the table below when using slot No.1.
<table>
<tr><th>Occupied slot No.</th><th>(Occupied slot quantity)</th><th>Insertable tray thickness</th></tr>
<tr><td>No.1</td><td>1</td><td>2.0mm to 11.0mm</td></tr>
<tr><td>No.1～2</td><td>2</td><td>Exceeding 11.0mm to 18.5mm</td></tr>
<tr><td>No.1～3</td><td>3</td><td>Exceeding 18.5mm to 26.0mm</td></tr>
<tr><td>No.1～4</td><td>4</td><td>Exceeding 26.0mm to 33.5mm</td></tr>
<tr><td>No.1～5</td><td>5</td><td>Exceeding 33.5mm to 41.0mm</td></tr>
<tr><td>No.1～6</td><td>6</td><td>Exceeding 41.0mm to 48.5mm</td></tr>
<tr><td>No.1～7</td><td>7</td><td>Exceeding 48.5mm to 56.0mm</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Supplying speed</td><td>・Supplying speed for each tray component is selectable from 3 kinds: Low speed, Medium speed, or High speed. (Standard : Low speed)
* Note：According to the component height, tray components may be fallen down at Medium speed or High speed.</td></tr>
</table>

4.4 Line Configuration

Regardless of a stand-alone installment or a line connection, FA PC is needed to set up NPM-GH.

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:

Model Name	FC-E20W series (Made by NEC)
Storage	SSD500GB 2 units RAID1 specification
OS	Miracle Linux (Version 8)
Outside dimension	W 100 × D 360 × H 310 mm
Mass	11.0 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-1016L (made by D-Link) In accordance with laws and regulations, when the following countries are the destination or the place where to put, read the recommended type carefully India：DGS-1016D (Made by D-Link India)

* Please prepare the LAN cable by yourself.

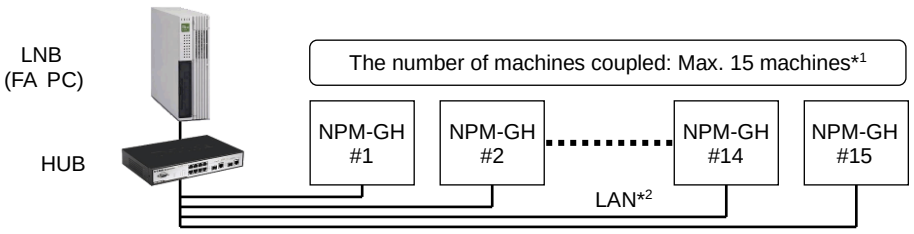
・LNB(Line Network Box)
LNB (Line Network Box) is a relay system connecting the machine and NPM-DGS (Data Creation System), being installed on the FA PC. It handles multiple machines as a line; thereby centrally managing information, downloading production data, and compiling production management information.
(This software is included in the NPM-GH 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. Google Chrome(the latest version recommended) is required for access.
Please refer to “NPM-DGS Specification booklet” for details.

■ Examples of system configuration (Line configuration of NPM-GH, NPM-X series)



*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: At least Enhanced Category 5e STP cable

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.

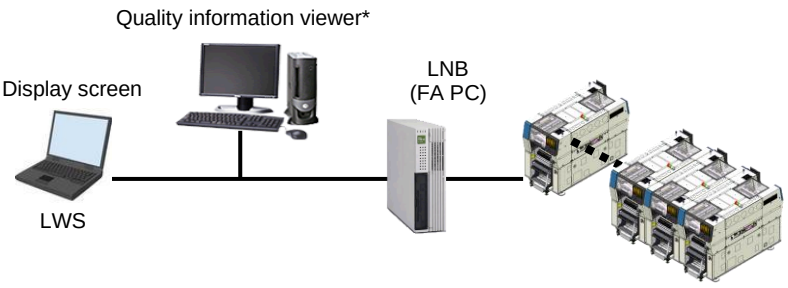
Links defect points to quality information when NPM-series with our inspection head is connected and doing component inspections.

Main features:

Gathers/Stores weekly quality information

Displays quality information to LWS

Example of system



* Please prepare a PC on your own. It cannot be shared with NPM-DGS.
This software is included in the NPM-GH 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® 11 Pro Microsoft® Windows® 10 Pro (64-bit version)	Required
	Support language	English, Chinese, Japanese	
	Framework	Microsoft® .Net Framework 3.5	
Virus check		Virus Buster™ Program version 7.0	Recommended

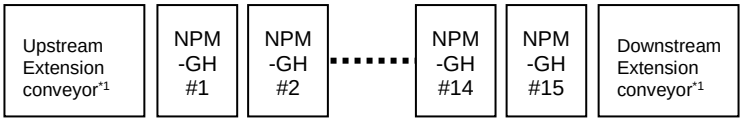
■ Examples of line configuration (Transfer direction: left to right flow sample).

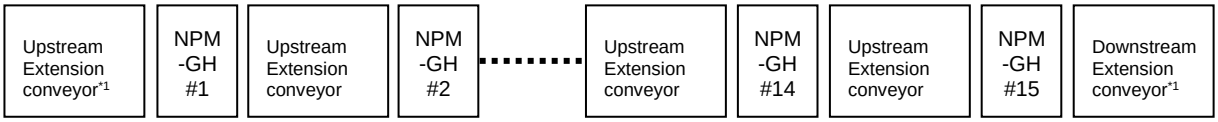
The line configuration of NPM-GH and the location of extension conveyors and others are as follows.
Extension conveyor must be required for the first (left) and last (right) NPM-GH to ensure the safety of the transfer opening.
When installing an extension conveyor between NPM-GH, choose upstream extension conveyor.

1. NPM-GH, or mixed line with NPM-DX, WX, NPM-D3A/ D3/ D2/ D,NPM-TT2/TT

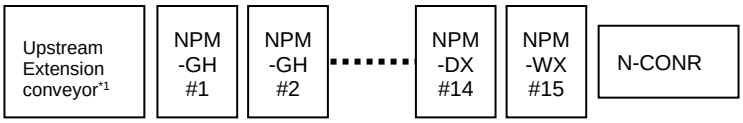
(The number of machines to be coupled is 15 or less, and the coupled stage is 30 or less)

1.1 Line configuration only with NPM-GH



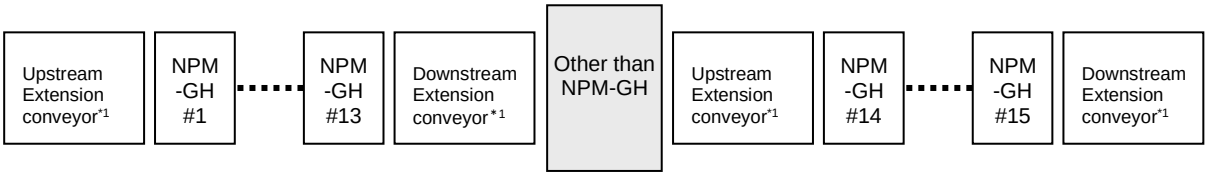


1.2 Mixed line with NPM-DX/ WX/ D3A/ D3/ D2/ D or NPM-TT



2. Line configuration including a machine other than NPM-GH, NPM-DX,WX/ WXS, NPM- D3A/ D3/ D2/ D,NPM-TT2/ TT*

Select either extension conveyor or conveyor(N-CONL, R) at a location next to a machine other than NPM-GH, DX, NPM-WX/WXS, NPM-D3A/ D3/ D2/ D, NPM-TT2/ TT.



* The above line configuration is a sample. It may differ depending on your system configuration. Please contact us for details.
* When you connect to NPM-W2/ W2S/ W, you need a traverser between mounters.
You cannot connect to NPM (NM-EJM9B series).
*1 You can use conveyor(N-CONL, R) as well.

■ Requirements in Mixed Lines

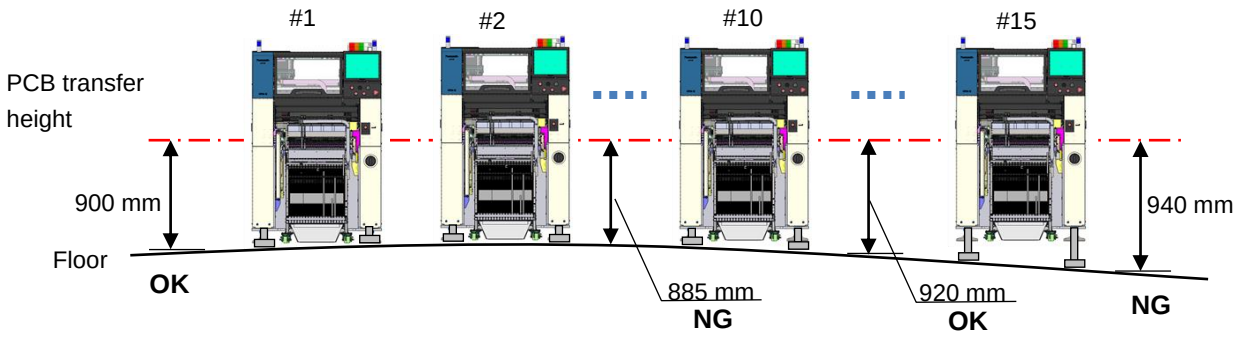
When you use NPM-GH in the mixed line with NPM series or X series, software version must meet the following requirements.

Software	NPM-GH	NPM-X series	NPM series
DGS	V10.19.00A or later		
LNB*1	V10.19.xx or later		
Mounter*2	V3.19.xx or later	V2.19.xx or later	V10.19.xx or later

*1 LNB's FA-PC is FC-27B or later.
*2 It is required to update to D7 board or later when a machine is loaded with an NPM-S/ -D D5 board.
Depending on individual specification circumstances, you may have trouble even in the above versions.
For the details, contact us.

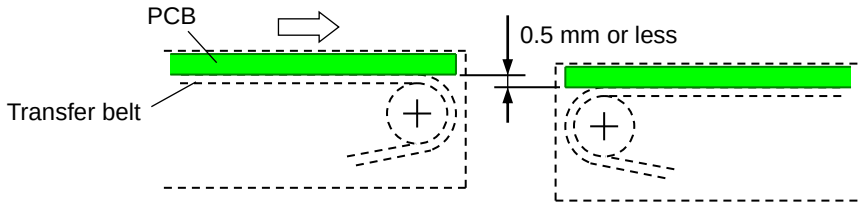
■ PCB transfer height

The standard NPM-GH PCB transfer height is 900 mm to 920 mm.
The PCB transfer height of the production line may differ based on your factory conditions.
The picture #2, #15 below shows a feeder cart/ C-Cart may not be able to be connected properly.
Please contact us if all the NPM-GH transfer heights in a production line are not 900 mm to 920 mm.



■ Height difference between PCB transfer units

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



4.5 Recognition Unit Configuration

■ **Head camera**

• Field of view: 10.24 × 10.24 mm
(For information about the PCB recognition mark dimensions, please refer to “7. PCB Design Standard.”)

■ **Multicamera(MC-S): Type 1**

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

Recognition method	Recognition speed	Applicable Component
Batch recognition	High	General chip components including the square chips measuring 0201*2 or over. BGA, CSP, QFP, SOP, and connector etc. *2 When "0201 placement support" is selected.

* NPM-GH Multicamera(MC-S) may not be compatible with Multicamera Parts Library belonging to mounters after NPM-DX, WX/WXS, NPM-D3A/ D3, NPM-W2/ W2S, NPM-TT2, and may not be compatible with Line Camera Parts Library belonging to mounters before them. (When you use the recognition option, such as brightness check)
* As for installation, NPM-GH is not compatible with conventional recognition cameras. Parts Library may not be compatible.

Recognition conditions of QFP (Multicamera MC-S：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.)

	FC16 head	FC08 head	FC 03 head
Outside dimensions	See “3.2 Standard Functions”.*1		
Thickness			
Lead pitch	0.4 mm or over		
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 short side of component outer dimensions exceeds 45 mm × 45 mm, it is split recognition.
* For information about the components that are not conforming to the above specifications, please consult us.

Recognition conditions of BGA/ CSP (Multicamera MC-S：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.)

	FC16 head	FC08 head	FC03 head
Outside dimensions	See “3.2 Standard Functions”.*1		
Thickness			
Ball pitch	0.075*2*3 ~ 1.5 mm		
Ball diameter	φ0.045 mm*3 ~ φ0.9 mm (Ball diameter must be consistent)		
Ball shape	Globular or cylindroid*4		
Materials of ball	High temperature solder, eutectic solder		
Ball count	Lattice arrangement：2 × 2 ～ 64 × 64 (Rows × Columns) (Staggering arrangement：2 × 2 ～ 32 × 32 (Rows × Columns)) *Ball pitch and ball dimensions should be uniform. When it is not lattice array：2 - 15 000		

・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 a gold body is placed with contour recognition only.
・Surface of ball
The surface of ball should be free from blur due to oxidation.
(Effect extent of oxidation for the recognition needs to be checked by an experiment.)
・Feeding type: Tapes and trays

*1 When the short side of component outer dimensions exceeds 45 mm × 45 mm, it is split recognition.
*2 Consult us regarding large-sized, minimal pitch components.
*3 At split recognition, the minimum ball pitch is 0.15 mm, and the minimum ball diameter is 0.09 mm.
*4 Placement may fail depending on the combinations of ball pitches or ball diameters.

Recognition conditions of connector (**Multicamera MC-S**：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.)

	FC16 head	FC08 head	FC03 head
Outside dimensions	See “3.2 Standard Functions”.*1		
Thickness			
Lead pitch	0.4 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

* 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.
*1 When the short side of component outer dimensions exceeds 45 mm × 45 mm, it is split recognition.

■ Component thickness measurement function (Multicamera MC-S : Type 2)

In addition to Type 1 features, Type 2 has the component thickness measuring feature and the top/bottom detecting feature and improves mounting quality.

Item	Description		
Applicable component	0201 component*1 ~ Mini Tr/ Di (Max: 6 × 6 mm) (Maximum component size that thickness measurement with Type2 is possible)		
	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 component 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 a nozzle with a pad or a nozzle with steps on its tip. ([e.g.] 205A)
* Please make purchase for each table at the front/ rear sides.
* NPM-GH Multicamera(MC-S) may not be compatible with Multicamera Parts Library belonging to mounters after NPM-DX, WX/WXS, NPM-D3A/ D3, NPM-W2/ W2S, NPM-TT2, and may not be compatible with Line Camera Parts Library belonging to mounters before them. (When you use the recognition option, such as brightness check)
* As for installation, NPM-GH is not compatible with conventional recognition cameras. Parts Library may not be compatible.

*1 When "0201 placement support" is selected.

■ 3D-measurement function (Multicamera MC-S : Type 3)

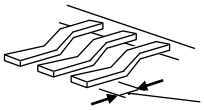
Based on the functions of type 2, the added functions on type 3 are as follows.

・The coplanarity(flatness) 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	0.2 mm	—
		BGA, CSP	0.4 mm*2	0.25 mm	0.25 mm

* NPM-GH Multicamera(MC-S) may not be compatible with Multicamera Parts Library belonging to mounters after NPM-DX, WX/WXS, NPM-D3A/ D3, NPM-W2/ W2S, NPM-TT2, and may not be compatible with Line Camera Parts Library belonging to mounters before them.(When you use the recognition option, brightness check or other optional features)
* As for installation, NPM-GH is not compatible with conventional recognition cameras. Parts Library may not be compatible.
* Coplanarity(Flatness) measuring range is ±0.5 mm.
* Depending on recognition speed and/or the number of electrodes, there may be recognition waiting time at mounting.
* BGA/ CSP is limited to the ones that electrode shape is circle and that the bottom surface has ball-shape terminals.
* When it is QFP/ SOP, there must be at least 0.2mm flat surface at the bottom surface of a lead.

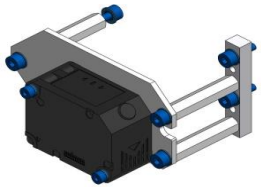


Lower plane of the lead is 0.2 mm or over.

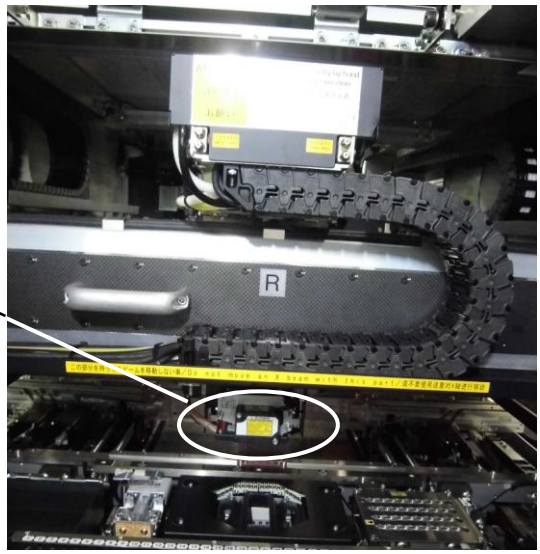
*1 For QFP/ SOP of a lead pitch less than 0.4 mm, please consult us.
*2 For BGA/ CSP of a ball pitch less than 0.4 mm, consult us.

■ **Height sensor(PCB warpage correction function)**

It controls the placement height of nozzles by measuring the height (warpage) of PCB.
If a measurement result exceeds the acceptable value, a warning is issued prior to placement to prevent the occurrence of quality defects.

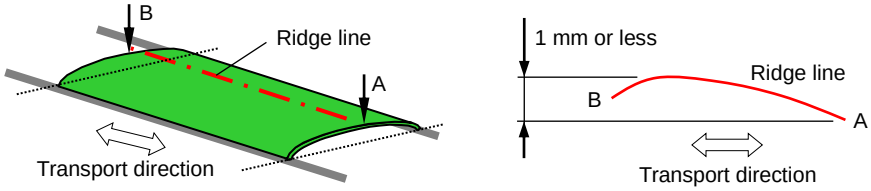
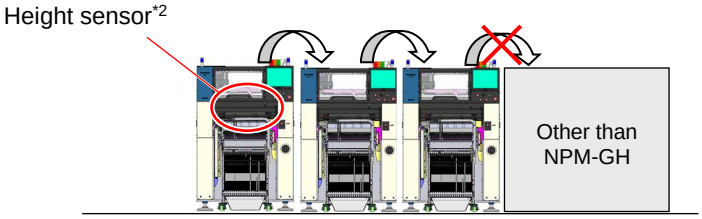


Height sensor



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	0.3 mm ~ 8.0 mm*3
	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 is 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-GH in line is passed to the downstream NPM-GH*.  * If any machine other than NPM-GH 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*4	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		2.0 s (350 × 300 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)

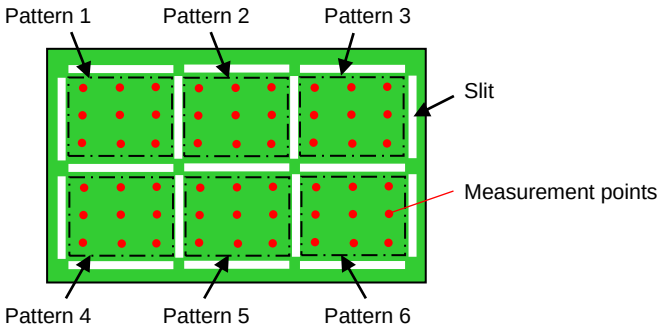
*2 Select the height sensor for the first NPM-GH in line.
Select only the front side for single conveyor specifications and, both the front and rear side, for dual conveyor specification.

*3 A PCB, which is 0.3 to 1.0 mm thick, needs to be verified in advance.

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

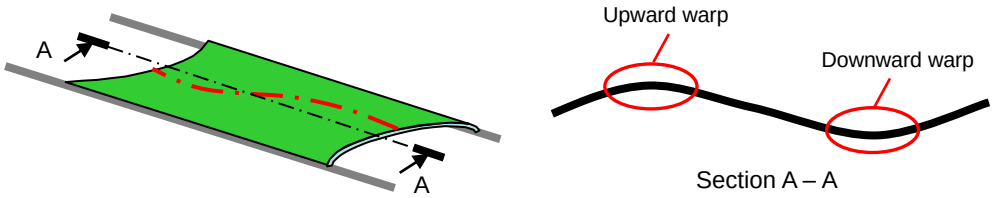
■ PCB with a slit

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

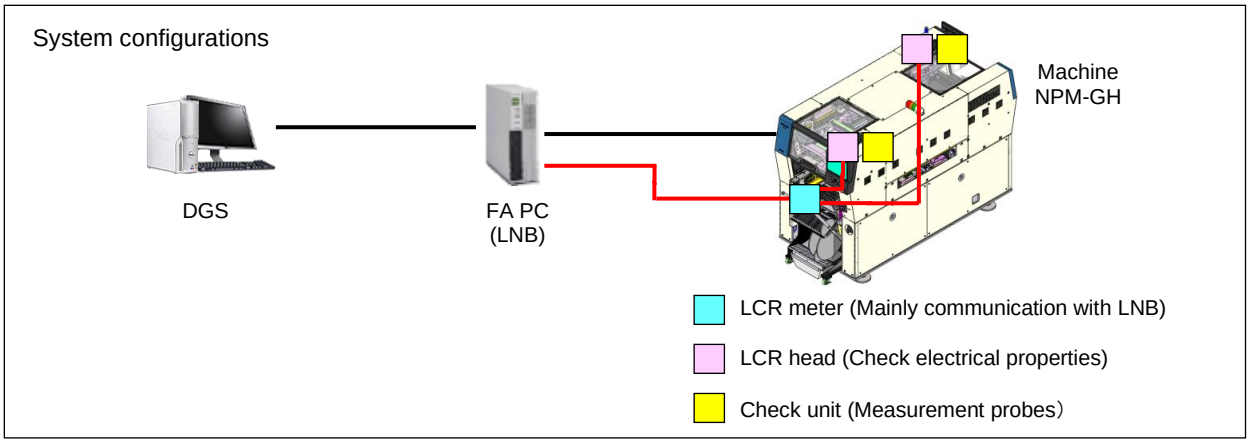


4.6 LCR checker(Built-in type)

LCR checker (Built-in type) measures electrical properties of chip components to prevent error mounting caused by erroneous picking up of chip components.
FA PC receives component electrical properties measured with LCR checker and checks whether machine is within the acceptable range.

■ Standard configuration

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	・FC16 head ・FC08 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 FC16 head：230CS nozzle FC08 head：230C nozzle
Supply unit rules	・Feeders are subject to LCR checks. It is applicable to Feeder Cart, C-Cart34C, and C-Cart40C only. You cannot use with single tray feeder.
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. The scanner is a wireless scanner (PDA).
Purchase of this option is required for the optional "Feeder Anywhere" feature.

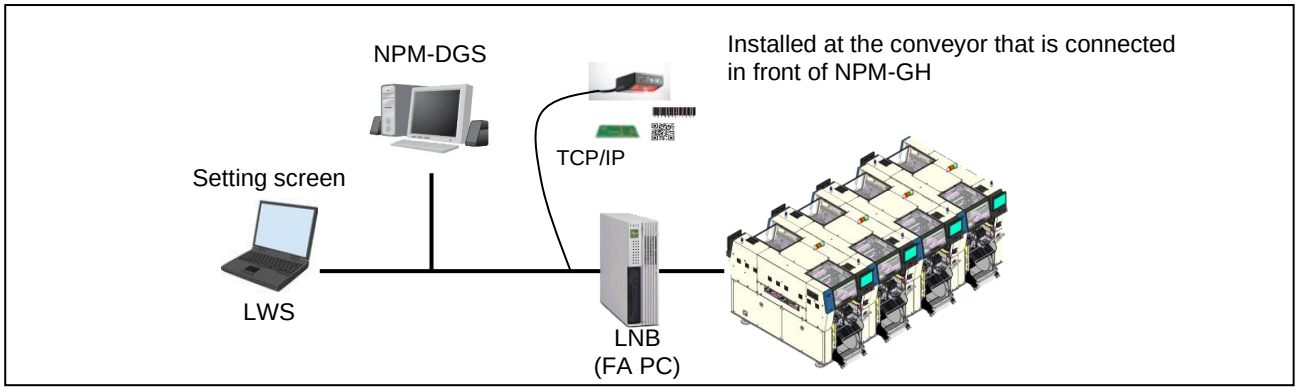
*1 Component verification is embedded as a product of PanaCIM-EE Gen2 material verification.
When you introduce PanaCIM-EE Gen2, that allows you to apply the system to material ID floor management, traceability, and others.
For details, see the PanaCIM-EE Gen2 specification.

5.2 Automatic Changeover

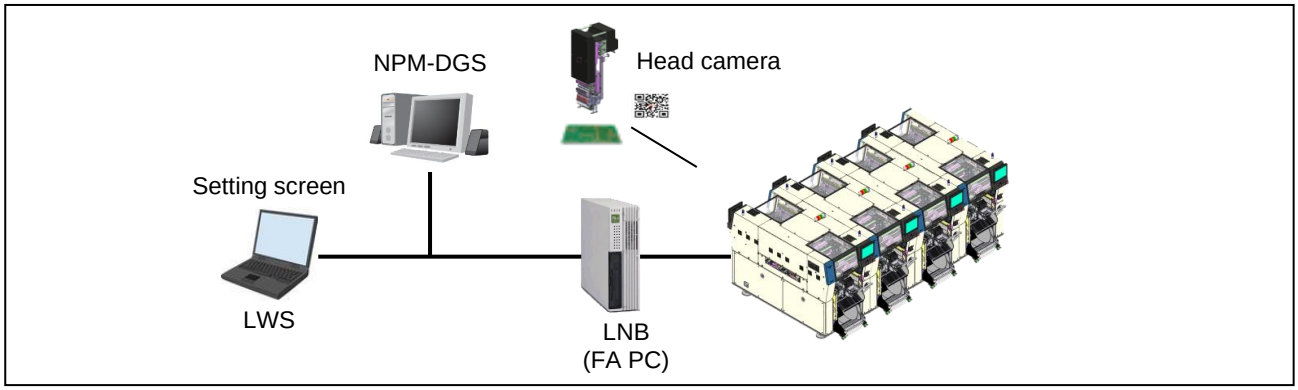
This supports changeovers (production data change and rail width change), minimizing the time loss of operation caused by product changes.
In accordance with your operation, you can choose from the following two types: “External scanner read type”, and “Head read type”.

■ System Configuration

External scanner read type



Head 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-GH, 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.)

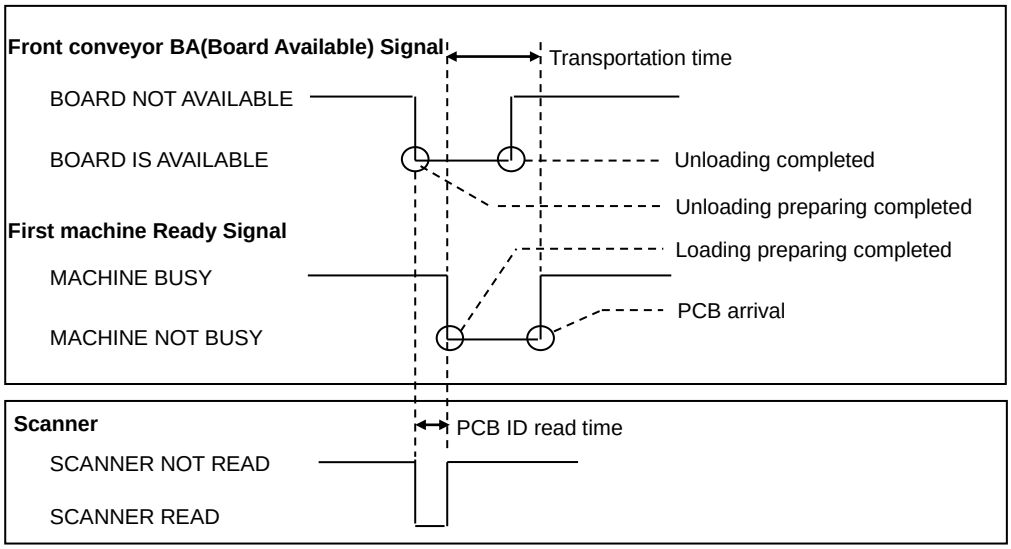
■ Standard Specifications

Item	Description
Readable codes	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
Restrictions for codes	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 languages	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-600, SR-600HA, SR-610, SR-750, SR-750HA, SR-1000, SR-2000 (KEYENCE CORPORATION) Communication unit: N-L1 (KEYENCE CORPORATION)*1 *1 The communication unit is required for SR-600, SR-600HA, SR-610. ・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.
License	A license is required for each machine. Please refer to “14. Regarding Licenses”.

* LNB controls scanner through intervention in SMEMA communication.
TCP/IP is used to interconnect LNB and an external scanner, and LNB and a machine.
There is a timing chart of SMEMA communication below.
SMEMA communication between conveyor and machine must be in conformity with this timing chart.

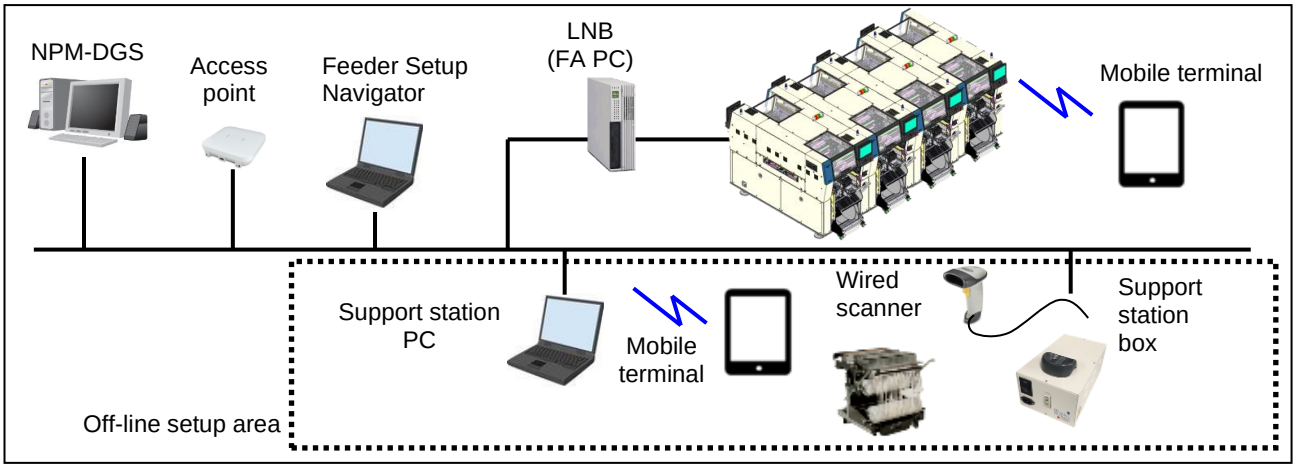


5.3 Feeder Setup Navigator

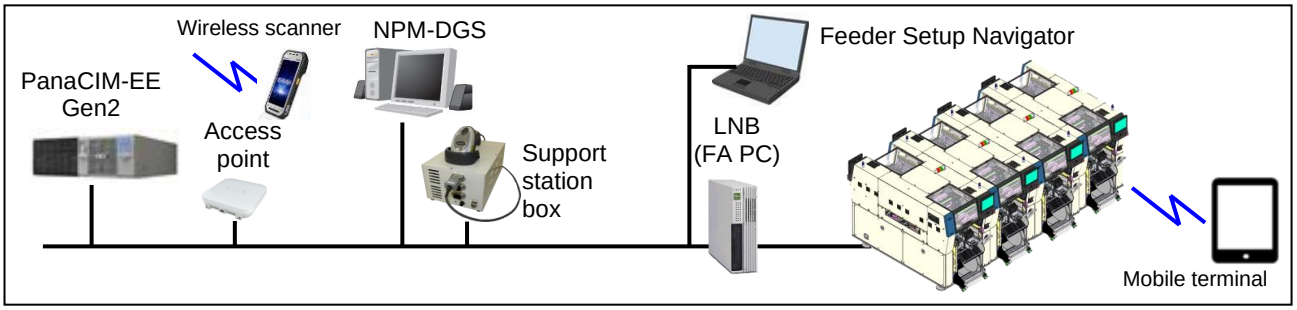
It is a support tool to navigate efficient setup procedure. The tool factors in the amount of time it takes to perform and complete setup operations when estimating the time required for production and providing the operator with setup instructions. This will visualize and streamline setup operations 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. <u>Required</u> Support station box (Component verification type) <u>Choice (Select any of the following options)</u> 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		iOS 11.0 or later、or、Android™ 4.3 or later Resolution：WUXGA or later	Recommended

Software specifications

Item		Specifications	Class
OS		<PC> Microsoft® Windows® 11 Pro (64-bit version) Microsoft® Windows® 10 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

Microsoft, Windows, and Windows Server are registered trademarks or trademarks of Microsoft Corporation in the United States.
Intel and Intel Core are registered trademarks or trademarks of Intel Corporation in the United States.
Virus Buster is a registered trademark or trademark of Trend Micro Incorporated.
iOS is a registered trademark or trademark of Cisco Corporation
Android is a registered trademark or trademark of Google Inc.

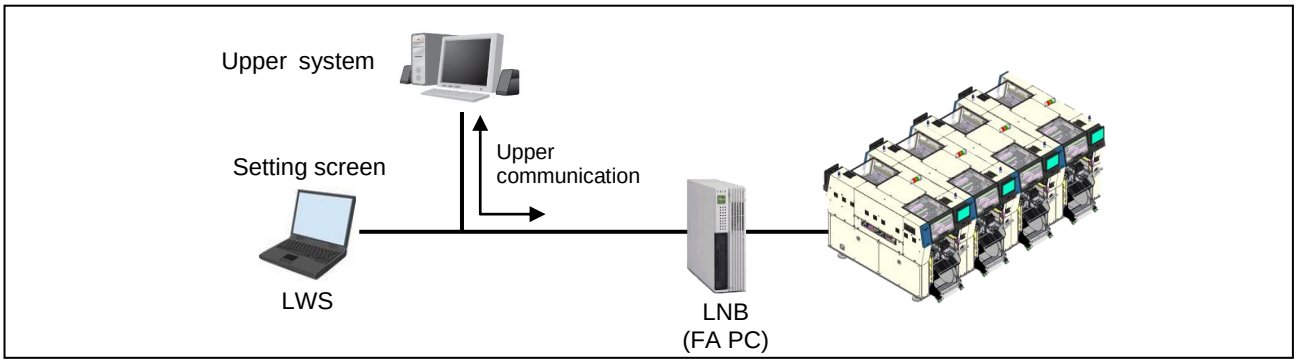
■ Constraint conditions

Item	Description
Target feeders	Intelligent tape feeder, Thin type single tape feeder, Auto Setting Feeder, Tray feeder *Only can display the setup instructions on tray feeder. Cannot check the status of the feeders in real time.
Target areas	In-line setups (Setups or preparations inside the machine) Off-line setups (Feeder cart/ C-Cart setups or preparations)
Others	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

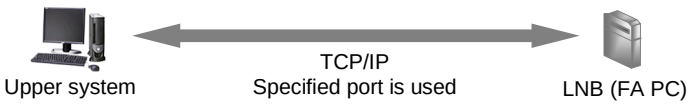
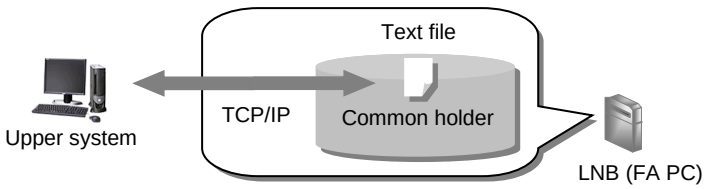


■ Function List

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*4	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 You need to input Component information of component verification option or "component verification with other vendor's machines " of this option.
*3 You need to input Board information of automatic changeover option.
*4 When you use Upper Communication, Other Company Component Verification feature(Machine Interlock feature), In addition to Upper Communication (License), Component Verification (License) is necessary. Component Verification (License) is an Individual Specification, and contact us for details.

■ Standard Specifications

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td rowspan="2">Communication form</td><td>Socket communication form</td><td>Sockets are used for this communication.
There is no over head caused by hard disc accesses.
This communication can be used when a file sharing is prohibited.
 
</td></tr>
<tr><td>Text communication form</td><td>Windows file-sharing function is used for this communication.
Technologically, it is easier to construct this form than socket communication because text files, which were input/output to a file-sharing area, are used.
 
</td></tr>
<tr><td>Communication format</td><td colspan="2">XML form</td></tr>
<tr><td>Communication cache</td><td colspan="2">This makes it possible to receive events of the latest 3 hours at the time of reconnection after the occurrence of disconnection.</td></tr>
<tr><td>Upper system connection</td><td colspan="2">One upper system can be connected for one LNB (FA PC).</td></tr>
<tr><td>Display language</td><td colspan="2">English, Chinese, Japanese (Applicable for display screen of setting terminal on LWS)</td></tr>
</table>

■ 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 and contribute to manpower saving.
It optimizes the supply sequence to provide an operator shortest route without component shortage.
The optimized supply sequence for each operator is displayed as supply route instructions on a wireless scanner or a monitoring PC.
Component Supply Navigator is included in Product Architecture on PanaCIM-EE Gen2.
For the details, see PanaCIM-EE Gen2 Specifications.

5.6 Support station

Time loss caused by changeover is drastically reduced by using your spare feeder carts/ C-Cart or feeders and preparing for next products while a machine continues its operation.
This has two types: one of them only supplies power to feeder carts/ C-Cart and feeders*1, 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 types
You can choose between power supply or component verification types.

①Power supply type:
Power is supplied to feeder carts/ C-Cart and feeders*1.

②Component verification type:
Power supply and component verification can be done for feeder carts/ C-Cart and feeders*1.
1D/ 2D codes of components are read with a scanner.

*1 It is not compatible with ASF.

■ **Function List**

Item	Description	
	Power supply type	Component verification type
Feeder cart/ C-Cart preparation	This supplies power to feeder carts/ C-Cart, enabling preparations for next products while the machine continues its operation.	This supplies power to feeder carts/ C-Cart, 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-G series, “Change Cart Preparation Unit” in CM series is not available.

■ Standard Configuration

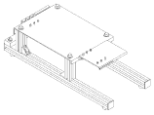
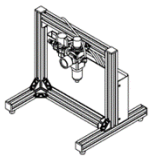
Power supply type

Item	Description
Power supply unit*1 *2 	This supplies power to feeder carts/ C-Cart 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*4 ・Power supply cable to feeder cart/ C-Cart

Component verification type

Item	Description
Support station box*1 *2 	This supplies power to feeder carts/ C-Cart 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*4 ・Power supply cable to feeder cart/ C-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. * Please prepare a support station PC on your end.

*1 Please prepare a electric source cable on your end. Please use a connection plug that complies with the following standard.
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 an NPM-GH system software DVD-ROM.
*4 It is not compatible with ASF.

Item	Descriptions
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*) * “Attachment for thin type tape feeder” is required to install thin type tape feeders. * It is not compatible with ASF.
Air supply unit 	It is a unit to supply air to C-Cart when setting tapes automatically in ASF.

■ 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 Component 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
	Processor	1 GHz or faster with 2 or more cores on a compatible 64-bit processor or SoC (System-on-a-chip)
	Mother board	IBM-fully-compatible machine
	Graphic board	WXGA or higher Desk top region: 1 280 × 768 dot or more
	Memory	4 GB or more
	Storage	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		WXGA-compliant
LAN port		1000/100BASE-TX × 2

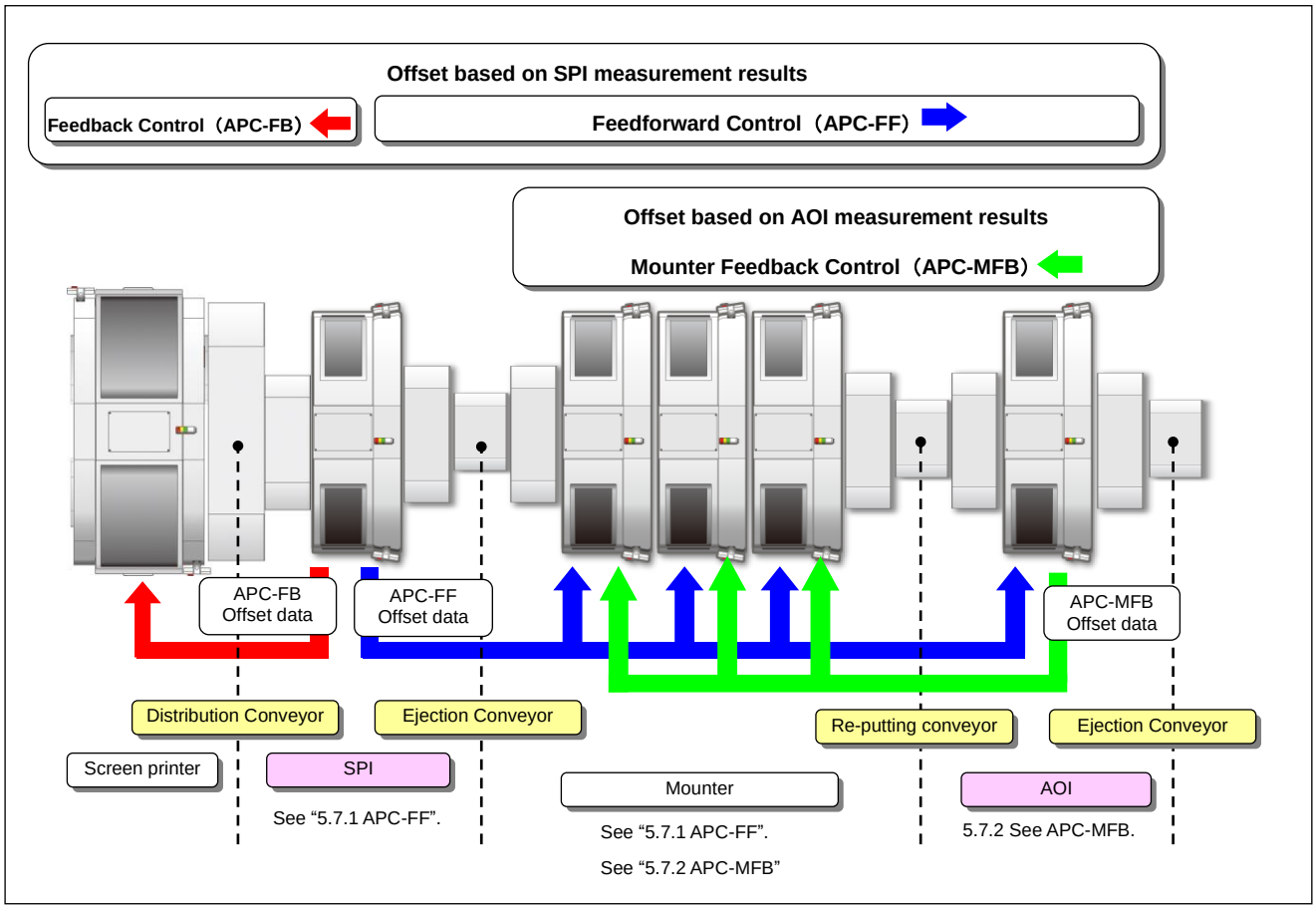
Software Specifications (Required)

Item		Specification
OS		Microsoft® Windows® 11 Pro Microsoft® Windows® 10 Pro (64-bit version)
	Support language	English, Chinese, Japanese

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.

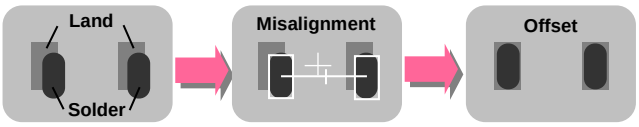
Function	License	Printer	Mounter (you need as many licenses as machines)
APC-FB	Inspection results feedback ready	○*	
APC-FF	APC system ready		○*
APC-MFB	APC-MFB2 system ready		○

* 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.

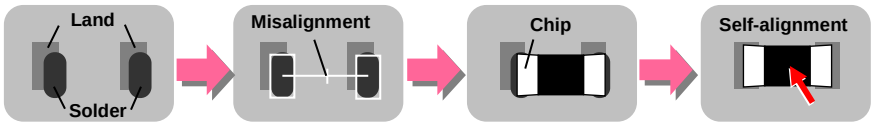
Print position correction (Target machine: SP series, NPM-GP/L connected with LNB)
It analyzes measurement data of solder inspection and offset printing positions (X, Y, θ).



Mask cleaning (Target machine: SP series, NPM-GP/L connected with LNB)
According to the solder inspection result (blur, oozing, bridging, etc.), mask cleaning is performed.

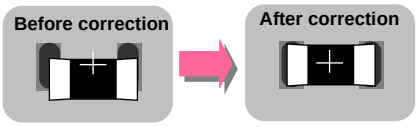
■ Feed-forward control（APC-FF）See “5.7.1 APC-FF” for details.

Placement position correction (Target machine: NPM-series, NPM-X-series, NPM-GH)
Places components in the optimal positions based on the measured location of solder paste.
Mounting to an appropriate position allows beneficial self-alignment achieving high quality placement.

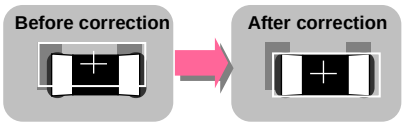


■ Mounter feedback control（APC-MFB） See “5.7.2 APC-MFB” for details.

Component placement position correction (Target machine: NPM series, NPM-X series, NPM-GH)
Compensate misalignments based on the AOI measurement results to place components.
Appropriately positioned placement provides stable quality after placed.



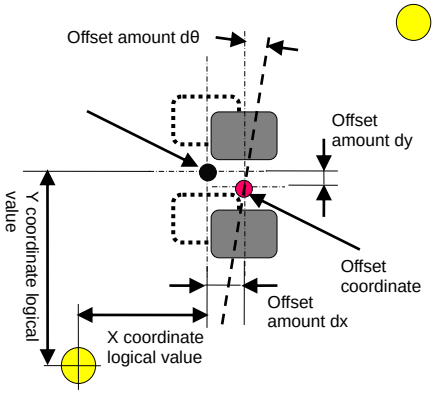
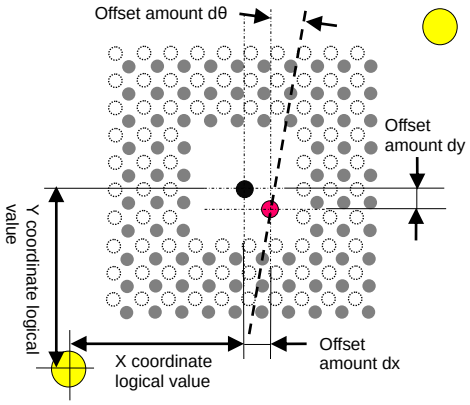
When APC-MFB is used with APC-FF, placement positions can be controlled and compensated before component inspections. (Target machine: Other companies’ MFB-authorized AOI)
Components are inspected based on compensated placement positions.



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

<table>
<tr><th>Items</th><th colspan="2">Description</th></tr>
<tr><td>Communication method</td><td colspan="2">Ethernet communication</td></tr>
<tr><td>Supported head</td><td colspan="2">FC16 head, FC08 head, FC03 head</td></tr>
<tr><td rowspan="3">Feed-forward control</td><td>Solder</td><td>Measure solder position and feed forward the offset amount of X direction (offset dx), Y direction (offset dy), and angle direction (offset dθ).</td></tr>
<tr><td>Land</td><td>Measure land position and feed forward the offset amount of X direction (offset dx), Y direction (offset dy), and angle direction (offset dθ).</td></tr>
<tr><td colspan="2">Chip component
 
</td><td>Package component
 
</td></tr>
</table>

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

- ・ Reduces the floating, misalignment or shortage of small components(0402, 0603 chips, etc.) and improves bonding strength.
- ・ 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

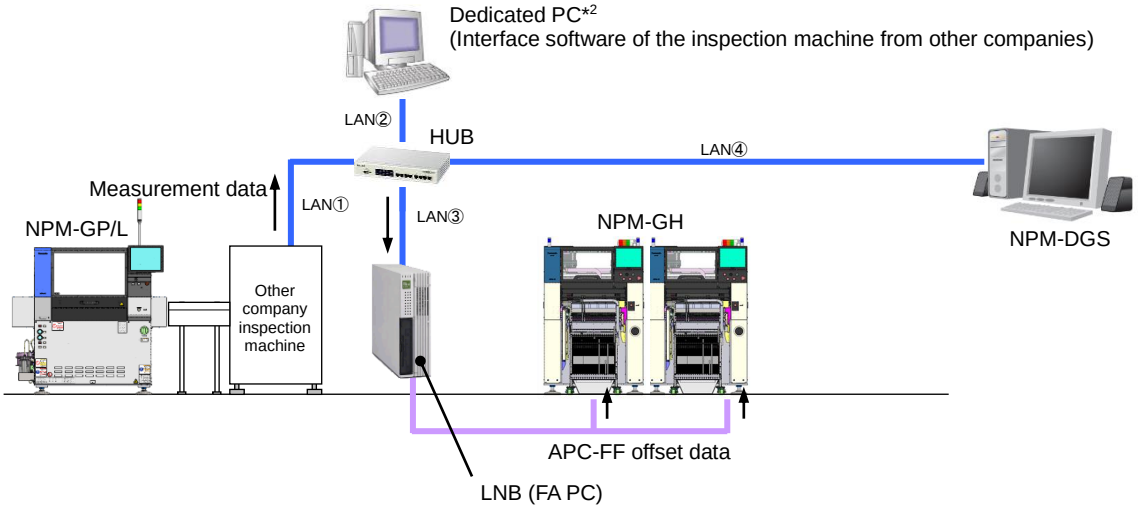
This section explains basic specifications for the use of SPI of inspection machines from other companies.

■ 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, 2 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 LNB (FA PC).
However, when you choose the “APC-5M” option, you can integrate(combine) LPC(Line Process Controller) computer to install LPC with a compute to install Other Company Inspection Machine interface.
When you combine with LPC computer, it must meet the recommended LPC operating environment.
For the details, see the ”APC-5M” Option.
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-GH turns ON the Ready signal to an upstream machine(other company inspection machine or conveyor) after confirming the BA signal from the upstream machine.)
- Up to one conveyor can be placed between other company's inspection machine and NPM-GH.
  Additionally, the number of PCBs that can wait on a conveyor is up to 1.
  Barcode operation control is required if you are likely to have more than two PCBs waited on the conveyor.
  Barcode reading specifications, and conveyor specifications for reading conform to the descriptions in the “Standard Specifications” and “Standard Configuration” paragraph of the “5.2 Automatic Changover” section.
  For details, please contact us.
- When other company inspection machine or a conveyor is connected between NPM-GH machines, APC communication does not work properly.
  When you change an NPM-GH upstream process from single lane to dual lane with a traverser (horizontal moving transfer equipment), you may need to remodel NPM-GH about signals between machines.
  Contact us for the details.
- Connection conditions between machines vary when you also use iLNB or PanaCIM.
  Contact us for the details.

In case of using interface software of an 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: At least STP Cat 5e (4 pieces)*1	

*1 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® 11 Pro (64-bit version) Microsoft® Windows® 10 Pro (32-bit/ 64-bit version)	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

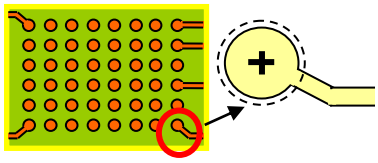
NPM-GH can receive APC-FF offset data (Correction data of placement position) when connected to NPM series with inspection heads.

■ **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 compo-nents to be placed with high accuracy.
It is effective for flip chip which is placed with flux or solder transfer.



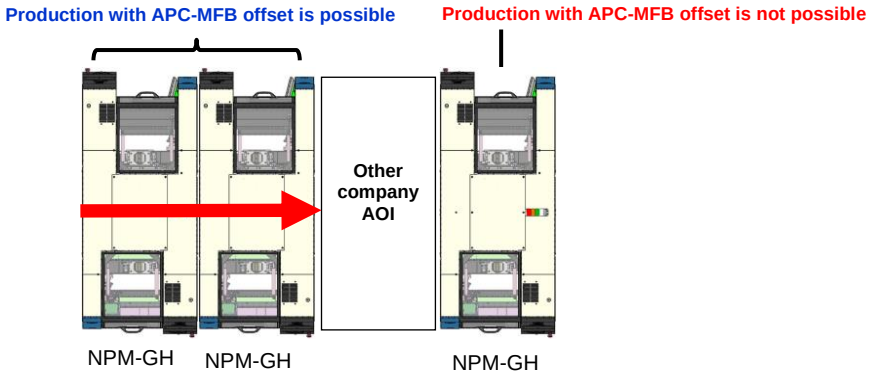
Land position is accurately measured through dedicated processing to seek the center of shape and dimension specified.

* Inspection head cannot be loaded on NPM-GH.
* "APC system ready" licenses are required per equipment.
  Targets machines are the machines that receive APC-FF offset data.
* APC-FF ready equipment: NPM-series, NPM-X series, NPM-GH (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.
* 0201 and 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 specifications

Items			Description
	Communication method		Ethernet communication
	Supported heads		FC16 head, FC08 head, FC03 head
	AOI		Applicable AOI for “APC-MFB2 system ready” ・Please contact us to confirm applicable AOI makers. (NPM inspection head is excluded) ・The AOI should be installed in line.
	Systems		About the applicable system version of NPM and AOI which support “APC-MFB2 system ready”, please contact the AOI maker or us.
	Placement modes		・Independent mode / Share mode ・Single lane mode / Dual lane mode * When using the Automatic Changeover line, Update of MFB offset starts after production model agrees between NPM and AOI.
	Remarks		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. 
Components	Types	APC-MFB Inspection target*	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)
		APC-MFB Offset target	When there are AOI measurement results and component placement uses nozzles, APC-MFB compensates for the placement positions of the targeted components for offset.
	Number of offset components		Number of offset components depends on the specification of machines

*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 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.

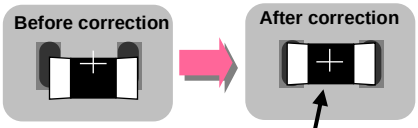
⁎⁎ Remarks ⁎⁎

- 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.

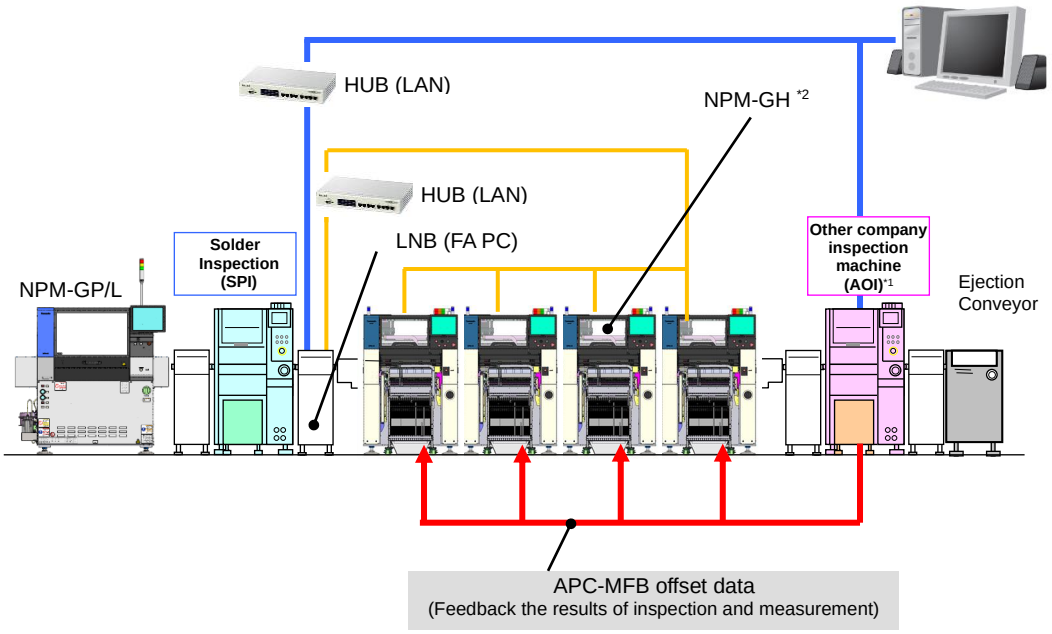
■ Example of system configuration

When using APC-MFB system only

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



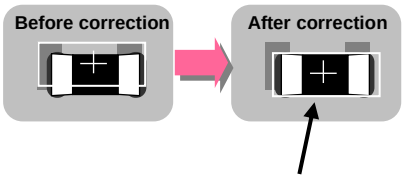
Apply APC-MFB offset based on Component Placement Design coordinates



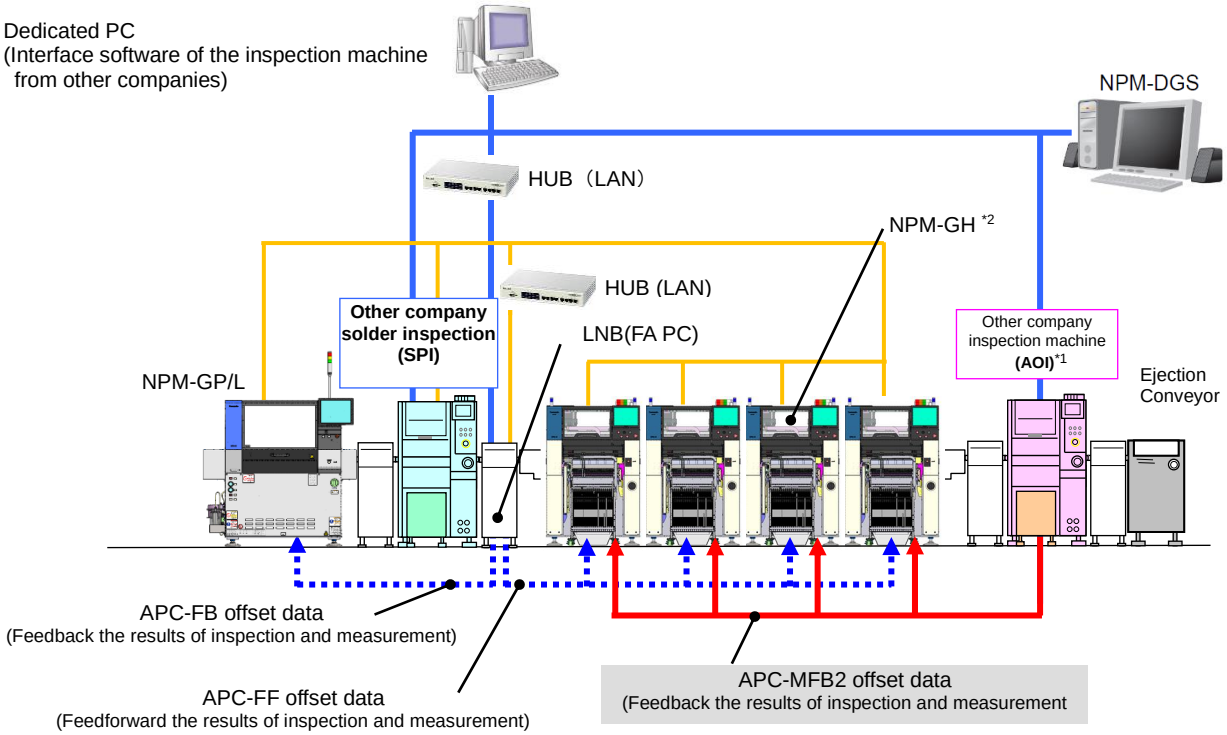
*1 Contact us for inspection machines (AOI) that support “APC-MFB2 system ready” license.
*2 ”APC-MFB2 system ready” license is necessary per equipment.

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” license.
*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 installed.

■ Effects

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.

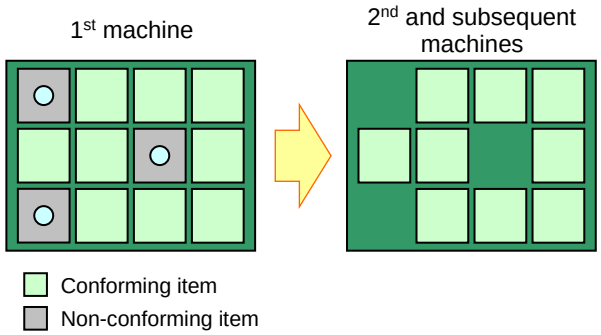
*The signal cable between mounting machine and AOI uses the Board Available (BA) signal including a board request signal.

5.8 PCB information communication function (standard feature)

The first machine in a line performs mark recognition and then passes mark recognition data or information on to the downstream machines.
The use of the transferred data at downstream machines shortens tact time.

■ Bad mark communication

Bad marks are recognized at the first machine in a line, and then the bad mark recognition data is passed on to downstream machines.
Downstream machines shorten the time required to recognize bad marks.

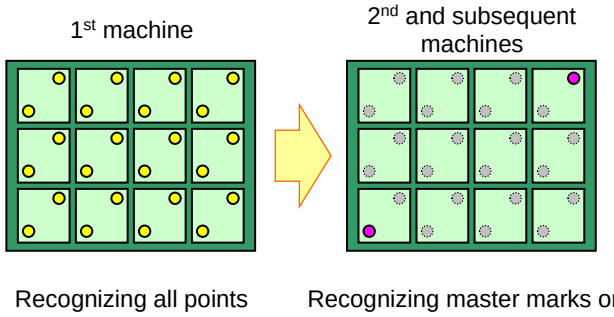


The 2nd and subsequent machines will skip bad mark recognition based on the mark recognition data or information transferred from the upstream machine.

* For connection with other company inspection machines, see the optional “Other Company Bad Mark Communication”.

■ Pattern mark communication

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

* During times of split placement, the 2nd and subsequent machines may also be required to recognize all points.

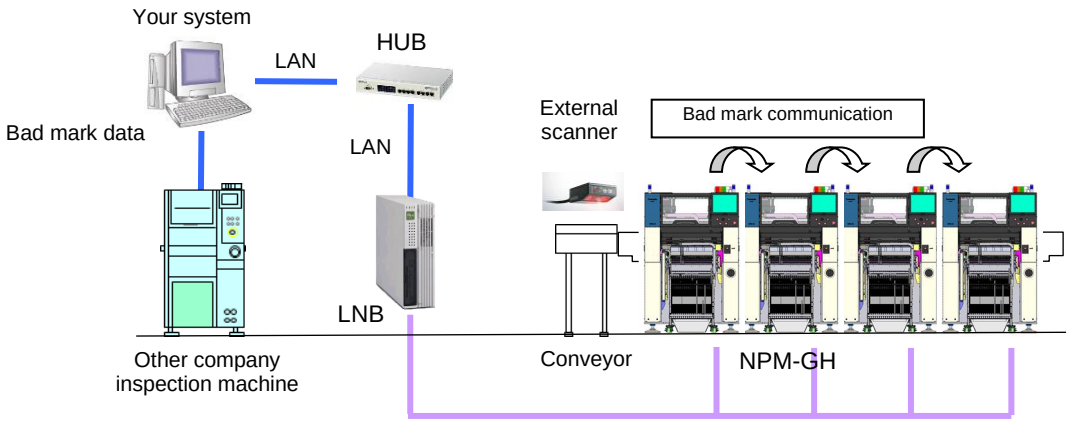
* Discussion on an individual basis is necessary when receiving PCB data from machines other than NPM-GH, NPM-X series or NPM-series, or when you use together with APC. For details, please contact us.

5.8.1 When Receiving Bad Marks from Other Company Inspection Machines

■ Bad Mark Communication from Other Company Machines (License)

Transfers bad mark data using bad mark data in each PCB written on a LNB's shared folder from your systems, for example other company inspection machines. This reduces bad mark reading time on a stage at the head of a line.

■ System Configuration Example



■ Processing

1. Write bad mark data in each PCB to a LNB's shared folder in the given format.

【Sample】

```
<?xml version="1.0" encoding="UTF-8" ?>
<BoardInformation>
<Element>
<Lane>1</Lane>
<BoardNumber>123</BoardNumber>
<BoardBarcode>BARXXX</BoardBarcode>
<BadMark>0100011100100101000100101010101010101</BadMark>
</Element>
</BoardInformation>
```

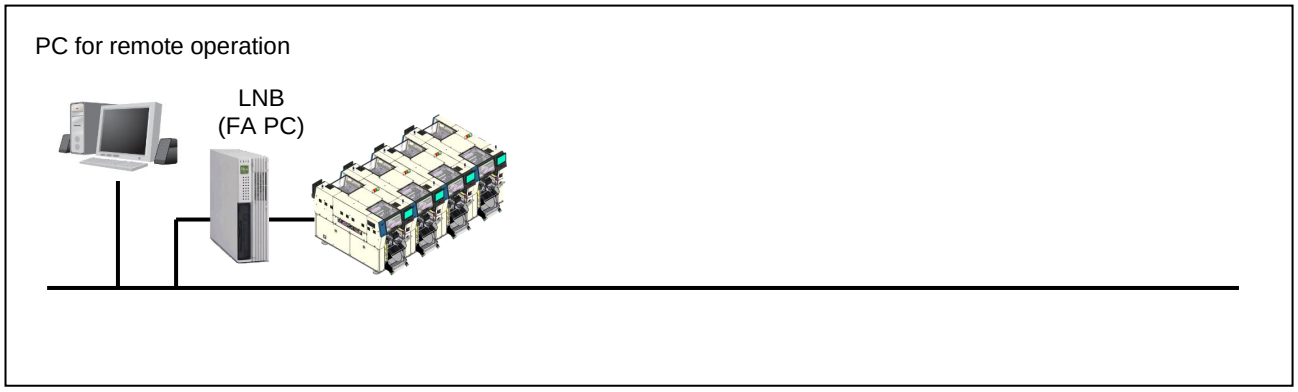
2. Transfers bad mark data using bad mark data associated with PCB barcodes read with a mounter's head camera or an external scanner.
   * Deletes bad mark data from oldest once gets accumulated more than 10 bad mark data in an LNB shared folder.

5.9 Remote Operation

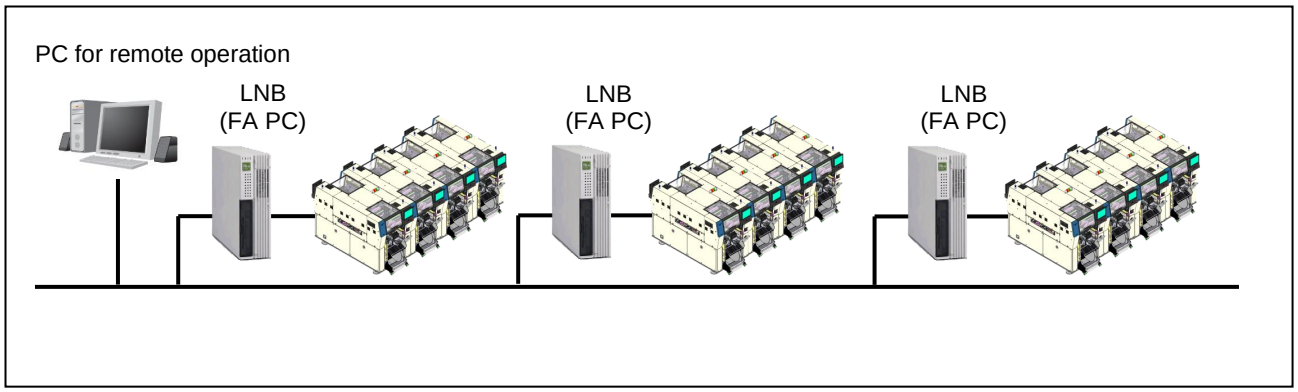
Errors occurred in the machine are gathered into the remote terminal and machine recovery is performed by remote operation. This allows reducing the time recovered from the errors, and thus achieving to improve the operating rate and labor saving. The mechanisms of machine error detection and recovery operation by remote operation are provided. Centralizing recovery operation enables reduction of "the time loss due to an operator to notice the error signal" and "the time loss due to an operator to move to the error machine".

■ System Configuration

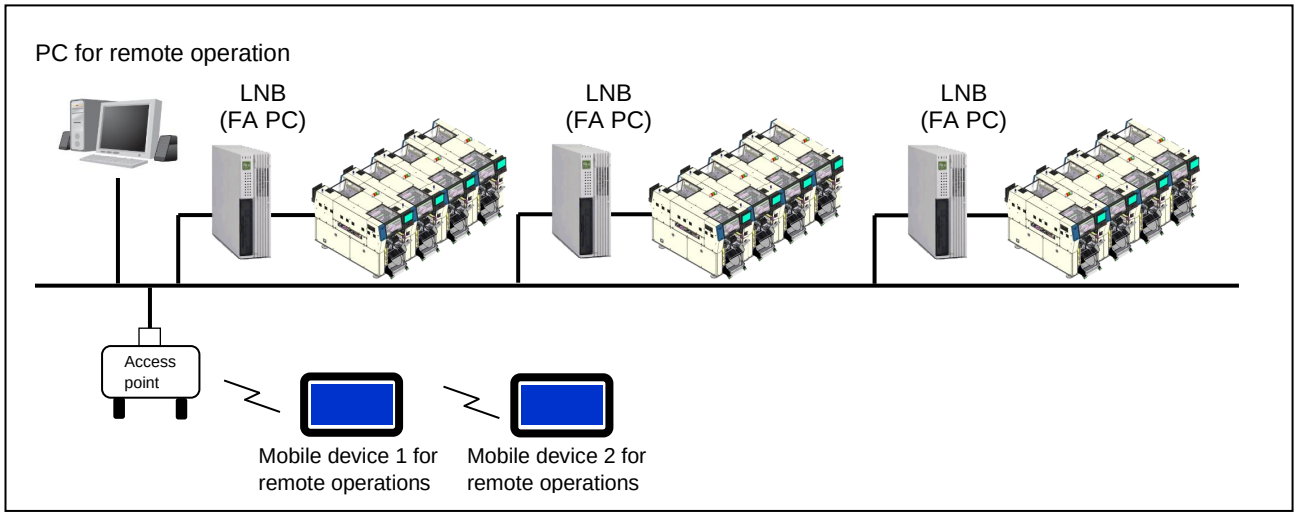
Basic configuration



Centralized control



Configuration with mobile devices



■ Function List

Item	Description
Remote operation function	You can operate the machine screen and control the switches by remote operation. This allows you to recover from an error in the machine by remove operation and resume production.
Remote reference function	You can browse the machine screen by remote operation. You can check machine conditions and the operations of a working operator on the active screen.
Status monitor function	Simplified error condition which can be recovered by remote operation in the controlled line is displayed. You can also display the machine screen from the status monitor to open the remote panel for operation.
Event list function	Error events occurred in the controlled line is displayed in a list. In addition, the state whether the error to be recovered by remote operation or not is displayed. The time of the event occurred and details of the error are displayed You can also display the machine screen from the event list to open/close the remote panel for operation.

■ Standard Configuration

Item	Description
License	License is required per machine. For license, see "14. Regarding Licenses".
Computer	The PC used for remote operation. Remote operation client software is installed. * Please prepare on your own.
Access points (when using mobile devices)	Access points are required for communications with computers on which to perform remote operations via Wi-Fi. *Prepare access points.
Mobile devices (when using mobile devices)	Mobile devices are required for remote operations with smart phones, tablets, or other devices. *Prepare mobile devices.

■ System Requirements

Computers Hardware specifications

Item		Specifications (primary PC)	Specifications (secondary PC)
Main body		IBM PC/AT-compatible machine (We recommend primary PC be desktop PC)	
	Processor	1 GHz or faster with 2 or more cores on a compatible 64-bit processor or SoC (System-on-a-chip)	
	Mother board	Fully compatible with IBM	
	Memory	8 GB or more	4 GB or more
	Storage	100 GB or more	
	Optical drive	DVD drive To be used in installation	
	USB port	USB Type-A x 1 or more ports (when you use an option license)	—
Keyboard		English version: 101 keyboard Japanese version: 106 keyboard	
Mouse		Supported by your OS as standard	
Monitor		WXGA Supported, Desktop size：1 280 x 768 dots or higher	
LAN port		100BASE-TX or faster x 1 port	

Computers Software specifications

Item		Specifications	Notes
OS		Microsoft® Windows® 11 Professional Microsoft® Windows® 10 Professional (64 bit version)	Required
	Display Language	Japanese, English, Chinese	—
Framework		Microsoft® .Net Framework 4.5.2 or later	—

・Microsoft, Windows, and Windows Server are registered trademarks or trademarks of Microsoft Corporation in the United States.

* Environmental requirements are based on Microsoft® Windows® 10 Professional.

* When you use anti-virus software or others, do not block the following port ranges.
(59 000 ～ 59 999)

Mobile devices Operation specifications(Standards)

Operations specifications on remote control operations with a smartphone or a tablet(Android) are as follows.

Item	Specifications	Notes
OS	Android 9～11	Recommended
Devices	Resolution：1 280 x 720 dots or higher (Operation tested devices are as follows) TOUGH BOOK FZ-S1 (Android 10) Galaxy Tab S7 (Android 11)	Some actions using devices other than those on left may vary.

IOS are not supported.

■ Constraint Conditions

Constraints in performing remote operations

Category	Operating status	Constraint	Descriptions
Constraint in ON/OFF operations	Remote operation is OFF	Inoperable Inaccessible	You cannot operate machines and refer because functions are OFF.
	Pause mode of remote operation is ON	Inoperable	You cannot operate machines remotely.
Constraint in authority	Service staffs are logged in machines	Inoperable	Engineers have authority to operate machines remotely. When service staffs are logged in, you cannot operate the machines remotely.
Safety constraint	Machines are running	Inoperable	Due to the priority on the operations of machines side, you cannot operate the machines remotely until the operation timeout period has passed after the last "Machine operation*1".

*1 "Machine operations" include all operations that you directly touch on machines such as operating touch panels or operation switches or opening the safety covers.

Constraints during remote operations

You cannot remotely control the removal of carts.
You cannot remotely control emergency stops.
When the safety is not maintained*2, you cannot remotely control axis operations*3.

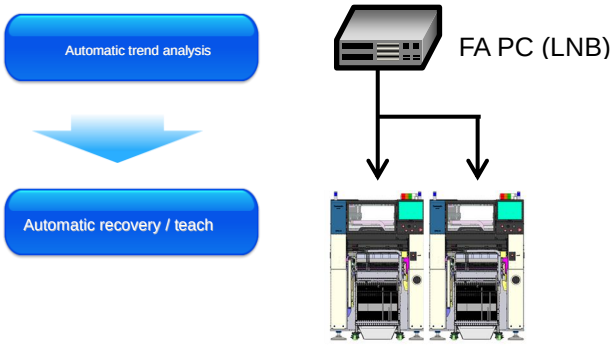
*2 "when the safety is maintained" is a state where the safety space is secured in machines (there are no objects and there is no abnormality in machines)
If you opened the safety cover of machines or pulled out carts, the safety is not maintained until the machines start productions.
*3 "Axis operations" are operations you operate with Activation buttons.

5.10 Automatic Recovery

Automatic recovery is carried out in the case of pickup error or recognition error to reduce stop count and the spoilage rate.

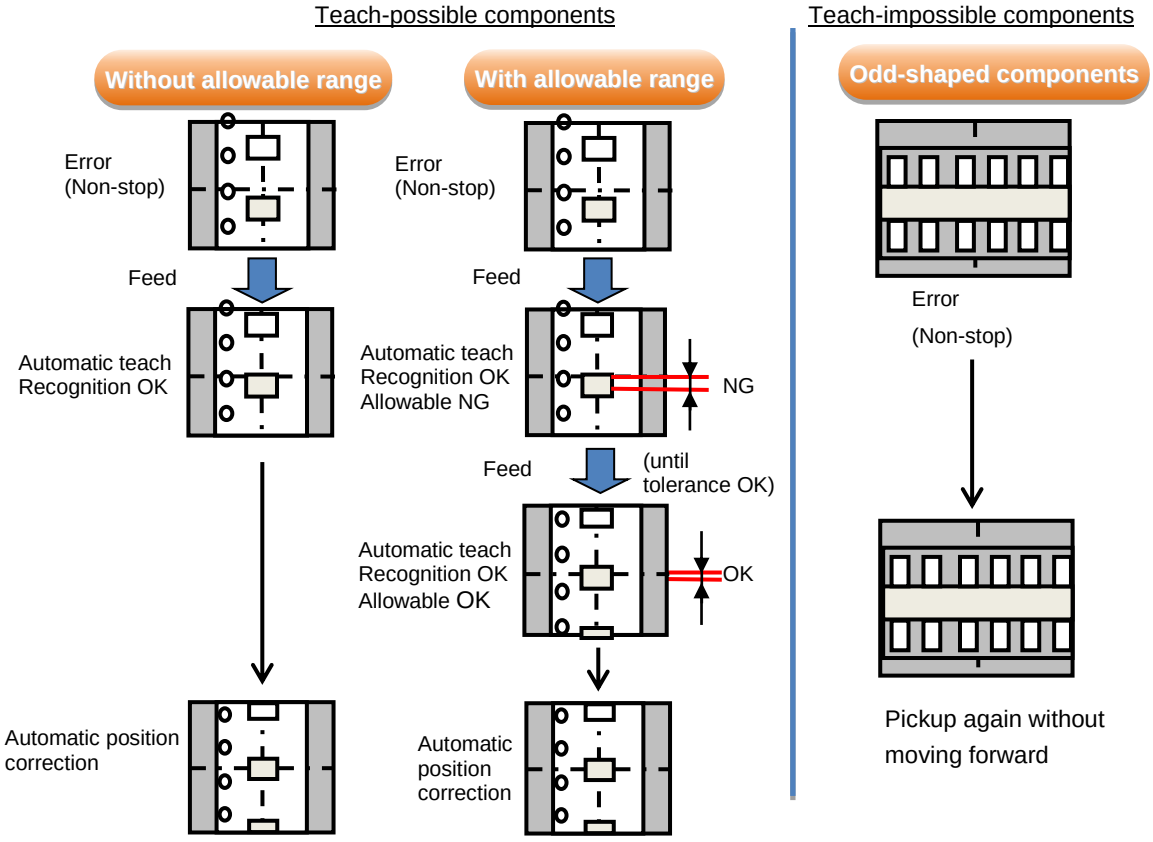
■ Timing of automatic recovery

1) Stop due to pickup error and recognition error
   At the timing of machine error occurrence, automatic recovery is carried out without stopping the machine.
2) When the spoilage rate becomes high
   Trend of pickup error or recognition error is automatically analyzed when the spoilage rate becomes high to prevent the spoilage rate from being higher.



■ Automatic recovery action

1) Pickup position automatic teaches
   Pickup position automatic teach is performed for teach-possible components.
   When an allowable range is set and a component is outside the allowable range, pickup position automatic teach is performed again.
2) Re-pickup action
   For teach-impossible odd-shaped component, re-pickup is performed without component feed.



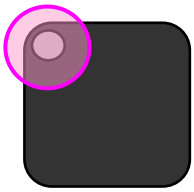
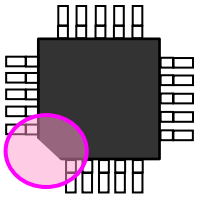
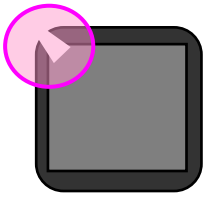
■ Condition setting

Batch setting in line is possible for the condition settings such as function to use /not to use and an operation timing.

5.11 Component inspection before pickup (Polarity)

This function recognizes the surface of a component captured with a head camera before picking it up from the tray and tape feeder to prevent possible misloading through polarity checks.

Misloading prevention
This function detects the orientation of the components by recognizing any of the following features to prevent misproduction.

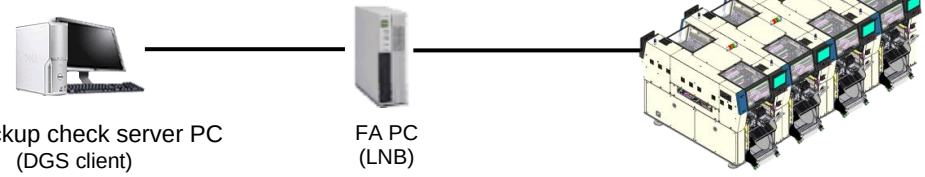
Polarity mark	Chamfering	luminosity
		

After inspections, when polarity is right, components are vacuumed and mounted and when polarity is wrong, an image picture is shown before going into a single stop.

■ System Configuration

Recognition images are captured with a machine, polarities are confirmed, and recognition images are managed with a 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”, or “Specified interval”. Inspection for components that exist at a joint can be also conducted when tape components are to be set and a feeder is capable of being detected.
Handling components judged as NG	Components judged as NG can be handled by 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		Components to be supplied in tray and tape feeder			
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 components.
2) the working environment of the machine or designed shape of tray pockets affect the captured images
*3 Check result may not be satisfactory if laser markings are low contrast image.
* Recognition check can be performed in advance at Panasonic. 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. 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.

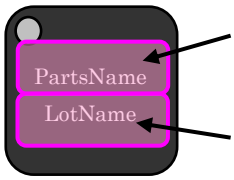
5.12 Pre-pickup Inspection(Char・2D Recognition)

■ 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.

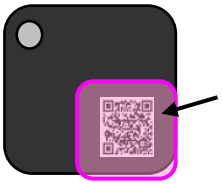
Character Recognition



String identifying the part number

String identifying the manufacturing lot number

2D code Recognition



2D code including the part number and manufacturing lot number information

■ 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

*Heads to be recognized character are 6 heads or less in total.

Pre-pickup check server PC (NPM-DGS client)

FA PC (LNB)

2. When check server PCs are connected to two line

*Heads to be recognized character are 6 heads or less in two lines total.

FA PC (LNB)

FA PC (LNB)

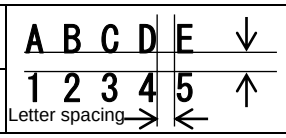
*1 The following conditions should be met.
- Heads to be checked connectable to 1 check PC should be 6 heads or less in total.
- FA PC (LNB) connectable to 1 check server PC should be 2 FA PCs (2 lines) or less in total.

■ 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, 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.

■ Basic specifications

<table>
<tr><th colspan="4">Item</th><th colspan="2">Description</th></tr>
<tr><td colspan="4">Applicable components</td><td colspan="2">Tray components, Tape feeder components</td></tr>
<tr><td colspan="4">Verifiable characters</td><td colspan="2">Max. 30 characters</td></tr>
<tr><td colspan="4">Traceable characters</td><td colspan="2">Max. 30 characters</td></tr>
<tr><td colspan="3" rowspan="2">Inspection processing time*1
(Component Verification
＋Trace Check)</td><td>1FOV</td><td colspan="2">1.5 s or less</td></tr>
<tr><td>4FOV</td><td colspan="2">2.5 s or less</td></tr>
<tr><td colspan="4">Recognition requirements*2</td><td colspan="2"></td></tr>
<tr><td rowspan="7">Characters</td><td colspan="2">Recommended fonts</td><td colspan="3">Sans-serif*3
* Italic, dotted, and underlined characters are not supported.</td></tr>
<tr><td colspan="2">Applicable characters</td><td colspan="3">Numbers, Upper-case letters, Lower-case letters
* Following lower-case letters are not supported:
‘ i ’, ‘ j ’, ‘ l ’</td></tr>
<tr><td rowspan="5">Printing conditions</td><td>Printing method</td><td colspan="3">Laser marking</td></tr>
<tr><td>Size (Width x Height)</td><td colspan="3">≥0.5 mm x 0.8 mm</td></tr>
<tr><td>Letter thickness</td><td colspan="3">≥0.1 mm</td></tr>
<tr><td>Letter spacing</td><td>≥0.1 mm</td><td rowspan="2">  </td></tr>
<tr><td>Line spacing</td><td>≥0.1 mm</td></tr>
<tr><td rowspan="3">2D code</td><td colspan="2">Applicable codes</td><td colspan="3">QR code, Micro QR code,
Data Matrix (ECC200)</td></tr>
<tr><td rowspan="2">Printing method</td><td>Printing method</td><td colspan="3">Laser marking</td></tr>
<tr><td>Cell Size</td><td colspan="3">≥0.15 mm</td></tr>
</table>

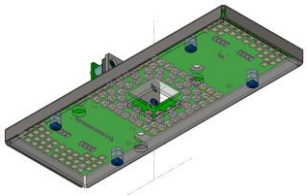
*1 Inspection processing time may vary due to the following situations
1) Communication load on network
2) Running state of other applications on check server PC

*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 manufactures 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.

■ 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.
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. 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.

5.13 Message board

This function can display different images[*2] for a certain period of time[*1] on 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.

5.14 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 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 jig for FC03 head is dedicated for head diagnosis; they do not have nozzle barcodes.

	Required quantity	No barcodes		With barcodes	
		Parts No.	Nozzle No.	Parts No.	Nozzle No.
FC16 head	16	N610148258AA	256CS	N610148260AA	256CSN
FC08 head	8	N610140967AB	256C	N610140968AB	256CN
FC03 head	3	MTKU002588AA	DIAG	—	—

5.15 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.

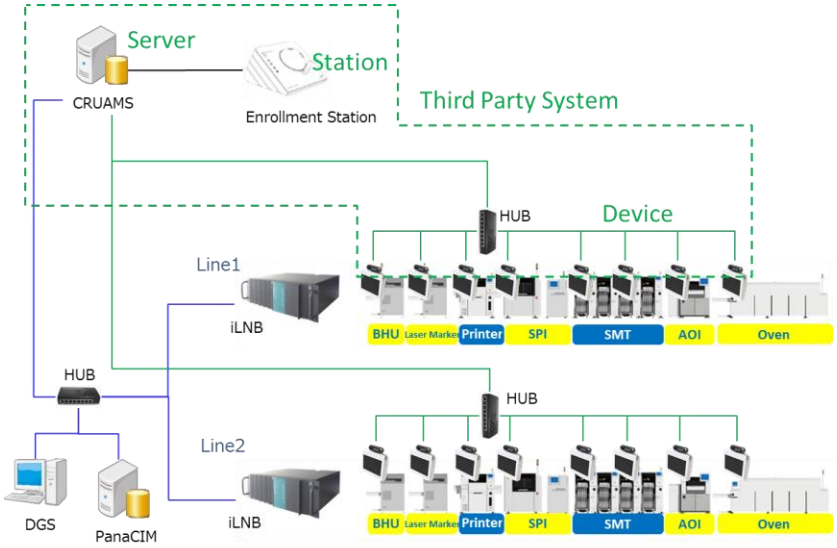
Trace

- Collects operation logs.

■ System configuration

Biometric authentication function checks who is using a 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.
	A license for E-Link (equipment control) is required. The license is required for each stage of a machine.
Biometric authentication license	Licenses are necessary per machine.
External authentication management system (external authentication device)	You need an authentication management system that you can link to our authentication system. For the details, contact us. We do not take any responsibility or liability for personal information management on other company's biometric authentication system.

5.16 APC-5M

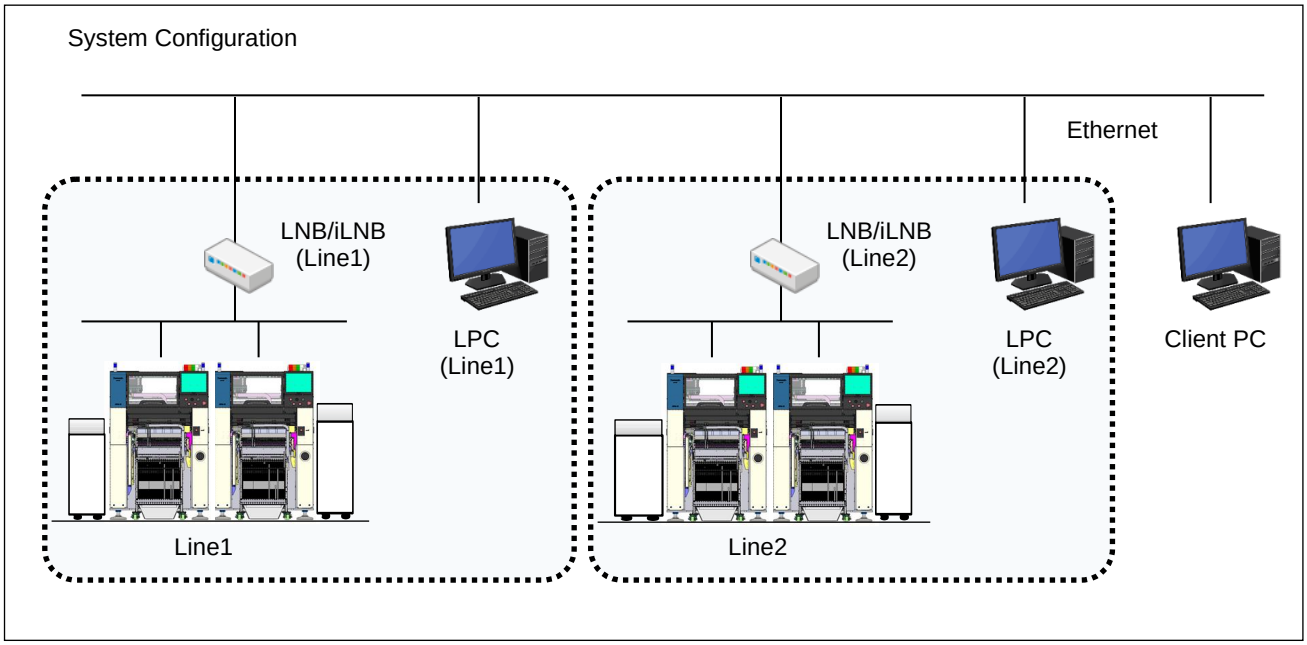
Monitors ”5M status” and ”operation status” in a real time to identify and control changes(variability) in 5M achieving "non-defective production" and "stable operation".

This is designed that can evolve and features available currently are as follows.

●Real Time Unit Monitoring

■ System Basic Configuration

Collects data output from machines and analyzes the collected data with LPC(Line Process Controller)
Connect LPC in a line(a line where one FA PC is connected).
When you connect to LPC from other than LPC PC in each line, you need to connect a client PC to the same network segment as LPC.



■ Basic Specifications

Items	Descriptions
APC-5M License	Need a license per one machine See ”14. License” on license details.
PC (Installation PC)	PC to install LPC(Line Process Controller) that collects data output from machines and analyzes the collected data * Please prepare a PC on your end or at a sales company or an agency. You can use with interfaces of other company inspection machines when your environment meets recommended operating environment.
LNB	Need a hard spec LNB; current selling model(*) or later models *For LNB FA-PC(Made by NEC) Model ID：FC-E20W series (2024/11～) For iLNB FA-PC (Made by SIEMENS) Model ID：IPC847D (2016/12～) FA-PC (Made by NEC) Model ID：FC-E20W series (2022/10～)
Client Computing (Client PC) * You can choose whether to prepare client PC.	It is a computer that controls LPC when connected to LPC from other than LPC(Line Process Controller) computer in each line. Concurrent connection is up to 5 computers. * We ask you to prepare a PC on your end, at a sales company or at an agency.

■ LPC Operating Environment

Hardware Specifications

Items		Specifications	Class
Main body		IBM PC/AT Compatible Machine	Required
	CPU	Intel® Core™ i7-13700 or superior	
	Mother board	IBM Fully Compatible	
	Serial I/O	IBM Fully Compatible	
	Graphic board	Full HD at least Desktop Resolution: 1 920 × 1 080 or more	
	Memory	16 GB or more	
	Storage*1*2	Primary drive：SSD 250 GB or more Secondary drive：HDD or SSD 4 TB or more	
	Optical Disk Drive	8× DVD-ROM drive speeds or faster Used for installation	
Keyboard		OS Standard Support	Required
Mouse		OS Standard Support	
Monitor		OS Standard Support	
Network Interface Card		1000BASE-T or faster	Required
Uninterruptible Power Supply(UPS)		OS Standard Support	Required

*1 When LPC and database are installed on the secondary drive and you add Other Company Inspection Machine Interface Software, install it on the primary drive.
*2 It is the OS boot drive and primary drive is SSD. When you add SSD onto an existing computer having only HDD as storage, connect SSD physically to the primary drive and reinstall the OS.
*3 When storage specifications do not meet the above hardware requirements, contact us.

HUB/ LAN Cable

Items		Specifications	Class
HUB	Transmission rate	1000BASE-T or greater	Required
	Ports	4 ports at least	
LAN cable		1000BASE-T: At least STP Cat 5e (4 cables) *1	

*1 LAN cable length depends on factory layout. Prepare appropriate LAN cable according to your installation environment.

Software Specifications

Items		Specifications	Class
OS		Microsoft® Windows 10/ 11 Pro (Required)	Required
	Support Language	Japanese, English, Chinese	
DBMS		PostgreSQL (Installation by APC-5M installer)	Required
Virus check		Virus Buster™ Program Version11.0 or later	Recommended
Browser		Google Chrome(Version 118 or later)	Required

Client PC

Items		Specifications	Class
OS		Microsoft® Windows 10/ 11	Required
	Support Language	Japanese, English, Chinese	
Virus check		Virus Buster™ Program Version11.0 or later	Recommended
Browser		Google Chrome(Version 118 or later)	Required

■ Functional Overview

Real Time Unit Monitoring

Monitors units in a real time during production and alerts of status before going abnormal status
Determines and indicates maintenance timing from status not time periods

・What is monitored?

Monitors the following items

Units	What is monitored?	Summary
Heads	Filter clogging	Checks filter clogging of placement heads
	Nozzle holder sliding property	Checks filter clogging of placement heads
Nozzles	Nozzle clogging	Checks nozzle clogging
	Nozzle tip	Checks nozzle tip dirt and wear
Feeders	Feeding accuracy	Checks feeding accuracy

・Status Category

Judges unit status from the following status

Unit Status	Definitions
Waiting	Measurements are not in progress.
Normal	No maintenance is needed.
Seminormal	Not abnormal but maintenance is recommended.
Warning	Not abnormal but maintenance is required soon.
Abnormal	Maintenance is needed. You can stop machines due to an error when unit abnormal status is detected if you arrange the setting.

■ Constraints

There are constraints below on the use of this feature

・Units to be monitored

Units	What is monitored	Units to be monitored
Heads	Filter clogging	FC16 head FC08 head FC03 head
	Nozzle holder sliding	FC16 head FC08 head
Nozzles	Nozzle clogging	Standard nozzle
	Nozzle tip	Standard nozzle (Pad nozzle and Odd-shaped component nozzles not included)
Feeders	Feeding accuracy	4 mm thin-type single tape feeder 8 mm thin-type single tray feeder 8 mm double tape feeder ASF08

・What features you cannot use with

Units	What is monitored	Features you cannot use with
Heads	Filter clogging	N/A
	Nozzle holder sliding	・High-speed head placement constant load control (License) Note that you cannot use together unless Periodic Monitoring Mode is set to ON. ・Low load nozzle
Nozzles	Nozzle clogging	N/A
	Nozzle tip	N/A
Feeders	Feeding accuracy	N/A

5.17 Mount complete position recognition

This option contains the following two functions.

Section	Functions
5.17.1	Mount complete position recognition function
5.17.2	Shield case warping inspection function before mounting

5.17.1 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 NG component is detected after Mount Complete position recognition, it automatically shows a NG component list.

Teaching

For recognition points that were set according to component, you can adjust the teaching of lamp value, area, and threshold by the 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.

5.17.2 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.

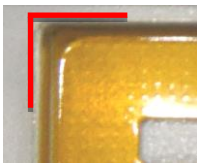
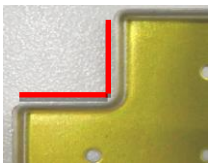
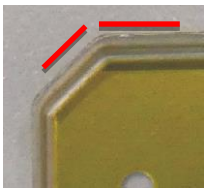
Teaching

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.
(Basically, we will receive samples and then decide whether to be able to detect or not after going through consideration and experiments)

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.
Multicamera MC-S：Type3	Multicamera MC-S：Type3 is necessary.

5.18 Tray 1 Pallet 10 Kind

This is a feature that uses tray units to achieve production by putting small volume components packaged in cut paper/ embossed tapes onto a pallet. You can put onto a pallet up to 10 kinds of components.
For example, you can use small volume components packaged in cut embossed tapes for trial production and/or small lot production.

(e.g.) Component Layout

■ Feature List

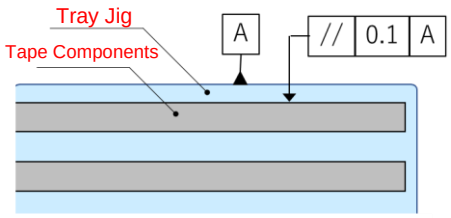
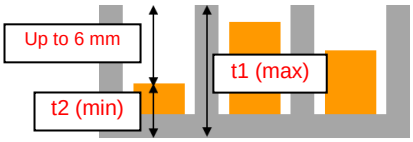
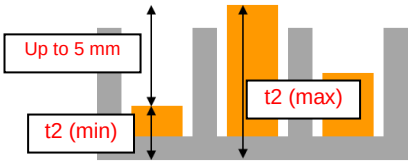
Items	Descriptions
Create Production Data	Uses DGS to create production data that it is up to 10 kinds of components onto 1 pallet.
Edit Production Data	Views/Edits the related layout data on the screen.
Teaching	Teaching about the related tray pickup positions on the screen.
Production	Based on the above production data, production is up to 10 kinds of components onto 1 pallet.
Component Shortage	Deals with component shortage by component type

■ Standard Configuration

Items	Descriptions
License	License is necessary by the machine. For License details, see ”14. License”.
Tray jig	We ask you to prepare a dedicated tray when you use this option.

■ Tray Jig Design Specification

Tray jig design specification basically conforms to “Tray Conditions” in the “4.3 Feeder Carriage Configuration” section.

Items	Descriptions
Component Layout	As shown below, put tape components parallel to PCB transfer direction on a jig. (We recommend that tray jig end face parallelism be 0.1 mm or smaller) 
Height	①When component height in all the components is equal to or lower than tray jig maximum height t1, the following formula about height difference of t1(max) and component minimum height t2(min) should be satisfied. t1 (max) − t2 (min) ≤ 6 mm  ②When there is a component higher than tray jig maximum height t1, the following formula about height difference of component maximum height t2(max) and component minimum height t2(min) should be satisfied. t2 (max) − t2 (min) ≤ 5 mm 

■ Restrictions

- When this option is activated, the following features will be deactivated.
  1） Use tray supply side
  2） Tray outside comp collation
  3） Tray stock Auto Change
- You cannot use this feature with FC16 head.
- You cannot attach this option in some cases; it depends on your jigs or components.
  For details about whether to be able to attach it, contact us.

5.19 Component Bottom-Side 2D code Reading

This is a feature to read 2D codes at the bottom of components at the same time as component recognition after component pickup, and provide the data to higher systems using trace files.

■ Basic Specification

Items	Descriptions
Applicable Components	Tray components, and Tape feeder components
Applicable Codes	QR code, Micro QR code, Data Matrix (EC200)
Character Length	128 characters maximum

■ Restrictions

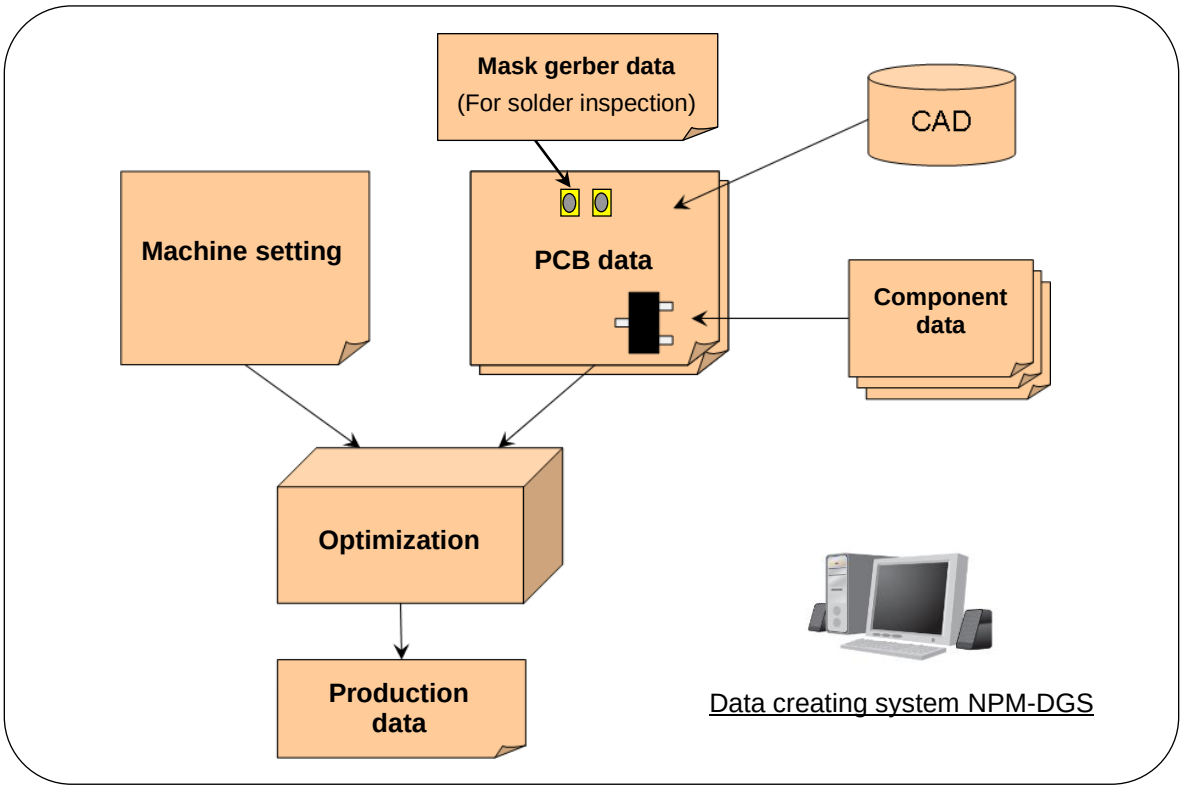
- Cannot extract specific zones from character strings.
- Cannot use with the Pre-pickup Inspection character・2D recognition feature.
- 2D code data is output to trace files, and the handling of the data conforms to the specification of higher systems.
- It is necessary that components included in the component bottom-side 2D code reading be placed to a mounter having this feature.
- 2D code printed side at the bottom of components is eual to the height of electorde(ground) or within plus or minus 0.7 mm.
- Reads 2D code data at the bottom of componnets at the same time as component recognition.
  For this reason, it is necessary that 2D codes be clearly recognizable in the same lighting condition as component recognition.
  (It is necessary to have brightness difference of at least 40 between a code and its background on a scale of 255 gradations maximum)

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 LNB (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.

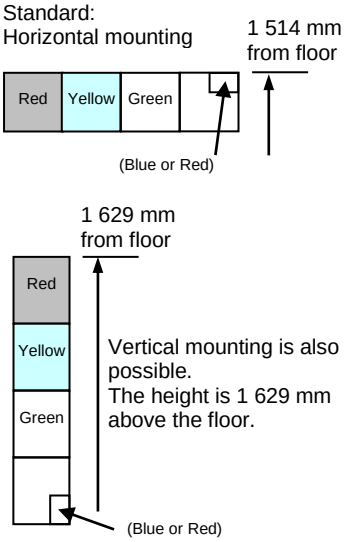
* The hardware for NPM-DGS should be prepared by yourself. (NPM-DGS should be purchased separately.)
  Regarding the license in NPM-DGS and in the option of NPM-DGS, a license is required for each machine, so you need to purchase license as many as the number of the machine you have.
  For details about NPM-DGS, please refer to “NPM-DGS Specification.”



Data creating system NPM-DGS

6.2 Signal Tower

Color of signal tower and lighting standard

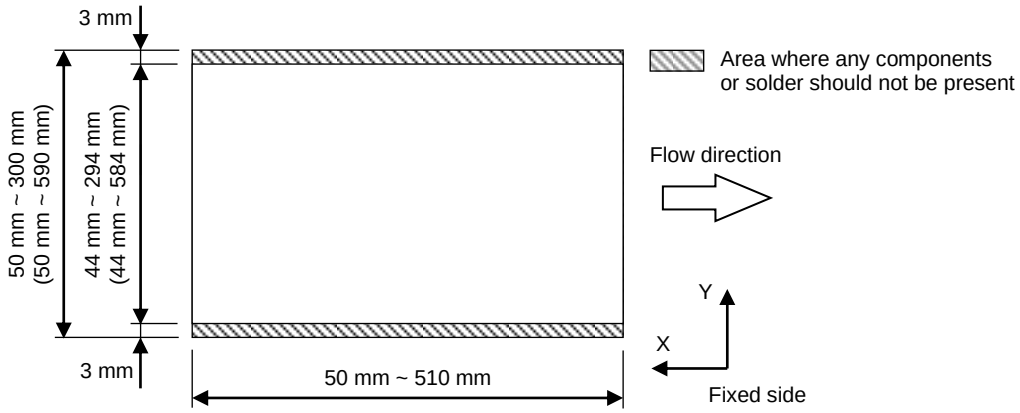


Signal Color	Classification	Lighting Standard
Red	Emergency stop error	・Trouble in shafts of motors, etc. ・Drop in air pressure ・Trouble in PCB supports ・Head trouble ・Tape trouble ,and etc.
Yellow	Single stop error	・Pickup error ・Placement error ・PCB transfer error ・Component run out ・Nozzle change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

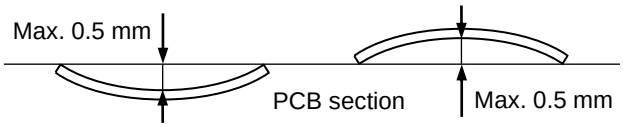


Numerical value in ( ) : For single lane mode

Item	Specifications
PCB dimensions	Dual lane mode : 50 × 50 mm ~ 510 × 300 mm Single lane mode : 50 × 50 mm ~ 510 × 590 mm
Placement and inspection area	Dual lane mode : 50 × 44 mm ~ 510 × 294 mm Single lane mode : 50 × 44 mm ~ 510 × 584 mm
	* When Length, L, is 350 mm or larger, Sliding Transfer Option is necessary.
PCB thickness	0.3 mm ~ 8.0 mm
PCB mass	3.0 kg or less(Mass including carrier after mounting) *1

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

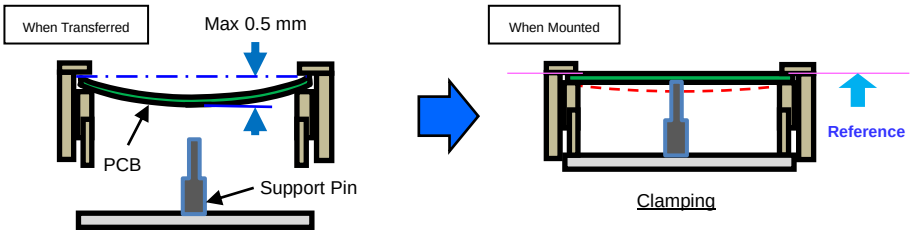
* For ceramic PCBs, please consult us.

Item	Specifications
Permissible PCB warpage*A	

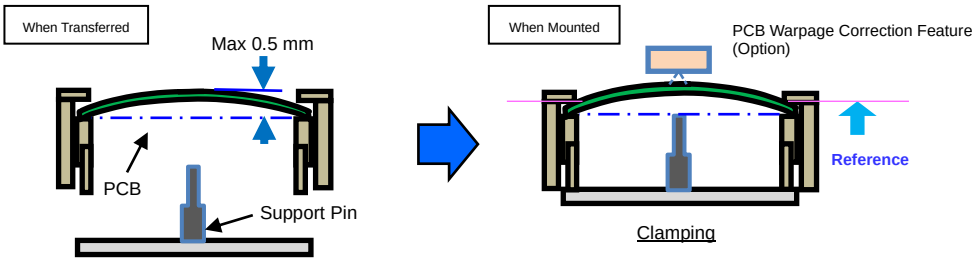
*A Here are PCB warpage dimension that can be transferred.

PCB warpage affects mounting quality.
To reduce impact of PCB warping downwards, use support pins to flatten warpage.
To reduce impact of PCB warping upwards, consider Height Sensor (PCB warpage correction feature).
(When using carriers, we ask you to design carries not to occur PCB warpage)

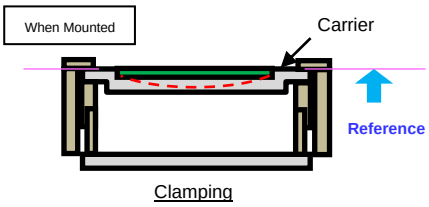
When Warped Downwards

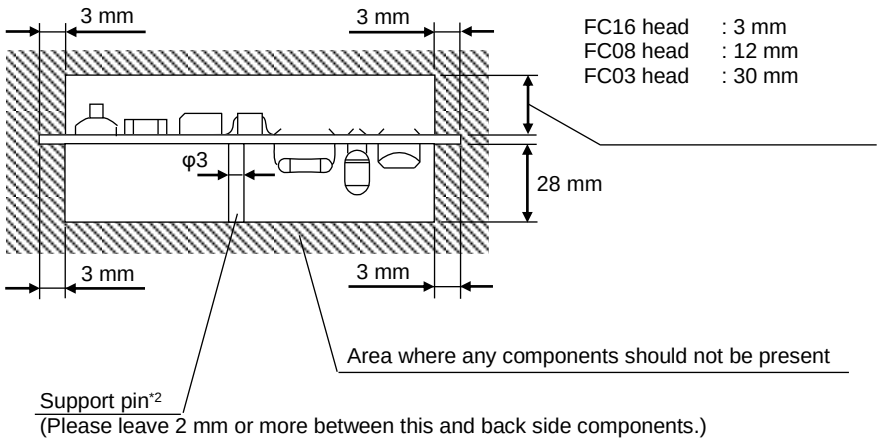


When Warped Upwards

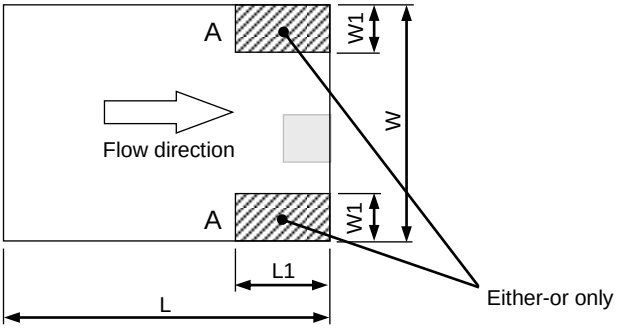


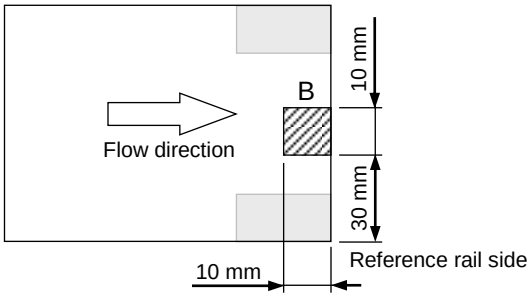
When Using Carrier



Item	Specifications
Conditions of PCB before placement	

*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.”

<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.
 

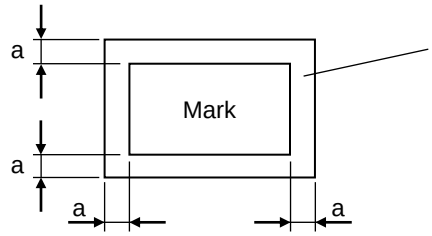
<table>
<tr><th>L</th><th>L1</th></tr>
<tr><td>50 mm ≦L ≦ 350 mm</td><td>Less than L/4</td></tr>
<tr><td>350 mm < L ≦ 510 mm</td><td>Whichever is smaller, L/4 or 100 mm.</td></tr>
</table>
<table>
<tr><th>W</th><th>W1</th></tr>
<tr><td>50 mm ≦ W ≦ 300 mm</td><td>Whichever is smaller, W/3 or 30 mm.</td></tr>
<tr><td>300 mm < W ≦ 590 mm</td><td>Please consult us.</td></tr>
</table>
* The above cases show PCBs of 1.6mm or more in thickness.
When PCB thickness is thinner than 1.6 mm, contact 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.

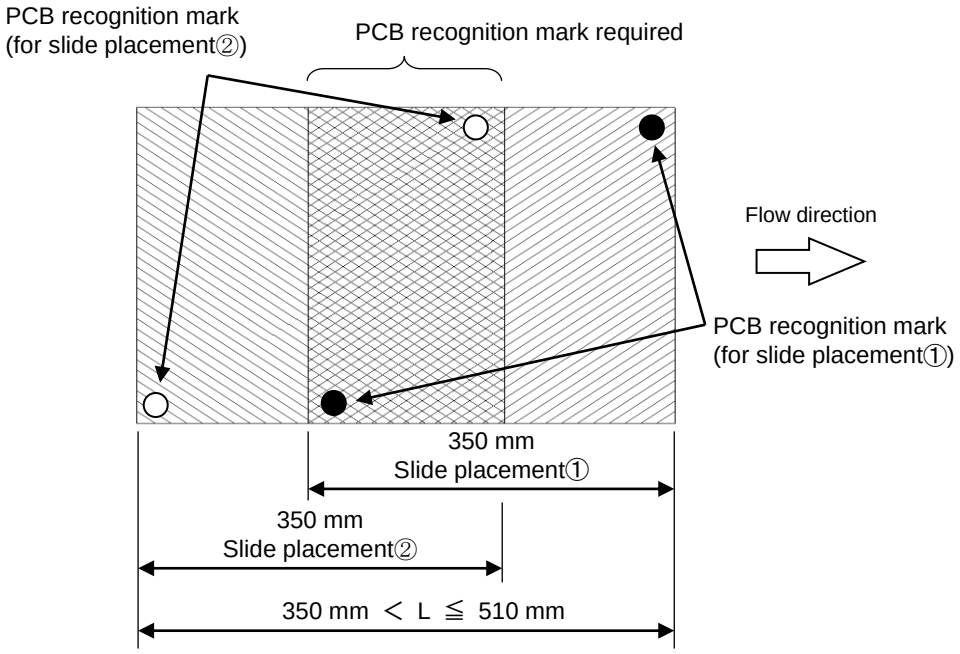
■ PCB Recognition Mark Specifications

Standard Mark Shapes and Dimensions	Standard Mark Shapes	Dimensions
	○	φ0.5 mm ~ φ1.6 mm
	△ (Equilateral triangle)	Length of one side: 0.5 mm ~ 1.6 mm
	□	Length and width: 0.5 mm ~ 1.6 mm
	✜	Length and width: 0.5 mm ~ 1.6 mm
	Length and width mean the dimensions of the quadrangle circumscribing the mark.	
Mark Materials and Circuit Pattern	Because PCB recognition correction is based on the positional relationship between the marks and the circuit pattern (conductor pattern), the marks must be made in the same process and of the same materials as those of the circuit pattern from the viewpoint of correction accuracy.	
Image Conditions of Mark Materials and PCB Base	Because, basically, mark recognition process is carried out based on the intensity difference of reflected light, a fixed contrast is required between the mark materials and the PCB base. This difference varies significantly depending on the plating condition, oxidation condition, surface height, unevenness, degree of mirroring, coating, or disturbance light; therefore, the assessment of the marks is required beforehand.	
Mark Dimensions and Background	Noninterference area of larger than a certain dimension is required outside of the mark.  	

■ **About PCB Recognition Marks During Slide Placement**

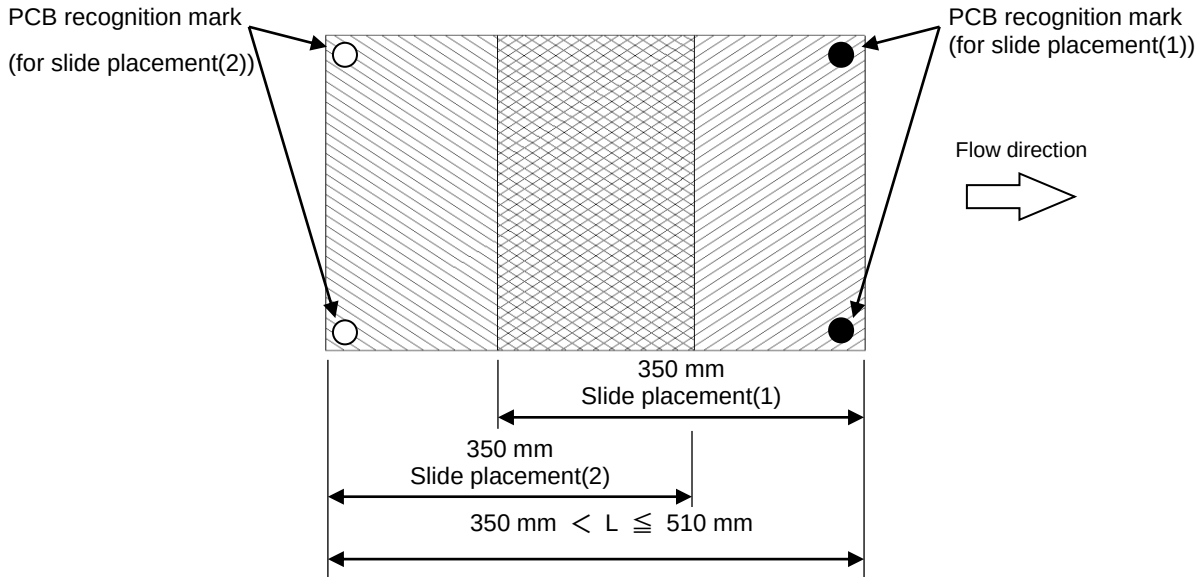
Two PCB recognition marks are required in the opposite corners on PCB.
Slide placement Option is applicable to the PCB exceeding 350 mm* of transfer-direction dimension(L).
Even in slide placement, two PCB recognition marks are required in the opposite corners, and we rec ommend that they exist as below.

Recommendation)

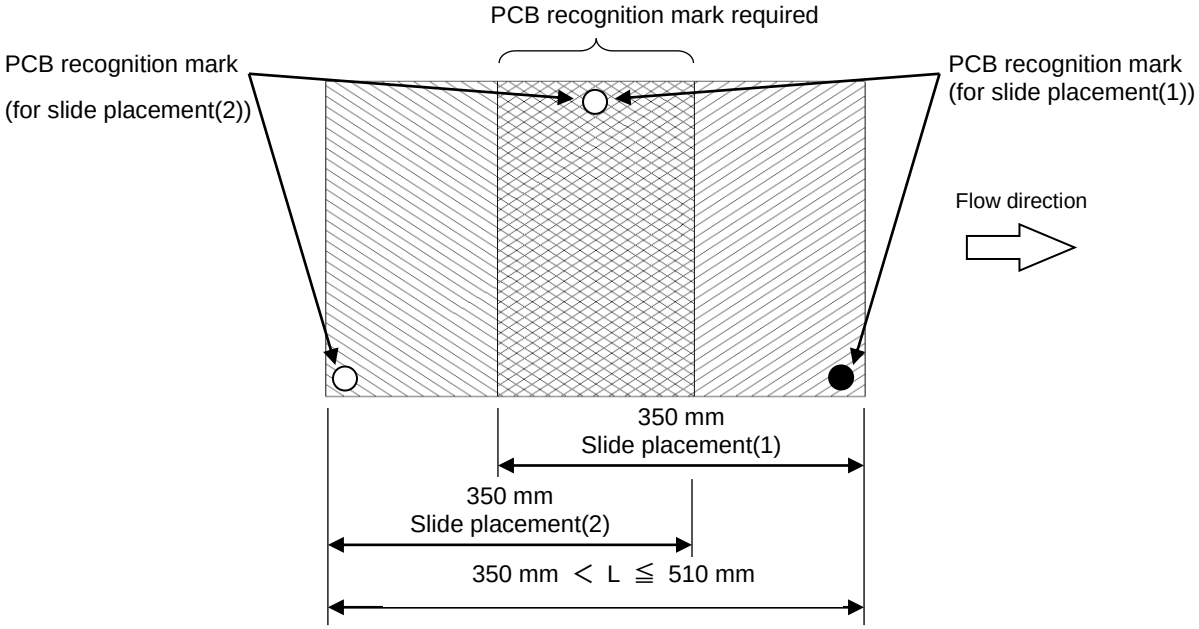


Other applicable examples:

・For four PCB recognition marks

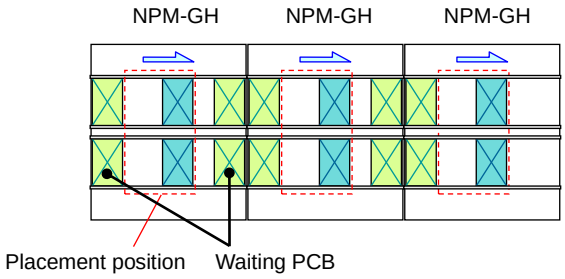
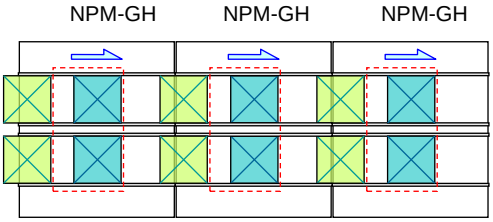
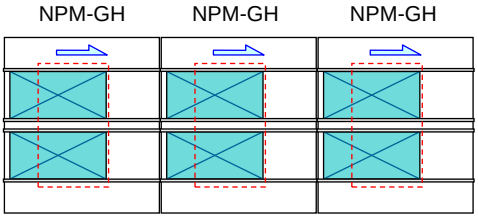


・For three PCB recognition marks



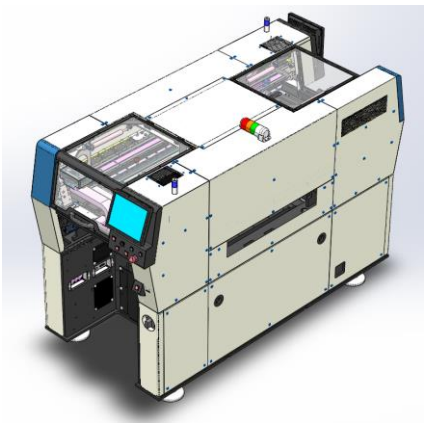
* These positions of PCB recognition marks are examples. The applicable conditions vary depending on your PCB specification. For details, please contact us.

7.3 PCB waiting condition

<table>
<tr><th>PCB length: L</th><th>Description</th></tr>
<tr><td>50 mm ≦ L
≦ 275 mm</td><td> 
</td></tr>
<tr><td>275 mm ＜ L
≦ 350 mm</td><td> 
</td></tr>
<tr><td>350 mm ＜ L
≦ 510 mm</td><td> 

* When PCB length L is 350 mm or longer, Sliding Transfer Option is necessary.</td></tr>
</table>

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 • Password-changing SD card	1 set each
	Manual (DVD－ROM) 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	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**	-
			・Upstream extension conveyor (L=200 mm) ・Downstream extension conveyor (L=200 mm)	**Factory**	-
	2	To select a component recognition unit suitable for the intended use.	・Multicamera MC-S: Type 1/ 2/ 3	**On-site**	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 Feeder(ITF) *1 ・Auto Setting Feeder(ASF)*2	Customer	-
	3	To use thin type tape feeder*1	・4mm 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 splicing work. To reduce the feeder setup time.	・Auto Setting Feeder(ASF)*2 ・Loading Unit(LU)*2	Customer	-
	5	To select the stick feeder in accordance with the production pattern	・3-lot stick feeder *1 ・Guide block (For 3-lot stick feeder) *1 ・Stick Feeder 3(SF3) *2 ・Guide block(For SF3) *2	Customer	-
	6	To manage and store tape feeders	・Tape feeder stand (ITF) ・Tape feeder stand(For ASF)	Customer	-
	7	To prepare for the replacement of a support pin	・PCB support block batch replacement set	On-site	Whole machine
			・PCB support block ・Support pin setting jig ・Additional support pins	Customer	-
	8	To replace the support pins automatically	・Automatic replacement of support pins	On-site	Whole machine
			・Support pin (For automatic replacement) ・Nozzle for support pin	Customer	-
	9	To prepare feeders in advance and change them collectively.	・Feeder cart ・C-Cart34C ・C-Cart40C	Customer	-
	10	To choose the Single Tray Feeder/ Cart replacement specification for Component Supply Unit	・Tray feeder/ (Feeder cart/ C-Cart34C) replacement specification. ・Tray feeder/ (C-Cart40C) replacement specification.	Factory	Table
			・Single tray feeder ・Additional tray magazine ・Additional tray pallet ・Additional component-ejection tray ・Pallet for vacuum formed tray	Customer	
			・Feeder cart ・C-Cart34C ・C-Cart40C	Customer	
	11	To place tray-feeding components	・Single tray feeder	Factory	-
			・Additional tray magazine ・Additional tray pallet ・Additional components-ejection tray ・Pallet for vacuum-molded-tray	Customer	-
	12	To improve the workability of tape splicing	・Splicing cart	Customer	-
	13	To mount onto PCB with PCB length(L) over 350 mm	・Sliding transfer option	Factory	-

*1 You can use with Feeder Cart only.
*2 You can use with C-Cart only.

No.		Purpose/Feature	Option name	Category	
C	1	To replace the placement head	・Spare placement head ・Spare nozzle changer	Customer	Table
			・Spare multicamera MC-S: Type 1/ 2/ 3	On-site	Table
	2	To correct the PCB height (warp) and improve placement quality	・Height sensor	On-site	Table
			・Height sensor teaching jig	Customer	-
	3	To improve the function of FC16 head	・0201 component placement support ・High-accurate mode1(License) ・High-accurate mode2(License)	On-site	Whole machine
	4	To align and eject the NG components onto the conveyor.	・Components ejection conveyor[*1] ・CEC (Components Ejection Conveyer)[*2]	Customer	Table
	5	To manage and store the removed heads	・Head stand (For two Heads)	Customer	-
	6	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 ・Air supply unit	Customer	-
	7	To use all sorts of function modules of PanaCIM-EE	・PanaCIM-EE ready (License)	On-site	-
	8	To use all sorts of function modules of iLNB	・iLNB ready (License)	On-site	-
	9	To implement changeover efficiently	・Automatic changeover (License)	On-site	-
	10	To prevent setting error at the time of component change	・Component verification (License)	On-site	-
	11	To streamline setup operations during a changeover	・Feeder Setup Navigator (License)	On-site	-
	12	To use existing system effectively	・Upper communication (License)	Customer	-
	13	To make use of the location-independent tape feeder function	・Upper communication (License) ・Support station: Component verification type	On-site	-
	14	To improve placement quality by controlling process by process measurement data of inspection head(solder inspection).	・APC system ready (License)	Customer	-
	15	To enable APC system using SPI	・Interface software of the inspection machine from other companies (License)	On-site	-
			・APC system ready (License)	Customer	-
	16	To maintain placement quality by using the AOI measurement data of mounting process	・APC-MFB2 system ready (License)	Customer	
	17	To perform transfer mounting.	・Transfer unit For G series [*1] ・DPU (Dipping Unit) [*2] ・Film thickness gauge	Customer	-
			・Air supply unit for the feeder[*1]	On-site	Table
	18	To avoid machine stop error by analyzing the trend of pickup condition during production.	・Automatic recovery(License)	On-site	-
	19	To perform the machine by remote operation	・Remote operation(License)	On-site	-
	20	To login to a machine using biometric information	・Biometrical authentication (License)	On-site	
	21	To display a chosen image when you haven't used touch panel for a certain period.	・Message board (License)	Customer	
	22	Visual control of placement head conditions and to prevent troubles	・Head diagnosis (License)	Customer	
	23	To keep FC16 ,FC08 head push-in load constant	・High-speed head placement constant load control (License)	On-site	-
	24	To perform transfer mounting with FC16 head	・FC16 head transfer (License)	On-site	-
	25	To perform polarity test of tray components and tape feeder components right before pickup.	・Inspection before pickup (Polarity) (License)	Customer	
	26	To recognize characters and 2D code on the surface of components before pickup from tray or tape feeder	・Inspection before pickup (character・2D recognition) (License)	Factory	-
	27	To reduce the time required for checking where is judged as NG at AOI	・AOI data display (License)	On-site	-
	28	To monitor unit status	・APC-5M (License)	Customer	

No.		Purpose/Feature	Option name	Category	
C	29	To communicate bad marks with other company machine	・Other company bad mark communication (License)	Customer	
	30	To increase mounting point to more than Max.50,000 points/machine or Max.50,000 points/line.	・Extend Mount points (License)	Customer	
	31	To see whether electrical properties of components is within a predefined range before mounting.	・LCR checker (Build-in type)	Factory	Table
	32	To measure push-in load when mounting and show result on the machine monitor or LNB.	・Load chacker	Factory	Table
	33	Low load mounting with FC16 head nozzle	・Low load nozzle	On-site	
	34	To connect the factory side plumping to equipment to enable primary air connecting.	・Primary air hose unit	Customer	-
	35	To use large reels	・Separator (For Feeder cart) ・Separator (For C-Cart) ・Spacer set	Customer	
	36	To enhance recognition camera performance	・Multicamera MC-S Type3 (License)	Customer	Table
	37	To do simple test for checking shield component conditions after mounting.	・Mount complete position recognition (License)	Customer	
	38	To do simple test for checking shield component conditions before mounting.	・Mount complete position recognition (License)	Customer	
	39	To use small volume components packaged in the cut tapes and do mounting for production trial and small lot production	・Tray 1 Pallet 10 Kind (License)	Customer	
	40	To measure pneumatic pressure and show the result on the equipment monitor and LNB	・Pneumatic equipment diagnosis feature	Factory	
	41	To recognize 2D codes at the same time as component recognition for tray components and tape feeder components.	・Component Bottom-Side 2D code Reading (License)	Customer	

*1 You can use with Feeder Cart only.
*2 You can use with C-Cart only.

No.		Purpose/Feature	Option name	Category	
D	1	To keep the machine condition in regular maintenance	・Greasing set ・Maintenance jig ・Maintenance jig (for FC16 head only) ・FC03 maintenance set ・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*1	Customer	-
	4	To remove and replace the switching unit in the Cart replacement specification	・Switching unit tool*1	Customer	-
	5	To automate head maintenance	・Head maintenance unit for FC head*2 ・HMUC (Head Maintenance Unit for C-Cart) *3 ・Air supply connection kit*2 ・Side filter ・Bottom filter ・Additional nozzle holder pallet	Customer	-
	6	To automate tape splicing	・Automatic tape splicing unit ・Splicing tape ・Battery box (Including connection cable) ・Charge Terminal ・Rubbish box ・Tape cutting jig	Customer	
			・Battery・Battery Charger	Customer	
	7	To automate feeder maintenance*4	・Feeder maintenance unit ・Master jig ・Attachment for thin type single feeder ・Thin type single feeder master jig	Customer	-

*1 It is for NPM-G series only.
*2 You can use with Feeder Cart only.
*3 You can use with C-Cart only.
*4 It is for Intelligent Tape Feeder.
For Auto Setting Feeder maintenance, see the Feeder Maintenance Unit (FMU:NM-EJW2B) specification document.

A-1	Selection of required options

On-site

FA PC
HUB

- Always required for the NPM-GH line. (1 set/line)
- For more information, please refer to “4.4 Line configuration.”

Factory

Upstream extension conveyor (L=200 mm)

- Please be sure to select it for the first equipment of the NPM-GH to ensure the safety of the transfer opening.
- The PCB of 275 mm or more in length is allowed to standby. (Max. L 475 mm)
- If the extension conveyor is installed between NPM-GH, the PCB of max. 475 mm in length is allowed to standby.

Factory

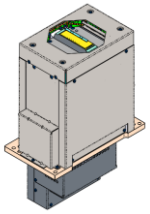
Downstream extension conveyor (L=200 mm)

- Please be sure to select it for the last equipment of the NPM-GH to ensure the safety of the transfer opening.
- The PCB of 275 mm or more in length is allowed to standby. (Max. L 475 mm)

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

On-site Table

Multicamera MC-S: Type 1

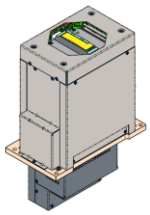


- The position in picking up the chip and the angle deviation are corrected.
- Please be sure to select it for the table where the placement head is selected.
- Please refer to “4.5 Recognition Unit Configuration” for details.

* Multicamera MC-S is for NPM-G series only.

On-site Table

Multicamera MC-S: Type 2
(Type 1 + Component thickness measurement)

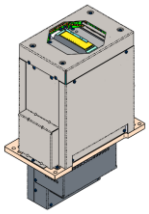


- Component thickness measurement function will be added to “Type 1”.
- This provides component thickness measurement (added to chip data entry and reflected in placement height), component's standing/tilted standing is detected, flip of Tr/ Di is detected, and nozzle tip is checked.
- This supports each Placement head.
- Please refer to “4.5 Recognition Unit Configuration” for details.

* Multicamera MC-S is for NPM-G series only.

On-site Table

Multicamera MC-S: Type 3
(Type 2 + 3D-measurement function)



- 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.
- This supports each Placement head.
- Please refer to “4.5 Recognition Unit Configuration” for details.

* Multicamera MC-S is for NPM-G series only.

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.

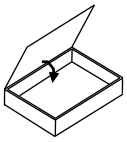
Customer

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, NPM, NPM-X 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 FC16 head (Less than nozzle diameter φ5 mm) can accommodate 50 nozzles.
- The one for FC08 head, FC03 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, NPM, NPM-X series.

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

Customer

Intelligent feeder(ITF)*1
Auto Setting Feeder(ASF)*2

- Please refer to “4.3 Feeder Carriage Configuration” for details.

*1 You can use with Feeder Cart only.
It is compatible with AM100, CM602, CM402/ DT401 series, CM232, CM212, CM101, NPM series, and NPM-X series.
*2 You can use with C-Cart only.

B-3	To use thin type tape feeder.

Customer

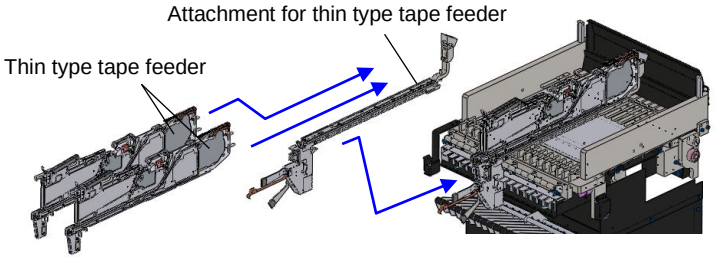
4 mm thin type single tape feeder (No detection sensor)
8 mm thin type single tape feeder

- Please refer to “4.3 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.
* It is for use with Feeder cart only.

Customer

Attachment for thin type tape feeder

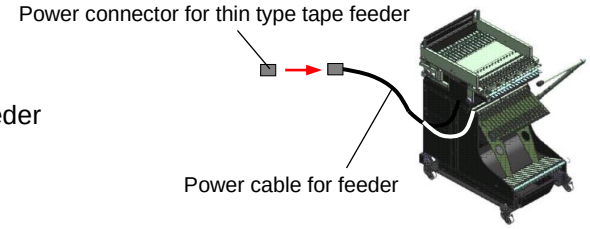


- One piece is required per slot when you attach a thin type tape feeder
  Two thin type tape feeders can be attached to each slot
- This is required even when you use a "Feeder setting jig" in offline setting.

* It is for use with Feeder cart only.

Customer

Power connector for thin type tape feeder

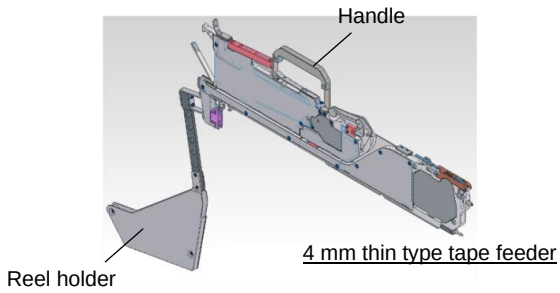


- Required to directly supply electricity to thin type tape feeders (at the time of preparation, etc.)
- Used by connecting to the power cable for feeders, which comes with feeder carts.
  It can also be connected to the feeder power cable of the support station.
- When power to thin type tape feeders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

* It is for use with Feeder cart only.

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 splicing work. To reduce the feeder setup time.

Customer

Auto Setting Feeder(ASF)*1
Loading Unit(LU)

・ Please refer to “4.3 Feeder Carriage Configuration” for details.
*1 You can use with C-Cart only.

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

Customer

3-lot stick feeder*1
Stick Feeder 3 (SF3)*2

・ Please refer to “4.3 Feeder Carriage Configuration” for details.
・ Supported nozzle is FC08 head and FC03 head only.

*1 You can use with Feeder Cart only.
3-lot Stick Feeder is compatible with AM100, CM602, CM402/ DT401 series, CM232, CM212, CM101, NPM series, and NPM-X series.
*2 You can use with C-Cart only.

Customer

Guide block (For 3-lot stick feeder)
Guide block (For SF3)

* 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.
* Guide block design method is open to the public, and you can design on your end.
For details, contact us.
* 3-slot stick feeder guide block and SF3 guide block are not the same.

B-6	To manage and store tape feeders.

Customer

Tape Feeder Stand (ITF)
Tape feeder stand (For ASF)

・ The maximum ITF tape feeder stand capacity is 90 feeders of 8 mm intelligent feeder double feeder.
・ ITF tape feeder stand and ASF tape feeder stand are not the same.
・ ASF tape feeder stand capacity is up to 186 feeders of ASF08.

* 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-7	To prepare for replacement of support pin

On-site Whole machine

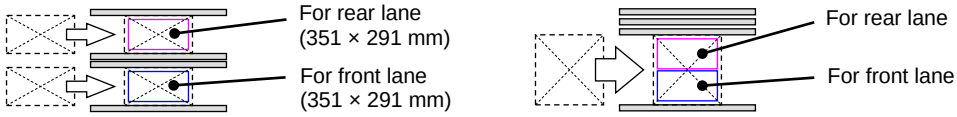
PCB Support Block Batch Replacement Set

- It is a set of PCB support blocks for batch exchange (one each for front lane/rear lane) and a batch exchange unit This is not used with “Automatic replacement of support pins”.
- Please select “Additional PCB support block” as needed.
- To set up the positions of support pins for new PCB externally, please select “Support pin setting jig” separately.
- It is for NPM-GH only.

Customer

PCB support block

- A set of one block each for the front lane and rear lane.
- No support pin is included. Please select "Additional support pin" as needed.



Dual lane mode　　Single lane mode

Customer

Support pin setting jig

- For off-line changeover of support pins, choose “PCB support block” additionally.

Customer

Support pin setting jig

- Please select when needed in addition. (20 pieces are included in 1 set.)
- Common with NPM-X series, NPM series, AM100 and NPM(Dual Lane Specification).

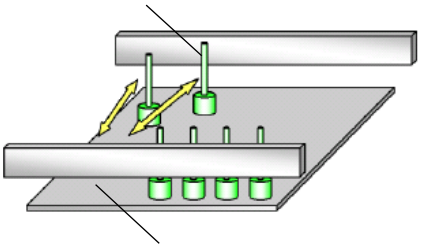
B-8	To replace the support pins automatically.

On-site Whole machine

Automatic replacement of support pins

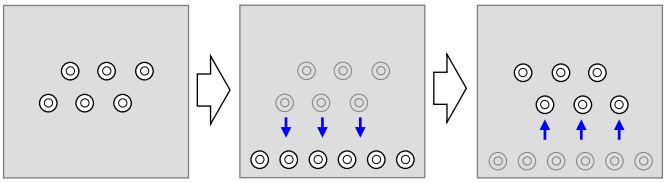
A function to automatically set up support pins using a placement head.
Up to 40 support pins can be automatically configured per a piece of PCB. (Standard support pins cannot be used.)
Support pin configuration data is created by NPM-DGS. You can check pin configuration on the PC screen.

Support pin (For automatic replacement)



PCB support block (For automatic replacement)

Time to configure support pins: 90 s/ 10 pins*1 (Product A → Product B)



Product A | Home position*2 (Reference rail side) | Product B

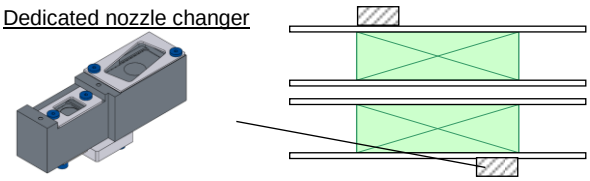
*1 For a PCB of 350 × 300 mm
(It does not include time to change the width of the transfer rail.)
*2 Under some conditions, the pin configuration of product A will be directly switched to the one of product B.

Accessory	Description	Remarks
PCB support block (Automatic replacement)	1 set (Front/Rear 1 block each)	Front/Rear: Common with NPM-X series
Nozzle changer for support pin	1 set (Front/Rear 1 each)	For NPM-GH only

Selection option	Description		Remarks
Support pin (For automatic replacement)			Common with NPM-X, NPM series, AM100
Nozzle for support pin changeover	300 nozzle	For FC16 head For FC08 head	----
	1100 nozzle	For FC03 head	Common with NPM-X, NPM series

The nozzle for support pin changeover is stored in the dedicated nozzle changer.
Each one of #300 nozzles and #1100 nozzles can be stored in the dedicated nozzle changer.

Dedicated nozzle changer

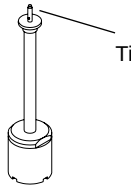


See the next page for the constraint condition when support pins are automatically replaced.

B-8	To replace the support pins automatically

Customer

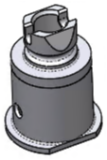
Support pin (For automatic replacement)



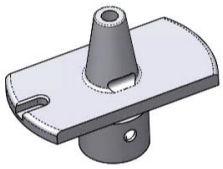
- Up to 40 pieces can be configured per a piece of PCB. (For PCBs whose size is L= 350 mm or less: up to 20 pieces)
- (Dual conveyor specifications: Max. 80 pieces with front lane and rear lane)

Customer

Nozzle for support pin



300 nozzle
(For FC16 head/ FC08 head)



1100 nozzle
(For FC03 head)

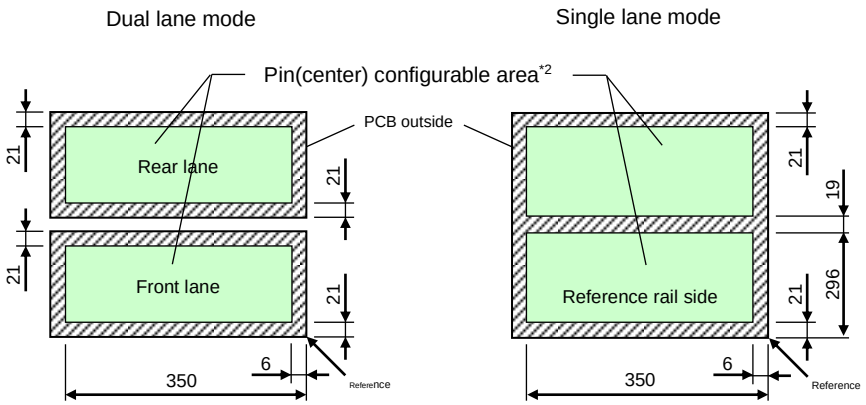
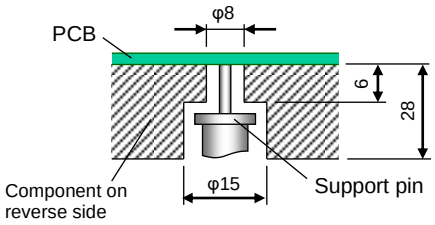
- Please select according to head configuration. (One nozzle is used for each placement head.)

B-8	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	L 50 × W 50 mm
Pin configuration pitch	16 mm or more (X, Y direction)
Pin configuration area (Left-to right flow)*1	 *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-9	To prepare feeders in advance and change them collectively.

Customer

Feeder cart

- Floor slope in the feeder cart installation area needs to be 6 mm or less on the left and right of a cart, and 11 mm or less in front of and behind of a cart. When floor slope is beyond the above limit, feeder cart cannot be taken in or out.
- It is not compatible with C-Cart.
- You cannot use Auto Setting Feeder with this Feeder Cart

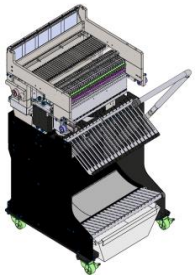
Customer

C-Cart34C

- Floor slope in the C-Cart installation area needs to be 6 mm or less on the left and right of a cart, and 11 mm or less in front of and behind of a cart. When floor slope is beyond the above limit, C-cart cannot be taken in or out.
- It is not compatible with Feeder Cart.
- You cannot use Intelligent Feeder with this C-Cart.

Customer

C-Cart40C

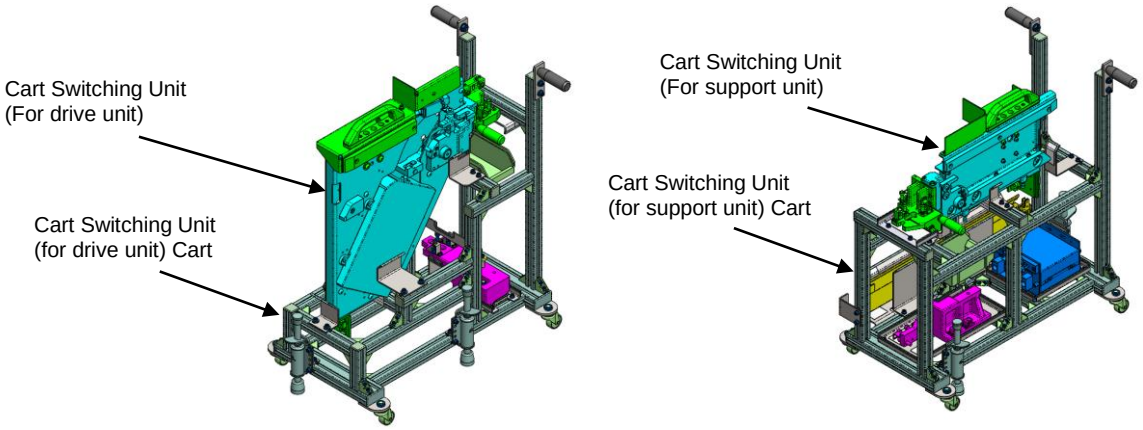


- Floor slope in the C-Cart installation area needs to be 6 mm or less on the left and right of a cart, and 11 mm or less in front of and behind of a cart. When floor slope is beyond the above limit, C-cart cannot be taken in or out.
- It is not compatible with Feeder Cart.
- You cannot use Intelligent Feeder with this C-Cart.

B-10	To choose the Single Tray Feeder/ Cart replacement specification for Component Supply Unit

Factory Table

Tray Feeder / <Feeder Cart/ C-Cart34C> Switching Unit
Tray Feeder / C-Cart40C Switching Unit
Switching Unit (for drive unit) Cart
Switching Unit (for support unit) Cart



- This is necessary when you switch Single Tray Feeder and Feeder Cart/ C-Cart.
- You cannot switch from the Single Tray Feeder specification or the Feeder Cart/ C-Cart specification.
- <Feeder Cart / C-Cart34C> switching unit and C-Cart40C switching unit are not the same.
- You can put the tray on the rear only.
- For details, contact us.

Customer

Single Tray Feeder
Additional Tray Magazine(7.5 mm pitch× 23 slots)
Additional Tray Pallet
Additional Component Ejection Tray
Pallet For Vacuum Formed Tray

- For details, see ”B-11”.

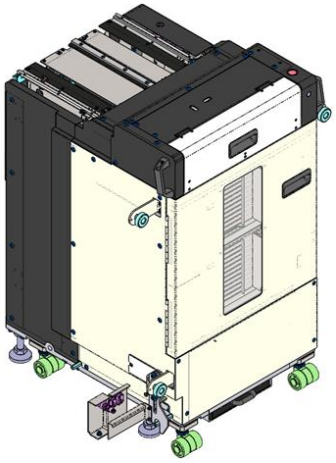
Customer

Feeder Cart
C-Cart34C
C-Cart40C

- For details, see “B-9”.

B-11	To place tray-feeding components.

Factory



Max. 24 pallets

Single tray feeder

Standard accessory	Single tray feeder*
Tray magazine (7.5 mm pitch × 23 stages)	2 pcs.
Tray pallet	21 pcs.
Components-ejection tray	1 pc.

* Single tray feeder is only for NPM-GH.

Customer

Additional tray magazine (7.5 mm pitch × 23 stages)
Additional tray pallet
Additional components-ejection tray

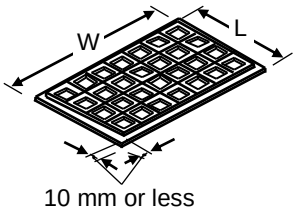
・ Please select this option when needed additionally.
・ Tray magagine, Tray pallet and Component Ejection Tray are common with NPM-WX tray feeder's.

Customer

Pallet for vacuum-molded-tray

Please select this option when using vacuum-molded trays

[Applicable tray dimensions]
L × W = Max. 220 × 325 mm



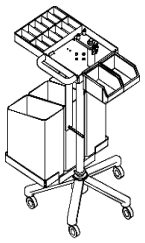
10 mm or less

・ Vacuum molding tray pallet is common with NPM-WX tray feeder's.

B-12	To improve the workability of tape splicing.

Customer

Splicing cart



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

B-13	To mount onto PCB with PCB length(L) over 350 mm

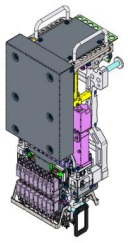
Factory

Sliding Transfer Option

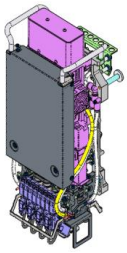
・ Extends the supported PCB size, PCB length (L) up to 510 mm.

C-1	To change placement head

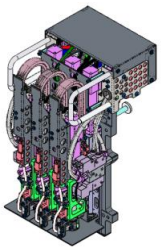
Customer Table



Spare
FC16 head



Spare
FC08 head



Spare
FC03 head

Head case

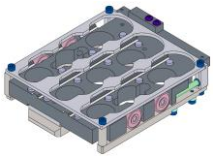
- Placement head is for NPM-G series only.
- Spare head comes with head case*1
- It should be replaced for each table. Different Heads can be installed to each table.
- Since nozzle changer does not come together, pelase select separately as options.

* This is head case for storing NPM-G series heads (FC16 head, FC08 head, FC03 head).
The head case for NPM seires is not compatible with NPM-G series heads.
Please ask us for details.

Customer Table

Spare nozzle changer
(For FC16 head)

Spare nozzle changer
(For FC08 head)



Spare nozzle changer
(For FC03 head)

- Nozzle changer is for NPM-G series only.

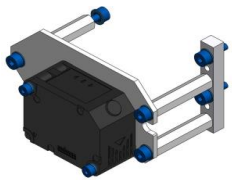
On-site Table

Spare Multicamera MC-S: Type 1
Spare Multicamera MC-S: Type 2
Spare Multicamera MC-S: Type3 (Multicamera only)
* Multicamera MC-S is for NPM-G series only.

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

On-site Table

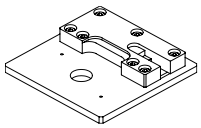
Height sensor



<PCB warpage correction>
・Controls the placement height of a PCB by measuring the height (warp) of the whole PCB.
Measurement time: 2.0 s (350 × 300 mm in an optimal condition, with 9-point measurement)
・Select the height sensor for the first machine in line.
Select only the front side when it is single conveyor mode and, both the front and rear side, when it is dual conveyor mode.
・Measurement data is passed to the downstream NPM-GH.
* For any PCB whose warp geometry changes each time it is clamped, please consult us separately.

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.
・Common with NPM series, NPM-X series and AM100.

C-3 Improve FC 16 head function

On-site Whole machine

0201 component placement support*1

・ Support for placement of 0201 components. (±0.025 mm (Cpk≧1) , ±0.015 mm(Cpk≧1): Under below conditions
・ Parameters dedicated for 0201 components are set.
・ When 0201 component is placed, "766CS (or 766CSN) nozzle" is necessary.
・ At 0201 component mounting, 4mm thin-type feeder(4W1P) is necessary.

＜Placement condition＞

Target head	FC16 head
Applicable components	0201C
Placement angle	0°, 90°, 180°, 270° only

*1 0201 component placement is supported with Intelligent Feeder only.

On-site Whole machine

High-accurate mode1 (License)
High-accurate mode2 (License) *1

1. Overview
High-accurate mode1：Placement accuracy is ±15 μm (Cpk≧1).
High-accurate mode2：Placement accuracy is ±10 μm (Cpk≧1).

2. Features
All axes operate in a positioning enhanced mode.
Parameter setting dedicated for a high-accurate mode only.
*Setting high-accurate mode is allowed per table.
When any table of two tables is set to the high-accurate mode, another table also work in the high-accurate mode.

3. Basic Performance
See the “High-accurate mode (options)” descriptions of the “3.2 Standard Functions” section.

4. Applicable heads, component size, placement angle

Heads	Component Size	Placement Angle
FC16 head	0201*2 ～ □6 mm*3	0°,90°,180°,-90°
FC08 head	0402 ～ □6 mm*3	0°,90°,180°,-90°
FC03 head	0603 ～ □6 mm*3	0°,90°,180°,-90°

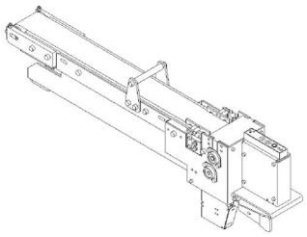
*1 High-accurate mode2 is supported in the ASF specification only.
*2 0201 is optional. High-accurate mode 2 is not included.
*3 Component is chip components.

5. Notes
This option includes “High-speed head placement constant load control (License).

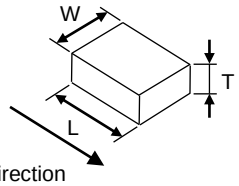
C-4	To align and eject the NG components onto the conveyor.

Customer Table

Components ejection conveyor*1

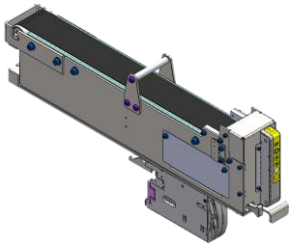


・ Applicable component dimensions
Max. W 42 × L 60 mm
T = 1 mm ~ 16.0 mm



・ Component shape
① No space exceeding 0.3 mm on its underside when put horizontally
② Shape should not be extremely unstable, e.g. the underside is small compared with height

CEC (Components Ejection Conveyer) *2



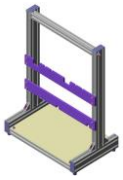
・ This is used for ejecting recognition NG components.
・ Usable only for FC08 head, and FC03 head.
・ This option will occupy four feeder setting slots.

*1 You can use with Feeder Cart only.
*2 You can use with C-Cart only.

C-5	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 head stand for NPM-G series head(FC16 head, FC08 head, FC03 head) only.
Do not use for storing existing modular mounter heads.
Please ask us for details.

C-6	To reduce time for changeovers.

On-site

Support station (Power supply type)
Support station box (Component verification type)

- By using your spare feeder carts/ C-Cart and feeders you can prepare for next products while a machine continues its operation.
- This has two types: one of them only supplies electric source to feeder carts/ C-Cart 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-GH series, NPM-X series and NPM series, “Change Cart Preparation Unit” in CM series is not available.

On-site

Support station: Component verification type (License)

- This is required for the use of “Support station box (Component verification type).”

* The license is not required for off-line setup (component verification) using PanaCIM-EE.

Customer

Feeder setting jig

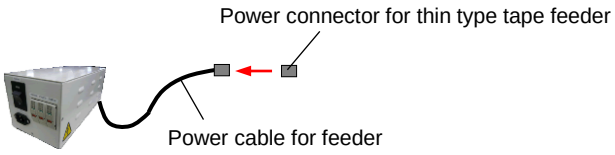
- Feeder setting jig is used as a feeder holder to set components on the feeder and to verify components.
- “Attachment for thin type tape feeder” is required to install thin type tape feeders.

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 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

Air supply unit

- It is a unit to supply air to C-Cart when setting tapes automatically to ASF.

C-7	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-8	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).” and “Remote control (License).”
- Please refer to “iLNB Specification” booklet for details.

C-9	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.
- You cannot choose “iLNB ready (License)” at the same time. (It is included in “iLNB ready (License)”).
- Please refer to “5.2 Automatic Changeover” for details.

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

On-site

Component verification (License)

- This prevents components from being put wrongly. If wrong components are put, interlock function of the machine operates to create the mode automatically where production cannot be continued. It is possible to customize order of barcode scanning and/or barcode definition, according to customers’ operation.

- Component verification (former LNB component verification) is integrated with PanaCIM-EE Gen2.
- Please select appropriate license from “PanaCIM-EE ready”.
- Please refer to “5.1 Component Verification” for details.

C-11	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-12	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).”)
- Please refer to “5.4 Upper Communication” for details

C-13	To make use of the location-independent tape feeder function.

・Tape feeders can be located flexibly within the same table.
・You can locate components alternately and a 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-14	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 in the NPM series to placement head in NPM-GH which enables component placement at the optimum and highly accurate positions
- This option is required per NPM-GH which receives APC-FF offset data.
- Please refer to"5.7 APC system" for details.

* APC system-ready equipment: NPM-GH/ NPM-X/ NPM series (mixed line supported)
  If a line is made up with other equipment than the above, please contact us.
* 0201 components and 03015 components are not eligible.

C-15	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 measurement data of an inspection machine (solder inspection) from other companies.
- This option is required per NPM-GH 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 on your end.
* 0201 components and 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-GH that receives APC-FF offset data.

C-16	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 and achieve stable 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 option is required per NPM-GH that receives APC-MFB offset data.
- This option supports NPM-GH/NPM-X/NPM series.
- Please refer to"5.7.2 APC-MFB" for details.

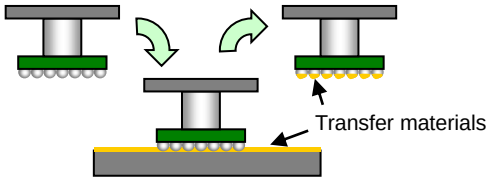
C-17	To perform transfer mounting.

Customer

Transfer unit for G series (For Feeder Cart)
DPU (Dipping Unit) transfer unit (For C-Cart)

1. Outline

Transfer unit is a unit to deposit a film of transfer materials in the process, such as PoP top package mounting, requiring transfer of flux etc.
Transfer process is complete when a component picked up with a mounter is pressed onto the film deposited with this unit.



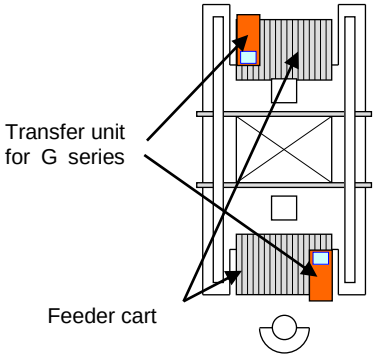
2. Features

You can set squeegee gap for each chip data based on the data. This enables you to perform the detailed transfer deposition thickness according to the size of bumps. (Programmable squeegee gap)

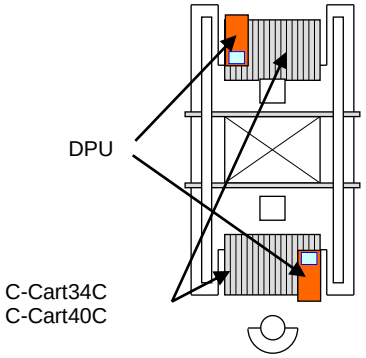
As well as tape feeders, you can install on the tape component Supply Unit.

- When it is Feeder Cart：
  Unit is for the G series transfer unit only and occupies addresses from 10 to 17(8 slots).
- When it is C-Cart34C：Unit is for DPU only and occupies addresses from 21 to 34(14 slots).
- When it is C-Cart40C：Unit is for DPU only and occupies addresses from 27 to 40(14 slots).

* You cannot use the existing mounter's multifunction transfer unit with NPM-GH.



Feeder cart specification



C-Cart specification

3. Specifications

Item	Specifications	
	Transfer unit for G series	DPU (Dipping Unit)
Electric source	DC 24 V (to be supplied from main body)	
Outside dimension	W 165 × D 676 × H 285 mm	W 148 × D 506 × H 290 mm
Mass	21 kg (including 1 kg of a transfer table)	13 kg (transfer table 1 kg included)
Environmental condition	Temperature: 20 °C ~ 30 °C (deposition allowable 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, comply with transfer material specifications.

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

	Applicable head		
	FC16 head*1	FC08 head	FC03 head
Feeding method	Taping and tray		
Component dimension	□2 mm ~ □10 mm T = 3 mm (Max)	~ 20 × 20 mm	~ L40 × W30 mm
Applicable component	BGA, CSP		

*1 Transfer with the FC16 head is optional. See the C-23 "To perform transfer mounting with FC16 head".

5. Automatic supply of transfer materials

Transfer unit of NPM-GH has a function to supply transfer materials automatically.
Use this function by specifying the supply frequency parameter. You can adjust the amount for one supply by specifying the syringe discharge time using parameters.
We recommend automatic supply as a supply method of the transfer materials. (Automatic supply makes the amount of the transfer material used minimum.) To use this function, air supply unit(option)*2 needs to be installed on the feeder cart on which the transfer unit is installed.
To use this function, set the materials on the transfer unit ,with being encapsulated in the MU-SASHI-ENGINEERING-manufactured φ26 mm syringe (PSY-30E, PSY-50E, PSY-70E, etc.) or its equivalent*3.
Specify when you purchase from a material manufacturer or to prepare a syringe on your end and refill it.

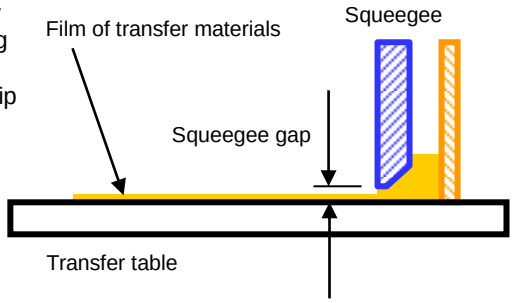
*2 C-Cart comes standard with air supply unit.
*3 Equivalent: The one that can be used in combination with the MUSASHI-ENGINEERING-manufactured adapter tube AT50-E.
The one that can be used in combination with the MUSASHI-ENGINEERING-manufactured joint J-R-3.

6. Programmable squeegee gap

Transfer unit determines the coating thickness of transfer materials by controlling the gap (space) between the transfer table depositing using transfer materials and the squeegee smoothing them.
This space is called a squeegee gap, and you can change for each chip from the data setting.
The setting range is as follows.

Squeegee gap setting range: 0.015 mm to 0.35 mm

The thickness of a film to be actually deposited varies depending on the transfer material; however, it is generally 50 % to 70 % of the squeegee gap.



Deposition Test Materials

• Panasonic	MSP521 Flux (Flux)
• Senju Metal Industry	WF-6450 (Flux)
• Senju Metal Industry	M705-NSV300HF-F (Solder paste for transfer)

* These materials are not a recommendation to use.

Transfer unit does not guarantee deposition in every transfer material. Even with the above deposition test completed materials, depending on the operating condition, such as their storage condition, replacement frequency, and other condition, deposition may fail.

7. Transfer materials

As for the usage of transfer materials, follow the specifications and instruction manuals provided from transfer material manufacturers. In addition, obtain the safety data sheet (SDS) of the transfer materials and follow the descriptions.

8. Transportation and carry

As for transportation of and/or carrying of transfer unit, follow the notes described in the instruction manual.
(Transfer unit for G serise：Mass 21 kg / DPU：Mass 13 kg)

Customer

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

・ This is a gauge for measuring the film thickness formed with 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 Table

Air supply unit for the feeder*1

・ It is necessary when using the transfer material automatic supply function.
*1 You can use with Feeder Cart only.

C-18	To avoid machine stop error by analyzing the trend of pickup condition during production.

Customer

Automatic recovery option (License)

- Automatic recovery is carried out in the case of pickup error and recognition error to reduce stop count and the spoilage rate.
  Two types of automatic recovery actions are performed at two separated timings.
- For details, refer to "5.10 Automatic Recovery"

C-19	To perform the machine by remote operation.

Customer

Remote operation option (License)

- Errors occurred in the machine are gathered into the remote terminal and machine recovery is performed by remote operation. This allows reducing the time recovered from the errors, and thus achieving to improve the operating rate and labor saving.
- The mechanisms of machine error detection and recovery operation by remote operation are provided. Centralizing recovery operation enables reduction of "the time loss due to an operator to notice the error signal" and "the time loss due to an operator to move to the error machine".
- For details, refer to "5.9 Remote Operation".

C-20	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 ”5.15 Biometric authentication”.

C-21	To display a chosen image when you haven’t used touch panel for a certain period.

Customer

Message board (License)

- If you are not going to operate a touch panel for a certain period of time, you can display a user-selected screen on it.
- When you make better use of vacant monitors and display screens such as an operator training or shift information on them, you could train and give instructions to operators while working on producing.
- See “5.13 Message Board” for the details.

C-22	Visual control of placement head conditions and to prevent troubles.

Customer

Head diagnosis (License)

- Diagnosis of placement heads prevents the occurrence of problems and assures stable operation.
- See “5.14 Head Diagnosis” for the details.

C-23 To keep FC16, FC08 head placement push-in load constant

On-site

High-speed head placement constant load control (License)

1. Overview

Keeps the placement push-in load constant with FC16 head and FC08 head.
Depending on the setting, you can choose either one of them described below.

2. Features

Controls the motor current value of the Z axis and keeps the push-in load constant.
Achieves the stable mounting without over-pushing even when a board has upward warp.

3. Specification

Set up	Head	Placement Load (N)		How to set up
Setting 1	FC16 FC08	OFF	It is mounting with the constant load OFF.	Setting is by the head
		ON	Mounting with the designated heads is automatically 1.0 N mounting.	
Setting 2	FC16 FC08	Standard	It is mounting with the constant load OFF.	Setting is by the component
		0.5 N	It reduces impact load and is 0.5 N mounting.*1	
		1.0 N	It reduces impact load and is 1.0 N mounting.	
		1.0 N (High-speed)	Speed is the same as standard and it is 1.0 N mounting.	

*1 Placement load 0.5 N works with FC16 only.
* You cannot use low load nozzles at the same time.
* You cannot use the (Setting 1) and the (Setting 2) at the same time.

4. Reference information

This function controls the push-in load.
When it is the “Standard” setting in the (Setting 1) or in the (Setting 2) and you want to reduce the impact load, put the Placement 2-Down setting for the target component.

C-24	To perform transfer mounting with FC16 head

On-site

FC16 head transfer (License)

1. Overview

Enables transfer motion with FC16 head.

2. Features

Enabling transfer motion with FC16 head enhances productivity.

3. Specifications

Item	Specification
Applicable components	Component Size：□2 mm～□10 mm Component Thickness: Maximum of 3 mm
Required condition	The nozzle pickup top surface is flat and larger than a pickup nozzle. * However, it is subject to some restrictions on the transfer method process condition.

C-25	To perform polarity test of tray components and tape feeder components right before pickup.

Customer

Pre-pickup inspection (Polarity) (License)

- Before picking up tray components and tape feeder, head camera captures component images and performs polarity tests to prevents setting wrong.
  When test result shows polarity direction is correct, components are picked up and mounted.
  When polarity direction is not correct, the image is shown, and it will be in single stop.
- See “5.11 Pre-pickup Inspection (Polarity)” for the details.

C-26	To recognize the characters or 2D codes on the surface of a component before picking it up from the tray and tape feeder

Factory

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

- Right before pickup of tray components and tape feeder components, character recognition or 2D recognition of component surface, captured with head camera, prevents setting wrong (incorrect components) and maintains traceability.
  * Character recognition supported head camera unit：(WD42) NPM-G series is necessary.
- For the details, see ”5.12 Pre-pickup inspection (Char/2D)”.

C-27 To reduce the time required for checking the positions judged as NG by AOI

On-site

AOI info display function (License)

1. Overview

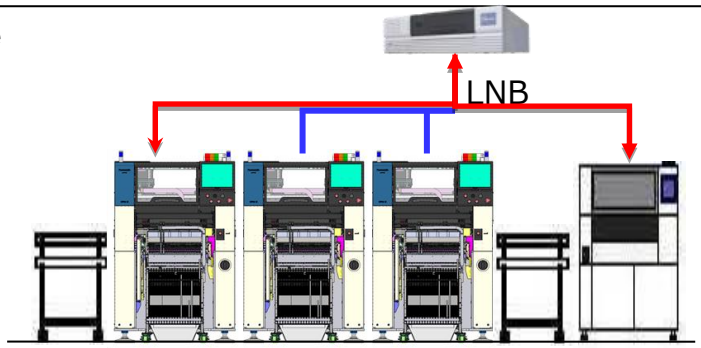
This function provides automatic two-way information display between the AOI and mounters
It automatically identifies NG positions to save labor.

* 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 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-28 To monitor unit status

Customer

APC-5M (License)

- APC-5M monitors ”5M status” and ”operation status” in a real time to identify and control changes(variability) in 5M achieving "non-defective production" and "stable operation"
- APC-5M’s “Real Time Unit Monitoring” feature monitors unit status in a real time during production and alerts of status before going abnormal status.
- Determines and indicates maintenance timing from status not time periods.
- See ”5.16 APC-5M” for the details.

C-29	To communicate bad mark data with other company machines

Customer

Bad Mark Communication from other company machines(License)

1. Overview

Transfers bad mark data using bad mark data in each PCB written on a LNB's shared folder from your systems, for example other company inspection machines. This reduces bad mark reading time on a stage at the head of a line. Each machine using bad mark communication needs this option.

* See "5.8.1 When Receiving Bad Marks from Other Company Inspection Machines" for the details.

2. Restrictions

(1) You cannot use with APC system ready or interface software of other company inspection machines(option).
(2) You cannot use with the following iLNB features when PCB barcodes are read with a mounter head camera.
(ア) Automatic changeover of iLNB's PCB ID reading method
(イ) Features needing to read PCB IDs with an iLNB
(Gate check, Different model check, PCB ID notification to upper systems)

(3) Barcodes must be printed on an upper surface of a PCB.
(4) You need to add barcode data(positions and size) as production data.
(5) 2D codes that can read PCB barcodes are as follows.
Compatible with standards(Data Matrix, GR codes, Micro QR codes)
Max size：□5 mm
Max data：128(alphanumeric characters)

(6) Use your system and write bad mark data in each PCB to a LNB's shared folder in the given format.
(7) You cannot use LNB automatic changeover of other company machines and bad mark communication from other company machines at the same time.
(8) PCB ID barcodes need reading at the head of a line.
There are cases in which you may have to add an external scanner or other devices.

* (3)(4)(5) are applicable when PCB barcodes are read with a mounter head camera.

C-30	To increase mounting points to more than Max.50,000 points/machine, or Max.50,000 points/line

Customer

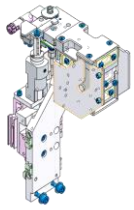
Extend Mount points (License)

・Increases up to Max.100,000 points/line.
* Includes mounting coordinates, recognition mark coordinates, NG mark coordinates, PCB warp measuring points.
* At dual lane mode production, it is total mounting points of front lane and rear lane.
When mounting point is over 50 000 points/line, contact us.
Contact us about mixed line with CM series.

C-31	To see whether electrical properties of components is within a predefined range before they are going to be mounted

On-site

LCR checker (Built-in type)



1. What Built-in type LCR checker is like

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. Built-in type LCR checker's main specifications

Items	**Built-in type LCR checker**
Component size	0402 ~ □6.0 mm, thickness is up to 5.0mm
Type and property range	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)	None
License	No Need

・For details, refer to"4.6 LCR Checker (Built-in type)".
* You cannot use LCR checker on the table having Tray Feeder set up.

C-32	To measure push-in load in placement and show results on a machine monitoror LNB

Factory

Load checker

1. Overview

Load checker is a feature to measure “push-in load” of placement heads and shows results on a machine monitor or LNB.

2. Load Definition

Impact Load ：Instantaneous load generated when a nozzle touches a load cell at a placement motion

Push-in Load：Load generated when a nozzle is pushed 0.3mm to a load cell at a placement motion

3. Main Features

Items	Specifications		
Measuring push-in load	Measures nozzle push-in load of placement heads with a load checker during maintenance or production and shows on a machine screen or on an LNB. * To measure push-in load(Pushing Depth：0.30 mm) FC16 head/ FC08 head： 1 step down FC16 head (Low load nozzle)： 2 steps down(2nd step speed is standard speed) FC16 head (Constant Load Control 1.0 N/0.5 N)： 2 steps down(2nd step speed×0.6)		
Judging push-in load results	Load Warning Range	Shows ”Warning” when measurement results exceed the specified ”Load Warning Range”.	
	Load NG Range	Shows ”NG” when measurement results exceed the specified ”Load NG Range”. Automartically sets to BAD Nozzles when detected as ”NG”. * Load NG Range must be a value greater than Load Warning Range.	
	Load Checker (20 N)	Threshold：0 N～30 N	
Production stops when push-in load is NG	Production stops when detected ”NG” in a push-in load measurement in production		
Accumulating push-in load results	You can check push-in load results measured during maintenance or production; push-in load results are recorded on LNB for 30 days		
Actual Load Calibration	Calibrates at an actual load with a weight *You need a calibration jig.		
Measuring Actual Loads	Measures actual loads of a load checker with a weight * You need a calibration jig and weights.		
Heads	FC16 head, FC08 head * FC03 is not supported.		
Load Reporting	Load Checker (20 N)	N]：Shows to 2 decimal places	
Unit Layout	Can install units by the table(Front, Rear) *When a load chekcer is installed on a machine at front only or at rear only, measurements during production is as follows: ・Cannot measure with an opposed load cell in an independent mode ・Can measure with an opposed load cell in a share mode		
The number of push-in load measurements	You can set the number of measurements per one axis of nozzles before measuring push-in loads. 1 ～ 10/nozzle * Default is 3		
The number PCB in a load measurement during production	You can set the number of PCB for push-in load measurements during production. 0 ～ 9,999 PCB * Default is 0		
Push-in load accuracy	Load Checker (20 N)	FC16 head FC08 head	Within ±0.20 N
		1.0 [N] Constant load control	Within ±0.10 N
		0.5 [N] Constant load control Low-load nozzles	Within ±0.07 N
Push-in load measurement time	FC16 head ：within 40 s (16 nozzles x 3 times) FC08 head ：within 30 s (8 nozzles x 3 times)		

C-33	To achieve low load mounting with FC16 head

On-site

Low-load nozzles

1. Overview
With low-load springs and lightweight moving parts at the tip of nozzles, low-load nozzles reduce the load during contact with boards.

2. Applicable head
FC16 head

3. Applicable nozzles

Low-load nozzles	Supported components (typical examples)	Adaptable standard nozzles
769CS / CSN	0201C	766CS / CSN
	03015R	276CS / CSN
281CS / CSN	0402R/C	256CS / CSN
291CS / CSN	0603R/C	225CS / CSN
275CS / CSN	0603R/C, 1005R/C	226CS / CSN
286CS / CSN	1005R/C, 1608R/C	230CS / CSN

4. Load during contact with boards
Low-load nozzles achieve 1.0 N or below of a load that generates during contact with boards.
When you want the load to be within 0.5 N, set the ”Two stages lowering at placement” and ”Speed of the second stage ×1(Standard)”.

5. Notes
Low-load nozzles are compatible only with NPM-X series, NPM-GH.
Accuracy inspections for low-load nozzles are necessary for machines that use the low-load nozzles.
* You cannot use ”High-speed head placement constant load control (License) at the same time.

C-34	To connect the factory-side plumbing to equipment to enable primary air connecting

Customer

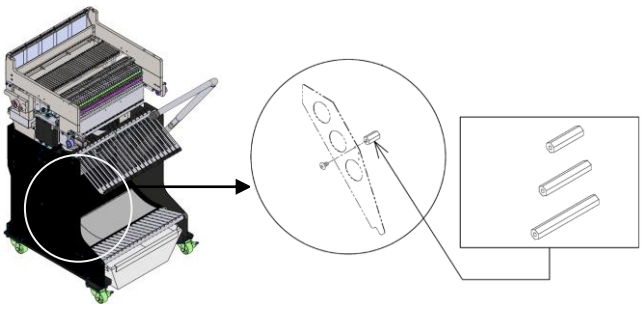
Primary air hose unit

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

C-35	To use large reels

Customer

Separator (For feeder cart)
Separator (For C-Cart)
Spacer set



・ It is used when supplying taping components for large reels.
・ It is not compatible between Feeder Cart separator and C-Cart separator.

C-36	To enhance recognition camera performance

Customer

Multicamera MC-S Type3 (License)

・ 3D measurement is added to Multicamera MC-S Type2.

C-37	To do simple test for checking shield component conditions after mounting

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 “5.17.1 Mount complete position recognition function”.

C-38	To do simple test for checking shield component conditions before mounting

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 “5.17.2 Shield case warping inspection function before mounting”.

C-39	To use small volume components packaged in the cut tapes and do mounting for production trial and small lot production

Customer

Tray 1 Pallet 10 Kind (License)

- You can place onto a pallet up to 10 kinds of feeder supply components packaged in cut tapes and do production.
- For the details, see “5.18 Tray 1 Pallet 10 Kind”.

C-40	To measure pneumatic pressure and show the result on the equipment monitor and LNB

Factory

Pneumatic equipment diagnosis feature

- Pneumatic equipment is equipped with a sensor, and that is a feature to measure pneumatic pressure when production starts, judge whether the measured result is OK or NG, and show and store the received data with LNB on the screen.

Item	Description
Targeted Pneumatic Pressure	Main air pressure
	Vacuum burst pressure
	Vacuum pump supply pressure
	Cleaning blow pressure
	Cart air pressure

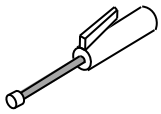
C-41	To recognize 2D codes at the same time as component recognition for tray components and tape feeder components.

Customer

Component Bottom-Side 2D code Reading (License)

- Reads 2D codes at the bottom of components at the same time as component recognition, and outputs the data to trace files.
- For details, see “5.19 Component Bottom-Side Barcode Reading”.

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-X, 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-X, NPM series and AM100.
Customer Maintenance jig (FC16 head)	Regular maintenance	Chart mark blower brush	Common with NPM-X, NPM series, CM602, CM402, CM401, CM400, DT401, DT400, CM212 and CM101
Customer FC03 Maintenance kit	Regular maintenance	Oil filling syringe	For FC03 head only

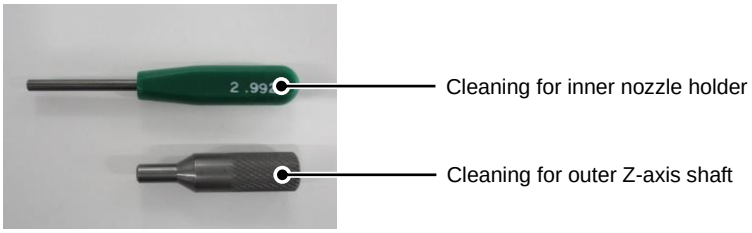
- These are used for the periodical application of grease and cleaning in machine maintenance, etc.
- They are necessary in purchasing the first machine.

Customer

Nozzle holder, shaft cleaning jig: For FC16/ FC08 head[*1]

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

*1 It is for FC head only. You cannot use with the conventional NPM series or NPM-X series.
You cannot use ones for NPM series or NPM-X series either.



D-2 To calibrate as needed.

- This is a placement head jig kit for various adjustments.
- When it has Feeder Cart installed： **Common**（①-1 / ②-1）*＋**Feeder Cart**（①-2 / ②-2）
- When it has C-Cart installed： **Common**（①-1 / ②-1）*＋**C-Cart**（①-3 / ②-3）
- Jig kit③, Jig kit for adjusting the main body, is for the NPM-G series only.

* When you already have Common, you do not have to choose.

Option name			Usage	Description	Recommended set		
					Recommended	Calibration after Head exchange	All calibration
Customer (1)Jig kit for accuracy verification					(1)	(1) + (2)	(1) + (2) + (3) + (4)
	①-1	**Common**	For placement position teaching of square chip component mounting and for accuracy verification	Placement position teaching jig*1 (Glass PCB, Jig chip components)			
			For placement position teaching of QFP placement and for accuracy verification	Jig components, Jig components supply pallet. Nozzle(1001: 2 each)			
	①-2	**Feeder Cart**		Jig supplyer Nozzle(153AS, 184, 1003: 2 each)			
	①-3	**C-Cart**		Jig supplyer Nozzle(153AS, 184, 1003: 2 each)			
Customer (2)Jig kit for standard calibration					—		
	②-1	**Common**	For calibration in changing heads	Jig station, Jig components			
	②-2	**Feeder Cart**	For pickup position calibration	Pickup position height teaching jig (For Feeder Cart)			
	②-3	**C-Cart**		Pickup position height teaching jig (For C-Cart)			
Customer (3) Jig kit for adjusting the main body			For Multicamera-related calibration	Multicamera jig		—	
			For placement load calibration	Placement load measuring jig			
Customer (4) Plane calibration jig			For plane calibration	One each of NPM-D3 plane calibration jig and NPM-W2 plane calibration jig is necessary.			

The following nozzles are separately needed for calibration. (requisite minimum number)

	Jig chip(1005) Mounting Position Teaching(Required)		0402R Mounting Position Teaching(Recommended)*2	
FC16 head	230CS (or 230CSN) Nozzle	16 pcs/head	256CS (or 256CSN) Nozzle	16 pcs/head
FC08 head	230C (or 230CN) Nozzle	8 pcs/head	256C (or 256CN) Nozzle	8 pcs/head
FC03 head	1001 (or 1001N) Nozzle*1	3 pcs/head	—	

	0201C Calibration*3	
FC16 head	766CS (or 766CSN) Nozzle (Option：Low-load Nozzle 769CS (or 769CSN))	16 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.
*3 At 0201 component placement, “4 mm Thin-type Feeder(4W1P)” is necessary.

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-G series.		

D-4	To remove and replace the switching unit in the Cart replacement specification.	
Option Name	Usage	Description
Customer Switching Unit Tool	Removal and replacement of the switching unit	Torque wrench Spinner handle Socket
・It is for the NPM-G series only.		

D-5	To automate head maintenance

Customer

Head maintenance unit for FC head / For feeder cart
HMUC / For C-Cart

1. Summary

This unit does maintenance work automatically that had been done manually, such as attaching and removing a nozzle holder and cleaning and inspection of a spline shaft.
It reduces not only man-hours but also inconsistency in work due to operator's judgement, that helps maintain mounting quality at a constant level.

◆Head Maintenance Unit For FC head：
This is for Feeder Cart only and you can install on the 8 slots in the right edge.
You cannot use with C-Cart.

◆HMUC：
This is for C-Cart only and you can install on the 16 slots in the right edge.
You cannot use with Feeder Cart.

2. Specifications

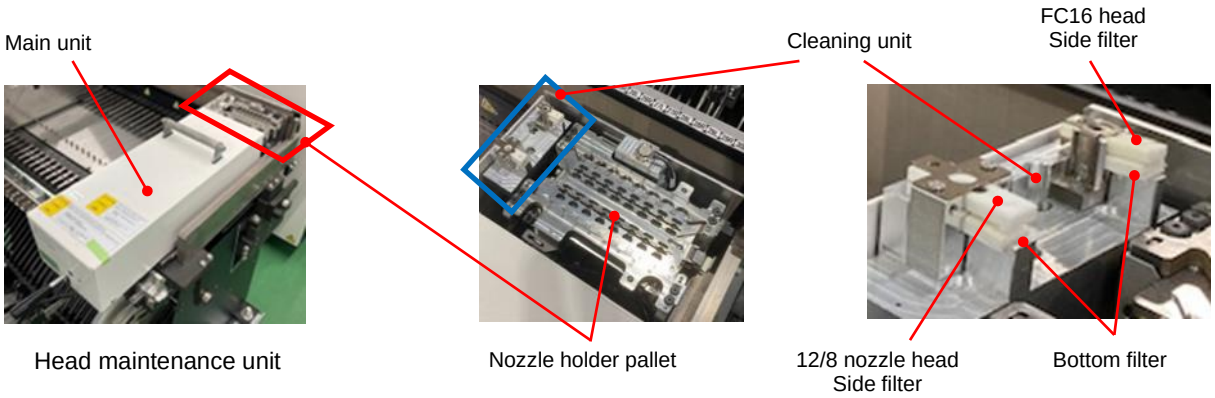
Item	Specification	
	Head maintenance unit for FC head	HMUC
Mountable Model	NPM-GH *1	
Target Head	FC16 head / FC08 head	
Function	①Nozzle holder attachment / detachment*2 ②Nozzle holder shaft cleaning ③Nozzle holder shaft bending inspection ④Nozzle holder sliding inspection	
Operation Mode	・Full inspection mode ・Function selection mode (① ~ ④ executed individually)	
Operation Time	FC16 head (Full inspection mode): 600 sec/ 1 head FC08 head (Full inspection mode): 330 sec/ 1 head	
External Dimensions	W 166 × D 640 × H 240 mm	W 165.3 × D 435.0 × H 239.5 mm
Weight	About 9 kg	About 7.6 kg
Electric Source	DC 24 V (Supply form main body)	
Pneumatic Source	0.4 MPa (Supply form main body)*3	0.4 MPa (Supply from the main body)
Environment	Temperature: 10 ℃ ~ 35 ℃ (No condensation)	
Accessory	・Nozzle holder pallet × 1 ・Side filter for FC16 head × 30 ・Side filter for FC08 head × 30 ・Bottom filter for FC16 head × 15 ・Bottom filter for FC08 head × 15	

*1 When using the head maintenance unit on the existing line, you may need to update the software of equipment, NPM-DGS(Data generation system), LNB(Line Network Box) and so on. Please contact us separately.
*2 Nozzle holder cleaning is not included.
*3 When installing this unit on the “Feeder cart with an Air supply unit for feeder”, the “Air supply connection kit(option)” is required.

D-5	To automate head maintenance

Customer

Head maintenance unit for FC head / For feeder cart
HMUC / For C-Cart



3. Important Points

- When recovered from an error during operation, make sure to check the status with your eyes before continuing the operation.

D-5	To automate head maintenance

On-site

Air supply connection kit

・This is an air supply unit modification kit for feeder carts.
・Please refer to the following information and select a kit for each cart.

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

Item name	Item No.	Remodeling target
Air supply connection kit (For 17-slot feeder base)	N610153400AA	Feeder cart

・This option is components for feeder cart remodeling.
・Modification with this option enhances is easily attaching and taking off the air supply vent supplying air from Feeder Cart.

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

Item name	Item No.	Remodeling target
Air supply connection kit (The air supply unit for feeder supported : 17 slot)	MTKA001660AA	Feeder cart

・This option is components for feeder cart remodeling.
・ When you install this unit on the feeder cart with “Air supply unit for feeder”, modification using this option is necessary.

* “Air supply unit for feeder” is an air supply port to supply air from a feeder cart or feeder base to transfer unit and other units.

Customer

Additional cleaning filter
① Side filter : for FC16 head (100 pcs./1 set)
② Side filter : for FC08 head (100 pcs./1 set)
③ Bottom filter : for FC16 head (100 pcs./1 set)
④ Bottom filter : for FC08 head (100 pcs./1 set)

・Side filter is a filter for side cleaning of spline shafts.
(One filter is enough for cleaning 2 heads.)
・Bottom filter is a filter for tip cleaning of spline shafts.
(One filter is enough for cleaning 4 heads.)

Customer

Additional nozzle holder pallet

・It is a pallet you keep nozzle holders in.
By setting up the cleaned nozzle holders beforehand, you can replace them by the pallet.

D-6	To automate tape splicing

Customer

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

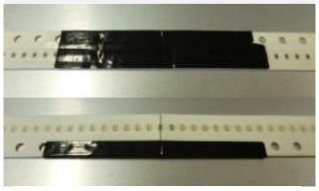
1. Summary

This unit can splice 8 mm tapes 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

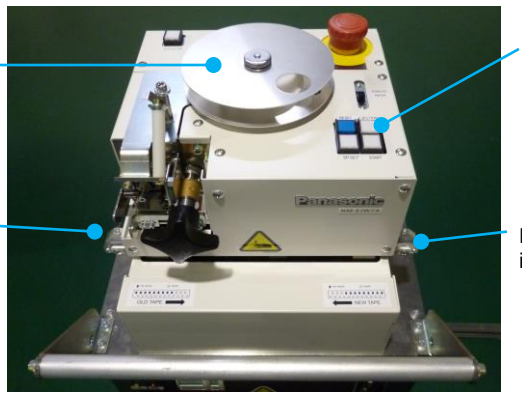
Item	Specification
Applicable tape	8 mm Paper/ Embossed *1
Splicing tape	Common to Paper/ Embossed (This unit only)
Empty pockets of splice junction	・8mm × 4P(Paper/Embossed)= 4pocket *2 ・8mm × 2P(Paper/Embossed)= 8～9 pockets
Operation Time	・Paper tape/ Embossed tape About 10 sec
External Dimensions	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 from a tape maker directly)
・We recommend treating 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-6	To automate tape splicing

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

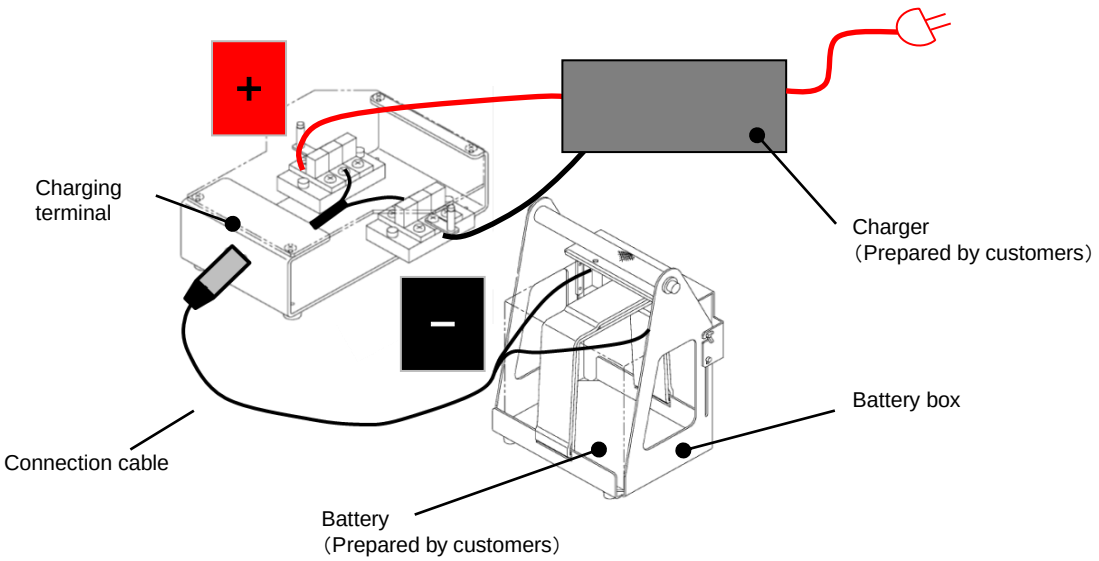
*1 Recommendation, not necessary.
*2 Time to run on one time charge becomes shorter though it runs on 12Ah capacity battery.
*3 The terminal shape of connection cable on Battery box is M5 Ring Terminal. Please make sure the battery is available.

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-7	To automate feeder maintenance

Customer

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

1. Overview

This unit inspects intelligent feeders and calibrates pickup positions 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-7	To automate feeder maintenance

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-7	To automate feeder maintenance

Customer

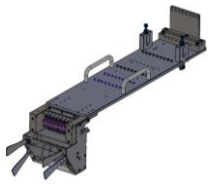
Attachment for thin type single feeder

Required for thin type single feeder.

1. Specifications

Item	Specifications					
Applicable feeder	When selecting thin type single tape feeder options : 8/4 mm thin type single tape 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			
	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※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 A function to update the feeder firmware.					
Operating time	Up to 60 sec / tape feeder (8 mm thin type single tape feeder) 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 is required. Please contact us.



D-7	To automate feeder maintenance

Customer

Master jig for thin type single feeder

Jig to calibrate attachments 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) is MTKA015403AA.

D-7	To automate feeder maintenance

Customer

When using the Feeder maintenance unit, the following hardware & software 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)	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.

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

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

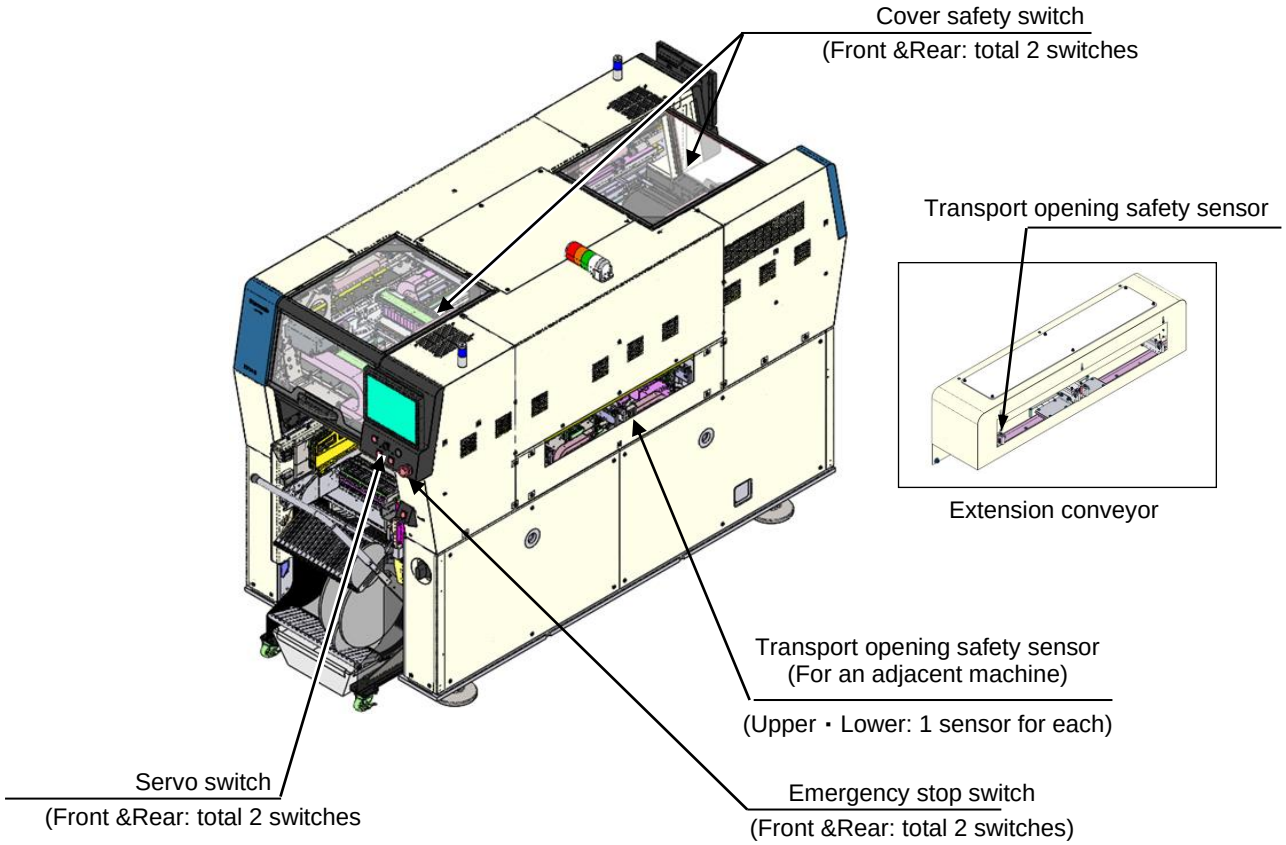
■ Standard color

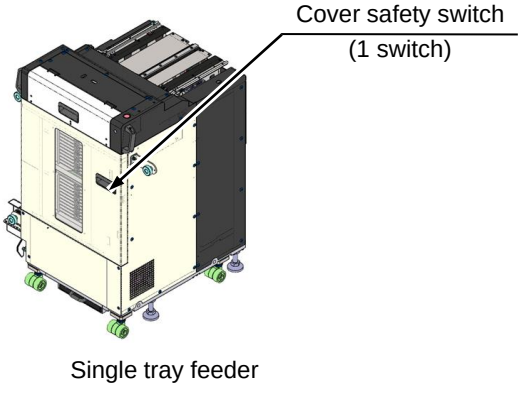
White	W-3
Blue	B-3

* The paint color cannot be designated.

11. Safety Devices

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





⁎⁎ Remarks ⁎⁎

- Please check 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.

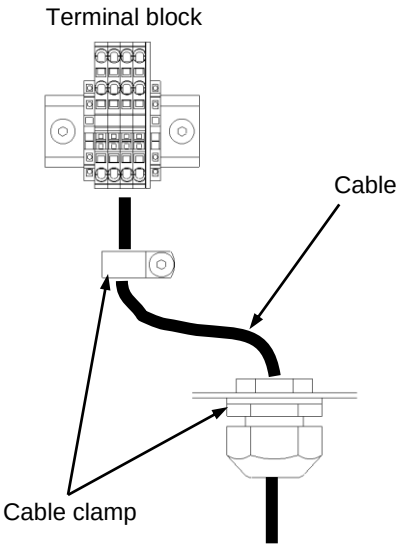
12. Electric / Pneumatic

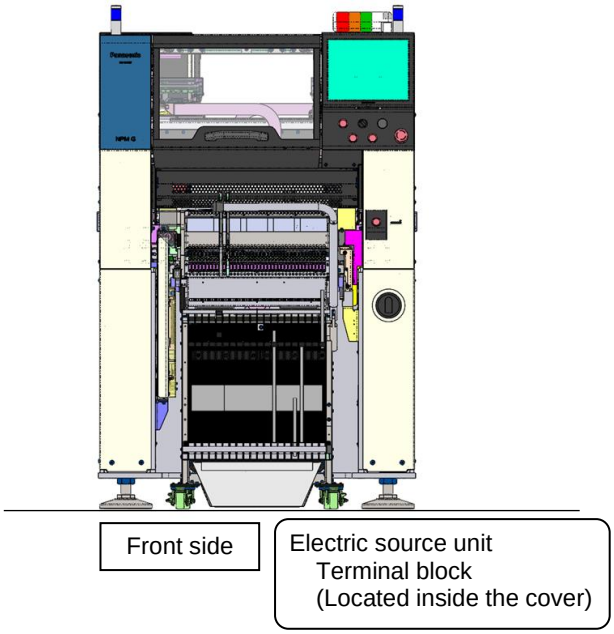
12.1 Electric Source Unit

■ 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 at 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

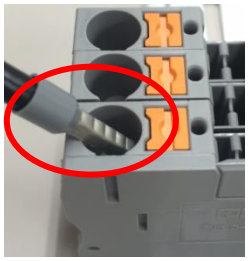
Terminal connecting pin (Recommended)

Manufacturer: Phoenix Contact

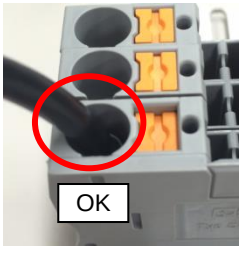
Type: 3.5 mm^2 ~ 4.0 mm^2 AI 4-12 GY

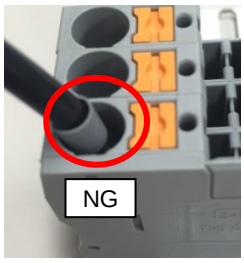
5.5 mm^2 ~ 6.0 mm^2 AI 6-12 YE

1. Insert the sleeve terminal with its uneven surface parallel to the terminal block.



2. Make sure that the sleeve terminal is fully inserted.



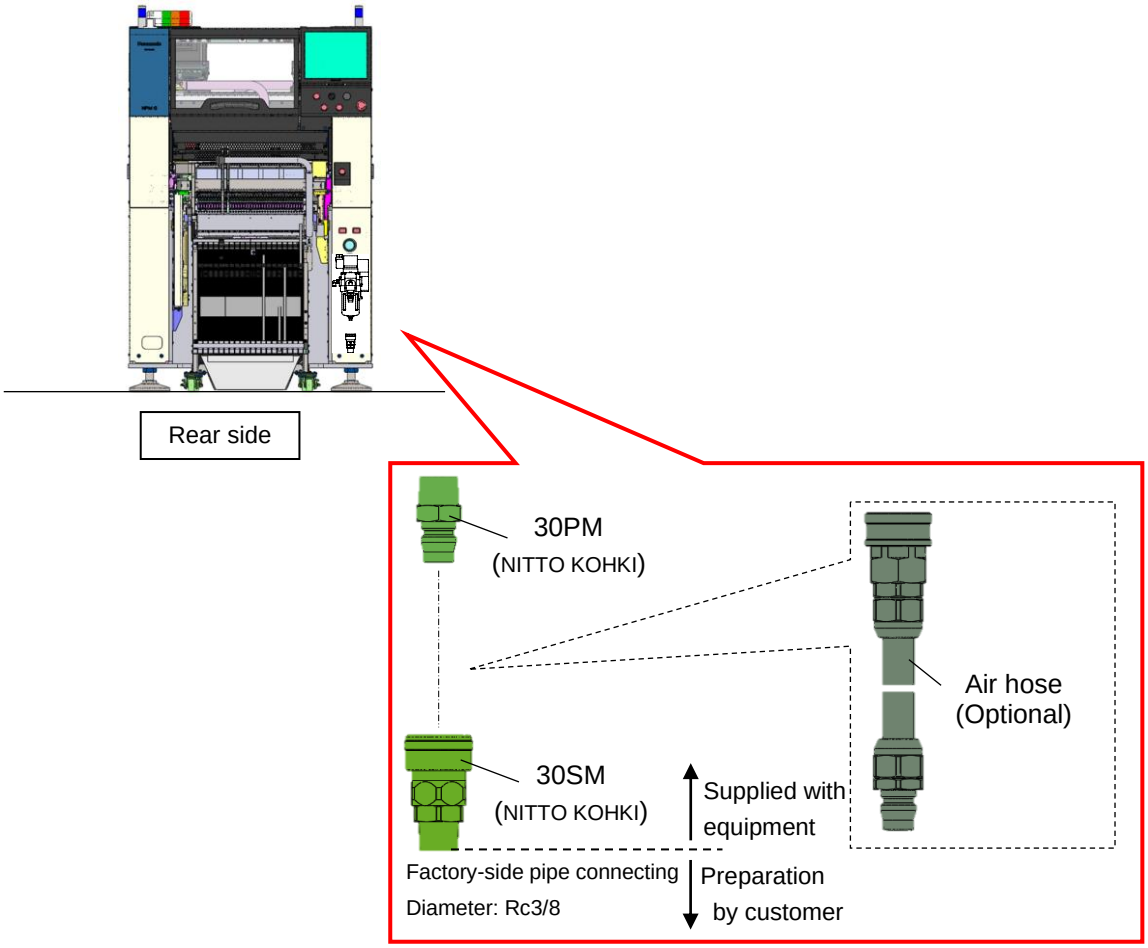


3. If the sleeve terminal is not used, fully check for the conductors spread out and the inserted state.

⁎⁎ Remarks ⁎⁎

•Please prepare the electric source cable by yourself.

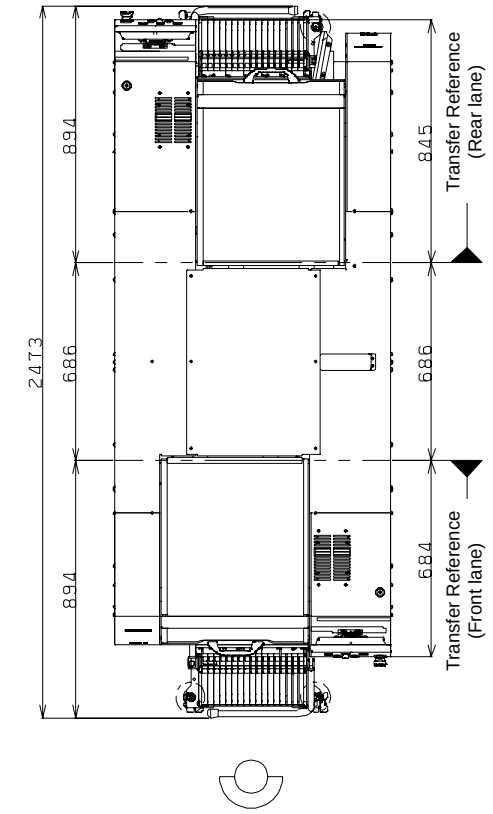
12.2 Pneumatic Source Unit

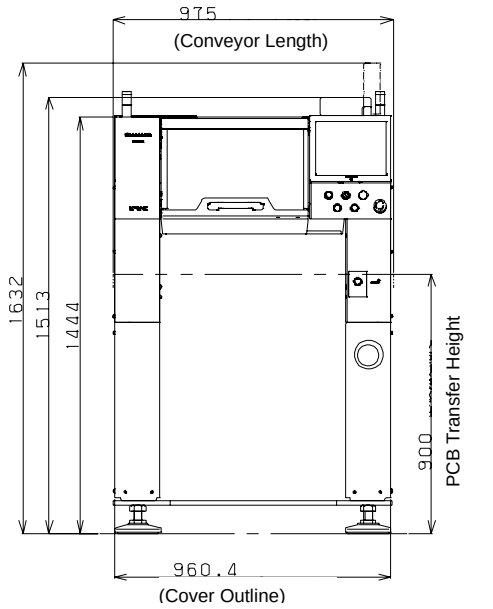


13. Dimensions

(Unit: mm)

■ When connecting feeder cart





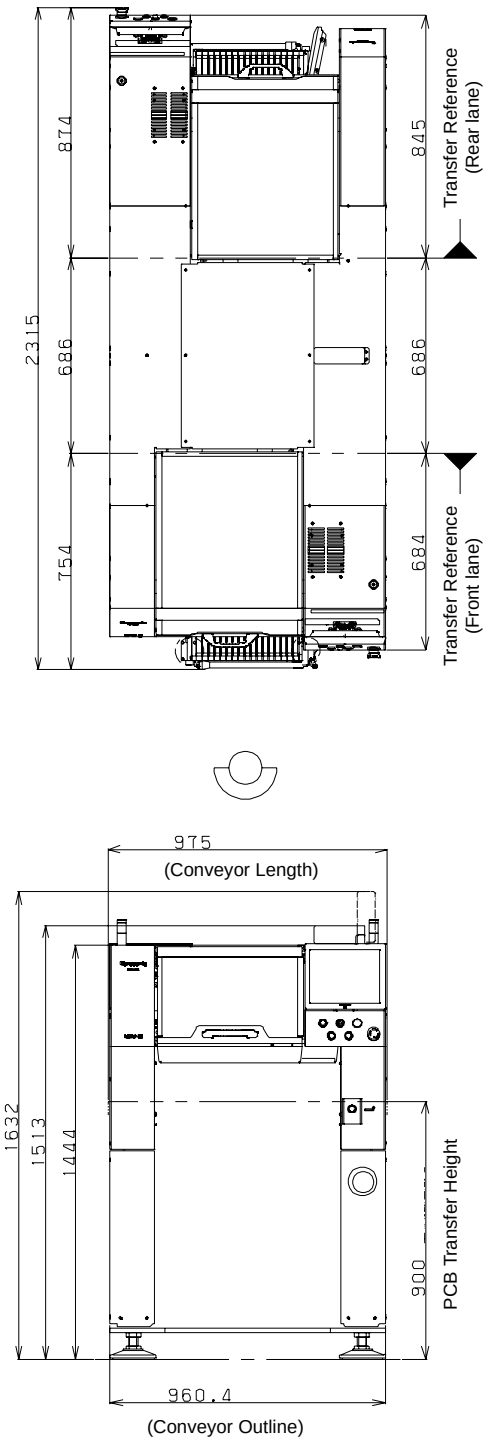
⁎⁎ Remarks ⁎⁎

- Technically speaking, the scale of the above illustration is not equal to the actual mounter. When you think about the line configuration, dimensions, and others, please request the document.
- When you pass a duct and others under this mounter, please keep at least a 40 mm space from the main unit.

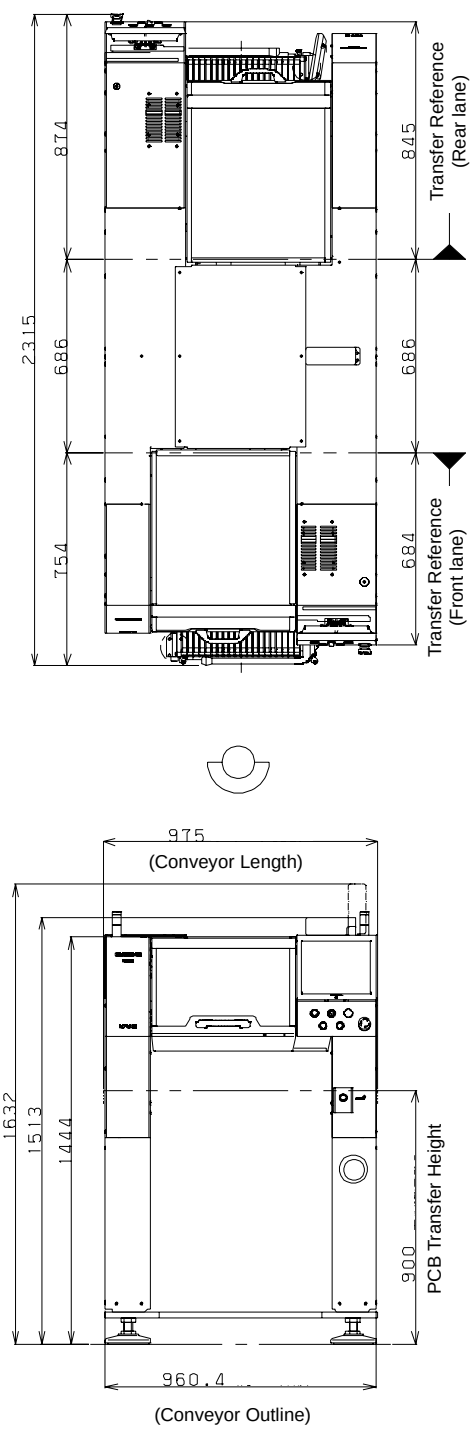
(Unit: mm)

■ When Connecting C-Cart

When connecting C-Cart34C



When connecting C-Cart40C



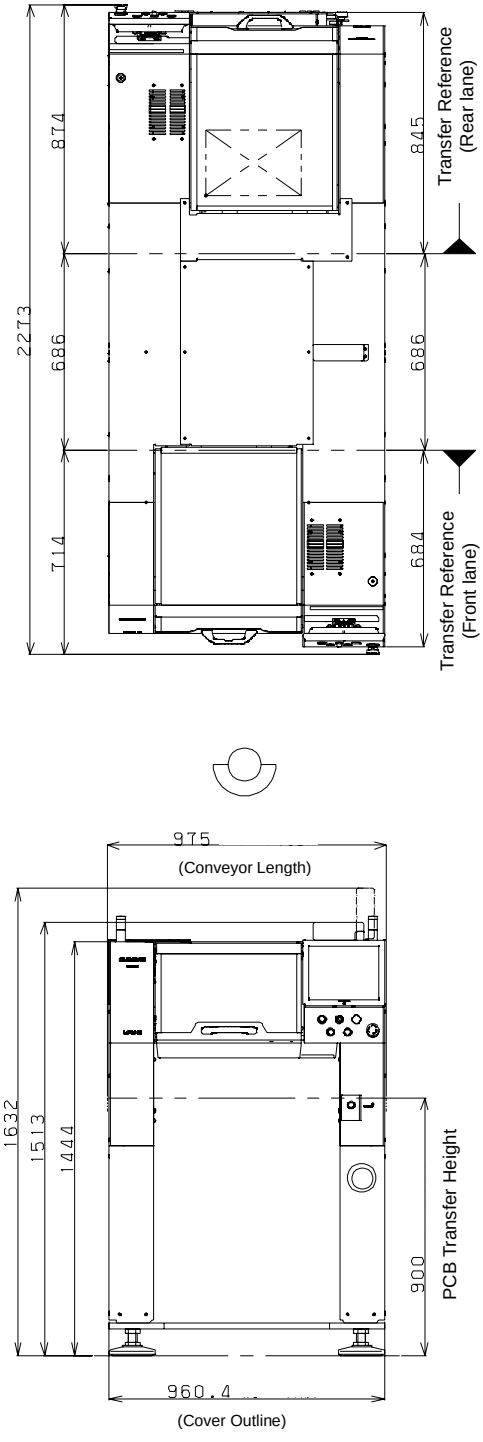
⁎⁎ Remarks ⁎⁎

- Technically speaking, the scale of the above illustration is not equal to the actual mounter. When you think about the line configuration, dimensions, and others, please request the document.
- When you pass a duct and others under this mounter, please keep at least a 40 mm space from the main unit.

(Unit: mm)

■ When connecting single tray feeder

(When you do not insert a cart at front Supply Unit)

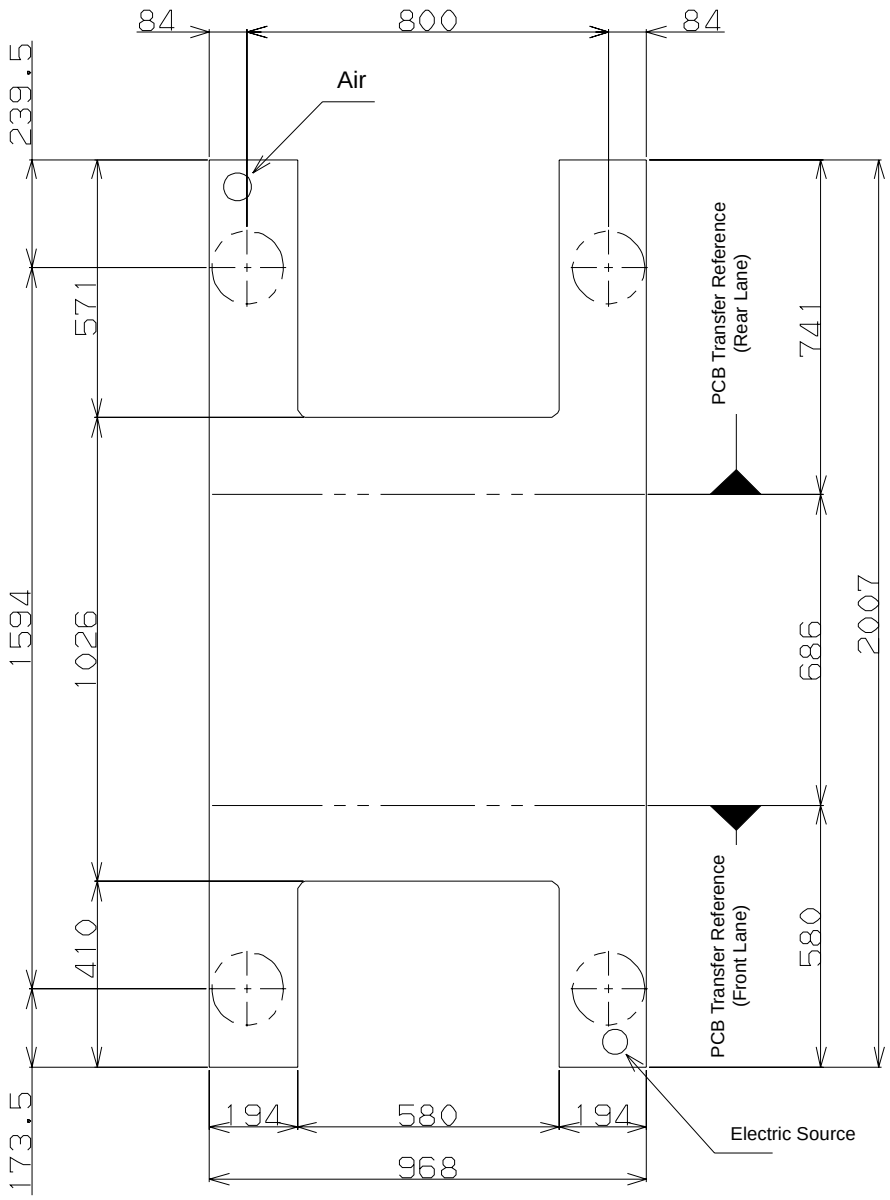


⁎⁎ Remarks ⁎⁎

- Technically speaking, the scale of the above illustration is not equal to the actual mounter. When you think about the line configuration, dimensions, and others, please request the document.
- When you pass a duct and others under this mounter, please keep at least a 40 mm space from the main unit.

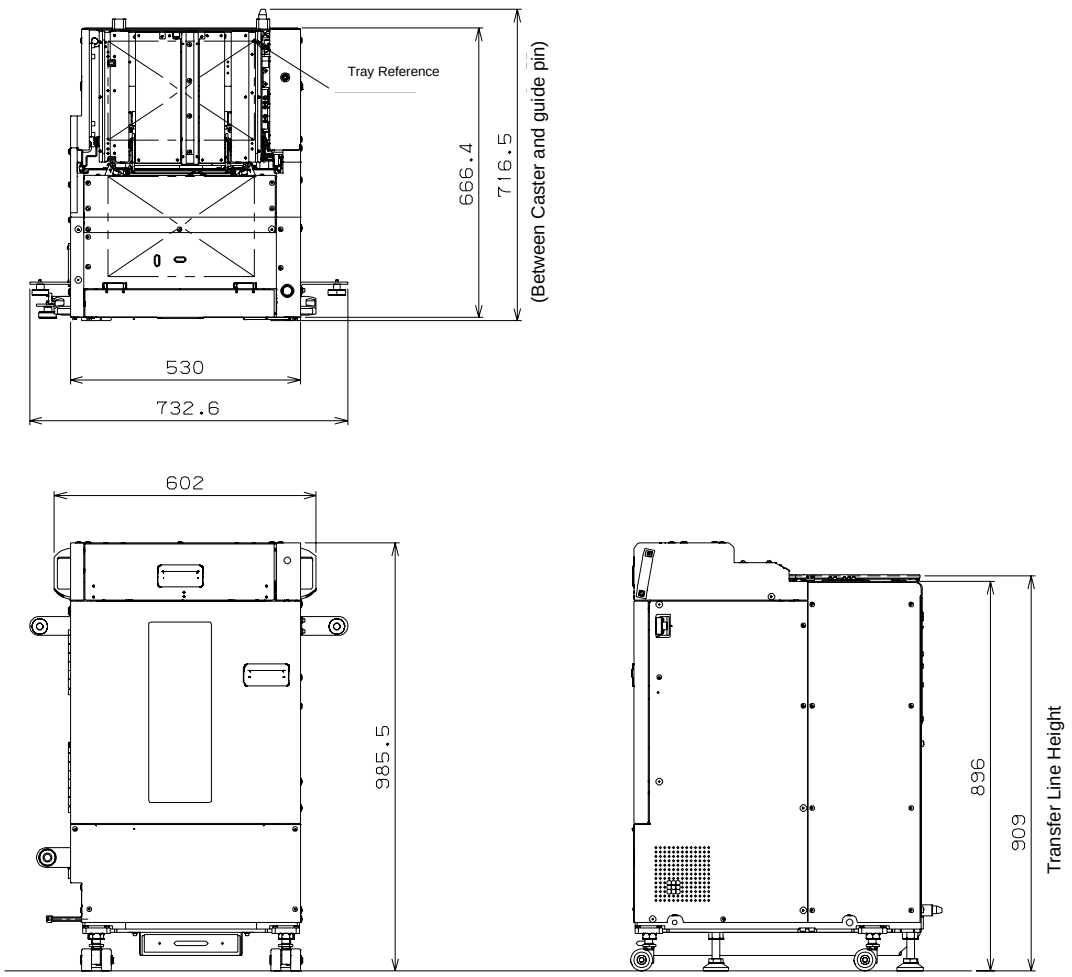
(Unit: mm)

■ Adjust Bolt Diagram



(Unit: mm)

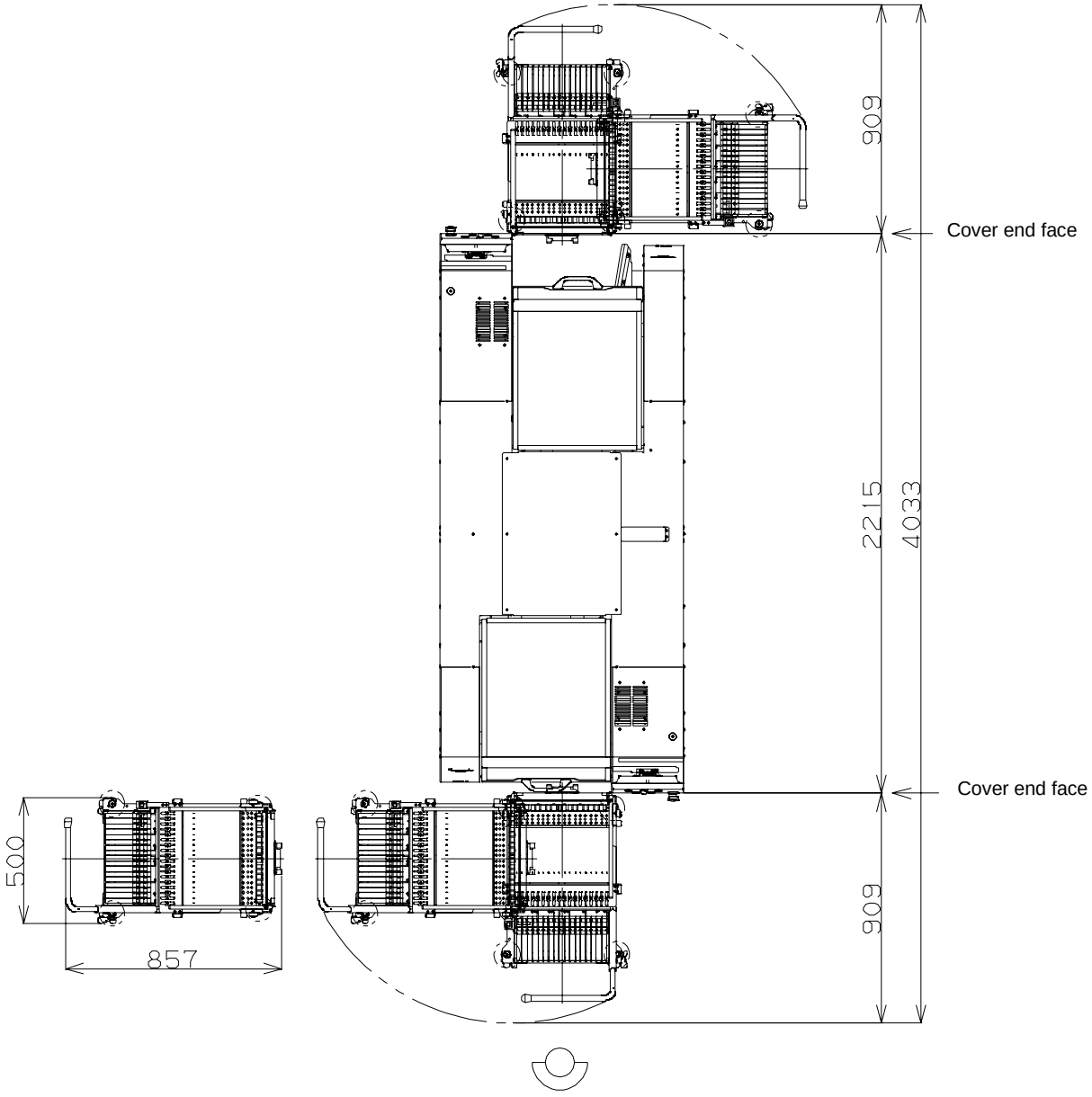
■ Single tray feeder



* The tray feeding height of 896 mm is a standard value when the PCB transport height of NPM-GH is 900 mm.
The adjustable range: 896 mm

This is the minimum necessary space when you change Feeder Cart.
Please be sure to keep the following space when you install the machine.

(Unit: mm)

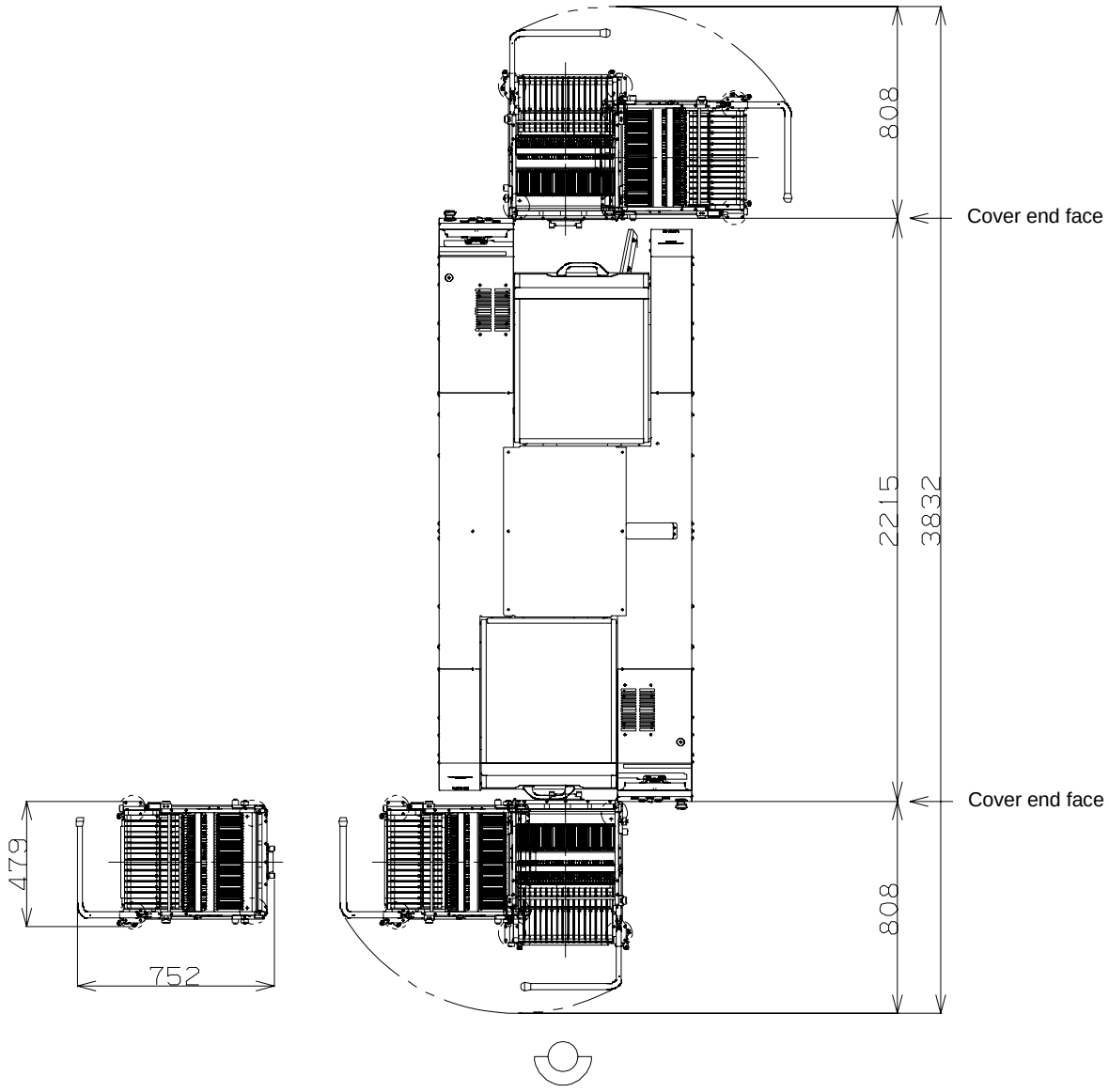


⁎⁎ Remarks ⁎⁎

- Floor slope in the feeder cart installation area needs to be 6 mm or less on the left and right of a cart, and 11 mm or less in front of and behind of a cart.
  When floor slope is beyond the above limit, feeder cart cannot be taken in or out.

This is the minimum necessary space when you change C-Cart34C.
Please be sure to keep the following space when you install the machine.

(Unit: mm)

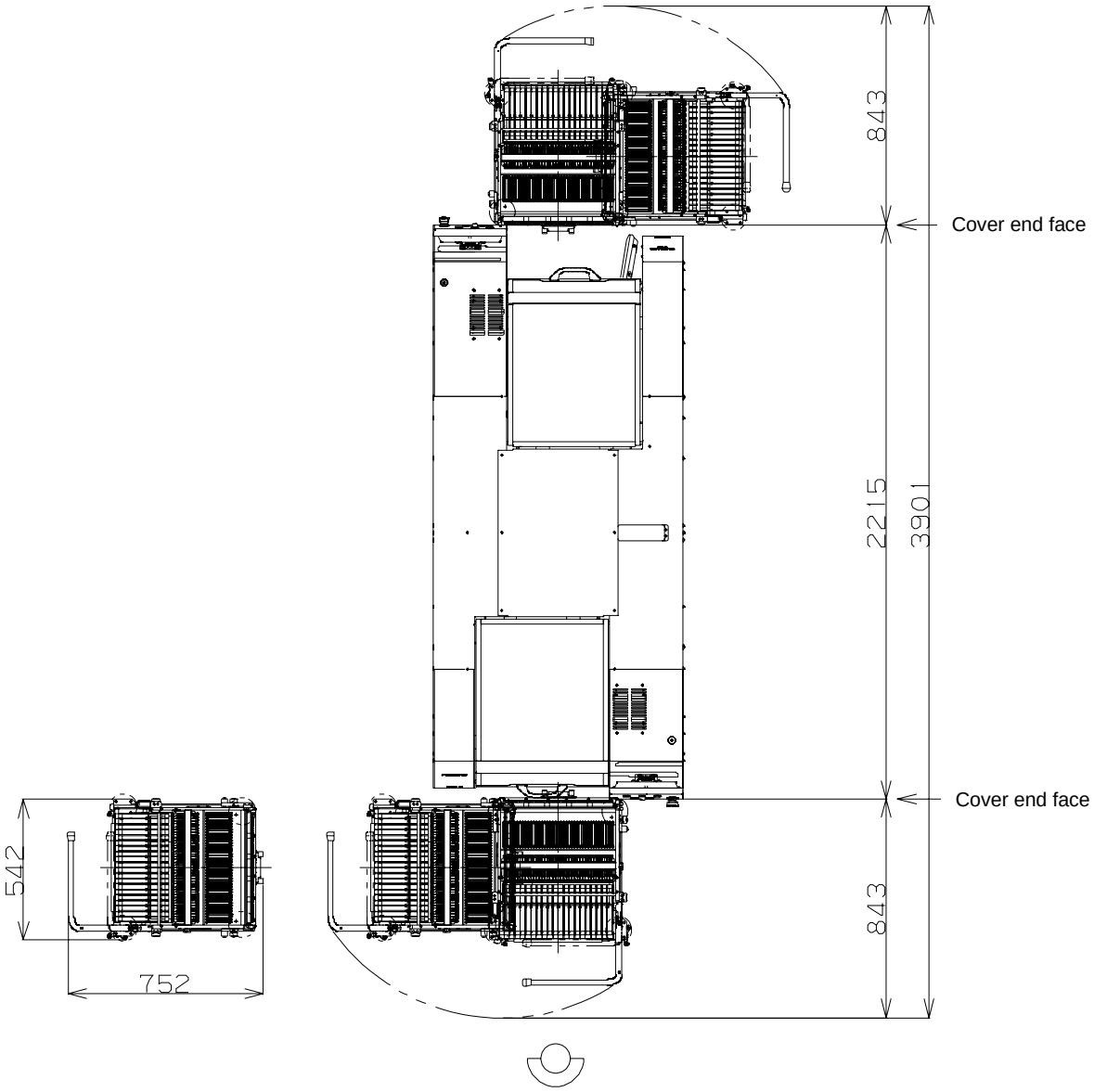


⁎⁎ Remarks ⁎⁎

- Floor slope in the C-Cart installation area needs to be 6 mm or less on the left and right of a cart, and 11 mm or less in front of and behind of a cart. When floor slope is beyond the above limit, C-Cart cannot be taken in or out.

This is the minimum necessary space when you change C-Cart40C.
Please be sure to keep the following space when you install the machine.

(Unit: mm)



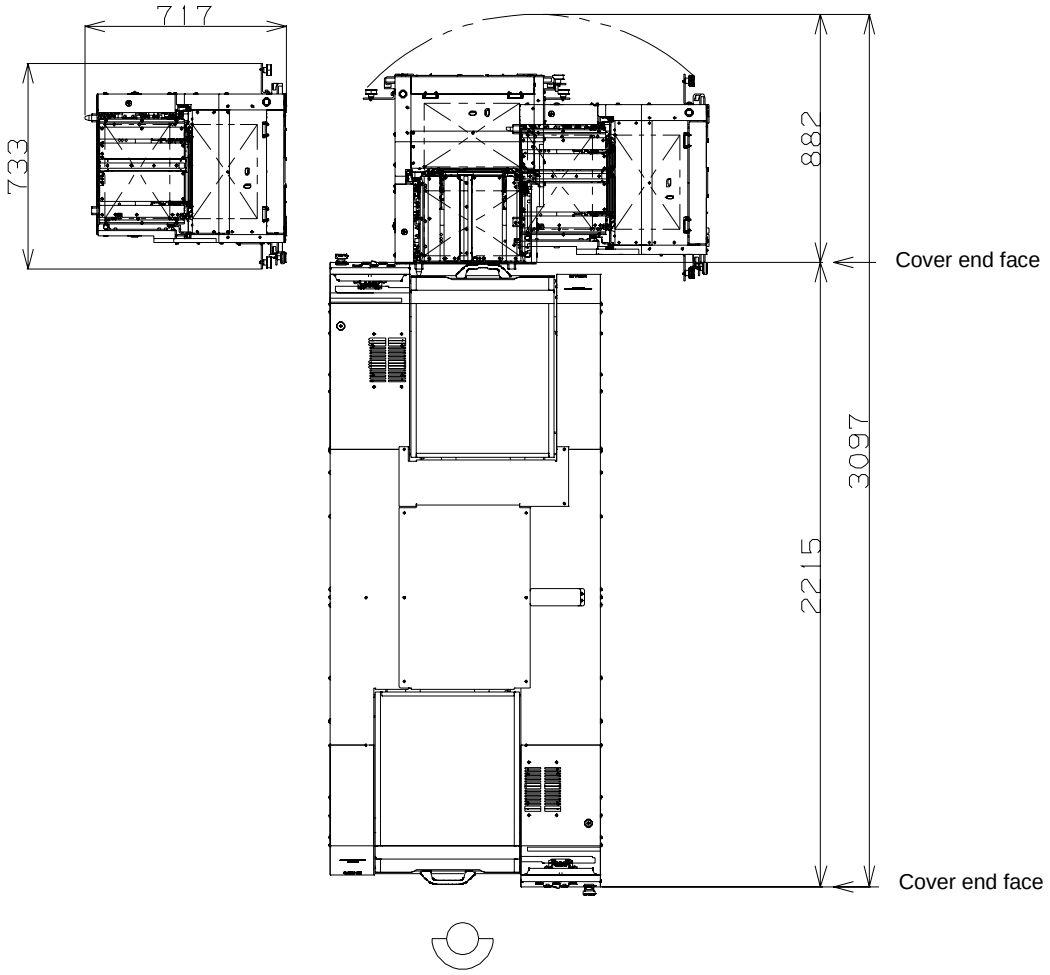
Front side

⁎⁎ Remarks ⁎⁎

- Floor slope in the C-Cart installation area needs to be 6 mm or less on the left and right of a cart, and 11 mm or less in front of and behind of a cart. When floor slope is beyond the above limit, C-Cart cannot be taken in or out.

This is the minimum necessary space when you change Single Tray Feeder.
You may have to remove Tray Feeder for maintenance.
Please be sure to keep the following space when you install the machine.

(Unit: mm)



**** Remarks ****

- Floor slope in the Tray Feeder installation area needs to be 6 mm or less on the left and right of a cart, and 11 mm or less in front of and behind of a cart. When floor slope is beyond the above limit, the Tray Feeder cannot be taken in or out.

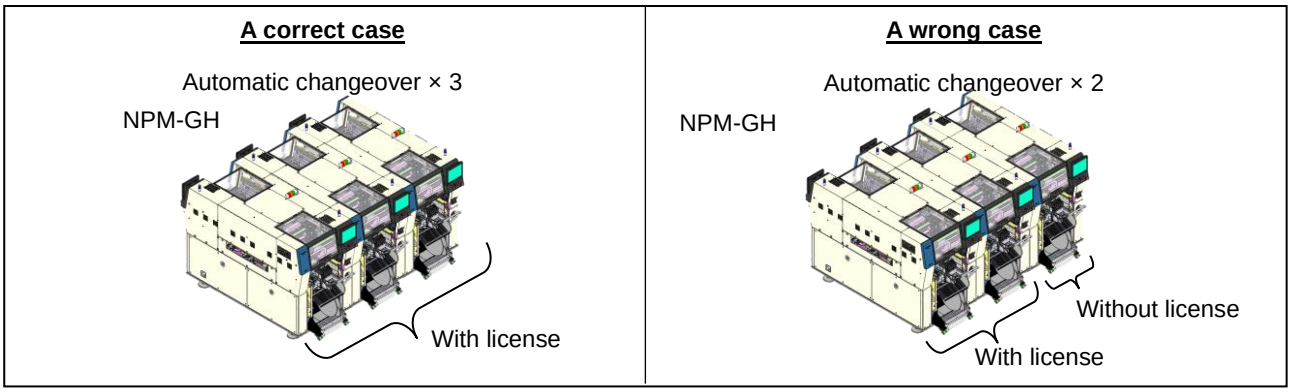
14. Regarding Licenses

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) *
Automatic recovery*
Remote operation*
Component inspection before pickup (Polarity)
Message board
Head diagnosis
High-speed head placement constant load control
FC16 head transfer
High-accurate mode1(±15 μm)
High-accurate mode2(±10 μm)
Other company bad mark communication
Extend Mount points
Multifunctional camera MC-S(Type3)
Pre-pickup Inspection(Char/2D)
AOI info display function
APC-5M
Mount complete position recognition
Shield case warping inspection function before mounting
Tray 1 Pallet 10 Kind
Component Bottom-Side 2D code Reading

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.



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Important Notes

1. Performance assurance of the Product is subject to the condition that the Product is used in accordance with specifications, specification manuals, and operating instructions provided by us. We do not guarantee performance if the Product is used in any way other than those described in such documents.

(a) Never use the Product near any noise generation sources such as welding machines, which will result in malfunctions.

(b) Do not unnecessarily turn off the power switch, servo switch, or air during operation; it will run without being controlled, which will result in damage.

(c) Before teaching operations or conducting manual operations in a servo free state, make sure there is no interference in the unit, which will result in damage.

(d) The covers of the main body, loader/unloader, tray feeder, and the other covers may be cylinder-locked.
Do not attempt to forcibly open the covers, which will result in damage to the covers and/or cylinders.

(e) Do not take apart or alter the equipment and its units, as it may influence product safety and/or its quality.

(f) Data modifications must only be undertaken by professionally trained and approved personnel. Modifications by unqualified personnel may be a cause of input error, which will result in malfunctions.

(g) Do not block any of exhaust openings and intakes. Excessive temperature in the control box is a cause of abnormal functioning.

(h) Do not turn off the servo switch during operation, as it may result in control failure.
Always set the Product to a temporarily paused state (e.g. single stop or cycle stop) or operation stop state before the Product is turned off.

(i) Be attentive to water quality when using spraying devices and/or humidifiers. In an environment where ultrasonic humidifiers are used, for example, mineral components such as calcium or magnesium, and components such as silica, carbonate, or iron, are released to the air. Such airborne particles stick to the equipment, resulting in the malfunction of sliding parts and/or optical components.

(j) Do not use the Product in an atmosphere where gasified low molecular weight siloxane exists.
Low molecular siloxane, released by exposed silicone-based materials (e.g. silicone adhesives, silicone oils, or silicone powders), sticks to the electric contact parts and/or optical components, and will result in contact failure and/or malfunction.

(k) Do not use the Product in corrosive gas environments (e.g. nitric acid, hydrogen sulfide, or ammonia), halogen gas environments, or any environment where conductive foreign substances may enter.
Electrodes and/or metal parts of electric components will corrode, and will become a cause of the malfunction of electronic circuits and/or malfunctions.

2. We shall not be held liable for the following failures and damages.

(a) Failure and/or damage caused by wrong use or improper repair, adjustment or modification

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

(c) Failure and/or damage caused by relocation or transportation of the Product, the dropping of the Product itself or by objects falling on the Product after purchase

(d) Failure and/or damage caused by fire, earthquake, flood, thunderbolt, other natural or man-made disasters, pollution damage, salt damage, gas damage (e.g. corrosive gas or halogen gas), abnormal voltage, or the use of power sources besides those specified (e.g. voltage or frequency)

(e) Failure and/or damage caused by carriers during delivery via vehicle, ship, or other modes of transport.

(f) Damage arising from failure to observe the instructions/cautions of the operating instructions provided with the Product.

(g) Any failure caused by hacking, unauthorized access, attacks upon the Product or connected networks and from other similar threats

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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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Panasonic Connect Co., Ltd.

4-1-62 Minoshima, Hakata-ku, Fukuoka City, Fukuoka, 812-8531, Japan

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