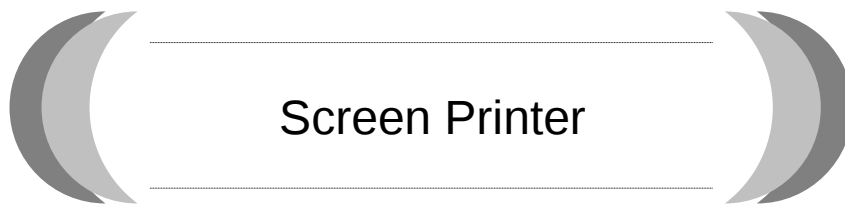


Specification

【 Electronic Component Mounting System 】



Model ID : **NPM-GP/L**
Model No.: **NM-EJP2B**

Panasonic Connect Co., Ltd.

Cautions Regarding These Specifications

Please note the following points.

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2. Due to improvements to the machine and software, the specifications may change without notice
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10. As the manufacturer of this system, we do not assume responsibility for defective products or costs incurred as a result of improper operation (errors in writing data to memory).
11. When reselling or moving this equipment, please make sure to contact us, our sales subsidiaries or agents.
12. The contents of this document are valid as of January 13, 2023.

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

Revision History

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

[illegible]

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1. General Description

NPM-GP/L is a screen printer that achieves the best OEE with no skills through automation and line solutions.

*O.E.E : Overall Equipment Effectiveness

■ Increasing Production Time

(1) Increasing Production Time/Automating Changeover

Automates operations required for changeover to reduce equipment availability losses and operation mistakes

- **Solder Transfer(Optional)**
Collects solder paste left on a mask automatically after printing is finished and transfers solder paste to a mask used in a next model
- **Solder paste anti-drop cover unit(Optional)**
Prevents solder paste touched to a squeegee from dropping on a mask or dropping in a machine
- **Support pin automatic replacement(Optional)**
Collects support pins automatically and places them automatically at changeover
- **Mask changer(Optional)**
Equipped with a magazine on its back and that can have stock of up to 10 masks.
Puts away masks into a magazine automatically when production is finished and prepares a mask that is used in a next model

(2) Automating Operations during Production

Automates operations to be performed during production to reduce equipment performance losses

- **Perforated pot type solder paste auto feeding unit(Optional)**
Feeds solder pastes automatically from a hole at the underside of a solder pot.
Used with a residual solder detection sensor, that keeps proper amount of solder on a mask.
- **Paper free wiping unit & Cleaning nozzle (Option)**
This is a cleaning that does not use cleaning papers or solvents.
This reduces using papers and solvents.
*When you use materials other than solder(glue, flux, resin paste, and others), contact us beforehand.
- **More-ne Block (Side Leakage Prevention Block) (Option)**
Touches a mask by using the reaction force of a magnet to prevent solder pastes from side leakage in printing.
Simple structure and cleaning is easy.

(3) Machine Condition Monitoring (Prevention • Predictive Maintenance)

Monitors machine conditions for maintenance at an appropriate timing to increase production time.

- **APC-5M Control : Prevention • Predictive Maintenance(Optional)**
Operating unit's travel distance monitoring/PCB transfer condition monitoring/
Camera condition monitoring/Blower operating time measurement/
PCB clamber dirt detection(Optional)/PCB clamber operation monitoring/
Vacuum booting time monitoring/Vacuum pump operating time measurement/
PCB clamber height measurement(*)
*Mask height detection (Option) is necessary.

■ Maintaining High Quality Printing in a Stable Manner

Various features that achieve high quality printing, and stable printing in response to the change in 5M reduce losses on defective products.

(1) High Quality Printing

Various features achieve high quality printing.

- **New Operation Screen**
Adopts a big panel(15-inch) and that has significantly enhanced operability and visibility.
- **Top/Side Clamper(Optional)**
Holds down the sides of a PCB to enhance printing quality with warped PCB.
You can choose either PCB TOP Control or PCB Side Control.
- **Variable angle of attack squeegee(Optional)**
You can set an attack angle in the 45 degrees to 70 degrees range in increments of 1 degree.
APC-F.B.(Volume) (License) automatically adjusts an attack angle based on the results of a solder inspection machine.
- **Tip-curved high filling squeegee(Optional)**
Metal squeegee that blade tip is curved, that has enhanced filling performance.
Easy to use as well as general metal squeegees.
- **Material Verification(Optional)**
Checks solder pastes, masks, squeegees, support blocks to prevent material setting mistakes.
Machine stops when materials are unmatched or unverified.
- **PCB Vacuum-holding Blower(switchable) (Option)**
Creates airflow from a mask to a PCB with a blower to increase solder paste transfer volume.

(2) APC-5M (Stable Production)

Machine monitors the change in 5M to adjust machine's parameters automatically.

- **Solder Paste Viscosity Feedback -U(Optional)**
Measures solder paste viscosity of a mask and shows a warning when it is out of the acceptable viscosity range.
- **Mask Tension Feedback -U(Optional)**
Measures mask tension when a mask is set and adjusts to the optimal mask snap-off.
- **Solvent Discharge Amount Feedback(Optional)**
Monitors solvent discharge amount at wet cleaning to maintain appropriate amount.

■ Line Solution Approaches

M2M(Machine to Machine) with a solder inspection machine achieves high quality productions by line.

- **APC-F.B.(Position) (Option)**
Offsets printing placement automatically based on the results of a solder inspection machine.
- **APC-F.B.(Volume) (Option)**
Offsets volume automatically based on the results of a solder inspection machine.
APC-F.B.(Volume) adjusts the attack angle of a squeegee and controls volume to ensure and maintain the optimum printing status smoothly.
- **Optimizing Control of Printing Conditions(APC-5M) (Option)**
Based on the results of a solder inspection machine, it adjusts conditions such as printing pressure, squeegee speed and snap-off speed to ensure and maintain the optimum printing status.

2. Features

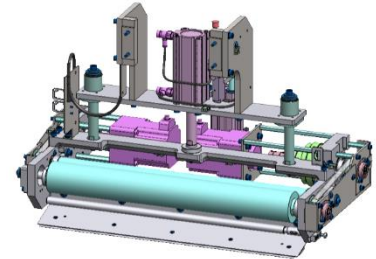
Increasing Production Time

(1) Increasing Production Time／Automating Changeover

Automates operations required for changeover to reduce equipment availability losses and operation mistakes

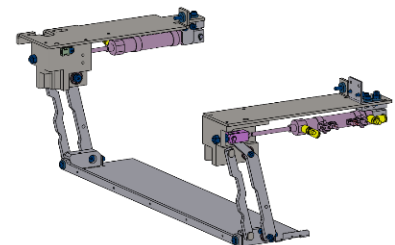
Solder transfer (Option)

Collects solder paste left on a mask automatically after printing is finished and transfers solder paste to a mask used in a next model.



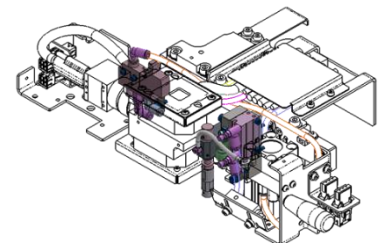
Solder paste anti-drop cover unit (Option)

Cover is movable and prevents solder paste touched to a squeegee from dropping on a mask or dropping in a machine.



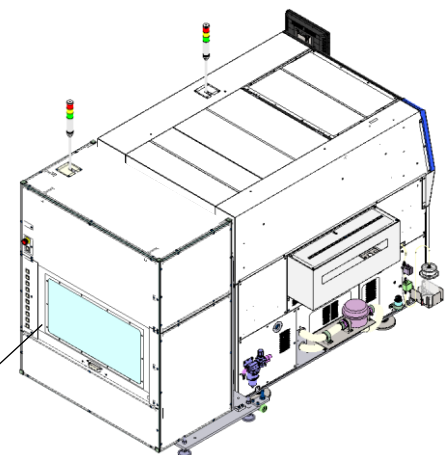
Support pin automatic replacement (Option)

Collects support pins automatically and places them automatically at changeover.



Mask changer (Option)

Equipped with a magazine on its back and that can have stock of up to 10 masks. Puts away masks into a magazine automatically when production is finished and prepares a mask that is used in a next model.



Mask changer

(2) Automating Operations during Production

Automates operations required for production to reduce equipment performance losses

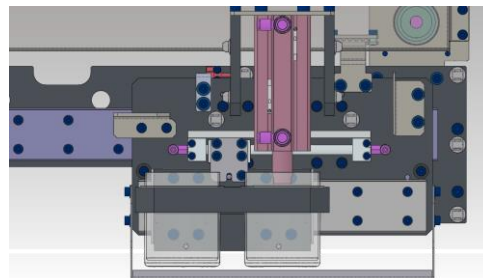
Perforated pot type solder paste auto feeding unit(Optional)

Feeds solder paste automatically from a hole at the underside of a solder pot.

Used with a residual solder detection sensor, that keeps proper amount of solder on a mask.

Two perforated pots being set, production can last about for four straight hours, and this unit is easy maintenance such as cleaning since it does not need nozzles to feed solder.

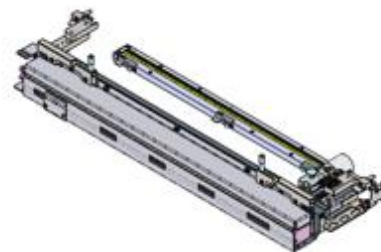
- * You cannot use this with low viscosity solder or rosin-free(resin containing solder) in some cases. Contact us beforehand.
- * In some cases, depending on physical properties or characteristics of solder or the shapes of a solder container, much solder drops from a container opening after supplied. You could see how it goes with your solder beforehand. Contact us for more details.



Paper free wiping unit & cleaning nozzle (Option)

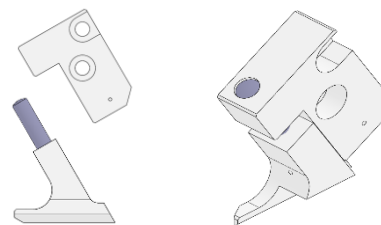
This is a cleaning that does not use cleaning papers or solvents.

Reduces using papers and solvents.



More-ne Block (Side Leakage Prevention Block) (Option)

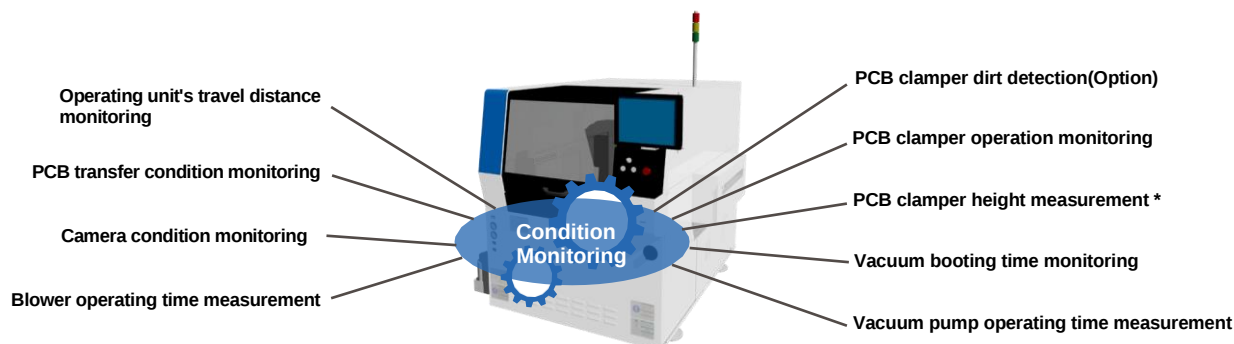
Touches a mask by using the reaction force of a magnet to prevent solder pastes from side leakage in printing. Simple structure, and cleaning is easy.



(3) Machine Condition Monitoring (Prevention • Predictive Maintenance)

Monitors machine conditions for maintenance at an appropriate timing to increase production time.

APC-5M Control : Prevention • Predictive Maintenance(Optional)



*Mask height detection(Optional) is necessary.

Maintaining High Quality Printing in a Stable Manner

Various features that achieve high quality printing, and stable printing in response to the change in 5M reduce losses on defective products.

(1) High Quality Printing

Various features achieve high quality printing

New operation screen

Adopts a big panel(15-inch) and that has significantly enhanced “operability” and “visibility”.

Top/Side clamber(Optional)

Holds down PCB edges to enhance printing quality with warped PCB.
You can choose either PCB TOP Control or PCB Side Control.

Variable angle of attack squeegee(Optional)

You can set an attack angle in the 45 degrees to 70 degrees range in increments of 1 degree.
APC-F.B.(Volume) (License) automatically adjusts an attack angle based on the results of a solder inspection machine.

Tip-curved high filling squeegee(Optional)

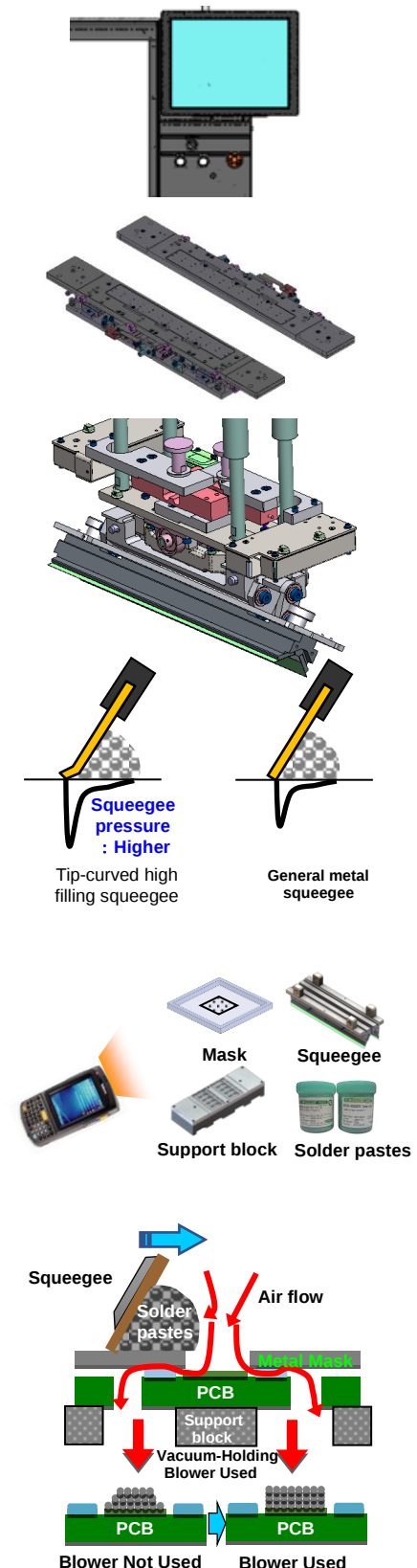
Metal squeegee that blade tip is curved, and that has enhanced filling performance.
Easy to use as well as general metal squeegees.

Material Verification(Optional)

Checks solder pastes, masks, squeegees, support blocks to prevent material setting mistakes.
Machine stops when materials are unmatched or unverified.

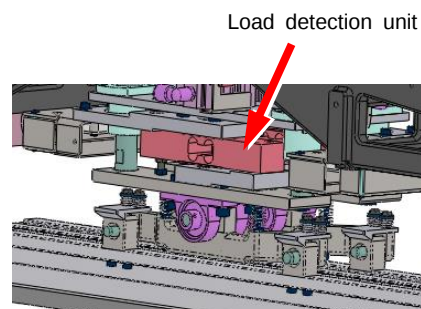
PCB Vacuum-holding Blower(switchable) (Option)

Creates airflow from a mask to a PCB with a blower to increase solder paste transfer volume.



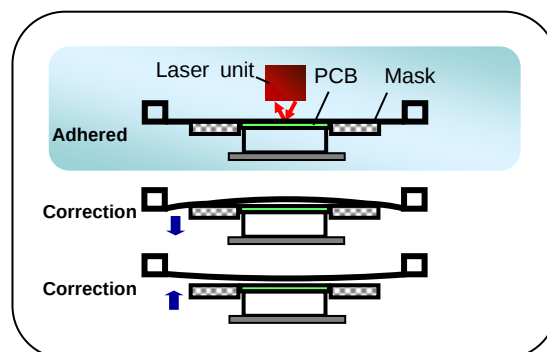
Printing pressure monitor function

The load detection unit has been newly mounted on the squeegee head.
This monitors printing pressure during printing and shows a warning when printing pressure deviates from the set range.



Mask height detection (Option)

This optimally controls adhesion between PCB and masks, detects clearance between them and keeps optimal adhesion and provides stable printing state.

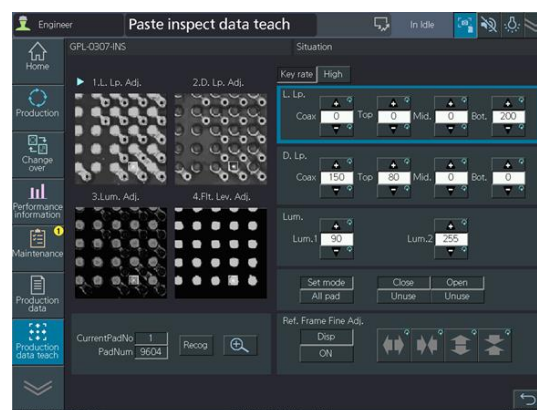


Solder Inspection Function Pro (Option)

PCB recognition camera detects defects such as misalignment, bridging, blur or oozing.

Mask recognition camera inspects mask openings for solder clogging, and the reverse side of masks for oozing. (The data created using NPM-DGS)

* NPM-GP/L has "Solder Inspection Function Light" as standard equipment.
See "5.1 Solder Inspection Functions" for details.



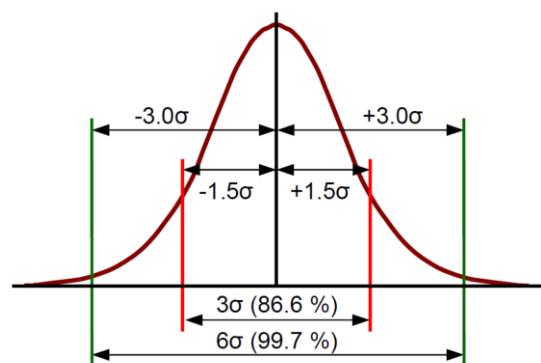
Positioning repeatability

2 Cpk $\pm 3.8 \mu\text{m}$ $\pm 3\sigma$

Positioning accuracy after recognition of the same PCB
(Under our specified conditions)

The above positioning accuracy is the same as the following expression.

2 Cpk $\pm 1.9 \mu\text{m}$ $\pm 1.5\sigma$



Printing accuracy

2 Cpk $\pm 15.0 \mu\text{m}$ $\pm 6\sigma$ (Under our specified conditions)

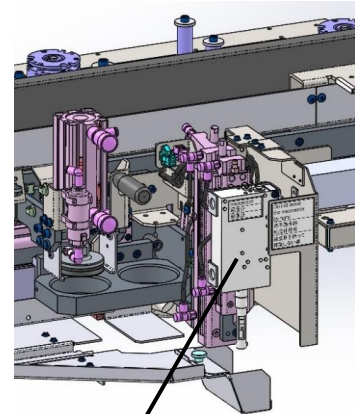
*CeTaQ measuring equipment

(2) Stable Production

Machine monitors the change in 5M to update machine's parameters automatically.

APC-5M : Solder paste viscosity feedback -U (Option)

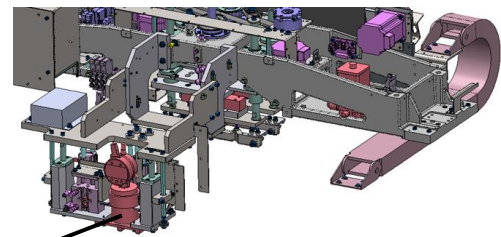
Measures solder paste viscosity of a mask and shows a warning when it is out of the acceptable viscosity range.



Solder paste viscosity measurement unit

APC-5M : Mask tension feedback -U (Option)

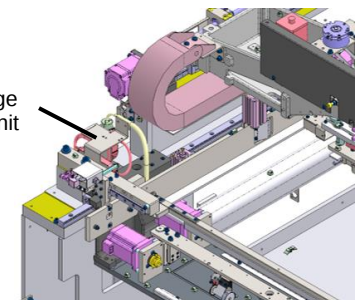
Measures mask tension when a mask is set and adjusts to the optimal mask snap-off.



Mask tension measurement unit

APC-5M : Solvent discharge amount feedback (Option)

Monitors solvent discharge amount at wet cleaning to maintain appropriate amount.



Solvent discharge measurement unit

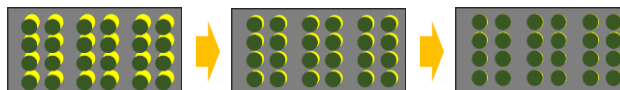
Line Solution Approaches

M2M(Machine to Machine) with solder inspection machines enable high quality productions by line.

APC-F.B.(Position) (Option)

Offsets printing placement automatically based on the results of a solder inspection machine.

APC-F.B.(Position)(Option)



APC-F.B.(Volume) (Option)

Offsets volume automatically based on the results of a solder inspection machine.

APC-F.B.(Volume) adjusts attack angle of a squeegee and controls volume to ensure and maintain optimum printing status smoothly.



* Variable **angle of attack** Squeegee(Optional) is necessary.

APC-5M : Optimizing Control of Printing Conditions(Optional)

Based on the results of a solder inspection machine, it adjusts conditions such as printing pressure, squeegee speed and snap-off speed to ensure and maintain the optimum printing status.



Expanding supported PCB size

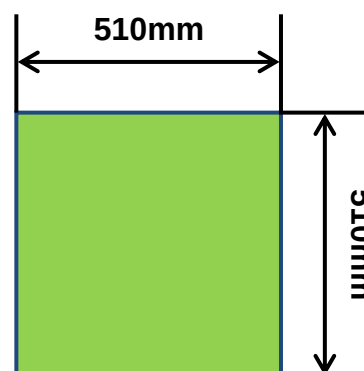
Large PCB supporting

The maximum PCB size is 510 mm x 510 mm

* It is up to 650 mm x 510 mm on an individual basis.

* There are certain constraints when you select

Paper free cleaning nozzle, Variable angle of attack squeegee or
Support pin automatic replacement unit.



3-conveyor specification

3-conveyor specification reduces the time needed for PCB change (including PCB recognition time).

Cycle time = PCB change time + Printing time (+ Cleaning time / intervals)

PCB size	PCB change time (including PCB recognition time)
L510 × W510 mm	8.5 s
L350 × W300 mm	6.5 s

* PCB change time may vary depending on printing conditions (whether PCB will get warping straightened, whether fixing method is PCB suction, plate-making reference, and other conditions).

Always be sure to use PCB stopper.

(PCB change time = time needed for PCB replacement + transfer time printing table takes + PCB recognition time)

* For details on how to find cycle time, see "4.3 Cycle time".

* PCB transfer speed is switchable from 4 patterns according to PCB.

* 3-conveyor specification allows up to 350 mm in X direction.

Improvement of operability

New operation screen

Adopts a new operation screen and its “visibility” and “operability” have greatly improved.
You can switch languages with a one-touch operation among English, Japanese and Chinese.

■ Hierarchical operation

Operating screens are classified into three modes:

-Operator, Engineer, and Serviceman

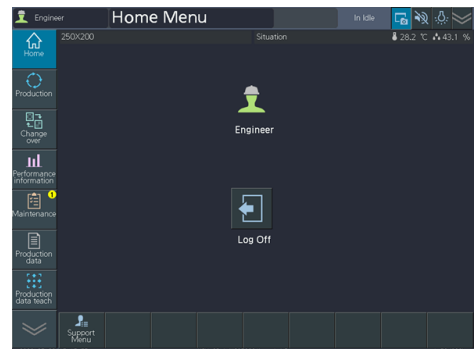
At the same time, its screen configuration is simplified to a necessary minimum in order to prevent improper operations.

■ Tree jump function

With the improved operability, you can move to the main menu screen from any screen.

■ Maintenance time displaying function

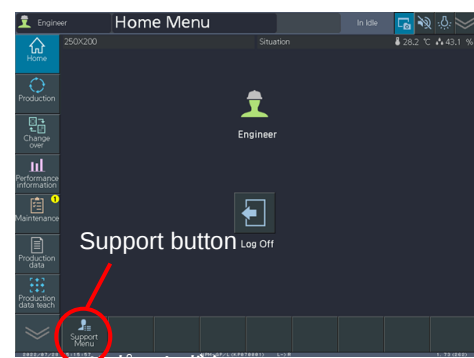
The screen shows inspection time information (daily, weekly, monthly or others) based on running time. The inspected date and time will be saved.



Support button

This has the support button installed, capable of directly calling up operation menus for daily works such as squeegee replacement, mask setting or paper replacement.

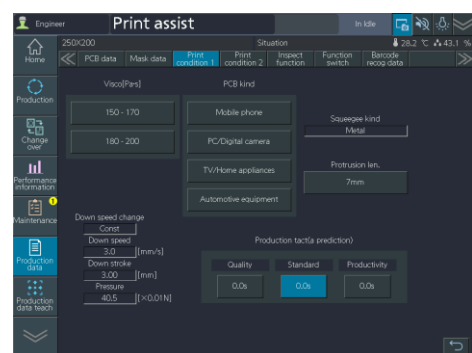
You can easily perform necessary operations for ordinary productions such as material setting or refills.



Printing conditions setup support

Our recommended printing conditions are automatically set by simply inputting solder viscosity, production models, and types of squeegees.

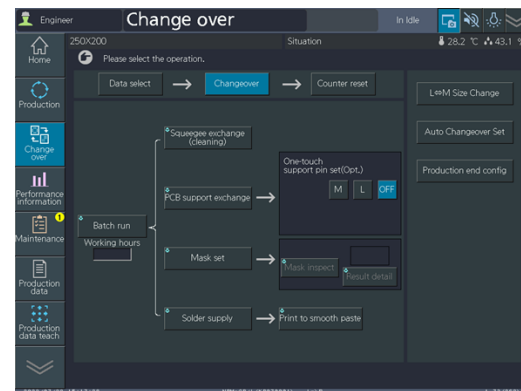
Estimated cycle time is displayed, and you can select printing conditions that ensure line balance.



Improvement of Changeover

Changeover mode

Has a dedicated mode that allows you to perform a series of changeover steps in order. Performing the steps in order of menu ensures reliable changeover.



Automatic changeover (License)

This supports changeover (production data change, rail width change) and minimizes the operation loss time of changeover.

Reduction of loss time at changeover

Automatically moves to the changeover mode after "Changeover button" is pressed or when the printing of the production scheduled numbers is finished, and achieves efficient changeover.

3. Specification

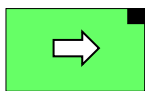
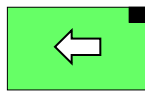
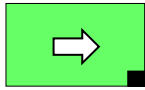
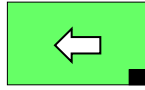
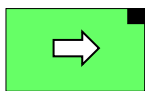
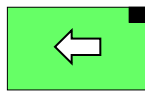
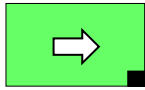
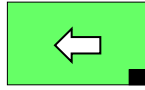
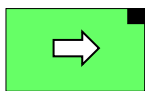
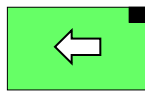
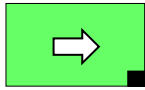
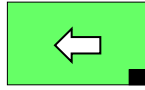
3.1 Standard Specifications

Electric source	- Rated voltage Single-phase, AC 200/ 220/ 230/ 240 V $\pm$10 V - Frequency 50/ 60 Hz - Rated capacity Main body (including the blower for cleaning and vacuum pump for PCB suction) Capacity rating is 3.3 kVA * The temperature control unit requires separate electric source. - Peak current values during operation Motor starting current flows 23 A (in the case of input voltage of AC 200 V) * Take this into consideration when you select capacity of primary electric source AVR such as stabilizing electric source. * Be careful of a voltage drop due to a primary power cable length or diameter
Pneumatic source	- Supply air pressure 0.5 MPa ~ 0.8 MPa (Working air pressure: 0.5 MPa ~ 0.55 MPa) - Supply air amount 30 L/min(A.N.R.): Blower motor specification 400 L/min(A.N.R.): Specifications including ejectors
Dimensions	W 1 580 × D 1 800 × H 1 500 mm (Excluding signal tower and touch panel)
Mass	- Main body(With full options) : 1 750 kg - Temperature control unit : 83 kg - Mask changer (Size M) : 540 kg - Mask changer (Size L) : 570 kg
Environment	- Temperature 10 °C ~ 35 °C * 20 °C to 30 °C when the temperature control unit (option) is connected. - Humidity 25 %RH ~ 75 %RH (No condensation) - Altitude 1 000 m or less, above sea level
Operating unit	Interactive control by LCD color touch panel One-touch switchover among English, Japanese and Chinese is possible. Recognition screen display (PCB/mask recognition screen*² is displayed in superimposed screen*¹) *¹ Recognition screen is displayed on operating screen. *² Images from both the PCB camera and the mask camera cannot be displayed together.
Paint color	Standard color White: W-3 * Paint color cannot be designated.

Control System	Microcomputer system (VxWorks)
Data creation	- NPM-GP/L main body (Standard) - NPM-DGS (Option: LAN connection)
No. of Programs	- No. of NC Program Steps - Embedded flash disk : 235 types - SD card : Up to 2 000 types can be saved * It is the No. of types to be saved when the solder inspection function is not used. * SD card capacity is as follows. SDHC : Max 32 GB SD : Max 2 GB * SDHC memory cards are supported, and SDXC memory cards are not.
Others	- Program Functions See "6. Other Standard Functions". - Updating the machine system The SD card included with the machine is used for updating its system. An environment, where the data of the update CD can be copied to the SD card, is required.

3.2 Standard Functions

No	Item	Specifications
1	Positioning repeatability	2 Cpk $\pm 3.8 \mu\text{m}$ $\pm 3 \sigma$ The above positioning accuracy is the same as the following expression. 2 Cpk $\pm 1.9 \mu\text{m}$ $\pm 1.5 \sigma$ * Rapid transitions in ambient temperature may affect the accuracy.
		* Positioning accuracy after recognition of the same PCB (Panasonic specified conditions)
2	Printing accuracy	2 Cpk $\pm 15.0 \mu\text{m}$ $\pm 6 \sigma$ (Panasonic specified conditions) *CeTaQ measuring equipment
3	Mask frame dimensions	Standard 736 mm × 736 mm
		Option 750 × 750 mm 650 × 550 mm (Horizontally long/ Vertically long) 600 × 550 mm (Horizontally long) 584 × 584 mm 736 × 584 mm (Horizontally long/ Vertically long)
		(See “7.1 Mask Specifications” for details)
4	Squeegee	- Type (selectable)*¹ Metallic squeegees & Holders: 530 mm, 480 mm, 370mm, 270 mm Plastic squeegees & Holders: 530 mm, 480 mm, 370mm, 270 mm Tip-curved high filling metallic squeegees & Holders: 530 mm, 480 mm, 370mm, 270 mm Variable angle of attack squeegees & Holders: 530 mm, 370mm - Velocity 5 mm/s ~ 400 mm/s - Printing pressure 5×10^{-2} N/mm ~ about 78×10^{-2} N/mm (N is allowed to change display) * This is a value when the squeegee length is 370 mm. * Printing pressure varies with the length of squeegees. (Max. 288N) Lowest printing pressure with variable angle of attack squeegee is 30×10^{-2} N/mm. - Motion Single printing and double printing are exchangeable. - Angle Standard squeegees : 60°(fixed) Variable angle of attack squeegees : 45° ~ 70° (in increments of 1 degree) - Supported PCB Standard squeegees : <u>PCB described in the “3.2 Standard Function [Applicable PCB]” column are all supported</u> Variable angle of attack squeegees : <u>Supported PCB depend on the size of masks</u> Max. 510 × 420 mm (736 × 736 frame, 750 × 750 frame) Max. 510 × 250 mm (736 × 584 frame/Horizontally long) Max. 350 × 300 mm (650 × 550 frame/ Vertically long, 736 × 584 frame/Vertically long) Max. 350 × 250 mm (650 × 550 frame/Horizontally, 584 × 584 frame, 600 × 550 frame/Horizontally long)
		You can switch a specification between the variable angle of attack squeegee specification and the standard specification.
5	Table	- Descending velocity 0.1 mm/s ~ 50 mm/s - Descending stroke Max. 10 mm (You can set the descending stroke in 0.01 mm increments) - Types of table descending velocity Vacuum-hold mask snap off High-acceleration mask snap off High-speed multiple mask snap off Uniform-velocity mask snap off Multilevel-velocity mask snap off [Speed and Stroke are selectable at the Advanced Setting screen]

No	Item	Specifications																	
6	Number of PCBs that can be stocked	Three PCB (within 350 mm in X-direction), One PCB (over 350 mm in X-direction)																	
7	PCB exchange time*2 (Including the PCB recognition)	6.5 s (reference value on 350 × 300 mm PCB) 8.5 s (reference value on 510 × 510 mm PCB)																	
8	Applicable PCB	• Dimension Min. 50 × 50 mm ~ Max. 510 × 510 mm (A carrier is required depending on the PCB size) (Note that when you select paper free cleaning nozzle, variable angle of attack squeegee, or support pin automatic replacement unit, there are some restraints. For details, see the descriptions in categories below. 「9.1 Paper free wiping unit & cleaning nozzle」 「3.2 Basic functions [Squeegee]」 , 「9.1 Support pin automatic replacement unit」 • Thickness 0.3 mm ~ 8.0 mm(0.1 mm : Individual specification) • Mass 3.0 kg or less (When the speed is ≤ 500 mm/s, including the carrier mass) (See “7.2 PCB Specifications Overview” for details) • Transfer speed High 700 mm/s Medium 500 mm/s Low 300 mm/s Ultra-slow 100 mm/s • Flow direction Left to Right, or Right to Left (selectable) (Front reference in both cases)*3 <table><tr><th colspan="2" rowspan="2"></th><th colspan="2">Direction</th></tr><tr><th>Left → Right</th><th>Left ← Right</th></tr><tr><td rowspan="4">Transfer reference ※from operators' position</td><td rowspan="2">Rear</td><td></td><td></td></tr><tr><td>Out-of-specification</td><td>Out-of-specification</td></tr><tr><td rowspan="2">Front</td><td></td><td></td></tr><tr><td>Supported</td><td>Supported</td></tr></table>			Direction		Left → Right	Left ← Right	Transfer reference ※from operators' position	Rear			Out-of-specification	Out-of-specification	Front			Supported	Supported
		Direction																	
		Left → Right	Left ← Right																
Transfer reference ※from operators' position	Rear																		
		Out-of-specification	Out-of-specification																
	Front																		
		Supported	Supported																
9	PCB fixing method	Mechanical clamp method, PCB suction method																	
10	Offset of mask/ PCB positioning	±5.0 mm in the X and Y directions, ±1.2° in the θ direction																	
11	Clearance between mask and PCB	-1.5 mm ~ 3.0 mm																	

*1 If wishing to use the squeegees of nonstandard length, please contact us.

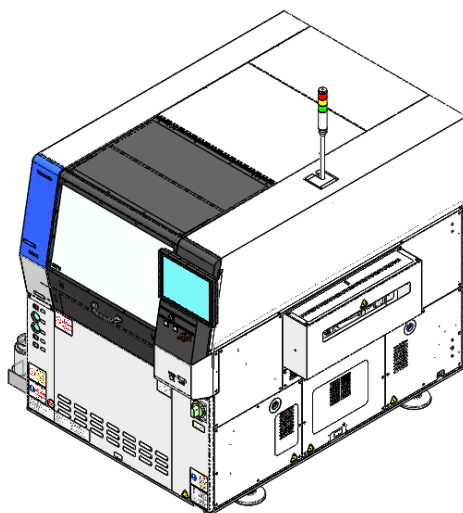
*2 PCB exchange time varies depending on the upstream/downstream equipment, PCB size, PCB positioning method, or other conditions. (See “4.3 Cycle Time” for details.)

*3 Rear transfer reference is not supported.

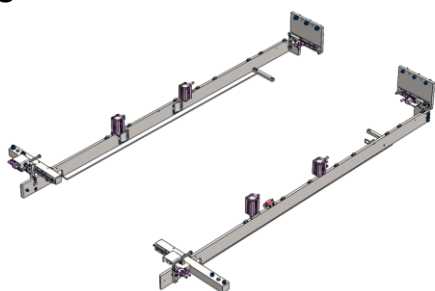
*4 The support box of PCB suction type needs to be designed/created in response to the PCB.

4. Machine Configuration

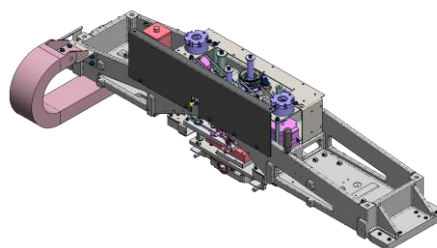
4.1 Overall Drawing



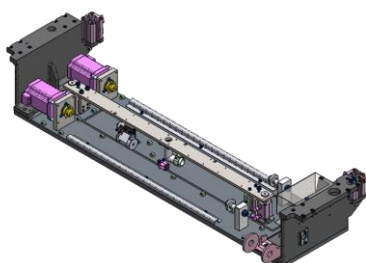
4.2 Units



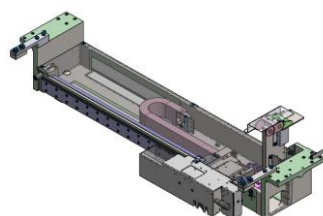
Universal mask holder (Option)



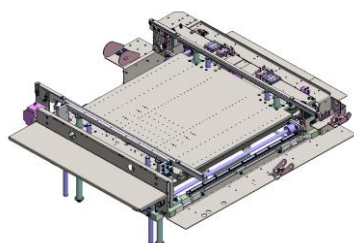
Hybrid squeegee head



Mask cleaning unit



Recognition unit



PCB positioning lift

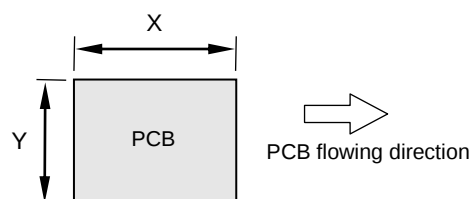
4.3 Cycle Time

■ Types of Mask-release Velocity Control

1. Uniform-velocity mask snap off: this is a control that descending stroke is constant.
2. High-acceleration mask snap off: this is a mode that you can easily maintain stable printing quality.
3. High-speed multiple mask snap off: this is a snap-off mode suitable for thin stencils.
4. Vacuum-hold mask snap off: holds down a mask for better PCB adhesiveness to enhance printing quality.
5. Multilevel-velocity mask snap off: this is a mode that you can set the mask snap-off motions as desired.

■ Calculation of Cycle Time (Simple Formulas)

T (s) : Cycle time
 Vs (mm/s) : Squeegee velocity
 Vz (mm/s) : Mask-release velocity
 Z (mm) : Mask-release distance [Clearance]
 X (mm) : PCB size
 Y (mm) : PCB size



• Vacuum-hold mask snap off

$$T = 8.1 + 0.001X + (Y + 80) / V_s + Z / V_z$$

• High-acceleration mask snap off

$$T = 7.1 + 0.001X + (Y + 80) / V_s + Z / V_z$$

• High-speed multiple mask snap off

$$T = 8.4 + 0.001X + (Y + 80) / V_s + Z / 2V_z$$

• Uniform-velocity mask snap off

$$T = 7.1 + 0.001X + (Y + 80) / V_s + Z / V_z$$

Calculation example

$$T = 8.1 + 0.001 \times 200 + \left(\frac{150 + 80}{100} \right) + \frac{2}{10} = 10.2 \text{ s}$$

$$T = 7.1 + 0.001 \times 200 + \left(\frac{150 + 80}{100} \right) + \frac{2}{10} = 9.8 \text{ s}$$

$$T = 8.4 + 0.001 \times 200 + \left(\frac{150 + 80}{100} \right) + \frac{2}{2 \times 10} = 11.0 \text{ s}$$

$$T = 7.1 + 0.001 \times 200 + \left(\frac{150 + 80}{100} \right) + \frac{2}{10} = 9.8 \text{ s}$$

Conditions: Vs = 100 mm/s, Vz = 10 mm/s, Z = 2 mm,
X = 200 mm, Y = 150 mm

** Remarks **

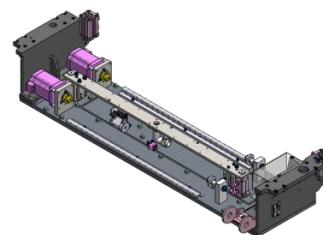
- The above examples of cycle time are approximate values. They vary a little in an actual print process. And also the time to transfer/receive PCB to/from the coupled equipment affects the cycle time.
- Conditions of above cycle time

1. PCB warpage correction (Option)	: Not in use	[In use: +1.4 s]
2. PCB suction (Option)	: Not in use	[In use: +1.0 s]
3. Mask suction	: Not in use	[In use: +0.5 s]
4. Plate-making reference	: Center	[Front (Option): +1.0 s]
- Cycle time of "Left to Right flow" is the same as that of "Right to Left flow."

4.4 Mask Cleaning

Mask cleaning is one of the important factors to maintain high-quality printing.

You can set the cleaning mode and NPM-GP/L flexibly adjusts to your various production types.



■ Cleaning Methods

There are 2 types: “Standard nozzle & Papers” and “Paper free cleaning (Option)”.

When you select the optional type, you can switch cleaning methods with no tools.

*Limitations when using paper free cleaning.

- See “9.1 Paper free wiping unit & cleaning nozzle” for supported PCB sizes.
- No solvent is required.
- Use masks thicker than 50 μ m .
When your mask thickness is under or equal to 50 μ m, when you use PCB half etched masks, or when your mask material is not stainless, contact us beforehand.
(Durability varies from that in standard stainless masks)
- Cleaning with uneven masks is less effective in some cases since solder and flux on a back of a mask are scrapped off with a plastic blade.
When you use a mask with a 20 μ m or larger bump/dent, use paper cleaning.
- When you use materials other than solder(glue, flux, resin paste, and others), contact us beforehand.

■ Setting of Cleaning Mode (Standard nozzle & Papers)

You can set cleaning conditions for 1-round cleaning or 2-round cleaning.

Item to be set	Description
Interval	Set at what intervals, by how many prints, cleaning is performed. Maximum print count is 255 prints.
Forward/Backward	Forward/Backward cleaning motion can be enabled/disabled.
Speed	Cleaning speed can be selected between 10 mm/s and 200 mm/s.
Wet process/Dry process	Choose wet or dry. (Solvent is applied to papers in a wet process)
Vacuum	Choose whether or not to enable the vacuum during a cleaning. The vacuum will be forcibly set to OFF during a wet cleaning.

■ Cleaning Conditions (Standard nozzle & Papers)

You can set cleaning intervals each for 1-round mode or 2-round mode.

<Recommended Cleaning Conditions>

Round mode	Interval (in units of sheets)	Forward/ Backward	Speed (mm/s)	Wet/Dry	Vacuum
1-round mode (Dry cleaning)	5	Forward	80	Dry	ON
		Backward	80	Dry	OFF
2-round mode (Wet cleaning)	20	1-round	Forward	Dry	ON
			Backward	Dry	ON
		2-round	Forward	Dry	OFF
			Backward	Dry	OFF

*1 When intervals of 1-round mode and 2-round mode overlap each other, the latter overrides the former.

■ Wet cleaning solvent precautions

- Use “**Water-soluble solvent**” for safety.
- **Do not use** any flammable solvents because they may ignite.
- **Do not use** acetone, methanol(methyl alcohol) or petroleum solvent because it can cause failure.
- Ethanol (ethyl alcohol), IPA (isopropyl alcohol), or the mixture of ethanol and IPA **should not be used**. (Non-compliant with CE marking. Besides, it can cause solvent leak)
- **Do not use** a static-prone cleaning paper with flammable solvent at the same time. That can cause serious accidents such as fuming, ignition or other accidents.
- Use a new cleaning solvent. Do not reuse the solvent.

** Remarks **

- [Recommended solvent] VIGON UC 160 (Maker: ZESTRON)
- Type of mask cleaning
 Dry process: Removes the solder particles and flux (from the aperture and the back of mask)
 Wet process: Removes the thin-film-like residual flux. (from the back of mask)

↑
 Cause of adhesion of solder particles to the back of mask

■ Setting of Cleaning Mode(Paper free cleaning)

Cleaning goes in one direction and only goes from the back of the mask to the front of the mask.

Cleaning conditions for paper free cleaning can be set

There are 2 types of conditions according to cleaning intervals.

Setting Item	Description
Interval	Set at what intervals, by how many prints, cleaning is performed. Maximum print count is 255 prints.
Number of times of operation	Number of cleaning operation. This can be set up to 10 times.
Speed	Speed of cleaning operation. This can be set from 10 mm/s up to 200 mm/s.
Vacuum	Choose whether or not to enable the vacuum during a cleaning. Do not forget to turn the Vacuum off when the last cleaning operation starts.
Interval (Wiping unit)	Set at what intervals, by how many times of cleanings, nozzle cleaning is performed.
The number of times (Wiping unit)	This is the number of times on nozzle cleaning, and the maximum number of times is 10 times.

■ Cleaning conditions (Paper free cleaning)

<Recommended conditions>

Cleaning conditions	Interval (piece)	The number of times of operation	Speed (mm/s)	Vacuum
Type 1	1~2	1 st operation	60	ON
		2 nd operation	60	ON
		3 rd operation and after that	-	-
Type 2	OFF	-	-	-

*The recommended conditions on wiping unit are as follows.

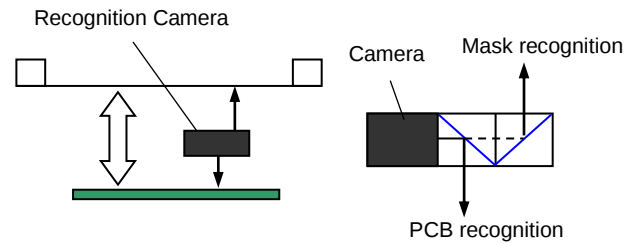
- Interval : 1
- The number of times of operation : 3

4.5 Recognition Mark Specifications

■ Recognition Method

One camera recognizes masks and PCB.

- **Mask recognition:**
Recognizes mask recognition marks from the underside of the mask.
- **PCB recognition:**
Recognizes PCB for each cycle



■ Mask Recognition

Item	Description
Objective mark	Recognition mark resin-sealed in mask aperture or on mask underside
Mark size	0.12 × 0.12 mm ~ 1.5 × 1.5 mm (φ 0.2 mm ~ φ 1.5 mm) The programmable range of mark size (a to d) in batch teaching is 0.5 mm to 1.8 mm.
Material of mask	SUS or Additive The resin mask may not be recognized depending on the "color of mask" and the "state of luster of mask surface".

* Contact us when you use mesh masks.

■ PCB Recognition

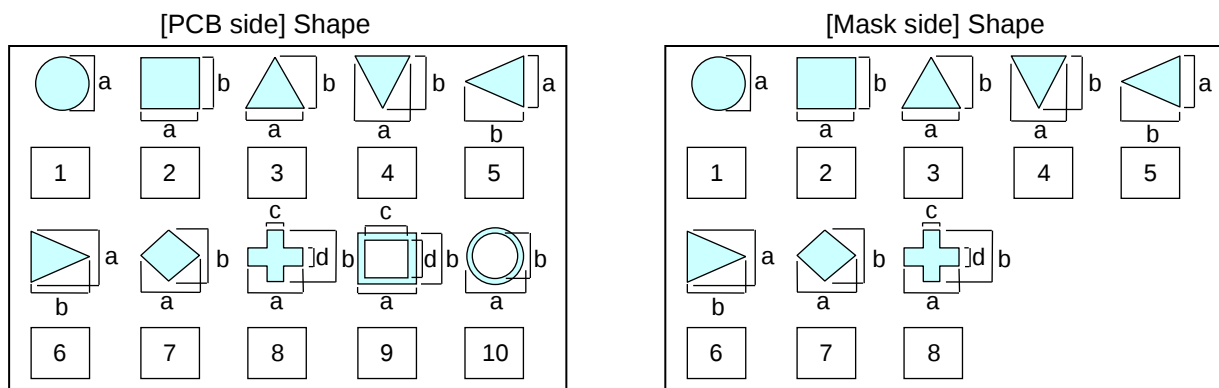
PCB is recognized every cycle and is fit to mask.

Item	Description
Offset	In X, Y direction: Within ±5.0 mm In θ direction: Within ±1.2°

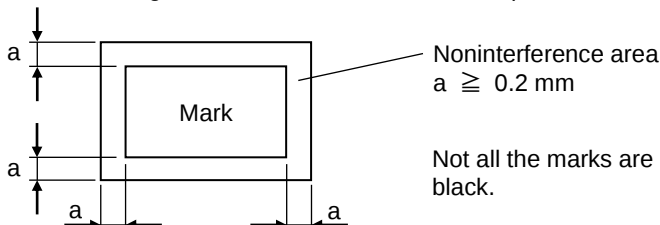
■ Batch Teaching Function

"Batch teaching function" facilitates PCB-mask alignment if the recognition mark on your mask and the PCB recognition mark are located in the same position.

- As for the mask whose recognition mark is located only on the printing surface, its aperture is to be used as a recognition mark. In this case, the batch teaching function is not available.
- Marks that can be used in batch teaching are as follows.



■ PCB Recognition Mark Specifications

Standard Mark Shapes and Dimensions	Standard Mark Shapes	Dimensions
	○	$\phi 0.5 \text{ mm} \sim \phi 1.6 \text{ mm}$
	△ (Equilateral triangle)	Length of one side: $0.5 \text{ mm} \sim 1.6 \text{ mm}$
	□	Length and width: $0.5 \text{ mm} \sim 1.6 \text{ mm}$
	+	Length and width: $0.5 \text{ mm} \sim 1.6 \text{ mm}$ (Line width: 0.3 mm or more)
	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 the circuit pattern from the viewpoint of calibration accuracy.	
Image Conditions of Mark Materials and PCB Base	Because, basically, mark recognition process is carried out based on the intensity difference of reflected light, a fixed contrast is required between the mark materials and the PCB base. This difference varies significantly depending on the plating condition, oxidation condition, surface height, unevenness, degree of mirroring, coating, or disturbance light; therefore, the assessment of the marks is required beforehand.	
Mark Dimensions and Background	Noninterference area of larger than a certain dimension is required outside of the mark.  Noninterference area $a \geq 0.2 \text{ mm}$ Not all the marks are black.	

■ Number of PCB Recognition Points

Normally, PCB recognition is carried out at two points (A and B). The number of recognition points can be selected from one to four as desired.

(Ex) 1 point recognition:

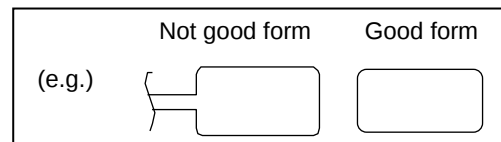
Cycle time can be reduced, although positioning accuracy decreases.

4-point recognition:

The PCB positioning is performed with higher accuracy.

* Although PCB "land" can also be selected as a recognition mark, please be aware that it may not be recognized correctly depending on its shape.

* By setting "lands" of "components for which you want to be most accurate of printing" as the recognition mark, more accurate prints (placements), which are never influenced by tolerable deviations of PCBs, become possible.



** Remarks **

- If the recognition mark undergoes "solder leveler," an error may occur in PCB recognition. In this case, adjust the lamp manually. When the recognition screen is uneven due to the reflection of the solder leveler, raising lamp 1 (coaxial lighting) brightness is more effective.

5. System software

5.1 Solder Inspection Functions

Item	Solder inspection function Light (Standard function)	Solder inspection function Pro (License)*
# of inspection points	Max. 3 000 points	Max. 30 000
Inspection items	Printing area (blur and oozing), misalignment, and bridging	
Data creation method	Mask scanning	Gerber data import Mask scanning
Others	—	FOV optimization

* When you use "Solder Inspection Function Pro (License)", NPM-DGS is needed.
Make sure that you select "LNB ready(License)" or "iLNB ready (License)" as well.

■ Printing Area Inspection

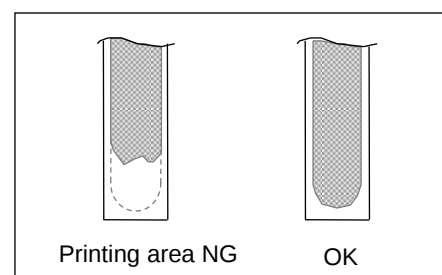
The printed solder area is inspected with a recognition camera.
It judges in three stages of OK/Warning/N.G. by the area ratio with Gerber data or a mask opening.

In the case of "Warning" : Feedback

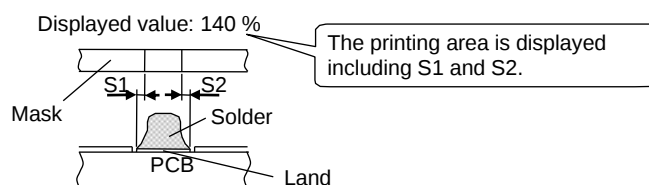
In the case of "N.G." : Immediate stop

- Recognition view size and resolution
 - High magnification: $5.0 \times 5.0 \text{ mm}$ ($10 \mu\text{m}/\text{pixel}$)
 - Middle magnification: $7.0 \times 7.0 \text{ mm}$ ($10 \mu\text{m}/\text{pixel}$)
- Inspection marks are a max. of 30 000 points. (Solder inspection function Pro)
- Inspection time: $\text{PCB size area} / (5.0 \times 5.0 \text{ mm}) \times \text{Rate of inspection view existence} \times 0.5 \text{ s}$ (High magnification)
The recognition time per one view is 0.5 s.
When PCB size is $150 \times 100 \text{ mm}$ and the rate of inspection view existence 10 %, $150 \times 100 \text{ mm} / (5.0 \times 5.0 \text{ mm}) \times 0.1 \times 0.5 \text{ s} = 30 \text{ s}$
- The minimum opening size is 0.2 mm or more.
The maximum opening size is up to recognition view size by magnification.
- Inspection interval can be set at customer.
- You can set the "threshold value" for judgment.

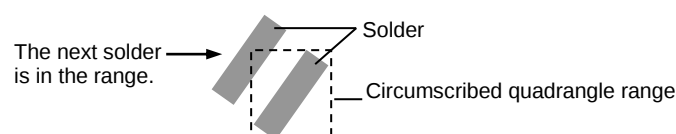
* Threshold value will trigger mask cleaning or print retry in Warning condition and if it is N.G., it will stop.



- This is the two-dimensional inspection by the recognition camera from above, and not aimed at the quantitative inspection such as the solder thickness or volume.
- Because of the 2-D inspection, the values do not always show the actual volume rate. (See below.)

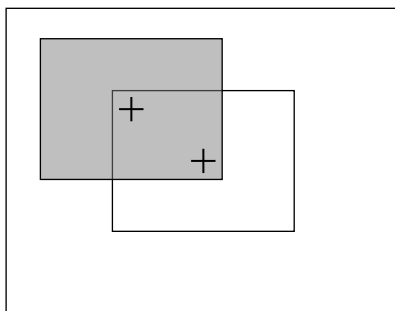


- Patterns, which have the non-resist coated base materials, including glass epoxy substrates may hinder accurate inspection. Please ask us for details.
- Depending on the solder, mask and PCB type, the "threshold value" may change greatly.
- Even if the PCBs are printed under the same conditions (solder, mask, PCB, printing conditions, etc.); the displayed value varies about $\pm 10 \%$.
- Please consult us about the inspection after printing of a ceramic PCB.
- If the recognition mark undergoes "solder leveler" or "flash Au plating", the PCB recognition may not be captured. Advanced evaluation may be necessary. Please ask us for details.
Please do not stick a protection vinyl seal on a PCB when solder inspection teaching is used.
- The solder of placement components with an angle may be unable to be inspected.
(It cannot inspect, when another solder is in the quadrangle circumscribed to solder.)



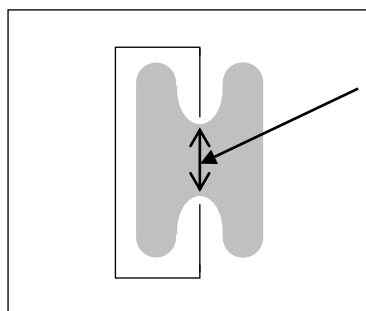
■ Printing Position Gap Inspection

The position (center of gravity) of the solder recognized with the recognition camera is compared with the solder position in data.



■ Bridge Inspection

When the length connected with the adjacent solder exceeds a certain amount which can be manipulated, it judges as a bridge.



* Illumination and luminosity data needs to be taught in advance to inspect the above items.

■ Mask Inspection

At the start of automatic operation, the mask apertures are checked for any clogging. Use this function to confirm cleaning.

During production, it checks for over-volume of solder in mask apertures.

This inspection is carried out with the camera under the metal mask. Some apertures may not be recognized when the squeegee unit is positioned right above them. Select the apertures that are recognizable.

5.2 Pattern recognition function (Standard function)

- This is effective for printing on PCB units attached to carrier.
Printing positions are corrected by recognizing deviations of PCB units.



- When deviations exceed offset allowable range, following actions can be done.
 - 1) Remove the PCB without doing printing.
 - 2) Make corrections to the PCB units except for the one exceeding the allowable range, and then do printing.
 - 3) Make corrections to the PCB units except for the one exceeding the allowable range, and then do printing.

Furthermore, feed (feed forward) information on the non-conforming unit to the mounter (NPM series).*

* Individual consideration should be made according to your line configuration. Please contact us for details.

5.3 Material verification^{*1}

This prevents setting error at the time of material change. (Solder paste, squeegee, and screen mask etc.)
 If you set materials 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. Make sure that you select "LNB ready (License)" or "iLNB ready (License)" as well.
 ("FA PC" is also required if it is not coupled to NPM line.)

^{*1} This is an option list of Material Verification.

Option		Hardware	Floor level control ^{*2}
PanaCIM-EE Gen2 ^{*3}	Material verification : wireless scanner type	Wireless scanner (PDA) , Access point iLNB PC	Available

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

^{*3} See PanaCIM-EE Gen2 Specifications for details.

5.4 Automatic Changeover

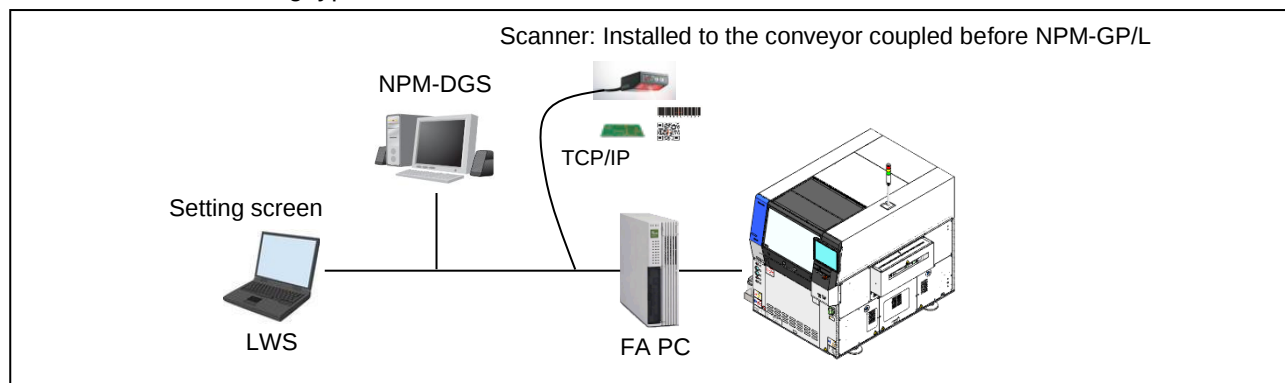
This supports changeovers (production data change and rail width change), minimizing the time loss of operation caused by product changes.

Make sure that you select "LNB ready (License)" or "iLNB ready (License)" as well.

("FA PC" is also required if it is not coupled to NPM line.)

■ System Configuration

External scanner reading type



■ Function List

Item		Description
Changeover function	External scanner reading type	The external scanner, installed to the first conveyor in line, reads 1D/2D code* ¹ of PCB and supports changeover.
Setting function	barcode setting	This defines barcode. This is used to specify production data, and two types of method of specifying are available. • <u>Method of specifying character string</u> Method in which data extracted from barcode is character string, which corresponds to production data name on a one-to-one level. • <u>Method of specifying range</u> Method in which data extracted from barcode is numeric value, and its range corresponds to production data name on a one-to-one level.

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

■ Standard Specifications

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

■ Standard Configuration

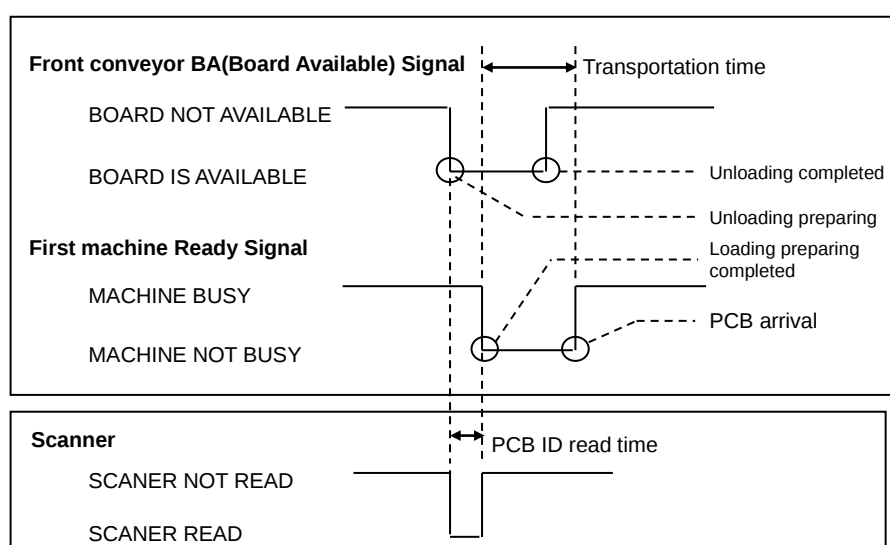
Item	Description
Hardware	• <u>External scanner unit</u> This is not supplied by us and for the purpose of 1D/2D code reading. One device is required for each lane in a line. Following is the scanner for which operation was confirmed by us. Please consult us when you use other scanners. Scanner: SR-510, SR-600, SR-600HA, SR-610, SR-750, SR-750HA, SR-1000, SR-2000 (KEYENCE CORPORATION) Communication unit: N-L1 (KEYENCE CORPORATION) • <u>Conveyor</u> This conveyor is not supplied by us. This is located on the Head of the line. This must be in conformity with following specifications. ①Availability of board waiting with stopper ②Equipment of mechanism that can change width automatically or manually with a handle. ③Availability of SMEMA communication*
Software	License key × 1 (Please refer to “15. Regarding Licenses”.)

* FA PC controls scanner through intervention in SMEMA communication.

TCP/IP is used to interconnect FA PC 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.



5.5 APC-F.B.(Position)

Offsets printing placement(X, Y, θ) automatically based on the results of a solder inspection machine.

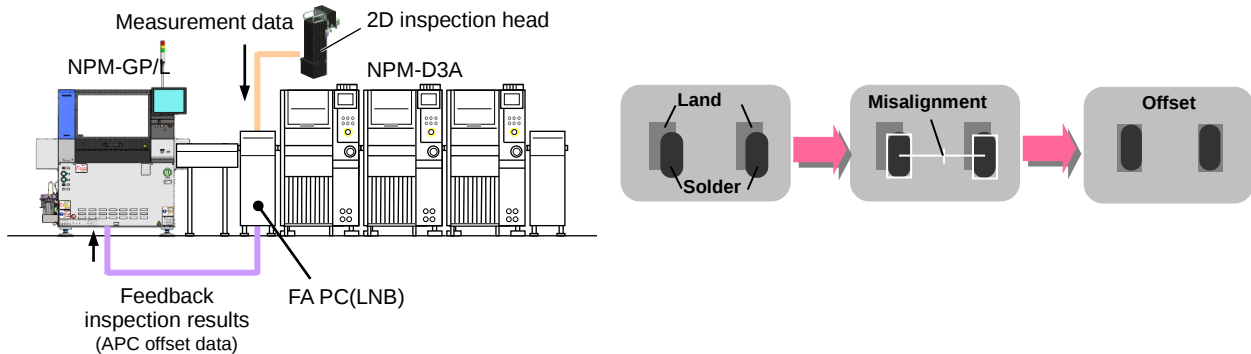
(Mask cleaning will be performed according to the inspection result.)

Print position correction data will be fed back to NPM-GP/L via FA PC (LNB).

Make sure that you select "LNB ready(License)" or "iLNB ready(License)" as well.

("FA PC" is also required if it is not coupled to NPM line)

The following figure shows an example of connection with an NPM-D3A line.



Compatible with the following solder inspections;

- Inspection using the 2D inspection head (NPM series)
- Inspection conducted by using an inspection machine from other companies
(The "interface software (license)" of the inspection machine from other companies" is needed)

5.6 APC-F.B.(Volume)

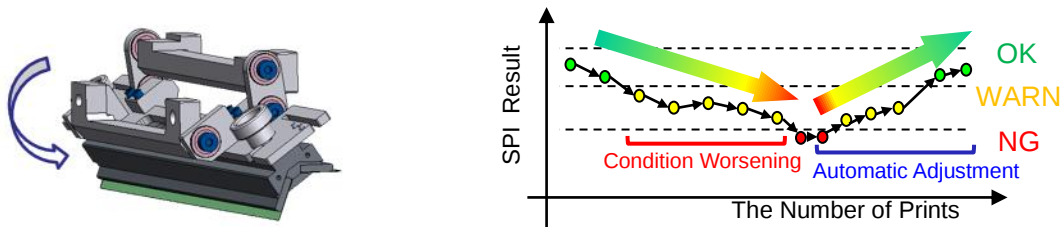
Adjusts attack angle of a squeegee automatically based on the results of a solder inspection machine to control volume and ensure and maintain optimum printing status smoothly.

Attack angle changes in the 50 degrees to 65 degrees range.

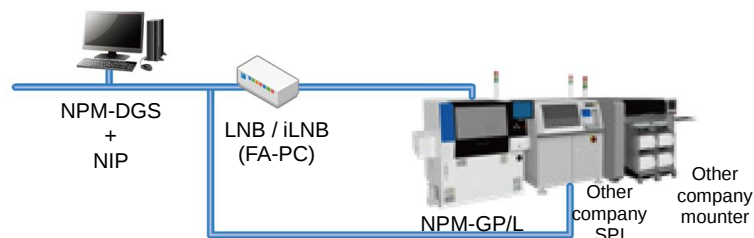
Offset data on solder volume is fed back to NPM-GP/L over FA PC(LNB).

Make sure that you select "Variable angle of attack squeegee", and "LNB ready(License)" or "iLNB ready(License)" as well.

("FA PC" and "NPM-DGS+PC for NIP" are necessary when not connected with a NPM line)



The figure below is an example of connection with other company mounter.



*NIP : APC-5M control software(for NPM-GP/L only)+other company inspection machine interface software

LNB / iLNB : Line Network Box

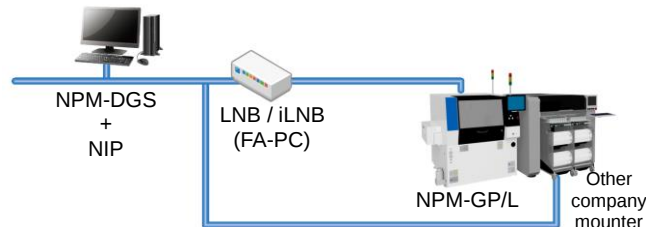
DGS : Data Generation System

- Connection with an other company inspection machine needs "Other company inspection machine interface software(License)".

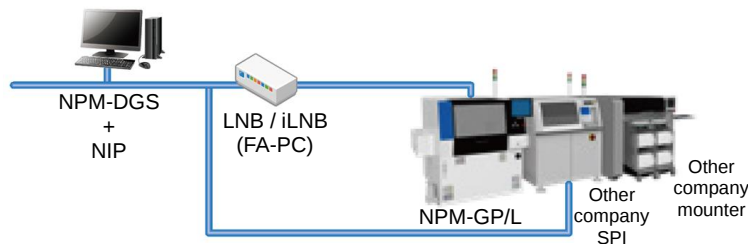
5.7 APC-5M

Monitors machine conditions and feeds it back to achieve and maintain high quality printing and increase production time. Make sure that you select "LNB ready (License)" or "iLNB ready (License)" as well. ("FA PC" and "NPM-DGS+PC for NIP" are necessary when not connected with a NPM line)

The figure below is an example of connection with other company mounter.



The figure below is an example of connection with other company SPI and other company mounter.



This license has the following features.

■ Optimizing Control of Printing Conditions(APC-5M)

Based on the results of a solder inspection machine, it adjusts conditions such as printing pressure, squeegee speed and snap-off speed to ensure/maintain optimum printing status(volume). Offset data on solder volume is fed back to NPM-GP/L over FA PC(LNB).

- * You cannot use with APC-F.B.(Volume).
- * Offsets do not work when printing pressure or printing speed is different in a printing.(This feature remains disable)
- * When snap-off speed is set to "Multilevel", it does not change.
- Connection with an other company inspection machine needs "Other company inspection machine interface software(License)" .

■ Stable Production

Machine monitors the change in 5M to adjust machine's parameters automatically.

Make sure that you select this license as well when you select any of the following options:

"Solder paste viscosity feedback -U", "Solvent discharge amount feedback", "Mask tension feedback -U".

■ Machine Condition Monitoring(Prevention ・ Predictive Maintenance)

Monitors machine conditions in a real time. Optimizes maintenance timing to increase production time.

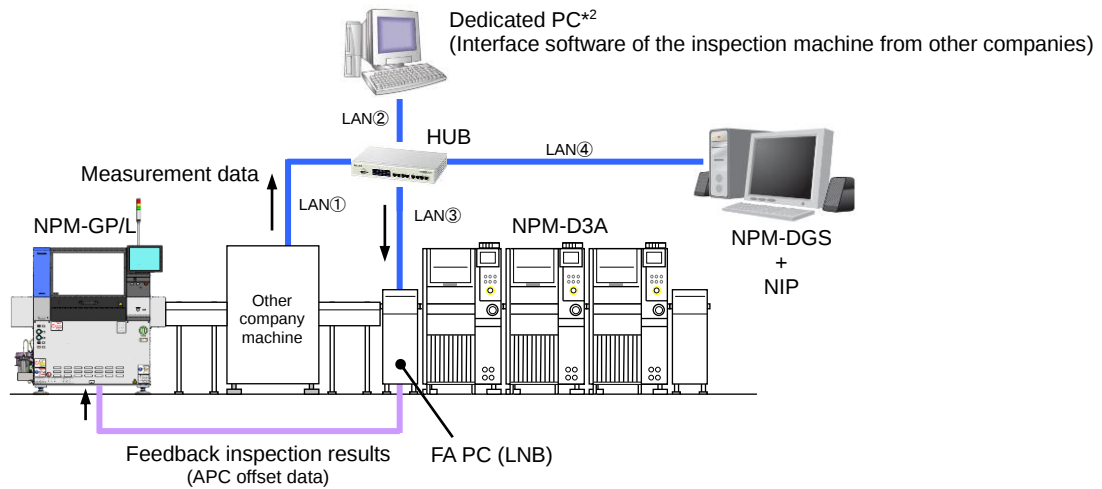
- Operating unit's travel distance monitoring
Monitors travel distance in an axis movement and shows a message of maintenance at an appropriate timing.
- PCB transfer condition monitoring
Monitors PCB transfer time and shows a message of maintenance, such as belt cleaning
- Camera condition monitoring
Checks for dirt on a camera lens before production is started.
When dirt is detected, it shows a message of cleaning.
- Blower operating time measurement
Monitors blower operation time and shows a message of maintenance.
- PCB clamper dirt detection
Monitors adhesiveness between a mask and a clamper in a printing and detects clamper dirt.
When you use this feature, select the "PCB clamper dirt detection" unit as well.
- PCB clamper operation monitoring
Monitors clamper operation time and shows a message of maintenance when clamper operation time gets long.
- PCB clamper height measurement
Measures flatness of a clamper and shows a message of maintenance when it is out of acceptable range.
* Mask height detection (Option) is necessary.
- Vacuum booting time monitoring
Monitors vacuum booting time at PCB vacuum-holding and shows a message of filter maintenance.
- Vacuum pump operating time measurement
Monitors vacuum pump operation time and shows a message of maintenance.

5.8 Interface software of the inspection machine from other companies

This is interface software to offset printing placement and volume based on the result of other company inspection machines*¹(Solder Inspections)

Select any of the followings as well: "APC-F.B.(Position)", "APC-F.B.(Volume)", "APC-5M(License)".

The following figure shows an example of connection with an NPM-D3A line.



*1 Target inspection machines need to satisfy the requirements of our specifications. For details, please contact us.

*2 A dedicated PC needs to be placed between the inspection machine from other company and FA PC (LNB).

Please prepare a PC, a HUB and LAN cables (LAN (1)-(4) shown in the figure above) by customer.

Please refer to the next page for details.

■ Inter-machine connection conditions

- SMEMA connection (BA and Ready signals) is essential for inter-machine connection.
(The downstream machine (inspection machine or conveyor made by other company) turns ON the Ready signal to NPM-GP/L after confirming the BA signal from NPM-GP/L)

Up to one conveyor can be placed between other company's inspection machine and NPM-GP/L.

Additionally, the number of PCBs that can wait on the conveyor is not more than one.

Barcode operation control is required if you are likely to have more than two PCBs waited on the conveyor.

Barcode reading specifications, and conveyor specifications that you install in front of the printer conform to the descriptions in the "Standard Specifications" and "Standard Configuration" paragraph of the "5.4 Automatic Changer" section. For details, please contact us.

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

■ Hardware specifications

Dedicated PC

Item		Specifications	Class
Main body		IBM PC/AT-compatible machine	Required
	CPU	Intel® Xeon W2123 (4 Core) 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	16 GB or more	
	HDD	4 TB 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	Required
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	Required
	Number of port	4 ports or more	
LAN cable		100BASE-T: UTP Cat 5 or larger (4 pieces)*	

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

■ Software specifications

Item		Specifications	Class
OS		Microsoft® Windows® 10 Pro for workstations (Max 4 cores)	Required
	Support language	English, Japanese, Chinese	
	Framework	Microsoft® .Net Framework 3.5	
Virus check		Virus Buster™ Program version 7.0 or later	Recommended

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

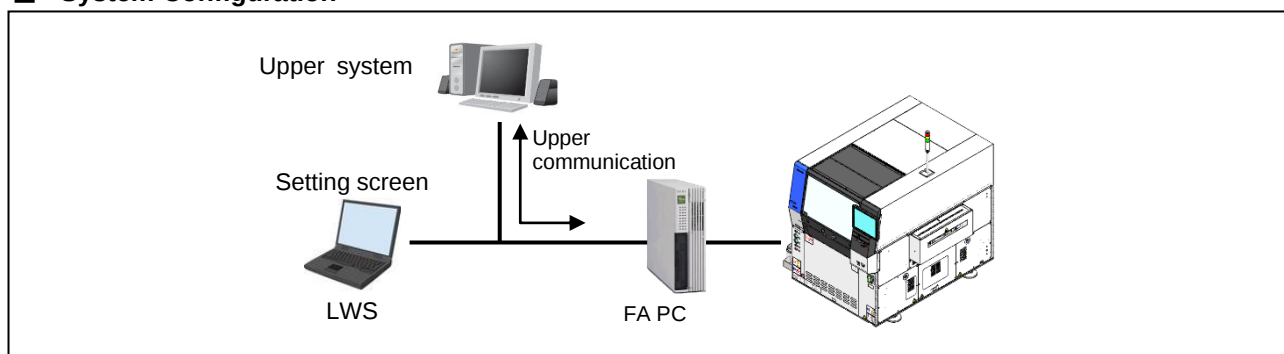
** Remarks **

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

5.9 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", "Material verification with other vendor's machine", and "Trace" can be used.

■ System Configuration



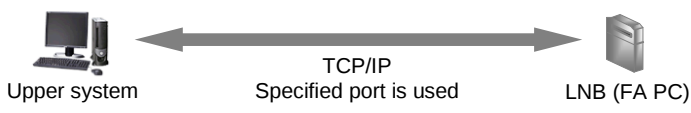
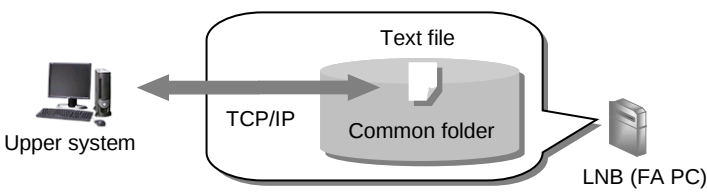
■ Function List

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.
	Material verification with other vendor's machine	Communicate with your material verification system. e.g.) In case to set up a system directing interlock to equipment using material verification at upper system within a floor
	Trace	Output following trace information on equipment 1) Equipment Information : Information on equipment 2) PCB Information : Information on manufactured PCB 3) Material Information*2 : Information on material used for manufacturing e.g.) In case to set up a system to do production traceability management using piece by piece PCB information and Material information
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 Need Material verification (License)

■ Standard Specifications

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

■ Standard Configuration

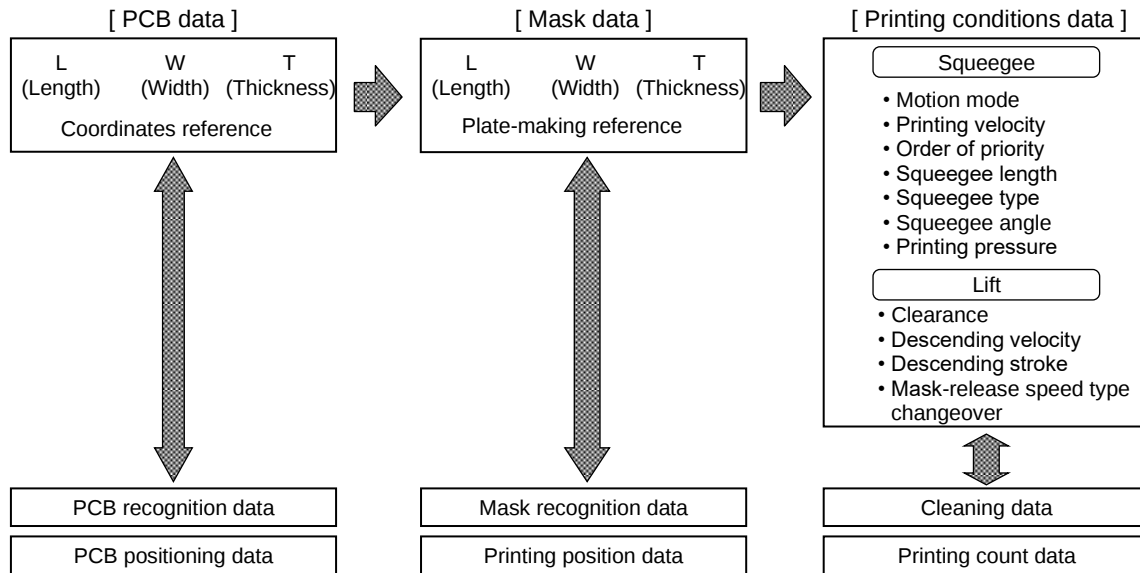
Item	Description
License	A license is required for each machine. Please refer to "15. Regarding Licenses."

6. Other Standard Functions

6.1 Programming Functions

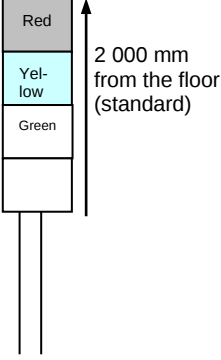
Production data are created and modified on the machine or NPM-DGS*.

* To create data with NPM-DGS, you need "LNB ready (License)."



6.2 3-Color Signal Tower

Color of signal tower and lighting standard

	Signal Color	Classification	Lighting standard
	Red	Emergency stop error	• Troubles in the shaft of the motor, etc. • Drop in air pressure • Cover open during axial operation • Inside conveyor transfer trouble • Recognition camera trouble etc.
	Yellow	Single stop error	• PCB recognition mistake • Solder exhaustion - Cleaning paper/Solvent exhaustion
	Green	In operation	Electric source ON (e.g., in automatic operation) Green is off while red or yellow is blinking.

* Setup of lighting can be changed.

7. Mask and PCB Design Criteria

7.1 Mask Specifications

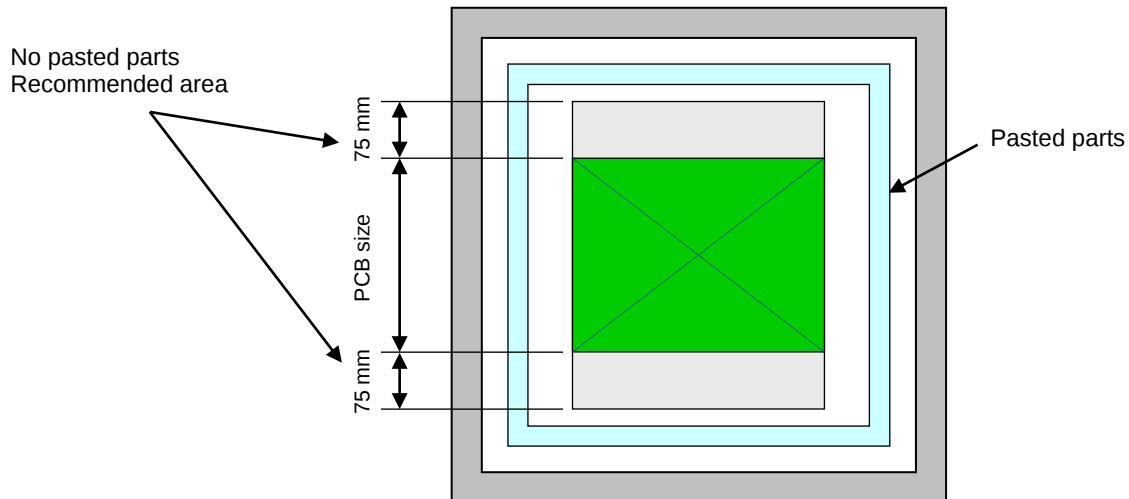
■ List of Mask Specifications

Types	Mask sizes	Plate-making reference		Maximum PCB sizes	
		X-direction	Y-direction		
Standard mask holders					
29-inch frame 29-inch frame DEK size reference (Max. 508 mm × 508 mm)	736 × 736 mm	Center	Center	510 × 510mm	
			Front	510 × 460mm	
			Center	510 × 510mm	
			Front	510 × 508mm	
Universal mask holders (Option)					
XL-size frame* ¹	750 × 750 mm	Center	Center	510 × 510mm	
			Front	510 × 460mm	
M-size frame* ¹	650 × 550 mm Horizontally long		Center	350 × 300 mm	
	550 × 650 mm Vertically long		Front	350 × 250mm	
			Center	350 × 300 mm	
			Front	350 × 250mm	
			Center	350 × 300 mm	
	29 × 23- inch frame* ¹		736 × 584 mm Horizontally long	Center	510 × 300mm
584 × 736 mm Vertically long			Front		
			23- inch frame* ¹	584 × 584 mm	Center
Front					350 × 460mm
Center	350 × 300mm				
Front					

*1 When you use the mask holders other than 29-inch frame mask holders, select "Universal mask holders (Option)".

- Since mask recognition is carried out from the mask underside, a recognition mark needs to be located on the underside or in the form of through-hole.
- If there is no recognition mark on the mask underside, the mask aperture is used as a reference for positioning.
- For any mask size, the applicable minimum PCB size is 50 × 50 mm.
- For NPM-GP/L, only the front reference is available. Please be aware that there is no rear-reference type.
- When you use a mask or plate-making reference other than in the preceding list, contact us.
- Be careful about the stencil size. When Y-direction has pasted parts within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Pay attention to stencil size when you use "Solder transfer unit".
When adhered on in the Y direction within an area of PCB size + 75mm on one side, solder transfer unit does not adhere properly to a mask, and that affects solder residual on a mask after solder is transferred.

* When you use the mask holders other than 29-inch frame mask holders, select "Universal mask holders (Option)".



Recommended material

- Stencils:
Hardness: $\geq$ HV400
Material: SUS304 or SUS301
- Mesh:
Size: #180
Wire dia.: 55 μ m
Material: Polyester
- Aluminum frame:
Wall thickness: $\geq$ 3 mm

* Limitations when using Paper free cleaning.

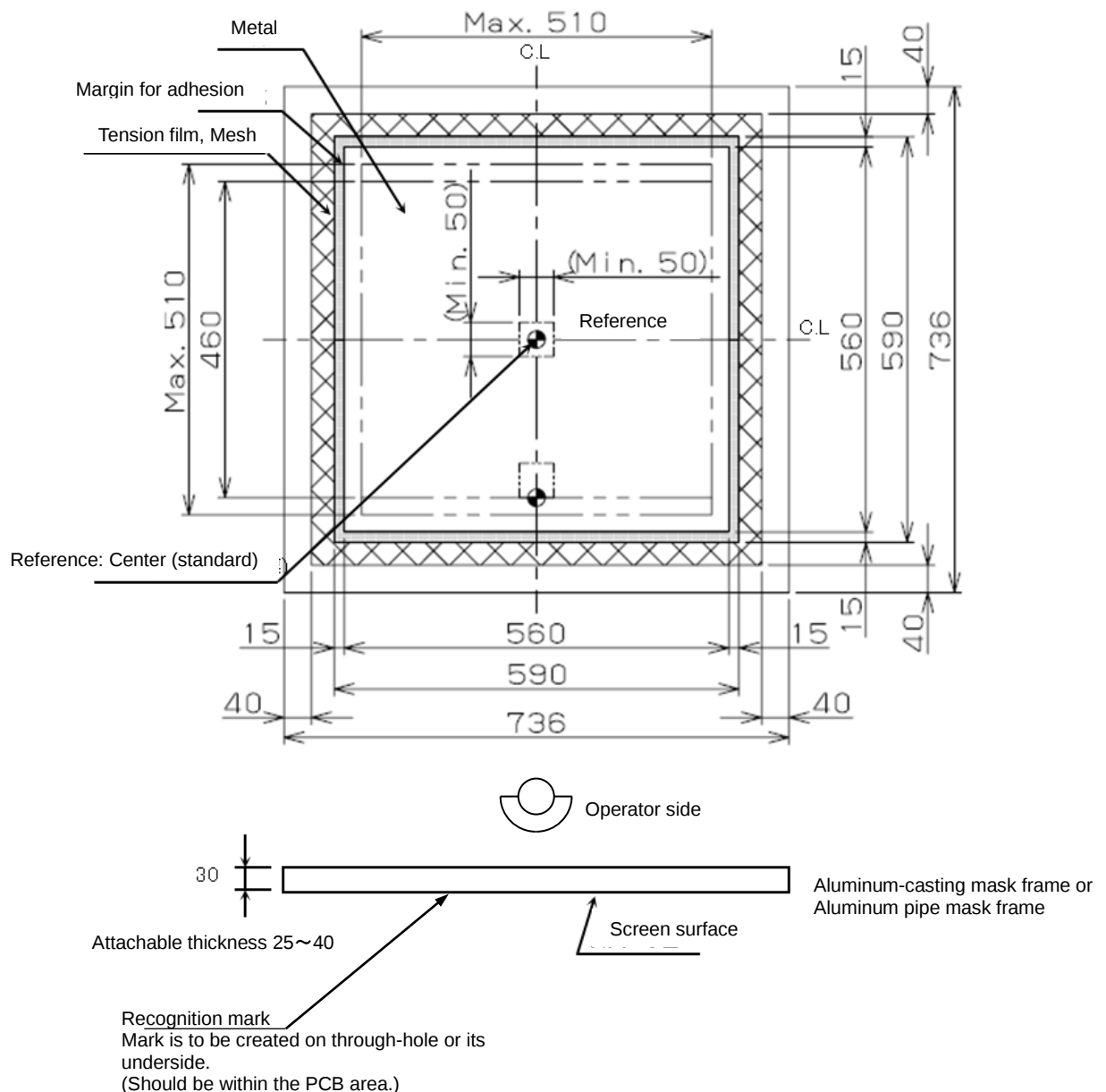
Use masks thicker than 50 μ m.

When your mask thickness is under or equal to 50 μ m, when you use PCB half etched masks, or when your mask material is not stainless, contact us beforehand.
(Durability varies from that in standard stainless masks)

■ Recommended size of mask

1	29-inch frame: 736 × 736 mm (standard)
---	--

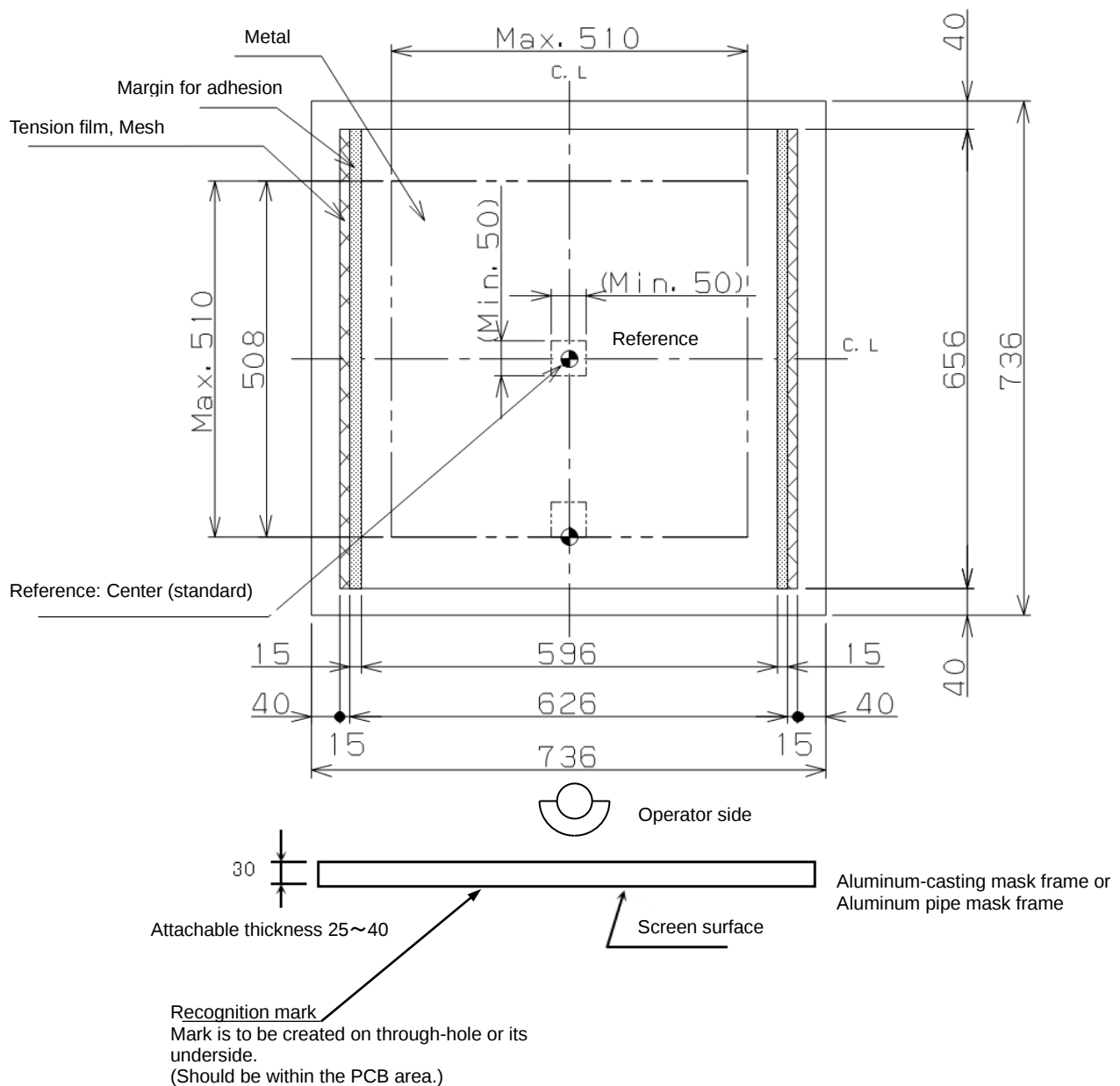
(Unit: mm)

**** Remarks ****

- Dash-dot-dot lines show the outside dimension of PCB.
 - Make the pattern so that the center or edge of a PCB will be located at  marks. The same is true of the mesh and the metal-combination.
 - For the mesh type, the entire surface is mesh.
 - Be careful about the stencil size.
- When Y-direction has parts to be pasted within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Mask frame should be (736 mm × 736 mm).
 - Contact us if using the masks that are thinner than 80 μm .
 - External tolerance of the mask frames must be ± 1.0 mm.
 - Recommended pipe thickness : $t=3.0$ mm
 - Contact us if using the mask whose reference is other than the above.

2	29-inch DEK frame: 736 × 736 mm (standard)
---	--

(Unit: mm)

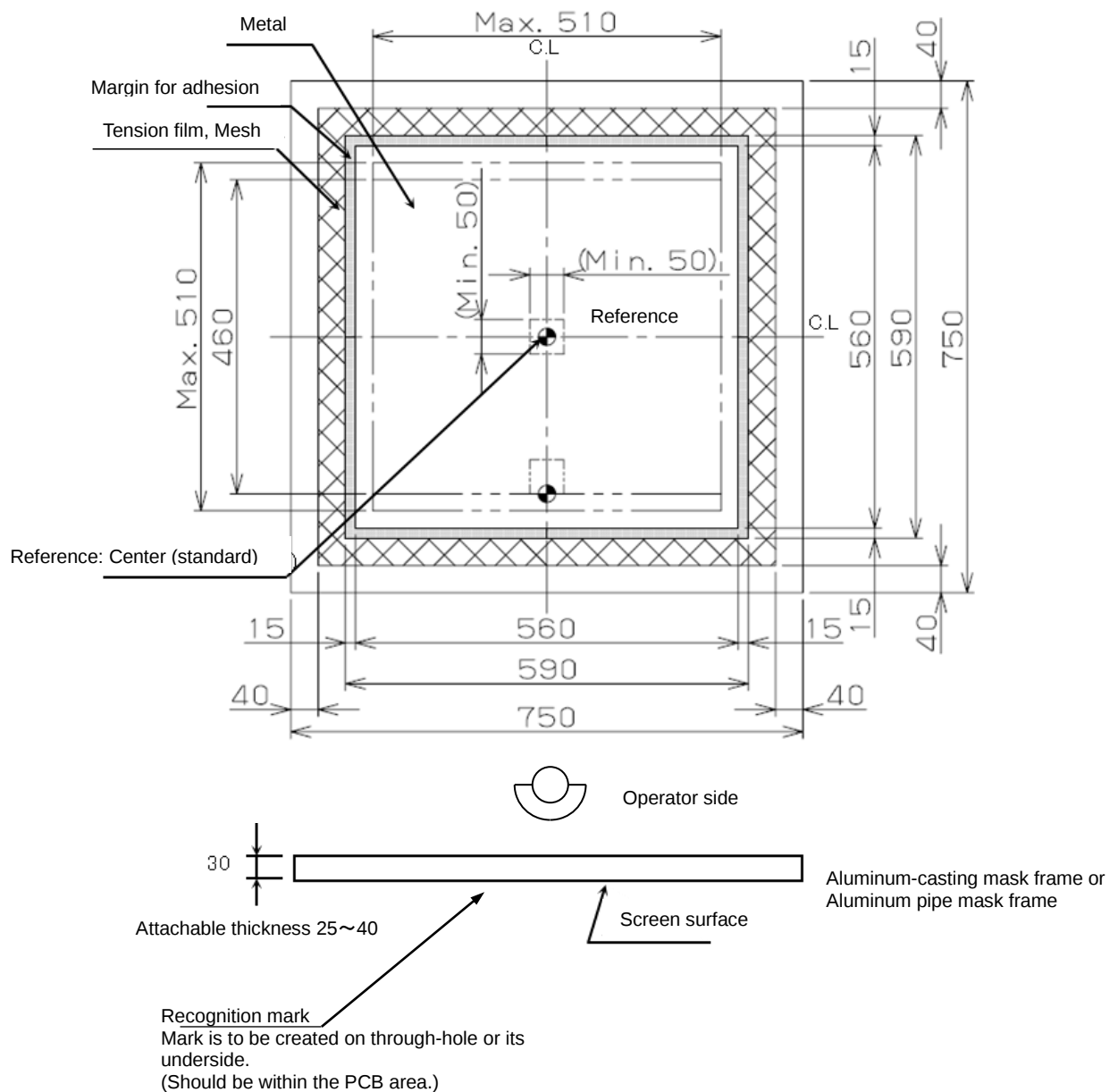


**** Remarks ****

- Dash-dot-dot lines show the outside dimension of PCB.
- Make the pattern so that the center or edge of a PCB will be located at  mark. The same is true of the mesh and the metal-combination.
- For the mesh type, the entire surface is mesh.
- Be careful about the stencil size.
When Y-direction has parts to be pasted within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Mask frame should be (736 mm × 736 mm).
- Contact us if using the masks that are thinner than 80 μm.
- External tolerance of the mask frames must be ±1.0 mm.
- When using the front reference type, attach the stencil directly in the X direction.
- Select "Automatic mask positioning (Option)" when using the front reference type.
- Recommended pipe thickness : t=3.0 mm
- Contact us if using the mask whose reference is other than the above.

3 XL size frame: 750 × 750 mm (option)

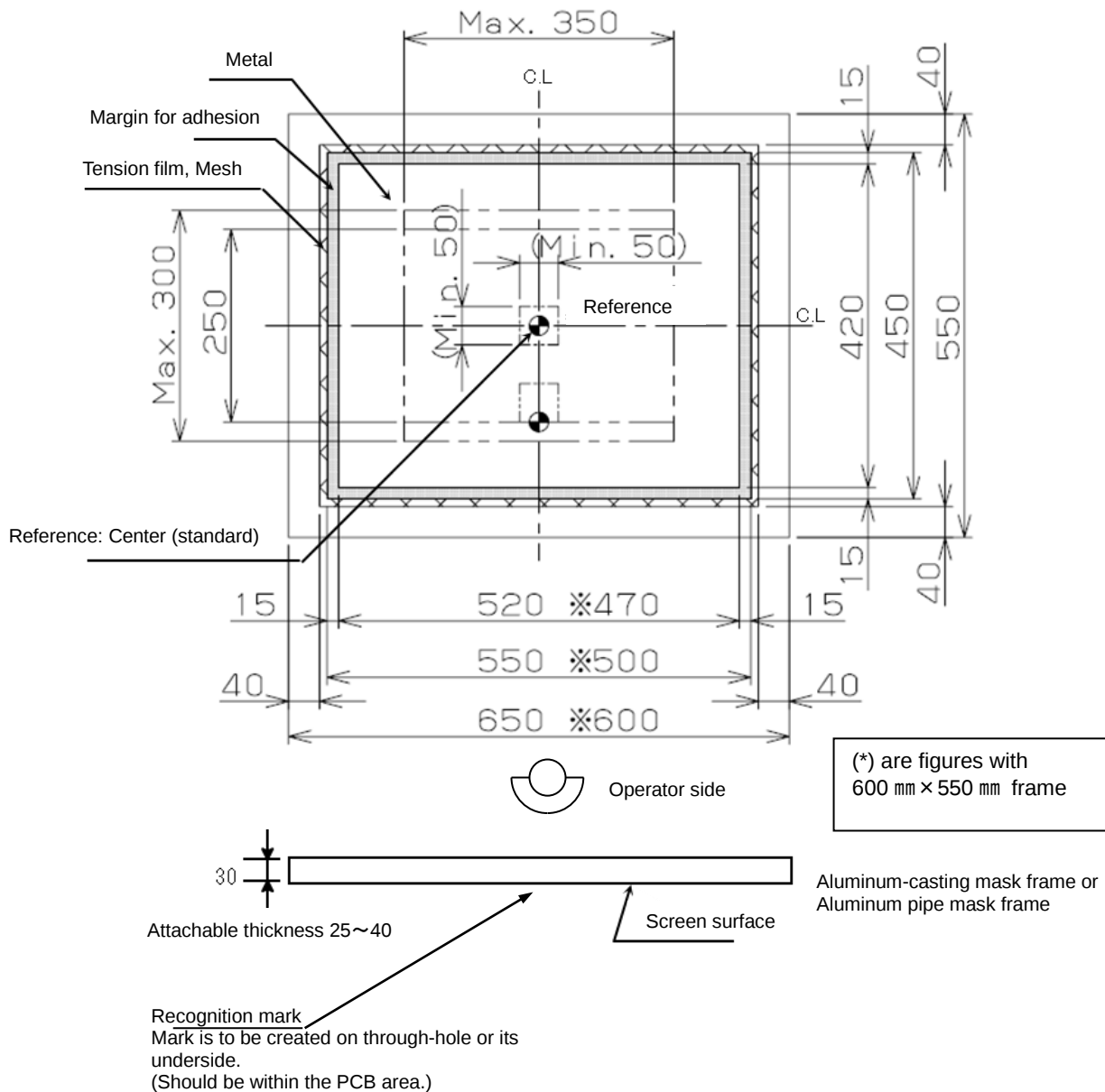
(Unit: mm)

**** Remarks ****

- Dash-dot-dot lines show the outside dimension of PCB.
- Make the pattern so that the center or edge of a PCB will be located at  mark. The same is true of the mesh and the metal-combination.
- For the mesh type, the entire surface is mesh.
- Be careful about the stencil size.
When Y-direction has parts to be pasted within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Mask frame should be (750 mm × 750 mm).
- Masks other than 29-inch masks need universal mask holder (Option).
- Contact us if using the masks that are thinner than 80 μm.
- External tolerance of the mask frames must be ±1.0 mm.
- Recommended pipe thickness : t=3.0 mm
- Contact us if using the mask whose reference is other than the above.

4	M size frame: 650 × 550 mm horizontally long frame／600 × 550 mm horizontally long frame (option)
---	--

(Unit: mm)

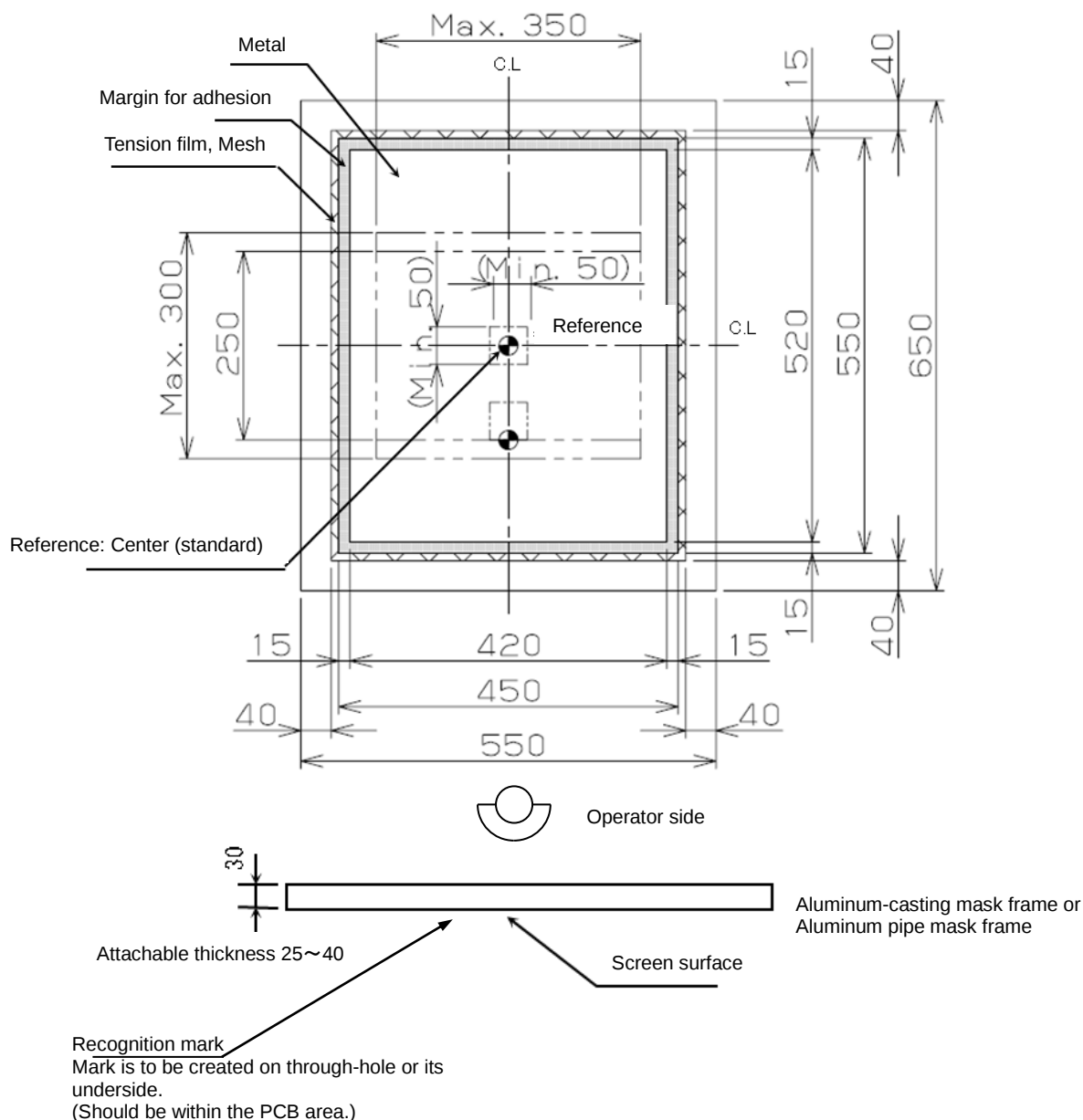


**** Remarks ****

- Dash-dot-dot lines show the outside dimension of PCB.
- Make the pattern so that the center or edge of a PCB will be located at  mark.
The same is true of the mesh and the metal-combination.
- For the mesh type, the entire surface is mesh.
- Be careful about the stencil size.
When Y-direction has parts to be pasted within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Mask frame should be (650 mm × 550 mm) or (600 mm × 550 mm).
- Masks other than 29-inch masks need universal mask holder (Option).
- Contact us if using the masks that are thinner than 80 μm.
- External tolerance of the mask frames must be ±1.0 mm.
- Recommended pipe thickness : t=3.0 mm
- Contact us if using the mask whose reference is other than the above.

5 M size frame: 550 × 650 mm vertically long frame(option)

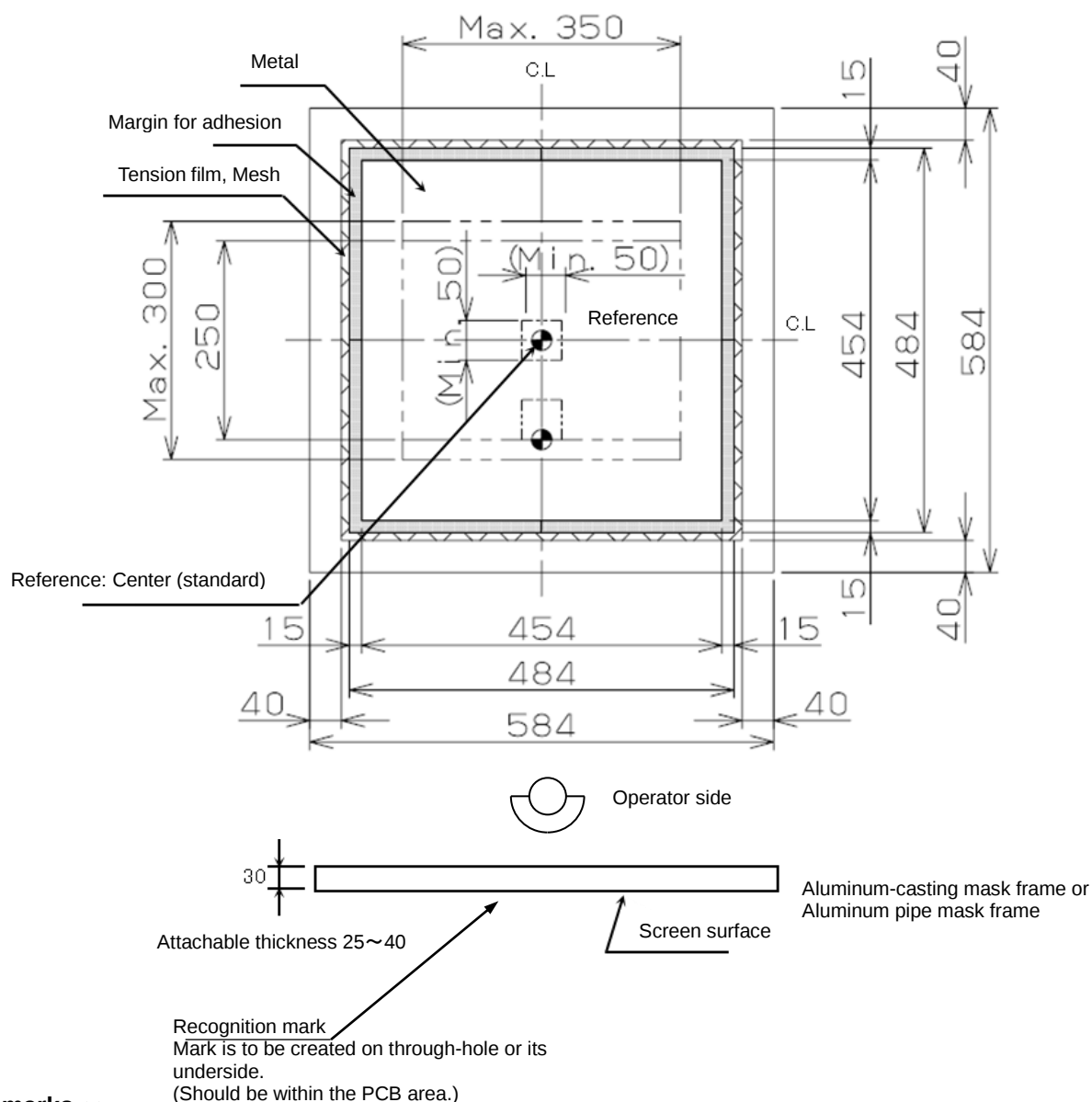
(Unit: mm)

**** Remarks ****

- Dash-dot-dot lines show the outside dimension of PCB.
- Make the pattern so that the center or edge of a PCB will be located at  mark. The same is true of the mesh and the metal-combination.
- For the mesh type, the entire surface is mesh.
- Be careful about the stencil size.
- When Y-direction has parts to be pasted within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Mask frame should be (550 mm × 600 mm).
- Masks other than 29-inch masks need universal mask holder (Option).
- Contact us if using the masks that are thinner than 80 μm.
- External tolerance of the mask frames must be ±1.0 mm.
- Recommended pipe thickness : t=3.0 mm
- Contact us if using the mask whose reference is other than the above.

6 23-inch frame: 584 × 584 mm (option)

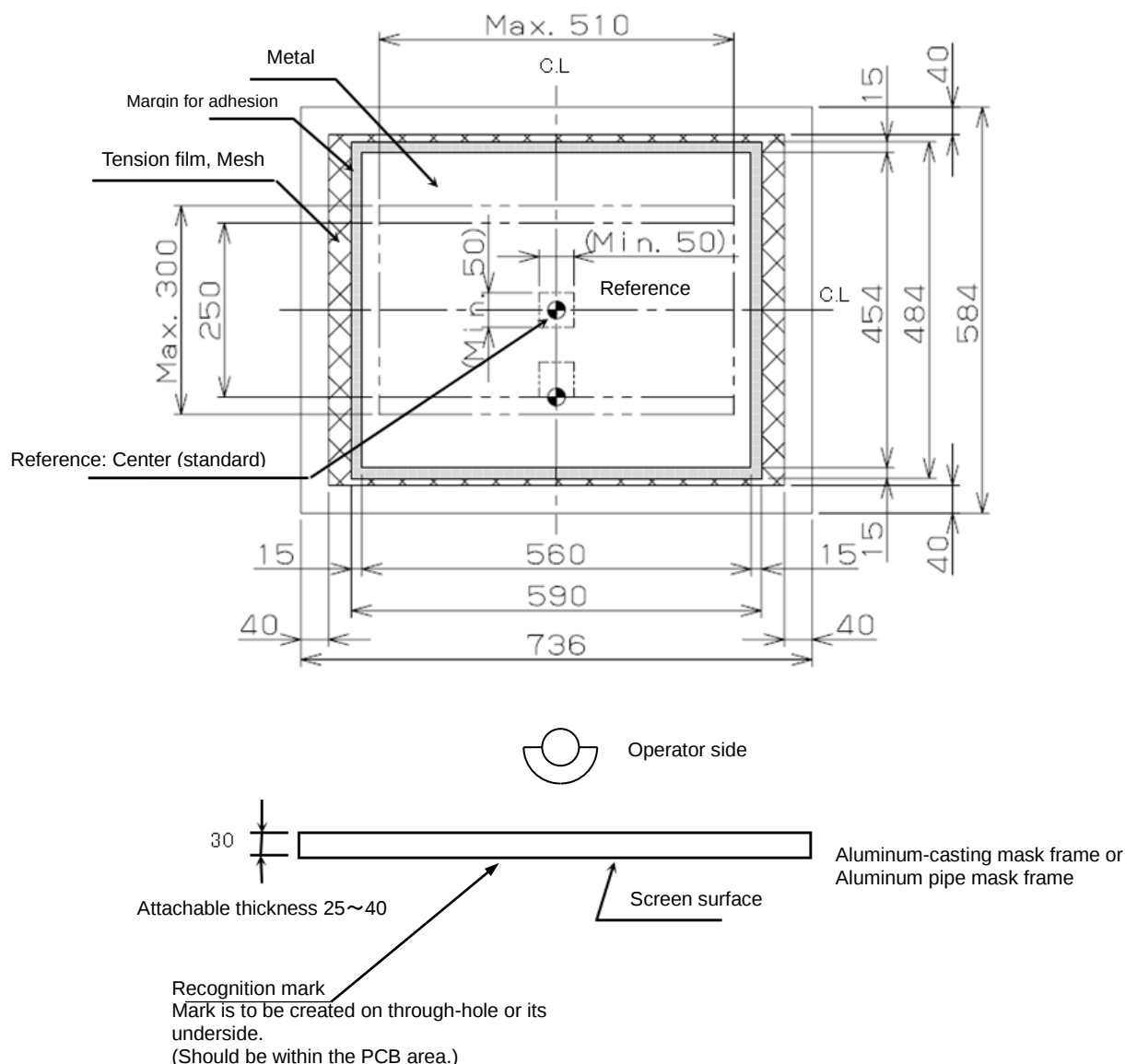
(Unit: mm)

**** Remarks ****

- Dash-dot-dot lines show the outside dimension of PCB.
- Make the pattern so that the center or edge of a PCB will be located at  mark.
The same is true of the mesh and the metal-combination.
- For the mesh type, the entire surface is mesh.
- Be careful about the stencil size.
When Y-direction has parts to be pasted within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Mask frame should be (584 mm × 584 mm).
- Masks other than 29-inch masks need universal mask holder (Optional).
- Contact us if using the masks that are thinner than 80 μm.
- External tolerance of the mask frames must be ±1.0 mm.
- Recommended pipe thickness : t=3.0 mm
- Contact us if using the mask whose reference is other than the above.

7	29 × 23-inch frame: 736 × 584 mm horizontally long frame(option)
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(Unit: mm)

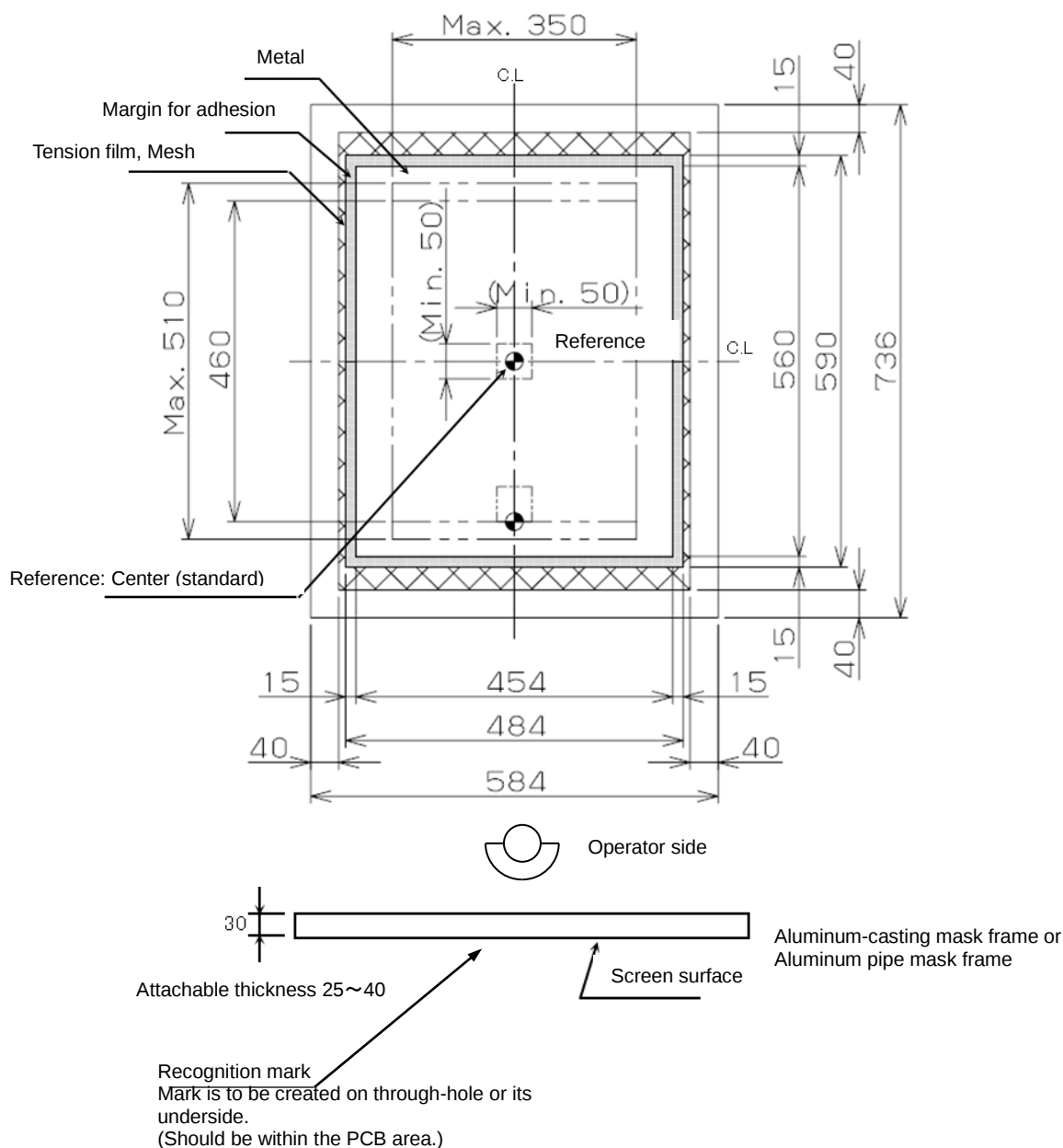


** Remarks **

- Dash-dot-dot lines show the outside dimension of PCB.
- Make the pattern so that the center or edge of a PCB will be located at  mark.
The same is true of the mesh and the metal-combination.
- For the mesh type, the entire surface is mesh.
- Be careful about the stencil size.
When Y-direction has parts to be pasted within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Mask frame should be (736 mm × 584 mm).
- Masks other than 29-inch masks need universal mask holder (Option).
- Contact us if using the masks that are thinner than 80 μm.
- External tolerance of the mask frames must be ±1.0 mm.
- Recommended pipe thickness : t=3.0 mm.
- Contact us if using the mask whose reference is other than the above.

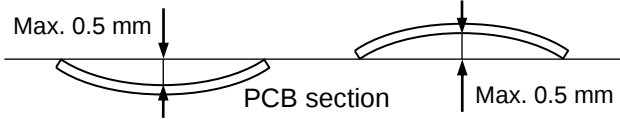
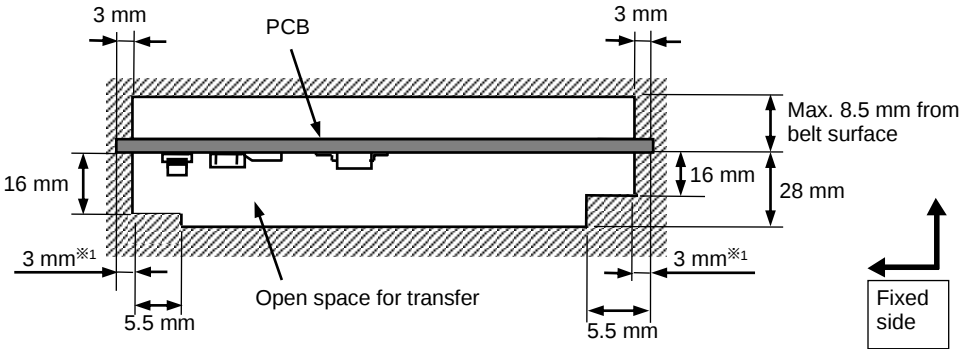
8	29 × 23-inch frame: 584 × 736 mm vertically long frame(option)
---	--

(Unit: mm)

**** Remarks ****

- Dash-dot-dot lines show the outside dimension of PCB.
 - Make the pattern so that the center or edge of a PCB will be located at  mark. The same is true of the mesh and the metal-combination.
 - For the mesh type, the entire surface is mesh.
 - Be careful about the stencil size.
- When Y-direction has parts to be pasted within the range of PCB size + 75mm on each side of PCB, PCB and mask wouldn't adhere sufficiently, affecting printing quality.
- Mask frame should be (584 mm × 736 mm).
 - Masks other than 29-inch masks need universal mask holder (Option).
 - Contact us if using the masks that are thinner than 80 μm.
 - External tolerance of the mask frames must be ±1.0 mm.
 - Recommended pipe thickness : t=3.0 mm.
 - Contact us if using the mask whose reference is other than the above.

7.2 PCB Specifications Overview

Applicable size PCB	50 × 50 mm ~ 510 × 510 mm * Note that when you select paper free cleaning nozzle, variable angle of attack squeegee, or support pin automatic replacement unit, there are some restraints. See the details described in the "9.1 Paper free wiping unit & cleaning nozzle" category, the "3.2 Standard Functions [Squeegee]" category, or the "9.1 Support pin automatic replacement unit" category.
Thickness of PCB	0.3 mm ~ 8.0 mm (0.1 mm : Individual specification)
Permissible PCB warpage	
PCB transfer space	 *  The area where no projections shall exist. *1 When PCB end face support plate (Fixed type) is set: 5 mm. The support-related units are compatible with SPG2, SPV-DC, SPV, SPG, SP70, NPM-DSP, SP28/18/60/80. Depending on user's specification [nonstandard specification], they may not be compatible. So please consult us. Contact us when using a support for SPF or SPP series.
Mass	Transfer speed is ≤ 500 mm/s : 3.0 kg or less (including the carrier mass) Transfer speed is ≤ 700 mm/s : 1.0 kg or less (including the carrier mass)
PCB materials	PCB transfer of the following types of PCB is possible. (including optional PCB) ① Glass epoxy ② Phenol ③ Ceramic (Individual specification required, recognition evaluation for each ceramic PCB is required) ④ Flexible PCB (Carriers are required, recognition evaluation for each flexible PCB is required) * Ceramic PCB and flexible PCB need an every-time check of whether PCB recognition is possible. * In some case PCB transfer fails when PCB color is transparent, translucent, or matt black. When you produce with PCB of these colors, contact us beforehand.

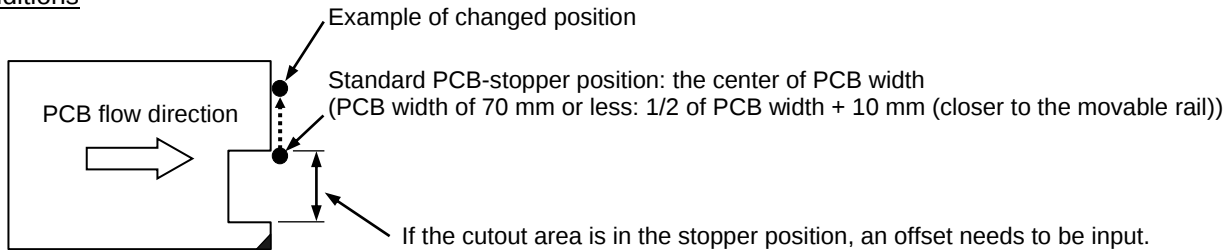
■ PCB cutout requirements

- If a cutout is located in the position where the PCB stopper will touch, the stopper stop position needs to be offset.
- Allowable slit width in the sensor detection area is up to 3 mm.
- The stopper stop position is $\frac{1}{2}$ of PCB width + 10 mm on the movable rail side.

It is not possible to move the stopper to the front within 35 mm from the fixed side.

[The following figure is the situation where PCB flows from left to right on front reference, and the other requirements apply to the same situation]

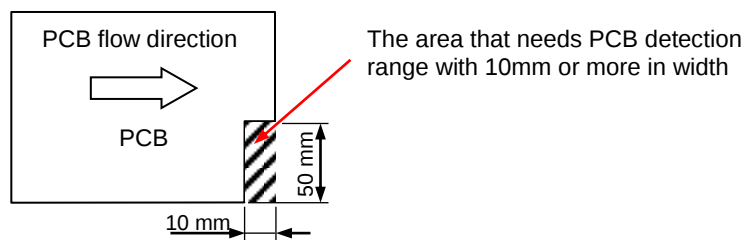
Conditions



We recommend that changed stopper stop position be outside cutout areas.

On the PCB flow direction, please keep the width from sensor detection area to the top over 10mm.

(Within 50mm width from the front side) (Recommended)



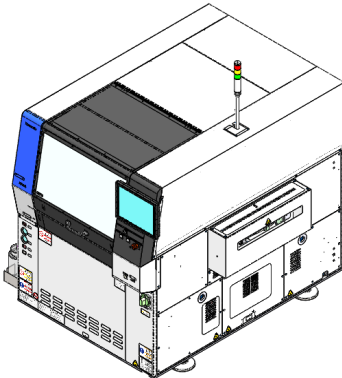
* If there is any cutout in this area, consult us separately.

■ PCB Materials

- If materials are transparent, translucent, or matte black, the PCB may not be transferred normally. Please consult us when you want to use these PCBs.

8. Standard Machine Configuration

■ Main body specification

Item	Description	Quantity
Main body		1 set
Accessories	SD card • Key disk for engineer (512 MB) • System install disk (512 MB) • Parameter saving disk (512 MB)	1 set each
	DVD-ROM • Machine system, Recognition system disk	1 set
	Manual (Choose either of binding manuals or DVD manuals) • Operating instruction • Maintenance • Trouble shooting • Parts list • Control wiring diagram	1 set each
	Caps (eyebolt cover)	4 pcs.
	Maintenance caution tag	2 pcs.
	Fixing brackets (for transport)	1 pc.

■ List of the items common to the conventional machine

Item	Shared with the conventional machine	Remarks
Squeegee holder (Outer length convertible type)	Shared	It is shared with SPG2, SPV-DC, SPV, SPG, SP70, SP18P-L, SPD, NPM-DSP.
Squeegee	Shared	Metallic squeegees, plastic squeegees
Cleaning paper	With conditions, shared	It is shared with SPG2, SPV-DC, SPV, SPG, and SPD.(L=370 mm) It is shared with SPG2, SPG. (L=540mm)
Mask	Shared (Recognition mark is through-hole.)	Contact us when using 450 × 450 mm mask exclusive for NPM-DSP.
	With conditions, shared (Recognition mark is through-hole.)	Positioning is required at the aperture. Contact us when using 450 × 450 mm mask exclusive for NPM-DSP.
Support parts	Shared	M-sized support parts can be shared except the support parts for SPF-series or SPP-series. Contact us regarding sharing with SPF or SPP series.

9. Option

Options are classified as follows.

Mark	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.

* 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.

9.1 Standard Options

Select options that suit your purpose, using the recommended option list below as a reference.

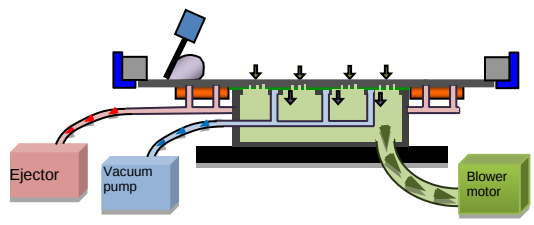
No.	Purpose / Feature	Option name	Mark
A	1 To set the PCB transfer line height at 930 mm/ 950 mm above the floor.	- Support for 930 mm transfer line - Support for 950 mm transfer line	Factory
	2 To attach the lighting inside the printer.	Internal lighting (LED type)	Factory
B	1 To use frames other than 29-inch (736 × 736 mm) frame.	- Universal mask holder - Universal mask holder (Automation option included) - Automatic mask positioning	Factory
	2 To select the mask cleaning unit.	- Standard cleaning nozzles - L=540 mm ready - L=370 mm ready - L=540 mm + L=370 mm ready	On-site
		- Blower - Ejector	Factory
		Cleaning paper	Customer
		Paper free wiping unit & cleaning nozzle	On-site
		- Paper free cleaning nozzle - Complete unit / one set - Spare blade (by the blade) - Nozzle wiping sponge (by 1 sponge)	Customer
	3 To select squeegee type and its length	- Squeegee holder (outer length convertible type) : Holder only - Variable angle of attack squeegee holder : Holder only	Customer
		Variable angle of attack squeegee ready	On-site
		- Squeegee blade - Tip-curved high filling squeegee - More-ne block - Side leakage prevention block (advanced type)	Customer
	4 To select the support-related units.	- One-touch support pin set - Magnetic support pin set - PCB suction support pin set - PCB support block set - PCB suction support block set - PCB support pin unit - Universal PCB support pin - Gang change type PCB support pin unit - Gang change type PCB support pin setting jig	Customer
		Support pin automatic replacement unit	On-site
		PCB end face support plate (fixed type)	Customer

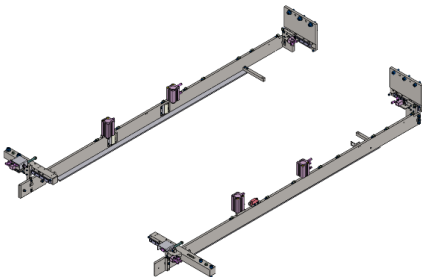
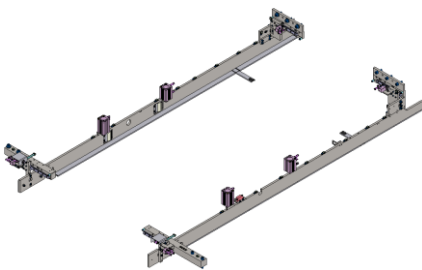
No.		Purpose / Feature	Option name	Mark
B	5	To assure the printing of thin PCB or largely warped PCB	- Vacuum pump - Blower - Hybrid suction (Blower + Vacuum pump)	Factory
			PCB suction box	Customer
			PCB warpage correction unit	On-site
			PCB clamping pressure digital control	Factory
			Claw clamber	
			- Fixed-type top/side clamber - Automatic top/side clamber (fixed type)	Factory
C	1	To add the residual solder detecting function	- Residual solder detection sensor Squeegee holder(outer length convertible type) - Residual solder detection sensor Compatible with variable angle of attack squeegee - Residual solder detection sensor Squeegee holder (Outer length convertible type) + Solder transfer - Residual solder detection sensor Variable angle of attack squeegee + Solder transfer	On-site
	2	To enhance adhesiveness of mask and PCB and improve printing quality	Mask height detection function	On-site
	3	To enable continuous operation. To make solder amount uniform	Perforated pot-type solder paste auto feeding unit	On-site
	4	To automate changeover	Mask changer (Size L, Size M)	Factory
			Solder transfer unit (Size L, Size M)	On-site
			Solder paste anti-drop cover unit (Size L, Size M)	On-site
			Support pin automatic replacement unit	On-site
	5	To monitor the change in 5M for stable production	APC-5M(License)	On-site
			Solder paste viscosity feedback -U	
			Setup & view of temperature control unit temperature	On-site
			Solder paste viscometer calibration jig	
	6	To monitor machine conditions and optimize maintenance timing	Mask tension feedback -U	On-site
			Solvent discharge amount feedback	On-site
			PCB clamber dirt detection	On-site
	7	To inspect misalignment, bridging, blur and oozing of solder	PCB clamber height measurement	On-site
			Solder inspection function Pro(License)	On-site
	8	To connect the factory-side plumbing to equipment to enable primary air connecting	Primary air hose unit	Customer

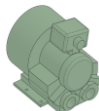
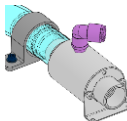
No.	Purpose / Feature	Option name	Mark
D	1 To capture signals from other companies' machines	• Cleaning signal capturing	Factory
	2 To install the temperature control unit	• Temperature control unit (PAP02A-SPH) + chamber	Factory
	3 To control ON/OFF of temperature control unit from NPM-GP/L	• Temperature control unit interlocking	Factory
	4 To know temperature/humidity inside the NPM-GP/L	• Temperature and humidity detection sensor	Factory
	5 To create data off-line To check production management information	• LNB ready (License) • FA PC • HUB	On-site
	6 To prevent setting error at the time of material change (Solder paste, squeegee, and screen mask etc.)	• PanaCIM-EE ready(License)	On-site
	7 To implement changeover efficiently	• Automatic changeover (License)	On-site
	8 To feedback printing positions using the 2D inspection head (NPM series).	• APC-F.B. (Position) (License)	On-site
	9 To offset printing placement automatically based on the results of other solder inspection machines	• APC-F.B. (Position) (License)	On-site
	10 To offset printing volume automatically based on the results of other solder inspection machines	• APC-F.B. (Volume) (License)	On-site
	11 To ensure and maintain the optimum printing status(Volume) automatically based on the result of other solder inspection machines	• APC-5M(License)	On-site
	12 To offset printing placement and printing volume automatically based on the results of other solder inspection machines	• Other company inspection machine interface software(License)	On-site
	13 To use existing system effectively.	• Upper communication (License)	Customer
	14 To connect printer with upper systems	• LNB ready(License)	On-site
	15 To use iLNB	• iLNB ready(License)	On-site
E	1 The state of a machine is always maintained at best condition.	• Lubrication set	Customer

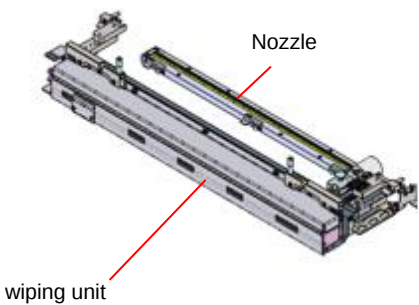
■ Recommended options

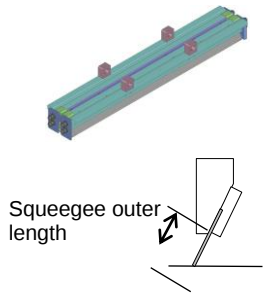
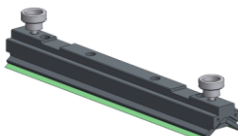
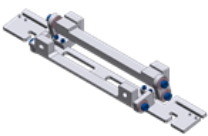
Select the desired options according to the products to be produced and materials used (solder, mask, PC boards, etc.).

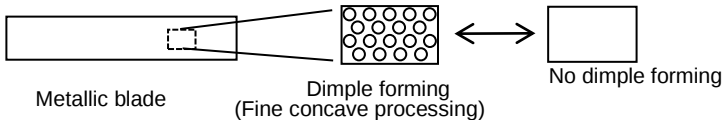
Item		Industries and production items							
Option		Major EMS mobile PC	Chinese EMS mobile PC	East Asian manufacturer	Japanese-affiliated manufacturer	In-car	Device FPC	Audio & visual, home appliances	LED
Mask cleaning									
Standard nozzle		○	○	○	○	○	○	○	○
Paper free cleaning nozzle		○	○	○	○	---	---	○	○
Mask suction + PCB suction (The same specifications as your screen printer are recommended.)									
Vacuum pump Blower PCB vacuum box PCB warpage correction unit		○	---	○	○	○	---	---	---
A vacuum pump or blower holds PCB and an ejector (clammer) holds masks. The vacuum sensor checks the condition of vacuum-held PCB in sucking with a vacuum pump .  Vacuum pump  Blower									
Hybrid suction (Blower + vacuum pump) PCB vacuum box PCB warpage correction unit		---	○	○	---	---	---	---	---
<u>Hybrid suction</u> 									
PCB Clamper (Comes with a mask-hold-down function as standard)									
Claw clamper		○	○	---	○	○	---	---	---
Automatic top/ side clamper		---	---	---	---	○	---	---	---
Fixed-type top/ side clamper		---	---	○	---	---	---	---	---
Squeegees									
Metallic squeegee		○	○	○	○	○	○	○	○
Plastic squeegee		---	---	---	○	○	○	---	---
Metallic squeegee (t=0.3 mm)		○	○	○	---	---	---	○	○
Variable angle of attack squeegee		○	○	---	---	---	---	---	---

A-1	To set the PCB transfer line height at 930 mm/ 950 mm above the floor.
Factory	Support for 930 mm transfer line Support for 950 mm transfer line The standard transfer-line height is 900 mm above floor (adjustable between 887 mm and 920 mm).
A-2	To attach the lighting inside the printer.
Factory	Internal lighting (LED type) When there is no internal lighting, the inside of a screen printer is about 200 lx to 300 lx darker than surrounding area.
B-1	To use masks other than 29-inch
Factory	Universal mask holder Applicable mask size 736 × 736 mm 750 × 750 mm 650 × 550 mm (Horizontally long, Vertically long) 600 × 550 mm (Horizontally long) 736 × 584 mm (Horizontally long, Vertically long) 584 × 584 mm  - Select this option when you use masks other than 29-inch (736 × 736 mm) masks. - Frame-size switching does not need any tools. - When you select this option, make sure that you select "Automatic mask positioning" as well.
Factory	Universal mask holder (automation option included) Applicable mask size 736 × 736 mm 750 × 750 mm 650 × 550 mm (Horizontally long, Vertically long) 600 × 550 mm (Horizontally long) 736 × 584 mm (Horizontally long, Vertically long) 584 × 584 mm  - When you select "Mask changer" or "Solder transfer unit", make sure that you select this option. - You can switch frame size with no tools. - When you select this option, make sure that you select "Automatic mask positioning" as well.
Factory	Automatic mask positioning - Mask automatically positioned in Y direction according to PCB data. - Please select this option when you select "Universal mask holder."

B-2	To select the mask cleaning unit.	
On-site		
Mask cleaning unit (L=540 mm ready)		
• One cleaning paper (L=540 mm) is attached. • One set (= two cushions) of cushions for cleaning nozzles (L=540mm) is attached.		
On-site		
Mask cleaning unit (L=370 mm ready)		
• One cleaning paper (L=370 mm) is attached. • One set (= two cushions) of cushions for cleaning nozzles (L=370mm) is attached.		
On-site		
Mask cleaning unit (L=540 mm & L=370 mm ready)		
• Please select this when you need to support various PCB sizes. • By exchanging the item, it can support for various types of PCB sizes and mask frame sizes. • Cleaning papers for L=540 mm and L=370 mm (one paper for each) is attached. • Cushions for cleaning nozzles, four cushions in total, are attached. (one set for each length; L=370 mm and L=270 mm) * To change the size, please exchange all the following items. Items: Vacuum nozzle, dispensing nozzle, cleaning paper, paper holder		
Factory	Blower 	• Vacuumed by Blower
Factory	Ejector 	• Vacuumed by Ejector (Max. air consumption: 400 L/min) • This is targeted to a vacuum for comparatively wider opening unit. Please select “Blower” when printing QFP/CSP with 0.4 mm or less pitch.
Customer		
Cleaning paper: 540 mm Cleaning paper: 370 mm		
• Select when needed in addition		

B-2	To select the mask cleaning unit																																																																																						
On-site		540mm/370mm																																																																																					
Paper free wiping unit & cleaning nozzle																																																																																							
• This is a cleaning nozzle that does not use papers. • When selecting this option, nozzles can be changed. • Comes with paper free cleaning nozzle 1 set with the length you selected, wiping unit and nozzle wiping sponge(1 sponge). • Nozzle cleaning sponges are washable and can be used repeatedly. *Use only the Panasonic specified sponges. We recommend that cleanser be the same as cleaning solvents. • For quality assurance, we recommend regular maintenance by hand wiping for the back of masks and clamber surface every six or eight hours. *Limitations when using paper free cleaning. • See the list below for PCB size. • Solvent is not required. • Please use the mask thicker than 50 μm. • When your mask thickness is under or equal to 50μm, when you use PCB half etched masks, or when your mask material is not stainless, contact us beforehand. (Durability is different from that in the standard stainless mask) • Plate-making reference: Center-reference only (No support for front-reference) • Cleaning with uneven masks is less effective in some cases since solder and flux on a back of a mask are scrapped off with a plastic blade. When you use a mask with a 20 μm or larger bump/dent, use paper cleaning. • When you use materials except for solder(adhesives, flux, resin paste, and other materials), check with Panasonic beforehand. 																																																																																							
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="3">Paper free cleaning nozzle</th> <th colspan="2" rowspan="2">Masks</th><th colspan="8">L size PCB /Y [mm]</th></tr> <tr> <th colspan="4">M size PCB/ Y [mm]</th><th colspan="4"></th></tr> <tr> <th>Mask size</th><th>Reference</th><th>50 ~220</th><th>~254</th><th>~270</th><th>~300</th><th>~360</th><th>~456</th><th>~470</th><th>~510</th></tr> <tr> <td rowspan="3">L = 540 mm</td><td>750 x 750 frame</td><td rowspan="3">Center</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○※1</td><td>○※1</td><td>×</td></tr> <tr> <td>736 x 736 frame</td><td></td><td></td><td></td><td></td><td></td><td></td><td>×</td><td>×</td></tr> <tr> <td>736 x 584 frame (horizontally long)</td><td>○</td><td>○</td><td>○※1</td><td>○※1</td><td>×</td><td>×</td><td>×</td><td>×</td></tr> <tr> <td rowspan="7">L = 370 mm</td><td>750 x 750 frame</td><td rowspan="7">Center</td><td rowspan="7">○</td><td rowspan="4">○</td><td rowspan="4">○</td><td rowspan="4">○</td><td rowspan="7">—</td><td rowspan="7">—</td><td rowspan="7">—</td><td rowspan="7">—</td></tr> <tr> <td>736 x 736 frame</td></tr> <tr> <td>650 x 550 frame (vertically long)</td></tr> <tr> <td>736 x 584 frame (vertically long)</td></tr> <tr> <td>584 x 584 frame</td><td></td><td>○※1</td><td>○※1</td></tr> <tr> <td>650 x 550 frame (horizontally long)</td><td>○※1</td><td>○※1</td><td>×</td></tr> <tr> <td>600 x 550 frame (horizontally long)</td><td>○※1</td><td>○※1</td><td>×</td></tr> </table> ○ : Compatible (*1 : Blades can go through superposing parts and we recommend a specification be a full-metal specification) × : Not compatible * When mask frame size, mesh size, bonding margin is larger than Panasonic-recommended size, maximum PCB width will get small. Check with Panasonic for details.				Paper free cleaning nozzle	Masks		L size PCB /Y [mm]								M size PCB/ Y [mm]								Mask size	Reference	50 ~220	~254	~270	~300	~360	~456	~470	~510	L = 540 mm	750 x 750 frame	Center	○	○	○	○	○	○※1	○※1	×	736 x 736 frame							×	×	736 x 584 frame (horizontally long)	○	○	○※1	○※1	×	×	×	×	L = 370 mm	750 x 750 frame	Center	○	○	○	○	—	—	—	—	736 x 736 frame	650 x 550 frame (vertically long)	736 x 584 frame (vertically long)	584 x 584 frame		○※1	○※1	650 x 550 frame (horizontally long)	○※1	○※1	×	600 x 550 frame (horizontally long)	○※1	○※1	×
Paper free cleaning nozzle	Masks		L size PCB /Y [mm]																																																																																				
			M size PCB/ Y [mm]																																																																																				
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L = 540 mm	750 x 750 frame	Center	○	○	○	○	○	○※1	○※1	×																																																																													
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	736 x 584 frame (horizontally long)		○	○	○※1	○※1	×	×	×	×																																																																													
L = 370 mm	750 x 750 frame	Center	○	○	○	○	—	—	—	—																																																																													
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	600 x 550 frame (horizontally long)			○※1	○※1	×																																																																																	
Customer																																																																																							
Paper free cleaning nozzle (complete unit) one set Spare blade (by the blade)																																																																																							
• Having spare paper free cleaning nozzle with you saves time of nozzle cleaning after nozzles are used. • Select this if necessary																																																																																							
Customer																																																																																							
Paper free cleaning nozzle wiping sponge (by 1 sponge)																																																																																							
• Select this option when additionally needed.																																																																																							

B-3	To select the squeegee type and length
Customer	530 mm/ 480 mm/ 370 mm/ 270 mm
Squeegee holder (outer length convertible type) : Holder only	
The squeegee outer length can be switched among 13 mm, 10 mm, 7 mm and 5 mm. When using metal blade : Please set outer length to be 13 mm, 10 mm, or 7 mm. When using plastic blade : Please set outer length to be 5 mm. Blade is not included. Please select the blade from "Squeegee blade". Plate to prevent solder leaks from side is included. When using "Residual solder detection sensor", change it to a plate that prevents solder leaks from side, which is option of residual solder detection sensor, or more-ne block. When you use tip-curved high filling squeegees, select dedicated backup plates at the same time. Consult with us if you prefer the length other than 530 mm, 480 mm, 370 mm and 270 mm.	
	
Customer	530 mm/ 370 mm
Variable angle of attack squeegee holder : Holder only	
When you use this squeegee, it is rigid printing where printing pressure is constant. Adjust the attack angle to decide printing conditions. Angle : Angle range is 45~70 degrees in increments of 1 degree. * When you want to use data created where metal squeegee's outer length is 13mm or 10mm and its attack angle is 60 degrees with variable angle of attack squeegees, pay attention to the printing status and printing adjustment. Benchmark attack angle is 55 degrees. Supported PCB size depends on mask sizes.	
	
Max. 510 mm x 420 mm (736 x 736 frame x 750 x 750 frame) Max. 510 mm x 250 mm (736 x 584 frame/ horizontally long) Max. 350 mm x 300 mm (650 x 550 frame/ vertically long, 736 x 584 frame/ vertically long) Max. 350 mm x 250 mm (650 x 550 frame/ horizontally long, 584 x 584 frame, 600 x 550 frame/ horizontally long)	
• Blades are NOT included. Select a blade from the "squeegee blade" category. • This option comes with More-ne blocks for variable angle of attack squeegees.	
On-site	
Variable angle of attack squeegee ready	
• This is an option needed for printings with variable angle of attack squeegees. • This is usable with 370mm or 530mm in variable angle attack of squeegee holder length. • Variable angle of attack squeegee holders are not included. • You cannot switch between "Variable angle of attack squeegee ready" and "Squeegee holder (outer length convertible type)". • When you select this option, make sure that you select "Optional expansion boards" as well.	
	

B-3	To select the squeegee type and length
Customer	530 mm/ 480 mm/ 370 mm/ 270 mm
Squeegee blade	
- We have squeegee blades for metallic squeegees, for plastic squeegees, for variable angle of attack squeegees, and for tip-curved high filling squeegees. - Metallic squeegee blades are 0.2 mm (standard) and 0.3 mm in thickness. - Squeegee length : - For metallic squeegees 530 mm/ 480 mm/ 370 mm/ 270 mm - For plastic squeegees 530 mm/ 480 mm/ 370 mm/ 270 mm - For tip-curved high filling squeegees 530 mm/ 480 mm/ 370 mm/ 270 mm - For variable angle of attack squeegees 530 mm/ 370 mm "Squeegee holder (outer length convertible type)": Holder only "Variable angle of attack squeegee holder: holder only" does not come with blades. "Blade for metallic squeegee", "blade for plastic squeegee" and "blade for tip-curved high filling squeegee" is NOT compatible with "blade for variable angle of attack squeegee". - Select any one of the blade types. Minimum blade quantity : two blades For tip-curved high filling squeegee : Metallic squeegees whose tips are curved with improved filling performance. * The number of PCBs you can print with single blade varies depending on printing or other conditions. * No dimple forming unlike conventional metal blades. * When you use existing metal blade with dimple forming (t 0.2 mm), we will handle it as an individual specification.  Metallic blade Dimple forming (Fine concave processing) No dimple forming	
Select squeegee length in accordance with your PCB size. Contact us when you prefer squeegees other than above squeegees.	

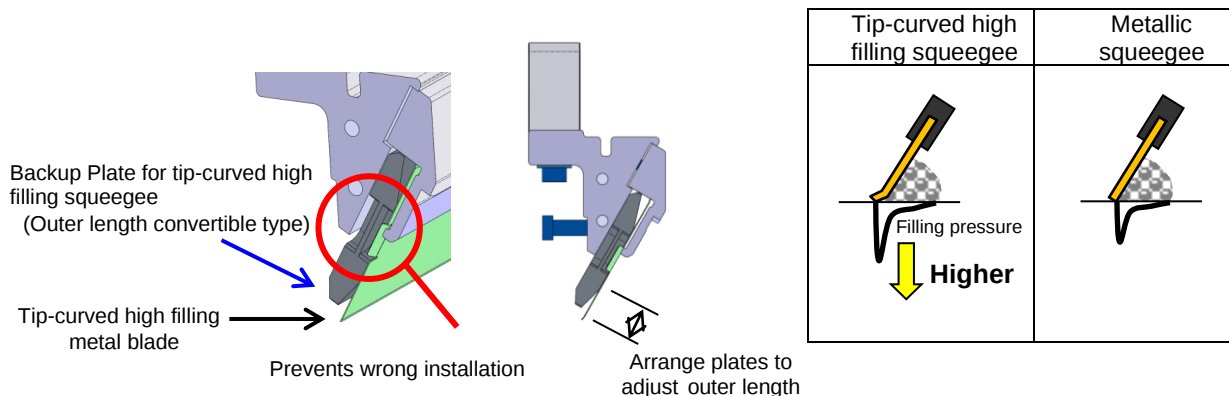
B-3

To select the squeegee type and length

Customer

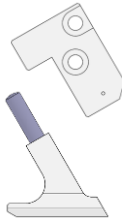
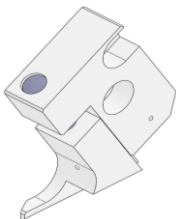
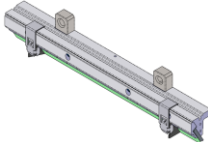
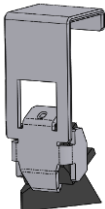
Tip-curved high filling squeegee

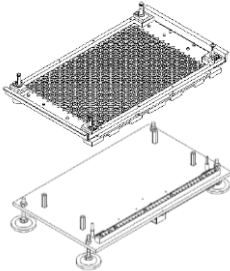
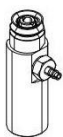
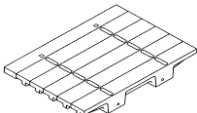
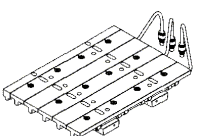
- Tip-curved high filling squeegees are metallic squeegees whose tips are curved with improved filling performance.
- Supports all SP18,SP60,SP70,SP80,SPD,SPG,SPG2,SPV,SPV-DC, NPM-GP/L series.
- Compatible with squeegee holder (outer length convertible type) once you have installed a dedicated backup plate.
- Not compatible with variable angle of attack squeegee holder.

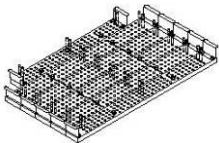
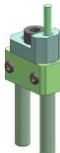
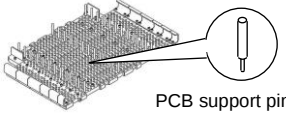
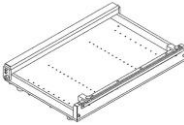
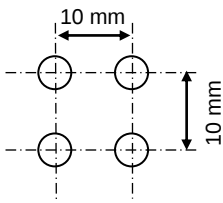
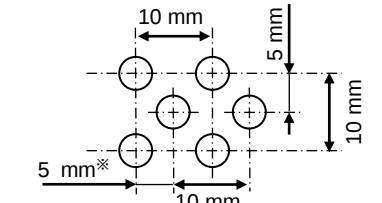


- Need to adjust blade outer length. See the list below showing recommended blade outer length.
- When you change squeegee type from urethane squeegees, start with 7mm of outer length under the same printing conditions.
- When you change from blade with 10 mm of outer length, start with 5mm or 7mm of outer length with printing pressure not very strong.
- Make changes so that front squeegee and rear squeegee have the same outer length at a 60 degrees of squeegee attack angle.

Blade outer length	Tip-curved high filling squeegee		Metallic squeegee (For your information)	
	Propriety	Solder filling	Propriety	Solder filling
5 mm	○ : General soldering /Recommended	About 105 %	× : Not compatible (for plastic)	(Overfilling)
7 mm	○ : General soldering, Automotive parts soldering /Recommended	About 110 %	○ : Compatible	About 86 %
10 mm	○ : Compatible	About 115 %	○ : Recommended	Standard : 100 %
13 mm	× : Not compatible	(Overfilling)	○ : Compatible	About 114 %

B-3	To select the squeegee type and length
Customer More-ne Block (Side Leakage Prevention Block)  	
• Comes into contact with the mask by the reaction force of magnet to prevent solder leaks from side during printing. • This block can be attached to squeegee holder (Outer length convertible type) and all squeegees of SPD / SPG. • Available for use with all the squeegee holders for other than double blade squeegee and for other than variable angle of attack squeegee. • Can be used together with the residual solder detection sensor. • Simple, easy-to-clean construction.	
Customer Side leakage prevention block (Advanced type)  	
• This is a block to prevent side leakage and the attaching position can be adjusted according to a size of PCB. • Attaching a block at optimal position can reduce solder amount when PCB length is short for the squeegee length. • When side leakage prevention block is attached, the printing range is up to "squeegee length -35 mm. • This block cannot be used with "Residual solder detection sensor", remove the solder leakage prevention block • One set=four blocks (two blocks each for front and rear)	

B-4	To select the support-related units.	
Customer	One-touch support pin set (M size) Applicable PCB size: M size 330 × 250 mm One-touch support pin set (L size) Applicable PCB size: L size 510 × 60 mm 	Support unit for batch replacement of support pins. Support pins can be set at arbitrary positions by checking a mounted PCB. Exclusive magnet support pins are used. (No support pin is included.)
Customer	Support pin (for one-touch support pin set) 	Magnet support pin exclusively for one-touch support pin set. Ten pieces are included in one set.
- One-touch support pin set can be commonly used among SP70, SP18, SPD, SPG, SPG2, SPV, SPV-DC, SP60/ 80 and SP28. - When using one-touch support pin set on SP18, SP60/ 80, SP28, exclusive support plate (for one-touch support pin set) per machine type is required. It is needed for the number of machines when used with multiple units. Please consult us for details.		
Customer	Magnetic support pin set Type S 	The pins can be arranged freely because of magnets. 30 pieces are included in 1 set. (Tip diameter: φ4 mm) Collective changing is not possible.
Customer	Magnetic support pin set Type L 	Magnetic force strengthen type. The pins can be arranged freely because of magnets. 24 pieces are included in 1 set. (Tip diameter: φ4 × 10 , φ10 × 10, φ20 × 4) Collective changing is not possible.
Customer	PCB suction support pin set 	PCB suction support pin × 6 Magnetic support pin (φ4) × 10 Collective changing is not possible. Select any one of the following options, "Vacuum pump", "Blower", or "Hybrid suction".
Customer	PCB support block set (M) Applicable PCB size: 330 × 250 mm PCB support block set (L) Applicable PCB size: 510 × 510 mm 	The number of blocks to be attached is adjusted in accordance with PCB width. For M size: 21 mm width × 1, 42 mm width × 5 For L size: 21 mm width × 1, 42 mm width × 9
Customer	PCB suction support block set (M) Applicable PCB size: 330 × 250 mm PCB suction support block set (L) Applicable PCB size: 510 × 510 mm 	The number of blocks to be attached is adjusted in accordance with PCB width. For M size: 21 mm width × 1, 42 mm width × 2, 42 mm width (with vacuum holding hole) × 3 For L size: 21 mm width × 1, 42 mm width × 6, 42 mm width (with vacuum holding hole) × 3 Select any one of the following options, "Vacuum pump", "Blower", or "Hybrid suction"

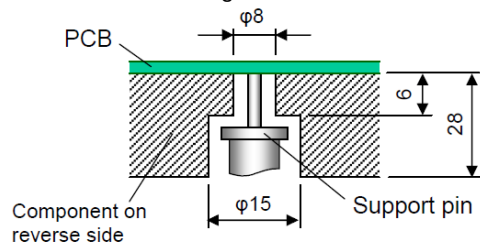
B-4	To select the support-related units.	
Customer	PCB support pin unit (M) Applicable PCB size: 350 × 300 mm PCB support pin unit (L) Applicable PCB size: 510 × 510 mm 	The pin diameter is 4 mm, and the pin pitch is 10 mm. The followings are included in the unit of M size: 35 mm width(small) × 1, 35 mm width(large) width × 1 40 mm width × 4, 100 pins The followings are included in the unit of L size: 35 mm width × 1, 40 mm width × 10 200 pins
Customer	Universal PCB support pin 	Since pin positions can be adjusted, PCB can be supported even at the positions where it used to be difficult to set up pins. This is used in combination with the PCB support pin unit and the gang change type PCB support pin unit. The mounting hole pitch is 10 mm. 10 pieces are included in one set. If wishing to incorporate vacuum-holding function, please consult us.
Customer	Gang change type PCB support pin unit (M) Applicable PCB size: 350 × 300 mm Gang change type PCB support pin unit (L) Applicable PCB size: 510 × 510 mm  PCB support pin	The pin diameter is 4 mm, and the pin pitch is 5 mm. For M size: 20 mm width × 2, 30 mm width × 4, 40 mm width (small) × 2, 40 mm width (large) × 4, pin × 100, coupling shaft × 4 For L size : 20 mm width × 2, 30 mm width × 3, 35 mm width (small) × 2, 40 mm width × 10, pin × 200, coupling shaft × 4
* You cannot use this option when equipment has an "Automated top/side clamper" installed on board.		
Customer	Gang change type PCB support pin setting jig (M) Applicable PCB size: 350 × 300 mm Gang change type PCB support pin setting jig (L) Applicable PCB size: 510 × 510 mm 	This is needed for the off-line preparation of support pins. Support pins can be changed in a shorter time.
As for the pin pitch, see the following illustrations. When you want the other pin pitch, please consult us. (The diameter of pin is 4 mm.) For PCB support pin] [For gang change type PCB support pin]  		When wishing to reduce the exchange time by making an off-line preparation for setting the support pins of the next model, another option, "Gang change type PCB support pin setting jig" is required.
The supports are compatible with the conventional SP series. (They may not be compatible with some of SP10P-M/L/LA, so please consult us.)		

B-4	To select the support-related units.
On-site Support pin automatic replacement unit Applicable PCB size: 510 × 460 mm * Rules for supported PCB size • When you use this option Max 510 X 460 mm • When you do not activate this option Max 510 X 510 mm	Support pin automatic changing unit automatically places the pins that were put on the table to the specified position. • 30 pins are attached. • A unit places up to 30 pins. • Pins are not used for mounters. • Cannot be used with PCB end face support plate(Fixed-type).
Pin Arrangement Area You cannot arrange a pin on an area with 10mm from the end of the back clumper. : Areas you can arrange a pin(the center of pins) : Areas you cannot arrange a pin(the center of pins) PCB size 510 mm × 460 mm PCB size 50 mm × 50 mm * You can arrange a pin (the center of pins) on visible outlines.	

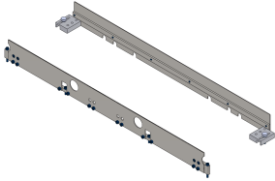
B-4

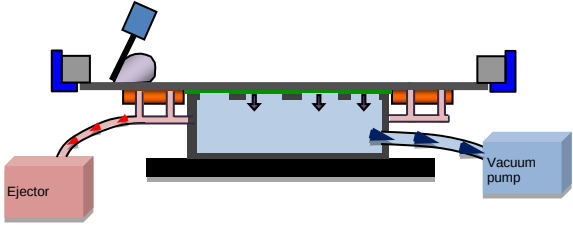
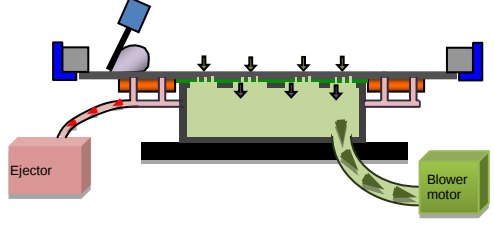
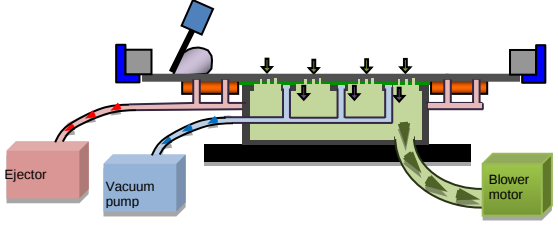
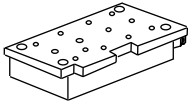
To select the support-related units.

Conditions for Pin Arrangement



Be sure to ensure the left-stated dimensions and prevent a PCB slit before arranging a support pin.

B-4	To select the support-related units.	
Customer PCB end face support plate (Fixed-type) 	This is a removable support plate for use fixed to Z-PLATE. * PCB end face (rear side) dead space shall be 5 mm. When any component is present on the PCB end face, remove the support plate. Please refer to “7.2 PCB Specifications Overview” for details. * Cannot be used with Support pin automatic replacement unit.	

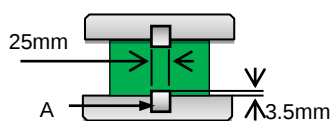
B-5	To ensure stable and reliable printing with thin or warped boards
Factory	
Vacuum pump	
	• Holds down PCBs with a vacuum pump. • The vacuum sensor checks the condition of vacuum-held PCB. • When you select “Mask changer”, select “PCB vacuum-hold unit: Vacuum pump(mask changer)”.
Factory	
Blower	
	• Holds down PCBs with a blower. • You need to select “Blower” in the choices of “Cleaning suction”. • When you select “Mask changer”, select “PCB vacuum-hold unit: Blower(mask changer)”.
Factory	
Hybrid suction (Blower + Vacuum pump)	
	• Ejector : Holds down masks (Standard specifications) • Vacuum pump : Holds down PCBs. • Blower motor : Holds down masks through a PCB. • The vacuum sensor checks the state of vacuum-held PCB. • When you select “Mask changer”, select “PCB & Mask vacuum-hold: Hybrid vacuum-hold(mask changer)”.
On-site	
PCB vacuum box	
	• This is effective for printing thin or warped PCB. • This is an option on an individual basis. (Specify specifications. Provide your PCB before designing or manufacturing) • Contact us for details.
On-site	
PCB warpage correction unit	
	• Retainer plate correct the warped PCB.(Retainer plate size: 510 × 150 mm) • The printing cycle time increases by about 1.0 s when the PCB is vacuum-held.
Factory	
PCB clamping pressure digital control	
	• Adjusts the clamping pressure to the preset value automatically.

B-5

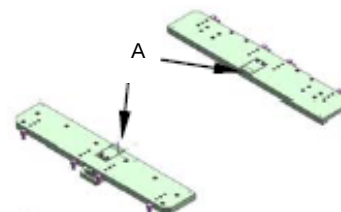
To ensure stable and reliable printing with thin or warped boards

Factory**Claw clamber**

A : Movable claw (2 positions)



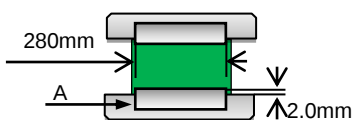
A : The clamping dimensions of PCB



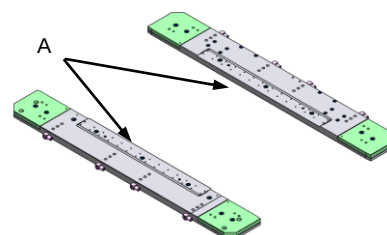
- Connect a thin plate to PCB to prevent the PCB from releasing in the process of positioning or mask-off.
- The movable claw (A) can be selected to clamp PCB or not to clamp PCB, from the operating panel during printing. When you select to clamp PCB, the clamped part cannot be printed.
- Comes with a mask-hold-down function as standard

Factory**Fixed top/ side clamber**

A : Fixed claw (2 positions)



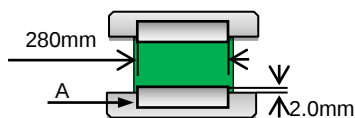
A : The clamping dimensions of PCB



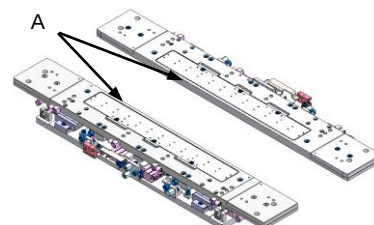
- Fixed top/side clamber corrects PCB warping and prevents the sticking of printed PCB to masks.
- Fixed top/side clamber controls the top of and the sides of PCB.
- The claws of a clamber enter PCB and consequently that causes the range that cannot be printed.
- Reattachable clawless parts are attached.
- PCB thickness is up to 2mm. (Supported PCB thickness depend on PCB size or material)
- Comes with a mask-hold-down function as standard.

Factory**Automatic top/side clamber**

A : Movable claw (2 positions)



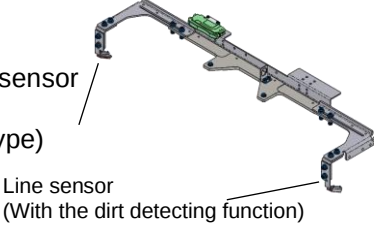
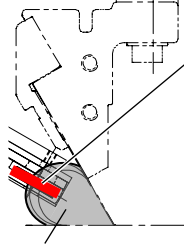
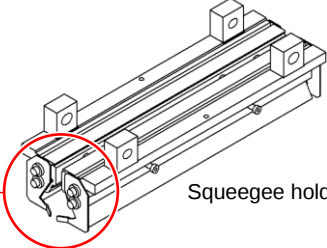
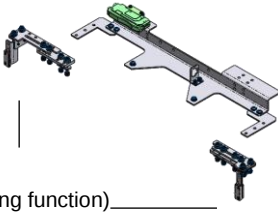
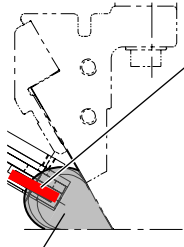
A : The clamping dimensions of PCB



- Automatic top/side clamber corrects PCB warping and prevents the sticking of printed PCB to masks.
- Automatic top/side clamber controls the top of and the sides of PCB.
- The movable claw (A) can be selected to clamp PCB or not to clamp PCB, from the operating panel during printing. When you select to clamp PCB, the clamped part cannot be printed.
- PCB thickness is up to 2mm. (Supported PCB thickness depend on PCB size or material)
- Comes with a mask-hold-down function as standard.

* You won't be able to use:

Gang change type PCB support pin unit (M size), Gang change type PCB support pin unit (L size)

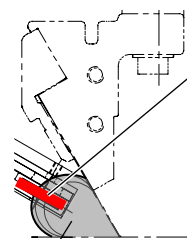
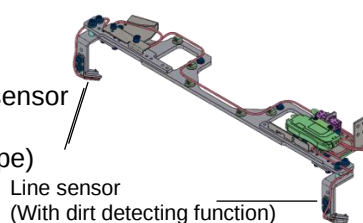
C-1	To add the residual solder detecting function
On-site Residual solder detection sensor	
• Detects residual solder amount automatically during printing. • Setups solder height data during printing and shows a warning when it is below the acceptable range. (Solder height: 12 mm to 18 mm) • When solder paste touches to a sensor and sensor gets dirty, "Dirt detection" shows that.	
On-site Residual solder detection sensor Squeegee holder (outer length convertible type)  Line sensor (With the dirt detecting function)  Detection area of the line sensor Solder height: 12 to 18 mm  Solder	
• When you select this option, make sure that you select "Optional expansion boards" as well.	
• 1 set (4 pcs.) of "side plates for residual solder detection sensor" comes with this option. If you need additional sets, please contact us. (Custom specification) * Cannot use standard side plates when the residual solder detection function is used. Side plates for residual solder detection sensor  Squeegee holder * When using the side leakage prevention block (Advanced type), remove the solder leakage prevention block before use.	
On-site Residual solder detection sensor Compatible with variable angle of attack squeegee  Line sensor (With the dirt detecting function)  Detection area of the line sensor Solder height: 12 to 18 mm  Solder	
• Residual solder detection sensor (for variable angle of attack squeegee) is compatible only with variable angle of attack squeegee. • When you select "Variable angle of attack squeegee ready" and use residual solder detection sensor, select this option. • When you select this option, make sure that you select "Optional expansion boards" as well.	

C-1

To add the residual solder detecting function

On-site

Residual solder detection sensor
Squeegee holder
(outer length convertible type)
+ Solder transfer



Detection area of the line sensor
Solder height: 12 mm to 18 mm

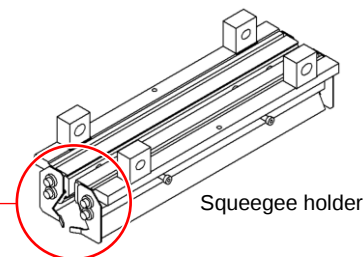


- When you select "Solder transfer unit" and use residual solder detection sensor, select this option.
- When you select this option, make sure that you select "Optional expansion boards" and "Optional expansion boards & Box" as well.

- This option comes with 1 set(4 side plates) of "side plates for residual solder detection sensor".
When additionally needed, contact us.(Individual specification)

* When you use residual solder detection, you cannot use standard side plates.

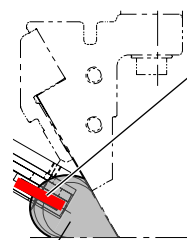
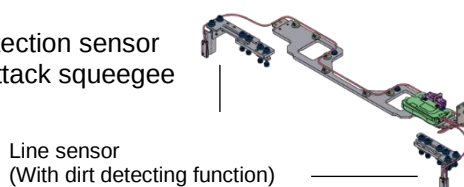
Side plates for residual solder detection sensor



* When using the side leakage prevention block (Advanced type), remove the solder leakage prevention block before use.

On-site

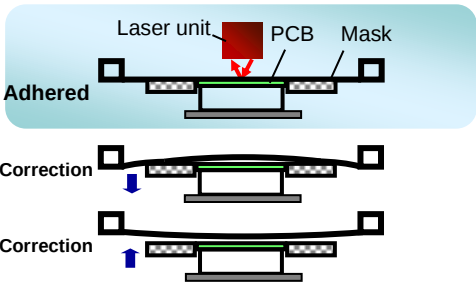
Residual solder detection sensor
Variable angle of attack squeegee
+ Solder transfer



Detection area of the line sensor
Solder height: 12 mm to 18 mm



- Compatible with Variable attack angle squeegee + Solder transfer Specification.
- When you select "Variable angle of attack squeegee ready" and "Solder transfer unit" and use residual solder detection sensor, select this option.
- When you select this option, make sure that you select "Optional expansion boards" and "Optional expansion boards & Box" as well.

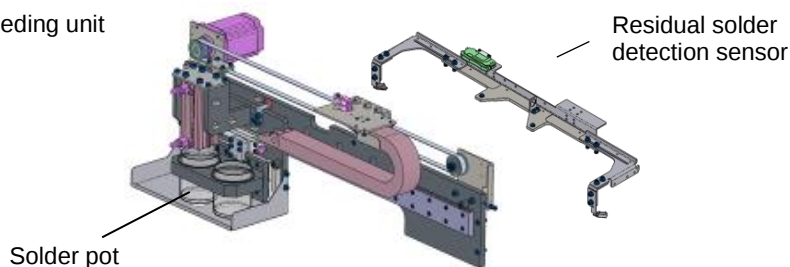
C-2	To improve the adhesion between a mask and a PCB, thereby increasing print quality
On-site Mask height detection function	
	• The degree of adhesion between PCB and mask is optimized by controlling the support height according to the mask height detected by the laser sensor in teaching before production. • When you select this option, make sure that you select “Optional expansion boards” and “Head X-axis drive unit” as well.

C-3

To enable long continuous operation. To make solder amount uniform.

On-site

Perforated pot-type solder paste auto feeding unit



- Install the solder pot directly to supply solder paste. (Stir the solder paste before installation)
 - Up to about four hours of continuous operation is enabled by installing two solder pots.
 - No maintenance or cleaning is required since the unit has no nozzle to supply solder.
 - When you select this option, make sure that you select "Optional expansion boards", "Head X-axis drive unit" and "Residual solder detection sensor" appropriate for your options as well.
 - Configure data of the solder height while printing, and if a value falls below the set value, solder is supplied. (Solder height: 12 mm ~ 18 mm)
 - The sideways (X-direction) movement allows the unit to feed solder uniformly. (Max. feeding range: L=300 mm)
Ready to be used for any process from the initial input of solder to automated supply during production.
 - Solder paste auto feeding time will be added to the printing time.
- * Shapes and sizes of perforated pot are standardized among solder manufacturers.
Before purchasing the unit, ask the manufacture if the solder to be used can be supplied by the perforated pot.
- * Some low-viscosity, or non-rosin type (resin contained) solder may not be applicable. Consult with us in advance.
- * In some cases, depending on physical properties or characteristics of solder or the shapes of solder containers, much solder drops from the container opening after supplied. You could see how it goes with your solder beforehand. Contact us for more details.

C-4

To automate changeover

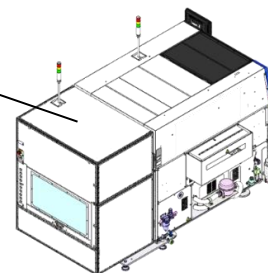
Factory**Mask changer**

- Replaces masks automatically at changeover.
- Stock of masks is up to 10 masks.
- Identifies mask types of masks set in with a QR reader.
- Mask changer does not work when a different size of masks exists.
- Allowable mask frame height is 25 ~30 mm.
- Mask size depends on the combination of "Mask changer" and "Magazine for mask changer". See the table below.
- Contact Panasonic service about the change of mask size(rearrangement of mask magazine).
- Rearrangement of mask magazine requires "Magazine for mask changer" appropriate for your mask size.
- When you select this option, make sure that you select the following options as well:
 "LNB ready (License)" or "iLNB ready (License)",
 and "Solder transfer unit", "Optional expansion boards", "Optional expansion boards & Box",
 "Universal mask holder (automation option included)", "Automatic mask positioning",
 "Magazine for mask changer" and
 "PanaCIM-EE ready(License)".

Mask size		Mask changer	Magazine for mask changer
X	Y		
600	550	M	X : 600 x Y : 550 mm
		L	
650	550	M	X : 650 x Y : 550 mm
		L	
584	584	L	X : 584 x Y : 584 mm
736	584	L	X : 736 x Y : 584 mm
550	650	L	Individual specification
584	736	L	X : 584 x Y : 736 mm
736	736	L	X : 736 x Y : 736 mm
750	750	L	X : 750 x Y : 750 mm

Factory**Mask changer (Size L)**

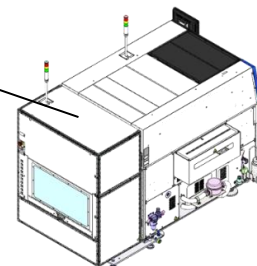
Mask changer



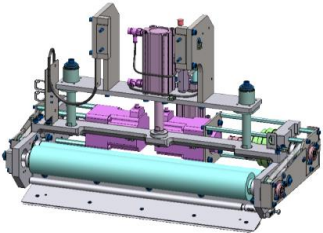
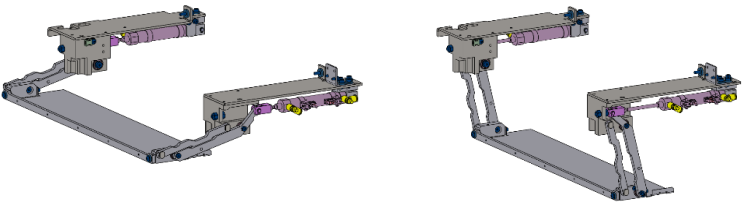
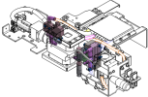
- When you select this option, select "Solder transfer unit (Size M)" or "Solder transfer unit (Size L).
- When you select this option, the dimensions are W 1 580 × D 2 654 × H 1 500 mm.

Factory**Mask changer (Size M)**

Mask changer



- When you select this option, select "Solder transfer unit (Size M)".
- When you select this option, the dimensions are W 1 580 × D 2 450 × H 1 500 mm.

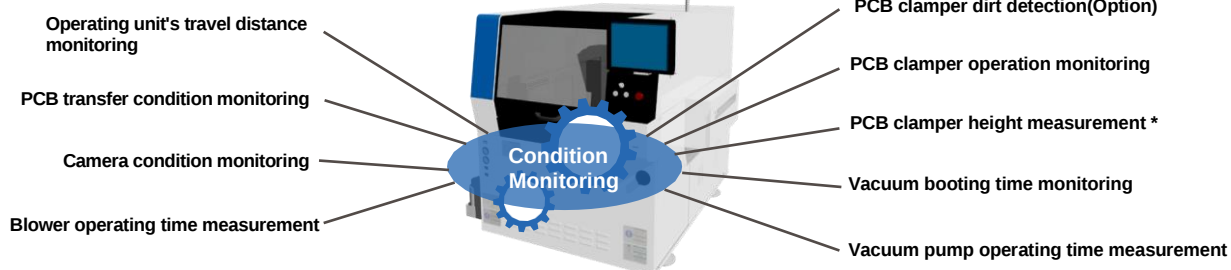
C-4	To automate changeover
On-site Solder transfer unit (Size M / Size L)	
	- Collects solder paste left on a mask automatically after printing is finished and transfers solder paste to a mask used in a next model.*1 - Allows solder transfer within PCB width conditions below. (Common to Size M and size L) - Y= up to 460 mm : 750 × 750 frame, 736 × 736 frame, 736 × 584 frame - Y= up to 270 mm : 650 × 550 frame, 600 × 550 frame, 584 × 736 frame, 584 × 584 frame * Mask design reference : Center reference only - Use Size M when squeegee length is 370 mm or shorter, mask frame is 600 or larger and a mask is put horizontally.*2 - Use Size L when squeegee length is 530 mm or shorter and mask frame is 736 or larger. - When you select this option, make sure that you select "Universal mask holder(automation option included)", "Automatic mask positioning", "Optional expansion boards" and "Optional expansion boards & Box" as well. - When you select this option, it comes with "Solder paste anti-drop cover unit " according to size you selected. *1 Solder transfer unit does not work without printing movements. *2 When you use Size M frame and put it vertically(550 × 650 frame), it is an individual specification.
On-site Solder paste anti-drop cover (Size M / Size L)	 When cover is moved up When cover is moved down
	- Cover is movable and prevents solder paste touched to a squeegee from dropping on a mask or dropping in a machine. - Use Size M when squeegee length is 370 mm or shorter and Size L when squeegee length is 530 mm or shorter and mask frame is 736 or larger. - Allowable mask frame height is up to 30mm. - When you select this option, make sure that you select "Optional expansion boards" and "Optional expansion boards & Box" as well.
On-site Support pin automatic replacement unit Applicable PCB size: 510 × 460 mm	 - Support pin automatic changing unit automatically places the pins that were put on the table to the specified position. 30 pins are attached. - A unit places up to 30 pins. - Pins are not used for mounters. - Cannot be used with PCB end face support plate(Fixed-type).
	Refer to B-4 for pin placement area and pin placement conditions.

C-5

To monitor the change in 5M for stable production

On-site

APC-5M (License)

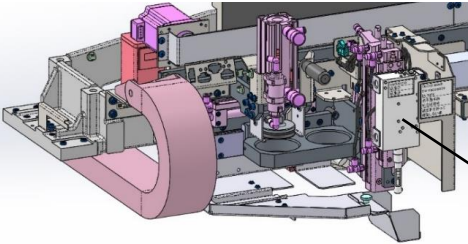
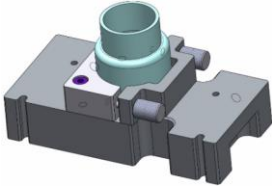


* Mask height detection(Optional) is necessary.

■ Machine Condition Monitoring (Prevention • Predictive Maintenance)

	Name	Descriptions
1	Operating unit's travel distance monitoring	Monitors travel distance in an axis movement and shows a message of maintenance at an appropriate timing.
2	PCB transfer condition monitoring	Monitors PCB transfer time and shows a message of maintenance, such as belt cleaning.
3	Camera condition monitoring	Checks for dirt on a camera lens before production is started. When dirt is detected, it shows a message of cleaning.
4	Blower operating time measurement	Monitors blower operation time and shows a message of maintenance.
5	PCB clamper dirt detection	Monitors adhesiveness between a mask and a clamper in a printing and detects clamper dirt. When you use this feature, make sure that you select the "PCB clamper dirt detection" unit as well.
6	PCB clamper operation monitoring	Monitors clamper operation time and shows a message of maintenance when clamper operation time gets long.
7	PCB clamper height measurement	Measures flatness of a clamper and shows a message of maintenance when it is out of the acceptable range. * Mask height detection (Option) is necessary.
8	Vacuum booting time monitoring	Monitors vacuum booting time at PCB vacuum-holding and shows a message of filter maintenance.
9	Vacuum pump operating time measurement	Monitors vacuum pump operation time and shows a message of maintenance.

- Make sure that you select "LNB ready(License)" or "iLNB ready(License)" as well.
("FA PC" is necessary when not connected with a NPM line)

C-5	To monitor the change in 5M for stable production
On-site	
Solder paste viscosity feedback -U	 Solder paste viscosity measurement
- Measures solder paste viscosity of a mask and shows a warning when it is out of the acceptable viscosity range. - Solder paste viscosity is measured when production started and at registered time intervals. - Adjusts the temperature of temperature control unit based on solder paste viscosity measurement results. (ON/OFF is switchable) To use this option, select "Temperature control unit interlocking", "Temperature control unit(PAP02A-SPH) & Chamber", and "Setup & view of temperature control unit temperature" as well. - When you select this option, make sure that you select the following options as well. "LNB ready (License)" or "iLNB ready (License)", "APC-5M (License)", "APC-5M data communication unit", "Optional expansion boards", "Optional expansion boards & Box", "Head X-axis drive unit" and "Residual solder detection sensor" appropriate for your options.	
On-site	
Setup & view of temperature control unit temperature	
Shows temperature of a temperature control unit on a NPM-GP/L touch panel and allows touch panel operation to change temperature setting of temperature control unit.	
On-site	
Solder paste viscometer calibration jig	
- Calibrates solder paste viscometer. - To use this option, you need viscosity known calibration fluids.	

C-5	To monitor the change in 5M for stable production
On-site Mask tension feedback -U Mask tension measurement unit • Measures mask tension when a mask is set and changes mask snap-off(ON/OFF is switchable) or shows a message of mask replacement. • When you select this option, make sure that you select the following options as well. "LNB ready (License)" or "iLNB ready (License)", and "Optional expansion boards", "Optional expansion boards & Box", "APC-5M (License)", "APC-5M data communication unit", "Automatic mask positioning".	
On-site Solvent discharge amount feedback Solvent discharge amount measurement unit • Monitors solvent discharge amount at wet cleaning to maintain appropriate amount. • When you select this option, make sure that you select the following options as well: "LNB ready (License)" or "iLNB ready (License)", and "APC-5M (License)" and "APC-5M data communication unit".	

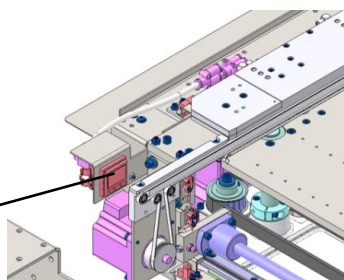
C-6

To monitor machine condition and optimize maintenance timing

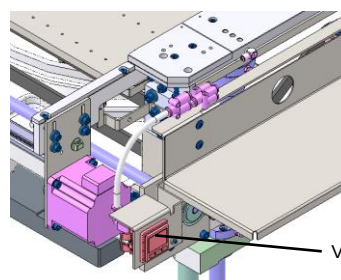
On-site

PCB clamber dirt detection

Vacuum pressure sensor



Viewed from movable clamber



Viewed from fixed clamber

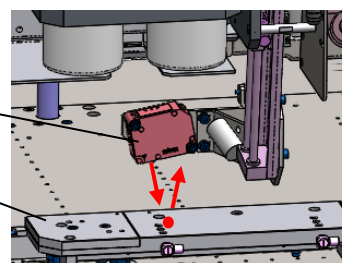
- Monitors adhesiveness between a mask and a clamber in printing and detects clamber dirt. When clamber dirt is detected, it shows cleaning alert message to prevent poor print quality.
- When you select this option, make sure that you select the following options:
 "LNB ready (License)" or "iLNB ready (License)",
 and "APC-5M (License)" and "APC-5M data communication unit".

On-site

PCB clamber height measurement

Laser unit

PCB clamber



- Measures flatness of a clamber and shows a message of maintenance when it is out of acceptable range.
- When you select this option, make sure that you select the following options:
 "LNB ready (License)" or "iLNB ready (License)",
 and "APC-5M (License)" and "Mask height detection".

C-7	To inspect misalignment, bridging, blur and oozing of solder
On-site	
	Solder inspection function Pro (License)
	• It inspects misalignment, bridging, blur and oozing of solder with the PCB recognition camera. • Up to 30 000 points can be inspected. (Inspection time: 0.5 s per view) • NPM-DGS is necessary for the inspection data creation. Make sure that you select "LNB ready (License)" or "iLNB ready (License)" as well. • NPM-GP/L has "Solder Inspection Function Light" as a standard feature. • Refer to "5.1 Solder Inspection Functions" for details.
C-8	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.

D-1	To capture the signals from other inspection machine
Factory	
	Cleaning signal capturing
	Enables mask cleaning or stops machine (cycle stop) by capturing the error signals from non-Panasonic inspection machine.

D-2

To install the temperature control unit

Factory

Temperature control unit (PAP02A-SPH) + chamber



* Power cable is not included.

• Connect a 3-core cable of 2 mm² or above.

• Connect power to M5 and grounding to M4 terminal blocks.

* Compressor starting current of 13 A flows for 240 ms. (in the case of input voltage of 200V AC)

Take this into consideration when you select capacity of primary electric source, AVR (automatic voltage regulator), etc.

Item		Specification		
Main body	Electric source	Single-phase, 200 /220 /230 /240V AC ±10V 50 /60 Hz (individual supply for this unit)		
	Rated capacity	3.0 kVA		
	Cooling capacity	1.5 kW (50/ 60 Hz)		
	Refrigerant	R410A		
	Heating capacity	1.7 kW Sheath heater with radiation fins		
	Blower air volume	1.5 to 2.5 m³ /min (50/ 60 Hz)		
	Measures against waste and bad smell	Suction filter: Nonwoven cloth Filter: Mesh		
	Controlled-temperature inside this unit	22 to 28 °C (Ambient temperature: 20 to 30 °C)		
	Capacity of drain tank	17 L		
	Protective devices	Main circuit	Earth leakage breaker (15 A), fuse	
		Compressor	Overcurrent relay, overload protector	
		Blower	Overcurrent relay, thermal protector	
		Condensation fan	Thermal protector	
		Heater	Overheat thermostat	
Refrigerant circuit		High pressure switch		
Mass	83 kg			
Accessories	Spare filter/ Blowoff duct			

• This temperature control unit can be installed on either side (right or left) of the printer.

• This temperature control unit is not needed in factories where temperature is controlled.

• Make sure you use temperature control unit in the environment where room temperature variation in a year or a day reaches around 10 °C.

D-3	To turn ON/OFF the temperature control unit from the NPM-GP/L
Factory	
	Temperature control unit interlocking
	• The temperature control unit starts by turning on the SPG's main unit. If turning off the SPG, the temperature control unit automatically stops after cool down. • An alert issued by the temperature control unit is displayed on the panel of the NPM-GP/L. (When an alert message appears during operation, the cycle stops)

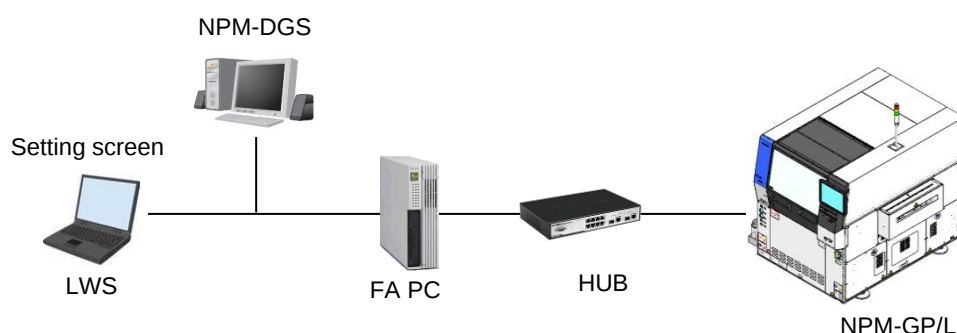
D-4	To know temperature/humidity inside the NPM-GP/L
Factory	
	Temperature and humidity detection sensor
	• Temperature and humidity in the NPM-GP/L can be displayed on the touch panel screen. • Since the thermometers is different in [temperature and humidity sensor] and [temperature control unit], displayed values won't be the same. • The value displayed here is not to be corrected and is a reference value.

D-5

To create data off-line. To check production management information.

On-site

LNB ready (License)
FA PC
HUB



• FA PC

It is FA specific PC equipped with line server function.
LNB will be installed.

Basic specifications of FA PC

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

* Please prepare the power supply cable by customer.

• HUB

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)

* Please prepare the LAN cable by customer.

• LNB(Line Network Box)

LNB 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.

Main Function:

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

• LWS(Line Work Station)

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 customer. There is no need to install the special software etc.

Please refer to "NPM-DGS Specification booklet" for details.

NPM-DGS

Data are created on NPM-DGS, the data creating system. The production data created on NPM-DGS will be downloaded to the machine via FA PC.

The data modified by the main unit of a machine and the detail of teaching are reflected in NPM-DGS.

* 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.

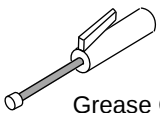
For details about NPM-DGS, please refer to "NPM-DGS Specification".

D-6	To prevent setting error at the time of material change (Solder paste, squeegee, and screen mask etc.)
On-site PanaCIM-EE ready (License)	
- It supports Material Verification module of PanaCIM-EE. (Solder paste, squeegee, and screen mask etc.) Possible to use PanaCIM EE only if connected to NPM line or AM100 line. - Make sure that you select "LNB ready(License) or "iLNB ready(License) as well. - Please refer to "PanaCIM-EE Specification" booklet for details.	

D-7	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. The external scanner installed in the pre-process conveyors used to read 1D/2D code of PCBs and to support product changeover. - Please refer to "5.4 Automatic Changeover" for details. - Make sure that you select "LNB ready(License) or "iLNB ready(License) as well. - When not connected with a NPM line, make sure that you select "FA PC".	

D-8	To feedback printing positions using the 2D inspection head (NPM series).
On-site	
	APC-F.B.(Position) (License)
	• Print positions (X, Y, θ) are corrected automatically based on APC offset data from the 2D inspection head. Print position correction data will be fed back to NPM-GP/L via FA PC (LNB). • Make sure that you select "LNB ready(License)" or "iLNB ready(License)" as well. • Inspections with other company inspection machines are also supported. • Please refer to "5.5 APC-F.B.(Position)" for details.
D-9	To offset printing placement automatically based on the results of other company solder inspection machines
On-site	
	APC-F.B.(Position) (License)
	• Offsets printing placement(X, Y, θ) automatically based on the results of a solder inspection machine. Offset data on printing placement is fed back to NPM-GP/L over FA PC(LNB). • Make sure that you select "LNB ready(License)" or "iLNB ready(License)" as well. • Select "Other company inspection machine interface software(License)" as well. • See "5.5 APC-F.B.(Position)" for details.
D-10	To offset printing volume automatically based on the results of other company solder inspection machines
On-site	
	APC-F.B.(Volume) (License)
	• Adjusts attack angle of a squeegee automatically based on the results of a solder inspection machine to control volume and ensure and maintain optimum printing status smoothly. • Offset data on solder volume is fed back to NPM-GP/L over FA PC(LNB). • Make sure that you select the following options as well: "LNB ready(License)" or "iLNB ready(License)" and "Variable angle of attack squeegee", "Residual solder detection sensor" and "Optional expansion boards". ("FA PC" and "NPM-DGS+PC for NIP" are necessary when not connected with a NPM line) • When connected with other company inspection machine, other company inspection machine interface software(License) is necessary. • See "5.6 APC-F.B.(Volume)" for details.
D-11	To ensure and maintain the optimum printing status(volume) automatically based on the results of other company inspection machine
On-site	
	APC-5M (License)
	■ Optimizing Control of Printing Conditions • Based on the results of a solder inspection machine, it adjusts conditions such as printing pressure squeegee speed and snap-off speed to ensure and maintain the optimum printing status(volume). • Offset data on solder volume is fed back to NPM-GP/L over FA PC(LNB). • Make sure that you select "LNB ready(License)" or "iLNB ready(License)" as well. ("FA PC" and "NPM-DGS+PC for NIP" are necessary when not connected with a NPM line) • When connected with other company inspection machine, other company inspection machine interface software(License) is necessary. • You cannot use with APC-F.B.(Volume). • Offsets do not work when printing pressure or printing speed is different in a printing.(This feature remains disable) • When snap-off speed is set to "Multilevel", snap-off speed does not change. • See "5.7 APC-5M" for details.

D-12	To offset printing placement and volume automatically based on the results of other company inspection machine
On-site	Interface software of the inspection machine from other companies (License) ▪ This is interface to use data measured with other company inspection machine(solder inspections) to offset printing placement and printing volume. ▪ Offset data on printing placement and printing volume is fed back to NPM-GP/L over FA PC(LNB). ▪ Make sure that you select the following options: any one from "APC-F.B.(Position)", "APC-F.B.(Volume)" or "APC-5M(license)" and "LNB ready(License)" or "iLNB ready(license)". ("FA PC" is also required if it is not coupled to NPM line) ▪ Please refer to "5.8 Interface software of the inspection machine from other companies" for details. * Target inspection machines need to satisfy the requirements of our specifications. For details, please contact us. * A dedicated PC needs to be placed between the inspection machine from other company and FA PC (LNB). Please prepare a PC, a HUB and LAN cables by customer.

D-13	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 inter communicate necessary information. Depending on the purpose of customer's system functions of "Event", "Material verification with other vendor's machine", and "Trace" can be used. - You cannot select with "iLNB ready(License) or "PanaCIM-EE ready(License). (It is included in "iLNB ready(License) and "PanaCIM-EE ready(License)") - Please refer to "5.9 Upper Communication" for details.	
D-14	To connect printer with upper systems	
On-site	LNB ready(License)	
	- Links with other company inspection machines. - This is necessary when you use any of the followings: PanaCIM-EE ready(License), Automatic changeover(License), APC-F.B.(Position), APC-F.B.(Volume). - NPM-DGS license is necessary. - Enables data downloading and uploading over FA PC(LNB).	
D-15	To use iLNB	
On-site	iLNB ready(License)	
	- Select this option when you connect to iLNB. - This option includes "Upper communication (License)" and "Remote control (License)". - For details, see iLNB Specification.	
E-1	The state of a machine is always maintained at best condition	
Customer	Lubrication set	
	 Grease Gun Nozzle	- This is used for a periodical greasing and cleaning at the machine maintenance, etc. * This is required when purchasing the first standard machine.

10. Paint Color

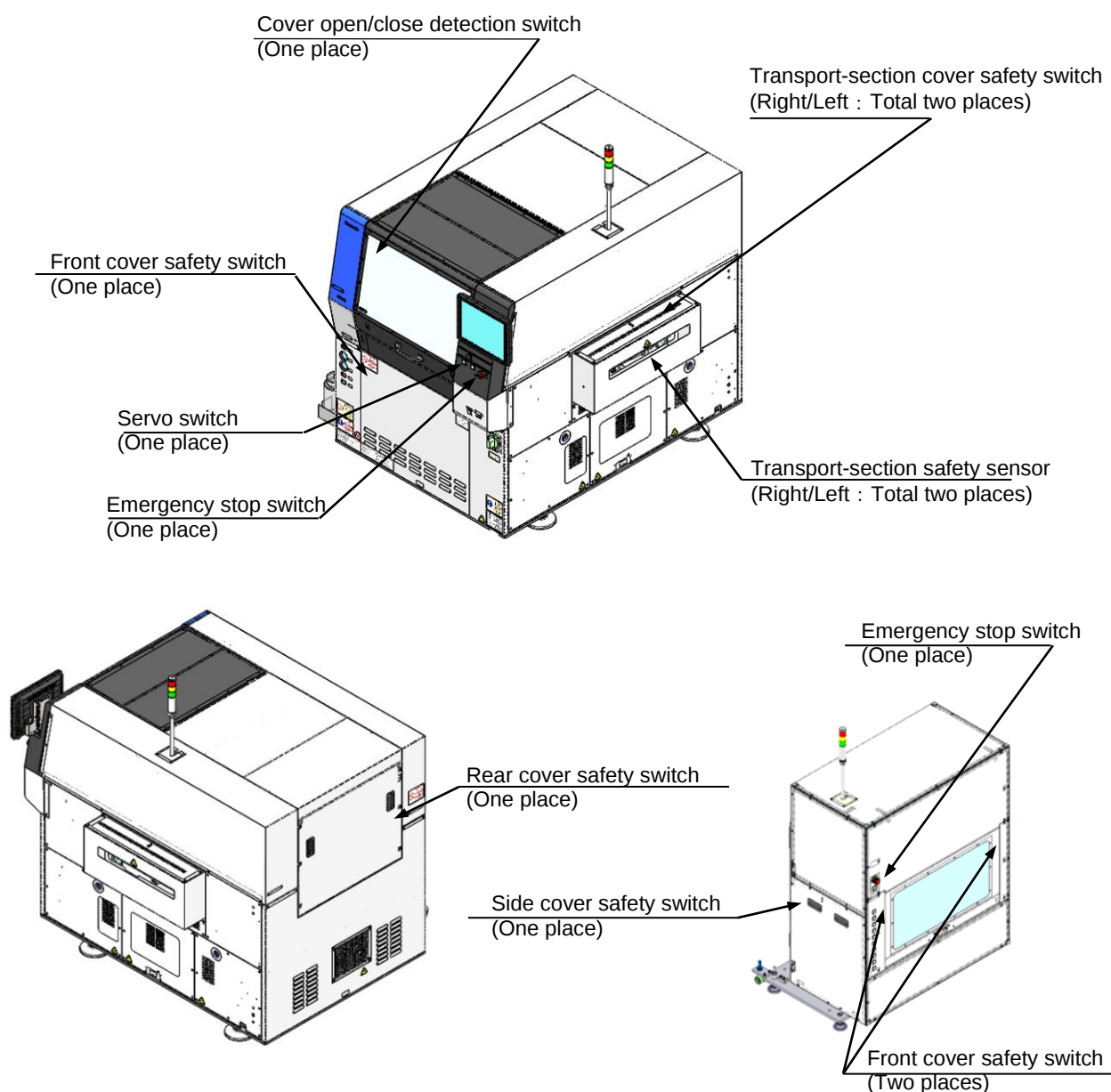
■ Standard color

White W-3

* The paint color cannot be designated.

11. Safety Devices

NPM-GP/L and mask changer are equipped with the safety devices as shown below for safety use. When you press an emergency stop switch while the machine is running, the machine is forcibly stopped running.



** Remarks **

- To use this machine safely, all works should be performed correctly after thoroughly checking the manuals and warning labels on the machine.

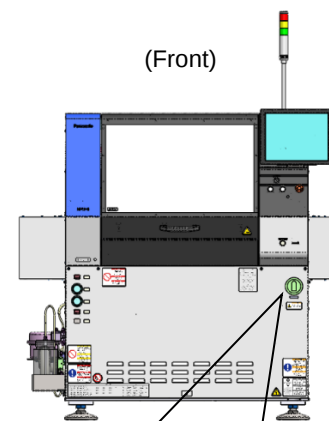
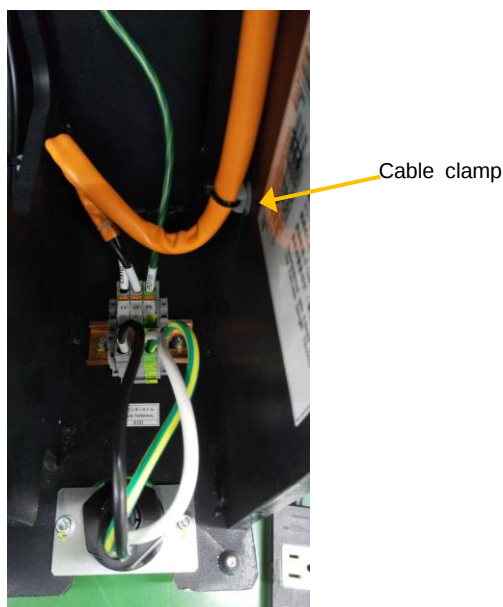
12. Electric/ Pneumatic/ Line Signal Connection/ Line Transfer

12.1 Electric Source Unit

The electric source should be connected with three-conductor cable of 5.5 mm² by using exclusive tool.

The cable should be clamped as the lower-left figure shows.

1. Outside diameter dimensions of the cable: $\phi 13.5$ mm ~ $\phi 18.0$ mm
2. Be sure to secure the cable with the cable clamps so that it will not be moved by being pulled (100 N) or turned.



Electric source unit (Only on the front)
Primary power terminal block
(Located inside the cover)
* Electric source cable is not attached.

Precautions in terminal block connection

Terminal connecting pin (Recommended)

Manufacturer: PHOENIX CONTACT

Type: 3.5 mm² ~ 5.5 mm² AI 4-12 GY
5.5 mm² ~ 6.0 mm² AI 6-12 YE

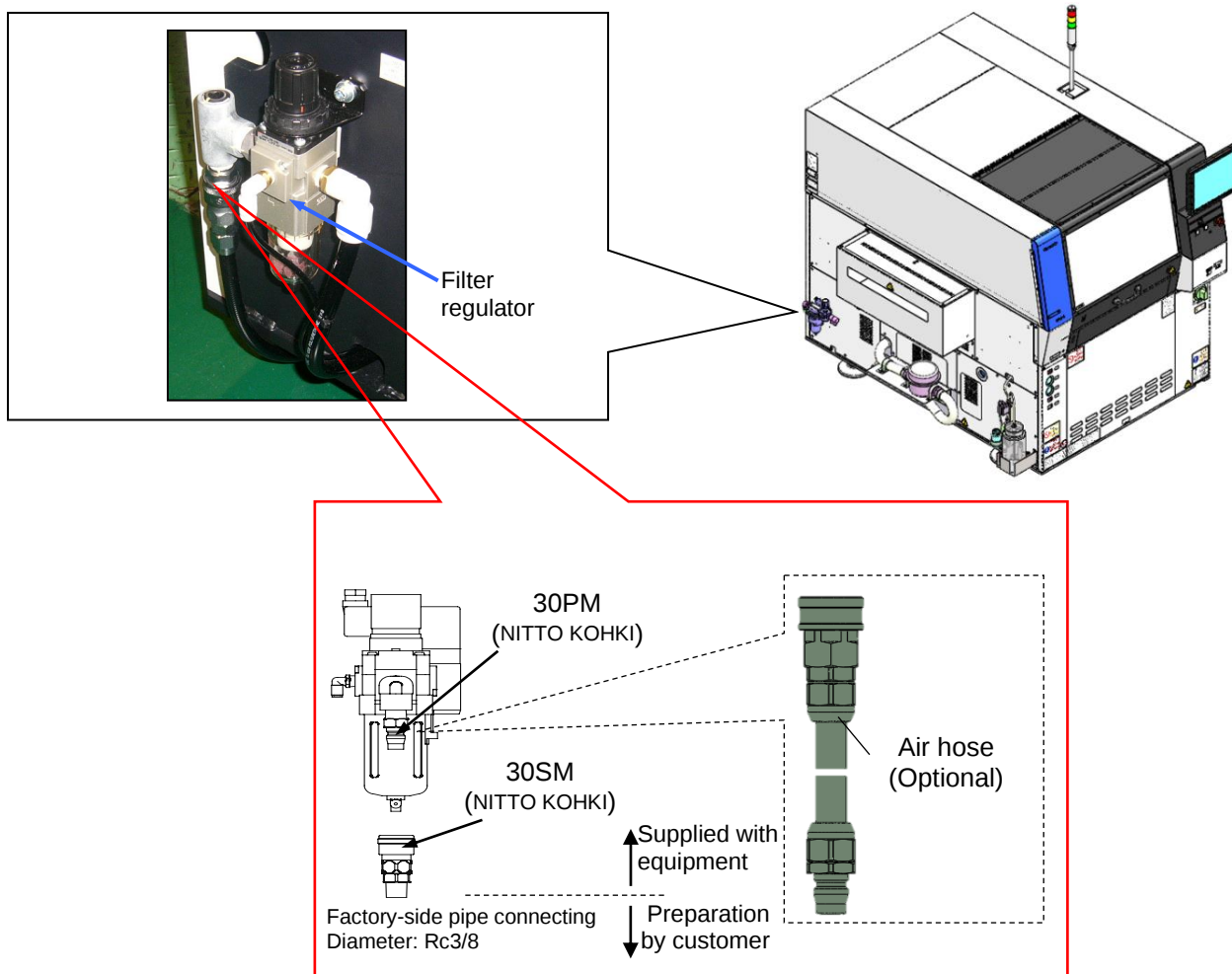
1. Directly connect to the primary power terminal block.
Connect to L1, L2 and PE terminals.
2. Pull out the cables with 50N force and make sure that they are fixed tightly.



** Remarks **

- The electric source cable is not supplied by us.

12.2 Pneumatic Source Unit



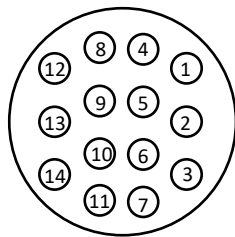
12.3 Line Signal Connection

■ NPM-GP/L line signal specifications (Common specifications)

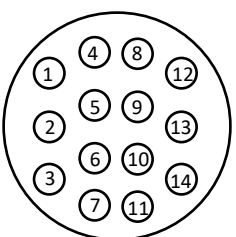
- Connector pinouts
 SMEMA connector is AMP's easy connection type.

■ Connector pinouts as seen from the connection ports

Connector pinout, cable side (Male)



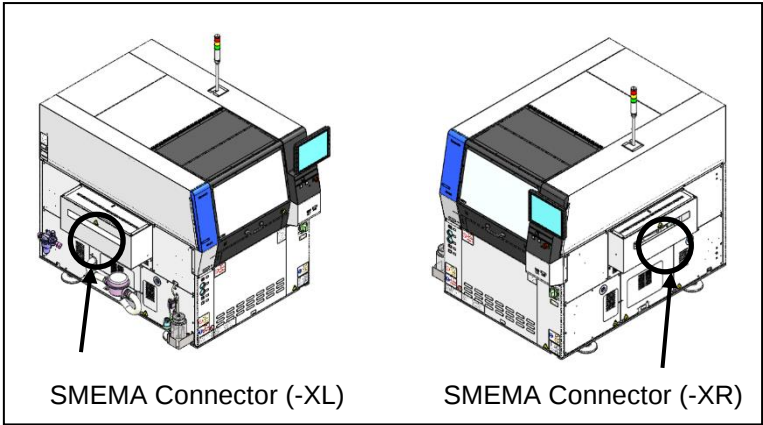
Connector pinout, main unit side (Female)



■ Connector part numbers

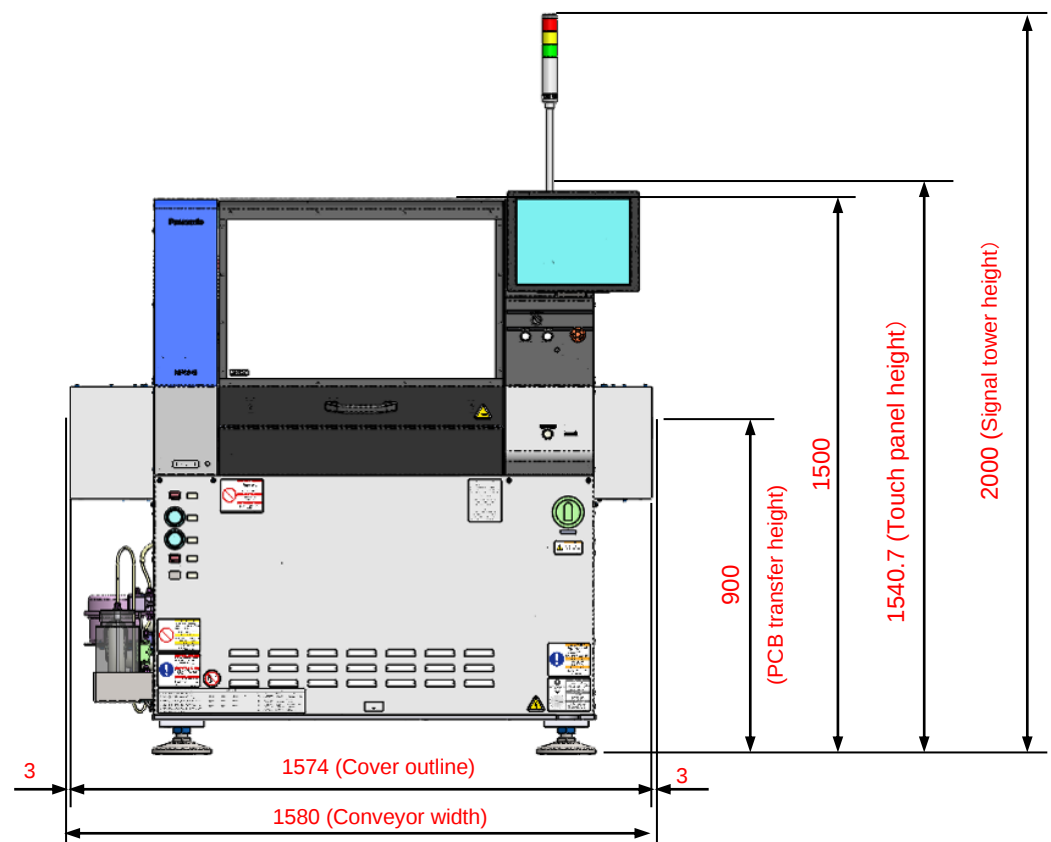
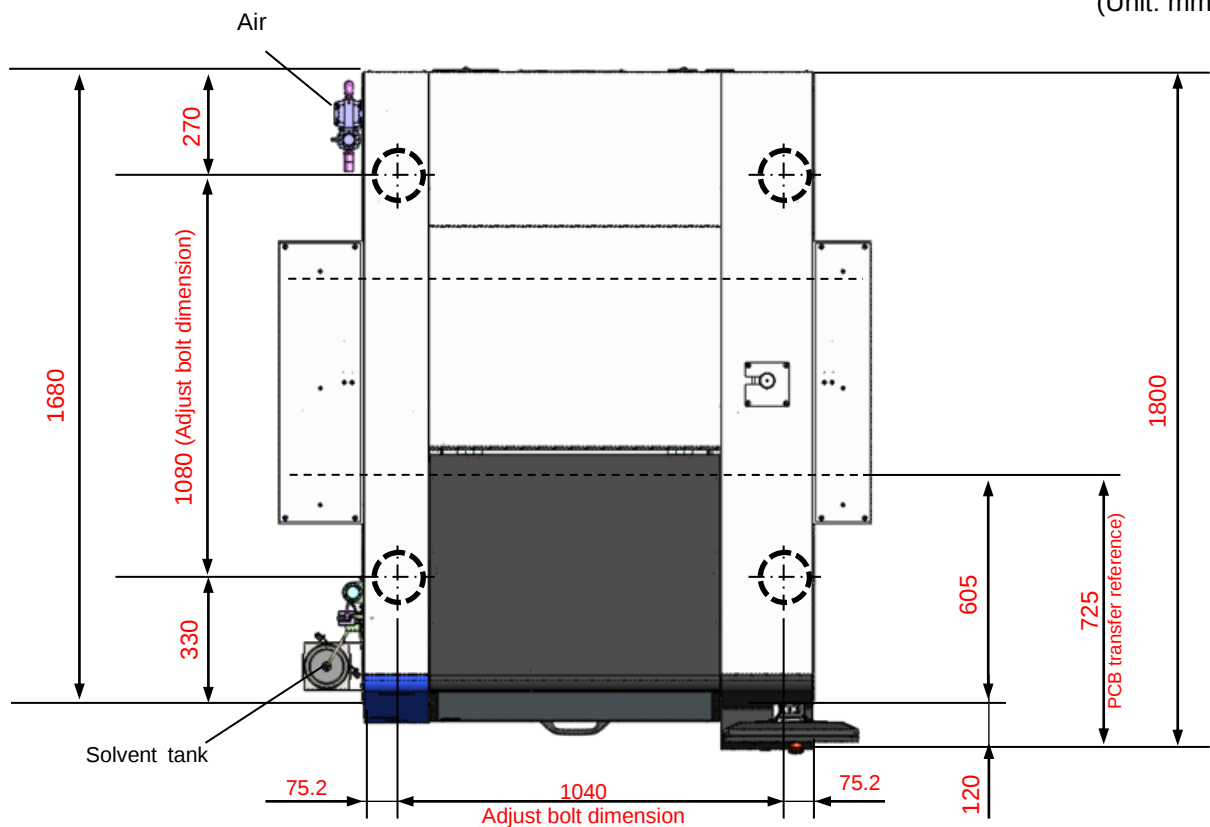
	Connector	Pin	Strain relief
Cable side	AMP 206044-1	AMP 1-66103-8	AMP 206070-8
Main unit side	AMP 206043-1	AMP 1-66105-9	-

■ Locations of SMEMA connectors (on the lower parts of the left and right conveyors)



13. Dimensions

(Unit: mm)

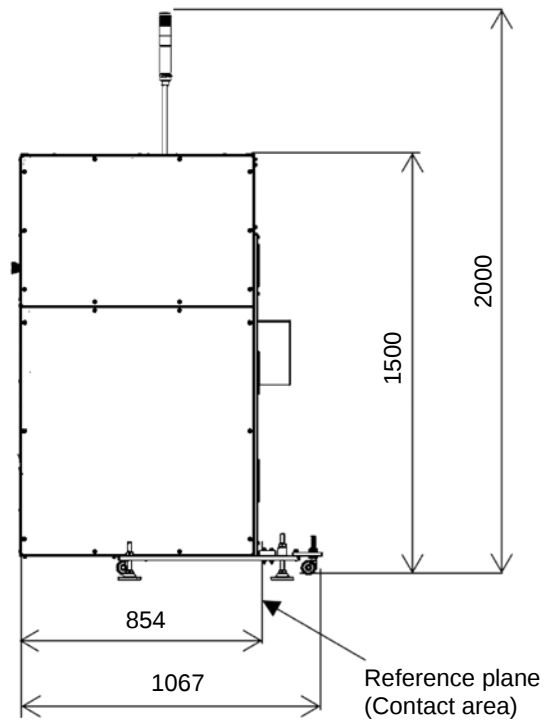
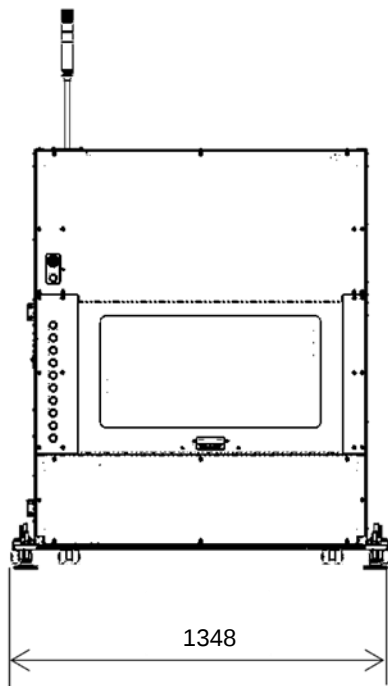
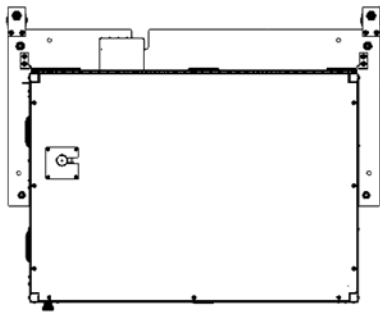


** Remarks **

- Regarding the reduced scale and etc., above illustrations do not strictly agree with an actual machine. When examining the line configuration, size, etc., please ask for the materials for them.

■ Mask changer(Optional)

Size L

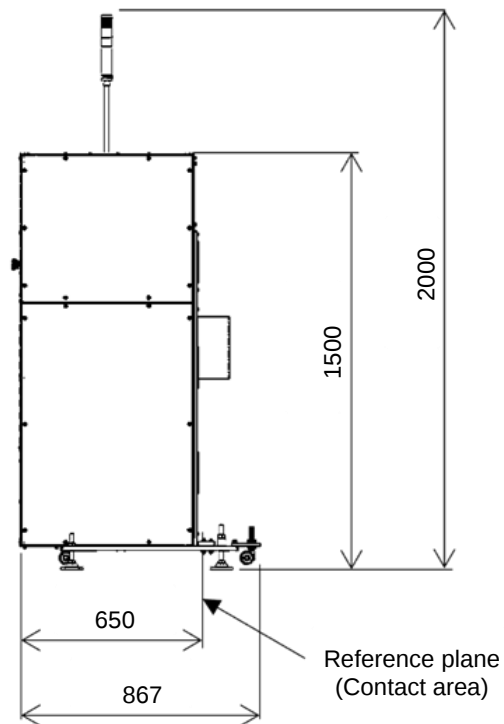
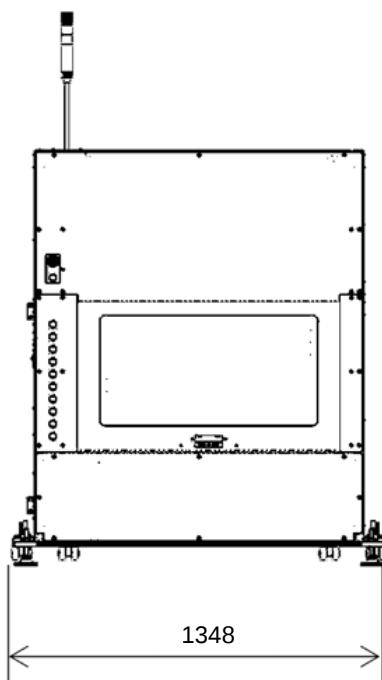
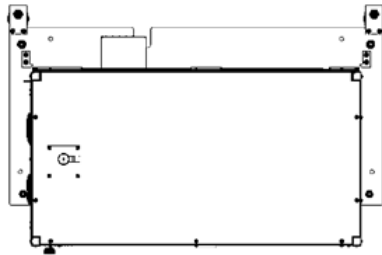


**** Remarks ****

- Regarding the reduced scale and etc., above illustrations do not strictly agree with an actual machine
When examining the line configuration, size, etc., please ask for the materials for them.

■ Mask changer(Optional)

Size M

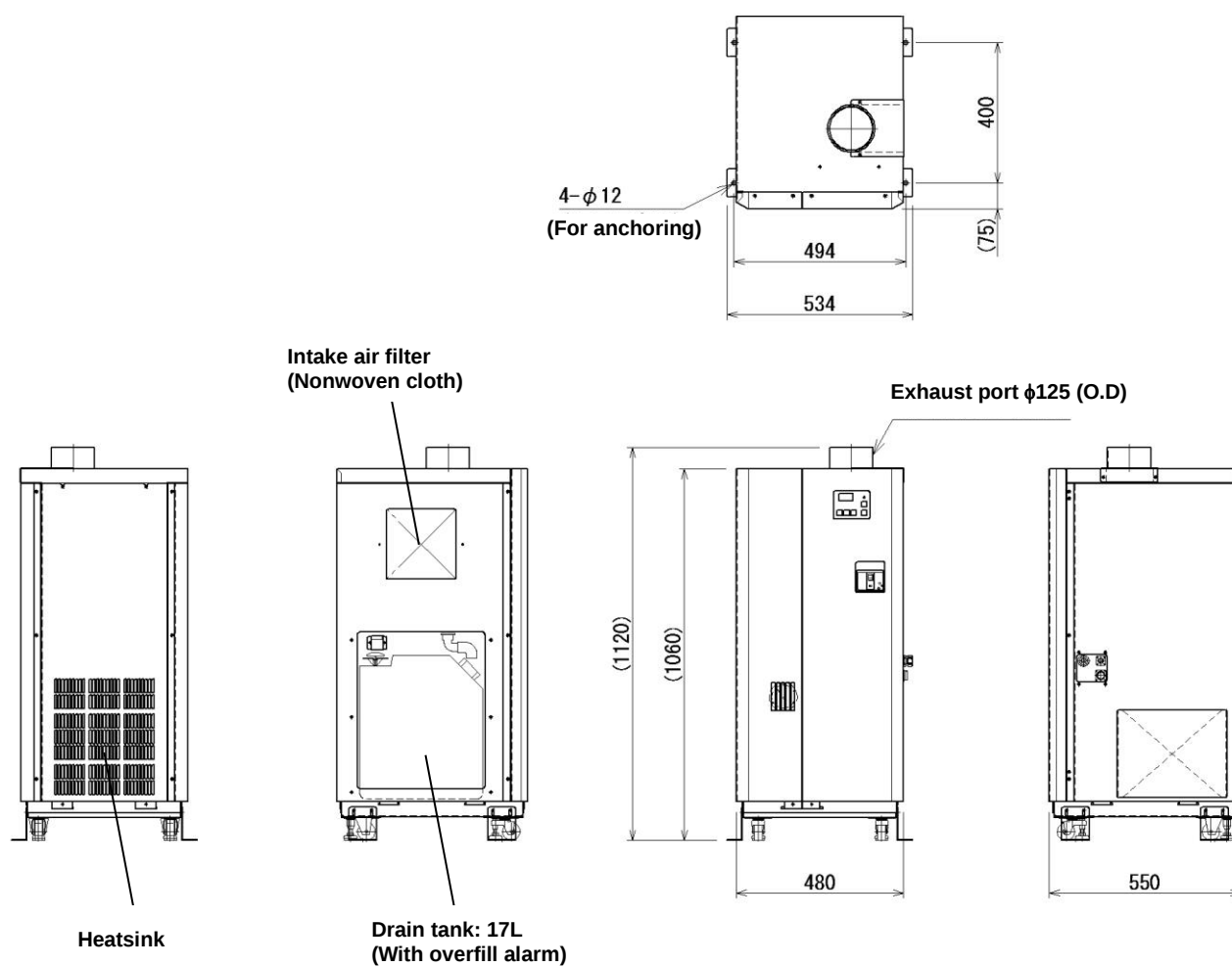


**** Remarks ****

- Regarding the reduced scale and etc., above illustrations do not strictly agree with an actual machine
When examining the line configuration, size, etc., please ask for the materials for them.

(Unit: mm)

■ Temperature control unit (Option) PAP02A-SPH

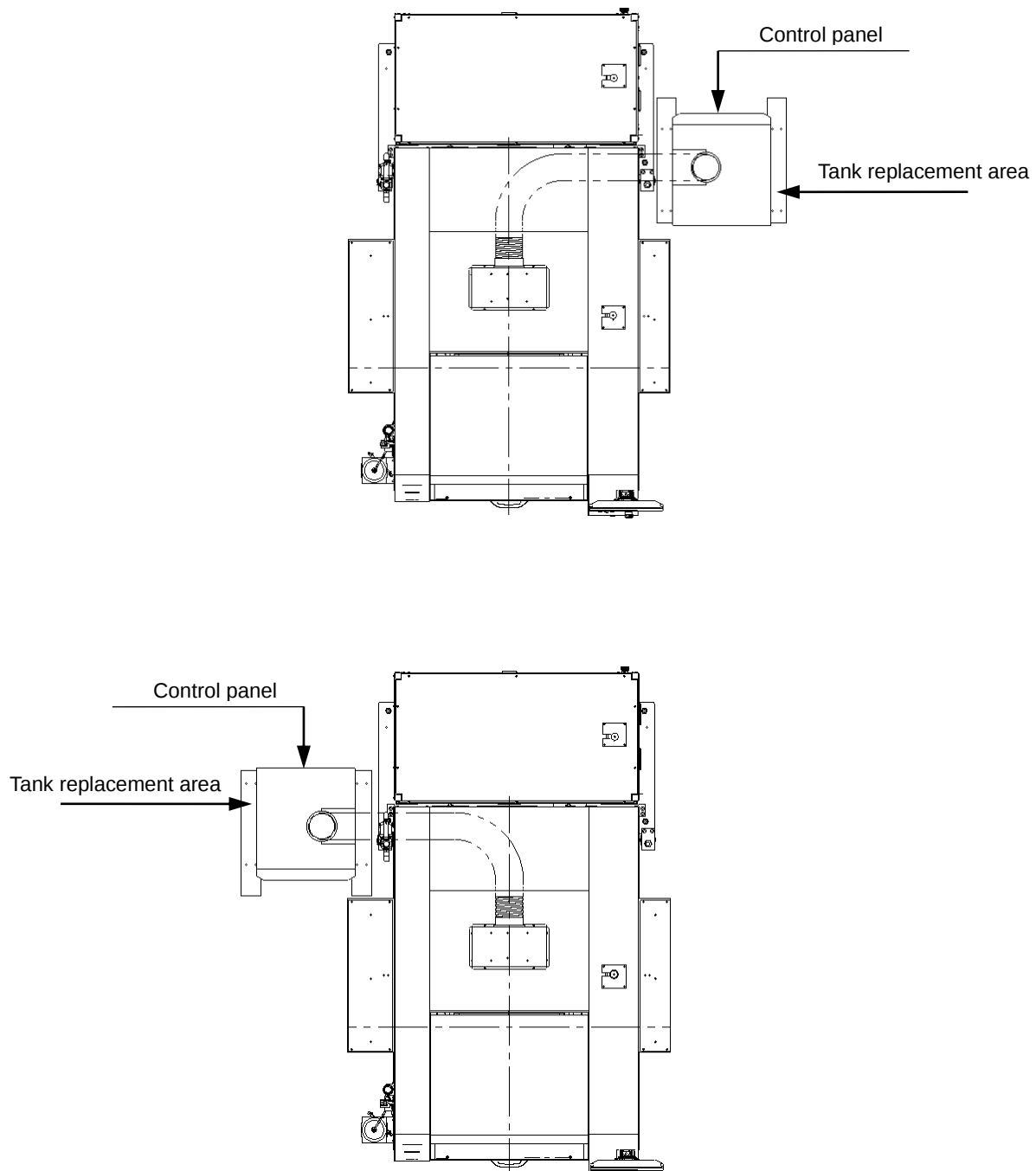


**** Remarks ****

- Note that the illustrations are not to scale.
When reexamining line configuration or dimensions, you may request separate materials.

■ Temperature control unit PAP02A-SPH Layout Reference

Make sure that control panel and tank replacement area are facing the directions shown as below, and then place temperature control unit in a position where a duct can be reached. (duct length : two meters).



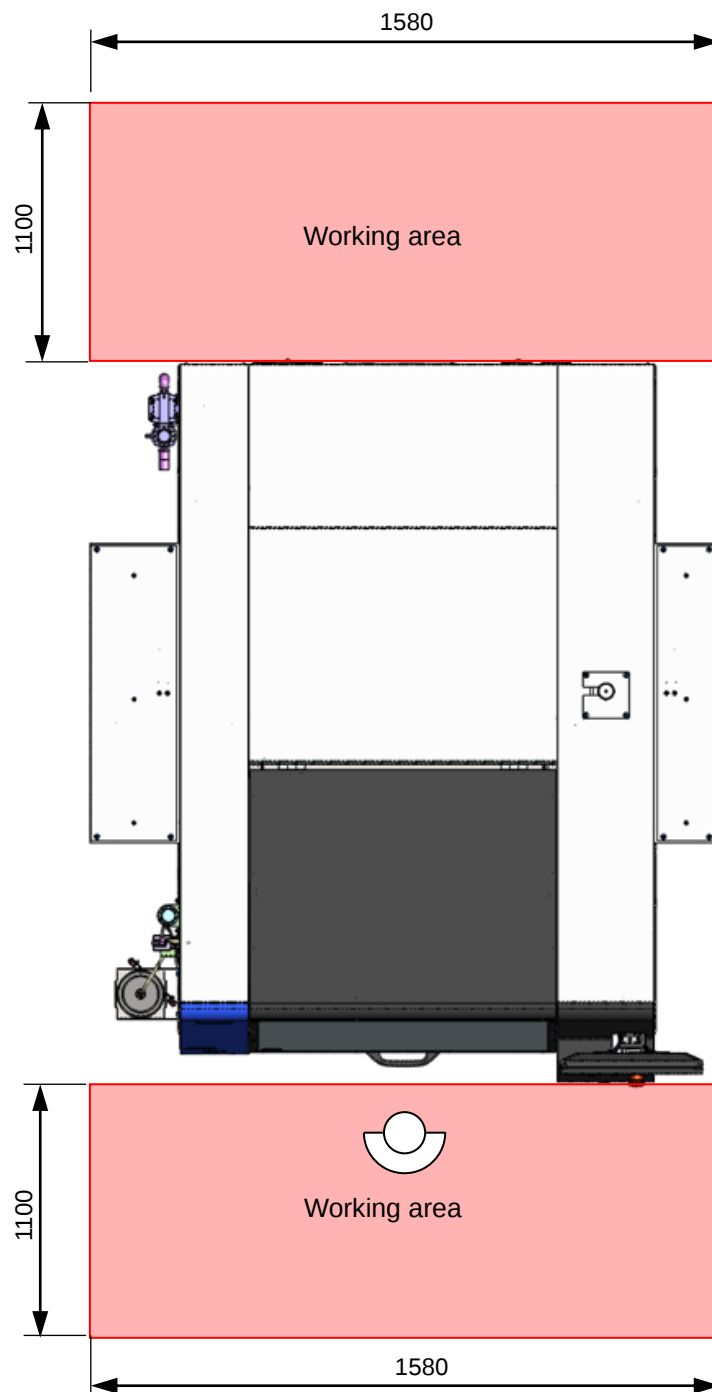
14. Working area

(Unit: mm)

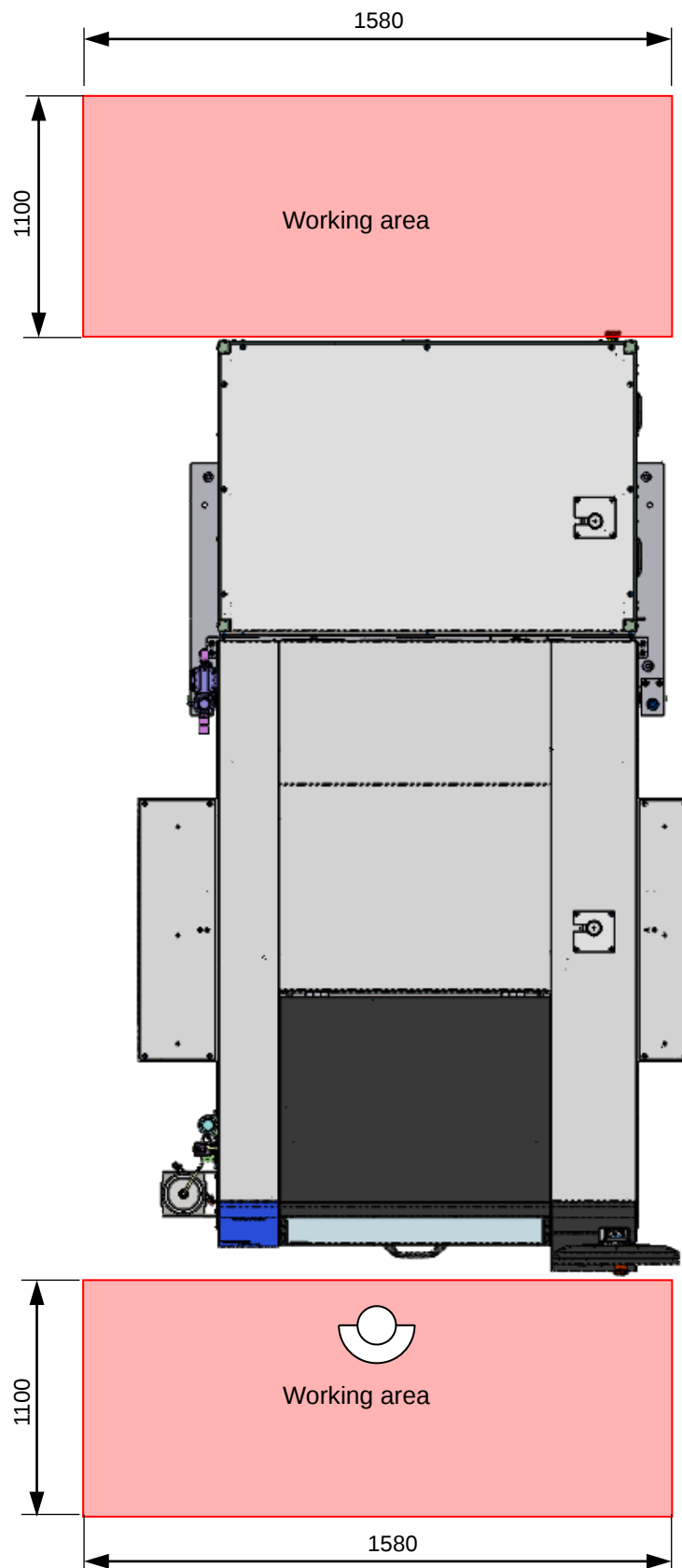
To ensure the safety of operations including installation, model changeover and maintenance, the following working area is required at a maximum.

- Note that the working area size required varies depending on conditions such as the actual installation location, masks or PCB size, job operations, and others.

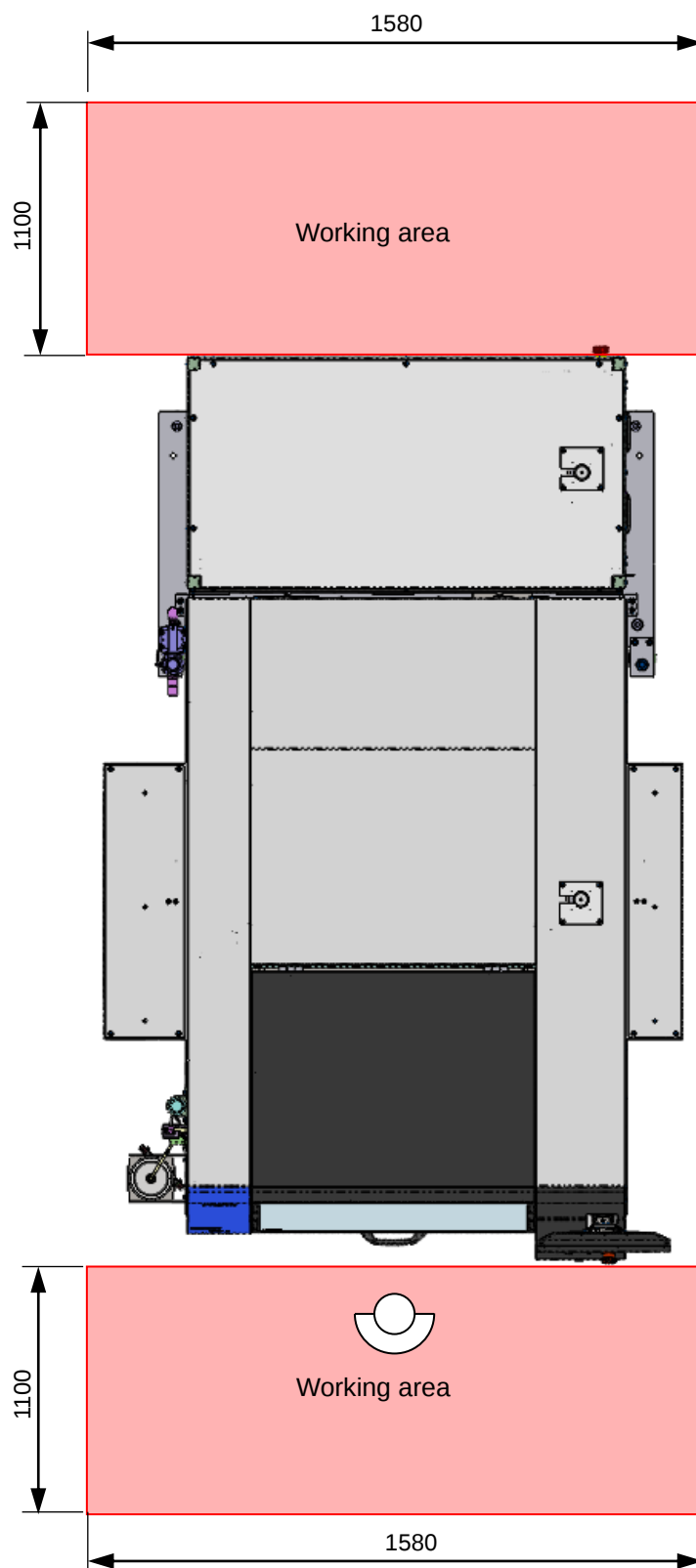
■ No Mask Changer



■ Mask changer(Optional)

Size L

■ Mask changer (Option)

Size M

15.Regarding Licenses

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

- Solder inspection function Pro
- PanaCIM-EE ready(Material verification)
- Automatic changeover
- APC-F.B.(Position)
- APC-F.B.(Volume)
- APC-5M
- Interface software of the inspection machine from other companies
- Upper communication

IMPORTANT—

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

Please be sure to look through it.

Terms and conditions regarding the use of software

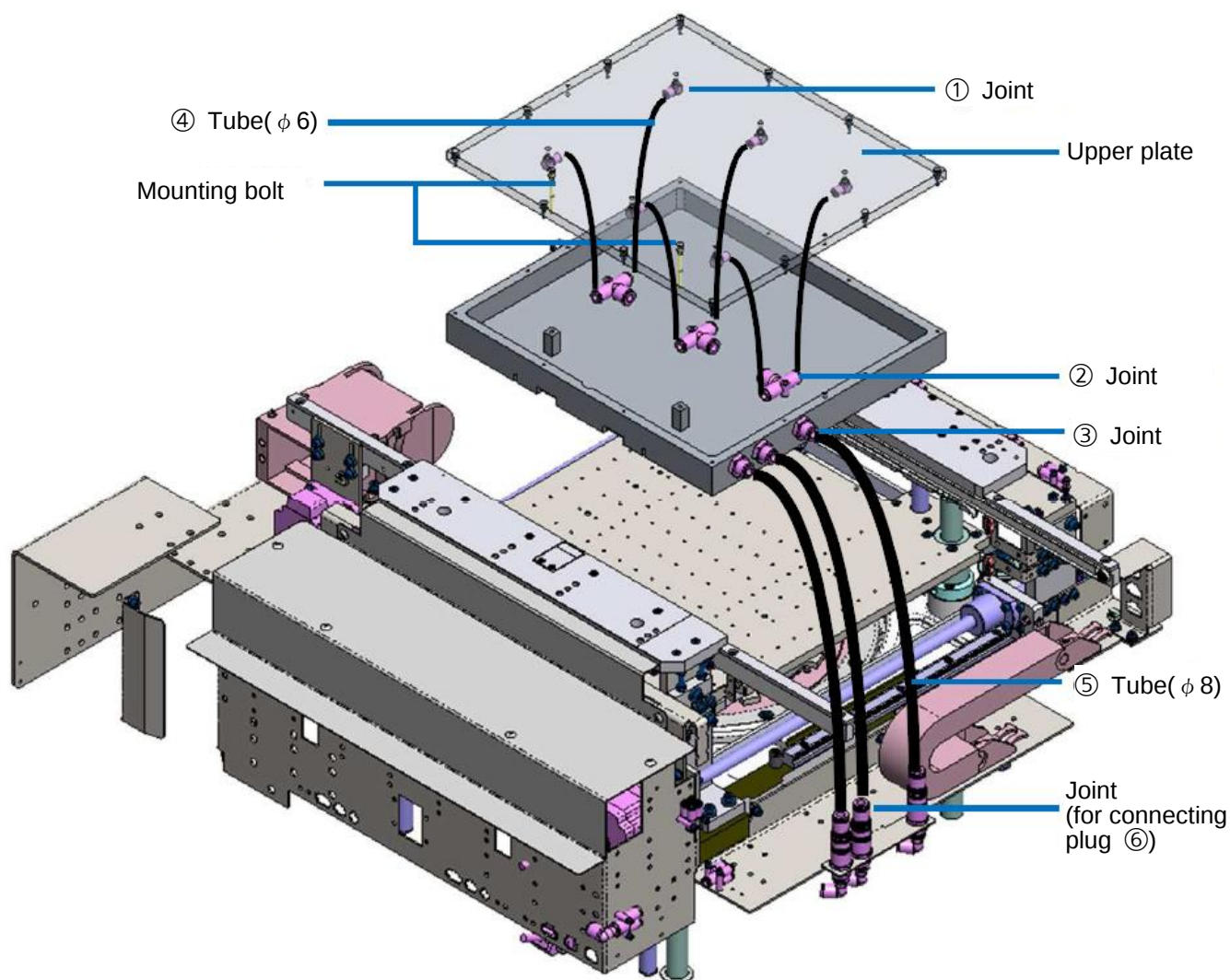
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 - (4) Any defects caused by accident, misuse, neglect, abuse, mishandling, misapplication, modification, alternation, acts of God, or improper installation or maintenance; or
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Important Notes

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

PCB vacuum box design procedure

■ How to mount



* The illustration above shows a hybrid vacuum type box.

No.	Name	Model	Type
①	Joint	M-5HL-6-X93	Hybrid vacuum
②	Joint	KQ2T06-08A(SMC)	Hybrid vacuum
③	Joint	KQ2H08-00A(SMC)	Hybrid vacuum
		KQ2H08-01AS(SMC)	Conventional
④	Tube	TU0604B(SMC)	Hybrid vacuum
⑤	Tube	TU0805B(SMC)	Common
⑥	Plug	KQ2P08(SMC)	Common

● Plugs are used to the joint parts with no tube connected.

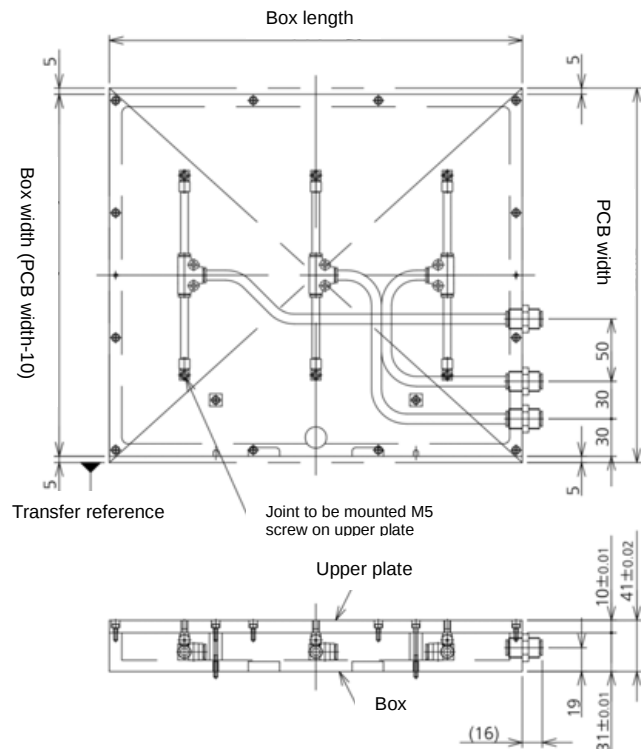
■ **Basic dimensions① (Hybrid vacuum type: Suction by blower and vacuum pump)**

(Unit: mm)

Basic dimensions 1

Blower vacuum, Hybrid vacuum type
(Suction with blower and vacuum pumps)

- This box is shared with NPM-GP/L, SPG2, SPV, SPV-DC.
- To use this box with other models, consult with us separately.
- Suction holes of upper-layer plate
 - Locate on the downside of the board when suction is from side with a vacuum pump.
 - Locate on the downside of the board, PCB slits or outside of board when suction is from downside of a box with a blower.



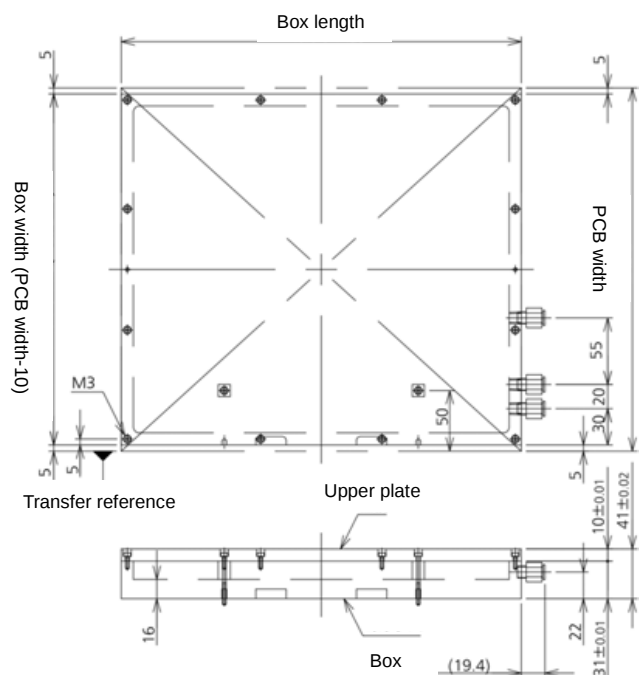
■ Basic dimensions② (Suction by vacuum pump only)

(Unit: mm)

Basic dimensions 2

Vacuum pump only, Conventional type

- Apply the target PCB width to the [PCB width] in the drawing.
- The box length must be no greater than 510 mm.
- To share the box with the SP28P-D or earlier models, a sensor recess is required. Consult with us separately.



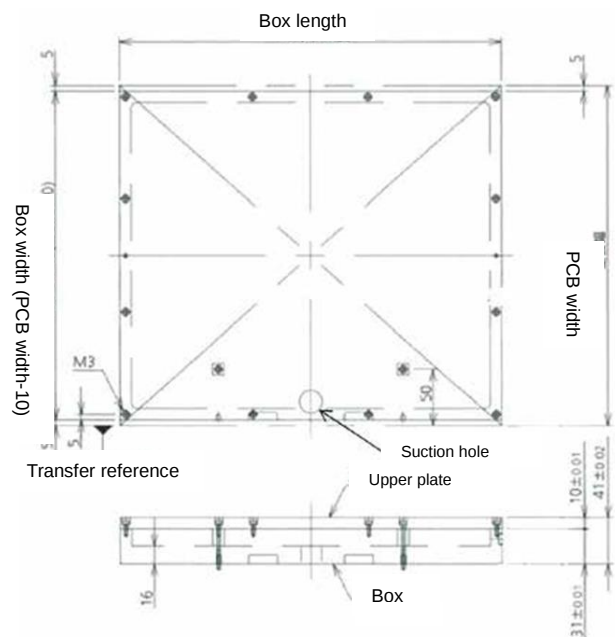
■ **Basic dimensions③ (Suction only with a blower)**

(Unit: mm)

Basic dimension 3

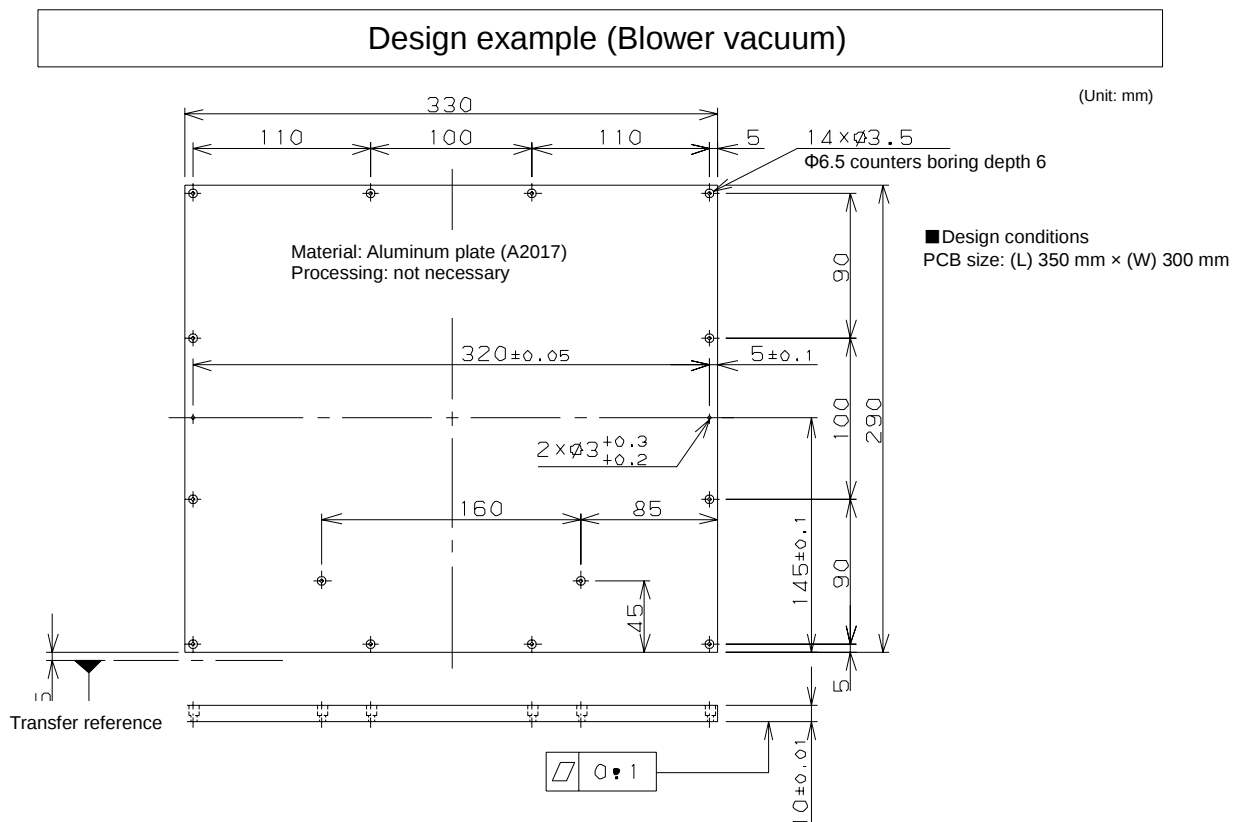
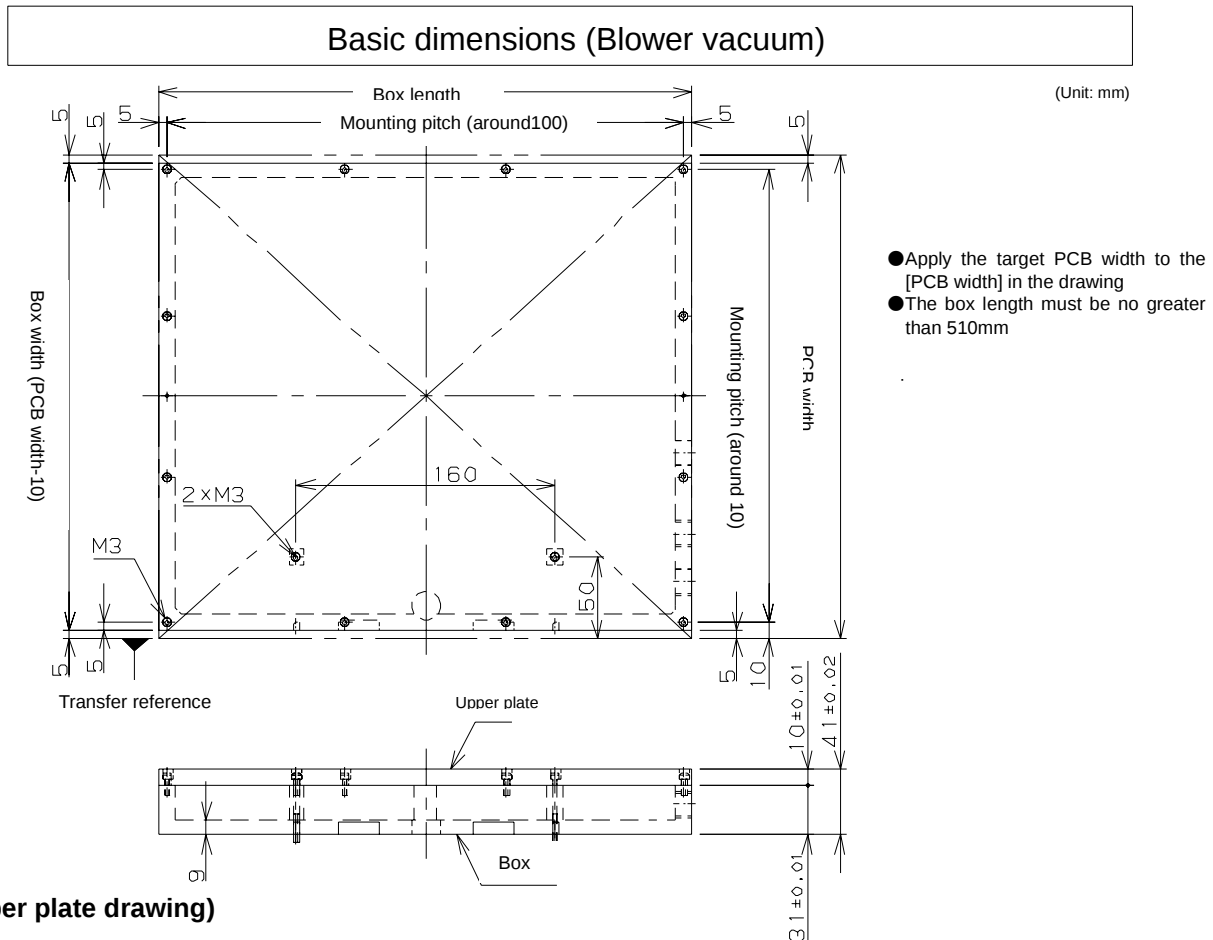
Blower suction specification
(Suction only with a blower)

- This is a box dedicated for NPM-GP/L, SPG2, SPV, SPV-DC.
- This can be used on SPG, however contact us before you use this on other machines
- Suction holes of upper-layer plate
 - Locate on the downside of the board, PCB slit or outside of board when suction is from the downside of a box with a blower.



■ Example of the PCB vacuum box design 1 (Hybrid vacuum type: Suction by blower and vacuum ejector)

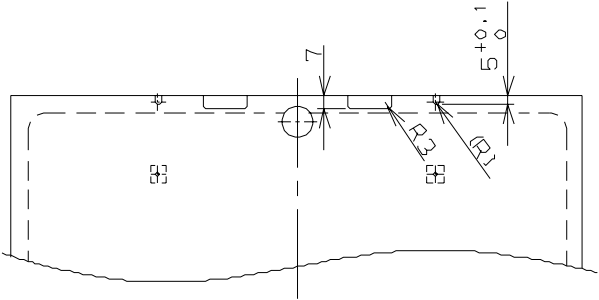
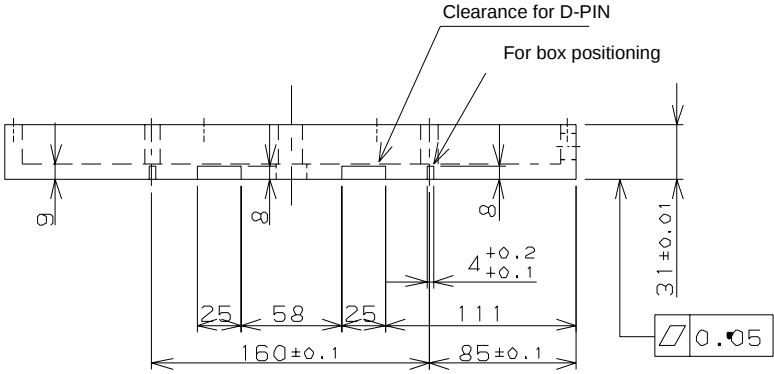
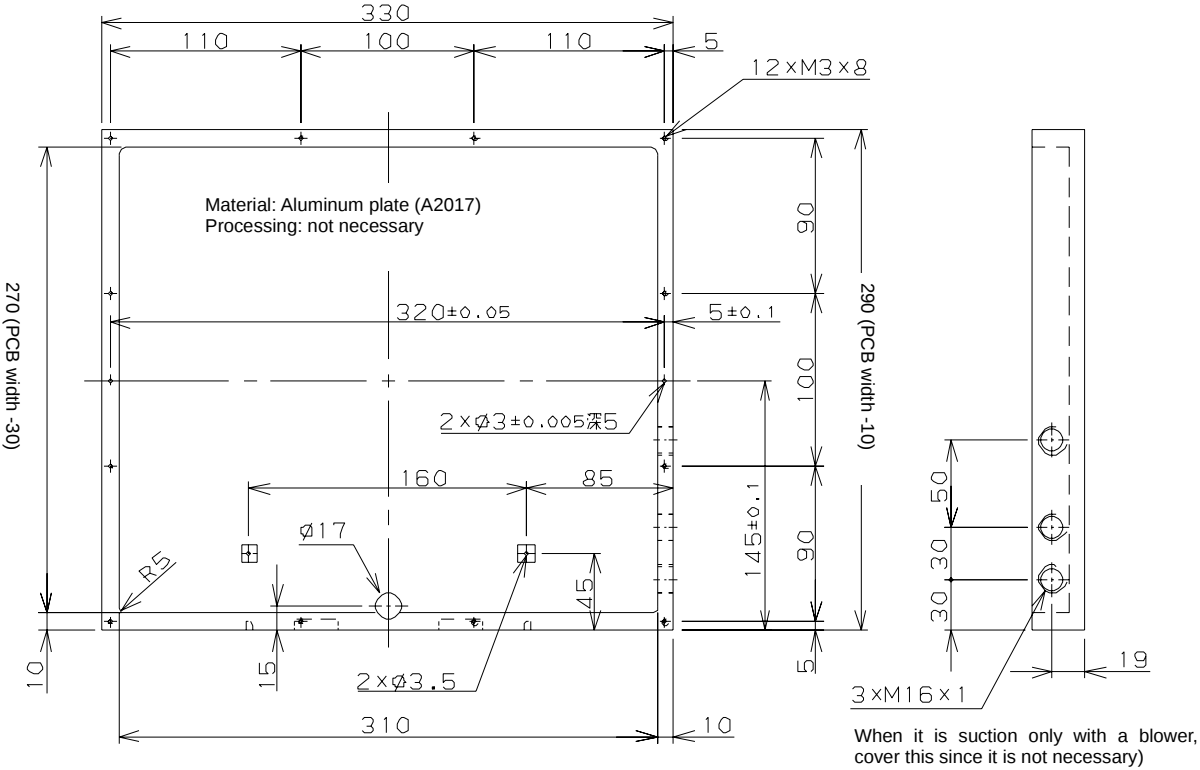
(Assembly drawing)



(Lower box drawing)

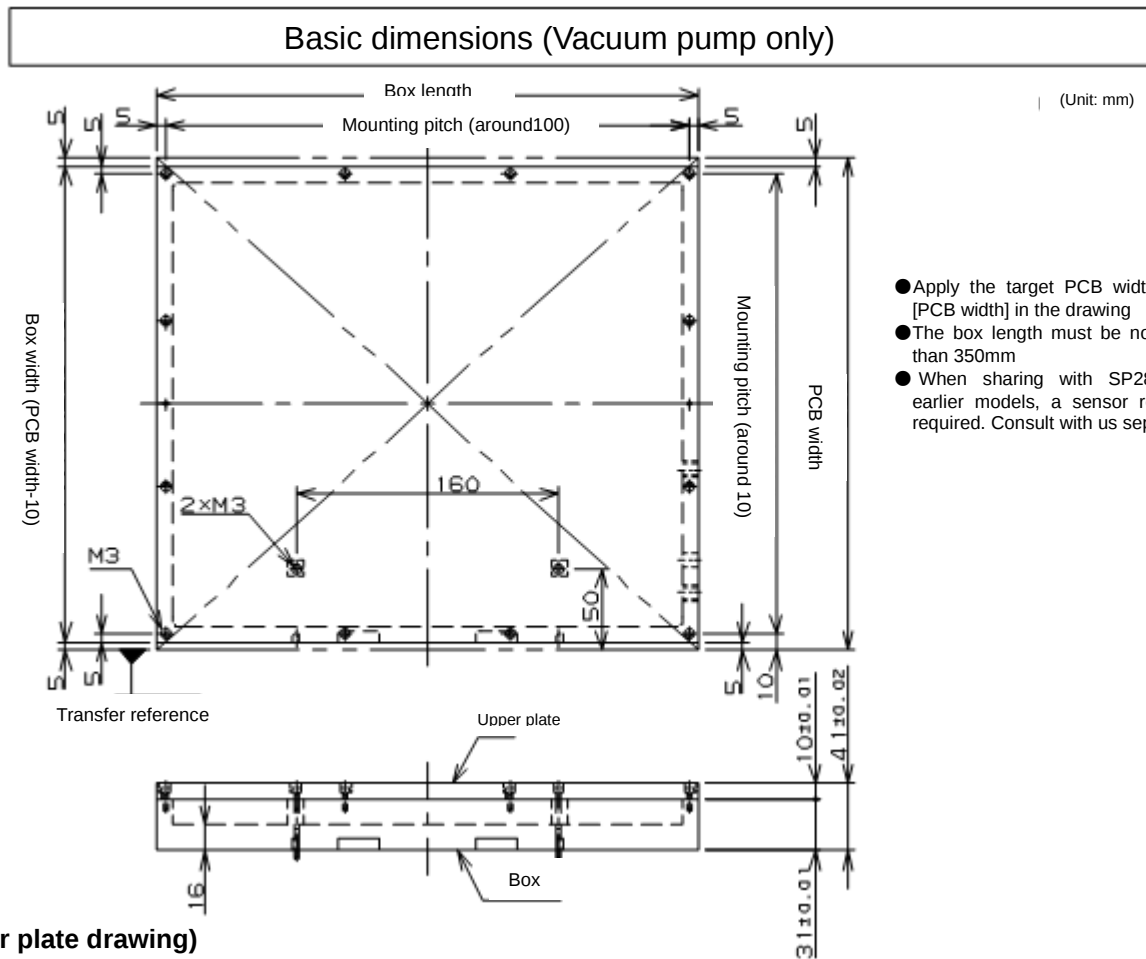
Basic dimensions (Blower vacuum)

(Unit: mm)

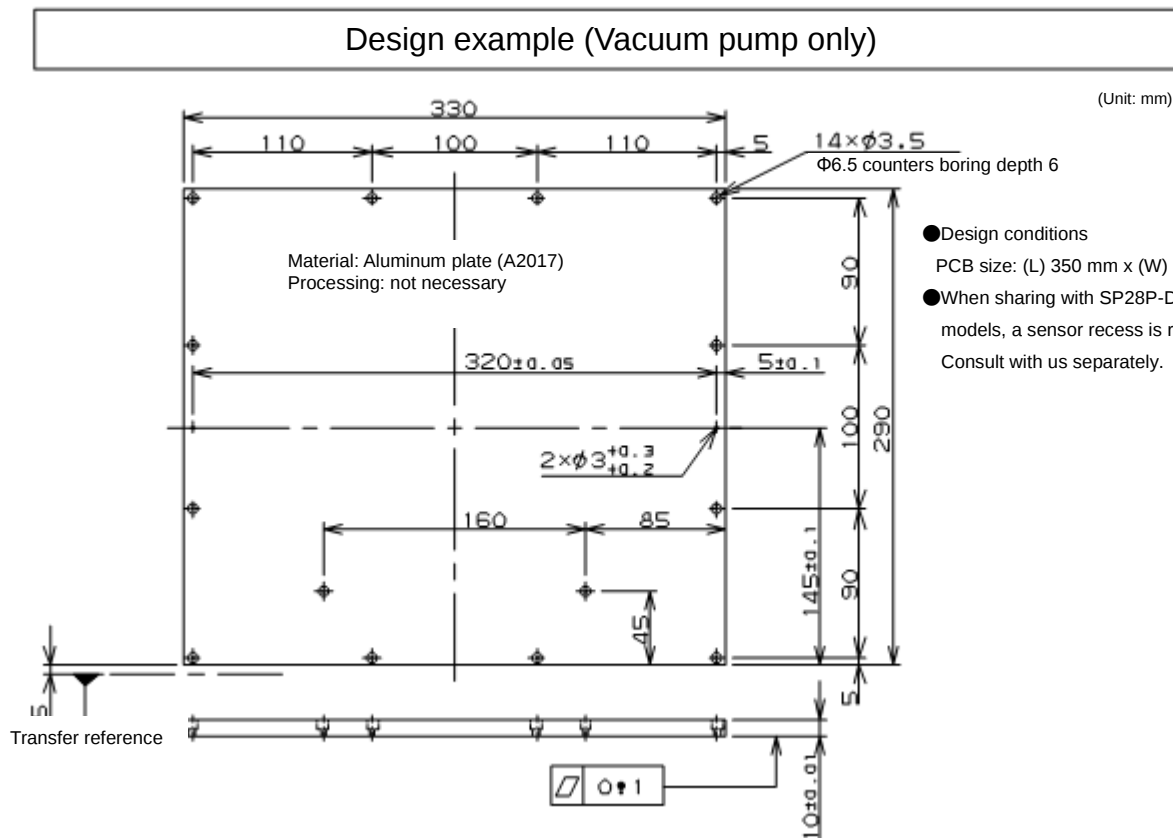


■ Example of the PCB vacuum box design 2 (Suction by vacuum pump only)

(Assembly drawing)



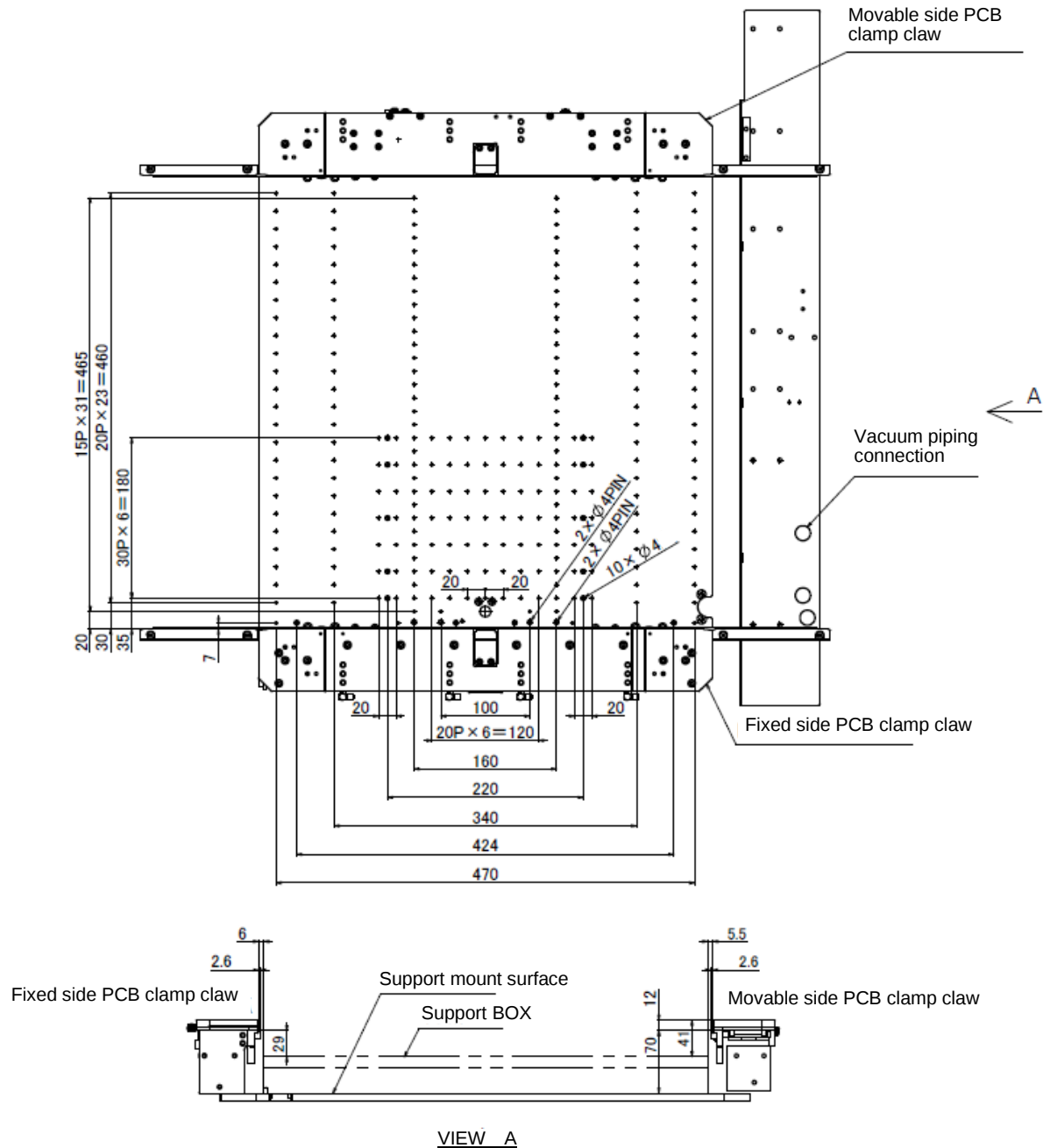
(Upper plate drawing)



■ Example of the PCB vacuum box design

■ Vacuum box mounting dimensions

(Unit: mm)



Customer Inquiry Form

We welcome your questions at all times.

If you have any troubles with printing condition setting or maintaining printing quality, please feel free to consult with us.

Date

Company name			
Your name		Product	
Machine		Serial No.	

Marketing		Agency	
-----------	--	--------	--

Question		
1) What happened? / What's matter?		
2) How happened? / What goal?		
3) What condition? / Why do you want?		
Printing Difficulty	QFP, Connector	0.65p, 0.5p, 0.4p, 0.3p, Others :
	BGA, CSP	1.0p, 0.8p, 0.5p, 0.4p, 0.3p, Others :
	Chip	3216, 2012, 1608, 1005, 0603, 0402, 03015, 0201, Others :
Stencil	Manufacturer	
	Process	Additive, Etching, Laser, Others :
Solder Paste	Manufacturer	
	Type	

★ Submit the "Printing Condition Adjustment Sheet" as well to help us offer you more specific suggestions.

Answer		
Section		Name
1) Factor		
2) Solution, Suggestion		
3) Others		

* This sheet is only for customer service, not for assurance of specification and performance.

Printing Condition Adjustment Sheet

This sheet is used also at PFSC when verifying the printing condition.
We recommend you to use it for easier and quicker adjustment.

Company name	
--------------	--

Your name		Date	
Machine		Serial No.	

Printing Difficulty	QFP	mm pitch	BGA, CSP	mm pitch
---------------------	-----	----------	----------	----------

Solder Paste		Stencil	
Manufacturer		Manufacturer	
Type		Process	
Viscosity		Thickness	μm (Half-etched area μm)
Thixotropic rate		Min. Size of Stencil Aperture	mm × mm
Particle diameter	μm ~ μm	Max. Size of Stencil Aperture	mm × mm

- Printing Process is divided into the following two processes.
 - 1) Process 1: Filling Up Solder Paste in Stencil Apertures
 - 2) Process 2: Mask-release control (Drawing Off Solder)
- Important Factors in Printing Process
 - 1) Process 1: Squeegee Speed (Up or Down), Squeegee Pressure and Squeegee Angle.
 - 2) Process 2: Speed of Mask-release (Up or Down)
- Avoid using new materials (solder and stencil) together as far as possible.
Make sure either solder or stencil is proven in use. (Otherwise, printing condition cannot be set properly.)
- You should analyze error factors with quantities of solder on board and also of remaining solder in stencil apertures.

Factor	Items	Unit	Condition					
			1	2	3	4	5	6
Process 1	Squeegee Speed	mm/s						
Process 2	Squeegee Pres- sure	× 10 ⁻² N/mm						
Process 3	Blade Thickness	mm						
	Squeegee Outer Length	mm						
Snap Off	Snap Off Speed	mm/s						
	Snap Off mode	---						
	Snap Off Stroke	mm						
	Clearance	mm						
	Squeegee Type	---						
	PCB Clamping Pressure	MPa※						
Error Detail	Solder on PCB (Much, Suitable or Little)							
	Remaining Solder in Aperture (Much, Little or Nothing)							
	Anisotropy (Yes or No)							
	Shape							
	Others							
	Cleaning condition							
Judgment								
Remarks								

* 1 kgf/cm² = 0.0981 MPa

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Panasonic Connect Co., Ltd.

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