JUKI®

Multitask Platform
JM-20

PRODUCT SPECIFICATIONS

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1 General

JM-20 (Multitask platform) is provided with a laser align sensor (LNC120) as standard and a vision centering system (VCS) as option having 6 placement axes equipment. This product that permits automatically mounting not only existing surface mounting components but connector(bulk) components and lead type electronic components (hereafter called insertion mounting components) that were manual insertion.

1) Basic Specifications

Model name				JM-20
PWB transport specification		PWB dimensions	L PWB	410×360 mm (When clamped once) 800×360 mm (When clamped twice) Longer sized PWB
			XL PWB	410×560 mm (When clamped once) 800×560 mm (When clamped twice)
		PWB flow direction		Transfer PWB from left to right Transfer PWB from right to left
		PWB Conveyor reference position		Front fixed only
		Conveyor height	Standard machine	900mm ±20mm Option : 950mm ±20mm
			EN machine	950mm ±20mm
Component height		Insertion mounting component		
		EC specification		0.09 to 28mm
		UC specification		0.09 to 55mm
		Surface mounting component		
		EC specification		0.09 to 25mm
		UC specification		0.09 to 55mm
Component size		Laser recognition		0603 to □50.0mm
		Vision recognition (Option)		54 mm view camera : ☐3 to ☐50mm 27 mm view camera : 1.0×0.5 to ☐20mm 27 mm view camera (DFFP camera) : ☐3 to ☐24mm For recognition of a component with dividing its image: up to ☐50
Component weight				Max 200g
Placement speed	Insertion mounting component	Pickup nozzle		0.8 sec./component (equvalent to 4,500CPH)
	Surface mounting component	Chip component(IPC9850)		
		EC specification		12,700 CPH
		UC specification		10,000 CPH
		Vision recognition		
		L PWB		4,200 CPH
		XL PWB		3,500 CPH
Placement accuracy		Laser recognition		±50μm (3σ)
		Vision recognition		±40μm
Number of component to be attached		Bowl feeder	MBF-C	12 types max. (using two front units)
			MBF-L	12 types max. (using the front/rear)
		Radial feeder	MRF-S	26 types max. (using the front/rear)
			MRF-L	20 types max. (using the front/rear)
			MRF-LF	20 types max. (using the front/rear)
		Axial feeder	MAF-S	22 types max. (using the front/rear)
			MAF-L	16 types max. (using the front/rear)
		Tape feeder		Maximum 60 types (calculated on the basis of 8-mm tape, and the front/rear banks are used)
		Tray supply device	MTS	40 types max. (using the rear)
Supported languages				English, Japanese and Chinese
EN specifications				Applicable

2) Recognition device

	Discription
LNC120	This unit recognizes Connector components (bulk), lead type electronic components (Insertion mounting component) and small/thin chips(Surface mounting component) by laser and placed at a high speed with 6 nozzles.
VCS	This unit takes an image of a part mounted on surface using a image recognition camera and carries out centering and detects bending of lead or deformation of ball etc.
VCS(DFFP camera)	The component to be inserted is imaged by a vision recognition camera and centering is performed. Then, a pin (lead) bend is detected.

* Select one of the 54 mm visual field camera, 27 mm visual field camera and DFFP camera.

Both 27 mm visual field camera and DFFP camera cannot be selected at the same time.

2 Features

For insertion mounting components

① This product can place insertion components in addition to existing surface components. After an insertion mounting component is picked up or held, centering is performed by using a laser alignment sensor (LNC120) to place this insertion component.

② The time required to mount an insert type component on a board is 0.8 seconds/component per pick-up nozzle under the conditions specified by JUKI.

[Conditions specified by JUKI]
Applicable component : Aluminum electrolytic capacitor (φ8 mm)
Feeder : MRF-S×2 Simultaneous pick-up of components at two positions ×3/cycle (when six nozzles are used)
Axis speed : Default value applied when the component type is “Insert”

*1When the component height is designed as 28 mm
*2This time does not include the time for transferring a board and that for recognizing a mark.

Insertion mounting component feeder unit

① The radial feeder for taping components (MRF-S/MRF-L/MRF-LF), axial feeder for taping components (MAF-S/MAF-L), 6-throw bowl feeder for connector (bulk) components (MBF-C), and 3-throw bowl feeder (MBF-L) are available.

② The maximum number of radial feeders (MRF-S) to be mounted is 26 (13 units for the front side and 13 units for the back side). The maximum number of radial feeders (MRF-L/MRF-LF) to be mounted is 20 (10 for the front side and 10 for the back side). The maximum number of axial feeders (MAF-S) to be mounted is 22 (11 for the front side and 11 for the back side). The maximum number of axial feeders (MAF-L) is 16 (8 for the front and 8 for the back). The maximum number of bowl feeders (MBF-C) is 2 (for the front only. Up to 12 types. The maximum number of bowl feeders (MBF-L) to be mounted is 4 (2 for the front and 2 for the back).

③ The switching work depending on the production is simplified by giving the bowl feeder the trolley function.

High Precision and High Speed Placement of Components

① Components can be placed at a high speed of 12,700 CPH (when placing surface mounting components) by a laser align sensor that consists of 6 nozzles and permits simultaneous vision recognition.

② An independent AC servo motor is used for an up/down operation (Z axis) of each nozzle shaft and two AC servo motors are used for a rotating operation (θ axis) of each nozzle shaft. This attains high-speed and high-accuracy placement without giving any effect to the placement pattern.

Improvement of Versatility

① The component height UC specification supports the maximum component height for our company's device 55mm to enable the mounting of component to be inserted or mounted such as large-capacity capacitor and transformer.

② For the supply of large component, the supply of maximum tray thickness 63mm and total tray weight 3,000g is enabled by using the matrix tray server dedicated to this device (TR5SNI).

③ Two models are set for the supported board size. XL specification supports up to 800x560mm.

④ Adopting a newly set chuck type nozzle improves the handling performance of large component and enables the mounting of a component to be inserted or mounted such as large-capacity capacitor or transformer.

⑤ If the new DFFP camera is adopted, vision centering of a component to be inserted can be performed. (Conventional vision centering of an SMT component cannot be performed.)

Improvement of Operability

① Touch panel is provided as standard. This can simplify key operations.

② An external memory unit such as USB flash memory can be used.

③ "MI line optimizer" that supports the creation of a production program with an external PC is supported.
Using this support software automating the allocation of mounting points to more than one machines and enables the improvement of line tact.

High Serviceability

① Protecting the passwords has a user level setting such as the operator, programmer, and administrator can be made.

② For troubleshooting by operator, the help function is completed.

③ A nozzle filter can be replaced easily.

High Flexibility

① A production program created by JUKI surface placement unit can be read.

Corresponding to the safety standards

① The machine available with Europe CE marking. (EN machine only)

② The product conforms to the European Union RoHS Directive.

3 System Configuration

○: Equipped as standard ●: Option -: No setting

Model name			JM-20	Remarks
Basic configuration				
Placement head			○	
Laser recognition head(LNC120)			○	
Offset collection camera L(OCC_L)			○	
Height measuring unit(HMS)			○	
Lighting unit of solder recognition			—	
Bad mark reader(BMR)			—	
Vision recognition unit			●	*1 *2
Component recognition camera(VCS)		54mm view camera	●	*1
		27mm view camera	●	*1
		DFFP camera	●	*1
PWB transport unit			○	
Placement station		External shape reference	○	
		Pin reference	●	*1
Transport height 950 mm			●	*3
Auto PWB width alignment control (AWC)			●	*1
Transport extension			●	*1
I/O control unit			○	
Motor control unit			○	
X-Y control unit			○	
Air pressure device piping system			○	
Air regulator			○	
Vacuum pump			○	
Main line filter			●	*1
Quick connect coupling			●	
Power supply unit			○	
Power receiving lamp			○	
Electric leakage breaker			○	
UPS			●	*1
Safety unit			○	
Emergency stop button			○	
Feeder floating sensor			●	*1
Transport safety cover			●	*3
Operating system			○	
Front-side operation unit		Liquid crystal display (touch panel)	○	
Rear-side operation unit			●	*1
Keyboard with Trackball			○	
SSD			○	
HOD			○	
External interface		USB 2.0/ 2 port	○	
		Ethernet 10/100 MB	○	
Internal/external equipment				
Three-color signal light (with buzzer)			○	
Caster			●	*1
Super-foot			●	*1

Model name			JM-20	Remarks
Equipment device				
	External drive unit	DVD/CD-ROM drive (USB)	●	
	Automatic tool change unit (ATC)	ATC 34-2	●	*1*4
		ATC 10-12	○	*4
		R-ATC	●	*1
	Trash box dedicated for large components		○	
	Simplified load control		●	*1
	Component verification system (CVS)		—	
	Solder print recognition placement position correction		—	
	Coplanarity function		—	
	Feeder position indicator (FPI)		—	
	Flexible calibration system (FCS)		—	
	Non-stop operation		—	
	Lead correction function		●	
	Lead correction jig		●	*5
	USB protection module		●	*5
Bank specification				
	Connector bracket combined for bowl feeder		●	*1
	Connector bracket combined for radial feeder		○	
	SMT feeder version bank		●	*1
	SMT connector bracket		●	*1
Component feeder unit				
	Tape feeder		●	
	Bulk feeder		●	
	Stick feeder		●	
	Bowl feeder (with a cart)		●	
	Radial feeder		●	
	Axial feeder		●	
	Tray holder, type 1, 2		●	
	DTS		●	
	MTS		●	
Production support system				
	Trash box		●	
	Feeder stocker		●	
	Table for radial components		●	
	Tape reel mounting base		●	
	Connector jig for tape		●	
	Automatic tape cutter unit		●	
	IC collection belt		●	
Production support system				
	MI line optimizer(LC-01)		●	*6
	Component Database		○	*6
	External programming unit (EPU)		●	
	Flexline CAD		●	
	White list type anti-virus software		○	
	Floor productivity improvement support system			
	Production support system JaNets		●	*6
	Production management system IFS-NX		●	*6 *7
Other				
	Production Management Information output		●	

*1 The option as marked set at the factory.

*2 For the recognition camera of the vision recognition unit (VCS), select a visual field size (54 mm or 27 mm, or DFFP camera).

*3 The EN specification is provided as standard.

*4 ATC cannot be installed at the same time.

*5 Lead correction jig and a USB protection module make one set with the lead correction function.

*6 External PC is necessary to use component database.

*7 A part of the JaNets functions is supported. For details, see the JaNets Instruction Manual.

4 Specifications

4.1 Mechanical/Electrical Specifications

Item		Contents	
Power supply	Voltage	3-phase, 200V/220V/240V/380V/400V/415V AC *(see **Note 1**)*	
	Frequency	50/60 Hz	
	Rated apparent power	2.0 kVA	
	Peak current	40A (When a 200V AC 3-phase power supply is used)	
Air supply	Air pressure	0.5±0.05 MPa Dry air *(see **Note 2**)*	
	Maximum air consumption	50 L/min (ANR) , *(see **Note 3**)*	
Environment requirements	During operation	Temperature	10 to 35 ℃
		Accuracy guaranty temperature	20 to 25 ℃
		Humidity	30 to 80%RH (No condensation)
		Altitude	1,000m or less
	Transportation or storage	Temperature	-15 to 70 ℃
		Humidity	20 to 95%RH (No condensation)
Noise	76.0 dB (A) *(see **Note 4**)*		
Installation place	Install this machine on a flat floor having a sufficient strength, such as reinforced concrete floor. Do not install this machine on a floor where the machine vibrates during operation or on a wooden floor.		
Particle dust	Do not install this machine in a place where a large amount of dust or dirt exists. Do not install this machine in a place close to a unit that produces the high-frequency wave.		
Power shut-down	Before turning OFF the main power, stop the machine and shut down the system completely. Additionally, if the main power is turned OFF while the SSD access lamp is lit, this may cause the machine to malfunction. Do not turn OFF the main power while the production is being carried out or an axis is moving.		
Installation conditions (for EN machine)	Pollution degree	Category Ⅲ according to IEC60664-1	
	Overvoltage category	Degree 3 according to IEC60664-1	

Note1: An appropriate cross-sectional area of the primary power cable may vary depending on the cable routing conditions, length, and/or power voltage. Always use an appropriate cable meeting the standards for the installation place from those stated in the Table below.

Power supply	Primary power cable			
	Less than 20 m	Less than 30 m	Less than 40 m	Less than 50 m
200V/220V/240V AC	5.5 mm^2 or more	8.0 mm^2 or more	8.0 mm^2 or more	14.0 mm^2 or more
380V/400V/415V AC	5.5 mm^2 or more	5.5 mm^2 or more	6.0 mm^2 or more	6.0 mm^2 or more

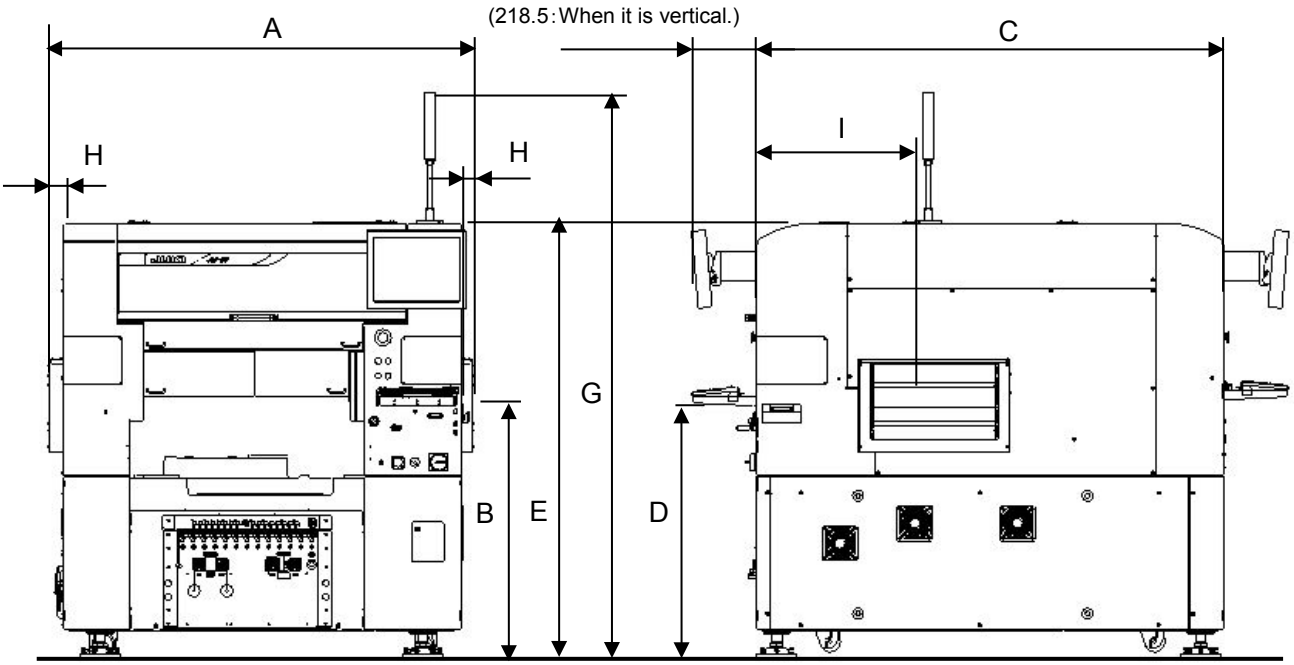
Note2: Dry air: Always use an appropriate air dryer or mist separator. As for references, blow the air to the metallic plate or other object at the compressor supply port to make sure that any water droplets are not sticking to it.

Note3: ANR: Temperature 20ºC, absolute pressure 0.1MPa (=100kPa =1 bar), and relative humidity 65%

In case of 50 L/min (ANR), 50/0.926 (Coefficient) = 54.0 L/min: 54.0 L/min or more air supply is required.

Note4: Conforming to JIS Z 8731.

4.1.1 Machine dimensions



(Unit: mm)

Dimensions	L size	XL size
A (transport length)	1,500	
C (depth: excluding LCD)	1,657	1,892
H (transport output amount)	Left side :50 Right side:40	
I (PWB transport path from the front side of the cover)	450	

* The tolerance of the above dimensions is ±5 mm.

(Unit: mm)

Transport height / Dimensions	900mm	950mm
B (Top surface of the transport belt from the floor)	900	950
D (Bottom of the keyboard from the floor)	935	985
E (Top surface of the cover from the floor)	1,550	1,600
G (Top surface of the signal light from the floor) *(see **Note 1**)*	2,014.5(M/C Rev.LExcept) 2,025.7(M/C Rev.L)	2,064.5(M/C Rev.LExcept) 2,075.7(M/C Rev.L)

Note 1:When it attached an option.

4.1.2 Mass

L size specification : 1,760 kg

XL size specification : 1,985 kg

4.2 Component placement Cycle Time

4.2.1 When placing insertion mounting components (Conditions specified by JUKI)

Pickup nozzle: 0.8 sec./component *1 *2

Insertion element: Aluminum electrolytic capacitor (φ8)

Feeder : MRF-S×2 Simultaneous pick-up of components at two positions ×3/cycle (when six nozzles are used)

Axis speed : Default value applied when the component type is “Insert”

*1 When the component height is designed as 28 mm

*2 This time does not include the time for transferring a board and that for recognizing a BCC mark.

4.2.2 When placing surface mounting components

(1) Laser recognition (conforming to IPC9850)

(Unit: CPH)

Component height	PWB size specification	
	L	XL
EC specification: 28mm	12,700	12,700
UC specification: 55mm	10,000	10,000

*1 This is the number of components to be placed for one hour when 400 pieces of 0603 and 1005 capacitors are placed onto a 200 mm x 200 mm board at an angle of 0, 90, 180 and 270 degrees sequentially. (This method conforms to the IPC9850 regulation.)

(2) Vision recognition (Option)

(Unit: CPH)

Supply form	PWB size specification	
	L	XL
Simultaneous pick-up of components from a feeder	4,200	3,500
DTS	2,850	2,150
MTS	2,850	2,150

*1 If the component height is set to EC (28mm)

*2 Regarding simultaneous pickup of feeders, this cycle time is for the case where lead components (surface mounting components) of □10 mm or less are placed by rear feeders (6-feeder simultaneous pickup).

*3 This value does not include the time required for ATC nozzle replacement, PWB transport, and BOC mark recognition.

4.3 Nozzles

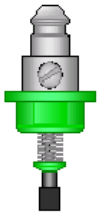
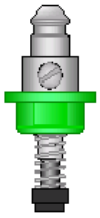
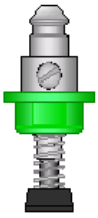
(1) For insertion mounting components (for radial lead components and connector components)
Regarding the nozzle shape, a gripper nozzle and a chuck nozzle etc. corresponding to component to be inserted or mounted.
For details, contact JUKI sales separately.

(2) For surface mounting components

Standard attachment: Nozzle 503 (1 nozzle for laser calibration)

: Nozzle 508C (1 nozzle for head offset)

Regarding the other nozzles, purchase each separately. Nos. 500, 501, 502, 503, 504, 505, 506, 507, and 508C are available for each shape and size of the component to be placed.

No.	500	501	502	503	504	505	506	507	508C
Appearance									
External diameter	1.0x0.5 mm	0.7x0.4mm	ϕ0.7mm	ϕ1.0mm	ϕ1.5mm	ϕ3.5mm	ϕ5.0mm	ϕ8.5mm	ϕ9.5mm
Internal diameter	2xϕ0.4 mm	ϕ0.25mm	ϕ0.4mm	ϕ0.6mm	ϕ1.0mm	ϕ1.7mm	ϕ3.2mm	ϕ5.0mm	ϕ8.0mm

Main mounting component types for individual nozzles

Nozzle No.	Minimum width (W)	Main mounting component type
500	0.45 to 1.45	1005, 1608, 2012* See Note 2 SOT (Molding: 1.6 x 0.8) <*see Note*>
501	Up to 0.45	0603
502	0.45 to 0.75	1005
503	0.75 to 1.45	1608, 2012 SOT (Molding: 1.6 x 0.8, Molding: 2.0 x 1.25)
504	1.1 to 2.5	2012, 3216, MELF, SOT (Molding: 2.0x1.25). SOT23
505	2.5 to 4	Aluminum electrolytic capacitor (small), tantalum electrolytic capacitor, trimmer
506	4 to 7	Aluminum electrolytic capacitor (medium), SOP (narrow type), SOJ, Connector
507	7 to 10	Aluminum electrolytic capacitor (large), SOP (wide type), TSOP, QFP, PLCC, SOJ, Connector
508C	10 and up	QFP, PLCC
Large nozzle	—	
Chucking nozzle	—	

Note : Theta-offset may be caused by the pickup surface shape of 2012R (manufacturer, difference in resistance value, etc.). When you require high-density placement (adjacent 0.3 mm or less) of 2012 components, use nozzle 504.

(3) Nozzle allocation unit (ATC)
If the number of required large nozzles is large, an optional ATC unit is required.
Moreover, it is necessary to add a dedicated ATC unit to the chuck nozzle.
Number of ATC nozzles in stock

Type		Number of small nozzles in stock	Number of large nozzles in stock	Number of chuck nozzles in stock
Standard	ATC 10-12 *See Note*	10	12	0
Option	ATC 34-2 *See Note*	34	2	0
	R-ATC	0	0	4

Note: Simultaneous attachment cannot be performed.

4.4 Applicable Component

(1) Component size

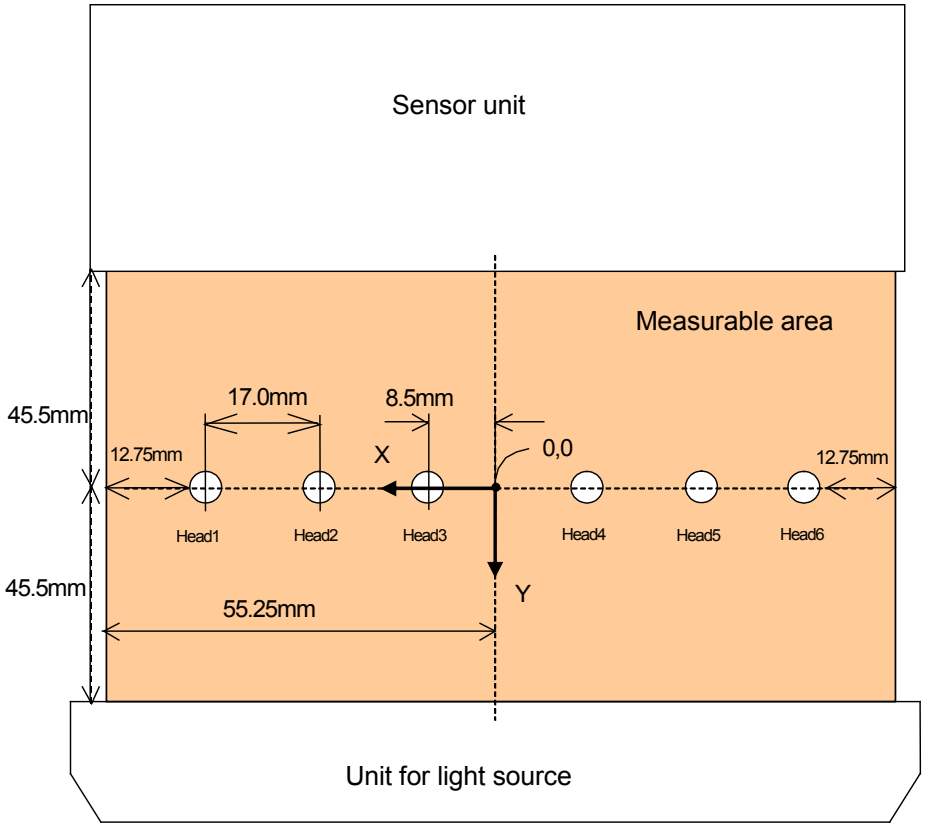
(Unit: mm)

Specifications				Component dimensions
Length × Width	Recognized with laser	LNC120 (Note 1) (Note 2)		Minimum: 0.6 × 0.3 Maximum: □50.0 (Note 2)
	Recognized with a VCS (Option) (Note 3) (Note 6)	54-mm visual field camera	Reflective	□3 - □50
			Transmissive	Not applicable
		27-mm visual field camera	Reflective	1.0 × 0.5 (Note 4) - □20
			Transmissive	Not applicable
		DFFP camera	Reflective	□3 - □24
			Transmissive	Not applicable
		DFFP camera Recognition of a component with dividing its image	Reflective	□3 - □50 (Note 9)
Component height (Note 5)		EC (28 mm) specifications	Recognized with laser	0.09 - 28
			Recognized with a VCS	
		UC (55 mm) specifications	Recognized with laser	0.09 - 55
			Recognized with a VCS	
Component mass				200g 以下
Lead pitch	Recognized with laser	LNC120		0.65 or more
	Recognized with a VCS (Note 6)	54-mm visual field camera		0.38 - 2.54
		27-mm visual field camera		0.3 - 2.54
Ball pitch	Recognized with laser	LNC120		1.0 - 1.27
	Recognized with a VCS (Note 6)	54-mm visual field camera		1.0 - 3.0
		27-mm visual field camera		0.5 - 2.0
Ball diameter	Recognized with a VCS (Note 6)	54-mm visual field camera		φ0.4 - φ1.0
		27-mm visual field camera		φ0.2 - φ0.63
Electrode cross-section	Recognized with a DFFP camera	DFFP camera (Note7)		Rectangle or ellipse whose ratio of height and width is 1 to 1.0-1.2 (Note 8)
Electrode size	Recognized with a DFFP camera	DFFP camera (Note7)		0.200 – 1.100
Electrode pitch	Recognized with a DFFP camera	DFFP camera (Note7)		0.500 - 11.000

***Note 1**: The maximum dimensions of components that can be recognized with six nozzles of an LNC120 at the same time are □10.0 mm.*

***Note 2**: Maximum recognizable component size for the single axis of each nozzle. If the component shape is not square, the component is applicable when the following conditions are within the sizes of long side and diagonal even if the maximum component size is exceeded.*

Nozzle No.	Maximum component dimensions	Sizes of long side	Diagonal
1	□20.0 ㎜	26.5mm	29.65mm
2	□33.5 ㎜	42.3mm	47.38mm
3	□50 ㎜	63.2mm	70.72mm
4		63.2mm	70.72mm
5	□33.5 ㎜	42.3mm	47.38mm
6	□20.0 ㎜	26.5mm	29.65mm



Note 3: *The minimum dimensions of the mold section are □1.7 mm.*
The maximum dimensions: the XY error of component pick-up is ± 1 mm or less and the angle error is ±3º or less.
Recognition of a component with a VCS (by dividing an image of a component) is not available.

Note 4: *To use a VCS to recognize a resistor chip, trimmer, SOT or LED component whose dimensions are from 1.0×0.5 to □3 mm, recognize such a component as a general-purpose vision component.*

Note 5: *If an insertion type component is supported, the shape of its lead shall be parallel to the Z-axis when it is inserted.(If a component is parallel when located on a tape but it is V-shaped when cut, it is not applicable.)*

Note 6: *A VCS recognizes surface-mounted components only.*

Note 7: *The DFFP camera recognition is inapplicable to surface mount components.*

Note 8: *The tip of a lead shall be flat. The shape of a lead shall be straight without any bend.*

Note 9: *The maximum size of a component whose image is shot with a DFFP VCS and divided for recognition is the same value described in the table under "Note 2."*
The pitch for recognizing a component with dividing its image is 24 mm.
When the longer side length is 63.2 mm, which is the maximum length, the system recognizes a component with dividing its image into 1 × 3 (24 mm × 72 mm field of view). For a component whose size is □50, the system recognizes it with dividing its image into 2 × 2.

4.5 Insertion ratio for insertion mounting components and Placement accuracy X, Y, θ for surface mounting components

4.5.1 Ratio of Insertion mounting component

99.5% or more

However, the following components shall be used and our specified PWB conditions shall be adopted.

- Aluminum electrolytic capacitor (φ8) RUBYCON 16MCZ470MT7Y0812 or equivalent
- Connector 4P J.S.T. Mfg. Co., Ltd. B4B-PH-K-S(LF) or equivalent
- Connector 12P FCI HLW12S-2C7LF ore equivalent

Note: In case it is judged whether the component can be inserted and the set default value is used for execution, it is guaranteed.

4.5.2 Placement Accuracy of Surface mounting component

* The placement accuracy is achieved when the PWB mark is used.
* The regulated value for recognizing a component with laser is ± 3σ.
* This is placement accuracy for surface mounting components. This placement accuracy is not applicable to insertion mounting components.

(1) Placed positions (X, Y) (not when the outer shape of a component is recognized)

(Unit: μm)

Component	Laser	Vision (VCS)
Square chip	± 50	—
Square chip LED	± 50	—
Melf	± 100	—
SOT	± 150	—
QFP (Pitch: 0.5, 0.4, 0.3)	—	When a component positioning mark is used: ± 40 (Only a component positioning mark is available.)

(2) Placed posture (θ) (not when the outer shape of a component is recognized)

(Unit: °)

Component	Size	Mounting posture (when a board reference mark is used)	
		Laser	Vision (VCS)
Square chip	0603	±3.0	—
	1005	±2.5	—
	1608 or larger	±2.0	—
Square chip LED	—	±3.0	—
Melf	—	±3.0	—
SOT	—	±3.0	—
QFP (Pitch: 0.5, 0.4, 0.3)	20 mm or more, and 33.5 mm or less	—	±0.22
	10 mm or more, and 20 mm or less		±0.32
	Less than 10 mm		±0.43

4.6 Applicable PWBs

4.6.1 PWBs transport direction

Rightward flow (carrying from left to right, looking from the front side)

Leftward flow (carrying from right to left, looking from the front side)

Note： Corresponding to shipments from the factory.

(1) PWB sizes

	Minimum size (L1 x W1) *(see Note 1)*	Maximum size (L2 x W2) *(see Note 1)*		Thickness T
		L	XL	
Insertion mounting components	50 × 50mm	When clamped once 410×360mm When clamped twice 800×360mm Longer sized PWB	When clamped once 410×560mm When clamped twice 800×560mm	0.8 to 4.0(2.0)mm *(see Note 2)*
Surface mounting components				0.4 to 4.0mm

**Contact us for a notched board or board whose shape is irregular.*

** A board whose reflectance is low may not be able to be detected with the sensor regardless of its material and/or color.*

Note 1: L represents the size in the board feed direction and W represents the right-angle direction. W/L =2 should be equal or less.

Note 2: The maximum board height T is 2.0 mm when the MRF-S is used.

(2) PWB Mass

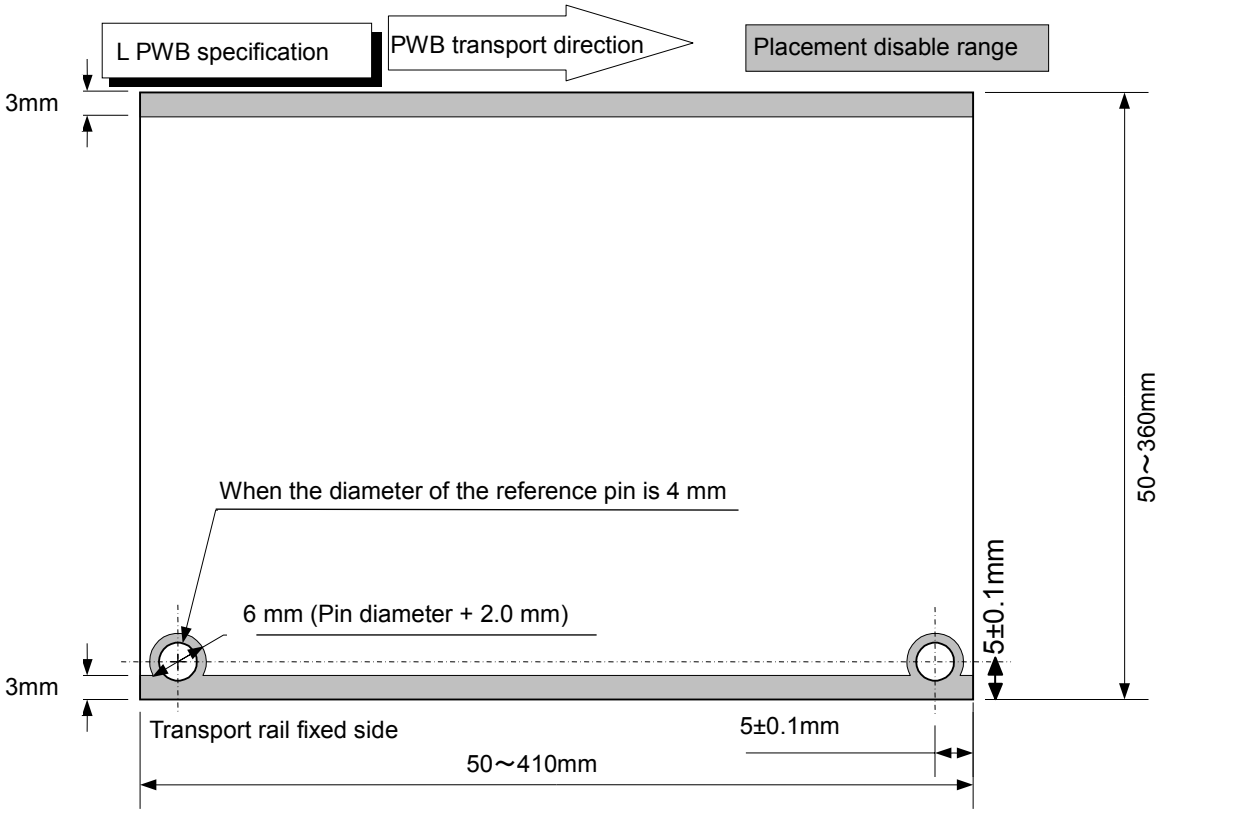
4,000g or less (including the already mounted part)

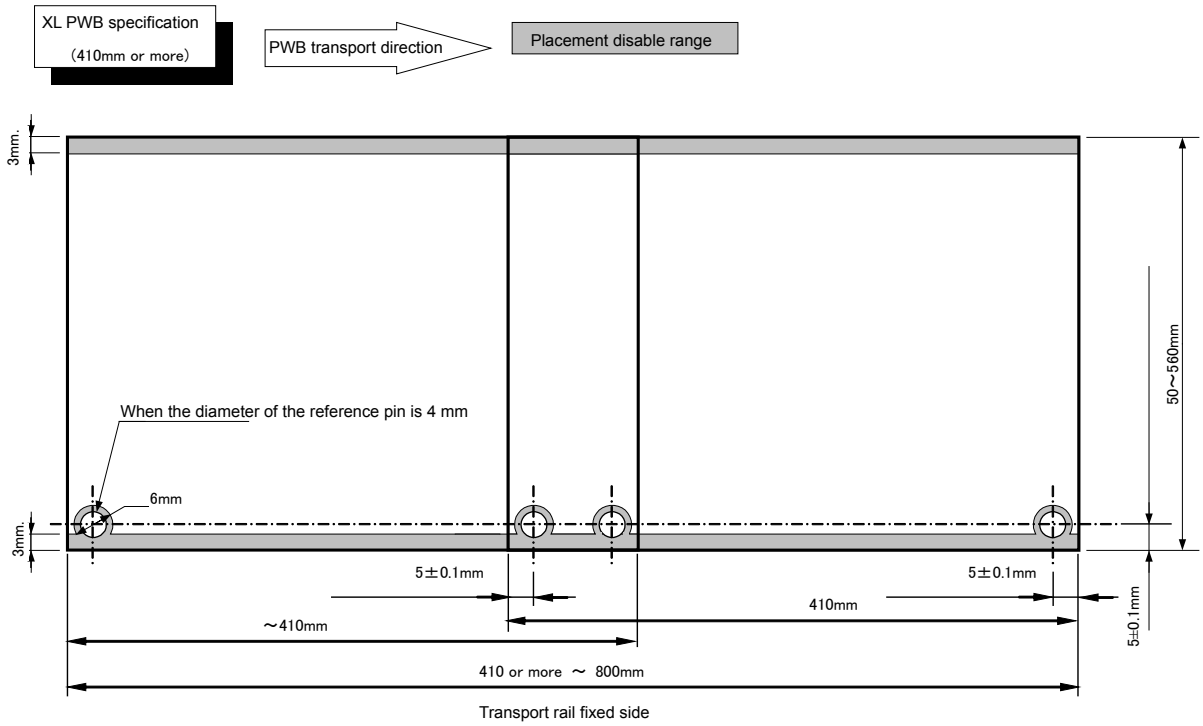
4.6.2 Allowable value of board warp

The allowable board warp is 0.2 mm or less per 50 mm, and 1 mm or less for both upper warp and lower warp (conforming to JIS B 8461)

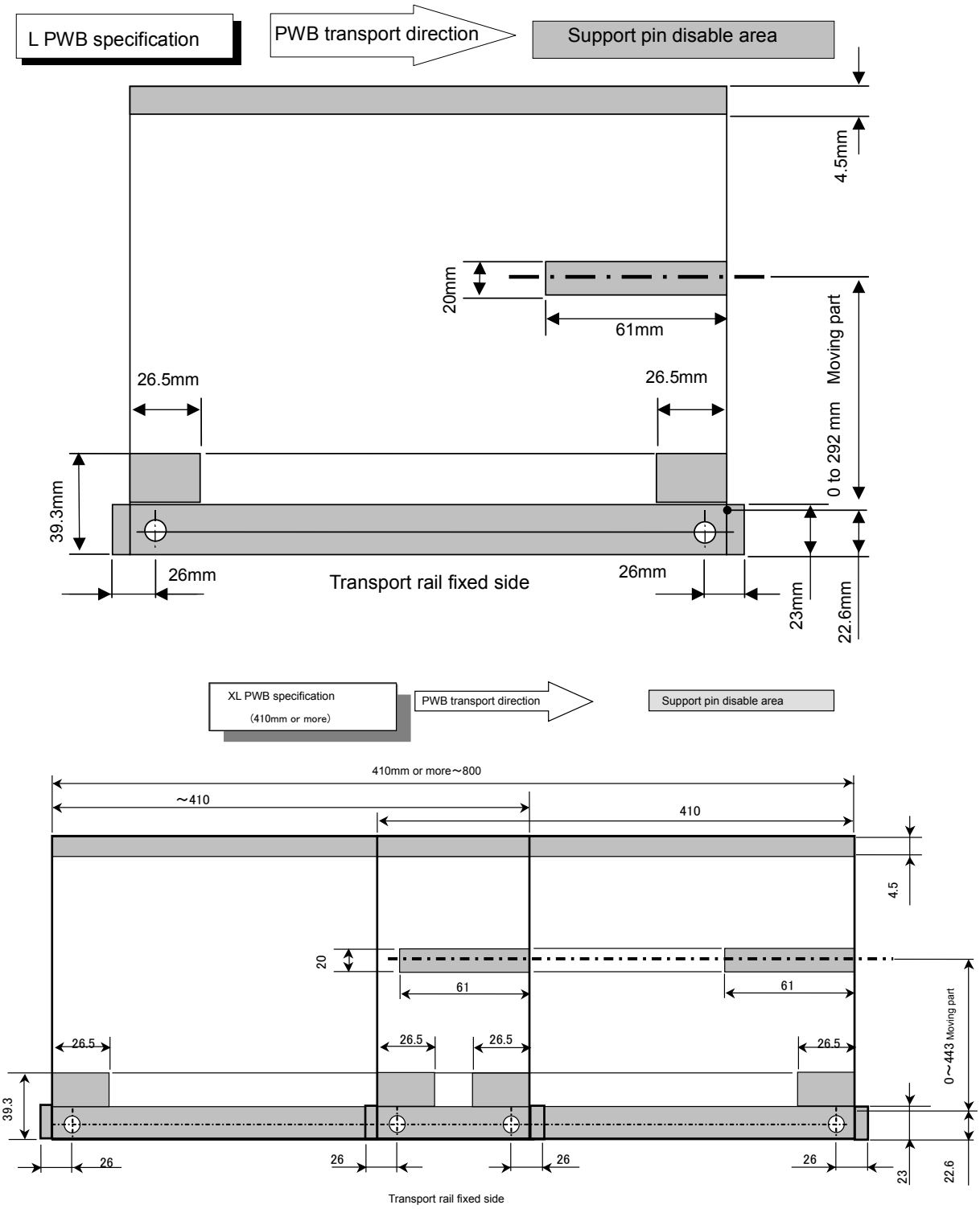
4.6.3 Limitations on PWBs

(1) A range not available to place the components





(2) A range not available to set up the support pins



(3) Area where components can be placed on the PWB top side and bottom side.

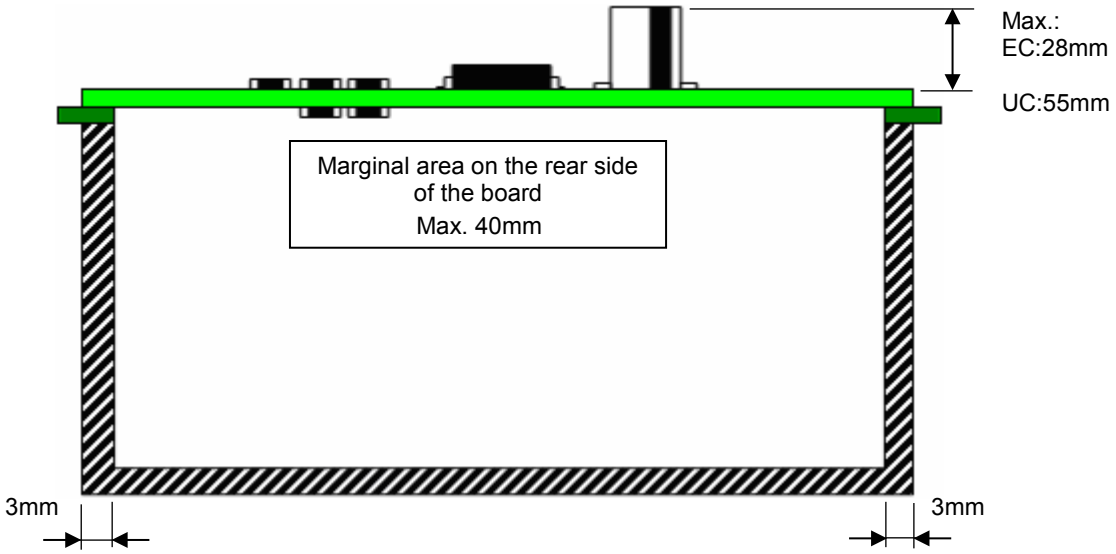


Figure Placement enable range in the height direction

PWBs clamping method

The PWB clamping method is based on the top surface of the board. The front/rear end part of the board is pinched by the transport rail for both fixed side and moving side.

PWB width adjusting methods

* Standard : Manually adjusting method with your hand
* Option : Automatic PWB width adjusting method via a motor

PWB positioning reference

* Shape reference
* Pine reference (optional)

4.6.4 Function correcting the PWB positions

Field of vision for recognizing the PWB reference marks

☐6.3 mm (camera's field of vision for recognition).

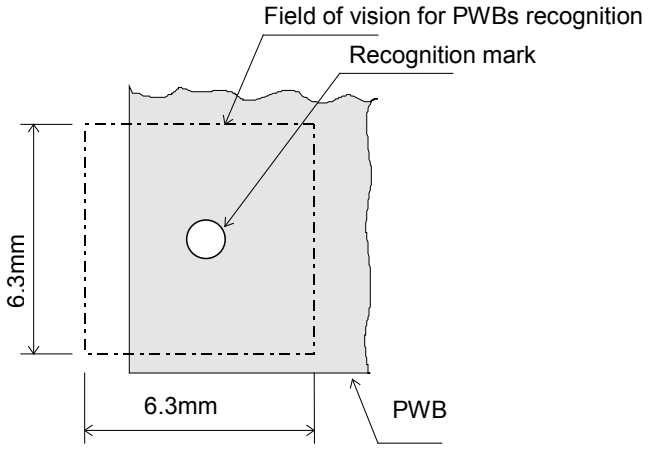


Figure Field of vision for PWB reference marks

Window size for recognizing the PWB reference marks

This size can be changed within a maximum of 6.3 mm, subject to securing a clearance between the recognition mark and its surrounding area.

Kinds of recognition marks and corrective method

- PWB reference mark
  Two or three marks *(see Note 1)* are located on a PWB to correct the entire PWB.
  When a machine detects two PWB reference marks, it corrects the positioning, angle and expansion/contraction of the entire PWB. When detecting three PWB reference marks, it corrects the perpendicularity in the X and Y direction also.
- Component positioning marks
  If a component such as an IC (QFP) needs to be placed on a board very precisely, two or three marks set on the component itself are used to correct each component placement position.
- Marks used to position the component area
  Two marks (their positions can be set as you like) are to be provided to a group of components placement positions, and they are used to correct each component placement position in the group.

Note1: The position is arbitrary, subject to not aligning three reference makes, if this is the case, on one straight line. (It is recommended that the reference marks should be made at the four corners of the PWBs.

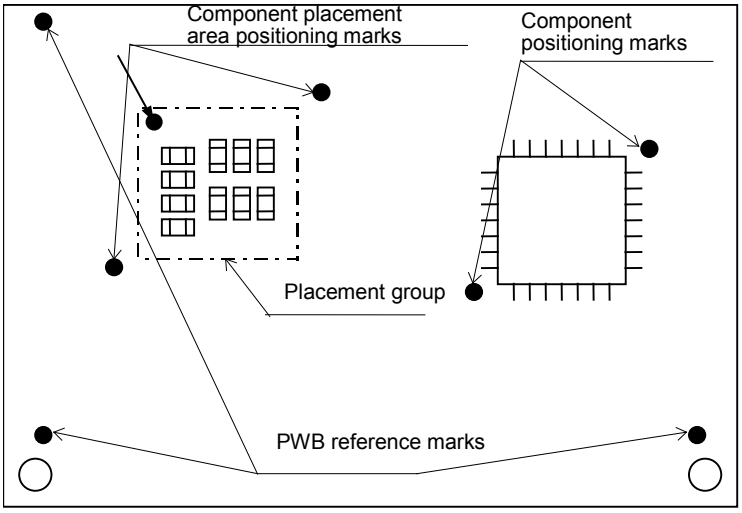


Figure Reference marks and components positioning marks

Basic *quality of recognition marks*

- Copper not coated or coated
- It needs to have a clear contrast between the recognition mark surface and the print wiring quality.
- It needs to have neither oxidation nor quality deterioration of the recognition marks.

Coating the recognition marks

The recognition mark surfaces shall all be coated as follows：

- Transparent antioxidant coating
- Nickel plating
- Tin plating
- Solder plating
- Gold plating
- Hot-air levelling solder coating

Marking forms

- The standard marks represent the thirteen (13) forms as shown in the following block, “Forms of Recognition Marks.”
- For any mark other than those shown in the said block, customers shall make templates to allow for recognition through a pattern matching.

  Note 1: *Up to three PWB reference marks and up to six component placement area positioning marks are supported.*

  Note 2: *Within a field of vision, there should be no similar form pattern other than the subjected form patterns.*

- For regular triangles, checker patterns and users’ templates, the 90° up-side-down marks can also be recognized.

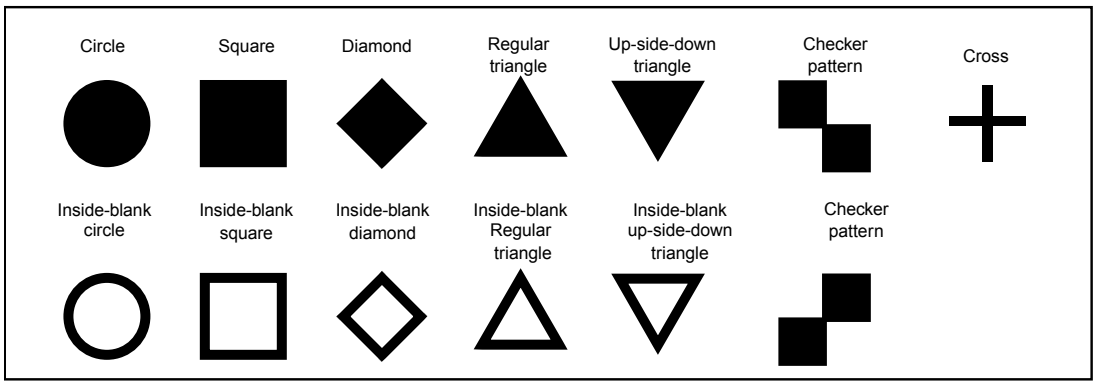


Figure Forms of Recognition Marks

The recognition marks shall all comply with EIAJ ET-7302 “Recognition marks for on-surface placed PWBs.”

Dimensions and tolerances

The outside dimensions shall range from 0.5 mm up to 3.0mm, whose tolerance, less than 10%.For all the inside-blank forms, the edging line width shall be more than 0.2 mm.

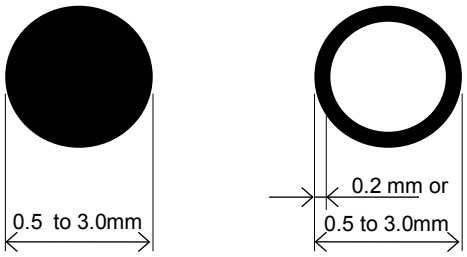


Figure Dimensions and tolerances of recognition marks.

Clearance

It is desirable that there is, around each recognition mark, a space having nothing of such other marks as conductor pattern, solder resist, marking and the like, and that this space dimensions is a larger square than the mark by 0.5 mm or more from the outer circumference of the recognition marks.

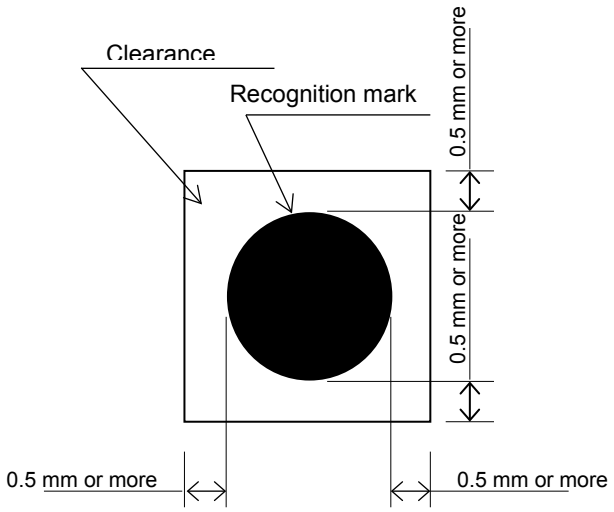


Figure Clearances of recognition marks

5 Standard Functions and Options

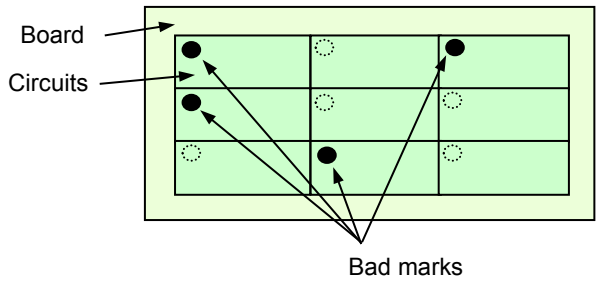
5.1 Standard functions

5.1.1 Bad mark recognition

A bad mark is given to a circuit on a multi-circuit PWB to prevent any component from being placed on the circuit.

The size of the mark should be ϕ2.5 mm or more and clear contrast with the PWB color is required.

If there is a difference in reflected light quantity between the PWB color and the mark color, the brightness/darkness for the PWB color must be switched.



5.1.2 Height measuring function (HMS)

When pickup data is prepared, the height of the component pickup position is automatically measured by laser sensor.

At the production, whether there is an obstacle at the planned mounting position is detected before mounting. After the mounting, whether the component was properly mounted is detected with the change of measured height.

The upper surface of components with a transparent pickup surface such as glass (LED, etc.), components with a mirror-like surface that reflects almost all of light, and components of blue color are excluded from applicable components. This can also be used as a teaching spot.

5.1.3 Liquid crystal display touch panel

This is an input device to operate the device by touching the screen. This device can be operated intuitively to improve the operability.

5.1.4 Handheld Operating Device (HOD)

HOD allows the operator to perform operations while watching actual operations by using various types of teaching. Usually, mark vision recognition can be checked and various types of teaching can be performed on the operating panel. When HOD is used, operations can be performed at hand, thereby improving the workability.

5.1.5 Vacuum pump

This pump can suppress the air consumption of the compressor, so that the air supply stability at component pickup can be improved.

5.1.6 Component database

The component database is software intended for the creation and management of “Component data”, which is used in the production program, with a mounter and/or an external programming unit (EPU),
Using component database can shorten the creation time of production program and edit the data by managing component data collectively.
* External PC is necessary to use component database.

Specification that the PC for component database requires is shown below.

Item	Windows XP Professional Edition SP2 or later	Windows Vista Business Edition SP1 or later Windows 7 Professional(32bit)
Main unit	Compatible with IBM PC-AT	
CPU	Pentium Ⅳ 3.2GHz or more	Intel Core2 Duo 2.40GHz or more
Memory	1GB or more	2GB or more
Hard disc	10GB or more	40GB or more
CD/DVD-ROM drive	1 unit or more	
Mouse	To be supported with OS	
Bus slot	Slot for network x 1	
Image resolution	1024 × 768	
Printer	To be supported with OS	
Interface	LAN connector x 1 accommodating 100BASE-TX/10BASE-T	

5.1.7 Signal light

Three-color signal and buzzer sound notify an operator of the status of the device. This is a necessary function when a few workers manage multiple lines. Leading an operator when lack of components or trouble is generated with buzzer sound can shorten the machine stop time.

5.1.8 Applicability to long PWB

The PWB size in the X direction can be extended by PWB twice-clamp transport.
This permits producing long PWBs to be used for LED lighting.

	L PWB specification		XL PWB specification	
	When clamped once	When clamped twice	When clamped once	When clamped twice
Standard	410×360mm	800×360mm	410×560mm	800×560mm

5.1.9 Leakage breaker

When a current flows (leaks) others than the intended electric circuit because the insulator (coating) of cable or electric wire is broken or an electric connection is made between conductors by external factor, this breaker can cut off the current automatically.

5.2 Option for the devices and software

By Factory setting

5.2.1 Nozzle tool change unit (ATC)

If the number of required large nozzles is large, an optional ATC unit is required.

Moreover, it is necessary to add a dedicated ATC unit to the chuck nozzle.

Number of ATC nozzles in stock

ATC type		Number of small nozzles in stock	Number of large nozzles in stock	Number of chuck nozzles in stock
Standard	ATC10-12 (See Note)	10	12	0
Option	ATC34-2 (See Note)	34	2	0
	R-ATC	0	0	4

Note: Simultaneous attachment cannot be performed. Select and attach only one of them.

5.2.2 Feeder overall change table system

This function allows a group of feeders to be attached or detached onto/from the main unit at a time. Since this function enables changeover from the current feeders to the next feeders even during production of PWBs, it shortens the time required for changeover.

5.2.3 SMT feeder version bank

A knock cylinder that carries out feeding to the feeder bank is attached for using tape feeder for mounting on surface and DTS. Simultaneous use with a radial feeder or bowl feeder is not supported.

5.2.4 SMT connector bracket

This item is required for using the device that needs power supply and communications of stack stick feeder, IC collection belt, and DTS etc.

5.2.5 Feeder floating detecting sensor

This sensor is used to avoid mechanical trouble that may be caused when the tape feeder, stick feeder, or bulk feeder cannot be mounted correctly.

When the sensor detects a floating status, the XY axis movement is stopped and a warning is given to the operator. (Front/Rear sides as standard)

5.2.6 Vision centering system (VCS)

This is an option to place components picked up by LNC120 head using MNVC through VCS vision recognition.

This system can greatly improve the productivity of PWBs having many small vision centering components. The camera with a visual field of 27 mm can recognize fine pitch components (lead and bowl) that cannot be recognized.

Select a 54mm view camera or a 27mm view camera.

5.2.7 Operation unit on rear surface

Mounting a touch panel type LCD monitor same as that of front side on the rear side of the main unit enables the operation same as that of front side and improves the workability.

Front and rear operation switching buttons are added to the operation panel.

A keyboard is an additional option.

5.2.8 UPS(Uninterruptible Power Supply)

This is a backup power supply to surely terminate the system without causing data destruction or loss at occurrence of an unexpected power failure.

5.2.9 Auto PWB width adjusting function (Automatic Board Adjustment/AWC)

This function can adjust the rail width automatically according to the PWB width.

5.2.10 Simple load control

Since this function allows you to perform a load check when a nozzle is assigned, you can analyze a malfunction such as a nozzle sliding error. In addition, it can pick up/place a component on a load cell to inspect the shock load applied to the component when the component is picked up/placed on a board.

When you use an optional 6*1 or 6*2 type of load control nozzle, you can use the stroke and the spring pressure to easily control the load applied to a component when it is placed on a board. By replacing an attachment on the tip of a nozzle with another one, you can inspect the load applied to various types of components.

- Load range : 6*1 type of nozzles: 98 to 135 g (1.0 to 1.32 N)
  6*2 type of nozzles: 146 to 270 g (1.43 to 2.65 N)
- Precision : ± 7.5% (2N or more)
  ± 0.15 N (Less than 2 N)

- This function allows you to turn on or off vacuum at the same time picks up/places a component to easily measure the load imposed during pick-up/placement of a component.
- The load can be displayed as a waveform.

5.2.11 Lead correction jig.

Lead determination after lead cutoff is corrected.

When the lead correction function is established, the movement which forces the lead part of the part judged to be impossible to load during production into a jig is performed.

Others

5.2.12 IC Collection Belt

This belt collects IC components whose lead is found to be bent or float with the VCS by separating them one by one.

You can change the feeding pitch easily by entering a value.

- Applicable component size: 10 x 10 mm to 50 x 50 mm, Height: 1 mm or higher
- Belt feeding pitch: 15 mm to 55 mm (in increments of 5 mm)
- Number of components that can be collected: 5 to 16
- Number of occupied positions: 9

5.2.13 Main line filter

This filter is provided ahead of 3 air sets, and removes oil, water, foreign substances in compressed air to extend the element life of the precision filter and prevent device trouble.

5.2.14 External programming unit (EPU)

The external programming unit is software that permits creating a program on the PC.

* When the EPU is attached on the machine, cannot be used EPU designed for another model on the same PC.

5.2.15 MI line optimizer (LC-01)

It is software that supports the creation of a production program.

The production line for which more than one JM series is mounted on PC is simulated. The allocation of mounted component is automated to enable the improvement of line takt.

6 Optional feeders

6.1 Feeder bank specification

A bank that feeds component is selected from nine types shown below.

The combination with front bank or rear bank is enabled depending on a customer's usage.

	Front bank type	Rear bank type	Remark
①	Fixed bank	Fixed bank	Standard machine
②	Fixed bank	Exchange trolley	Note 1
③	Fixed bank	Lifter Unit	Note 1
④	Exchange trolley	Fixed bank	
⑤	Exchange trolley	Exchange trolley	Note 1
⑥	Exchange trolley	Lifter Unit	Note 1
⑦	Lifter Unit	Fixed bank	
⑧	Lifter Unit	Exchange trolley	Note 1
⑨	Lifter Unit	Lifter Unit	Note 1

Note 1: When MTS is attached, it is necessary to select an option; collective exchange trolley for the rear bank type.

If the feeder for SMT is used, optional functions; "SMT feeder version bank" and "SMT connector bracket" are required.

○ : Needed - : Not needed

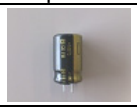
Device	SMT feeder version bank	SMT connector bracket
Tape feeder	○	―
Stick feeder (N, W)	○	―
Stack stick feeder	―	○
IC collection belt	―	○
DTS	○	○

6.2 Maximum Number of Types

(1) Insertion mounting components

Description		Number of feeders mountable on the front side	Number of feeders mountable on the rear side	Total number of mountable feeders	Number of occupied positions
Bowl feeder	MBF-C	2	No available	2	Left 42 Right 38
	MBF-L	2	2	4	20
Radial feeder (Note 1)	MRF-S	13	13	26	6
	MRF-L	10	10	20	8
	MRF-LF	10	10	20	8
Axial feeder	MAF-S	11	11	22	7
	MAF-L	8	8	16	10

Example of insertion component shape:
The components shown below are insertion components and each of them has a package portion (body) and a lead portion.

Aluminum electrolytic capacitor	Inductor (Coil)	Ceramic capacitor	Film capacitor	Solid state relay
				
DIP type	SIP type	Connector	Transformer	Fixed resistor
				

(2) Surface mounting components

Description	A number of available places at the front side	A number of available places at the rear side	Total number of units that can be installed	Number of occupied positions
8 mm tape feeder	40	40	80	2
12 mm tape feeder	26	26	52	3
16 mm tape feeder	26	26	52	3
24 mm tape feeder	20	20	40	4
32 mm tape feeder ***(Note 1)***	16	16	32	5
44 mm tape feeder	10	10	20	8
56 mm tape feeder	10	10	20	8
72 mm tape feeder	8	8	16	10
Stick feeder type N	26	—	26	3
Stick feeder type W	13	—	13	6
Stack Stick Feeder	5	—	5	8
Bulk feeder	40	—	40	2
Tray holder Type 1	—	2	2	40
Tray holder Type 2	—	4	4	20
DTS	—	1(2-sheets)	1(2-sheets)	48
MTS	—	1(40-stages)	1(40-stages)	80

Note 1: Not available 32mm adhesion feeder type.

6.3 Feeder unit for Insertion mounting component

6.3.1 Bowl feeder (MBF-C)

(1) Applicable Components

Product code	Applicable components	Length L	Width W	Height H	Lead length LH
MBF-C	Connectors (Note 1)	3.5～8mm	5～15mm	3～8mm	2.5～4mm

Note 1: Applies only to straight pin headers (top type) connectors.
This applies only to components that are held by their side or top surfaces with a gripper nozzle or components with a surface that can be picked up with a suction nozzle. It is incompatible with components that are extremely hard to distinguish from the machine. Refer to the fig. below for the suitable range of dimensions in detail.

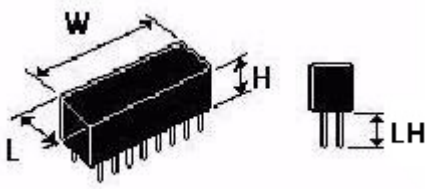


Figure Connector component detail

(2) Feeder Equipment and Environment conditions

Item	Specification
Product code	MBF-C
No. of units	Max. 2 (Front side only)
External dimensions	Length : 830 mm Width : 370 mm Height : 1140 mm (standard) 1190 mm (EN standard)
Weight	50 kg
Power source	Supplied from the machine
Method of conveyance	Motor drive
Power voltage	DC24V
Allowable current	Max. 6.0A
Environment requirements during operation	Temperature: 10~35°C Humidity: 30~80%RH (No condensation) Altitude: Up to 1,000m
Overvoltage category	Category I (IEC60664-1)
Environment pollution degree	Pollution degree Class 3 (IEC60664-1)

Do not to connect the bowl feeder to any commercially power equipment.

WARNING	Do not to connect the bowl feeder to any commercially power equipment.

6.3.2 BOWL feeder (MBF-L)

(1) Applicable components

Unit : mm

Product code	Applicable component	Component length (L)	Width (W)	Height (H)	Lead length (h)
MBF-L	Connector components (See Note 1)	5.0 to 25.0	3.5 to 10	3 to 13	2.5 to 4

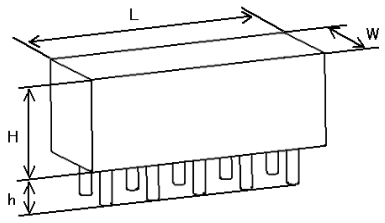


Figure 1.2.1.1 Connector component

Note 1: This feeder supports only straight-pin header (top) type connectors. The supported connectors are limited: the side or topside of a component should be able to be held with a gripper nozzle, or one of sides of a component should be able to be picked with a pick-up nozzle.
Even though a component is a straight-pin header (top) type connector, it cannot be supported unless its polarity can be determined with a JUKI mounting device.

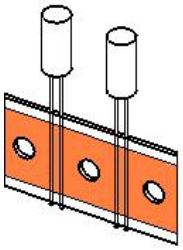
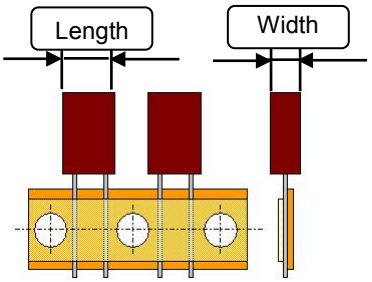
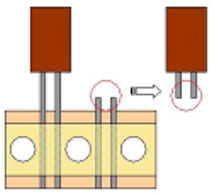
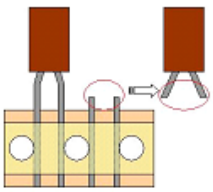
(2) Component supply facility and environment conditions

Item	Specifications
Product code	MBF-L
Mounting device that supports the bowl feeder	JM-10/JM-20
Number of occupied slots	20 slots
External dimensions	Total length = 980 mm, Total width = 325 mm, Total height = 1150 mm
Mass	75kg
Power supply	External power supply
Component transport system	Driven by a motor (rail unit), driven by a piezo-motor (bowl unit)
Power supply voltage	24 V DC (rail unit), 80 to 242 V AC (bowl unit)
Allowable current	Maximum 6.0 A (rail unit), Maximum 0.5 A (bowl unit)
Environmental condition during operation	Temperature: 10ºC to 35ºC Humidity: 30 to 80 %RH (No condensation) Altitude: 1,000 m or less
Overvoltage category	Overvoltage category II (IEC60664-1)
Environmental pollution degree	Pollution degree 3 (IEC60664-1)

6.3.3 Radial feeder (MRF-S / MRF-L)

This unit holds radial lead electronic components taped at certain intervals and sends out each of them at fixed timing, and then supplies radial taping electronic components to the JUKI machine by cutting the lead wire.

(1) Applicable components Unit : mm

<table>
<tr><th>Style</th><th>MRF-S</th><th>MRF-L</th></tr>
<tr><td rowspan="3">Shape and size of component</td><td rowspan="2">Diameter:φ5.0/φ6.3/φ8.0/
φ10.0(Note1),(Note2)</td><td>Length:5 to 25(Note 2),(Note 4)</td></tr>
<tr><td>Width:5 to 20(Note 2),(Note 4)</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Component height</td><td colspan="2">5 to 25(Note 3)</td></tr>
<tr><td>Tape feed pitch</td><td>12.7</td><td>12.7 / 15.0</td></tr>
<tr><td>Spacing pitch</td><td>12.7</td><td>12.7 / 15.0 / 25.4 / 30.0</td></tr>
<tr><td>Lead pitch</td><td>2.0 to 5.0</td><td>2.0 to 10.0mm</td></tr>
<tr><td>Lead wire diameter</td><td>Max. φ0.6 ±0.05</td><td>Max. φ0.8 ±0.05</td></tr>
<tr><td>Cut wire lead length</td><td>2.5 to 5.0(Note 3)</td><td>2.5 to 8.0(Note 3),(Note 5)</td></tr>
<tr><td rowspan="2">Allowable
component shape</td><td>Useable</td><td>Unusable</td></tr>
<tr><td>Component whose lead section can be straight after cut
  </td><td>Component whose lead section cannot be straight after cut
  </td></tr>
</table>

** Radial feeder and Tape feeder is disabled in the same bank.*

Note 1: Components with 2 leads such as electrolytic condensers and coils / inductors possess a cylindrical nozzle pickup surface. Lead forming is not applicable (straight lead cut only).

Note 2: The nozzle pickup surface must be flat without holes or grooves (no air leakage).

Note 3: For a tape feed hole to component base distance of 18.5 to 20.0mm, the combination of component height + cut lead length is 28mm or less.

Note 4: The component needs to have a side to be touched by a pick nozzle in the shape of a cylinder or a rectangular parallelepiped, in addition to having two leads. Ask a sales company or us about a misshapen component (other than the shape of a cylinder type or rectangular parallelepiped).

Note 5: Cutting-plane line lead length includes part of forming shape.

(2) External dimensions

Item	Specification	
Style	MRF-S	MRF-L
Number of occupied slots	6	8
Number of mountable units	Up to 26 units (13 units each on the front and rear sides)	Up to 20 units (10 units each on the front and rear sides)
Dimensions	Length: 750mm Height: 160mm Width : 50mm	Length: 750mm Height: 160mm Width : 75mm
Weight	3.5kg	4.5kg
Power supply	Supply from the machine proper	
Component transport method	Air cylinder driven	
Supply voltage	DC24V(±5%)	
Allowable current	Max.0.2A	

CAUTION	This feeder uses components matched to the specified component. Do not use components other than matched components.

(3) Options

①Component box (for MRF-S and MRF-L)

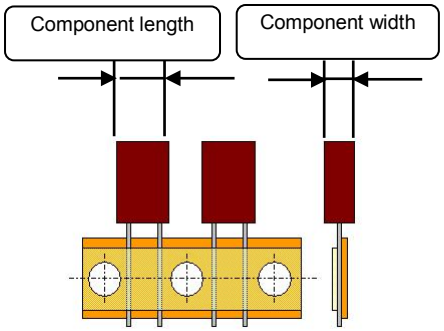
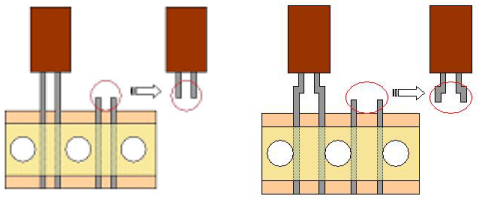
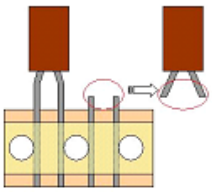
This is a box in which components are collected, and a partition board is in it.

②Branch/extension air piping (for MRF-S and MRF-L)

This air piping is used to supply air to the device installed at a remote distance from the main unit, for example, for preparation at the feeder base.

6.3.4 Radial feeder (MRF-LF)

(1) Applicable Components

Product style	MRF-LF	
Component length	5 - 25mm（Note 1）（Note 2）	
Component width	5 - 20mm（Note 1）（Note 2）	
Component height	5 - 25mm (Note 3)	
Tape feed pitch	12.7mm/15.0mm	
Component spacing pitch	12.7mm/15.0mm/25.4mm/30.0mm	
Lead pitch	2.0 - 10.0mm	
Lead wire diameter	Max. φ0.8 ±0.05mm	
cut lead length	2.5 - 8.0mm (Note 3) (Note 4)	
Allowable component shape	Usable	Unusable
	Component whose lead section can be straight after cut OK 	Component whose lead section cannot be straight after cut NG 

*Both a radial feeder and a tape feeder cannot be mounted on the same bank.

Note1: Only components that possess a cylindrical or rectangular nozzle pickup surface and are equipped with two leads are applicable to the feeder. Contact JUKI or your local dealer for irregularly-shaped (neither circular nor rectangular) components.

Note 2: The nozzle pickup surface must be flat without holes or grooves (no air leakage).

Note 3: For a tape feed hole to component base distance of 18.5~20.0mm, the combination of component height + cut lead length is 28mm or less.

Note 4: The length of a lead wire after cut from a tape includes its formed section also.

(2) External dimensions and ambient conditions

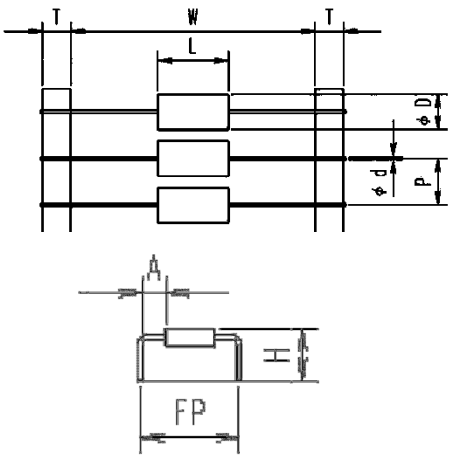
Item	Specification
Occupied slots	8
Number mounted	Max. 20 (front / rear 10 each.)
External dimensions	750 (L), 170 (H), 67 (W)
Weight	5.5kg
Power source	Supplied from machine main unit
Component conveyance	Air cylinder drive
Power source voltage	DC24V(±5%)
Allowable current	Max. 0.2A
Operating ambient conditions	Temperature: 10 - 35℃ Humidity: 30 - 80% RH (no condensation) Altitude: Up to 1,000m
Temperature range to maintain precision	20 - 25℃
Overvoltage category	Category I (IEC60664-1)
Pollution degree	Degree Class 3 (IEC60664-1)

CAUTION	This feeder is designed exclusively for the supported components. When setting for other size components, even if tape feed works, it will not properly and there may be breakage.

6.3.5 Axial feeder (MAF-S)

(1) Applicable Components

Model	MAF-S
W	26mm (Note 1)
T	6mm
P	5mm / 10mm
L	Maximum 15mm (Note 2)
φd	0.4 - 0.8mm
φD	Maximum 7.6 mm
FP	5.0 - 11.0mm
A	2.0 - 5.5mm
Cut lead length	Minimum 4.0mm (Note 3)



※Both a axial feeder and a tape feeder cannot be mounted on the same bank.

Note1: Lead forming is not supported (Only cutting of a straight lead is supported). Contact JUKI or your local dealer for irregularly-shaped (neither circular nor rectangular) components.

Note 2: Only components that satisfy the following formula shall be applicable:

$L + 2A + 2h \leqq 18$ mm

Note 3: The total of the component height and the cut lead length shall be 28 mm or less.

(2) External dimensions and ambient conditions

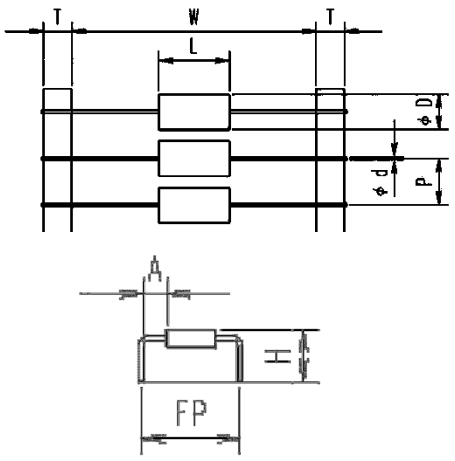
Item	Specification
Occupied slots	7
Number mounted	Maximum 22(11on each of the front and the rear)
External dimensions	940 (L), 245 (H), 59 (W)
Weight	6.3 kg
Power source	Supplied from machine main unit
Component conveyance	Air cylinder drive
Power source voltage	DC24V(±5%)
Allowable current	Max. 0.2A
Operating ambient conditions	Temperature: 10 - 35℃ Humidity: 30 - 80% RH (no condensation) Altitude: Up to 1,000m
Temperature range to maintain precision	20 - 25℃
Overvoltage category	Category I (IEC60664-1)
Pollution degree	Degree Class 3 (IEC60664-1)

CAUTION	This feeder is designed exclusively for the supported components. When setting for other size components, even if tape feed works, it will not properly and there may be breakage.

6.3.6 Axial feeder (MAF-L)

(1) Applicable Components

Model	MAF-L
W	52mm (Note 1)
T	6mm
P	5mm / 10mm
L	Maximum 15mm (Note 2)
φd	0.4 - 0.8mm
φD	Maximum 7.6 mm
FP	5.0 - 26.0mm
A	Minimum 2.0mm
Cut lead length	Minimum 4.0mm (Note 3)



※Both a axial feeder and a tape feeder cannot be mounted on the same bank.

Note1: Lead forming is not supported (Only cutting of a straight lead is supported). Contact JUKI or your local dealer for irregularly-shaped (neither circular nor rectangular) components.

Note 2: Only components that satisfy the following formula shall be applicable:

$L + 2A + 2h \leqq 37$ mm

Note 3: The total of the component height and the cut lead length shall be 28 mm or less.

(2) External dimensions and ambient conditions

Item	Specification
Occupied slots	10
Number mounted	Maximum 16 (8 on each of the front and the rear)
External dimensions	940 (L), 245 (H), 85 (W)
Weight	7.0 kg
Power source	Supplied from machine main unit
Component conveyance	Air cylinder drive
Power source voltage	DC24V(±5%)
Allowable current	Max. 0.2A
Operating ambient conditions	Temperature: 10 - 35℃ Humidity: 30 - 80% RH (no condensation) Altitude: Up to 1,000m
Temperature range to maintain precision	20 - 25℃
Overvoltage category	Category I (IEC60664-1)
Pollution degree	Degree Class 3 (IEC60664-1)

CAUTION	This feeder is designed exclusively for the supported components. When setting for other size components, even if tape feed works, it will not properly and there may be breakage.

6.4 Feeder unit for Surface mounting component

6.4.1 CTFR

(1) List of specifications

Product code	Tape type		Feeding pitch	Number of pins at the edge	Diameter of a reel	Typical component type
	Paper	Embossed				
CF03HPR	○	—	2mm	Two	Φ180mm	0603
CF05HPR	○	—				1005
CF08HER	—	○				Two-terminal diode
CF081PR	○	—	4mm			1608, 2012, 3216
CF081ER	—	○				SOT
CF8L1PR	○	—			Φ180 – Φ380mm	1608, 2012, 3216
CF8L1ER	—	○				SOT
CN05HPR	○	—	2mm	One	Φ180mm	1005
CN08HER	—	○				Two-terminal diode
CN081CR	○	○	4mm			1608, 2012, 3216
CN8L1CR	○	○			Φ180 – Φ380mm	1608, 2012, 3216

* For a tape feeder designed for both paper and embossed paper, contact our sales person.

* Use a tape feeder whose supported component sizes and tape specifications conform to the JIS C0806-3:1999 and IEC 60286-3:2007.

(2) Common specifications

1	Dimensions	C*0***R	L=602mm, H=208mm, W=16.2mm
		C*8L1*R	L=683mm, H=431mm, W=16.5mm
2	Mass	C*0***R	1.2kg (Excluding a reel)
		C*8L1*R	1.9kg (Excluding a reel)
3	Component transport method		Ratchet drive system

6.4.2 FTF/FTFR

(1) Specification table

① FTF (12 mm, 16 mm, 24 mm, and 72 mm)

Product code	Feed pitch	Pick position (Y direction)	Applicable component	
			Emboss width	Emboss depth
FF121S	4mm	132mm	8.3mm or less	6.5mm or less
FF122S	8mm			
FF123S	12mm			
FF12FS	4/8/12mm			
FF12NS	4/8/12mm			
FF161S	4mm		12.2mm or less	
FF162S	8mm			
FF163S	12mm			
FF16FS	4/8/12/16mm			
FF16NS	4/8/12mm			
FF242S	8mm		20.2mm or less	10.5mm or less
FF243S	12mm			
FF244S	16mm			
FF245S	20mm			
FF246S	24mm			
FF24FS	8/12/16/20/24mm			
FF24NS	8/12mm			
FF724S	12/16mm		62mm or less	
FF728S	12/16/20/24/28/32mm			

Dimensions	FF12**	L =693mm , H =472mm, W=31.5mm
	FF16**	L =693mm , H =472mm, W=31.5mm
	FF24**	L =693mm , H =472mm, W=40.0mm
	FF72**	L =693mm , H =472mm, W=89.2mm
Mass (Excluding a reel)		FF12**: 2.45kg , FF16**: 2.45kg , FF24**: 2.6kg, FF72**: 5.1kg
Component transport method		Ratchet drive system

* Use a tape feeder whose supported component sizes and tape specifications conform to the JIS C0806-3:1999 and IEC 60286-3:2007.

② FTFR (32 mm, 44 mm, and 56 mm)

<table>
<tr><th rowspan="2">Product code</th><th rowspan="2">Feed pitch</th><th rowspan="2">Pick position (Y direction)</th><th colspan="2">Applicable Component</th></tr>
<tr><th>Emboss width</th><th>Emboss depth</th></tr>
<tr><td>FF323R</td><td>12mm</td><td rowspan="3">132mm</td><td rowspan="3">23.5mm or less</td><td rowspan="11">25mm or less</td></tr>
<tr><td>FF324R</td><td>16mm</td></tr>
<tr><td>FF32FR</td><td>8/12/16/20/24mm</td></tr>
<tr><td>FF32FR-OP</td><td>8/12/16/20/24/28/32mm</td><td>114mm</td></tr>
<tr><td>FF443R</td><td>12mm</td><td rowspan="3">128mm</td><td rowspan="3">33.8mm or less</td></tr>
<tr><td>FF444R</td><td>16mm</td></tr>
<tr><td>FF44FR</td><td>8/12/16/20/24mm</td></tr>
<tr><td>FF44FR-OP</td><td>8/12/16/20/24/28/32/ 36/40/44mm</td><td>114mm</td></tr>
<tr><td>FF564R</td><td>12/16mm</td><td>128mm</td><td rowspan="4">46.0mm or less</td></tr>
<tr><td>FF568R</td><td>12/16/20/24/28/32mm</td><td>114mm</td></tr>
<tr><td>FF56FR</td><td>8/12/16/20/24mm</td><td>128mm</td></tr>
<tr><td>FF56FR-OP</td><td>8/12/16/20/24/28/32/ 36/40/44/48/56mm</td><td>114mm</td></tr>
<tr><td>Dimensions</td><td colspan="4">L =693mm , H =472mm
W= FTFR32**:47.7mm , FTFR44**:61.6mm , FTFR56**:66.0mm</td></tr>
<tr><td>Mass (Excluding a reel)</td><td colspan="4">FTFR32**:3.2kg , FTFR44**:3.5kg , FTFR56**:3.8kg</td></tr>
<tr><td>Component transport method</td><td colspan="4">Ratchet drive system</td></tr>
</table>

* Use a tape feeder whose supported component sizes and tape specifications conform to the JIS C0806-3:1999 and IEC 60286-3:2007.

(2) Options

① Emboss spacer (FTFR only)

When the component width and length are large and the tape depth is small, the posture stability at component pickup can be improved by placing the spacer at the component pickup position of the tape feeder.

The usable emboss depth is 1.0 mm to 8.0 mm.

6.4.3 Adjustment calibration jig for the feeder with a monitor

This is a jig for checking a component pick position with a CCD camera to adjust it.
If you check and adjust the pick position on a regular basis, you can maintain the stable pick-up capability.

(1) Specifications

1	Power supply	100 V to 240 V AC
2	External Dimensions	290 mm(W)×200 mm(D)×480 mm(H)
3	Mass	Total mass 20 kg - Set of a jig base : 12 kg (including the DC power supply box) - Set of a liquid crystal monitor : 6 kg (including the AC adaptor) - Master feeder : 2 kg

(2) Environment conditions

① During operation

- Temperature: 10 to 35°C
- Accuracy guaranty temperature: 20 to 25°C
- Humidity: 30 to 80% RH (No condensation)
- Altitude: 1,000m or less

② Transportation or storage

- Temperature: －15 to ＋70°C
- Humidity: 20 % to 95 % RH (No condensation)

(3) Configuration

- Adjustment jig main unit - Master feeder - CCD camera (including a lens)
- Light - Power supply - Monitor - Jig tape - Adjustment tool

(4) Applicable feeders

- ATF : 8 mm to 24mm
- CTF : 8 mm
- CTFR : 8 mm
- FTF : 12 mm to 72 mm
- FTFR : 32mm to 56mm
- BF : BF10/11AS, BF12BS, BF12/25/28CS and BF28RS

6.4.4 Tape reel mounting base (for MRF-S, MRF-L and feeders)

This is a base to mount a tape on the tape feeder. Operations can be performed in the status where the tape feeder is correctly held, so that the tape mountability can be improved and tape feeder falling can be prevented.

Type	Use
Tape reel mounting base (without feet)	The base is fixed on a table or the like with screws on the user side.
Tape reel mounting base (with feet)	This base can be installed freely because it is provided with feet.

6.4.5 Stick Feeder

A stick feeder is driven by the belt without requiring any power supply nor air supply.
It feeds an ordinary SOP, SOJ and PLCC which are packed in a stick.

Call the JUKI head office or local distributor for special components packed in a stick.

(1) Feeder type: Type W (SFN*AS)

Model	Lane width [mm]	SOP			SOJ			PLCC(QFJ)		
		Nominal length [mil]	Element width [mm]	Element height [mm]	Nominal length [mil]	Element width [mm]	Element height [mm]	Nominal length [mil]	Element width [mm]	Element height [mm]
SFN0AS (Type N0)	At delivery: 6.9 Adjustment range: 6.6 to 9.2	225	5.72 to 6.99	Up to 1.5						
		300	7.62 to 8.89	2.0						
SFN1AS (Type N1)	7.2	225	5.72 to 6.99	Up to 1.5						
SFN2AS (Type N2)	9.2	300	7.62 to 8.89	2.0	300	8.38 to 8.76	3.25 to 3.76	285 × 425	8.05 to 8.31	4.20 to 5.08
								290 × 490	8.13 to 8.51	
SFN3AS (Type N3)	11.2	375	9.53 to 10.8	2.5	350	9.65 to 10.03		350	9.78 to 10.03	4.20 to 4.57
								350 × 550		4.20 to 5.08
SFN4AS (Type N4)	13.0	450	11.43 to 12.7	3.0	400	10.92 to 11.30		450	12.32 to 12.57	4.20 to 4.57
					450	12.19 to 12.57		450 × 550		4.20 to 5.08

(2) Feeder type: Type W (SFW*AS)

Model	Lane width [mm]	SOP			SOJ			PLCC(QFJ)		
		Nominal length [mil]	Element width [mm]	Element height [mm]	Nominal length [mil]	Element width [mm]	Element height [mm]	Nominal length [mil]	Element width [mm]	Element height [mm]
SFW1AS (Type W1)	15.0	525	13.34 to 14.61	3.5						
SFW2AS (Type W2)	18.2	600	15.24 to 16.51	4.0				650	17.40 to 17.65	4.20 to 5.08
SFW3AS (Type W3)	20.8							750	19.94 to 20.19	
SFW4AS (Type W4)	26.0							950	25.02 to 25.27	
SFW5AS (Type W5)	31.2							1150	30.1 to 30.55	

- For Types N1 to N4 and types W1 to W5, an optional spacer kit is available for a change to another type.
- In the case of N0, the clearance can be finely adjusted to secure the optimum lane width for 8 pins and 10 pins.

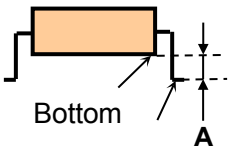
CAUTION	Use a dedicated stick feeder matched to each element size. Otherwise, elements may be broken due to inaccurate operation even if they are caused to flow.

(3) Stack Stick Feeder (for a mechanical bank)

A stack stick feeder is to be installed on the fixed bank, which is a section of a JUKI mounter on which a feeder is to be installed, or a feeder exchange trolley, and feeds sticks of components such as SOP, PLCC and SOJ with stacked on one another to the pick-up position of the mounter automatically.

❖ SOP(EIAJ ED-7402-1)

Stack Stick Feeder type	Lane width (mm)	Groove depth (mm)	Nominal component size	Component width (mm)	Component height (mm)	Component length (mm)	Distance from the bottom of a lead to that of a mold ("A") (mm) *See Note 1.*	Stick width (mm)
Type 1	7.0	1.7	TYPE Ⅰ 225 mil	5.72 to 6.99	1.01 to 1.50	8.89 to 13.97	0.4 or less	8 to 10
Type 2	9.0	2.3	TYPE Ⅱ 300 mil	7.62 to 8.89	1.51 to 2.00	11.43 to 13.97	*<Note 1: Distance "A">*	10 to 12
Type 3	10.8	2.8	TYPE Ⅲ 375 mil	9.53 to 10.80	2.01 to 2.50	11.43 to 16.51		12 to 14
Type 4	12.8	3.3	TYPE Ⅳ 450 mil	11.43 to 12.70	1.80 to 3.00	13.97 to 19.05		14 to 16
Type 5	14.8	3.8	TYPE Ⅴ 525 mil	13.34 to 14.61	3.01 to 3.50	13.97 to 24.13		16 to 18



❖ QFJ(PLCC)(EIAJ ED-7407)

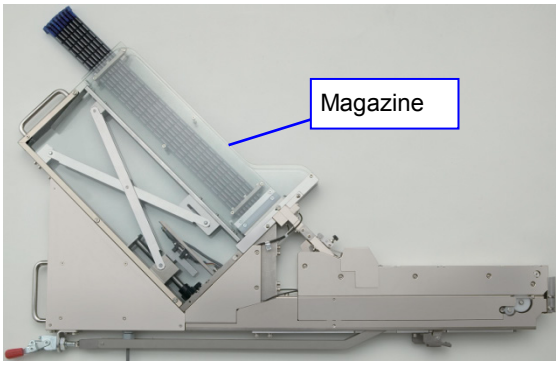
Stack Stick Feeder type	Lane width (mm)	Groove depth (mm)	Nominal component size	Component width (mm)	Component height (mm)	Component length (mm)	Stick width (mm)
Type 3L	10.8	5.1	TYPE Ⅰ 350 mil	9.78 to 10.03	4.20 to 4.57	9.78 to 15.11	12 to 14
Type 4L	12.8		TYPE Ⅱ 450 mil	12.32 to 12.57		12.32 to 15.11	14 to 16
Type 6L	18.0		TYPE Ⅲ 650 mil	17.40 to 17.65		17.40 to 17.65	18 to 20

❖ SOJ(EIAJ ED-7406)

Stack Stick Feeder type	Lane width (mm)	Groove depth (mm)	Nominal component size	Component width (mm)	Component height (mm)	Component length (mm)	Distance from the bottom of a lead to that of a mold ("A") (mm) *See Note 1.*	Stick width (mm)
Type 2J	9.0	4.0	TYPE Ⅰ 300 mil	8.382 to 8.763	3.251 to 3.759	10.922 to 21.41	1.2 or less	10 to 12
Type 3J	10.8		TYPE Ⅱ 350 mil	9.652 to 10.033		13.462 to 29.00		12 to 14
Type 4J	12.8		TYPE Ⅲ 400 mil	10.922 to 11.303		17.272 to 29.00		14 to 16
			TYPE Ⅳ 450 mil	12.192 to 12.573				

• Stack Stick Feeder Specifications

1	Number of the occupied positions	8
2	Supply voltage	DC24V、DC6V
3	External dimensions	8.5kg
4	Weight	Width =60mm Height =580mm Length =930mm
5	Dimensions of an applicable stick	Width =20 mm or less Height =10 mm or less Length =400 to 600mm



6.4.6 Tray Supply device

(1) Tray Holder

This tray holder is equipped with one tray, and can be installed on the rear bank so that the head of the main unit can pick up a component directly from this holder.

When the tray size is small, several trays can be attached on the holder to allow this holder to function as a multi-tray holder.

	Full type	Half type
Longitudinal direction	65mm to 320mm	65mm to 155mm
Horizontal direction	65mm to 259.5mm	65mm to 259.5mm
Thickness	5 mm to 11 mm (from the bottom of a tray to the top of an IC)	
Number of occupied positions (See *Note 1*)	42	21

*The maximum number of tray holders at the rear bank is one full type holder or two half type holders.

Note 1: Although the number of feeder positions actually occupied is 40 for the full type, and 20 for the half type, the number of positions used during PWB production (according to the feeder layout) is shown in the table above.

(2) TRSeries

TR series device supplies a mounter with a tray component.
The two types of DTS (Dual Tray Server), MTS (Matrix Tray Server) are available.

① TR1SNR (DTS, Dual Tray Server)

This is a tray supply device on which two trays can be set, and is to be installed on feeder bank of the rear bank so that the head of the mounter can pick up components directly from this tray server.
Since the head of the mounter directly picks up components from this tray server, even irregularly-shaped components can be supplied easily.
(Not available Non-stop mode)

② TR5SNX･SNI (MTS, Matrix Tray Server)

This matrix tray server is to be installed on the rear bank of a mounter, and pulls out all trays at a time so that the head of the mounter can pick up components directly from the trays. Since the head of the mounter directly picks up components, even irregularly-shaped components can be supplied easily.
TR5SNI supports large component such as capacitor and transformer. It enables the supply of max. 50mm component height.

③ TR7DN (MTS, high-speed matrix tray server)

This device is installed in the rear bank. With a two sets of tray tracker (hereinafter called stacker), components are transported and supplied alternately on the same plane from the tray stacker to the pickup position. (Not available Non-stop mode)

1) **Specifications**

MTS specification

Model		**TR5SNI**	**TR5SNX**	**TR7DN**
Method for supplying a mounter		Direct supply from the tray		
Applicable bank specification		Overall change table system		
Tray unit (*1)(*2)(*3) (*4)(*8)	Size of a tray that can be supplied	Width: 150mm～340mm	Length:90mm～230mm	
		Thickness: 5mm～63mm	Thickness: 5mm～23mm	
	Mass / tray (*5)	3,000 g	500 g	
Component size		Maximum ☐ 74 mm and 50 x 150 mm		
Mass(*6)		217kg (Standard) 220kg (EN)		310kg (Standard) 320kg (EN)
Occupied position		80		
Voltage of the power supply		Single-phase 200、220、240、380、400、415 V AC (supply from the mounter side)		
Apparent power		800VA		1.0kVA
Air consumption (normal)		3L/min		6L/min
RFID option (*7)		Applicable		

DTS specification

Model		**TR1SNR**
Method for supplying a mounter		Direct supply from the tray
Applicable bank specification		Mechanical bank
Tray unit[(*1)(*2)(*3)	Size of a tray that can be supplied	Width: 150mm～340mm Length: 90mm～230mm Thickness: 5mm～27mm
	Mass	500g or less / tray (Total of mass of a tray and that of a component(s))
Component size		Maximum☐74mm、50×150mm
Mass		16kg
Occupied position		48
Operating voltage		DC 24V±10%
RFID option(*7)		-

(*1) The following types of tray units (tray bases) on which trays can be set are provided:

Model	**Type of a tray unit**	**Description**	
DTS	Top plate (ST) assembly	Top plate on which one tray can be set. (Standard)	
	Top plate (MTX) assembly	Top plate on which two or more trays can be set. (Option)	
MTS (TR5SNX/5SNI/7DN)	Tray unit (ST)	One-touch style of holder unit that pushes down a tray with its spring pressure. A tray can be replaced with another one easily. (Standard)	When the soft material trays are used a fixed holder unit can be replaced from Tray unit (ST). (Option)
	Tray unit (A)	Unit that fixes a tray with screws. It is appropriate for a tray whose material is soft. (Option)	
	Tray for heavy part	Used when the tray weight 500g is exceeded 10 trays are regularly included with TR5SNI	

(*2) When you use a DTS and a tope plate (MTX) assembly, the minimum size is 65 mm (W) × 65 mm (L). When you use a MTS and an optional waffle tray holder, the minimum size is 50 mm (W) × 50 mm (L).

(*3) The thickness is a dimension from the bottom of a tray to the top of the tray or a component, which is higher. When you use a tray whose thickness is more than 11 mm with a DTS/MTS, you have to set the feeder float sensor of the mounter so that it cannot be used.

(*4) If the tray thickness T exceeds 9mm, it is necessary to remove the tray base at upper stage depending on the tray thickness.

Thickness of tray	Number of removed stages at upper stage		
	TR5SNI	TR5SNX	TR7DN
5 or more to less than 9mm	Not need to be removed	Not need to be removed	Not need to be removed
9 or more to less than 22 mm	1	-	-
9 or more to 23 mm	-	1	1
22 or more to less than 36 mm	2	-	-
36 or more to less than 50 mm	3	-	-
50 or more to 63 mm	4	-	-

TR5SNI uses a tray base for heavy part. Do not set a tray base at 1st stage and 20th stage at the setting position to prevent the interference with reinforcement material of tray base for heavy part.

(*5) Total of the mass of a tray and that of a component(s)

(*6) This is the mass when the device is equipped with full options.

(*7) For the use of the RFID system, the RFID tray bases are required.
Note that the RFID tray bases cannot be shared among the different types of the devices.
The RFID system is a factory-set option. For further information on installing the RFID option, please contact JUKI or the representative office in your area.

RFID tray base	
Applicable model	TR5SNR,TR5SNI,TR7DN

* The standard tray base can be used for all the models mentioned above.

(*8) The tray unit for TR7DN has no compatibility with the existing machine models.

2) Options

No.	Name	Function/applicable model (Note1)	
		TR5SNX/SNI	TR7DN
1	No-components display function	This function turns on the LED button to notify the number of steps without components. Additional components can be replenished by pressing its LED button.	
		-	○(Note2)
2	Ultra-slow mode (Note 3)	To pull out/store the tray base to which components are supplied, this function changes the motor/cylinder speed to a low speed in order to prevent components from jumping out. This speed setting is performed by production program.	
		○	○
3	Stacker with opening/closing cover	To prevent the tray base from jumping out when setting the tray base in the stacker, this stacker is provided with a cover for fixing the tray base without level difference of the tray base.	
		○	○
4	2-inch waffle tray holder	Tray holder to set the waffle tray of □50 mm.	
		○	○
5	Applicability to RFID function	Reading the RFID tag attached to the tray base is enabled by adding the RFID reader (antenna). For using this function, IFS-NX applicable to the mounter proper is required. For details, refer to “IFS-NX Device Specification.”	
		○	○

Note1 *The above functions of the TR series are factory-set options.*

Note2 *TR7DN is a standard function.*

Note3 *Ultra-slow mode is displayed as “Low speed 2” on the operation screen of the mounter.*

7 Control System

7.1 Control

7.1.1 Program Selection

The production program can save it in SSD.

When you use a USB port, you can save it on an external storage device also.

7.1.2 Limit of a production program

- Maximum number of placement points per circuit : 10,000 points
- Maximum number of circuits per PWB : 1,200 for a matrix board
  200 for a non-matrix board
- Maximum number of points per PWB : 10,000 points
- Maximum number of component data records : maximum number of component types that can be attached on the machine
- Maximum number of component pick-up records : same as the above.
- Maximum number of registerable marks :
  50 sets for component placement positioning mark,
  1 set for a BOC mark (2 to 3 marks)

7.2 Production mode

The following three production modes are available during production

PWB production

- Specifies the number of PWBs you plan to produce and produces PWBs actually.

Trial mode

- Performs a trial PWB production.
  You can select the PWB pick-up position tracking function or PWB placement position tracking function that is to be performed after placement.

Dry run mode

- Checks the PWB pick-up/placement process without using any component.
  You can select the PWB pick-up/placement position tracking function.

8 Interface

8.1 Electrical interfaces

8.1.1 Kinds and meanings of electrical signals

A conceptual electric signal connection diagram related to the machine and the opposite-side machine is shown in the following “Conceptual electric signal connection diagram.”

The electrical signals between the machines and upstream-side devices ①, ② and between the machines and downstream-side devices ③, ④ is shown in the following diagram.

a) The electrical signal ① is called the “carryout request input signal (or PWBs available-in),” receiving the PWBs carryout requests from the upstream-side devices.

b) The electrical signal ② is called the “carryout permit output signal (or ready-out),” having the PWBs carried out to the upstream-side devices.

c) The electrical signal ③ is call the “carryout request output signal (or PWBs available-out),” requesting the PWBs carryout to the downstream-side devices.

d) The electrical signal ④ is called the “carryout permit input signal (or ready-in),“ receiving the PWBs carryout permits from the downstream-side devices.

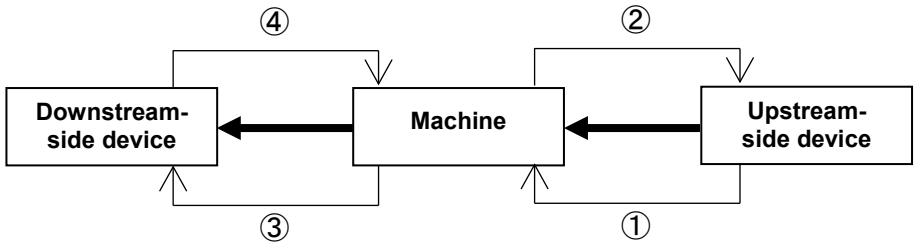


Figure Electrical signals connection conceptual diagram

8.2 Input and Output Signal Interfaces

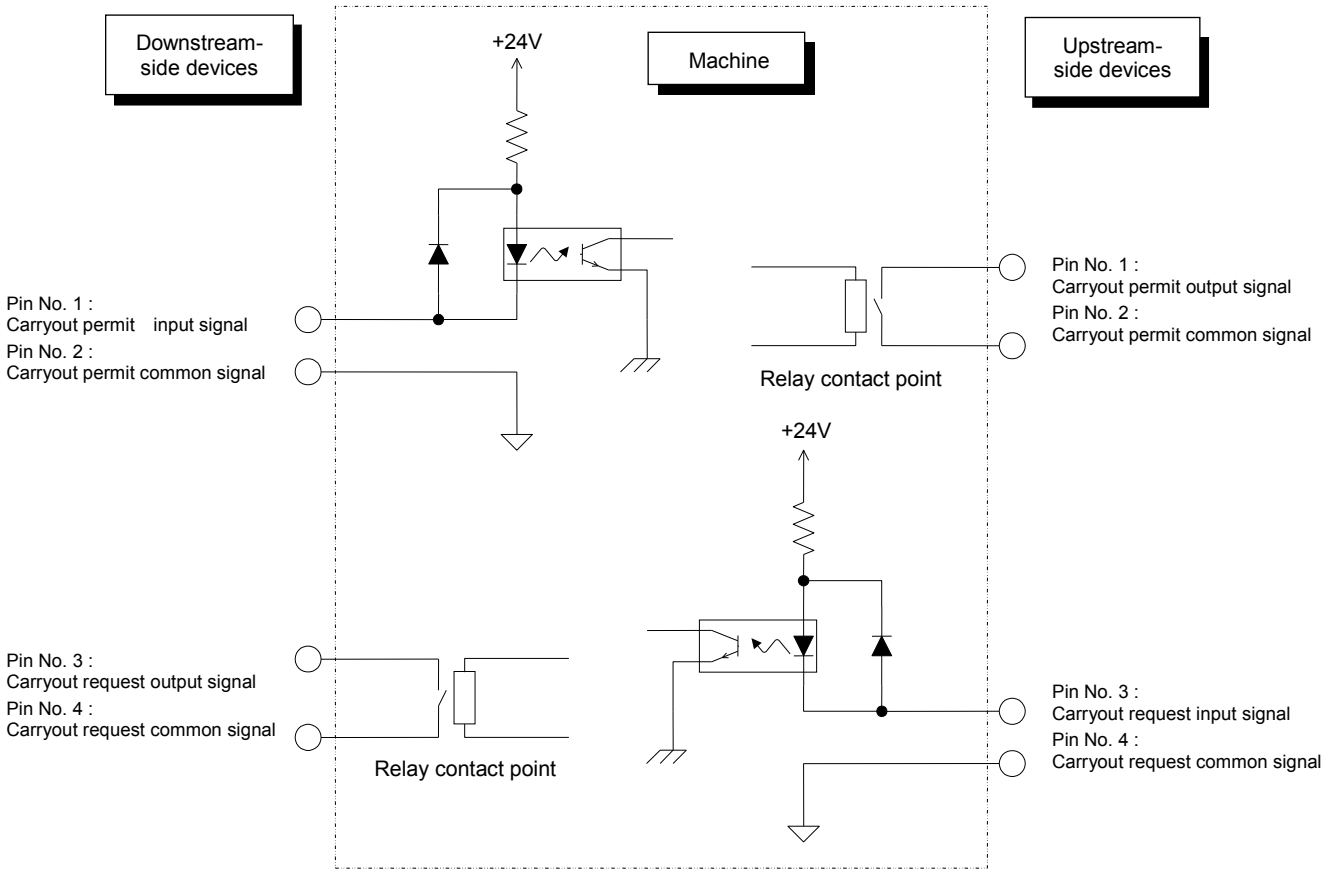


Figure Signal interfaces and connection terminals

8.2.1 Connection cable specifications

A connection cable shall conform to the JIS B 8438 Industrial Robot – Electric Equipment.
The cable length shall be 10 m or less.

8.3 Data interface

- Equivalent to USB 2.0, two ports
- As data interfaces, devices such as DVD/CD-ROM drive are connected. (USB connection, option)

8.4 Utility Connections

- Piping joint

  Quick connect coupling joint plug for $\phi 8 \times \phi 12$ (option)

9 Safety specifications

9.1 Emergency stop

This machine is provided with three emergency stop buttons each at the front, rear sides, and HOD.
Depressing these emergency stop buttons immediately stops each axis to cut off the power supply for driving the motors.

9.2 Safety covers

The machine is provided with covers, each at the front and rear sides, for both of which the cover open switch detects either status of opening or closing to suspend the continuous operation temporarily upon opening either cover or both. Moreover, the machine is provided with the "Switching key" on the operation panel that switches "Maintenance mode" or "Operation mode" to perform switching operation of safety covers according to each mode.

- Operation mode

  It is a mode that enables a safety cover to be locked, and limits opening of cover during normal production. Moreover, it releases the safety cover from being locked in operation, and frees the servomotor "SERVO FREE state" for the safety operation while the safety cover opens.

- Maintenance mode

  It is a mode that enables the low-speed operation while a safety cover is not locked and opened, and is used for maintenance.

9.3 CE marking specifications (for EN machine)

This shall comply with the following EC directive (European committee).

- EC Machinery Directive 2006/42/EC
- EC EMC Directive 2014/30/EU

Applicable standard

- Machinery Directive :
  EN ISO12100:2010, EN ISO13849-1:2008/AC:2009, EN60204-1:2006+A1:2009
- EMC Directive :
  EN 61000-6-4:2007/A1:2011, EN 55016-1-2:2004/A1:2005/A2:2006,
  EN 55016-2-1:2009, EN 55016-2-3:2006, EN 61000-6-2:2005,
  EN 61000-4-2:2009, EN 61000-4-3:2006/A1:2008/A2:2010,
  EN 61000-4-4:2004/A1:2010, EN 61000-4-5:2006, EN 61000-4-6:2009,
  EN 61000-4-8:2010,EN 61000-4-11:2004

10 Reliability specifications

10.1 Reliability of the machine (Devices)

For five (5) years：Excluding either the consumable components or the following regularly replaceable components.
Refer to the Instruction Manual for the details.

- Periodic replacement parts: These must be replaced at intervals of 2 to 3 years as standard. (The replacement interval varies depending on the operating conditions.)

Cableveyor	HOD
Bare cable assembly	Battery unit (option)
Air tube	Electro Pneumatic regulator (option)
Optical fiber cable (in a cableveyor)	
Filter element	
Gas spring	

Criteria for calculating the lifetime：

22 hours per day
300 days per year
Therefore, 22 x 300 x 5 = 33,000 hours/5 years

◆ Revision record

Rev.	Date	Revised locations	Revision contents	Remarks
00	May.2013			First edition
01	May.2014	The overall revision	The addition of an option Standardization of an option	Revised
02	Jun.2015	1 to 6,9,12,13,28,40,47,49	Standardization of an option	Revised
03	Feb.2016	15	Board thickness change	Revised
04	May.2016	5・10・23・24	Addition of the lead correction function	Addition
05	Aug.2016	9	G (Top surface of the signal light from the floor) Dimensions	Revised
05	Dec.2016	P51	EC EMC Directive	Revised
06	May.2018	Chapter 3	JaNets	Revised

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2018.05 Printed in Japan