M4s
SPECIFICATIONS

i-PULSE Co., Ltd.
1-9-3 Shinmiyakoda, Hamamatsu-city,
Shizuoka-pref., 431-2103 Japan
TEL: (81) 53-484-1876
FAX: (81) 53-484-1870

1. SCOPE

These specifications apply to the surface mounter **"M4s"** manufactured by i-PULSE.

2. GENERAL DESCRIPTION

This machine positions a board transferred from the preceding process, places electronic components on programmed locations on the board, and transfers the board to the next process.

3. CONFIGURATION

Machine: 1 unit

Options: 1 set

4. LEADING PARTICULARS

4.1. Main Body

1) Dimensions: L1750mm x D1500mm x H1485mm, excluding signal tower, CRT display, and keyboard.

2) Weight: Approx. 1950kg

3) Air Supply: 0.5MPa (No fluctuation of original pressure)

Clean air without moisture, oil, and dust

Air filter and mist separator are standard equipped.

4) Air Quantity: **46** liter / min. A.N.R.

5) Color: DIC NO. 439 (Blue) for top cover

SK fine leather YH gray

4.2. Applicable Board and Board Transfer Unit

1) Board Size

L dimension: Max. 460mm, Min. 50mm

W dimension: Max. 410mm, Min. 50mm

Thickness: Max. 2.0mm, Min. 0.5mm

No cuts allowed at the board edges

Magnet Backup Clamp with adjustable-height magnet pins (OPTION)

Matrix Backup Clamp with fixed-height matrix pins (STANDARD)

Board Clamp Conveyor with magnet or matrix backup clamp (OPTION)

2) Allowable Board Warp

Maximum 0.2 mm per 50mm long, and 0.5mm upward and 1.5mm downward about full board length

* The board warp larger than the above may badly affect the placement accuracy.

3) Board Locating Method

Pin locating with tooling holes, or edge holding

The diameter of tooling hole can be 3.0 +0.1/-0mm, 3.5 +0.1/-0mm, or 4.0 +0.1/-0mm.

* Contact us for other diameters and tolerance.

Board loading time: Approx. 6.6 sec (using the edge holding method)

Board unloading time: Approx. 3.5 sec (using the edge holding method)

* The above time is given with the maximum-sized board and no optional buffer stoppers.

* Although the board arrival sensor is factory-adjusted, the sensitivity of the sensor may need to be re-adjusted according to the color of actual boards.

4) Board Transfer Method

Belt conveyor using antistatic belt (10 kilo ohm cm or less)

5) Conveyor Flow Direction

Left to right

6) Conveyor Speed

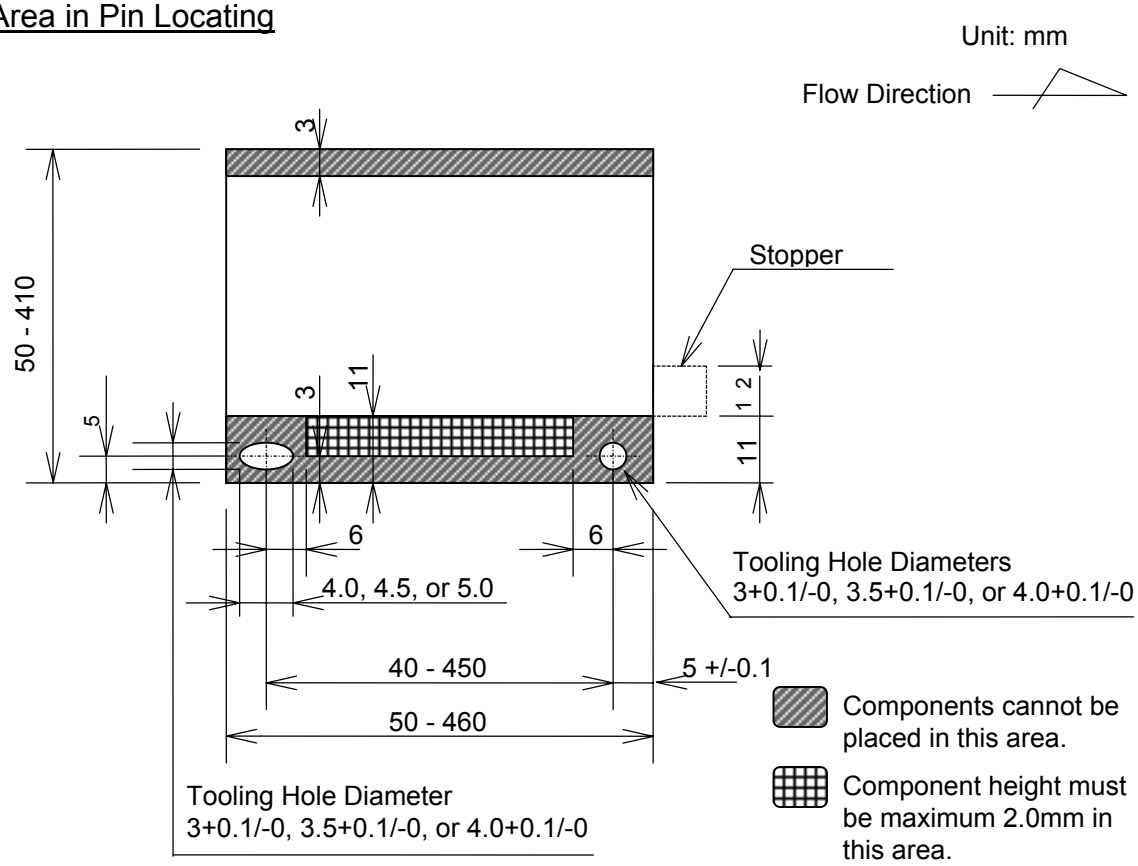
Max. 420mm/sec, speed adjustable, with soft stop function

7) Board Transfer Height: 900 +/-20mm, 900+20/-10mm (with Feeder bank changer CFB-2)

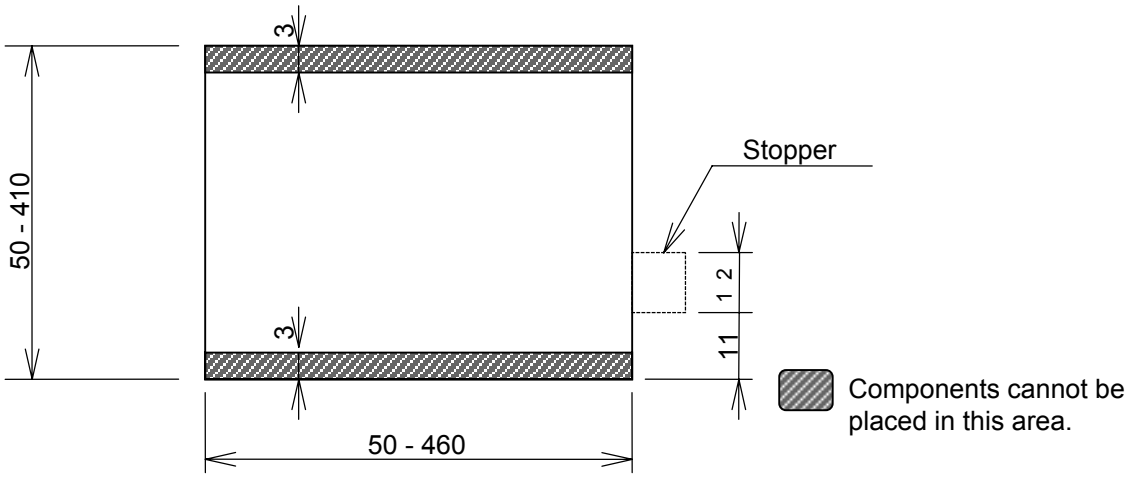
8) Reference Side: Front side

9) Conveyor Width Adjustment: Manual by crank handle

Unplaceable Area in Pin Locating



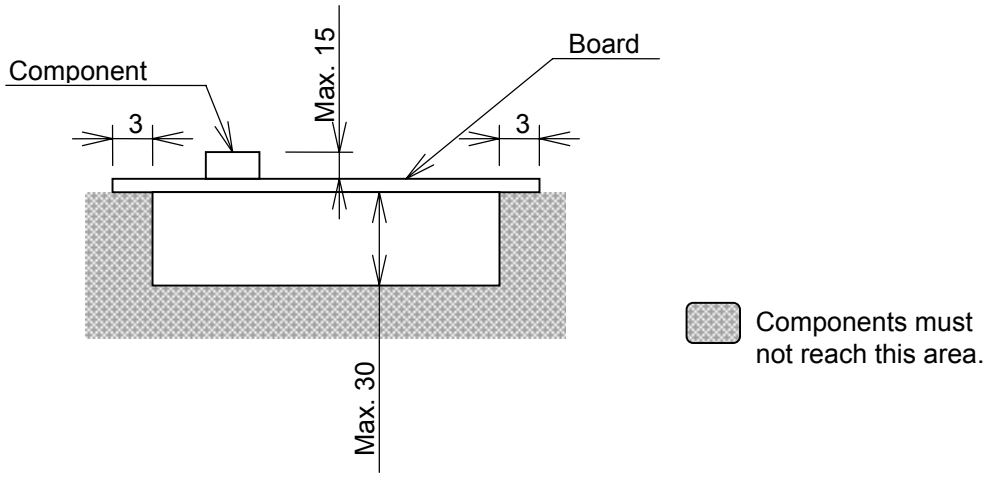
Unplaceable Area in Edge Holding



Top and Bottom Clearance

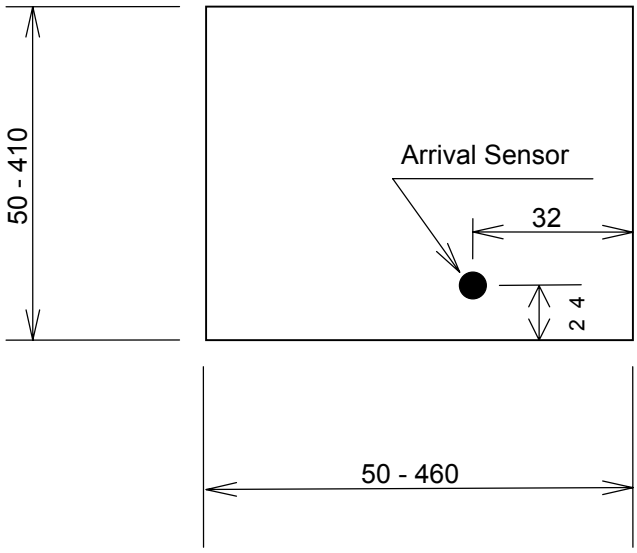
Unit: mm

Flow Direction



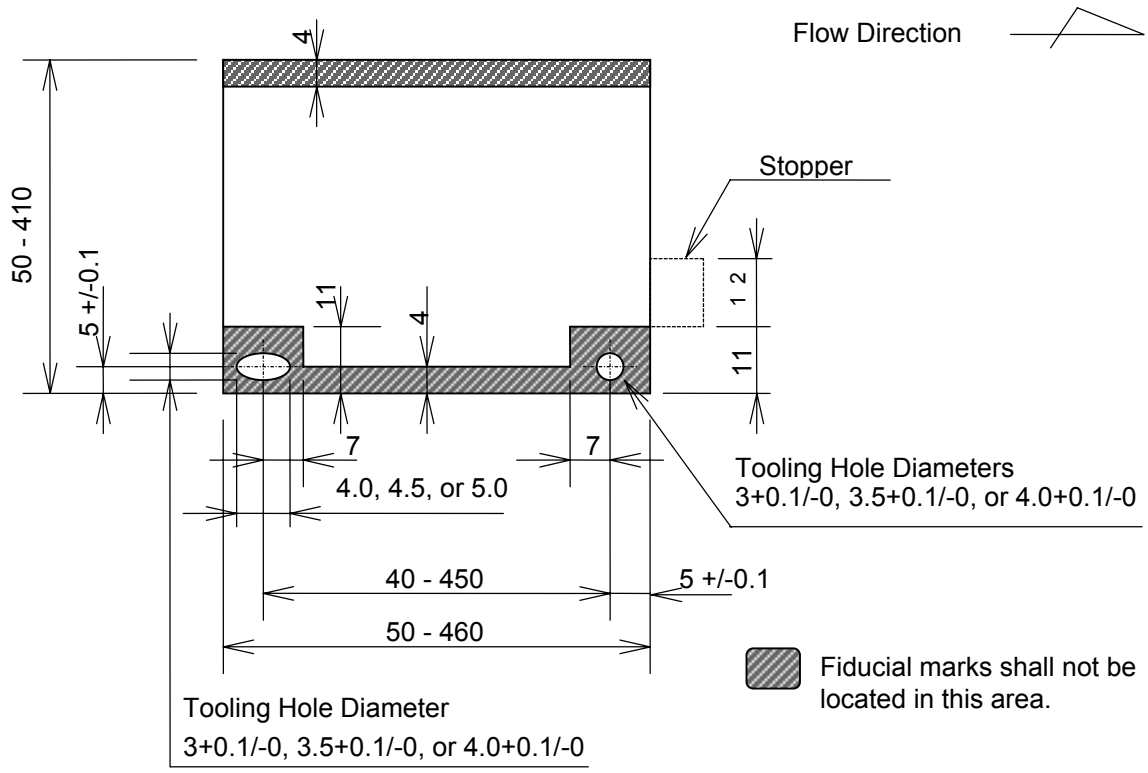
NOTE: When the Board Clamp Conveyor option is installed, the restrictions are different from those of the standard conveyor. Please refer to the separate Specifications for Board Clamp Conveyor.

Arrival Sensor Position

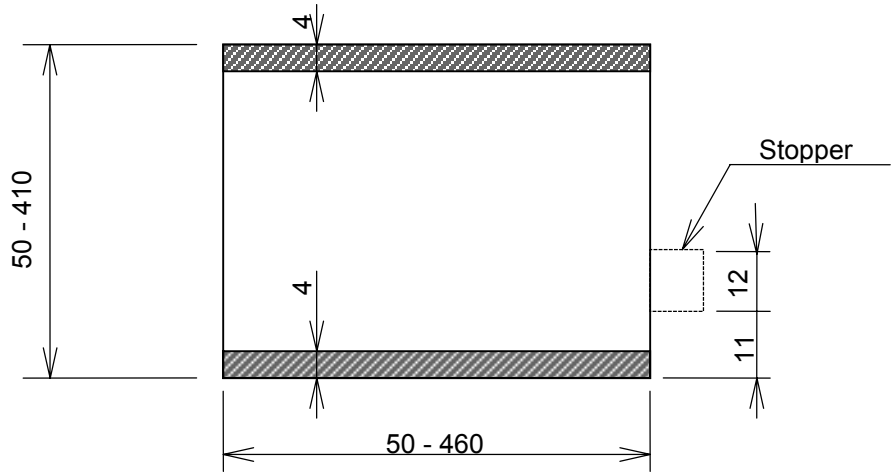


Unallowable Area for Fiducial Marks in Pin Locating

Unit: mm



Unallowable Area for Fiducial Marks in Edge Holding



4.3 Standard Head

1) Number of Placement Heads

   4 heads (30mm pitch)

2) Z-axis Drive

   4 AC servomotors, Resolution 0.006mm

3) Rotation Axis Drive

   2 AC servomotors, Resolution 0.022 degree

4) Pickup Error Detection

   Negative pressure check or vision recognition

5) Component Alignment Method

   Vision alignment

6) Pickup Method

   Suction by vacuum

7) Placement Accuracy

   CHIP: +/- 0.06mm (mu+3sigma) by standard scan camera, placement on sticky tape

   QFP: +/- 0.05mm (mu+3sigma) by standard scan camera, placement on sticky tape

   +/- 0.035mm (mu+3sigma) by fixed camera FC05/FC03/FC02, placement on sticky tape

   BGA: +/- 0.10mm (mu+3sigma) by standard scan camera, placement on sticky tape

   +/- 0.10mm (mu+3sigma) by fixed camera FC05/FC03/FC02, placement on sticky tape

   CSP: +/- 0.10mm (mu+3sigma) by standard scan camera, placement on sticky tape

   +/- 0.10mm (mu+3sigma) by fixed camera FC03/FC02, placement on sticky tape

8) Placement Speed

   Max. 0.18 sec/CHIP by standard scan camera, **4**-head simultaneous pickup, under optimum conditions

   Max. 0.69 sec/QFP by fixed camera FC05, QFP100/0.65, **4**-head consecutive pickup, under optimum conditions

9) Component Size by Standard Scan Camera

Dimensions: Max. 20mm x 18mm

Min. 0.5mm square

Minimum lead pitch: 0.5mm

Component height: 15.0mm (Pre-placed components max. 10.5mm)

10) Scan Camera

Field of view: (X) 23mm x (Y) 21.6mm

Function: Component alignment, Vision test, ADA (Auto Data Acquisition), Nozzle presence check

11) Component Range and Camera Type

Component Range		Standard Scan Camera	Optional Fixed Camera
Resistors	Chip Resistor	YES	YES
	MELF Resister	YES	YES
Capacitors	Ceramic Chip Capacitor	YES	YES
	Tantalum Capacitor	YES	YES
	Electrolytic Capacitor	YES	YES
Semiconductors	SOT	YES	YES
	SOIC, TSOP, SOJ	YES	YES
	QFP, PLCC, LCC	YES	YES
	BGA, CSP	YES	YES
Connectors	-	YES	YES

The above table shows standard components only. Besides the above, there are other components that can be handled. On the other hand, even shown above, some components may not be recognized by vision according to specific conditions. Contact us for further information.

12) Teaching Camera:

1 unit

［Camera Teaching］

Manual teaching using CCD camera with a field of view of 14mm square
Teaching Camera covers feeder lanes No. 1 to 47.

［Skip Function］

Bad board skip function by sensing bad marks by vision

Recommended mark color: Silver, white, or black

Maximum number of mark data: 100 marks

［Fiducial Function］

Correction of placement coordinates by sensing fiducial marks on the board by vision
1-point sensing (X/Y shift), 2-point sensing (X/Y/R shift), or 4-point sensing (X/Y/R shift)

Recommended mark and size: Circle mark of 0.5 to 2.0mm diameter (Max. 5.0 mm square)

Employed the pattern matching method, it can recognize a wide range of mark shapes.

Mark surface material: Solder plated, gold plated, copper.

Maximum number of mark data: 100 marks

The other specifications for fiducial marks conform to JIS B8461:1997.

［Nozzle ID Recognition］

Recognition of nozzle ID marks

4.4 Parts Feeder

1) Number of Component Types:

Max. 120 types, using 8mm tape feeders

Front station: 60 types
Rear station: 60 types

With the optional MXR-20 installed: 60 front + 22 rear + 20 (MXR-20) = Max. 102 types

With the optional MX-20D installed: 60 front + 18 rear + 40 (MX-20D) = Max. 118 types

With the optional MX-ST2 installed: 60 front + 25 rear + 2 (MX-ST2) = Max. 87 types

2) Component Package: Tape, stick tube, and tray, conforming to JIS C 0806:1995.

4.5 Controls

1) Axis Control: X/Y/Z/R/S axes, Semi-closed loop control with AC servomotors

2) Position Control: Absolute method

3) Data Input Increment: X/Y/Z/S 0.01 mm or 0.1 mil

Rotation 0.01 degree

4) Data Input Method: Manual, teaching, offline programming

5) Memory Capacity: Max. 3000 steps per program

Max. 500 programs in the built-in hard disk

6) External Memory: 3.5" floppy disk 1 unit

Hard disk 1 unit

7) Display: One 15" color CRT for operation and vision monitoring

English, Chinese, Korean, or Japanese / mm or inch

8) Operation: Mouse, mini keyboard, operation switches

9) Ethernet: Network standard IEEE802.3 Ethernet

Interface port RJ-45

Applicable network 10BASE-T

Data transfer rate 10Mbps

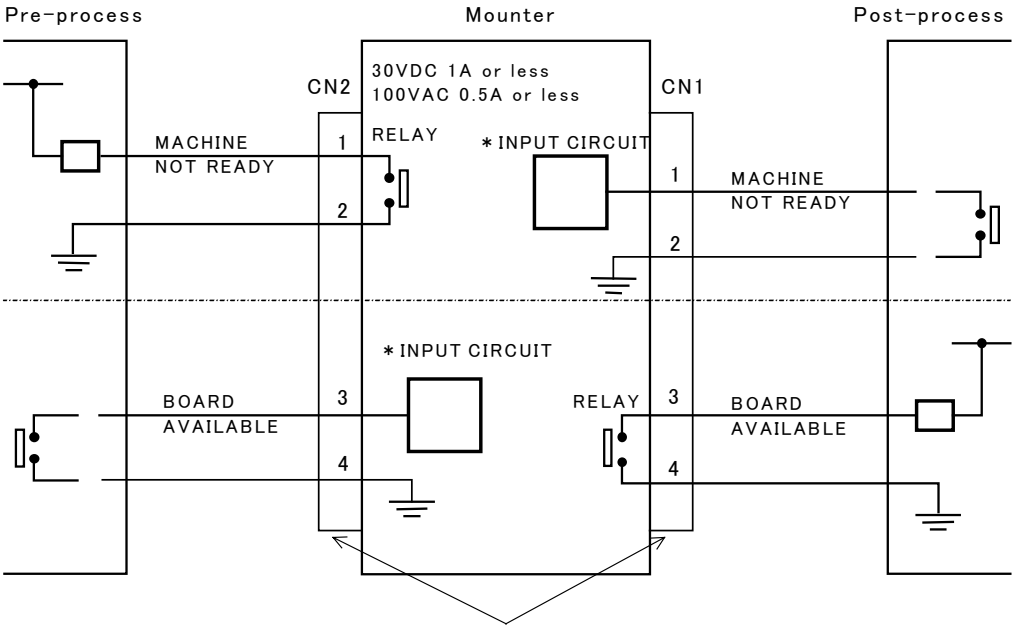
(10) Up and Downstream Signals

Pre-process signal: Output by contact

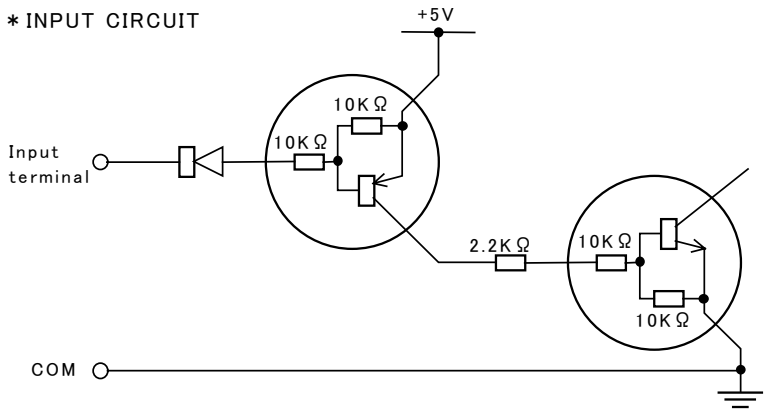
Post-process signal: Output by current

i-PULSE Interface: Upper half of the diagram below

SMEMA Interface: Whole diagram below.



Connector (Mounter side)	Connector (Cable side)
AMP	AMP
206043-1(receptacle)	206044-1(plug)
	66099-2 or equivalent (pin)
	206070-1(cable clamp)



4.6 Environmental Requirements

1) Ambient Air Temperature: Accuracy assurance 23 +/-2 degrees centigrade

   Operation assurance 5 to 40 degrees centigrade

   (The average over a period of 24 hours does not exceed 35 degrees C.)

2) Relative Humidity: 45 to 60%, no dewing

3) Atmosphere: Dust and corrosive gas free

4) Floor Condition: Flat and solid enough

   The machine may present larger vibration, if the floor condition is not proper.

5) Power Requirements: 200V +/-10%, 3-phase, 50/60 Hz

   208/220/240/380/400/415/440V using optional power transformer

   NB) The power transformer is standard in export model.

   Power consumption 1.5kW

   Installed Capacity 4.0kVA

   Leakage current 20mA or less

* In case there are other machines, such as compressor, welding machine, wave-soldering machine with contacts, reflow oven, which may generate noise, do not use the power and ground common to those machines.

* Take the power independently from the switchboard and take the ground independently.

* Improper power and environmental condition will create serious problems on the machine, so the power and environmental requirements must be observed strictly. Contact us, if you have any questions.

* As the acrylic safety cover is clear and transparent, the strong room light and the direct sunlight coming inside the machine may badly affect the vision processing. Contact us beforehand, if such a case is assumed.

4.7 Other Standard Features

1) Alarm Devices: Buzzer and Signal Tower

STATUS		SIGNAL TOWER				BUZZER
		GREEN	YELLOW	RED	(WHITE) *	
Auto Mode	Running	Lights				
	Pausing		Lights			
	In troubled state			Blinks		Hazard sound
	Lack of components		Blinks			Warning sound
	Notice of component shortage	Lights	Blinks			
Manual Mode	In normal state		Lights			
	In troubled state		Lights	Blinks		Hazard sound
Others (axis not moving)	In normal state				Lights	
	In troubled state			Blinks	Lights	Hazard sound

2) 100V Outlet (for the tape cutter)

Front Station (1A) 1 outlet

Rear Station (1A) 1 outlet

3) USB Port (Ver. 1.00, 12Mbbs, 1 each on front and rear)

To be used for a barcode reader for Intelligent Feeder System and a USB memory for data backup

Not applicable for devices other than those recommended by i-PULSE

4) Auto Nozzle Changer

ANC20, accommodating 20 nozzles

5) Rear Fixed Camera, 1st

FC05, FC03 or FC02 can be chosen.

6) Buffer Stopper

A set of input and output buffers

7) BGA/CSP Scan Recognition

Adds BGA/CSP high-speed placement ability to the normal scan camera.

8) CE Marking

Conforms to European safety specifications

9) Intelligent Feeder Bank

Licenses for Intelligent Feeder System to be required separately

4.8 Conditions for Installation

Power Supply: Only the secondary side is factory-prepared. The power cable (VCT 4x3.5mm2 or equivalent) to the terminal block of the machine is to be prepared by customers.

Air Supply: The air hose with a female coupler is to be prepared by customers.

Machine side coupler	Hicoupler 20PM of Nitto Koki (factory-installed)
Hose side coupler	Hicoupler 65SN (ID6.5/OD10) or 85SN (ID8.5/OD12.5) of Nitto Koki (to be prepared by customers)

5 OPTIONS

1) Parts Feeders

F1-82-0603	8mm tape, 2mm index, for 0603 (0201)
F1-82-1005	8mm tape, 2mm index, for 1005 (0402)
F1-84	8mm tape, 4mm index
F1-12	12mm tape
F1-16	16mm plastic tape
F1-24	24mm plastic tape
F1-32	32mm plastic tape
PS-32A	32mm adhesive paper tape
F1-44	44mm plastic tape
F1-56	56mm plastic tape
F2-82-0603	Intelligent Feeder, 8mm tape, 2mm index, for 0603 (0201)
F2-82-1005	Intelligent Feeder, 8mm tape, 2mm index, for 1005 (0402)
F2-84	Intelligent Feeder, 8mm tape, 4mm index
F2-12	Intelligent Feeder, 12mm tape
F2-16	Intelligent Feeder, 16mm plastic tape
F2-24	Intelligent Feeder, 24mm plastic tape
F2-32	Intelligent Feeder, 32mm plastic tape
F2-44	Intelligent Feeder, 44mm plastic tape
F2-56	Intelligent Feeder, 56mm plastic tape
PS-T1S	S type stick feeder
PS-T1M	M type stick feeder
PS-MS3	Multilane stick feeder
MX-ST2	Manual slide tray feeder
MX-RT1D	Removable tray feeder
MX-20D	20-pallet tray feeder, 40 JEDEC trays
MXR-20	20-pallet tray feeder, 20 JEDEC trays

The tape feeders are applicable to reel diameter of 178mm to 382mm.
For detail, refer to the separate Specifications for Feeders.

2) Intelligent Feeder Function Base License

Component Setup Verifier (Full closed loop)

Automatically checks wrong feeder setting and assists inexperienced operators to set feeders correctly. The F2 Intelligent feeders are required. A barcode reader is used for data registration of component information and feeder ID.

3) Intelligent Feeder Function Additional License

Feeder Relocatability

Regardless of the actual feeder location, the machine automatically recognizes each feeder and component. Feeder setting does not have to be changed. Effective for high-mix and low-volume production.

4) Feeder Bank Changer (CFB-2) Changes feeders in a batch

5) Feeder setting bench Bench for setting reel on tape feeder

6) Feeder Stocker (PFS-3) Feeder stocking wagon with/without Feeder Drive Adapter

* Two-branch Connector (Optional item for Drive Adapter)

* Extension Cable (Optional items for Drive Adapter)

For detail, refer to the separate Specifications for Feeder Stocker.

7) Tape Cutter (TCM-1B) Including a waste tape box

For detail, refer to the separate Specifications for Tape Cutter. No CE conformity.

8) Waste Tape Box Trash tape box

9) Set Master (PCJ-1) Tool for checking pickup points

10) Extra Teach Camera (EXC1) Attached on the left side of the head assembly

Field of view 20mm square

For teaching operation only

Covers feeder lanes No. 11 to 60

11) Rear Fixed Camera, 2nd

Max. 2 cameras can be fitted to a machine. The 1st camera is standard and the 2nd one is optional.

Camera Type	Max. Applicable Component	
Fixed Camera FC05 (Resolution: 0.08mm/pix.)	Single-frame Process	34 mm square
	Four-frame Process	54 mm square
	Three-frame Process	80 x 34 mm
Fixed Camera FC03 (Resolution: 0.05mm/pix.)	Single-frame Process	20 mm square
	Four-frame Process	35 mm square
	Three-frame Process	50 x 20 mm
Fixed Camera FC02 for 0603 (0201) chip (Resolution 0.03mm/pixel)	Single-frame Processing	12 x 11 mm
	Horizon Two-frame Processing	24 x 11 mm
	Horizon Three-frame Processing	37 x 11 mm
	Vertical Two-frame Processing	12 x 22 mm
	Vertical Three-frame Processing	12 x 34 mm
	Four-frame Processing	24 x 22 mm
	Single-frame Processing	12 x 11 mm

Camera Type	Min. lead pitch	Min. ball diameter / pitch	
		With ball damage check	Without ball damage check
Fixed Camera FC05	0.5 mm	0.8 mm / 1.0 mm	0.4 mm / 0.8 mm
Fixed Camera FC03	0.3 mm	0.5 mm / 0.65 mm	0.25 mm / 0.5 mm
Fixed Camera FC02	0.3 mm	0.3 mm / 0.5 mm	0.2 mm / 0.5 mm

12) Adjustable PCB Locating Pins 3.0/3.5/4.0mm

13) Measurements Inch

14) Right to Left Flow Conveyor

15) SMEMA Risers For transfer height 950 +/-20mm

16) Conveyor Extension 200mm one side, input side or output side, or both

17) Automatic Conveyor Width Adjustment By motor drive

18) Offline Programming Software (iOSII)

19) Power Transformer For 202/220/240/380/400/415/440V (Standard in export model)

20) Reject Conveyor (RC-54) Conveyor for rejected IC components
For details, refer to the separate Specifications for Reject Conveyor

21) Rear Operation Switches Enables operation by switches on the rear side of the machine.

22) Matrix Backup Clamp Different pins for different board thickness. (Standard in export model)

23) Board Clamp Conveyor Holds and fixes the board by clamping its edges from top and bottom.
Board support pins are commonly usable.
Unplaceable area at board edges is 5mm top side and 6mm bottom side.
For detail, refer to the separate Specifications for Board Clamp Conveyor.

24) 0603 (0201) Scan Camera Field of view 15.4x14.4mm
Component size Minimum 0.6x0.3mm to maximum 12.0x11.0mm

25) UPS-2 Uninterrupted Power Supply
For details, refer to the separate Specifications for UPS-2. No CE Conformity.

26) LCD Monitor 15-inch

6 WARRANTY

The warranty period shall be 15 months after shipment from factory or 12 months after installation at customer’s site, whichever comes first.

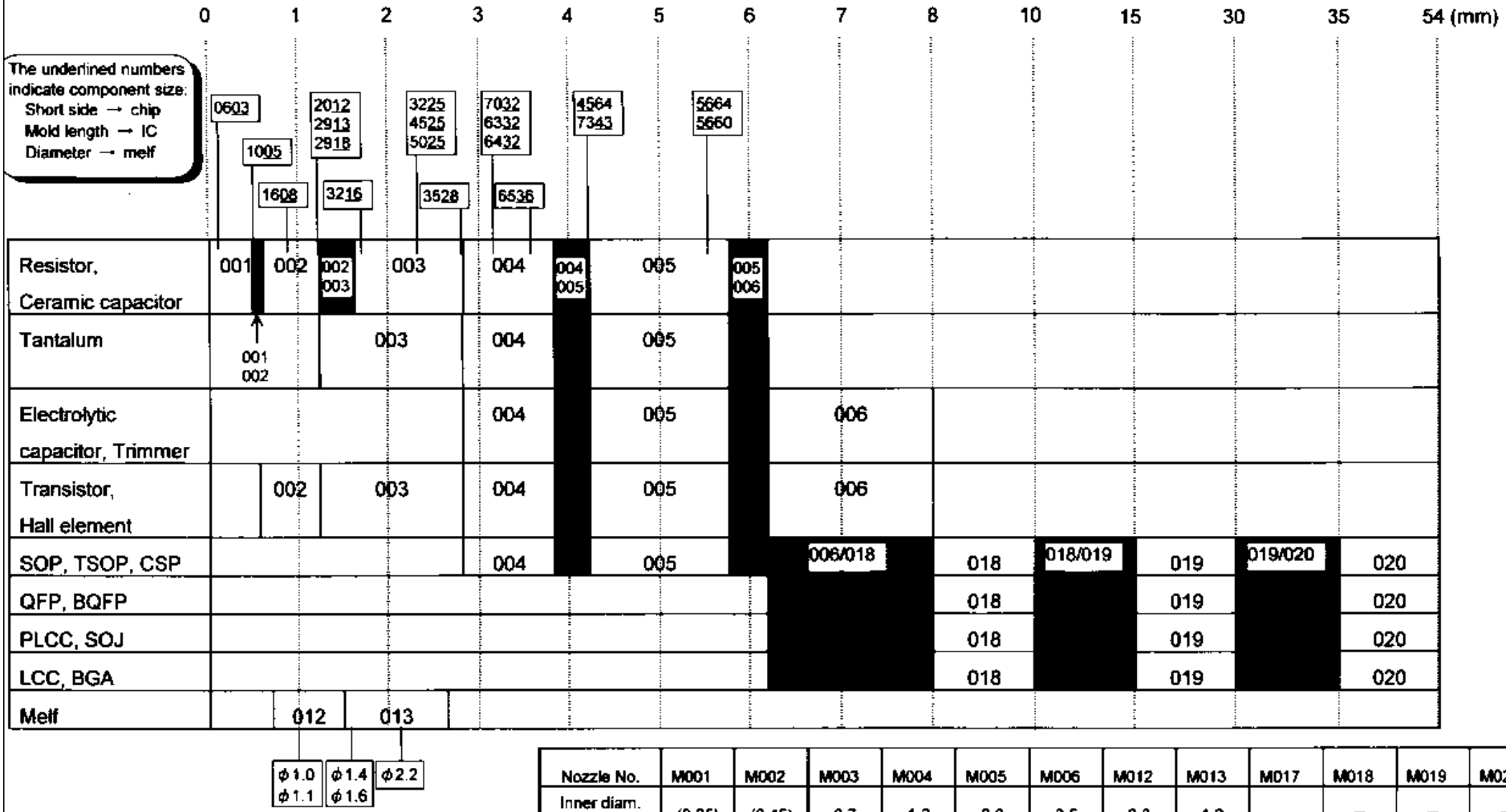
The warranty shall not apply to any damage resulting from customer's improper storage, handling, installation, or the like, even if it happens during the warranty period.

Attachments

Description	Part No.	Qty. (pcs)	Remarks
Nozzle with ID Marks			Contact us beforehand, if the standard nozzles cannot handle specific components.
M001	LG0-M7701-00		
M002	LG0-M7703-00		
M003	LG0-M7705-00		
M004	LG0-M7707-00		
M005	LG0-M7709-00		
M006	LG0-M770B-00		
M012	LG0-M770D-00		
M013	LG0-M770F-00		
M017	LG0-M770H-00		
M018	LG0-M770K-00		
M019	LG0-M770M-00		
M020	LG0-M770P-00		
TOTAL		**4**	
Nozzle ID Mark Sticker			Each nozzle includes one spare ID Mark sticker.
M001	LG0-M77D0-00		
M002	LG0-M77D1-00		
M003	LG0-M77D2-00		
M004	LG0-M77D3-00		
M005	LG0-M77D4-00		
M006	LG0-M77D5-00		
M012	LG0-M77D6-00		
M013	LG0-M77D7-00		
M017	LG0-M77D8-00		
M018	LG0-M77D9-00		
M019	LG0-M77DA-00		
M020	LG0-M77DB-00		
Labeler for ID Mark Sticker	LG0-M8903-00		
Fixed PBC Locating Pin 3.0mm dia. 3.5mm dia. 4.0mm dia.			For Japan market
Adjustable Locating Pin 3.0mm dia. 3.5mm dia. 4.0mm dia.			
Support Pin (Matrix type)			For Matrix PCB Backup Clamp
Board thickness 0.5mm	LG0-M9901-00	8	
Board thickness 0.8mm	LG0-M9902-00	8	
Board thickness 1.0mm	LG0-M9903-00	8	
Board thickness 1.2mm	LG0-M9904-00	8	
Board thickness 1.6mm	LG0-M9905-00	8	
Board thickness 2.0mm	LG0-M9906-00	8	
TOTAL		48	
Support Pin (Magnetic type)	LG0-M9820-00	(9)	For Magnetic PCB Backup Clamp
Signal Cable (for Tenryu pre-process) Signal Cable (for Tenryu post-process)	LG0-M56K0-10 LG0-M56K0-20		4m cables
Signal Cable (SMEMA)	LG0-M56K0-00	1	
Hex. Wrench Set	LG0-M89A3-00		
Fine Blade Screwdriver	LG0-M89A2-00		
Vacuum Gauge Set	LC1-M89A5-00		
Conveyor Handle	LG0-M90B9-00	1	
Lens Cleaning Set	LG0-M89A4-00	1	
Silicone Grease	LG0-M89AB-00	1	
CRT	LG0-M11H7-00	1	
Mini Keyboard, English (Mini Keyboard, Japanese)	LG0-M51H0-10 (LG0-M51H0-00)	1	

Mouse	KW3-M5169-00	1	With wheel, PS/2, Mini DIN 6pin
Guide pin 6.00mm	LG0-M86A5-00		For feeder bank
Guide pin 6.01mm	LG0-M86A5-10		Ditto
Reamer 6.01mm	LG0-M86A6-00		Ditto
Reamer 6.02mm	LG0-M86A6-10		Ditto
Feeder presetter (FPS-1)	LG0-M5D00-00		
Waste tape separator	LG0-M340C-00	16 or 24	Depend on machine configuration
Set Master	LG0-M5C00-00		
Needle Wire for nozzle cleaning	KV8-M8887-00	1	
Nozzle Cleaning Kit	LG0-M5J00-00		The wire with a handle.
Air Coupler (85SN)	LG0-M89A1-00		For air hose of ID8.5/OD 2.5mm.

Recommended Nozzle Application



* Three-digit numbers indicate nozzle NO. (e.g. 005→M005)

* ■ indicates overlapping portion.

Nozzle No.	M001	M002	M003	M004	M005	M006	M012	M013	M017	M018	M019	M020
Inner diam. (equivalent)	(0.25)	(0.45)	0.7	1.2	2.0	3.5	0.8	1.2	–	–	–	–
Outer diam.	0.4x0.5	0.6x0.9	1.3	1.8	3.0	4.5	2.0	2.5	–	–	–	–
Diam. of pad	–	–	–	–	–	–	–	–	3.5	6.0	8.0	10.0