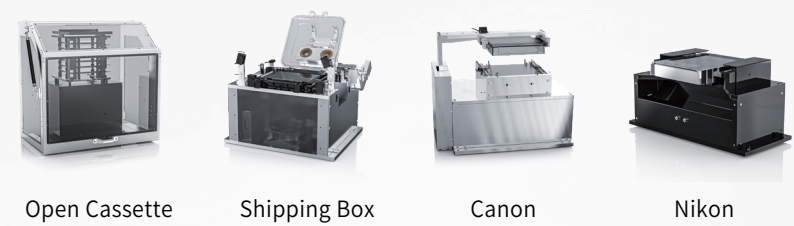


OPTIONAL MASK MODULE

MASK LOADPORT(PLM)



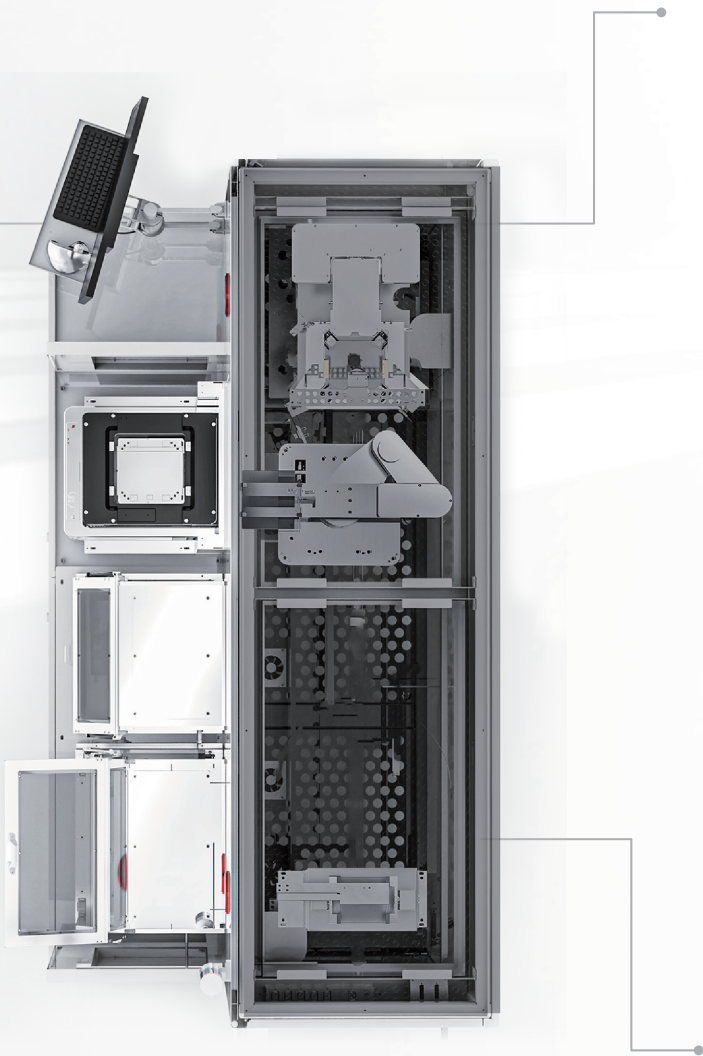
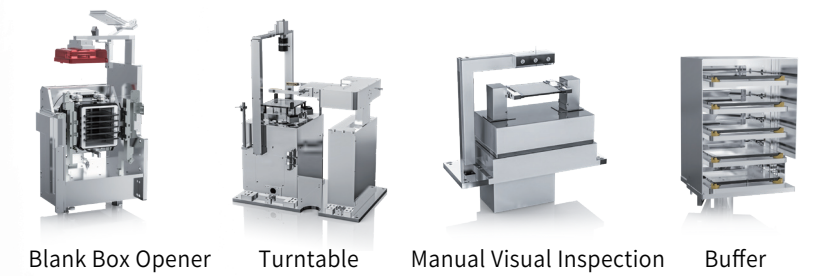
MASK LOADPORT



MASK ROBOT



OPTIONAL MODULES



MASK SORTER

Product Introduction

Fortrend designs and manufactures sorters for the transfer of reticles between SEMI SMIF Pods and reticle shipping boxes in IC manufacturing facilities, including Canon, Nikon, RSP, and others. The system supports mask rotation to any orientation, chamfer detection, and includes functions such as centering, flipping, scanning, visual inspection, and caching. The transfer path can be fully customized and edited, and the sorter supports a wide range of optional configurations. The internal chamber cleanliness can reach ISO Class 1. Various opening modules can be equipped, including:



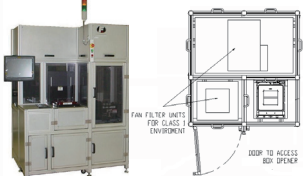
- Blank Box Opener (BBO) – for Hoya, ShinEtsu, and AGC blank mask boxes
- Clam Shell Box Opener (CSO) – for Pozzetta, DMS, Toppan, IBM, and others
- Nikon & Canon Box Openers – for lithography tool cartridges
- SMIF Pod Openers – for SEMI E111 (150mm) and SEMI E100 (200mm) pods
- EUV Pod Openers – for SEMI E152 EUV SMIF pods

Product Features

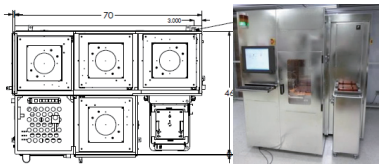
- Independent sorting use (MASK SORTER)
- It can achieve fully automated carrier replacement, and conversion between transport boxes (Hoya, ShinEtsu, Nikon, Canon, etc.) and RSP illumination boxes (RSP150/RSP200/RSP EUV)
- Customizable robotic arms can be paired with photomask end-effectors to meet various complex application scenarios, including reticles, masks, and pellicles
- Configurable turntable modules can satisfy the horizontal 360° rotation and flip functions of reticles, and achieve precise alignment and reading of MASK ID/PELLICLE ID
- Configurable manual inspection device, air knife module, etc., to achieve reticle inspection function and surface particle sweeping function

MASK SORTER Case Display

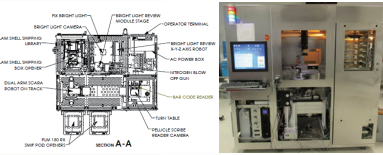
- Lamina 202 Inline
RSP 200 to Blank Box



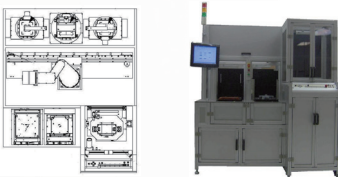
- Lamina 202 Fixed Robot
RSP 200, Clamshell Box, Blank Box with turn/flip module



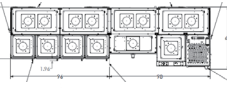
- Lamina 203 Inline
2x RSP 150, Clamshell Box with 6-position auto loader, bright light review module with N2 blow off, turntable with BCR



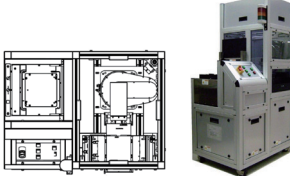
- Lamina 205 Inline
RSP 150, RSP 200, pozzetta Clamshell Box, Hoya Blank Box Opener, Shin-Etsu Blank Box Opener, bright light review module with N2 blow-off



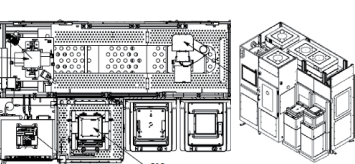
- Lamina 206 Inline
R2x EUV/RSP 200, Clamshell Box, Blank Box Opener, bright light review module with N2 blow-off, turn/flip module with OCR and BCR.



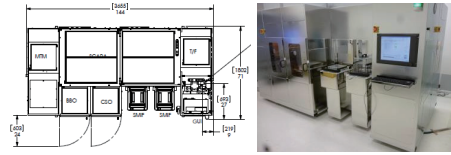
- Lamina 202 Fixed Robot
RSP 150 to Nikon Box with turntable



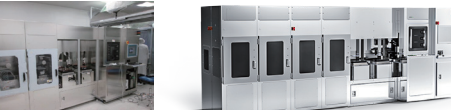
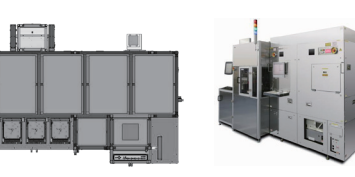
- Lamina 202 Inline
RSP 150, RSP 200, Clamshell Box, turn/flip module with BCR



- Lamina 204 Inline
2x RSP 200, Clamshell Box, Blank Box Opener, turn/flip module with BCR and thickness measurement module



- Lamina 205 Inline
3x RSP 200, Clamshell Box, Blank Box Opener, 30 mask storage buffer, bright light review module with N2 blow-Off



Product Introduction

The MASK EFEM is designed for the automated transfer and docking of masks/reticles to process equipment in a controlled cleanroom environment. It supports integration with vacuum chambers (VTMs) for processes such as ion implantation, vapor deposition, and CD-SEM, as well as stand-alone use with metrology and cleaning tools. The system features centering, flipping, scanning, visual inspection, and caching capabilities, with fully customizable transfer paths and optional configurations. The internal cleanliness level reaches ISO Class 1. Available opening modules include:



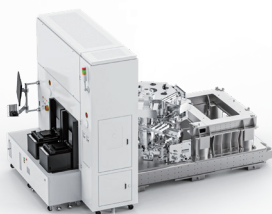
- PLM 150Rx & PLM 200Rx – SMIF pod openers for SEMI E111/E100 pods
- PLM EUV Dual – for SEMI E152 EUV SMIF pods
- Blank Box Opener (BBO) – for mask blank storage boxes
- SMIF Pod Openers – for SEMI E111 (150mm) and SEMI E100 (200mm) pods
- EUV Pod Openers – for SEMI E152 EUV SMIF pods

Case Presentation



MASK EFEM & Other Equipment

The MASK EFEM automation equipment can be integrated with vacuum chambers (VTM) for processes such as ion implantation, vapor deposition, and CD-SEM, and can also be used independently with metrology and cleaning equipment.



Product Features

- Modular design allows flexible integration with customer workflows and fab layouts
- Each module includes air extraction to eliminate particles and maintain cleanliness
- Self-developed software with ASCII TCP communication protocol
- High reliability: ≥99% uptime, MTBF ≥4000 hours, MTTR ≤2 hours
- Supports SEMI S2/S8, CE standards, and SEMI E78 ESD Level 1 compliance

Cleanliness Level	ISO Class 1
Repeatability	±0.1mm
Software	Self-developed software by Fortrend
Communication Protocol	ASCII TCP
Uptime	≥99%
MTBF	≥4000 hours
MTTR	≤2 hours
Rated Voltage	Single-phase DC 220V

MASK SMIF

MASK SMIF Product Introduction

Fully self-developed by Fortrend, this mask/reticle opening module offers a variety of reticle handling arms and gripper designs to meet flexible OEM reticle-handling needs, including flipping, rotating, long-distance extension, OCR/BCR, and more.



150MM RETICLE SMIF



200MM RETICLE SMIF



200MM RETICLE SMIF (3-LINK)

- Opens SEMI E111 single RSP SMIF Pods
 - Ready for OHT/AGV loading
 - Optional E84 communication board for handshake with OHT/AGV systems
 - Support serial and parallel I/O communication protocols
 - Turnkey system on wheels (easy transportation to service areas)
 - Optional 1D, 2D (SEMI T11) and EUV (SEMI T16) bar code readers
 - Optional OCR reader
 - Optional RFID reader
- Opener & Robot Arm meet ISO Class I cleanliness work environment
 - Rotate reticle 0 to 360°; Flip reticle 0 to 300°
 - Various reticle handling arms and gripper designs for flexible OEM reticle manipulation requirements (flip, rotation, extended reach, OCR/BCR, etc.)
 - Support serial and parallel I/O communication protocols
 - Turnkey system on wheels (easy transportation to service areas)

Product Introduction

Product Name	150MM RETICLE SMIF	200MM RETICLE SMIF
Product Image		
Project	Parameter Comparison	
SMIF Pod Size	150 mm (SEMI E111)	200 mm (SEMI E100)
Height	1812-1847mm	1812-1847mm
Width	381mm	381mm
Depth	562mm	562mm
Reticle Rotation	0 to 360°	0 to 360°
Reticle Tilt	0 to 300°	0 to 300°
Arm Z	145mm	145mm
Arm Reach - STD	274mm	274mm
Arm Reach -3 link	422mm	422mm
SMIF Arm Payload	3.2 kg	3.2 kg
Pod Interface	SEMI E19.3	SEMI E19.4
Power	110V@3A/ 240V@1.4A, 60/50 Hz	110V@3A/ 240V@1.4A, 60/50 Hz
Weight	93Kg (pod not included)	93Kg (pod not included)
Load Height	925 mm ± 25 mm	925 mm ± 25 mm
Mounting Repeatability	±0.5 mm	±0.5 mm
Cycle Time	50 to 65 seconds	50 to 65 seconds
Control	Front panel, pendant, host	Front panel, pendant, host
Communication	EIA-RS232C,Parallel I/O, SEMI E23-96,IEEE-TTL	EIA-RS232C,Parallel I/O, SEMI E23-96,IEEE-TTL
Lot ID Reader Options	RFID and/or IR Link	RFID and/or IR Link
Cleanliness	ISO Class 1	ISO Class 1

MASK LOADPORT

PLM Product Introduction

For SEMI E152 EUV SMIF Pods & SEMI E100 RSP Pods

Fully self-developed by Fortrend, the PLM series offers a comprehensive range of SMIF pod openers for 150mm, 200mm, and EUV reticle handling. Designed for seamless integration into process tools, EFEMs, or sorters, they provide reliable access to reticles in an ISO Class 1 mini-environment, supporting OHT/AGV, overhead crane, and manual loading in compliance with SEMI standards (SEMI E100). The system can identify information of different incoming cassettes through Info Pad / RFID.

- Equipped with material presence sensors
 - Pellicle presence and orientation sensors
- Supports overhead crane, AGV, and manual feeding
 - Identifies cassette information via Info Pad / RFID



PLM EUV

- SEMI E100 RSP 200
- SEMI E152 EUV Pod

■ Opens inner & outer doors of EUV pods. Applies 80N force per SEMI E152.



PLM 200RX

- SEMI E100 RSP 200
- Outer door of SEMI E152 EUV Pod

■ Opens inner & outer doors of EUV pods. Applies 80N force per SEMI E152.



PLM 150RX

- SEMI E111/E112 RSP 150

■ Lifts pod shell, leaving reticles in sealed mini-environment.

Product Introduction

Product Name	PLM EUV	PLM 200RX	PLM 150RX
Product Image			
Project	Parameter Comparison		
Mask Specification	152mm W x 152mm D x 6.35mm H	152mm W x 152mm D x 6.35mm H	152mm W x 152mm D x 6.35mm H
Module Size	467W x 460D x 770H mm	467W x 460D x 770H mm	467W x 460D x 770H mm
Lifting Stroke	210 mm	210 mm	210 mm
Material Box Type	SEMI E100 Single RSP /SEMI E152 EUV SMIF Pod(Internal/ External)	SEMI E100 Single RSP SEMI E152 EUV SMIF Pod(External)	SEMI E111 Single RSP SEMI E112 Multiple RSP
Material Box Interface	SEMI E19.3	SEMI E19.3	SEMI E19.3
Power Requirement	100V/240VAC @ 1Amp 50/60Hz Or 24 VDC (Option)	100V/240VAC @ 1Amp 50/60Hz Or 24 VDC (Option)	100V/240VAC @ 1Amp 50/60Hz Or 24 VDC (Option)
Open Material Box	< 12 seconds	< 12 seconds	< 12 seconds
Close Material Box	< 10 seconds	< 10 seconds	< 10 seconds
MTBF	50,000 cycles	50,000 cycles	50,000 cycles
MTTR	< 1 hour	< 1 hour	< 1 hour
Communication	EIA-RS232C, Parallel I/O, SEMI E23-96, IEEE-TTL, Ethernet (TCP/IP Fortrend HEX), SECS		

Product Introduction

Fortrend's reticle handling robots are designed for high-cleanliness (ISO Class 1) environments. Utilizing closed-loop control and precision end-effectors, they ensure efficient, stable, and particle-free transfer of masks, reticles, and square glass substrates throughout lithography and inspection processes. Optional flip axis is available upon request. The integrated turn/flip module is designed to orientate and flip the mask/reticles. Maximum payload: 3 kg.



Single-Arm Lifting Robot / Handler

- Design: Vertical-lift single-arm mechanism for straightforward pick-and-place operations.
- Strength: Optimized for simple, reliable transfers where footprint and cycle time are primary concerns.
- Typical Use: Direct loading/unloading between fixed stations, open cassettes, or process ports.



Single-Arm Gripping Robot / Manipulator

- Design: Single-arm SCARA-style robot with customizable grippers (side-grip, fork, paddle).
- Flexibility: Supports rotation, extension, and precise placement for varied cassette and pod interfaces.
- Typical Use: High-speed sorting, EFEM integration, and systems requiring flexible end-effector tooling.



Dual-Arm Gripping Robot / Manipulator

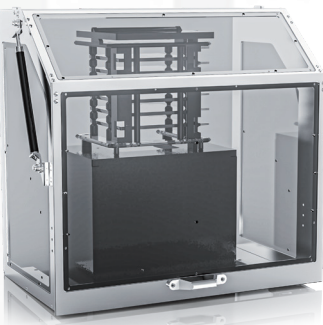
- Design: Dual-arm SCARA configuration for simultaneous or overlapping motions.
- Productivity: Reduces wafer-exchange time significantly by performing pick-and-place operations in parallel.
- Typical Use: High-throughput sorters, multi-station EFEMs, and applications demanding maximum throughput.

Mask Robot Product Introduction

Product Name	Mask Support Type Robot / Handler	Mask Single-Arm Grip Type Robot / Manipulator	Mask Dual-Arm Grip Type Robot / Manipulator
Product Image			
Project	Parameter Comparison		
Load	Mask Wafer/Square Glass	Mask Wafer/Square Glass	Mask Wafer/Square Glass
Gripper Type	Lifting Type	Sunken-style	Sunken-style
Reach	Arm: 376mm	Arm: 376mm	Arm: 376mm
Theta Rotation	340°	340°	340°
Lifting	Lifting: 300/400/500/600/700/800	Lifting: 240/300/400/500	Lifting: 240/300/400/500
Handling Speed	350mm/s	600mm/s	600mm/s
Arm Type	Single Arm	Single Arm	Dual Arms
Repeatability	Within ±0.1mm	Within ±0.1mm	Within ±0.1mm
Communication Protocol	HEX/ASCII	HEX/ASCII	HEX/ASCII
Communication Method	EtherNet/RS232	EtherNet/RS232	EtherNet/RS232
Cleanliness	Highest ISO Class 1	Highest ISO Class 1	Highest ISO Class 1
Power Supply	220V, 10A	220V, 10A	220V, 10A
Air Source Vacuum	-70Kpa~-90Kpa	-70Kpa~-90Kpa	-70Kpa~-90Kpa
Positive Pressure	0.1~0.5Mpa	0.1~0.5Mpa	0.1~0.5Mpa

OPEN CASSETTE/SHIPPING BOX/NIKON/CANON

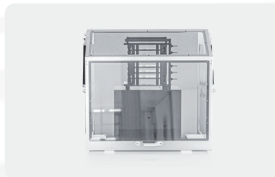
Open Cassette Product Introduction



Mask Cassette Unloading Module:
Mask Specification: 6 x 6 x 0.25 inches
Feeding Method: Manual
Each layer is equipped with a position detection sensor for the incoming masks and a pin sensor



Product View



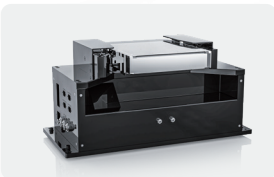
Mask Cassette



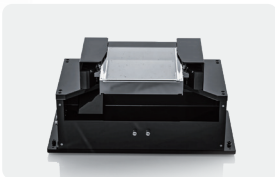
Nikon Product Introduction



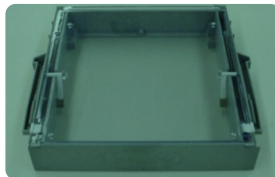
Nikon Unloading Module:
Feeding Method: Manual
Opens the box using grippers on both sides, equipped with a mask presence detection sensor



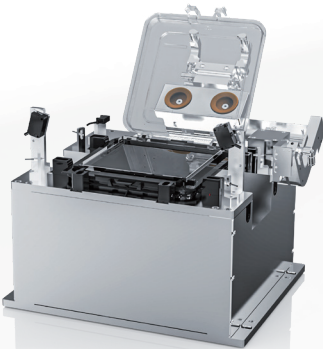
Product View



Nikon Box



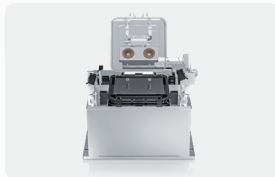
Shipping Box Product Introduction



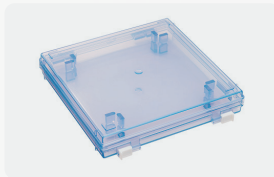
Shipping Box Unloading Module:
Mask Specification: 6 x 6 x 0.25 inches
Feeding Method: Manual
Equipped with feeding direction detection for shipping box, buckle opening mechanism, mask presence detection, and bump detection sensors. Utilizes a particle exhaust fan to ensure cleanliness of the internal microenvironment



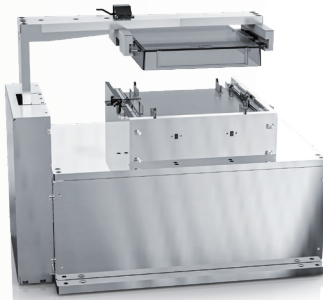
Product View



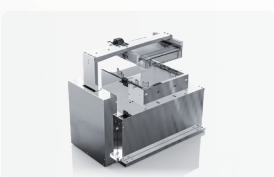
Shipping Box



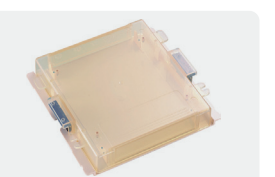
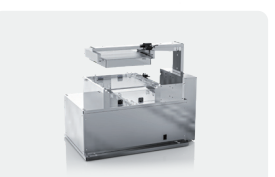
Canon Product Introduction



Canon Unboxing Module:
Feeding Method: Manual
Opens the box using grippers on both sides, equipped with a mask presence detection sensor



Product View

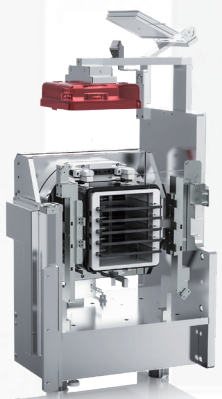


Canon Box



MASK FUNCTION MODULE

Blank Box Opener Module



The BBO module is a modular unit designed for integration into reticle EFEM or sorters, capable of achieving a cleanliness level of ISO Class 1.

- Supports multiple reticles/masks from hoyo, Shin-Etsu, and AGC
- Configures specifications for each carrier/pod type
- Lifts the transport pod lid / shipping container cover
- Tilts the lid to 90-degrees for robotic handling/access
- Rotates mask 0° or 180° to enable inverted transfer / reverse handling
- Box/Pod presence sensor
- Box/Pod orientation sensor
- Mask/Reticle tab sensor (or protrusion detection sensor)

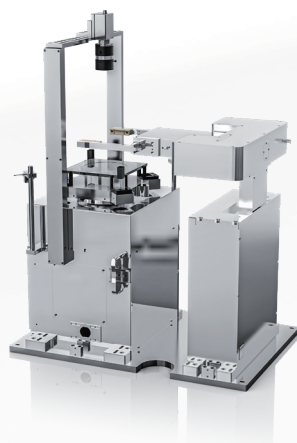


Product View



Blank Box

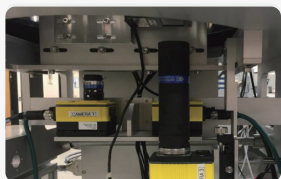
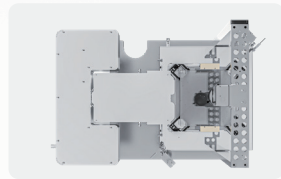
Turntable Module



The internal key structure and design of the turntable module are all independently developed patents of Fortrend. The module mainly includes: notch recognition, rotation, center alignment, reading of engravings (barcode), flipping function, and compatibility with mask and reticle incoming materials.

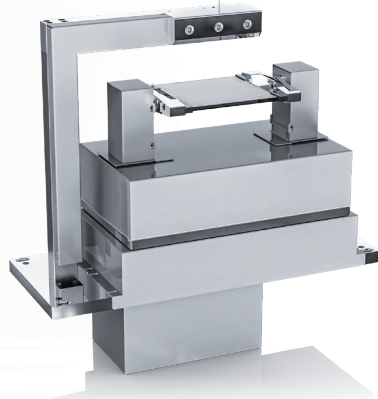


Product View

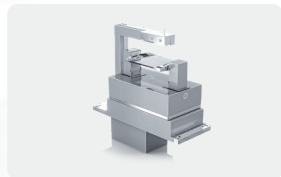


Turntable Module

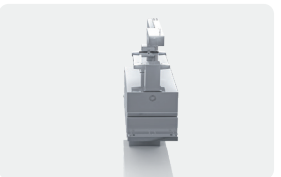
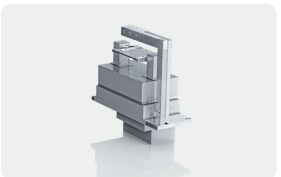
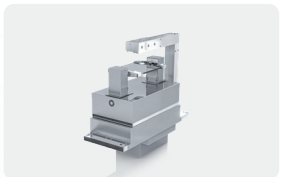
Manual Inspection Module



After the mask is transferred to the inspection device, a manual observation through the viewing window is conducted to check for any visible particles on the mask surface. The air knife module is then used to blow and clean the surface.



Product View



Buffer Module



The buffering workstation for incoming mask and reticle is equipped with presence detection sensors, with peek support pins in contact with the materials. Each layer is fitted with a dust extraction pipe to eliminate particles generated from contact.



Product View

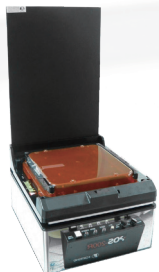


Product Introduction

POM 150 and POM 200 are desktop standalone photomask unboxing modules, respectively compatible with SEMI-Standard RSP 150 and RSP 200. Operators can unlock/close the cassette manually via a button and transfer the mask/reticle using a clamp.



POM 150R/150 RSP Opener



POM-200R Reticle Pod Opener

- Class 1 cleanroom cleanliness
- Supports 150mm SMIF interface cassettes compliant with SEMI standards
- All electrical systems designed for easy installation
- Substrate protrusion sensor protects the mask during operation
- Patent-Pending clamping sensor ensures optimal safety for operators and masks
- Multiple cassette presence sensor eliminates operational errors
- Anti-Static transparent panel

Dimensions	Width 340mm x Depth 470mm x Height 690mm
Working Height	690mm (including cassette housing)
Lifting Stroke	350mm
Load Capacity	5.4KG
Cassette Interface	SEMI E15-96
Lifting Accuracy	±0.1mm
Clamping Stop Device	Collision Bar Sensor
Pod Presence Sensor	2 sets
Mask/Cassette Protrusion Sensor	1 piece

Product Introduction

The PLS 200 is a tabletop standalone 200 mm SMIF pod opener. It opens the SMIF pod to allow the operator to remove the lid and access the cassette or wafers for manual loading or unloading. Ideal for use with tools within a SMIF fab that require cassettes to be loaded manually when the OEM tool cannot be automated with SMIF loadports.



- Ultra small footprint saves valuable
- Support SEMIE19.4 compliant
- FAB floor space
- 200mm wafer and reticle SMIF pods
- ISO Class 1 cleanliness
- Optional IR or RF ID read/write
- LED Statue Indicator

SMIF Pod	SEMI E19.4
Weight	6.5 Kg
Load Capacity	12 Kg
Size	340mm W x 430mm D x 119mm H
MTBF	50,000 Cycles
MTTR	Less than 1 hour
Power	100-240 VAC 1 amp Max 50/60 HZ
Communication	Serial
Options	SECS I/II
SMIF Pod ID	RFID
Options	IR (Smart Tag)- 8200 or 8400 series Hermos RFID ntellion Reader

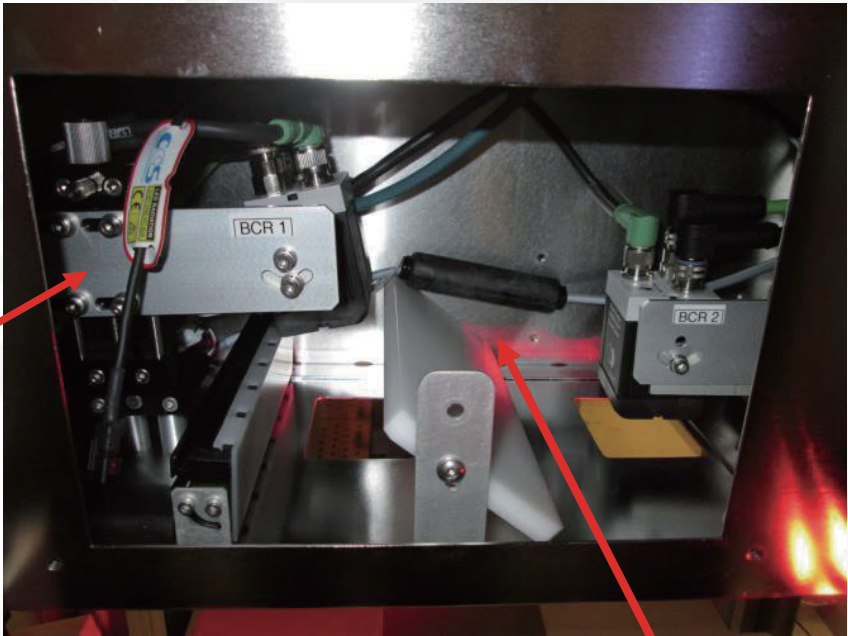
ID Reader Stations

Product Introduction

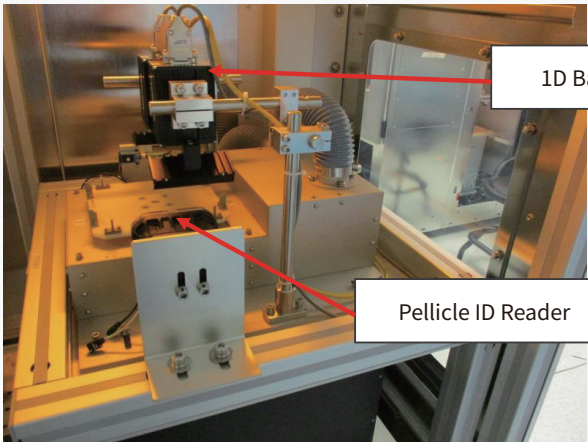
Fortrend ID readers are set up to identify the following types of Bar Code on Masks and Pellicles:

- 1D codes (Nikon, ASML, Canon)
- SEMI T11 Data Matrix
- SEMI T16 Data matrix on EUV Mask
- QR Codes
- OCR Codes
- Optional IR or RF ID read/write
- LED Statue Indicator

Bar code Reader #1-Read 1D and Date present on the mask present on the corner of mask



Bar Code Reader #2-Read 2D QR code



1D Bar Code Reader

Pellicle ID Reader