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FORTREND

SEMICONDUCTOR WAFER AUTOMATIC TRANSFER SYSTEM TOTAL SOLUTIDN

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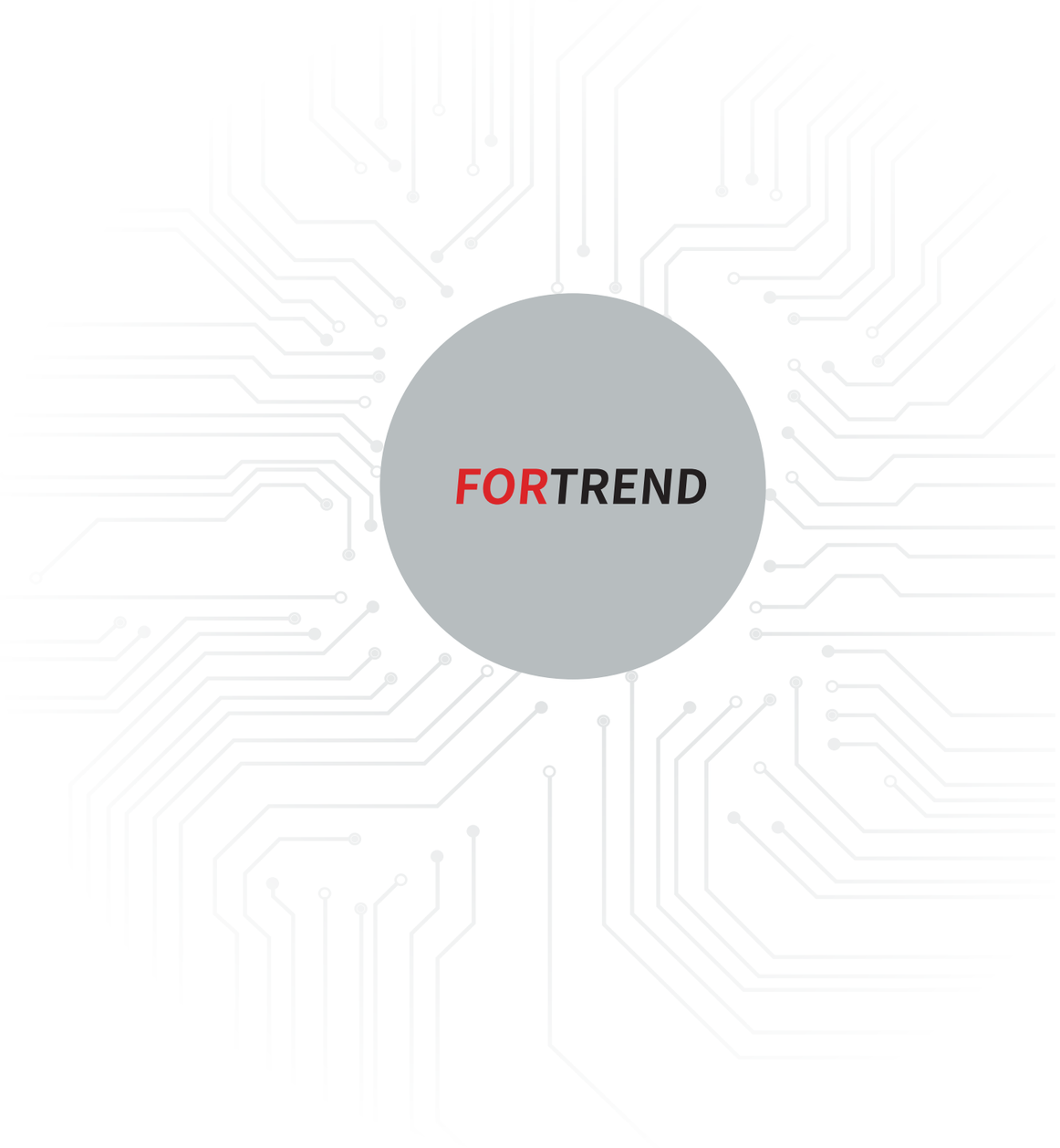
FORTREND

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ABOUT FORTREND

Founded in 1979 in Silicon Valley, USA, Fortrend has always been the top leader in batchwafer transfer technologies, Standard Mechanical Interface (SMIF) technologies, ultra-cleanautomation solutions, and wafer surface curing processes for the semiconductor and PV industries. Fortrend SMIF products have become the crucial automation connections between process equipment and the factory delivery system and between different processing equipment.

Fortrend's standard 200mm and 300mm front end automation modules are readily integrated into processing tools reliably and cost effectively. Fortrend's 3DIC thermal curing tools set the industrial standards for wafer surface curing processes. Fortrend offers not only standard automation and thermal curing modules, but also custom solutions allowing us to meet custom challenges and difficult configuration requirements quickly with a minimum of expenses. Contact Fortrend and experience our engineering excellence first hand.

45+ years experience

100+ patents worldwide

100+ researchers

100+ after-sales supporters

20000+ square meters factory space

1800+ equipment installed/year

Wuxi Fortrend Intelligent Technology Co.,Ltd
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FORTREND MILESTONE

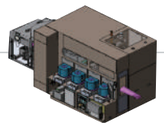
2023
Semiconductor vacuum transfer system

2021
WET WAFER TRANSFER & STORAGE SYSTEM

2018
P-Rack Stocker System

2019
Automatic Mobile Robot

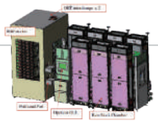
2017
H2O/O2 Environmental Controlled EFEM



2016
ISO-1 Reticle Load Ports

2011
IOS-1 Reticle SMIF

2006
0% Humidity Bareticle Storage Chamber



1996
200mm Wafer SMIF
200mm Robot

2002
Class-1 Reticle SMIF

1980
Vertical Wafer Transfer System

WAFER STANDARD MECHANICAL INTERFACE

Obtained Chinese patent in 2010

Long-term market validation

- Unique dust-free chamber, internal circulation can reach Class 1 level of cleanliness, prevent the lid opening process contamination of the wafer.
- The modular design, combined with a variety of custom options, can be adapted to different devices without frame modifications.
- Flexible PIO connection with self-developed software and macro instructions, more convenient operation, easy to use.
- AMHS communication mode is optional to meet diverse transfer needs.

Specification parameter

Models	PLUS500S / PLUS500R / PLUS500Sx / PLUS500Cx / PLUS500F / PLUS500Ux / PLUS500Sd
Applicable carrier types	200mm SMIF Pod (SEMI)
Carrier Load Height	900 mm (tailor to fit specific needs)
Cleanliness	Class 1 (ISO-Class 3)
Comm Mode	Parallel I/0 (SEMI E23-96) 8 in / outputs or EIA-RS232(SECS I/II)
Cycle Time	< 90 sec (with tilt and lateral movements)
Lot ID Reader	Smart tag / RFID tag

Axis - Gripper positioning accuracy	± 0.1 mm
Axis - Arm Elevator positioning accuracy	± 0.1 mm
Axis - Arm Extent positioning accuracy	± 0.1 mm
Axis - Tilt positioning accuracy	± 0.1 mm
Axis - Wrist positioning accuracy	± 0.1 mm
MTBF	> 2000 Hours
Up time	⩾ 99.5 %

WAFER SORTER

- Down-sizing design, reduce the floor space and ensure high internal cleanliness and high productivity,reduce cost and increase efficiency
- A variety of handling methods and LP combinations,a variety of custom options, can meet the needs of various working conditions.

Specification parameter

Rated voltage	Single Phase AC 220V 50/60 Hz
Rated power	3.52kW (Decide by config)
Body material	Painted SPCC (RAL 9003)
Comm interface	RJ45
Comm protocol	HSMS&SECS II
Software	Fortrend custom configuration software
Cleanliness	Class 1 (ISO-Class 3)
End-effector	Vacuum blade / edge grip / Bernoulli / custom
Load Port	2 ~ 4 Ports (optional compatible open cassette)
Applicable carrier types	cassette、SMIF Pod、FOUP/FOSB (SEMI)
Gas pressure supply	VAC : - 70 ~ - 90 kPa, >10LPM (Ø6 air tube) CDA : 0.4 ~ 0.6 MPa, >10LPM (Ø6 air tube)

Applicable wafer materials	Si、SiC etc. (Decide by config)
Applicable specif. types	Dia. 100 ~ 300 mm (4 inch ~ 12 inch)
Robot repeatability	± 0.1 mm
Aligner initial offset	Max 6 mm
Aligner centering	± 0.1 mm (Decide by config)
Aligner angular offse	± 0.1 ° (Decide by config)
Aligner notch finding time	< 5 sec / pcs
MTBR	< 2 Hours
MTBF	> 4000 Hours
MTBM	> 6 Months
Wafer breakage rate	< 1 Per 100,000 Wafer
Up time	⩾ 98 %

EFEM(EQUIPMENT FRONT END MODOLE)

- It can be connected to a variety of different types of process equipment, and can be customized for process requirements.
- A variety of handling methods and LP combinations,a variety of custom options,can meet the needs of various working conditions

Specification parameter

Rated voltage	Single Phase AC 220V 50/60 Hz
Rated power	3.52kW (Decide by config)
Body material	Painted SPCC (RAL 9003)
Comm interface	RJ45
Comm protocol	HSMS&SECS II
Software	Fortrend custom configuration software
Cleanliness	Class 1 (ISO-Class 3)
End-effector	Vacuum blade / edge grip / Bernoulli / custom
Load Port	2 ~ 4 Ports (optional compatible open cassette)
Applicable carrier types	cassette、SMIF Pod、FOUP/FOSB (SEMI)
Gas pressure supply	VAC : - 70 ~ - 90 kPa, >10LPM (Ø6 air tube) CDA : 0.4 ~ 0.6 MPa, >10LPM (Ø6 air tube)

Applicable wafer materials	Si、SiC etc. (Decide by config)
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Aligner angular offse	± 0.1 ° (Decide by config)
Aligner notch finding time	< 5 sec / pcs
MTBR	< 2 Hours
MTBF	> 4000 Hours
MTBM	> 6 Months
Wafer breakage rate	< 1 Per 100,000 Wafer
Up time	⩾ 98 %

WET WAFER TRANSFER&STORAGE SYSTEM

- The integration of EFEM and storage stations,combined with the control system developed by Fortrend, can solve the problems of wafer storage and throughput difficulties in complex processes such as Wet bench cleaner, furnace, and implanter.

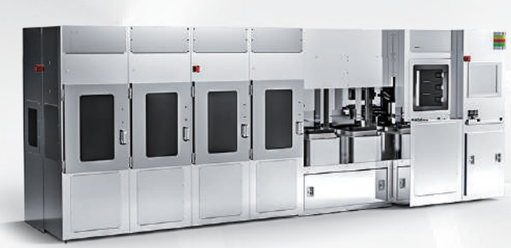
- Built-in multi-mapping function can detect stacked and inclined chips in multiple sections to eliminate the chip collision problem in wafer transfer.

Specification parameter

Equipment dimension	L 2600* W 2100* H 3080 mm
Equipment weight	4500kg (Decide by config)
Rated voltage	Single Phase AC 220V 50 Hz
Rated power	9.9KW
Body material	Painted SPCC (RAL 9003)
Comm interface	RJ 45
Comm protocol	HEX
Gas pressure supply	VAC： - 80 kPa , >10LPM(Ø8 air tube)　CDA： 0.5 ~ 0.7 MPa, >10LPM(Ø16 air tube)
Wafer contact material	PEEK / PTFE Different modoules have different contact materials

Applicable carrier types	300mm FOUP（SEMI）
Applicable wafer materials	Si
Applicable specif types	Dia. 300 mm / Thick. 775 μm ± 25 μm
MTTR	< 4H
MTBF	> 1500H
MTBI	> 6 Months
Wafer breakage rate	< 1 Per 100,000 Wafer
Up time	⩾ 98 %
Softwear	Fortrend Standard configuration software
Aligner notch finding time	Class 1 @ 0.1μm *Only the wafer transfer area shares the same cleanliness level as cleanroom grade within the Fab.

FULL AUTOMATIC RETICLE HANDLING SYSTEM



- Customized manipulators with mask end effectors for a variety of complex mask handling applications.
- A variety of shipping boxes (Hoya, ShinEtsu, Nikon, Cannno, etc.) and fully automatic robotic RSP pod are available.
- Selectable component selection and PDS subsystem.

Specification parameter

Material	Mask, Reticle, EUV
Carrier	RSP150, RSP200, Dual EUV Pod, Various Shipping Boxes
Read ID Position	Mask and Pellicle
Cleanness Level	Better than ISO Class1
3rd Party particle inspection Station	Measure particles ⩾1μm (PDS)

Optional Bright Light Inspection Station	0° to 360°turn flip and Bright Light Review
	N2 or XCDA Blow off Gun
	Mask 1D & 2D Bar Code Reader
	Pellicle ID Reader and Measurement Camera
	Mask Chamfer Identification
Mask Thickness Measurement	Repeatability ≦ 0.2μm (integrated with measurement module)

AUTOMATED STORAGE SYSTEM(STOCKER)

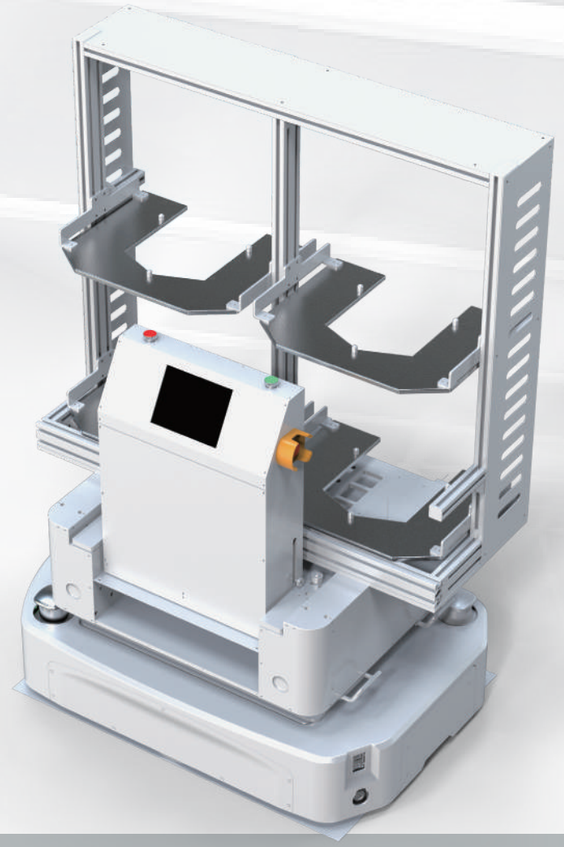
- Modular design, faster assembly and adjustment, and can be customized according to demand to meet the needs of various working conditions.
- Provides docking interfaces to the existing OHT and AGV in the Fab, complementing the existing AMHS system.
- It can be interconnected with the vehicle handling/portable shelf AGV launched together to quickly handle multiple wafer boxes for higher efficiency.

Specification parameter

Equipment dimension	L 5800* W 1600* H 4620 mm(Decide by config)
Applicable carrier types	SMIF Pod、Reticle Box、FOUP/FOSB
Load Port	2 Ports (Optional P-rack Port)
Carrier Load Height	900 ± 10 mm
Comm protocol	HSMS or SECS Ⅰ / SECS Ⅱ
Rated voltage	Single Phase AC 220V 50 Hz
Cleanliness	Class 100 (Optional FFU)
Quakeproof Level	0.3G (M-S >7.0)
Storage Capacity	146+6 carriers (Decide by config)

Max. carrier arm Load	20 kg
Single Continuous Pod In/Out	< 6 sec
Max. moving speed of the carrier arm	2m / s (non-line motion)
Max. rotating speed of carrier arm	90°/sec
Carrier arm repeat positioning accuracy	± 0.2mm
MTTR	< 4 Hours
MTBF	> 2000 Hours
MTBI	> 6 Months
Up time	⩾ 98 %

P-RACK AUTOMATED GUIDED VEHICLE



- SLAM laser navigation design and custom map navigation system, to achieve trackless free navigation, easy to cope with a variety of complex road conditions, more convenient, more flexible.

- The self-developed FTC and MCS dispatching and traffic control systems have better algorithms, which can quickly complete the AGV transportation planning of the whole plant.

Specification parameter

Equipment dimension	L 1000* W 700* H 1180 mm
Equipment weight	300 Kg (Decide by config)
Battery Type	Ternary lithium battery
Battery Capacity	48V, 52Ah
Battery runtime	> 8 h
Charging Time	0-80%, 2h；0-100%, 3h
Battery Life	Full discharge>500 times; Battery attenuation ratio of 85%, charging and discharging frequency>1500 times
Charging Mode	Manual/Automatic/Quick change
Single shipment	4 pcs (300mm FOUP) (Decide by config)
Applicable carrier types	SMIF Pod、Reticle Box、FOUP/FOSB

Control method	Computer wireless control & touch screen control
Navigation method	SLAM by laser navigation
Comm method	2.4G / 5G WIFI(AMR to AMR server) & HSMS / SECS II (AMR sever to MCS/MES)
Max. moveing speed	1m / s
Min. Miss Distance	2m
Min. Passage Width	1m
Positioning Accuracy	±10mm, ±1°
Up time	⩾ 98%
MTTR	< 4 Hours
MTBF	> 2000 Hours

FRONT LOAD AUTOMATED MOBILE ROBOT(AMR)

- SLAM laser navigation design and custom map navigation system, to achieve trackless free navigation, easy to cope with a variety of complex road conditions, more convenient, more flexible.
- The self-developed FTC and MCS dispatching and traffic control systems have better algorithms, which can quickly complete the AGV transportation planning of the whole plant.

Specification parameter

Equipment dimension	1050* W 700* H 1611 mm
Equipment weight	300 Kg (Decide by config)
Battery Type	Ternary lithium battery
Battery Capacity	48V，52Ah
Battery runtime	> 8 h
Charging Time	0-80%，2h；0-100%，3h
Battery Life	Full discharge>500 times; Battery attenuation ratio of 85%, charging and discharging frequency>1500 times
Charging Mode	Manual/Automatic/Quick change
Single shipment	2+1 pcs (300mm FOUP) (Decide by config)
Applicable carrier types	SMIF Pod、Reticle Box、FOUP/FOSB
Max. Payload	15kg

Drive Type	Dual wheel differential drive
Control method	Computer wireless control & touch screen control
Navigation method	SLAM by laser navigation
Comm method	2.4G / 5G WIFI(AMR to AMR server) & HSMS / SECS II (AMR sever to MCS/MES)
Max. moveing speed	1m / s
Min. Miss Distance	0.1 m
Min. Passage Width	0.9 m
Positioning Accuracy	±10mm，±1°
Up time	⩾ 98 %
MTTR	< 4 Hours
MTBF	> 2000 Hours

WAFER TRANSFER ROBOT

- Universal RS232 protocol interface, more convenient
- The design concept of SCARA arm adopts to a variety of wafer retention methods such as vacuum suction / edg gripper /non-con-tact bernoulli.
- A variety of end-effector specifications and customizable linear modules to meet a variety of working conditions.
- With Smart Move function, it can achieve the shortest distance and the best movement trajectory.

Specification parameter

Equipment dimension	L 340* W 340* H 931.2 mm (Decide by config)
Control box size	L 421.5* W 263.5* H 261.5 mm (Without handle)
Device weight	45 ~ 60Kg (Decide by config)
Rated voltage	Single phase AC 220 V
Rated power	1.1 kW
Body material	Aluminum
End effectors(EEF) Specif	Ceramics / Aluminum / CFRP
Arm qty	Single Arm / Double Arm
Single shipment	VAC - 70 ~ - 90 kPa / CDA 0. 1~ 0.3 MPa
Wafer holding Method	VaCUUM/ eDGE-GRIPPER / bERNOULLI / CLAMP TYPE FORK
Cleanliness	MaxClass 1 @0.1μm

Axis-Zmax speed:	500 mm/S
Axis-Theta max speed	340°/s
Axis-R1& R2 max speed	750 mm/s (non-line motion)
Axis -θ Repeatable positioning accuracy	±0.05°
Repeatable positioningaccuracy	±0.1mm
Axis-Theta max Range of motion	340°
R1&R2 Max stretch	520~685.5mm(200mmWafer)/600~729.4mm(300 mm Wafer)
Axis-Z max Range of motion	Single Axis-Z:300/400/450/500mm Dual Axis-Z:600 mm
Single shipment	2+1 piece (300mm Foup) (Decide by config)
Applicable carrier types	SMIF Pod、Reticle Box、FOUP/FOSB
Arm load	3kg

300MM LOAD PORT

- Standard Load Port Universal device, fully compliant with SEMI standards, with high versatility, high compatibility.
- Built-in original Mapping system, can be stacked, inclined chip detection, eliminate the chip collision problem in integrated wafer transfer, and can load 200/300 wafers.
- A variety of customized components can be selected to flexibly respond to different working conditions.

Specification parameter

Equipment dimension	L 586* W 472* H 1349 mm
Equipment weight	66 ± 0.5kg (Decide by config)
Rated voltage	DC 24 V
Rated power	120 W
Body material	Aluminum、Painted SPCC (RAL9003)
Applicable carrier types	200/300 mm FOUP (SEMI)
Acoustic Noise	≦ 60 dB
Comm interface	Serial RS-232C, Parallel I/O
Comm protocol	HEX

Cleanliness	Class 1 @ 0.1μm
Carrier Load Height	900mm ±10mm
Gas pressure supply	VAC : - 80 kPa (Ø6 air tube)
	CDA : 0.5 ~ 0.6 MPa(Ø6 air tube)
	N2(Matching) : 0.1 ~ 0.2 MPa(Ø8 air tube)
Matching options	N2 purge function (MFC control)
	AMHS system communication port
	200mm cassette adaptor
	Mechanical control / Electrical control Info Pad

200MM LOAD PORT

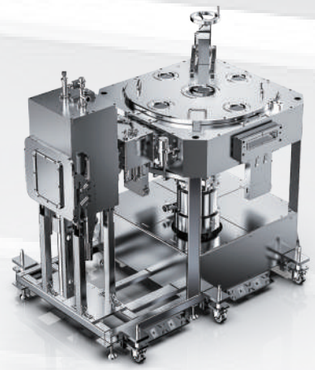
- Standard Load Port Universal device, fully compliant with SEMI standards, with high versatility, high compatibility.
- Built-in original Mapping system, can be stacked, inclined chip detection, eliminate the chip collision problem in integrated wafer transfer, and can load 120/200 wafers.
- A variety of customized components can be selected to flexibly respond to different working conditions, such as whether is connectecl with OHT.

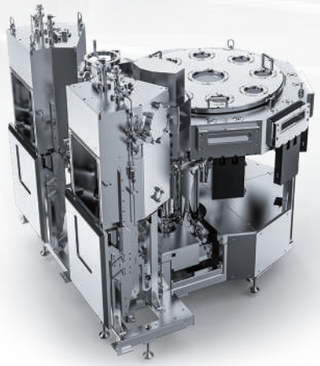
Specification parameter

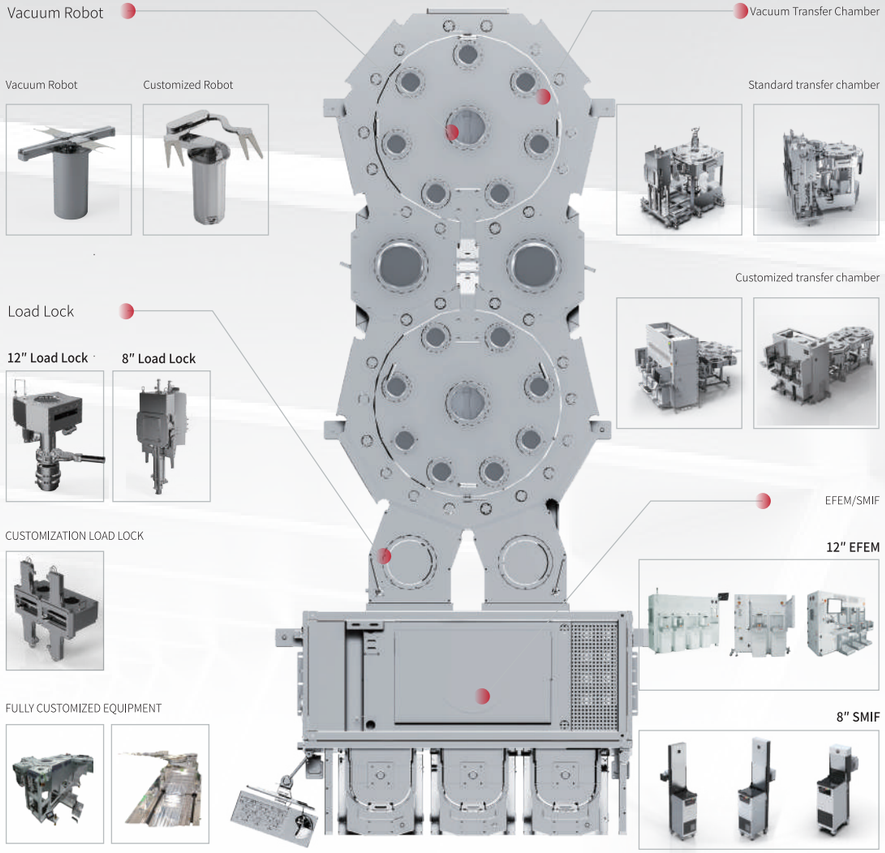
Equipment dimension	L 421mm* W 364mm* H815 mm
Equipment weight	40kg (Decide by config)
Rated voltage	DC 24 V
Rated voltage	60 W
Body material	Aluminum、Stainless steel（SUS 304）T
Applicable carrier types	150/ 200mm POD(SEMI)
Acoustic Noise	≦ 60 dB
Comm interface	Serial EIA-RS232C,Paralle I/O
Comm protocol	HEX、SECS

Cleanliness	Class 1 @ 0.1μm
Wafer box interface	SEMI E19.4
Load loop	VAC： - 80 kPa (Ø6 air tube)
Removal loop	CDA： 0.5 ~ 0.6 MPa(Ø6 air tube)
Matching options	150/200mm Open box to detect sensor configuration
	E84 Electric control module selection
	Communication protocol module selection HEX/SECS
	ID read/write device with RFID module or IR Link

SEMICONDUCTOR VACUUM TRANSFER SYSTEM







Independent research, development and production of core hardware and software.

The core components of the vacuum transfer system are independently designed and developed by Fortrend, and assembled and produced at its own production base, achieving better delivery times and performance.

Deeply rooted in the semiconductor field for many years, adaptable to most semiconductor front-end process equipment.

Fortrend has been deeply involved in the semiconductor transfer field for over forty years, with equipment adapted to most semiconductor front-end processes. All production equipment complies with SEMI standards and adapts to the process requirements of various semiconductor/microelectronic material processing equipment, such as wafers/masks.

Providing standardized modules and customized solutions to meet different requirements.

Fortrend vacuum transfer systems can provide standard solutions for process equipment integration and can also be customized according to customer requirements. Both software and hardware have mature solutions to choose from, meeting the needs of different process equipment and actual operating conditions.

Customized solutions

- EFEM / SMIF can be optionally equipped at the equipment front end, with EFEM offering standard and custom types.
- Load Lock can be chosen with different structures and transfer methods.
- Customized transfer chambers can be made according to actual process chamber requirements.
- Vacuum mechanical arms can be selected with different models and end effectors according to actual operating conditions.
- Transfer chambers & Load Lock can include optional built-in directional / cooling / pre-heating modules.
- Optional features include AWC functionality, Buffer functionality, wafer storage modules.