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11. Main Specs.

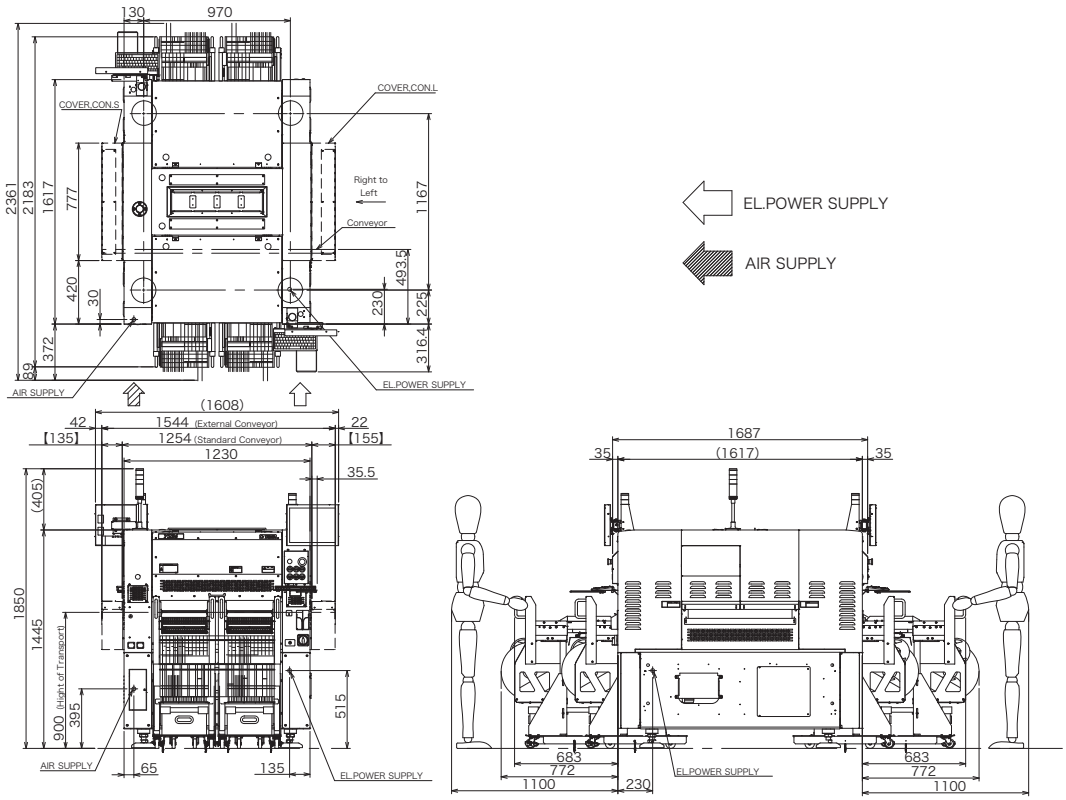
11.1 Outline dimensions

- L1,254 x W1,687 x H1,445 mm (main unit only)
- L1,544 x W1,687 x H1,445 mm (With conveyor extension)

* These dimensions do not include detachable protruding parts.

* See the drawing below for dimension details and dimensions with the various optional devices.

* The figure below shows the system with all options (feeder batch change carriage, etc.) installed.



11.2 Weight

- Approx. 1,700 kg (main unit only)
- Approx. 65 kg (12mm pitch feeder batch change carriage)

11.3 Air supply source

- 0.45MPa or higher (4.5kgf/cm^2 or higher), clean and dry air

* Use an air supply hose with an inner diameter of 8mm or larger to ensure an adequate air flowrate.

* Install an air dryer and line filter in the air supply source line to ensure that good quality air is supplied. (The purpose of the air filter inside this machine is only to protect the machine itself. It is important that the air supplied from the customer's air source line also be kept clean and dry in order to ensure that the functions and performance of this machine are maintained over a long period.)

11.4 Air consumption flowrate

- 260L/min (ANR) (Average consumption amount for basic model under standard operating conditions) (Note: EM1005005)
- 350L/min (ANR) (Max. momentary flowrate of basic model) (Note: EM1005005)
- 270L/min (ANR) (Average consumption amount under standard operating conditions with tape cutter installed) (Note: EM1005005)
- 430L/min (ANR) (Max. momentary flowrate with tape cutter installed) (Note: EM1005005)

* "ANR" is an acronym for the French term "Atmosphere Normal de Reference" (standard reference atmospheric conditions). This condition is defined as a temperature of 20°C, relative humidity of 65%, absolute pressure of 101.3kPa (1.03kgf/cm^2) or 760mmHg).

11.5 Power supply

-01- Compatible types:	3-phase 200VAC / 208VAC / 220VAC / 240VAC / 380VAC / 400VAC / 416VAC ±10%	
-02- Frequency:	50Hz / 60Hz	
-03- Capacity:	8.8kVA	(Note: EM0907017)
-04- Average power consumption:	2.0kVA (under standard operating conditions)	(Note: EM0907017)
-05- Power cable:	Cross-sectional area of each phase conductor: 5.5mm^2 or larger	
-06- Other:	<1> To prevent electric shocks, be sure that the power source is shut off when connecting the power supply. <2> Be sure to securely connect the main unit's ground wire.	

11.6 Noise level

- 78dB (A) or lower

11.7 Ambient environment

-01- Temperature
- 15 to 35°C (functional guarantee)
- 20 to 28°C (precision guarantee)

-02- Humidity
- 20 to 80%, no condensation (permissible range)
- 50 to 60% (Optimal range)

* A condition of 40% or higher should be maintained to prevent electrostatic charges.

* When using an industrial humidifier, always use pure (deionized) water.

-03- Atmosphere
<1> Free from dust, etc.
<2> Free from organic solvent vapor, sulfurous acid gas, chlorine gas, and flammable gas.

-04- Elevation
Do not use at altitudes exceeding 1,000m above sea level.

* To prevent the insulation performance from being adversely affected by the atmospheric pressure and cosmic rays.

-05- Installation site floor requirements

<1> The floor's load strength must be capable of supporting a weight of approximately 850kg/cm^2 or more.

* Regarding the floor's load strength, please consult with a qualified professional who is familiar with the installation site. At that time, be sure to provide the professional consultant with information regarding the equipment weight, floor footprint, and adjustable feet positions, etc.

<2> The floor must be level, and strong enough to prevent vibration during equipment operation. A concrete floor, or a floor with a strength equivalent to concrete, is required. Unacceptable floors include wood floors, typical office floors, and grating floors (gutter cover gratings, etc.).

* For non-concrete floors, consult with a professional who is familiar with the installation site in order to determine the best way to reinforce the load-bearing positions where the equipment's adjustable legs (feet) will be located.

<3> When using feeder batch change carriages at both the front and rear, the floor's levelness must within 10mm, including the area directly beneath this equipment.

-06- Ambient noise
<1> Free from loud noises.
<2> The equipment's operation sounds and warning buzzers, etc., must be audible over the ambient noise.

-07- Ambient lighting
Strong sunlight, etc., must not be shining on the vision system (optical image processing system).

-08- Immunity / electromagnetic noise resistance, or electromagnetic susceptibility
Refer to section 10.7 "CE Marking".

-09- Emission / electromagnetic noise generation, or electromagnetic interference
Refer to section 10.7 "CE Marking".

12. Basic Performance

12.1 Mounting capability

- 72kCPH (0.050sec/CHIP) * Under optimal Yamaha conditions
- The mounting capability when using the customer's boards and components can be estimated (calculated) by using the following tools (consult with Yamaha for details):

-1- Simple tact simulation program

-2- Yamaha SMT line support software Y.FacT / P-Tool

12.2 Mounting accuracy

When using Yamaha's standard evaluation test board, glass QFP16 / ceramic chip components, and two-faced adhesive tape

- Absolute accuracy (μ+3 σ) for CHIP: ±0.05mm / Chip
- Absolute accuracy (μ+3 σ) for QFP: ±0.05mm / QFP
- Repeated accuracy (3 σ) for CHIP: ±0.03mm / Chip
- Repeated accuracy (3 σ) for QFP: ±0.03mm / QFP

12.3 Compatible components

Components for which normal mounting can be expected when all conditions are good

The mounting capability of this equipment is significantly affected by operating conditions such as the components and boards, etc., which are being used. Determining whether or not a given component can be mounted requires a test operation with an actual sample of the component in question. Some guidelines for compatible components are given in the table below.
(Factors which determine whether or not a component can be used include the following: an electrode lead's bend, lift, optical surface conditions. An electrode's deformation, height variations, background color, and glossiness conditions. The component's weight, the pickup nozzle's contact face condition, and amount of board warp, etc.)

Component Types	Representative Component Sizes	Remarks
Square chip components Cylindrical chip components Mini-mold transistors Power transistors Aluminum electrolytic capacitors, etc.	0.4 x 0.2mm to 8 x 8mm * Thickness of 6.5mm or less	
Lead electrode components (SOP, SOJ, QFP, etc.) * When 8x8mm or smaller, the scan recognition camera (standard / with coaxial illumination) is used. * When larger than 8x8mm, the multi-camera (option) is required.	5 x 4.5mm to 20 x 20mm * Thickness of 6.5mm or less 20 x 20mm to 32 x 32mm * Thickness of 6.5mm or less	Min. lead pitch: 0.4mm or larger (0.22mm pitch for a reference lead width of 0.18mm) Min. lead pitch: 0.5mm or larger (0.28mm pitch for a reference lead width of 0.22mm)
Odd-form components such as connectors, etc.	*** to 32 x 32mm * Thickness of 6.5mm or less	Separate consultation required for each component.

12.4 Side-view recognition system

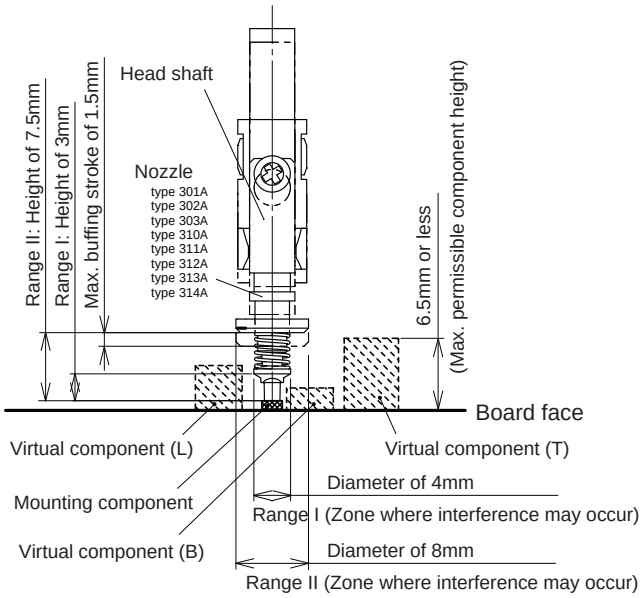
Scan recognition camera (standard / with coaxial illumination)

- Thickness detection function: Square 0402 to 3216 chip components ("mm" size), thickness of 1.2mm or less.
- TBoard top & bottom face detection function: Components such as mini-mold transistors and 2-terminal diodes, etc., which can be identified on both the top and bottom faces of the board.
  Smaller than 4x4mm, with a thickness of 0.32 to 1.2mm, and with features such as lead electrodes, etc., which are often in the X-direction.

12.5 Reflective-surface component compatibility (with coaxial illumination "scan camera CX")

From December, 2010, an optional "scan camera CX" is available with additional coaxial illumination LEDs to accommodate components with reflective surfaces (bare chips, small metal pieces, glass components, etc.) which make the electrode area difficult to recognize. This camera enables recognition of small reflective-surface components without using the multi-camera. Compatible components are the same as for the standard specs. scan camera: 8x8mm or smaller, with a thickness of 6.5mm or less.

12.6 Component height & mounting restrictions (at mounting and loading processes)



-01- Max. permissible component height: Height: 6.5mm or less

-02- Mounting restrictions: Height: 6.5mm or less

- In the above figure, virtual component <B> is free of any interference.
- In the above figure, virtual component <L> can be mounted because it is outside "Range I", but interference will occur if it is positioned inside that range.
- In the above figure, virtual component <T> can be mounted because it is outside "Range II", but interference will occur if it is positioned inside that range.

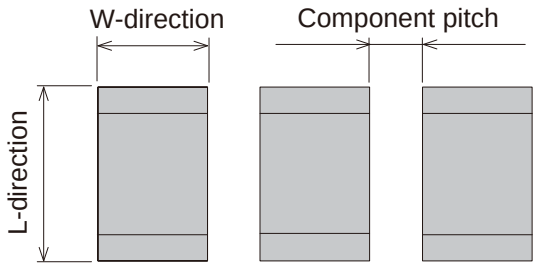
The "P-Tool" programming tool is available as support software to assist users with mounting restrictions such as the above interference risks, etc. Users are encouraged to specify this programming tool.

⇒ For details, see section 3. "Ordered Items / -4- Support System".

-03- Permissible height on board before board loading: Height: 6.5mm or less

*In the same manner as described at item -02- "Mounting restrictions" above, it may not be possible to mount other components within a given area around components which have been mounted before the board is loaded to the machine.

12.7 Component mounting pitch



Mounting components ("mm" size)	Component mounting pitch			
	For interchangeable 30X group nozzles		For narrow-pitch 31X group nozzles	
0603 square chips (L0.6 x W0.3mm)	301A nozzles	0.35mm or more	311A nozzles	W-direction: 0.15mm or more
1005 square chips (L1.0x W0.5mm)			312A nozzles	W-direction: 0.15mm or more

* The above values apply under Yamaha standard conditions (when using Yamaha's standard evaluation test board, standard components, and two-faced adhesive tape).

* The above values may not be obtainable for some tape reel pocket shapes and dimensions, and for some component shapes and dimensions.

* A mounting pitch smaller than those shown above requires a special specification nozzle (separate consultation required).

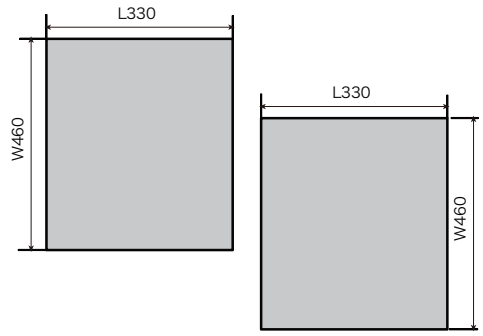
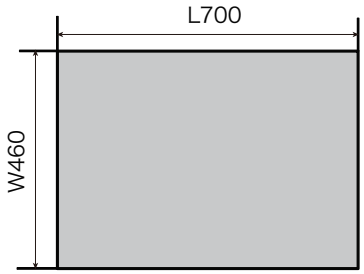
12.8 Compatible board dimensions

- L50 x W50mm (min.) to L700 x W460mm (max.) [Dual stage type & single lane type]
- When the "Yamaha dual lane system" is installed, the maximum dimension shown above is as follows:
  (A) Same-type boards, W216mm (max.) x 2 boards.
  (B) Or, for 2 different-type boards, W382mm (max.) + W50 (min.) [trade-off relationship].

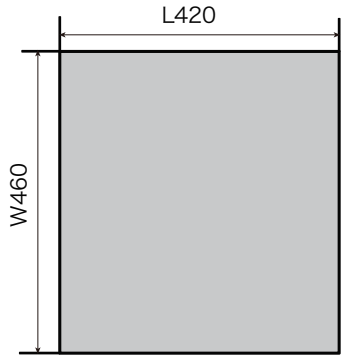
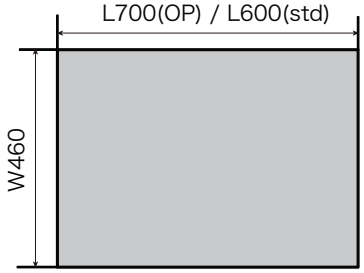
* "L" denotes the conveyance direction, and "W" denotes the direction which is at right angles to the conveyance direction.

* The maximum dimensions are explained in the illustration below. Note, however, that these dimensions vary, depending on the presence/absence of a double fiducial camera, and the presence/absence of an L700mm compatible stopper.
The dimensions shown in the illustration apply when the L700 (op) stopper is installed.

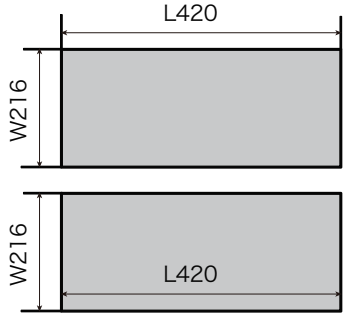
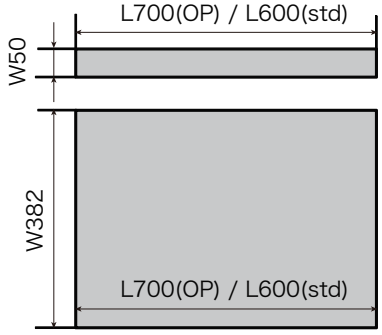
● Dual stage type ==> [DS]

L&W max. dimensions with 2-stage conveyor. L max. dimension with single FID.	W max. dimension with 1-stage conveyor. L max. dimension with double FID.
	

● Single-lane type ==> [SL]

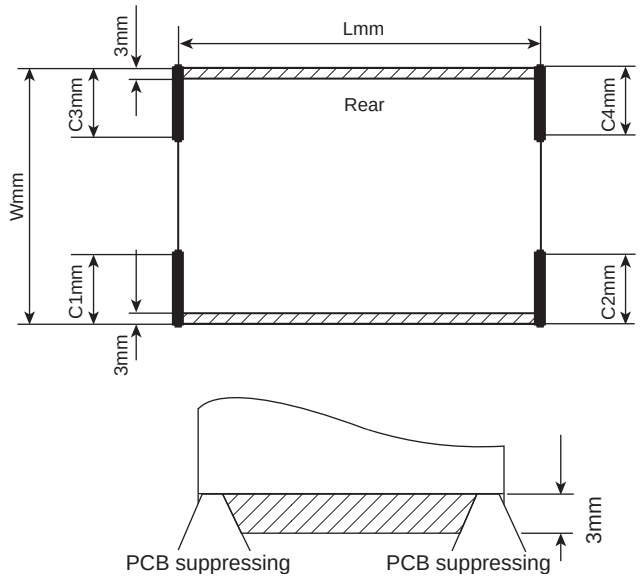
W max. dimension. L max. dimension with single FID.	W max. dimension. L max. dimension with double FID.
	

● Yamaha dual-lane system (dual lane type ==> [DL]

W max. dimension with 2 same-type boards conveyance. L max. dimension for single FID.	W max. dimension (one-side PCB) with 2 different-type boards conveyance. L max. dimension with double FID.
	

12.9 Compatible board's "mounting not possible" range

As shown in the illustration below, mounting is not possible at specified parts of the board because this could cause interference with the conveyor rail, and, in particular, the board holding hooks. Moreover, the 30mm straight area represented by "Cx" is also required for stopper operation. The "Cx" area shifts to the C1, C2, C3, or C4 areas, depending on the conveyor type, the conveyance direction, and the conveyor reference machine configuration.



- Dual stage type & single lane type
  - C1: Right → Left conveyance & front reference
  - C2: Left → Right conveyance & front reference
  - C3: Right → Left conveyance & rear reference
  - C4: Left → Right conveyance & rear reference
- Dual lane type
  - C1: For Right → Left conveyance, with front conveyor
  - C3: For Right → Left conveyance, with rear conveyor
  - C2: For Left → Right conveyance, with front conveyor
  - C4: For Left → Right conveyance, with rear conveyor

"Mounting not possible" range

12.10 Compatible board thickness

- 0.4 to 3.0mm

12.11 Compatible board weight

- 0.65kg / sheet or less

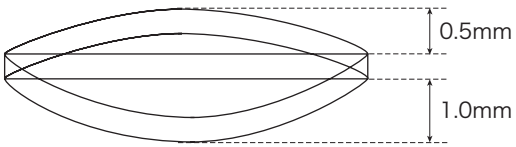
  * Consultation required for board weights exceeding 0.65kg.

12.12 Recommended board material

- Glass fiber reinforced epoxy resin

  * Separate consultation required for other materials.

12.13 Compatible board's permissible warp



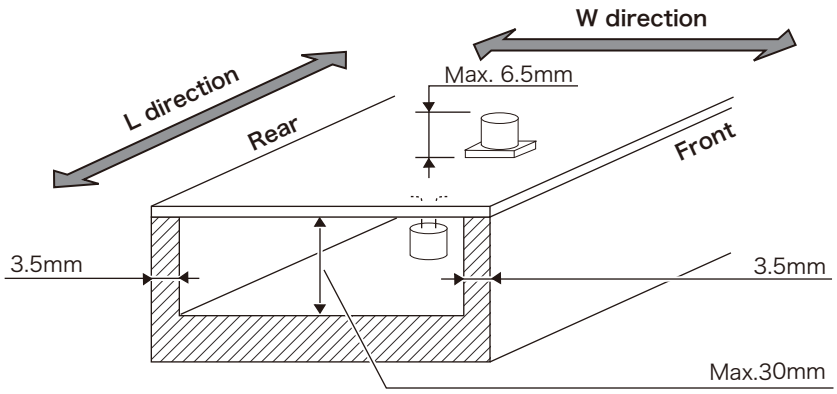
- Upward warp: 0.5mm or less
- Downward warp: 1.0mm or less

* Warps which exceed the above values (particularly the upward warp) will dramatically reduce the mounting accuracy. Moreover, an excessive warp could cause interference with the head, nozzle, or camera. To avoid this, check the board's warp carefully.

12.14 Board slits & holes

The conveyor is equipped with sensors (light transmission type) to check the position of boards being conveyed. Therefore, this position detection may not be possible for boards which have slits and holes. Separate consultation is required for such boards.

12.15 Compatible board's component restrictions

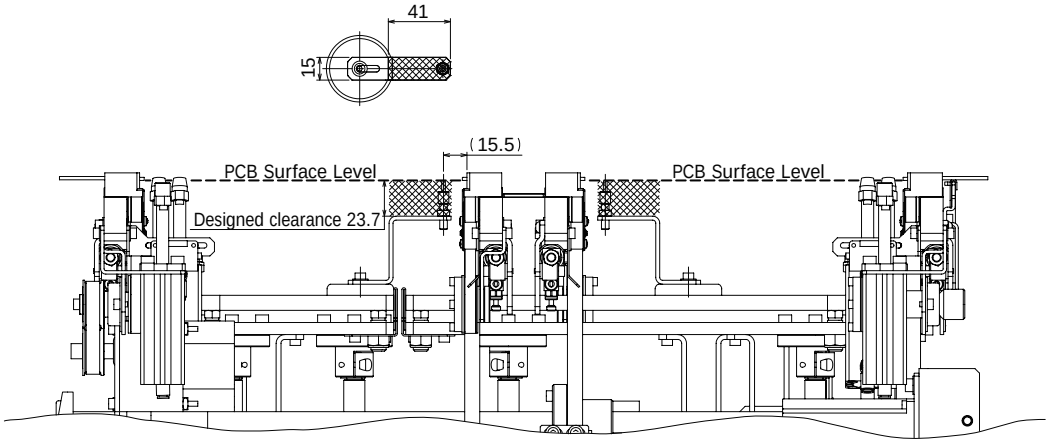


- The height of the board's top-face components must not exceed 6.5mm.
  - * There must be no components within 3mm of the board's conveyance direction edges.
  - ⇒ See the illustration shown in section 12.6 "Component Heights & Mounting Restrictions (At Mounting & Loading)".
- The height of the board's bottom-face components must not exceed 30mm.
  - * There must be no components within 3.5mm of the board's conveyance direction edges.
  - ⇒ Shaded area in the above illustration.

- Additional restrictions which apply to dual-lane type conveyors:

-1- The board's bottom face height must not exceed 20mm in the vicinity of the push-up pin stays (shaded area in the illustration below).

-2- The push-pin assembly must be changed to a dual-lane conveyor type.



12.16 Board's conveyance speed

- 50 to 450mm/sec (variable by setting)
  - * The conveyance speed may change if the board's weight is increased or decreased, etc.

12.17 Board's conveyance height

● 900mm ± 10mm (Measured from floor to conveyor belt's top surface)

12.18 Input data

-01- Number of mounting points:
10,000 points (this value may be lower, depending on the number of boards, the number of blocks, and the number of fiducials.)

-02- Component types: 255 types per board

-03- Board data: 100MB / unit

-04- Number of fiducials: 128 sets per board (for 2-point fiducials)

-05- Input format: By the main unit's accessory input unit

12.19 Minimum positioning setting resolution

● X-axis / Y-axis / Z-axis: 0.001mm

● R-axis: 0.001°

12.20 External interface

● LAN *1 port (See section 7.8 "Network", and 7.9 "Anti-virus measures".)

12.21 Internal memory

● Internal 1GB Flash Card *1 card

* For saving the OS / mounter application software / board data / component data / vision data / machine information / production history information, etc.

12.22 External memory

● USB Flash Memory, 1GB or more *1 device (Provided as standard item: For data backup)