Specifications

Item \ Model		High-speed chip shooter KE-2050RM KE-2050RL KE-2050RE	High-speed chip shooter with MNVC KE-2055RM KE-2055RL KE-2055RE	High-speed flexible mounter KE-2060RM KE-2060RL KE-2060RE
Board size	M size (330×250mm)	○	○	○
	L size (410×360mm)	○	○	○
	L-wide (510×360mm)	○	○	○
	E size (510×460mm)※1	○	○	○
Component height	6mm	○	—	—
	12mm	—	○	○
	20mm	—	—	○
	25mm※2	—	—	○
Component size	Laser recognition	0603(0201)～□20mm or 26.5×11mm (0402(01005) optional)※10		0603(0201)～□33.5mm (0402(01005) optional)※10
	Vision recognition	—	1.0×0.5mm※3～□20mm or 26.5×11mm	1.0×0.5mm※3～□74mm or 50×150mm
Placement speed	Chip※4	13,200CPH	12,500CPH	12,500CPH
	IC	—	MNVC 3,290CPH※6	1,850CPH※4※5
				MNVC 3,400CPH※6
Placement accuracy	Laser recognition	±0.05mm		
	Vision recognition	—	±0.04mm	±0.03mm(±0.04mm when using MNVC)
Feeder inputs		Max. 80 on 8mm T/F※7		
Power supply		200 to 415 VAC, 3-phase		
Apparent power		3kVA		
Operating air pressure		0.5±0.05Mpa		
Air consumption		230L/min		280L/min
Machine dimensions (W×D×H※8)※9	M size	1,400×1,393×1,440mm		
	L size	1,500×1,500×1,440mm		
	L-wide	1,730×1,500×1,440mm		
	E size	1,730×1,600×1,440mm		
Mass (approximately)		1,400kg	1,410kg	

Item \ Model		High-speed modular mounter FX-1R
Board size	L size(410×360mm)	○
Component height	6mm	○
Component size	Laser recognition	0603(0201)～□20mm or 26.5×11mm (0402 (01005) optional)※10
Placement speed	Chip	33,000CPH(optimum condition)
		25,000CPH(IPC9850)
Placement accuracy	Laser recognition	±0.05mm
Feeder inputs		Max. 80 on 8mm T/F
Power supply		200 to 415 VAC, 3-phase
Apparent power	Averaged value during pickup or placement	4kVA
	Maximum value	12kVA
Operating air pressure		0.5±0.05Mpa
Air consumption		400L/min
Machine dimensions (W×D×H※8)※9		1,880×1,731×1,490mm
Mass (approximately)		2,000kg

※1 Production arrangement starts only after receipt of P/O for E size board.
※2 Available only for E size board.
※3 When using high resolution camera.(option)
※4 Effective tact: The chip placement speed indicates an estimated value obtained when the machine places 400 1005-chips all over a M size board.
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) all over a M size board.
(CPH=number of components placed for one hour)
※5 The placement speed indicates an estimated value from the tray holder.
※6 Estimated value when using MNVC (option for KE-2060R) and picking up components simultaneous with all nozzles.
※7 In addition to matrix tray changer, max 110.
※8 Display is not included in height.
※9 Dimensions of machine described are for conveyor height 900mm.
※10 Please ask for details on 0402(01005) placement.

※Please refer to the product specifications for details.

MS JAB CM001 / JSA EMS ISO14001:2004 REG.NO.JSAE389 / UKAS ENVIRONMENTAL MANAGEMENT 089

JUKI CORPORATION HEAD OFFICE

Juki Corporation operates an environmental management system to promote and conduct the following as the company engages in the research, development, design, sales, distribution, and maintenance of industrial sewing machines, household sewing machines, industrial robots, etc., and in the provision of sales and maintenance services for data entry systems:
(1) The development of products and engineering processes that are safe to the environment
(2) Green procurement and green purchasing
(3) Energy conservation (reduction in carbon-dioxide emissions)
(4) Resource saving (reduction of papers purchased, etc.)
(5) Reduction and recycling of waste
(6) Improvement of logistics efficiency (modal shift and improvement of packaging, packing, etc.)

JUKI®

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http://www.juki.co.jp

Dec-2009/0000

JUKI®

R Series
High-speed Flexible SMT Placement System

High-speed modular mounter
FX-1R

High-speed chip shooter
KE-2050R

High-speed chip shooter with MNVC
KE-2055R

High-speed flexible mounter
KE-2060R

3E Concept + High Quality
Higher productivity. Higher quality.

High-speed Flexible SMT Placement System
R series is born.

3E Modular Concept

EXPANSION

Modular Concept introduced
by JUKI in 1993.
Our products continuously
evolve to meet the needs
of the ever-changing SMT industry.

Economical

Flexible machine modules can be configured in a wide variety of lines to meet the exact production needs with minimal investment.

Easy to use

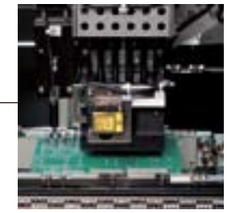
Simple software layout, graphical interface, and intelligent mechanical design make the machines easy to use and easy to maintain.

Expandable

Machines can easily be added or removed from a line to suit changing production requirements. Re-balancing and optimization of production files takes just seconds.

This is JUKI

**JUKI's original technology supports
the high accuracy and high repeatability
required for high density placement.**



4 nozzles on-the-fly centering
(MNLA: Multi-Nozzle Laser Align)

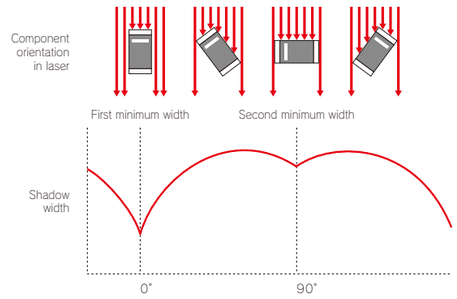
Laser centering

Laser centering technology

High accuracy, high-speed mounting

1) High-speed 4 nozzles on-the-fly centering

A high resolution laser is mounted on the head to center components in all directions including angle. Centering is done on-the-fly, allowing high speed placement of components from small chips to SOPs.



Adaptable centering

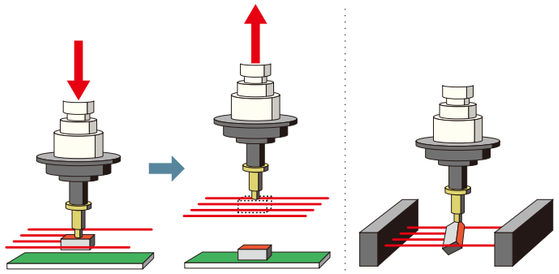
2) Centering accommodates component variations

Laser centering measures the components on the side. It is not affected by variations of component color or width/length so, unlike vision centering, there is no need to edit component data for different component vendors.

Low loss ratio

3) Component check function improves placement reliability

Since the laser is mounted on the head, it can be used to monitor the presence of components the entire time from pick to placement. This is difficult to accomplish with vacuum detection only. The placement reliability is also improved because the release of the component is confirmed after placement.



Presence of component is monitored until just before placement.

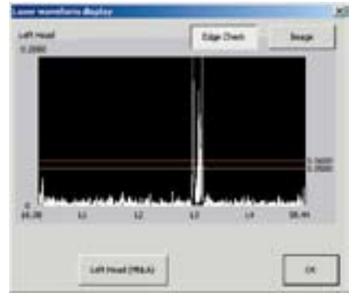
Component release confirmed after placement.

Tombstone pick easily detected.

High reliability

4) Centering errors prevented by self check

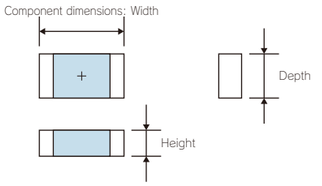
Laser contamination is checked prior to the production. If contamination is detected, an alarm is given to prevent centering errors.

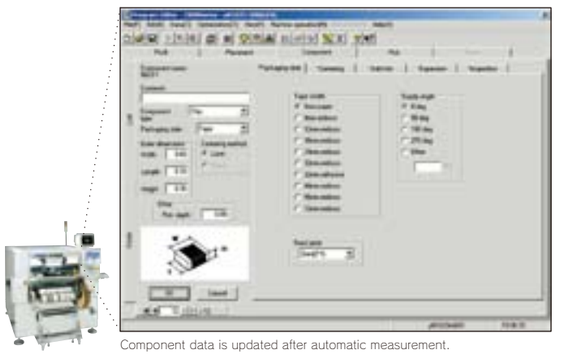


Simplified data entry

5) Ease-of-use improved by automatic component measurement

Component data can be completed entering just approximate dimensions, type and packaging information. The exact dimensions and lead count/pitch are measured by the machine and automatically entered into the component data.





Component data is updated after automatic measurement.

Features for maximum quality and maximum productivity

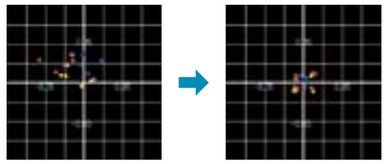
NEW Features of the R series

"Racing" - means enhancing the competitiveness at the mounting site

High quality

FCS (Flex Calibration System)

JUKI's highly regarded easy maintenance just got even easier! The optional FCS calibration jig is a simple to use system to re-calibrate placement accuracy. The machine automatically picks and places jig components, then measures the error and adjusts all necessary calibrations. (optional)



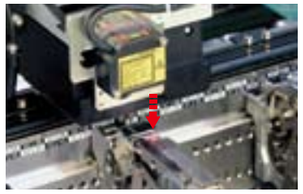
Fast and easy setup, Low defect ratio

Auto Teaching of Pick Position

Auto teaching of pick position reduces changeover time and mis-picks.

HMS (Height Measurement System)

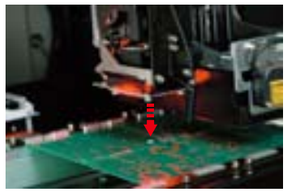
Now standard on all R Series models, the HMS is used to quickly and accurately measure the component pick height. A laser sensor measures the distance instantly without any physical contact.



Flexible

Camera Bad Mark Detection

Bad mark detection is performed using the machine's standard downward looking camera (also used for fiducials and teaching). This system accurately detects a wide range of marks on various substrates, including flex circuits.



Simple operations

Graphical user interface

Easy to use and easy to learn programming and operations make the R Series a great choice for new or experienced operators. Add the optional touch panel or rear side operation panel for even greater convenience.

Maximum throughput

Simultaneous Pick Priority Mode

Users can now select the best pick mode to suit their production requirements. For the maximum possible throughput, simultaneous pick priority mode will try to pick as many components as possible in a single pick sequence.

High density placements

Pick Position Priority Mode

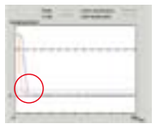
For high density component placement, pick position priority always picks components at the taught pick location.

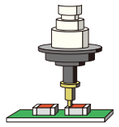
Technology for high density placement

High quality

No-blow placement technology

JUKI's original vacuum self-calibration function eliminates the need for a vacuum "blowing-off" during placement, which can disturb neighboring components or solder paste.





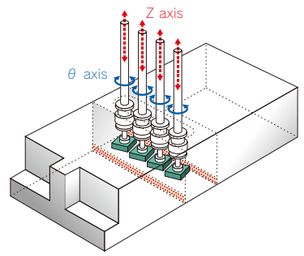
High density placement without "blowing-off"

Possible effects of "blowing-off"

High accuracy

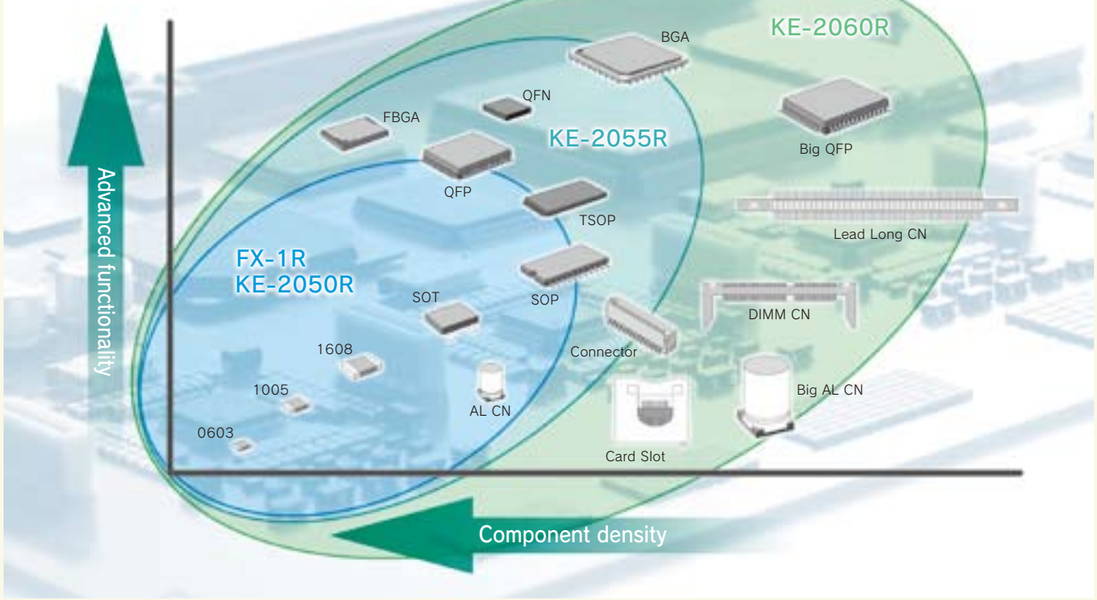
Independent Z/θ control

Each nozzle has independent Z and θ motors for high reliability and high accuracy. Precise control of each nozzle is possible without affecting other nozzles.



R series category

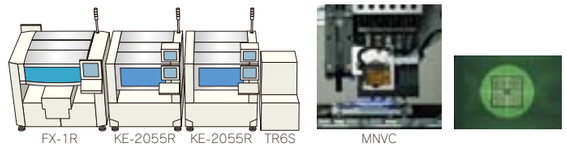
Production volume, component type, cost and production style ... Any and all needs are answered by a variety of configurations of JUKI's modular machines.



Compact line for small electronics

High density placement | High-speed, highly accurate placement of small components including fine pitch or odd-shaped devices

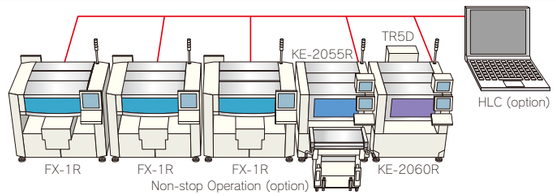
For the high density placement of very small components such as 0603 (0201) and for jobs requiring high speed and highly accurate placement of small odd-shaped components, the combination of FX-1R and KE-2055R is most suitable.
The MNVC function and the laser centering function of KE-2055R provide a well balanced line structure.



High speed, general use line

High throughput | Place virtually any SMT component

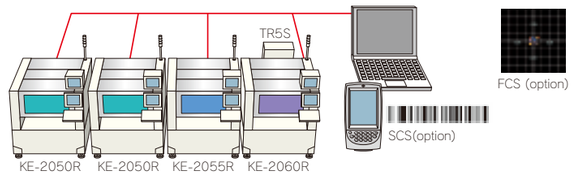
Full-function high speed line with the ability to place all components from 0603 (0201) to large BGAs, QFPs and connectors. Non-stop Operation allows feeders to be changed on-the-fly without stopping the machines. Productivity is maximized using the HLC (Host Line Computer) for line balancing and optimization.



Quality control line for automotive or medical applications

Setup verification | Traceability | Small lot, high changeover production

Designed for situations where verification and product traceability are required. FCS (Flex Calibration System) to perform periodic re-calibrations or accuracy certification.
Traceability to record lot number/manufacturing codes of components placed on all boards. Setup Control System (SCS) to verify feeder setup prior to production and new reel replacement during production.



Advanced linear motor and unique HI-Drive system delivers higher placement speed

High-Speed Chip Shooter with two multi-nozzle heads

High-speed modular mounter

FX-1R

Laser centering

The FX-1R is a traditional modular chip shooter driven at extreme speeds. Refinements in the drive system deliver real world improvements in actual throughput.

- 33,000CPH: chip (optimal) / 25,000CPH: chip (IPC 9850)
- Two independent multi-nozzle laser heads (8 total nozzles)
- from 0603(0201) to 20mm square components or 26.5×11mm 0402 (01005) option factory installed.

Actual throughput may vary.

Technology for high speed placement — Linear motor

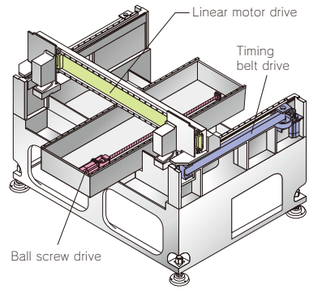
High reliability

Linear motor technology

A linear motor is used for the X axis for higher reliability and lower maintenance. Linear motors require fewer structural parts such as pulleys or supports and require no maintenance. In addition, they are quieter and do not induce as much vibration as other drive systems.

The right technology for the application

The FX-1 uses 3 different drive systems: linear motor, belt drive and ball screw. Why? Because each is best suited for different applications. Belt drive is used for the heavy movement of the Y axis. A ball screw is used for the short frequent movement of the PWB table. And the linear motors are used for the X axis to reduce weight and improve performance. As technology continues to evolve, you can count on JUKI to use the best technology for every application.



User-friendly operation

Ergonomics

Operation unit

Keyboard and monitor easily adjust in height and angle for operator convenience. The new HOD design incorporates an LCD display for the top vision camera. Teaching fiducials or pick positions has never been easier!

Flexible operation unit

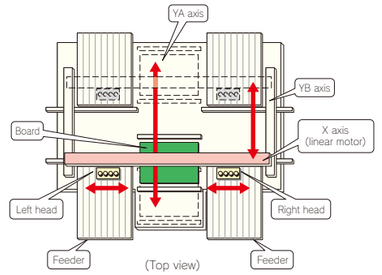
HOD with LCD

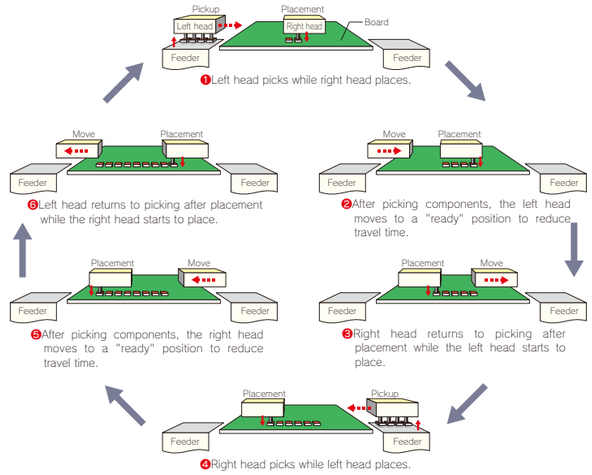
Unique design for highest efficiency — HI-Drive

Productivity

HI-Drive

The new HI-Drive system is designed for high speed placement of smaller SMT components (from 0603(0201) to 20x20mm). The HI-Drive has 2 Y motors moving the X beam. Two heads mounted on the X beam, each with 4 nozzles, are moved by a single linear motor. During production, one head picks while the other head places. The heads alternate picking and placing until production is completed on the front of the machine. The heads and PWB then move to the rear (if necessary) and repeat this process.

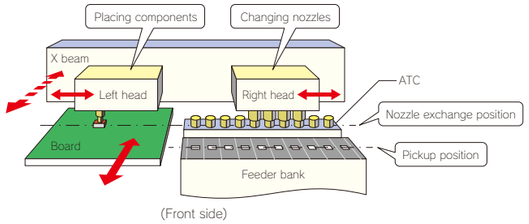




Placement efficiency

Reduced nozzle change time

Even nozzle change time has been carefully considered on the FX-1R. A benefit of the HI-Drive is the ability to change nozzles on one head while the other head continues to place components. This means that there is significantly less time lost to nozzle changing compared to a traditional drive system and also does not require a complicated "on-the-fly" nozzle change mechanism.



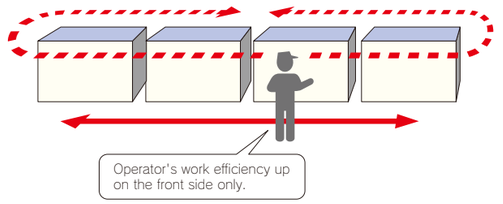
Non-stop Operetion (optional)

With the non-stop operation option, feeder banks can be removed and feeders replenished while continuing to run in high speed production. With the HI-Drive system, there is very little impact on the throughput.

Fast setup and changeover

Operator efficiency

The flexible design of the FX-1R means that whether you run a high volume or high changeover line, you always get the best efficiency. For a high volume line, feeders can be mounted on the front only. The operator does not need to go to the rear and the machine runs at the maximum tact time. For flexible production, feeders can be mounted on both sides and the machine will still run at the maximum efficiency using the HI-Drive system.



Simple board setup

The HI-Drive allows the PWB table to be moved to an easy-to-access location in the front of the machine. The operator can easily add or remove support pins and change any other hardware for different boards.

Rugged, field proven design provides high speed, high accuracy, high reliability and low maintenance

Chip Shooter

High-speed chip shooter

KE-2050R

Laser centering

High speed small chip placement system. The KE-2050R is typically used as a compliment to the KE-2055R or KE-2060R to increase overall throughput by placing the higher volume small chip components SOTs and ICs.

- 13,200CPH: chip (laser centering/effective tact)
- One multi-nozzle laser head (4 nozzles)
- from 0603(0201) to 20mm square components or 26.5×11mm
  0402(01005) option factory installed.

Flexible Placement System for smaller components

High-speed chip shooter with MNVC

KE-2055R

Laser centering | Vision centering

KE-2055R is a high speed placement system for smaller components, including vision centered parts such as QFPs, BGAs, and CSPs. Great starter machine or addition to KE-2050R or KE-2060R.

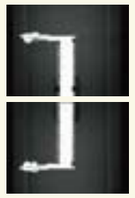
- 12,500CPH: chip (laser centering/effective tact)
- 3,290CPH: IC (vision centering with MNVC)
- One multi-nozzle laser head (4 nozzles)
- from 0603(0201) to 20mm square components or 26.5×11mm
  0402(01005) option factory installed.
- Vision centering system (featuring bottom, side, and back lighting, ball recognition)

Full Function Flexible Placement System

High-speed flexible mounter

KE-2060R

Laser centering | Vision centering | High resolution head



The best flexible placement system for high-density placements. The ultra-flexible KE-2060R can place a wide range of components from 0603 and ICs, to odd-form, all at a high rate of speed.

- 12,500CPH: chip (laser centering/effective tact)
- 1,850CPH: IC (vision centering/effective tact), 3,400CPH with MNVC option.
- One multi-nozzle laser head (4 nozzles) plus one high resolution head (1 nozzle)
- from 0603(0201) to 74mm square components or 50×150mm
  0402(01005) option factory installed.
- Vision centering system (featuring bottom, side, and back lighting, ball recognition and split recognition)

Actual throughput may vary.

KE-2050R / KE-2055R / KE-2060R Common Features

Core design for ultra-high density placement

Productivity

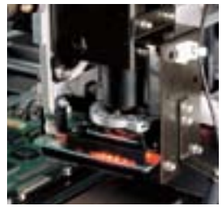
Ultra-rigid frame

Single molded casting Y-axis frames allows for 40% improvement in the gantry rigidity. Providing a 20% increase in axis speed and minimizes overall machine vibration. (compared to conventional models)

Flexible

Fiducial recognition

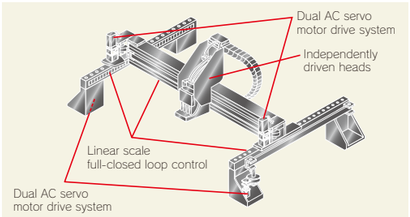
OCC lighting system supports wide variety of board materials including FPC (Flexible Printed Circuit board). Programmable brightness and directional lighting improves fiducial recognition.



Accurate

Dual XY drive system & independently driven heads

X-Y drive system features JUKI's original "Full closed loop control" using AC motors and magnetic linear encoders. Dual motor drive of both X and Y achieves high-speed, and highly reliable placements unaffected by dust and temperature variations. Independent Z and θ motors improve accuracy and robustness.



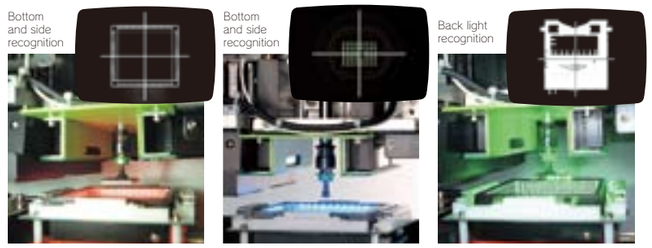
KE-2055R / KE-2060R Common Features

JUKI's unique component centering systems. Dual centering methods (Laser or Vision)

Flexible

Vision centering technology

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



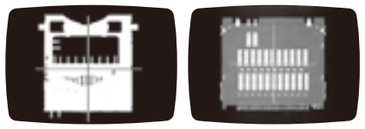
Vision recognition

Nozzles for odd-shaped components

Flexible

General Vision

General vision function is used to support a wide variety of today's unusual vision centered components. After programming is complete, the data can be verified by picking and test centering a component.



High speed vision placement

MNVC (Multi-Nozzle Vision Centering)

Vision centering by the multi-nozzle head nearly doubles the placement rate for smaller components, including CSPs, BGAs, and smaller QFPs. (option on KE-2060R)

JUKI Software supports Expandability and Productivity at upper level

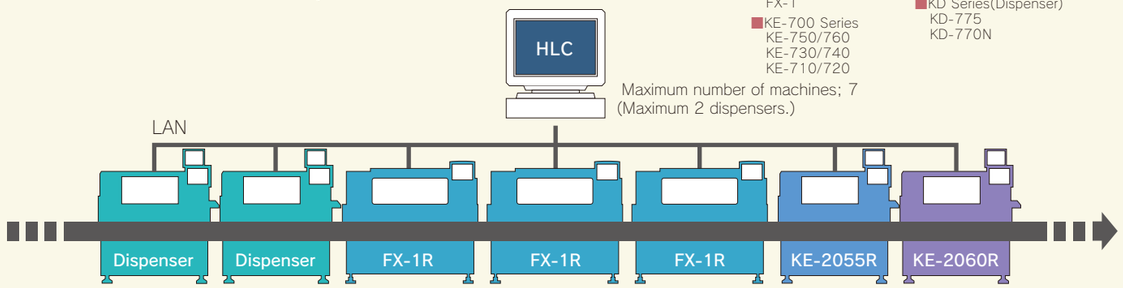
HLC (Host Line Computer)

HLC is the line control software that makes the modular concept work. On HLC a single production file can be created and edited and then optimized for the entire line in a single step. HLC will divide the production job among each machine in the line, considering each machine's capabilities as it does. The result will be a file optimized and balanced over the entire line. Other important features of HLC include job clustering to minimize changeover time, line monitoring, and job scheduling. HLC connects to the machines via Ethernet and can also be connected to the company network.

Expandability

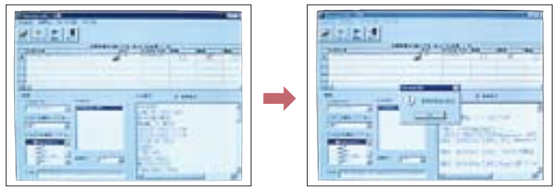
HLC supports from one to seven machines in a single production line, with up to two adhesive dispensers. It is compatible with all KE, KD, and FX Series machines as shown in the table. Any combination of machines can be used.

- CX Series
  CX-1
- FX Series
  FX-1R
  FX-1
- KE-700 Series
  KE-750/760
  KE-730/740
  KE-710/720
- KE-2000 Series
  KE-2050R/2055R/2060R
  KE-2050/2060
  KE-2010/2020/2030/2040
- KD Series(Dispenser)
  KD-775
  KD-770N



FLEXLINE CAD

JUKI's 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 HLC, CX-1, FX Series, or KE Series machines. 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.



Placement data created by another company's mounter

After conversion (JUKI data)

EPU

EPU is off-line programming software designed for a single machine. Using EPU software, the best feeder layout and optimized placement order can be achieved with the highest production efficiency. Like the FX series and the KE-2000 series, it has a component database to further decrease programming time.

Board Viewer (option)

The board viewer further reduces changeover time by providing off-line verification of component orientation. The placement program, as created, is overlaid on a scanned image of the PWB. The operator then steps through each placement verifying the rotation. All of this can be done without having to run an actual board, dramatically reducing "first article" inspection time.

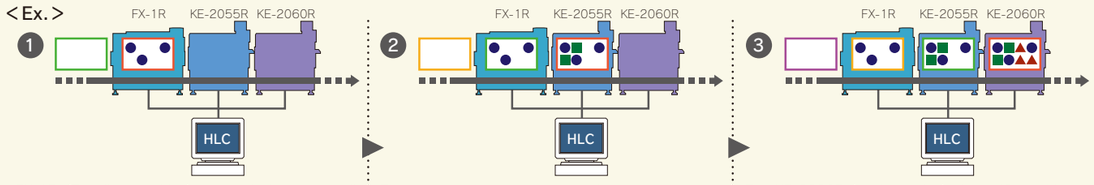
Without scanned board image

With scanned board image

Line control

Optimum line balance

With feedback from "Line Balancer" and "Mount Simulation", HLC optimizes the machine program to provide the maximum utilization and efficiency of each placement machine.



FX-1R (The first machine) starts placing the small chips on the board at high speed.

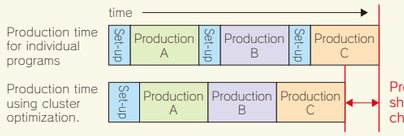
The board then moves to the next machine (KE-2055R) which begins to place additional components. A new board moves into the FX-1R.

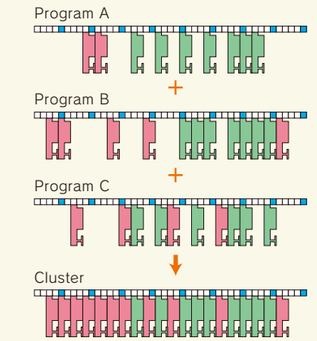
The KE-2060R (third machine) places ICs and large size components on the board and then pass the board to the next process. In this way, HLC allocates the components to be placed by each machine for the best balance and overall throughput.

Powerful support for low volume, high mix production

Cluster optimization

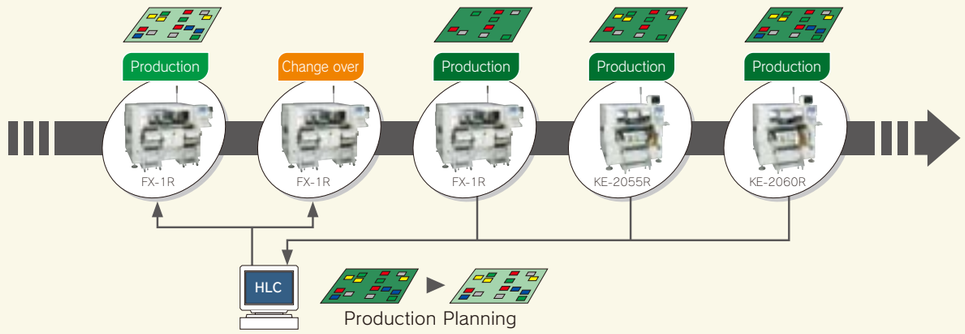
A "Cluster" is a group of feeders that can be used for more than one production file. The feeders required for several different production files are grouped into a single feeder configuration, or cluster, thus eliminating the need for change over between different boards. The clustered feeders, which are used on more than one production file are assigned (set) first, then other feeders, which are used on one particular (single) program are set (assigned).





Automatic file download

The operator can set the number of boards to be placed for each job individually. When that number is reached, the current job data is automatically uploaded to the HLC computer and then the next job is downloaded to each of the machines as they are ready.



High value added system aiming at the quality management which is one step ahead of today

Software

SCS (Setup Control System)

SCS is a feeder barcode verification package that confirms operator accuracy and provides related value-added functions. There are four modules available: Barcode Parts Verification (standard), Off-Machine Setup (optional), Traceability (optional) and Component Balance Management (standard).

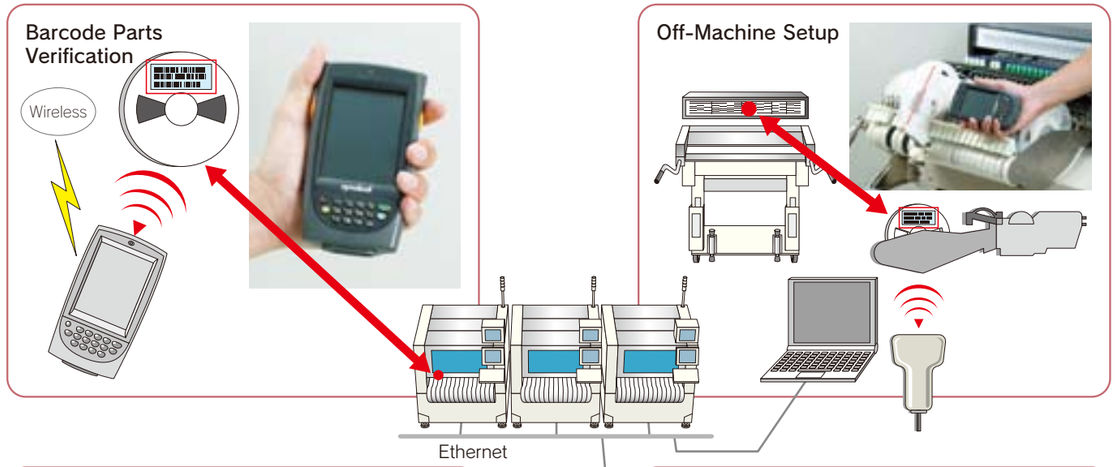
Improved accuracy, productivity and reduced operator workload

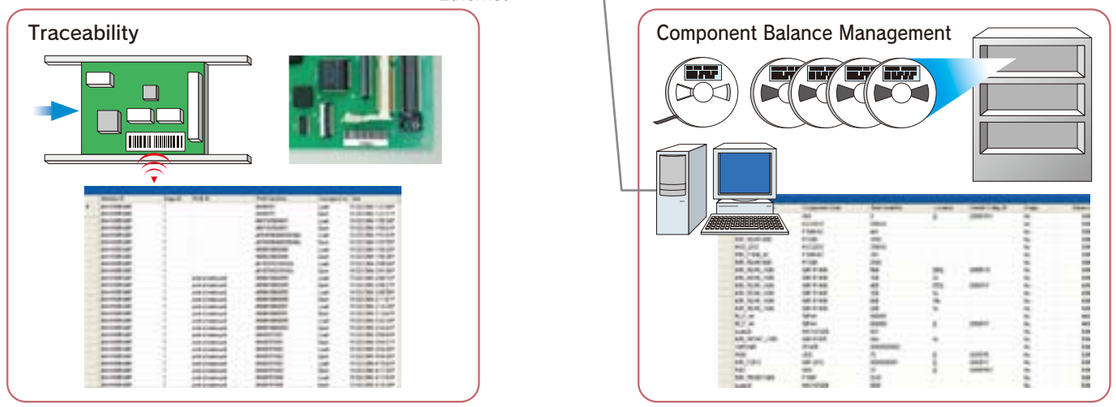
Barcode Parts Verification

The main module of SCS is the barcode parts verification. This system confirms that the correct component has been placed in the correct location when a reel or feeder is replaced. An interlock prevents production from continuing until the component and location are successfully verified using a hand-held wireless data terminal.

Off-Machine Setup Module (option)

The off-machine setup module allow an operator to verify the placement of all feeders on a feeder trolley before it is installed on a machine. This ensures all feeders are present and accurately placed for a quick changeover.





Identify boards with defective components

Traceability Module (option)

Traceability records the serial number of all boards assembled by each machine along with the part number and lot codes of every component placed. This information can be used to identify potentially "bad" boards resulting from a defective lot of components.

※2D barcode reading for traceability.

Rationalization to component management

Component Balance Management

The component balance management is included with SCS to provide basic stock and location information. The stock information is automatically updated as reels are used for production.

Available options for a wide variety of needs

Options

Increased throughput

MNVC (Multi-Nozzle Vision Centering)

MNVC increases the number of heads capable of placing vision centered parts from one to five on the KE-2060R. This can nearly double the placement rate depending on the component. Highly recommended for boards with a high number of CSPs or other small, fine pitch devices.

Eliminate down time

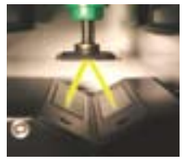
Non-stop Operation

Non-stop operation allows the operator to replace feeders while the machine continues to run at full speed. The TR5D and TR6D matrix tray changers function in NSO mode, allowing uninterrupted production for tray components.

Reduce wasted components

Coplanarity Sensor

Measures true coplanarity for both leaded components and BGAs, reducing the chance of a bad solder joint.



Component Verification System (CVS)

Measures electrical resistance, capacitance or polarity to verify components have been loaded correctly on the machine.

Bad Mark Reader

Detects "bad circuit" marks on matrix type boards and skips placement of parts on all defective circuits, preventing waste.

Fast setup and changeover

Feeder Position Indicator

LED's on the feeder bank indicates which feeder needs to be replaced or which feeder has an alarm, indicates location of feeders to be set during change over, and helps simplify feeder setup.

Feeder Trolley

Industry leading design for easy replacement of an entire bank of feeders in seconds. Single switch release/lock and no feeder re-teaching required.

KE-2050R/2055R/2060R

FX-1R

Tape Cutter

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

KE-2050R/2055R/2060R

Automatic Board Width Adjustment

Automatic motorized adjustment of the conveyor to the specified board width decreases changeover time.

Mini Signal Light Tower

In addtion to the standard signal tower, shows the operator which side of the machine a component has run out on.

Rear-side Operation Unit

Allows complete machine operation from the rear side of the machine. (includes monitor, keyboard, and trackball)

Flexible

High-resolution Camera

Increases component handling range to include fine pitch CSPs, 0.3mm pitch QFPs and other small devices. 30% higher resolution than the standard camera.

Special-order Nozzles

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

L-wide Conveyor

Increases maximum PWB size of L size machine to 510 x 350mm.

Ease of operation

Bilingual language support

Software for English/Japanese and English/Chinese is available.

Touch Panel

12" touch sensitive color LCD with tilt function.

Cost saving

IC Collection Belt

A conveyor belt provides a safe way to handle valuable rejected components. Components gradually index away from the machine and the operator is notified when the belt is full.

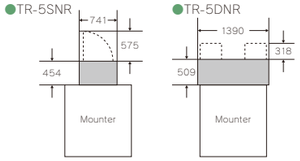
Production efficiency is improved by affluent product variation

Matrix Tray Changers and Servers

Matrix Tray Server (Rear Type) TR-5SNR/TR-5DNR


TR-5SNR

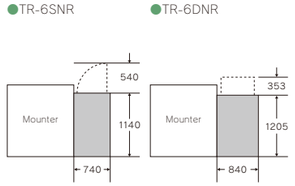

TR-5DNR



Matrix Tray Changer (Side Type) TR-6SNR/TR-6DNR

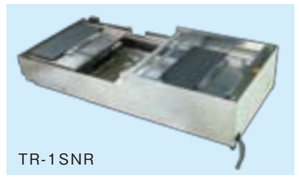

TR-6SNR

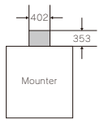

TR-6DNR



Matrix Tray Holder

Dual Tray Server (Rear Type)


TR-1SNR

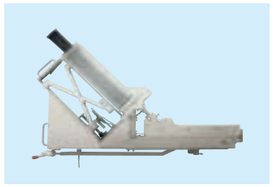


Feeders

Tape Feeders

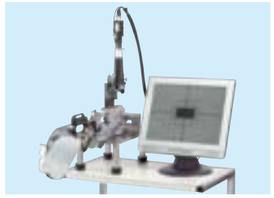
Bulk Feeders

Stack Stick Feeders



Stick Feeders

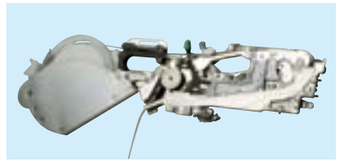
Feeder Calibration Jig with Monitor



NEW

ATF (Splicing tape feeder)

Splicing tape feeder ATF is featuring tape splicing for easy component replenishment during production. Like previous generations, the ATF is fully backwards compatible with all KE and FX series models.




Tape splicing jig (optional)

※ for details of feeders, matrix tray changers/servers, please refer to our catalogue of "Feeder Series" and "TR-series".

Option list

		KE-2050R	KE-2055R	KE-2060R	FX-1R
Recognition system	MNVC	–	–	○	–
	Bad Mark Reader	○	○	○	○
	High-resolution Camera	–	○	○	–
	0402(01005) Optional	○	○	○	○
	Offset Placement After Solder Screen-printing	○	○	○	–
Operation system	Rear-side Operation Unit	○	○	○	○
	Touch Panel	○	○	○	○
Inspection function	Coplanarity Sensor	–	○	○	–
	Component Verification System (CVS)	○	○	○	–
	SOT Direction Check Function	○	○	○	–
Board carrying system	Automatic Board Width Adjustment	○	○	○	○
	Conveyor Extension	○	○	○	○
Safety device	UPS (Uninterruptible Power Supply)	–	–	–	○
Others	L-wide Conveyor	○	○	○	–
	FCS Calibration Jig	○	○	○	○
	Feeder Position Indicator	○	○	○	○
	Non-stop Operation	○	○	○	○
	Mini Signal Light Tower	○	○	○	○
	Super Foot	○	○	○	○
	Connector Bracket	–	–	–	○
	Caster	–	–	–	○
	Pin Reference	–	–	–	○
Software	HLC	○	○	○	○
	Board Viewer	○	○	○	○
	EPU	○	○	○	○
	Flexline CAD	○	○	○	○
	SCS (Barcode Parts Verification)	○	○	○	○
	(Off-Machine Setup Module)	○	○	○	○
	(Traceability Module)	○	○	○	○
Component handling and Feeders	Matrix Tray Server TR-5	○	○	○	–
	Matrix Tray Changer TR-6	○	○	○	–
	Matrix Tray Holder	○	○	○	–
	Dual Tray Server TR-1SN	○	○	○	–
	Splicing Tape Feeder / ATF	○	○	○	○
	Tape Feeder	○	○	○	○※1
	0402(01005) Tape Feeder	○	○	○	○
	Bulk Feeder	○	○	○	○
	Stick Feeder	○	○	○	○
	Stack Stick Feeder	○	○	○	–
	Feeder Calibration Jig with Monitor	○	○	○	○
	Feeder Trolley	○	○	○	○
	IC Collection Belt	○	○	○	–
	Trash Box	○	○	○	–
	Tape Cutter	○	○	○	–

※1 Berow 44mm feeder