

Winners of Advanced Packaging, Surface Mount and Global SMT Vision Awards (2003 – 2009)

AWPb 300 Automatic Wafer Bumper System



General Description

Milara takes its combined system technology practice one step further with the development of the new AWPb 300 Wafer Printer / Bumper system. The system is capable of handling 150, 200 and 300mm wafers with either a dual or single FOUF option. A single robotic arm with pre-aligner is used to load and unload wafers onto the automated print stage (EFEM). Utilizing our patented vibration squeegee technology which has proven viability in wafer bumping, the AWPb 300 employs the same technology used by all Milara printers to accomplish ultra fine pitch printing (down to 39um) with 100 percent printing reliability in conjunction with unsurpassed solder brick geometry.



(Single FOUF shown)



The AWPb 300, fully automatic robotic wafer bumper offers advanced technological features and combines them with unprecedented ease of operation. Windows™ Professional based programming simplifies every aspect of set-up. A customized windows based system allows either first time or experienced operators to use the printer's full capabilities in just a sort time. The AWPb 300 is engineered to achieve the highest levels of precision and consistency in paste deposition. A self-diagnostic program for instant

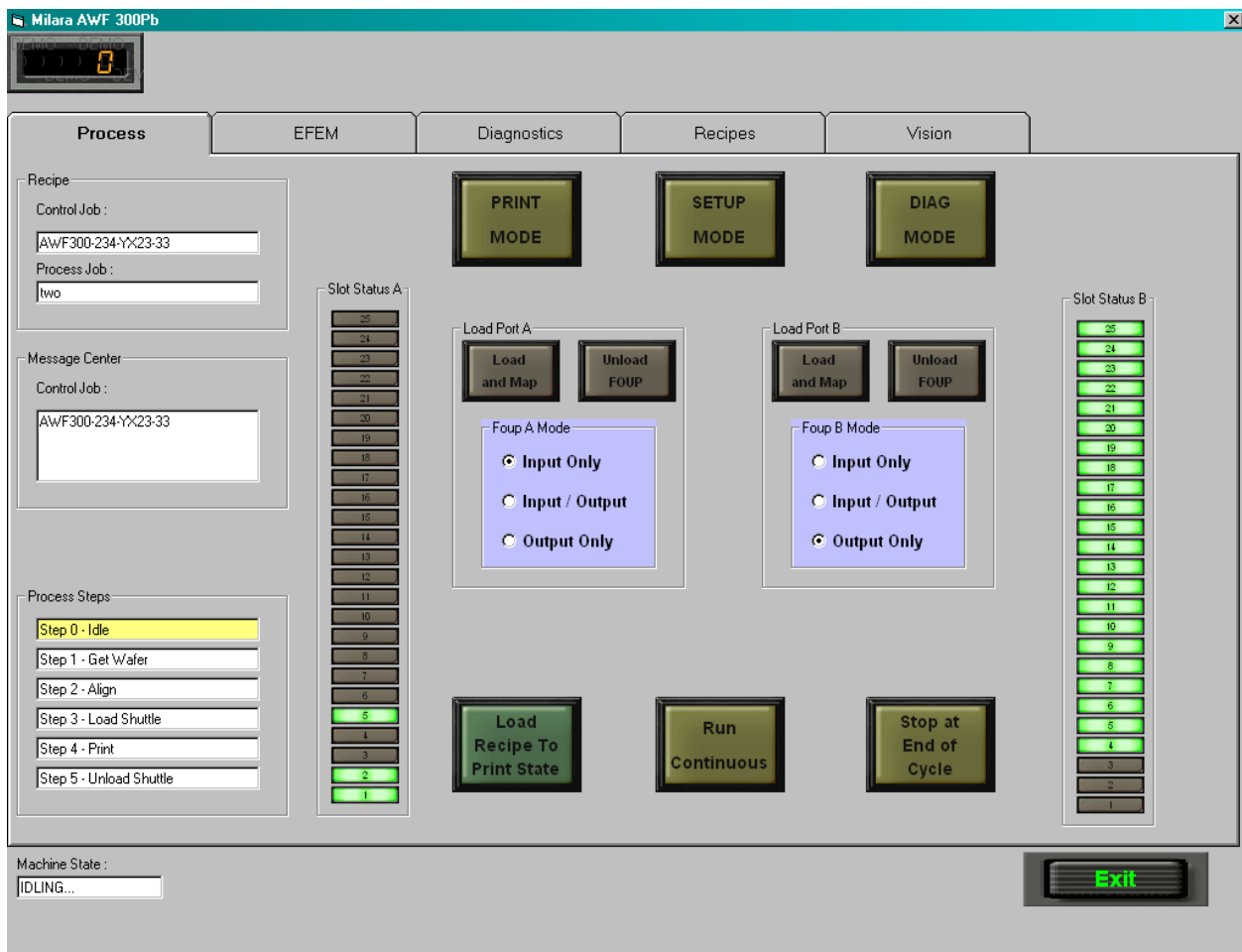
trouble shooting is built in to ensure maximum productivity.

All complex wafer motion sub systems are produced by our vendor partners located in Germany with the exception of the load ports currently provided by Asyst. The AWPb 300 has the software capability to integrate ANY vendor load port on the market today.

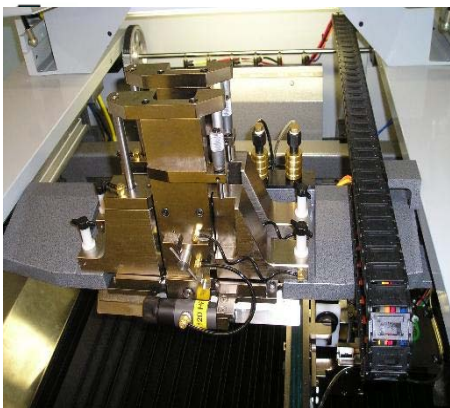


Operator Interface (GUI)

The AWPb 300 operating system is the latest version of Microsoft's Windows™ Professional. This operating system was chosen due to its flexibility and overall robustness. As versions of this operating system advance, the AWPb possesses the ability to easily accept these upgrades and provide customers with the latest in operating software technology. A simplistic, non-embedded menu system simplifies overall use to an operator. All primary setup screens are located only one level below the main menu for less confusion.



Above is shown the main process panel showing all recipe data, mapped wafers within the cassette or FOUP and current status of the active process. The AWPb operating system is the latest version of Microsoft's Windows™ Professional. This operating system was chosen due to its flexibility and overall robustness. As versions of this operating system advance, the AWPb possesses the ability to easily accept these upgrades and provide customers with the latest in operating software technology. A simplistic, non-embedded menu system simplifies overall use to an operator. All primary setup screens are located only one level below the main menu for less confusion.



Squeegee Vibration Technology (patented)

The world's first industrial vibrating squeegee from Milara provides multiple benefits including lower squeegee pressures, longer stencil life, consistent paste deposition and eliminates paste scavenging. Higher print speeds, and improving print quality are also achieved through this major break-through in printing technology. **Absolute** solder paste deposition onto the wafer is achieved with this patented technology.



Bottom Side Stencil Wiper (patented)

Bottom side stencil cleaning is a critical aspect of high quality printing and a definite consideration in overall production cycle time. The AWPb accomplishes this operation by incorporating a tri-blade ultrasonic vibration wiper system (patent pending). After moving the cleaning squeegees back and forth, the stencil is effectively wiped 6 times in approx. 6 seconds. The small amounts of solder paste on the squeegee blades are removed via ultrasonic cleaning and the blades are 100% clean for the next



clean cycle. The wiper system greatly reduces cycle time when considering production run average cycle time. The need for vacuum, paper rolls or other consumables is thereby eliminated. Hazardous waste disposal is also simplified. Wiper frequency, stroke and ultrasonic clean time are fully programmable. Used in conjunction with this system is our new non-toxic, non-flammable, water based, biodegradable, highly concentrated cleaning solution which when used with ultrasonic technology ensures.



Resistive Touchscreen Control

The AWPb is the industries first printer to use a built in resistive, flat panel touch monitor for complete system control. This compact design saves valuable floor space, allows easy access, and does not interfere with the adjacent equipment. The interlocked hood can remain closed for all set up operations throughout the production runs for total operator safety while providing an unobstructed view of machine activity. By employing resistive touch technology, operators may setup the system with protective hand wear.





AWPb 300 Squeegee Pressure Loop Controller (Tescom)

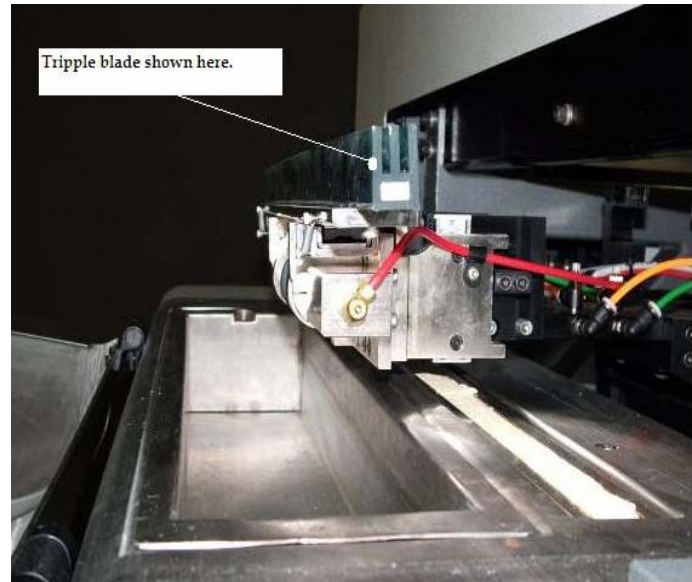


A closed loop feedback pressure control system maintains consistent pressure over every print stroke. The individually programmed squeegee pressure is regulated and updated every 2.8 milliseconds, insuring uniform depositions. Milara incorporates a precision industrial proportional air valve to accomplish this task to insure reliability and robustness.



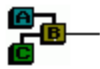
Print Area Third Blade Cleaning Wiper

The new In Print Area (IPA) wafer wiping squeegee system operates separately from the two main print squeegees although located in the same print area. If wafer gasket printing is used, the final residual cleaning wipes of the wafer can be produced within the print area eliminating paste on wafer bottom and edge. The AWPb 300 accomplishes this operation by incorporating a single squeegee wiper system. After moving the cleaning squeegees back and forth, the wafer is effectively wiped 1 time in approx. 6 seconds. The small amounts of solder paste on the squeegee blades are removed with the ultrasonic cleaning and the blades are 100% clean for the next wiping cycle.



Standard Features

- Vibrating squeegee assembly
- Programmable Squeegee pressure
- 150, 200 or 300 mm Wafer size capability
- Dual FOUP load port equipped (single FOUP or cassette load optional)
- Wafer thickness 0.3mm – 2mm
- Integrated resistive touch monitor for easy and reliable operation
- On and off contact print modes
- Servo shuttle style X, Y, and Theta carriage
- X, Y, and Theta Adjustments
- Servo programmable squeegee speed and positions
- Servo programmable controlled vertical stencil lift
- Double squeegee assembly
- Last Wafer Recall
- Wafer recipe library
- Runtime diagnostics
- Programmable snap off, squeegee up delays and squeegee offset
- Closed loop operator message feedback
- Hard nickel vacuum chuck with vacuum finger pop-up
- Squeegee down stop via micrometer
- Floating or fixed squeegee holders
- Programmable number of print strokes
- Closed loop squeegee pressure control



AWPb 300 Load Ports (Asyst Corporation)

IsoPort™

Asyst's IsoPort, the next generation 300mm I/O port, breaks new ground in automated 300mm wafer handling with its industry leading interoperability and low cost of ownership. It leverages Asyst's proven pioneering leadership in automation technology to deliver a reliable, economic, Front-Opening-Unified-Pod (FOUP) interface that is the industry's most advanced to date.

The IsoPort gives semiconductor tool equipment manufacturers a highly configurable, automated wafer-handling solution that easily integrates with any tool. In short, IsoPort offers many advanced benefits for both equipment makers and chipmakers transitioning to 300mm wafers.

Maximum Productivity & Profitability

- Provides **best-in-class interoperability** performance through precise servo-controlled motion, smart latchkey design, and optimized carrier sensing.
- Exceeds both the **ergonomic and economic** necessities of automation-the results of larger, heavier wafer carriers and significantly increased yield risks.
- Optimized tool throughput **reduces time** from FOUP arrival to first-wafer access to just 8 seconds.
- **Best-in-class cleanliness** with contamination conformance to ISO Class 1 particle level.
- Provides **low cost of ownership** with zero maintenance design, simple tool integration, and global support.
- Optional gas purge ports provide an **inert ambient environment** for wafers in the carrier on the load port
- Configurable design **easily integrates all types of automated carrier identification solutions** (RF, infrared, or barcode).





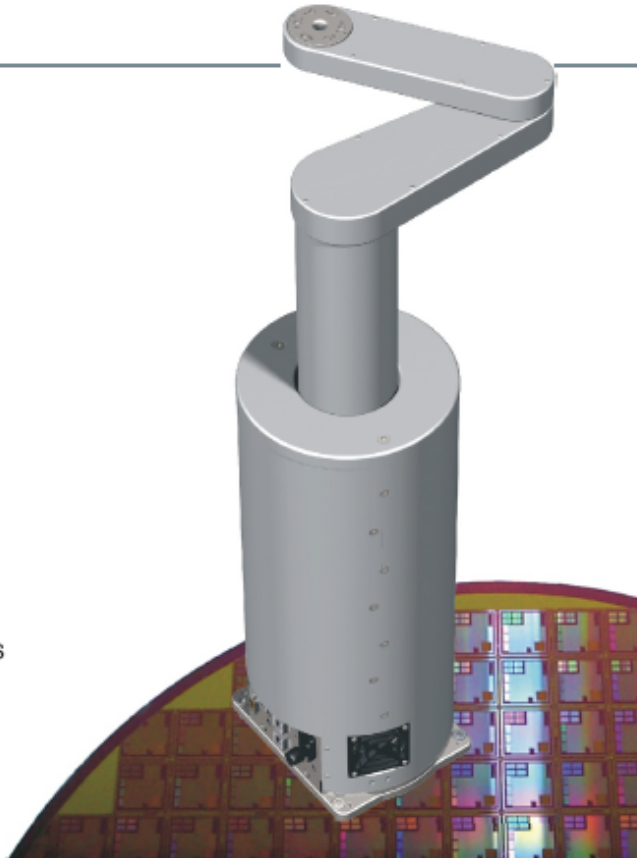
AWPb 300 Robotic Hander (Isel Automation, GmbH)

isel Wafer Handling Robot

IWH-BA13S14F-1

Characteristics

- Innovative All-In-One design
- Excellent structural rigidity
- Wafer handling of up to 300mm
- Maximum reliability and precision
- Easy connection of a linear track to the robot controller
- Real time motion control
- Very smooth running
- Brushless, maintenance free servo motors with low inertia
- Backlash free Harmonic Drive® gears
- Various communication interfaces
- Class 1 clean room compatible
- MTBF: >50.000 operating hours



Description

This wafer handler is an innovative All-In-One design and is class-1 clean room compatible. It integrates the motion control, power amplifier and power supply.

With this innovative method, there is no need for an external control and power unit. It is suitable to handle wafers up to 300 mm and distinguishes itself with an extremely high precision and reliability. Brushless motors with extreme high reaction capability, coupled with direct driven Harmonic Drive® gears guarantee precise and trouble free arm movements.

The used power controller with 32-bit real-time kernel allows a smooth integration of linear tracks and other peripherals. This controller provides smooth running along multiple path segments. The efficient wafer operation and script languages with optimal emulation of third party software allow the integration of various semiconductor tools. The control system supports RS-232, RS-485, tech-pendant and Ethernet interfaces.

Automation Modules for the Semiconductor Industry

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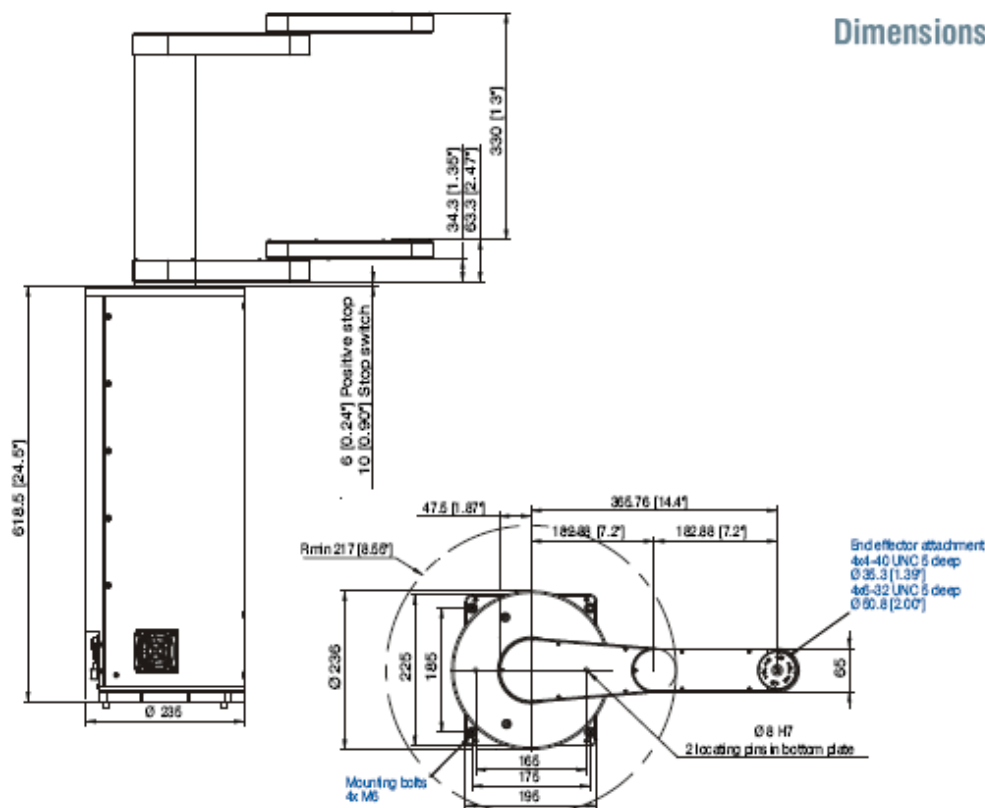
isel Wafer Handling Robot

Specifications

Repeatability	T	± 0.02°
	R	± 0.05 mm
	Z	± 0.05 mm
Working range	Z	330.2 mm [13.0"]
	radial	365.8 mm [14.4"]
	theta	380°
Payload		0.75 Kg

Maximum speed	T	360°/s
	R	500 mm/s
	Z	375 mm/s
Power supply		110 / 230 V AC
Main interface		RS-232 [DB9], Option: Ethernet [RJ-45]
Peripheral interface		RS-485 [R-J-45]

Dimensions



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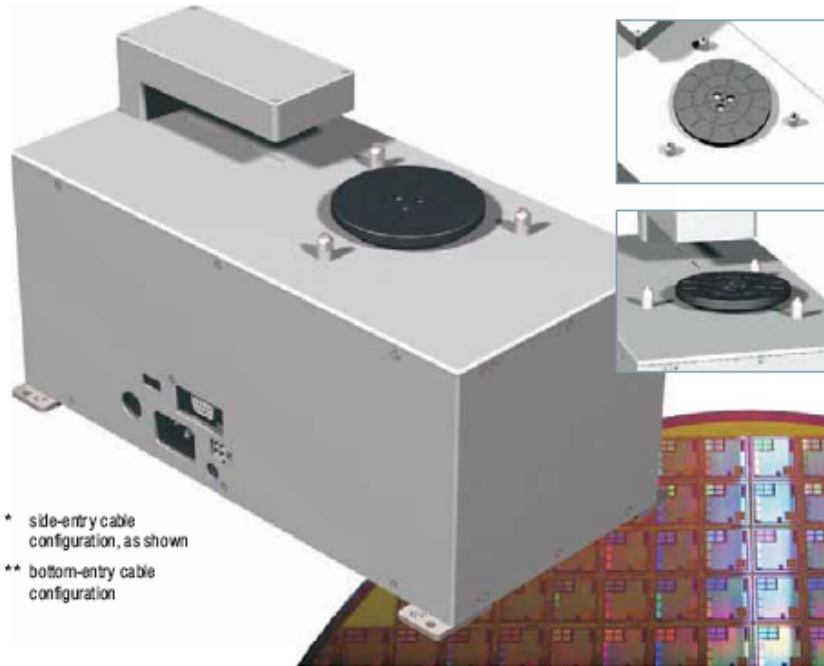


AWPb 300 Pre-aligner (Isel Automation, GmbH)

isel-Prealigner

IPA-300VS-1*

IPA-300VU-1**



- * side-entry cable configuration, as shown
- ** bottom-entry cable configuration

Description

IPA-300VS/VU-1 is innovative, high precision, class 1 compatible prealigner solution including scanning electronics, motion controller and power supply within an industry standard footprint.

This unique all-in-one design eliminates external controller and interconnecting cables while maintaining drop-in compatibility.

All 3 axes are servo driven and equipped with ultra low inertia brushless motors for smooth, instant response.

IPA-300VS/VU-1 supports both chuck and pin load configurations without any mechanical changes. The advanced scanning head is capable of detecting transparent, semi-transparent and opaque objects without repositioning between different wafer sizes.

The built-in intelligent motion controller features a comprehensive set of commonly used command to allow the seamless integration of the prealigner in variety of semiconductor platforms.

IPA-300VS/VU-1 is available in bottom-entry and side-entry cable configurations. The unprecedented aligning cycle time of less than 3.5 seconds allows achieving maximum throughput.

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isel®

Automation Modules for the Semiconductor Industry

isel-Prealigner

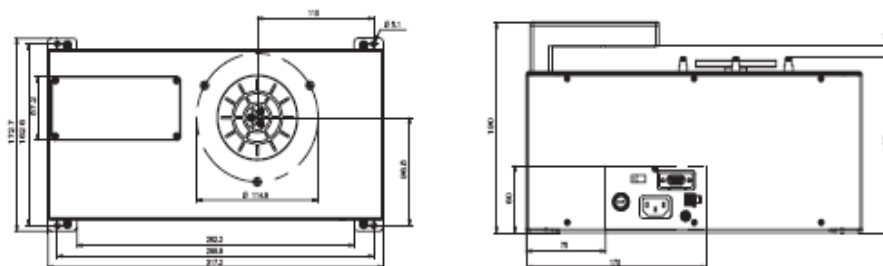
IPA-300VS-1

IPA-300VU-1

Specifications

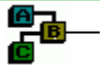
Kinematics	Rotating Vacuum Chuck
	Horizontal Linear Axis for Offset Compensation
	Vertical Linear Axis for Chuck Height Positioning
Alignment Repeatability	Linear: ± 0.0025 mm
	Angular: ± 0.05 degrees
Maximum Offset	Single Step Alignment: 12.5 mm
	Two Step Alignment: 25 mm
Wafer Sizes	8" (200 mm) and 12" (300 mm)
Wafer Configurations	Entire SEMI Flat and Notch Specification
Object Opacity	Transparent, Semi-Transparent and Opaque Wafers
Drive System	Sinusoidal AC Closed Loop Servo on all 3 Axes
Load Options	Universal Chuck and Pin Loading
Detection	Optical CCD, Non-Contact
Throughput	Less than 3.5 seconds
Cleanliness	Class 1 Compatible
Power	115/230VAC, 50/60Hz, 65VA
Vacuum	20" Hg

Dimensions (Side-entry cable configuration)



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AWPb 300 Customer Specified End Effectors

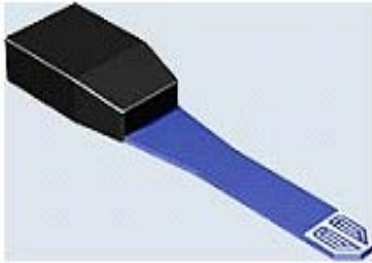
IE E-Series

Characteristics

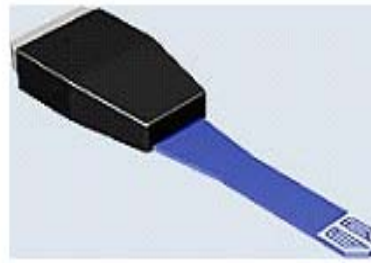
For wafer sizes up to 12" (300 mm)
Modular concept
Low own weight
High rigidity
Good cost/performance ratio

Options

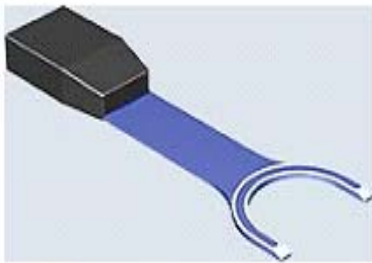
Diverse wafer mapping sensors
Several surface coatings
Special designs



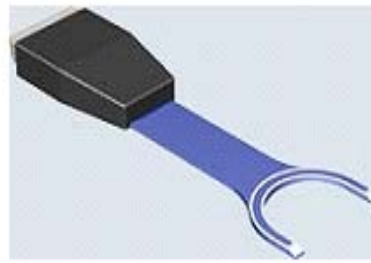
Paddle
without Scanner



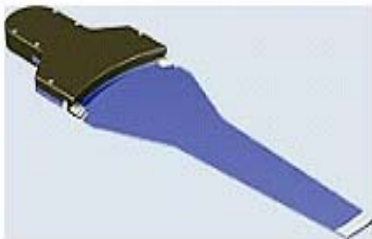
Paddle
with Scanner



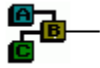
Horse shoe
without Scanner



Horse shoe
with Scanner



Edge gripper



AWPb 300 Front Open Unified Pods (FOUP)



Highest Overall Output for Your Facility

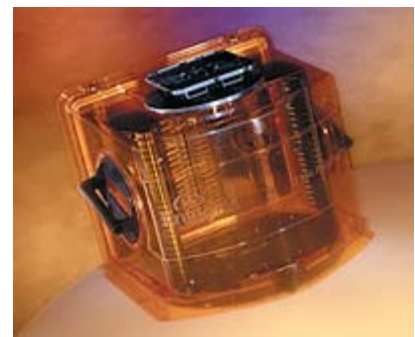
The F300 is engineered to improve the overall productivity of your facility by offering wafer protection and optimum automation interface. Yield and throughput increases are achieved by:

- Maximizing your wafer transfer throughput by precise wafer plane performance
- Maximizing tool and automated materials handling systems uptime and long-term reliability with a dimensionally stable integral cassette
- Door mechanism reliability exceeding 100,000 cycles
- Maximizing water cleaning capability and minimizing dry time for reduced downtime
- Minimizing any contribution to contamination optimum automation

Clean and Secure Wafer Protection

The F300 is engineered and manufactured to provide maximum protection for your wafers from contamination, electrostatic discharge and UV exposure:

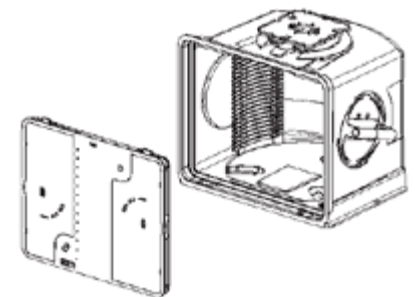
- Ultrapure, UV filtering (to 500 nm) polycarbonate housing material
- Static dissipative STAT-PRO® 3000 carbon fiber filled PEEK™ in areas requiring a path to ground
- Integral, single piece cassette provides reliable wafer plane performance
- Robust wafer retainer ensures repeatable wafer positioning and minimizes particle generation
- Metal-free assembly prevents metallic contamination

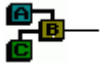


Optimum Automation Performance

The F300 incorporates a variety of features to provide reliable automation interface and interoperability:

- The F300 Autopod® conforms to SEMI standards **E47.1** and **E1.9**.
- Precise 10mm wafer spacing with accurate and reliable wafer plane
- 142mm square top robotic lifting flange
- Lower side conveyor rails
- Kinematic coupling plate
- Configurable A, B, C or D info pads for product segregation
- FIMS interface two-key door





AWPb 300 Cassette Options

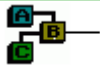


Advanced Wafer Transport

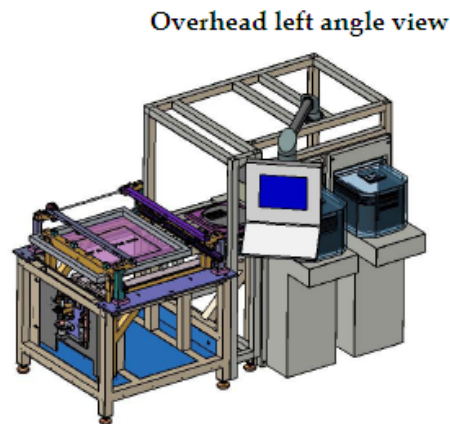
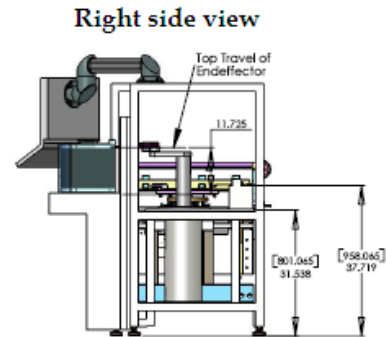
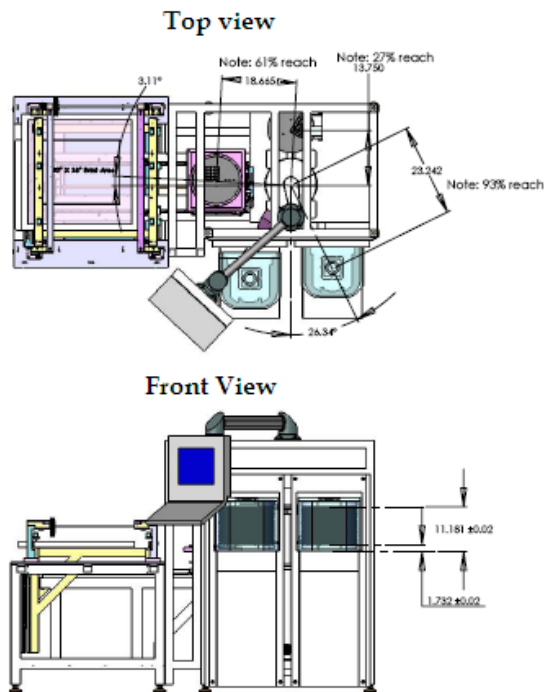
Trends in wafer processing technology have mandated advancements in wafer carrier technology to support today's advanced semiconductor processing facilities. Wafer carriers designed for **advanced wafer transport** offer dramatic performance benefits over traditional low and mid-range wafer carriers, including:

- *Precise wafer access* – the wafer is in a precise and predictable location
- *Reliable equipment operation* – on process tools and automated materials handling systems
- *Secure wafer protection* – from contamination and damage

The 198/192 Series 200mm Wafer Transport Carrier is a component of Silicon Delivery™ Systems and Services – Entegris' unique materials integrity management solution to cost-effectively manage silicon from production to consumption. This offering brings together wafer and device handling systems and services into a customized, coordinated package that works for you.



AWPb 300 Views (no skin, dual FOUP EFEM shown)



AWPb 300 Printer Standard Features

- Integrated resistive touchmonitor for reliable operation
- On-board vacuum monitor system
- On and off contact print modes
- Servo shuttle style X, Y, and Theta carriage
- X, Y, and Theta Adjustments
- Servo programmable squeegee speed and positions
- Servo programmable controlled vertical stencil lift
- Double squeegee assembly
- Last wafer recall
- Infinite wafer storage library
- Easy step through programming for new operators
- Interchangeable squeegee heads
- Runtime diagnostics
- Industrial PC main control computer
- Programmable snap off, squeegee up delays and squeegee offset
- Closed loop operator message feedback
- Multiple print modes
- Mylar set up alignment fixture
- Accepts stencil adapter plate for 8" x 10" up to 24" by 24" stencils
- Squeegee downstop via micrometer
- Floating or fixed squeegee holders
- Online software manual is incorporated into the operating system for quick referencing

AWPb 300 Printer Mechanical Specifications

Print Area.....	16" x 20" (406mm x 508mm)
Screen Frame.....	8" x 10" (203mm x 254mm) to 29" x 29" (736mm x 736mm)
Repeatability.....	+/- .0005" (12.5µm, 6 Sigma),
X and Y adjustment.....	+/- 0.75" manual / fixed lock (19mm)
Theta adjustment.....	+/- 10 degrees, manual / fixed lock
Squeegee stroke length.....	1" to 19" (25.4mm to 482mm)
Stencil separation gap.....	0.5" (12.7mm) range programmable
Squeegee pressure.....	1 to 65 P.S.I.
Dimensions.....	69"H(152mm) x 107"L(2717mm) x 52"W(1320mm)
System weight.....	1,900 pounds (861Kg)
Power.....	150 to 250VAC @5A, 50/60Hz, Auto
Vacuum.....	18 to 23Hg

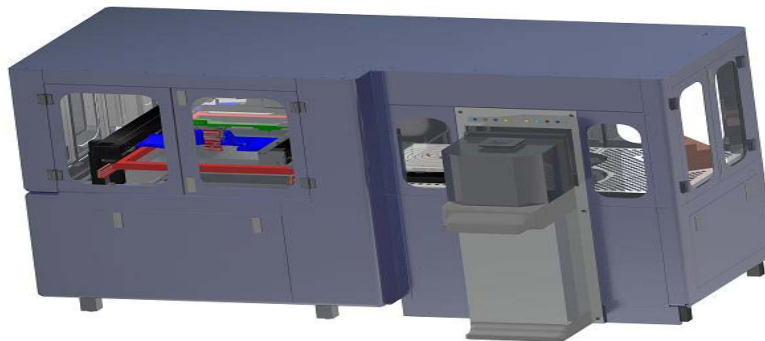
AWPb 300 Certifications

All components are Semi S2/S8 compliant and CE certified

AWPb 300 Dual FOUP System

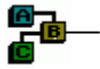


AWPb 300 Single FOUP System



AWPb 300 Dual FOUP and Cassette System



**Logistics**

- Training:** Operational training and maintenance for this product will be conducted at Milara's facility requiring the presents of client. Duration for training will be approximately 1 full week and will consist of system operation, setup, maintenance and troubleshooting (the in-house training will be discretionary by client). Post delivery, Milara's area representative or service engineer will provide final training and operation setup with client at client's facility. Estimated time of onsite training shall be determined by client at NO COST, maximum of 30 days. Additional time is negotiable
- Delivery:** All standard deliveries are shipped freight collect. Shipping dates vary depending on when the order Is placed relative to our build schedule. Ship dates are currently running net 12 weeks post ARO
- Remit To:** Milara, Inc. 4 Marc Road, Medway, MA 02053
- Terms:** 50% ARO, 50% net 30 days post shipment or other negotiable
- Warranty:** One year parts and labor under normal operating conditions

Reverences and thanks to:
Entegris Corporation – FOUP and cassette products
Isel Automation – All EFEM robotics
Tescom – Industrual pressure control products
Elo – Touchmonitor products
Asyst – Load port products