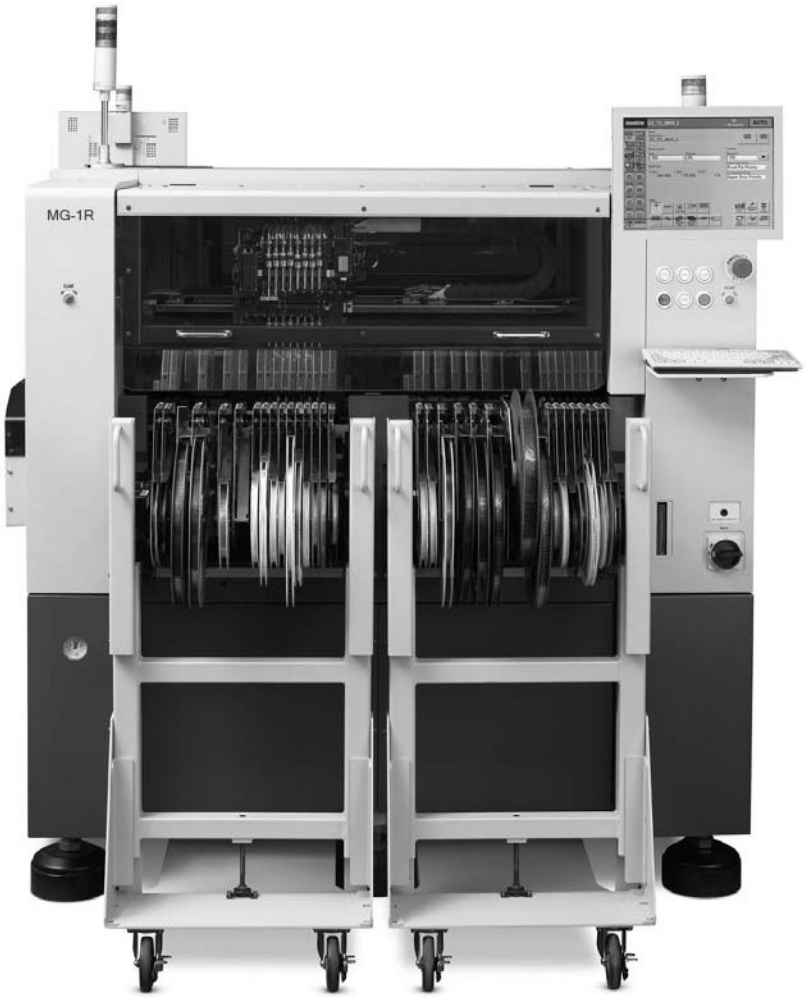
SPECIFICATIONS

Assembléon



MG-1R

January
2010

PA 1317/13 MG-1R (SF) ITF
PA 1317/16 MG-1R (SF) CL
PA 1317/17 MG-1R (SF) CLi

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Contents

1 Introducing the MG-1R

The MG-1R, the new generation High Speed Multifunctional Production Machine, belongs to the top-of-the-line Assembléon SMD pick & place machines.

With the MG-1R a feeder commonality between all Assembléon machines has been continued which increases the MG-1R flexibility.

The MG-1R is a High Speed Multifunctional machine that can handle a wide range of components at speeds up to 24,000 SMDs per hour. The machine is built around a very rigid, vibration-free frame for improved accuracy and long-term stability and is perfectly suitable for round-the-clock production.

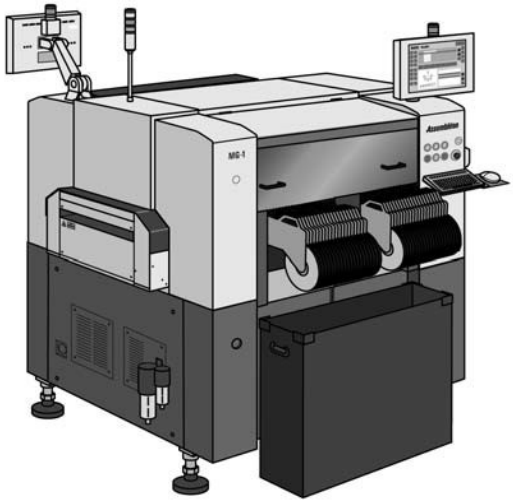

Figure 1 Front view MG-1R

The MG-1R features a high precision single placement beam that carries 8 independent Z-servo controlled high precision heads with exchangeable nozzles. The placement beam moves in X/Y and Z direction, while the board and component feeders are stationary. A flexible board transport system enables the MG-1R to handle virtually any type of PCB. Board conveyor width is automatically adjustable, allowing board dimensions up to 510 x 440mm (20" x 17.2") to be handled.

The digital vision system with Line Array camera allows fast and accurate "on-the-fly" alignment of a wide range of components from 01005 up to 45 x 100mm, including 45mm square QFPs with lead pitches down to 0.5mm (20 mil). Dark or white background BGAs, μBGAs and CSPs with ball pitches down to 0.4mm (16 mil) and ball diameters down to 0.1mm (4 mil) can be recognized by the newly developed illumination unit which allows measurement of ball positions and dimensions.
The vision system detects missing, bent or irregular spaced leads or BGA balls; faulty components are rejected.

A separate camera system monitors fiducial marks at the board, circuit and component level, using a combination of white-light and IR LEDs with multi-angle diffusers to provide optimal illumination.

Just six nozzle shapes are required to cover the specified SMD range. High output levels are therefore achieved, as the need for nozzle exchanges is minimal. Optionally a 32 position nozzle exchange station including a full set of nozzles, enables additional special nozzles to be accommodated.

Up to 96 tape feeders can be loaded on the MG-1R. The machine supports tape, stick and tray feeders. The tape feeder design for the MG-1R allows simultaneous picking from any mix of tape feeders ranging from 8 to 72mm.

A Windows XP based controller, running a user-friendly Graphical User Interface, allows the MG-1R to be used stand-alone or in-line and can be easily hooked up to the external network. The controller includes a Management Information System (MIS) that continuously gathers production data for management feedback. The unique bad mark sensing capabilities allow a multi-circuit panel to be run as one large board, thus maximizing placement speed while still using bad mark information.

Off-line feeder changeover is achieved by using a 24 position Feederbar Exchange System (FES). An entire feederbar can be conveniently loaded off-line, minimizing change-over time.

A basic program optimization function is also included in the machine as standard which can be used during production. For more advanced line optimization the Advanced Manufacturing Suite AMS, allows you to create and optimize SMD machine programs on a PC instead of using the SMD machine. User interface from machine and AMS software are the same; therefore reducing training requirements.

2 General Specifications

	MG-1R (SF)	
		REMARKS
Tact time:	0.15 sec/chip with line array camera 0.30 sec/SO with line array camera 0.8 sec/QFP with line array camera	Simultaneous pick with 8 heads Simultaneous pick with 4 heads Sequential pick with 4 heads
Optimal placement rate:	24,000 cph	Simultaneous pick with 8 heads
Tact time IPC 9850:	17,400 cph	C0603; all heads, all angles
Nominal placement rate:	14,000- 16,000 cph	Real mounting speed
Applicable Components:	01005 - SOP, SOJ, PLCC 32mm ⍁ (1.26") 01005 - 20mm ⍁ (0.79") with pin pitch down to 0.3mm (12 mil) 20mm - 32mm ⍁ (0.79") with pin pitch down to 0.4mm (16 mil) BGA, μBGA,CSP : 32mm ⍁ : Min. ball pitch down to 0.4mm (16mil) Min. ball diameter down to 0.1mm (4mil) Irregularly shaped SMDs, 100mm x 32mm Maximum grid for BGA components is 64x64	Line array camera system (32mm) Ball presence check for $\geqslant$ 0.1mm ball diameter Ball defect check for $\geqslant$ 0.2mm ball diameter
	0201 - SOP, SOJ, PLCC 45mm ⍁ (1.77") 0201 - 20mm ⍁ (0.79") with pin pitch down to 0.4mm (16 mil) 20mm - 45mm ⍁ (1.77") with pin pitch down to 0.5mm (20 mil) BGA, μBGA, CSP: 45mm ⍁ : Min. ball pitch down to 0.4mm (16mil) Min. ball diameter down to 0.15mm (6mil) Irregularly shaped SMDs, 100mm x 45mm Maximum grid for BGA components is 64x64	Line array camera system (45mm) Ball presence check for > 0.15mm ball diameter. Ball defect check for > 0.3mm ball diameter.
Component height:	Max: 15mm	Placing of higher parts is possible if certain conditions are met.
Mounting accuracy (X,Y) $\mu+3\sigma$:	± 50µ for chips 01005-0201-0402	Line array camera PA 2969/35 required
	± 75µ for all chips and SOIC (this is lead dependent) ± 30µ for QFP's	When using Line array camera PA 2969/36 (all placement heads and all placement angles, with special components and board)
Mounting accuracy (φ) 3σ:	For Chips and SOIC (Lead dependent) ±0.1° for QFP's	Line array camera system (all placement heads and all placement angles)
Mounting repeatability X,Y 3σ:	15µ for QFPs	
Mounting angle:	0° up to 360° (programmable in steps of 0.01)	

	MG-1R (SF)	
		REMARKS
Number of heads:	One single beam with 8 high precision heads	The high precision heads can exchange nozzles with the use of the Nozzle Exchange Station
Alignment system:	Line array camera 45mm with illumination system for Vision on the Fly	Standard
	Second line array camera Side view camera for reliability and quality performance 3D camera for co-planarity check functionality Moving CCD camera for Fiducial alignment	Optional Optional Optional Standard
Type of nozzles:	Type 211A Type 212A (rectangular tip) / 219A (round tip) Type 213A Type 214A Type 215A Type 216A (Melf nozzle) Special nozzle for 01005 (on request only)	Standard for the MG-1R (SF) will be delivered: 8x nozzle 212A,
Nozzle exchange station:	Optionally: 32 nozzle positions	Nozzle set included: 8x211A, 4x213A, 4x214A, 1x215A
Component weight:	Max: 31 gr. (with nozzle type 215A)	
Nozzle cleaning station: Component mounting interdistance:	For nozzle types 211A, 212A and special 01005 nozzle 01005-0402: 0.25mm or more Chip: 0.5mm or more SOP: 0.5mm or more QFP: 0.25mm or more	4 heads at one time
Placement system: Placement force:	Servo controlled for component height compensation 0.2N/mm (for nozzles with buffer this value is different)	 Pre-tension is 1.67N. (spring loaded)
Max number of feeders:	Pneumatic Tape Feeders CI(i) type: 8mm: 96 feeders 12mm: 44 feeders 16mm: 44 feeders 24mm: 32 feeders 32mm: 28 feeders 44mm: 20 feeders 56mm: 16 feeders 72mm: 12 feeders Stick feeders: Depends on stick dimensions	
Feeder indicators:	96 LED indicators (Green, Yellow & Red)	Optionally (Not available for MG-1R with ITF feeder interface)

	MG-1R (SF)	
		REMARKS
Max Number of ITF feeders:	Intelligent Tape Feeders: 8mm: 80 feeders (160 code numbers with Twin tape feeder) 12mm: 36 feeders 16mm: 36 feeders 24mm: 40 feeders 32mm: 24 feeders 44mm: 20 feeders 56mm: 16 feeders Stick: Depends on stick dimensions	
Component Packaging:	Tape according to IEC/EIA-J/JEDEC: 8-56mm For larger tape feeders such as 72mm please contact your local sales representative	Tape reel diameter max: 380mm (15")
	Single ATS Tray Feeder: Max. tray size: 230mm x 335mm (9.1" x 13.2") Min tray size 90mm x 140mm (3.5" x 5.5")	Optional (**factory built in**): Single ATS Tray Feeder. Max. number of amount of pallets 2 x 15 with 12.5mm pallet pitch, pick area for all heads from tray 210mm x 325mm (8.3" x 12.8") **No PCB width restriction**
	Double Shuttle Tray Sequencer: Max. tray size: 230mm x 335mm (9.1" x 13.2") Min tray size 90mm x 140mm (3.5" x 5.5")	Optional: Double Shuttle Tray Sequencer (**no PCB width restrictions**). Amount of pallets 4x 15 with 12.5mm pallet pitch, including inspection conveyor.
Maximum height pre-mounted components:	15mm on placement side (0.16") 30mm on non placement side (1.2")	Depending on component neighborhood
PCB Dimensions (x,y):	Min: 50 x 50mm (2.0" x 2.0 ") Max: 510 x 440mm (20" x 17.2") Long board sizes upon inquiry only	
PCB Weight:	Max. 2.0 Kg	
PCB Thickness:	Min: 0.4mm (0.015") Max: 4.0mm (0.15") *Special applications upon request*	

	MG-1R (SF)	
		REMARKS
Non - Mountable area:	Board Top side: 3mm from rear side board edge (0.12") 3mm from front side board edge	Component height restrictions apply in the 4mm (0.40") area from front side edge depending on board thickness
	Board Bottom side: 5mm from front and rear side board edge (0.2")	Flat edge of 30mm (1.2") is required on bottom right corner for the use of the main stopper, sub and exit stopper. For Ceramic PCBs (optional) the Non-Mountable area can be different.
PCB Material:	Phenolic/FR4/Composite Materials	Ceramic PCB's requires special conveyor section (optional)
PCB positioning:	One independent Z servo controlled push up system + board clamp unit Optional: Two independent board clamping units for board sizes <190mm	PCB clamp thickness software controlled
	Push up pins	Adjustable positions
	Sub stop (PCB waiting buffer)	Fixed position
	Exit stop	Fixed position
PCB Transport height:	900mm ± 10mm (35.4" ±0.4")	Standard
	SMEMA 953mm 12.5mm (37.5" ± 0.5")	Standard
PCB Transport direction:	Left to Right	Right to Left is optional
PCB Transport width:	Automatic	Front rail fixed Rear rail moving
PCB loading time:	Approximately 2 sec. for small boards (<180mm)and 4 sec for big boards (>190mm)	PCB loading concurrent to SMD picking and alignment
Control system:	Celeron 2.0 GHz controller Industrial Windows XP width Realtime operating system	512Mb internal memory
	1 Gb flash disk	
	USB	
	CD-ROM	
	RS 232 Serial Interface + LAN interface	
	15" Color User Interface Flatscreen front and rear side	15" touch screen optional
LAN interface	Based on IEEE802.3u, IEEE802.3	
Communication protocol:	TCP/IP	
User Interface:	VGOS (Visual Graphical Operating System): • Front side LCD monitor, keyboard, mouse • Rear side LCD monitor, keyboard, mouse Operating panel front Operating panel rear	 Standard Optional Standard Optional

	MG-1R (SF)	
		REMARKS
Control system functions:	Max. 127 PCBs	12,800 comp/PCB
	# components types/PCB	255
	Max. blocks/PCB	512
	Backup and restoring data using USB stick	
	Supported formats: VIOS, VIOS-TXT,YGX	VIOS: binary format VIOS-TXT: text format YGX: format (preferred)
	MIS data gathering	
	Data teaching	
	Data tracing	
	Component database	16,000 Component packages; user can define and teach vision files
	Mark database	300 Mark shapes
	SMEMA electrical interface	
	On line calibration	
	On line help functions	
Machine dimensions and weight:	Length: 1650mm (5.4 ft) Height: 1850mm (6.1 ft) Width: 1562mm (5.1 ft) Weight: 1630kg (3592 Lbs)	Width including feeders; pneumatic feeders 2376mm (7.83 ft), electrical feeders 2150mm (7.05 ft)
Safety standards:	EN 292, EN 294, EN 349, EN 614, EN 1050, EN 55011, EN 61000-6-2, EN 60204-1 EN 301 489-1, EN 301 489-3, EN 300 330-2, EN 60950	CE-safety is part of system design. Safety measurements are tested on each product in the factory. For MG-1R with CLi feeder interface
Warning lights :	White: Emergency stop, safety cover interlock Blue light: Pick up error, out of components Green: In automatic operation	
Electric Power:	Voltage AC: 200/208/220/240/380/400/ 416 V ± 10 %, 3 Phase Frequency: 50/60 Hz	
	Noise peak: 1,500V, 1µ sec or less	
	Consumption: 4.6 kVA max.	
	Average power consumption: 0.75KW	
	Floor: Flat, slope is 10mm or less	
Air supply:	Pressure: > 5.5 .10^5 Pa (5.5 bar, 80 PSI) Quality: dust and oil free Consumption: min.350 Nl/min (10 = CFM)	
Operating Temperature:	15-35^o C (59^o - 95^o F)	Specification guaranteed: 20^o-28^{o}C (68^o - 82^o F)
Humidity:	20 - 90 %, no dew	
Noise:	< 78dba	
Clean Room:	Class 10,000 (10 K)	

Table 1

3 Features, Accessories and Options

3.1 Features

The standard-MG-1R includes the following features:

- On the fly alignment using a vision system with a Line array camera standard equipped with a side illumination unit for BGA's, μBGA, CSP components.
- Placement beam with 8 high precision heads. All heads have independent Z servo control and for rotation two rack and pinions motors are used.
- Simultaneous picking is possible by all 8 heads from any mix of tape feeders. This allows a much higher nominal placement rate and board throughput.
- Complete component range can be handled with only 6 nozzle shapes.
- Fiducial alignment camera with software controlled illumination unit (white + IR Leds),wide angle diffuser and co-axial illumination. Fiducial camera can also be used as teaching/tracing device and for Bad Mark sensing
- 8x Nozzle type 212A
- Automatic width adjustment. The PCB dimension is included in the PCB data.
- Substopper, allowing an additional PCB to enter the machine for reducing
- transport time
- Exit Substopper, providing a buffer section
- CD-ROM drive for software installation
- Front: 15" LCD, operation panel, keyboard and mouse
- Component dump box
- Operator manual, available in different languages
- User manual
- Service manual
- Two empty tape bins
- Toolset
- First aid spare parts kit (including nozzles: 1x211, 212, 213, 214)
- CE safety
- ESD safety
- Electrical and Mechanical SMEMA
- Ethernet communication port
- RS 232 communication port

The MG-1R supports the following options:

- Component supply indicator
- Automatic nozzle change station with complete nozzle set.
- Two independent board clamping systems (for PCB length < 190mm).
- Two independent Z servo controlled push up systems including push up pins, for PCB support (for PCB length < 190mm). PCB thickness is included in the PCB data.
- Automatic nozzle cleaning station for small nozzle. Four heads at once are positioned in the cleaning station and by air pressure the nozzles will be cleaned.
- Feeder indicators which provide the operator with all the essential information regarding the feeder status (easy set-up).
- Feeder lock verification system to avoid damage to the machine due to incorrectly latched feeders.
- Rear 15” LCD, operator panel, keyboard and mouse

Standard Software features:

- Variable XY axis speed per component.
- Datum angle functionality (especially for stick components, there is no pick angle necessary to recognize the component which results in higher output).
- User Friendly Graphical Human interface VGOS with touch screen capability.
- An On-line help function allows display of detailed descriptions of operations and functions on screen.
- Management Information System (MIS) to gather production history data.
- 4 point fiducial correction, to maintain accuracy for stretched/distorted boards.
- Template (pattern) matching for PCBs that have no fiducials.
- Different mark shapes for fiducial pair possible.
- Fiducial recovery function in case of recognition error or damaged fiducials.
- Data editing functions with the use of the fiducial camera (teaching,tracing).
- A Component database, that can hold up to 16,000 component packages, with the most frequently used components already predefined.
- A Mark database, that can hold up to 300 mark shapes, with the most frequently used mark shapes already predefined.
- Precede pick-up, allowing to pick up components before the PCB is fixed, reducing cycle time.
- Alternative feeder function, reducing operator intervention (empty feeder switching).
- Self Production Control, with use of bad marks the machine can determine which components should be placed. This is ideal for family boards.
- Automatic rework cycle to improve operator efficiency and online optimization, to keep mounting speed during production in case of empty feeders. Detected empty feeders are automatically skipped until end off programs, to allow one time replenishment.
- Product preparation can be done on the machine including basic optimization of the mount program (nozzle and feeder set-up).
- Multi-section PCBs can either be mounted block-by-block or the block data can be combined to achieve the fastest mounting sequence. In the latter case, block badmarks still remain in effect.
- Programmable retry function.
- Adaptive pick-up for automatic correction of feeder pick-up position.
- Task manager to carry out daily maintenance like automatic nozzle cleaning automatically on a pre-defined sequence.