

JUKI

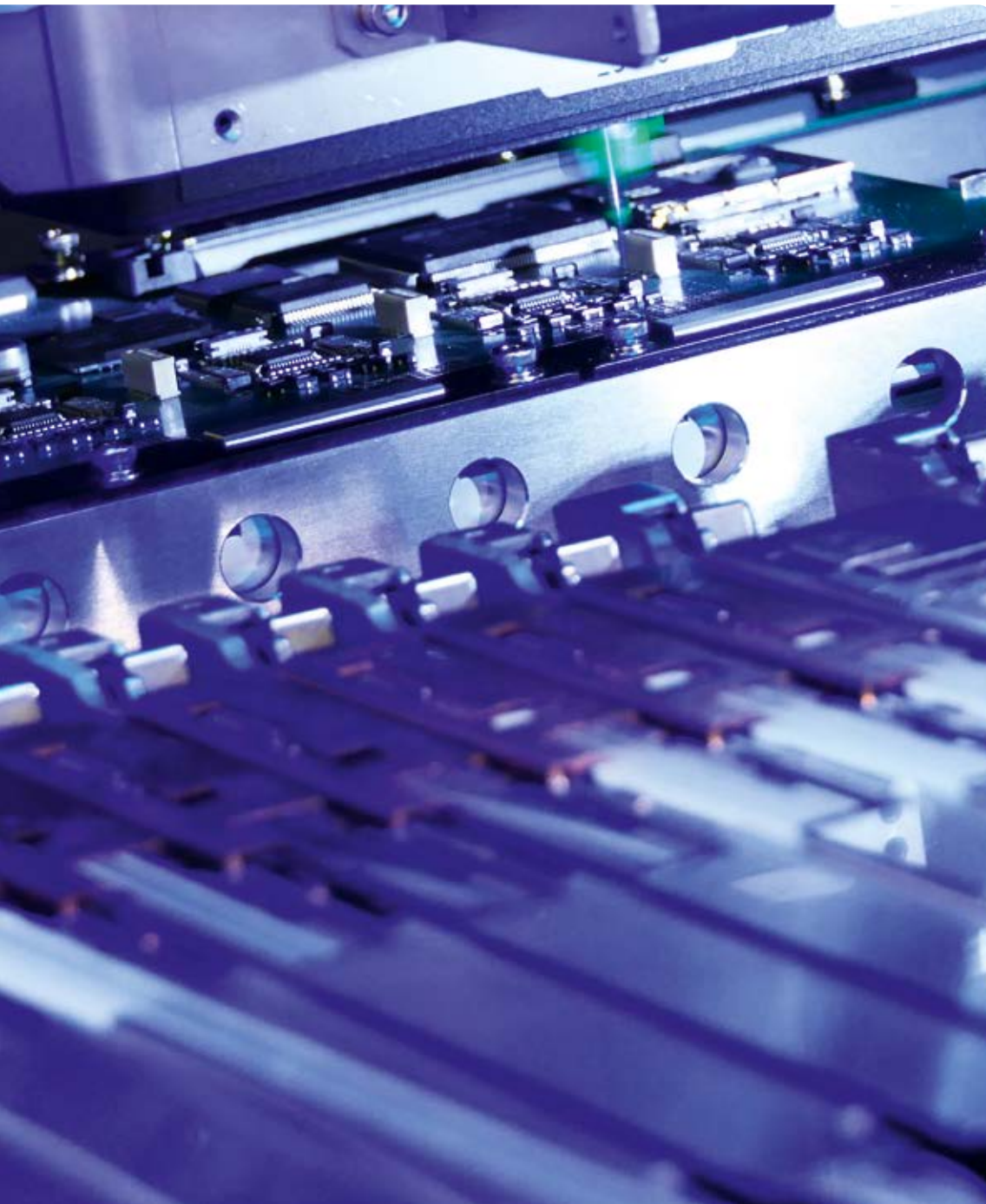
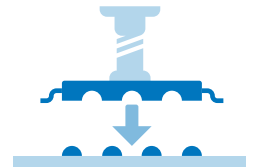
smart.fast.modular.



PLACEMENT SOLUTION

KE-3010 SERIES
High-Speed Chip Shooter

KE-3020 SERIES
High-Speed Flexible Mounter



HIGH-SPEED FLEXIBLE MOUNTER MEETING VARIOUS EXPECTATIONS

From ultra-small components to odd-shaped components



KE-3010 PLACEMENT High-Speed Chip Shooter

For fast placement of ultra-small components

- | 23,500 CPH chip (optimum)
- | 18,500 CPH (IPC9850)
- | One multi-nozzle laser head (6 nozzles)
- | From 0402 (metric)/01005 (inch) to 33.5 mm square components



KE-3020 PLACEMENT High-Speed Flexible Mounter

For placement of small and large, odd-shaped components

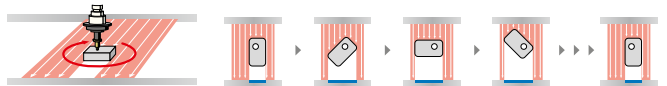
- | 20,900 CPH chip (optimum)
- | 17,100 CPH (IPC 9850)
- | From 0402 (metric)/01005 (inch) to 74 mm (square components) or 50 × 150 mm
- | Vision centering system (depending on the application with light from the bottom, from the side and as backlight)

1. JUKI BASIC TECHNOLOGY

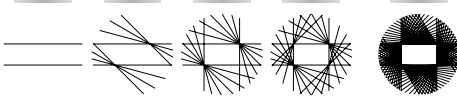
JUKI ON-THE-FLY CENTERING TECHNOLOGY FOR FLEXIBILITY AND QUALITY

The machine can recognize components of various shapes: from ultra-miniature components such as 0402 (metric)/01005 (inch) chips to 33.5 mm square components such as PLCCs, SOPs, BGAs and QFPs. Variations such as shape, color and reflection do not matter when a laser is used for recognizing a component.

Recognition algorithm

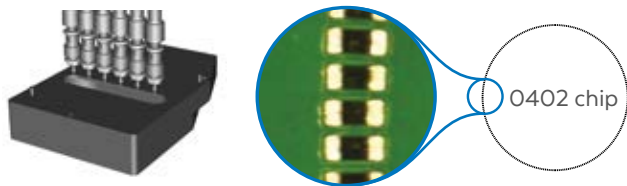


Laser calculates the following data for each component on-the-fly: shape, center, angle and width



INDEPENDENT Z- AND THETA-AXIS CONTROL

Each nozzle has independent Z and theta control for superior flexibility, accuracy, and redundancy. The height and angle of each nozzle can be controlled precisely.

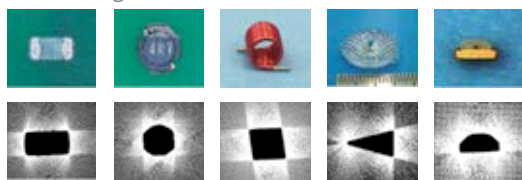


Using servomotors high-precision placement angles can be achieved

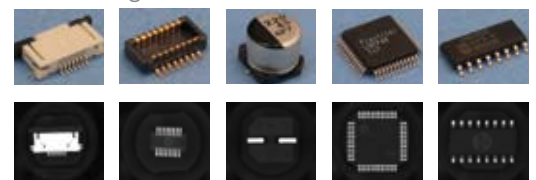
MNVC (MULTI-NOZZLE VISION CENTERING)

Vision centering using the multi-nozzle head nearly doubles the placement rate for smaller components including CSPs, BGAs and smaller QFPs.

Laser recognition



Vision recognition

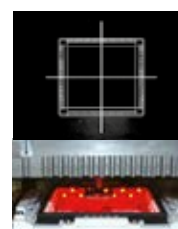


VISION CENTERING TECHNOLOGY

The centering method can be selected based on component type, shape, size and material. Laser centering is used for the high-speed placement of smaller components. Vision centering is used when lead or ball recognition is required. Many nozzles providing unsurpassed component handling are available for odd-shaped components.



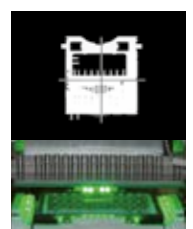
Nozzles for odd-shaped components



bottom recognition



side recognition



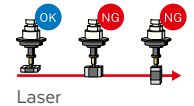
back light recognition

THE COMPONENT CHECK FUNCTION IMPROVES THE QUALITY OF COMPONENT PLACEMENT

The component check function improves the quality of component placement. The laser monitors the component presence from pick to placement and reduces the chance for missing components.

1. On-The-Fly component detection

The laser detects the presence and position of components.

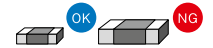


2. Component state check

In order to confirm the pick orientation, the dimensions and the ratio of the component data are compared to the component picked.

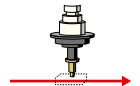
3. Component dimension check

To ensure that the right part has been picked, the dimensions of the picked part are compared to the component data.



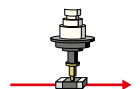
4. Component fall check

The laser checks whether the component falls before placement.



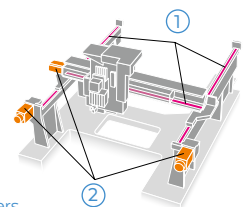
5. Release check

The laser checks whether the component has been properly released on the board after placement.



FULL CLOSED-LOOP CONTROL

The X-Y drive system features JUKI's original "full closed-loop control" using AC motors and magnetic linear encoders. The X- and Y-axes keep high speed whilst ensuring highly reliable placements.



1. Linear encoders
2. AC motors

2. HIGH PRODUCTIVITY

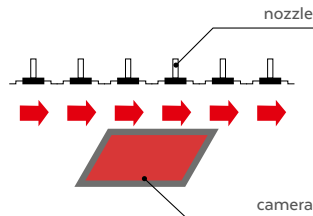
HIGH-SPEED, ON-THE-FLY VISION CENTERING

Dual upward looking strobe cameras capture images of large, fine-pitch, or odd-shaped components in high speed.

Existing recognition



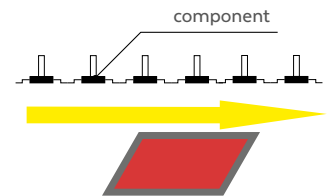
Pause for each component recognition



Non-stop vision recognition



Non-stop recognition for each component



TAPE CUTTER*

The tape cutter automatically cuts used tape and stores it in an easily removable trash bin, eliminating mess and decreasing operator workload.

*Recommended option (for electrical feeder only)

HIGH-RESOLUTION CAMERA

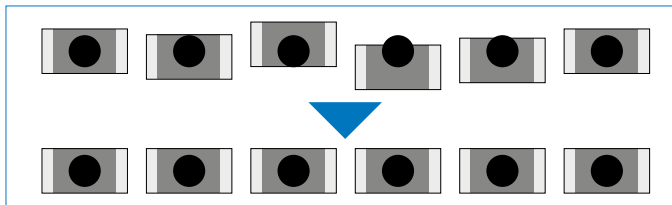
The high-resolution camera enables high-precision inspection of components such as QFPs with 0.2 mm lead pitch.



VCS unit (Vision Centering System)

AUTOMATIC CORRECTION OF PICK POSITION*

The position error information of a nozzle is transmitted to each electric feeder so that each electric feeder automatically adjusts the feeding operation to ensure a more stable pick position and simultaneous picks.



*Only available for electrical feeders

160 COMPONENT INPUTS

Up to 160 different components can be installed in the machine for ultimate flexibility.



single & double lane feeder



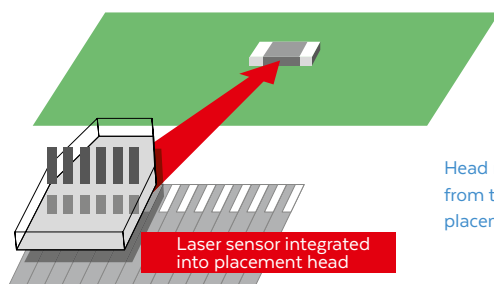
EF08HDR



trolley set up image

SIMULTANEOUS ON-THE-FLY COMPONENT CENTERING FOR HIGH-SPEED PRODUCTION

The laser sensor has been integrated into the placement head for On-The-Fly centering. To implement the shortest possible head travel and maximum placement speed, the head moves directly from the pick to the placement position.



Head moves directly from the pick to the placement position

Laser sensor integrated into placement head

ELECTRIC FEEDERS FOR HIGH-PRECISION AND HIGH-QUALITY PLACEMENT

No tools are required for changing the feeder pitch. The pitch is set using buttons on the feeder.



Simple feeder pitch setting

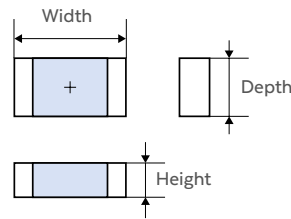
REAR-SIDE OPERATION UNIT

The rear-side operation unit allows complete machine operation from the rear side of the machine.

EASE OF OPERATION IMPROVED BY EASY-TO-OPERATE AUTOMATIC COMPONENT MEASUREMENT

Simple programming of component data is possible by typing approximate dimensions, type and packaging information. Accurate dimensions, number of leads and lead pitch are measured and programmed automatically by the machine.

Component dimensions:



The component data is updated after automatic measurement.

EASY OPERATION

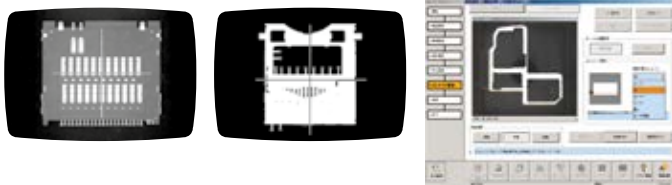
This function assists operators in the preparation of a new production. By simply following a checklist of setup items from "1. Automatic width adjustment" to "8. Production program check," operators can be sure they have performed the necessary steps and see which steps have not been completed.



Checklist

FLEXIBLE VISION TEACHING

Complicated programming of odd-shaped components is made easier by following step-by-step guidelines which reduce programming times significantly.



Flexible vision teaching

FEEDER POSITION INDICATOR

LEDs on the feeder bank indicate which feeder needs to be replaced or which one is malfunctioning. They also indicate the locations of the feeders that have to be set during changeover and help simplify the feeder setup.



Feeder position indicator

AUTO TEACHING OF THE PICK POSITION

Auto teaching of the pick position reduces changeover times and mispicks.

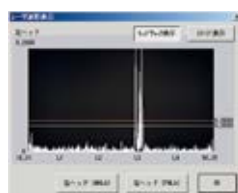


NON-STOP OPERATION

Non-stop operation allows the operator to replace feeders whilst the machine is running at full speed. Only for use with electric feeders.

CENTERING ERRORS PREVENTED BY SELF-CHECK

The laser is checked for contamination before the placement of each PCB starts. If contamination is detected, an alarm is given to prevent centering errors.



Laser contamination check

AUTOMATIC TOOL CHANGER (ATC)

The automatic tool changer (ATC) automatically replaces nozzles according to component dimensions.



ATC unit
(Automatic Tool Changer)

3. HIGH FLEXIBILITY

LONGER PCBs IN THE X-AXIS

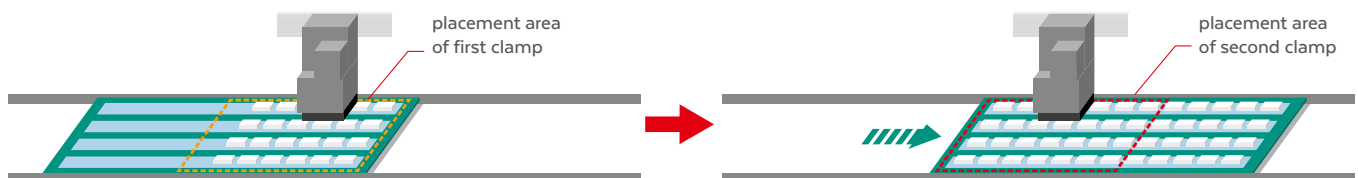
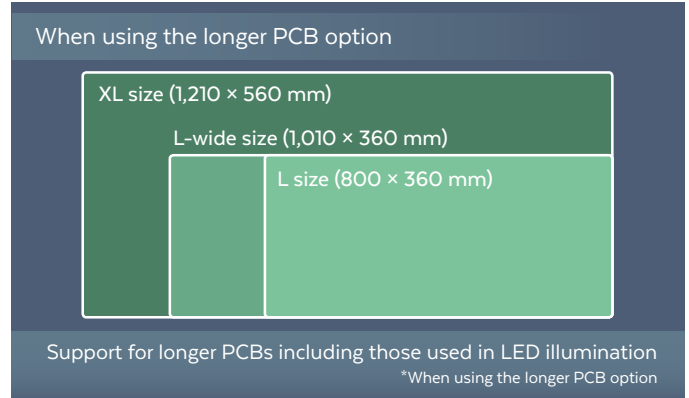
It is possible to place longer boards with dimensions of up to 800 mm × 360 mm (L size), 1,010 mm × 360 mm (L wide size) and 1,210 mm × 560 mm (XL size) by automatically indexing the board twice in each station. This enables the production of long PCBs used for LED lighting etc.

Solder paste print recognition lighting option

The solder paste print can be recognized as a BOC mark when there is no BOC mark on the PCB or the circuit.

Component quantity control option

The lot of the product (PCB) where the components (LED components etc.) are placed is managed. When a PCB is loaded, it is checked whether components are required to complete a PCB production remain in the feeders so as to avoid that components of different lots get mixed up on a PCB. If any components are missing, a warning is displayed before placement starts.

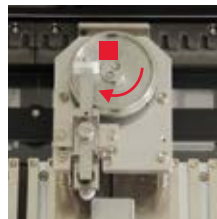


POP PLACEMENT

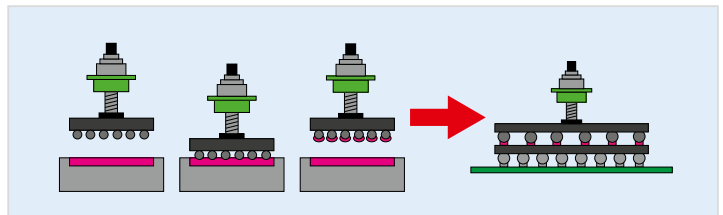
Package-on-package (PoP) assembly is fully supported using either linear or rotary fluxer units that also support solder paste dipping.



Linear type transfer unit



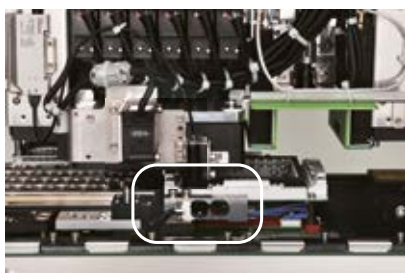
Rotary type transfer unit



PoP placement

PLACEMENT FORCE CONTROL

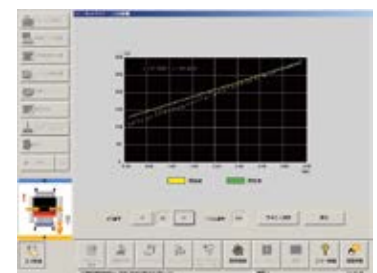
Using a built-in load cell, the placement force of each nozzle can be measured and controlled during the placement process. The placement force can be set individually for every component.



Placement force control unit



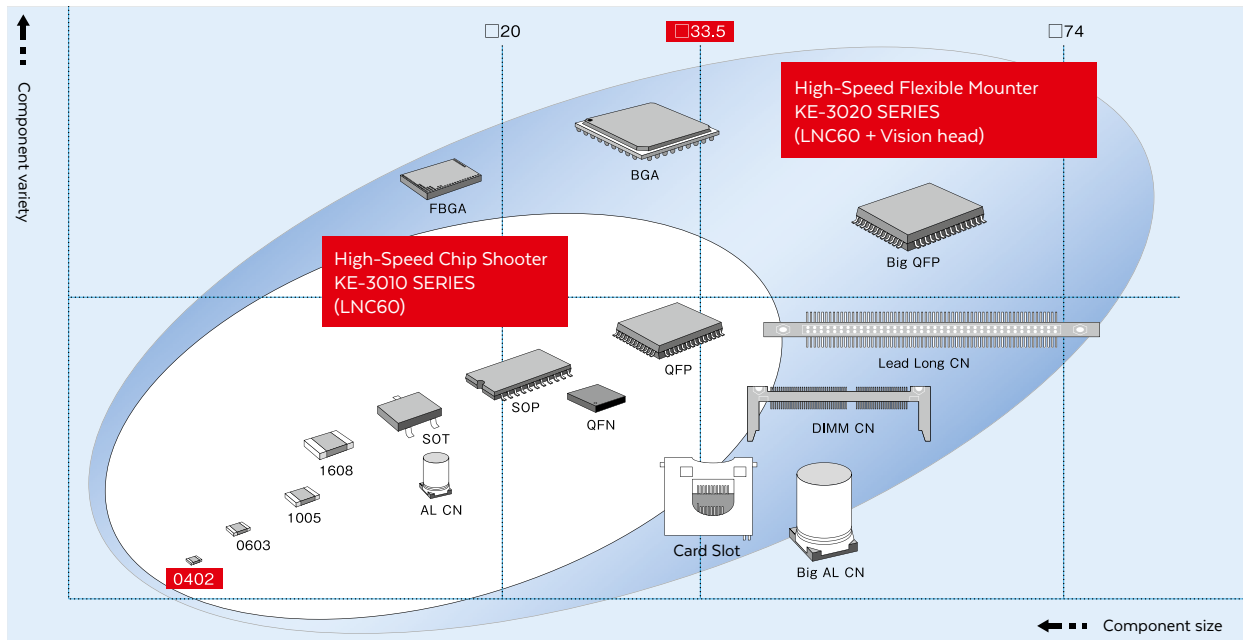
Placement force control nozzle



Data check on monitor

WIDE RANGE OF PARTS

The KE series meets the requirements of a wide range of applications with maximum performance. High-speed, high-accuracy component centering using unique laser technology and powerful vision processing.



TOTAL LINE PRODUCTIVITY IMPROVEMENT SUPPORT SYSTEM
IS (INTELLIGENT SHOP FLOOR SOLUTIONS) AND JANETS
IFS-NX (INTELLIGENT FEEDER SYSTEM)

IS and JaNets

The systems will control and optimize various operations and data within the production line, and contribute to the improvement of line productivity, product quality and work efficiency.

IFS-NX

This system can achieve quality control by preventing improper component loading. Ensuring traceability etc. and efficient production changeovers, it contributes to improvements in quality and work efficiency.

FLEXLINE CAD

Flexline CAD is a data conversion application that reads a text file output by various CAD systems or other assembly machines and converts it to the format used by IS and JaNets, FX series, KE series machines, or RX series or RS-1. There are several supported CAD formats but users may also define their own format using an interactive „wizard“ and save that definition for later use.

IC COLLECTION BELT

A conveyor belt constitutes a safe way of handling valuable rejected components. Whilst the components gradually move away from the machine, the operator will be notified when the belt is full.



IC Collection Belt

SPECIAL-ORDER NOZZLES

A wide variety of special-order nozzles are available for unusual components including grippers.

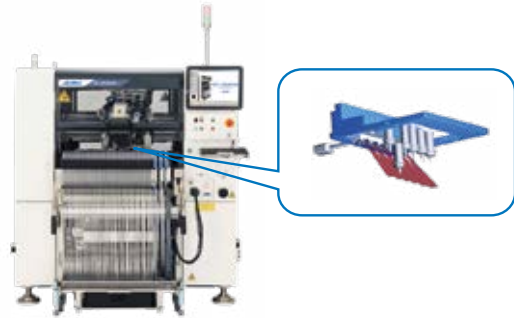


Special-order nozzles

4. HIGH QUALITY

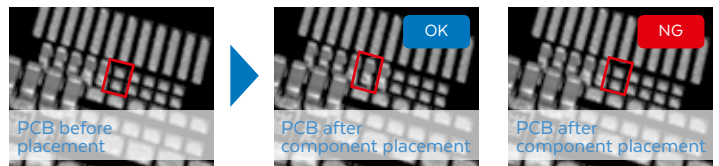
PREVENTION OF DEFECTIVE PCBs AND RAPID ANALYSIS COPLANARITY SENSOR - CHECKS BALLS AND LEADS. DETAILED INFORMATION OF THE CAUSE AND CORRECTIVE ACTION WILL BE DISPLAYED ON THE PLACEMENT MONITOR

An ultra miniature camera built into the head section captures real-time images of the component pick and placement operations. An analysis is run for presence/absence, whilst traceability information can be saved. This unique function prevents defective PCBs and reduces the duration of the root cause failure analysis.



Component presence check

The images are analyzed automatically. If a missing component is detected, the machine will stop automatically and an error will be displayed.



Root cause failure analysis function

Root cause failure analysis uses image analysis to quickly identify problems in the production process and reduce the time for corrective action.



A tombstone error occurs.

Analysis including the following items:
date/time, cause of an error, nozzle, feeder number, head number and barcode (option)



Cause analysis

Cause of the error visible in images

Rapid solution

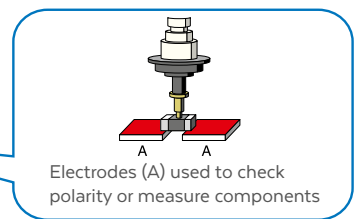
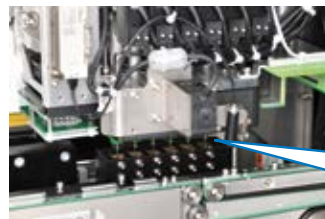
COMPONENT VERIFICATION SYSTEM (CVS) TO PREVENT THE PLACEMENT OF INCORRECT COMPONENTS

By measuring the resistance, capacitance or polarity before production starts, the machine can prevent incorrect components from being placed. The new CVS unit can check six components simultaneously, thus reducing check and changeover times.

Resistance, capacitance and polarity are checked before production starts.

This prevents incorrect component/reel from being used.

Incorrect component placement is prevented.

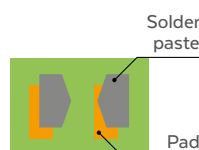
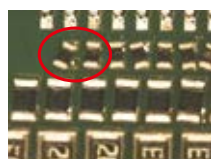


REDUCTION OF ERRORS DUE TO SOLDER PASTE ALIGNMENT OFFSET PLACEMENT AFTER SOLDER SCREEN-PRINTING

The OPASS function uses the machine's downward looking camera to check the location of the solder paste vs. the pads and corrects the placement accordingly. This function reduces defects caused by misalignment of the paste on the pads.



A printing misalignment occurs



Solder paste

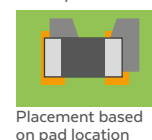
Pad

With OPASS function

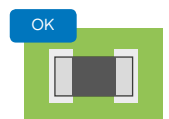
Without OPASS function



Placement based on solder paste location



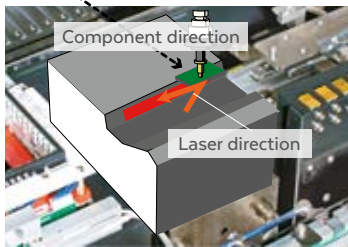
Placement based on pad location



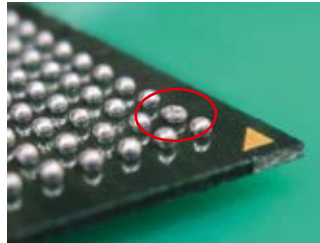
Reduction in the defect rate

COPLANARITY SENSOR - CHECKS BALLS AND LEADS

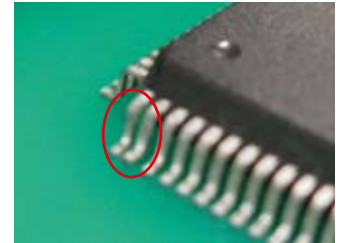
Prevents the placement of defective components by checking lead components for lead defects. The high-precision, high-speed coplanarity check will improve the products' reliability.



Coplanarity sensor



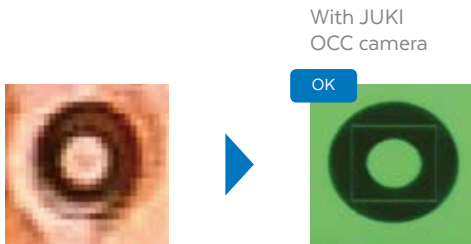
BGA ball defect



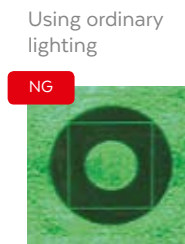
Lead float defect

FLEXIBLE LIGHTING IMPROVES FIDUCIAL MEASUREMENT ACCURACY

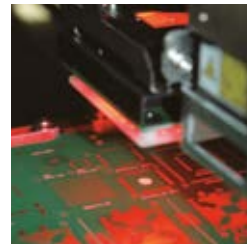
The offset correction camera (OCC) is a downward looking camera used for fiducial recognition and bad mark detection. Flexible lighting allows the machine to accurately recognize poor contrast fiducials, patterns and flexible printed circuits (FPC). It can also detect bad board marks to prevent waste of components.



Good contrast



Worse contrast due to light diffusion



The OCC camera is standard equipment.

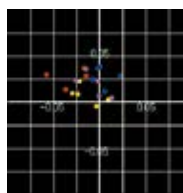


Bad board mark detection by optional bad mark sensor

FCS (FLEXIBLE CALIBRATION SYSTEM)

OPTIONAL

JUKI's highly regarded easy maintenance just got even easier! The optional FCS calibration jig is an easy-to-use system for re-calibrating the placement accuracy. The machine automatically picks and places the jig components. Then, it measures the deviation and adjusts all necessary calibrations.



FCS (Flexible Calibration System)

SOT DIRECTION CHECK FUNCTION

This function uses the OCC to check the component supply angle by placing a 3-terminal SOT component on the SOT direction check table. This happens before production starts or restarts after the machine has run out of components.

HEIGHT MEASUREMENT FUNCTION

A non-contact laser sensor measures the height of the PCB to prevent excessive force on components and reduce the risk of damage. This sensor can also measure the pick height more accurately and faster than other methods.



5. OTHER PERIPHERAL EQUIPMENTS

CHOICE OF FEEDER TYPE (ELECTRIAL/MECHANICAL)

Please choose between electric or mechanical feeders.

Electrical Feeders



splicable

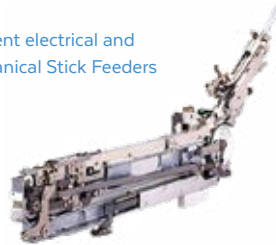
Mechanical Feeders



splicable / non splicable

VARIOUS FEEDER TYPES

Different electrical and
mechanical Stick Feeders



Exchange trolley for
electronic feeders



Exchange trolley for
mechanical feeders



Feeder calibration jig with monitor



TR SERIES

Matrix Tray Server (Rear Type)



TR5S

TR5D

Matrix Tray Changer (Side Type)



TR6S

TR6D

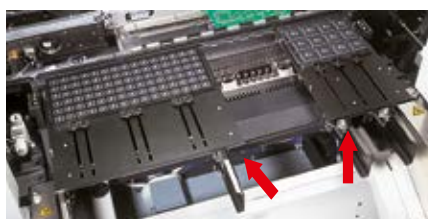
High-Speed Matrix Tray
Server TR7DN



TR7DN

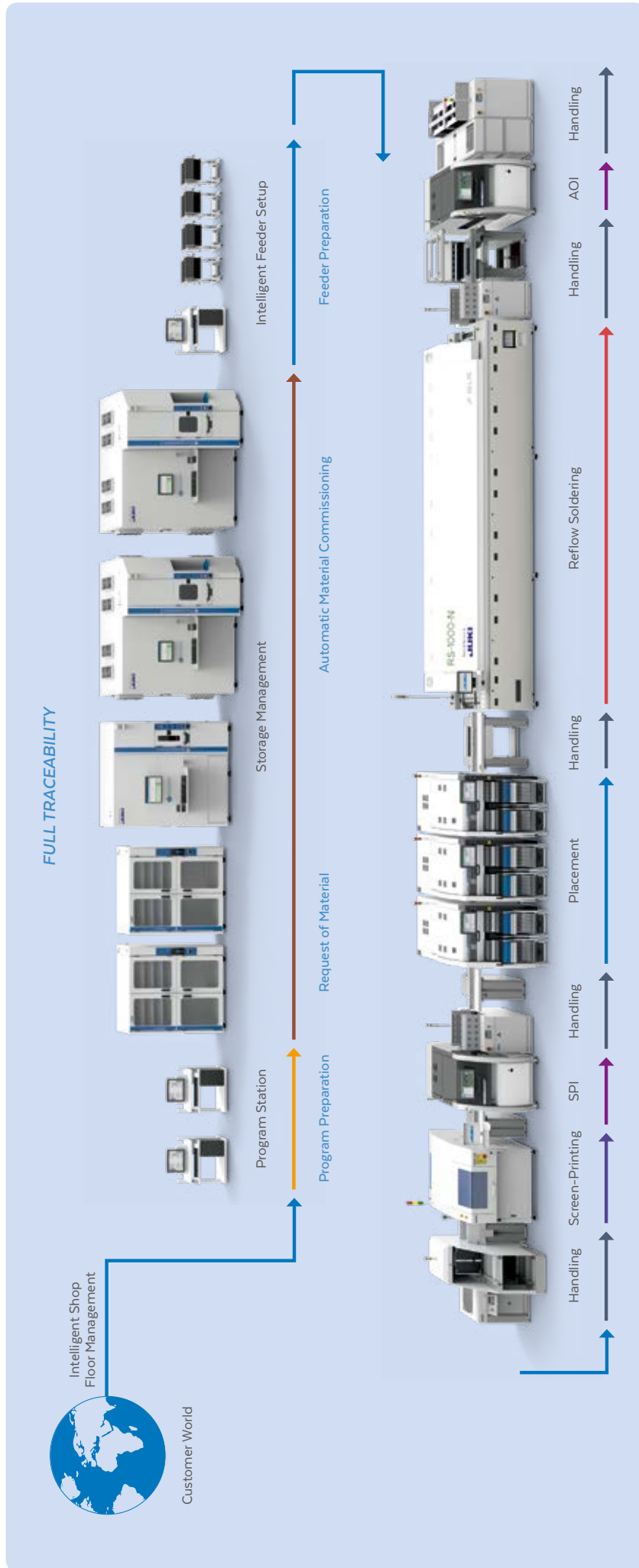


Dual Tray Server (Rear Type)



Matrix Tray Holder

PRODUCT PORTFOLIO



SPECIFICATIONS

High-Speed Chip Shooter KE-3010 SERIES			High-Speed Flexible Mounter KE-3020 SERIES
Board size	L size (410 × 360 mm)		o
	L-Wide size (510 × 360 mm)		o
	XL size (610 × 560 mm)		o
	Application of long PCB (L size)*1		800 × 360 mm
	Application of long PCB (L-Wide size)*1		1,010 × 360 mm
	Application of long PCB (XL size)*1		1,210 × 560 mm
Component height	6 mm		—
	12 mm		o
	20 mm		o
	25 mm		o
Component size	Laser recognition		0402 (metric); 01005 (inch)
	Vision recognition	Standard camera	3 mm*2 ~ 33.5 mm
		High-resolution camera	1.0 × 0.5mm*3 ~ 20 mm
Placement speed	Chip	(optimum)	23,500 CPH
		(IPC9850)	18,500 CPH
	IC*4		9,000 CPH*5
Placement accuracy	Laser recognition		±0.05 mm (±3 σ)
	Vision recognition		±0.04 mm ±0.03 mm (MNVC ± 0.04 mm)
Component loading quantity			Max. 160 in case of 8 mm tape (Electric double tape feeder)*6
Power supply			200 ~ 415 VAC, 3-phase
Apparent power			2,2 kVA
Operating air pressure			0.5 ± 0.05 MPa
Air consumption			50 L/min
Machine dimensions (W × D × H*7)*8	L size		1,500 × 1,690 × 1,500 mm
	L-Wide size		1,800 × 1,690 × 1,500 mm
	XL size		2,131 × 1,890 × 1,500 mm
Mass (approximately)	L size		1,900 kg
	XL size		2,250 kg

05/2018_Rev03

*¹ The application of long PCBs is optional. *² When using MNVC (option) *³ KE-3010A: when using the high-resolution camera and MNVC (option), KE-3020VA: when using the high-resolution camera (option) *⁴ Effective cycle time: the IC placement speed indicates an estimated value obtained when the machine places 36 QFP (100 pins or more) or BGA components (256 balls or more) on an M size board. (CPH=number of components placed in one hour) *⁵ Estimated value when using MNVC and picking up components simultaneously with all nozzles. MNVC is optionally available for KE-3010A; MNVC is standard equipment for KE-3020VA & KE-3020VRA. *⁶ When using the EF08HD electric double tape feeder. *⁷ Display not included in height. *⁸ Dimensions of machine described for conveyor height of 900 mm.

OPTIONS

Recognition system	MNVC / Bad mark reader / High-resolution camera
Inspection function	Coplanarity sensor / Component Verification System (CVS) / SOT detection check function
Conveyor	Automatic board width adjustment / L-Wide size / Application of long PCBs
Electrical protection	Ground fault circuit interrupter
Component handling and feeders	Matrix Tray Server TR5 / Matrix Tray Changer TR6 / High Speed Matrix Tray Server TR7D / Matrix Tray Holder /
	Dual Tray Server TR1 / Tape Feeder / Stick Feeder / Feeder trolley / IC collection belt / Trash box /
	Tape cutter / Feeder stocker / Fluxer unit / Tape reel mounting base
Software	IS / JaNets / IFS - NX
Others	FSC calibration jig / Feeder position indicator / Offset placement after solder screen printing /
	Placement force control / Solder recognition lighting / Residual PCB quantity control / Placement monitor

Specifications and design subject to change without notice.

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