YASKAWA TOTAL SOLUTION FOR SEMICONDUCTOR EQUIPMENT

Best Solution for Your System

Advanced Technology
High Reliability
Originality
Our Innovative Technology offers the best solution for all the requirements of a semiconductor equipment.

In the world of semiconductor manufacturing where micronization and high integration are crucial, manufacturers are looking for:

• Factory layout and design for 300-mm wafer manufacturing
• Small-lot production of multiple types of highly integrated chips and reduced lead time
• High productivity in safe operations

To meet the requirements of each of our customers, we at Yaskawa have developed some innovative technologies. Our leading-edge technologies and our highly reliable and unique products offer the best solutions for the requirements of your semiconductor equipment.

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**Small Footprint**

To minimize the footprint of semiconductor equipment

1. **Compact system with less wiring**
   - Compact transfer devices
     - Compact prealigner
     - Compact controller
       (Features: Multi-axis driver : Controller with built-in driver)
   2. **Less wiring with networked devices**
     - SEMI-compliant host network (SECSI/II) (Ethernet-based network)
     - Synchronous and high-speed MECHATROLINK network
   3. **Compact enclosure**
     - Small, space-saving footprint for EFEM (EFEM: Equipment Front End Module)

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**Quick Installation and Safe Operation**

To minimize process yield by installing a system in a short time and assuring safe operation

1. **Automatic teaching**
   - Automatic teaching function makes troublesome teaching operations easy, even in the confined space of the EFEM

2. **Easy replacement of component parts**
   - Standardized and modularized units

3. **High reliability proven in endurance tests**
   - High reliability proven in real-world applications

4. **Safe sequence to stop a manipulator during a power failure**
   - Easy and fast restoration
   - Damage prevention and detection for wafers and machine

5. **Global service network**
   - Consultants for spare parts with our qualified service staff working in cooperation with the customer
To speed up the wafer transfer and processing to meet the needs for the production of multiple types in small lots.

**High-speed transfers**

1. High-speed processing technology
   - High-speed operation processing based on the latest technology for processor applications
2. High-speed transmissions
   - Reduced transmission time by macro motion commands
3. High-speed transfer drive technology
   - High-speed motion by linear motor drive
   - Optimum design based on mechanical analysis of simulations and the actual machine

To meet the needs for micronization by making the semiconductor equipment applicable for a higher cleanliness class without increasing the costs.

**High Class of Cleanliness**

1. Components adapted for super-clean environment
   - Robot
   - Prealigner
   - Load port
2. Airflow control technology of EFEM
   - Chemical filter with high filtering capacity
   - Air down flow technique to minimize particles around wafer

To reduce the maintenance costs for the semiconductor equipment using advanced-technology.

**Less Maintenance**

1. Buffering of operation results and status
   - To be used as the information to optimize the system operation for each recipe and operation rate
   - To be used as the information to decide the intervals between maintenance

To develop the semiconductor equipment for product that complies to global standards.

**Adaptation to Global Standards**

1. Conformity of Yaskawa’s products with main global standards
   - Conforms with SEMI (Semiconductor Industries) standards
   - Adapted to global standards such as UL (in the U.S.A) and CE Marking (in Europe)
In everything from components to systems, rely on our experience and ability for first-rate performance and quality.

With our entire line-up of components together with our motion control technology and application know-how, we offer a wide range of solutions for semiconductor equipment to fit your specific requirements.
Semiconductor Equipment
Transfer Systems for Cleaning or CMP

Cleaning Equipment
- Waterproof or Chemical-proof Robot
- Servomotor
- Load Port
- Clean Robot
- Prealigner
- Hollow-shaft Motor

Semiconductor Equipment
- Host Computer for Production Control
  - HSMS/SECS-II (Ethernet)
- Device Controller
- Front End Module
- Field Networks
- Robot Controller
- Load Port
- FFU
- Waterproof or Chemical-proof Robot
- Hollow-shaft Motor
- Servomotor

Clean environments
Solution

Proposal 1

High Level of Reliability and Cleanliness
- Load port for super-clean use
- FFU with filtration* for chemical contaminants
- Optimal airflow control

Improved throughput
- High-speed manipulator with traverse axis driven by linear motor
- High-speed wafer mapping
- Throughput prediction
- Vibration check for arms

Efficient Wiring and Piping
- Direct Servomotor with Hollow Shaft

Components for Special Environments
- Waterproof or Chemical-proof Robot

Space-saving and Less Wiring
- Compact prealigner
- Compact controller (Volume reduced 50% as compared with previous products)
- High-speed communications networks

Quick Installation
- Automatic teaching and fast restoration

* Chemical vapor filtration (CVF) to absorb airborne molecular contaminants (AMC) less than 1 ppb

Computer assisted 3-D Simulation
The 3-D simulation of a detailed system design including all components and the controller helps to construct the perfect system for your needs.

- Airflow analysis
- Interference check
- Vibration analysis
- Throughput estimation
**Semiconductor Equipment**

**CVD System**
- Vacuum Robot
- Load Port
- Clean Robot
- Prealigner
- Vacuum Hoist Unit
- Servomotor

**Ion Implanter**
- Load Port
- Clean Robot
- Prealigner
- Vacuum Robot
- Vacuum Linear Motor
- Vacuum Actuator
- Servomotor

**Components for Vacuum Environments**
- Aluminum chamber
- Vacuum robot (Thermal analysis for arms)
- Vacuum hoist, vacuum prealigner
- Vacuum linear

**Load port for super-clean use**
- FFU with filtration* for chemical contaminants
- Optimal airflow control

**Improved throughput**
- High-speed manipulator with traverse axis driven by linear motor
- High-speed wafer mapping
- Throughput prediction
- Vibration check for arms

**Efficient Wiring and Piping**
- Vacuum, direct servomotor (High speed/ Low speed/ Large capacity)

**Space-saving and Less Wiring**
- Compact prealigner
- Compact controller (Volume reduced 50% as compared with previous products)
- High-speed communications networks

**Quick Installation**
- Automatic teaching and fast restoration

**Computer assisted 3-D Simulation**

The 3-D simulation of a detailed system design including all components and the controller helps to construct the perfect system for your needs.
Wafer Handling Devices
Transfer Systems for Sorting

Sorting System

- Host Computer for Production Control
  - HSMS/SECS-II (Ethernet) / GEM

Operation Panel

Device Controller

Field Networks

- Operation Panel
- Device Controller
- Robot Controller
- Prealigner
- Clean Robot
- Load Port
- FFU
- OCR Reader
- T7 Reader
- Amplifier

Easy Operation

- GUI screen and touch panel

Improved Optical Character Recognition (OCR)

- Special OCR (supports OCR/T7)

High Level of Reliability and Cleanliness

- Load port for super-clean use
- FFU with filtration* for chemical contaminants
- Optimal airflow control

Space-saving and Less Wiring

- Compact prealigner
- Compact controller (Volume reduced 50% as compared with previous products)
- High-speed communications networks

High-accuracy sorting at high speeds

- High-speed manipulator with traverse axis driven by linear motor
- High-speed prealigner
- Throughput prediction

Various Handling Methods for Wafers

- Wafer transfers in the FOUP and between the FOUPs
- Automatic handling between a FOUP and FOSB
- Error log function

*: Chemical vapor filtration (CVF) to absorb airborne molecular contaminants (AMC) less than 1 ppb
Laser Marking Equipment

- Laser Unit
- FFU
- Clean Robot
- Load Port
- FOUP

Easy Operation
- GUI screen and touch panel

High Accuracy and High Quality
- Green laser

High Level of Reliability and Cleanliness
- Load port for super-clean use
- FFU with filtration* for chemical contaminants
- Optimal airflow control

Improved throughput
- High-performance manipulator at high speeds
- High-speed prealigner
- Two load ports

Space-saving and Less Wiring
- Compact prealigner
- Compact controller (Volume reduced 50% as compared with previous products)
- High-speed communications networks

*: Chemical vapor filtration (CVF) to absorb airborne molecular contaminants (AMC) less than 1 ppb
Global Field Network
Applications for CMP Systems or Spin Coaters

CMP Systems (CMP : Chemical Mechanical Polishing)
• A system for polishing the uneven portion on a wafer’s surface.

System Features
1 Flexible
   • Applicable for PLCs of various companies and commercial DeviceNet.
2 Improved table performance
   • with direct-drive motor
   • Low fluctuation when rotating
   • Simplified table mechanism
   • Reduction of noise
3 Variety of Recipes
   • Settings for rotating speed, acceleration, and deceleration

Spin Coaters
• A system for coating the surface of a wafer with photoresist.

System Features
1 Multi-axis system with simple wiring
   • Improved use of space with the multi-axis distributed system
2 Flexible
   • Applicable for PLCs of various companies and commercial DeviceNet.
3 Simplified mechanical design
   • Wafer-transfer system simplified with linear drive
   • Air-piping system simplified with direct-drive motor

*1: Registered trademark of ODVA (Open DeviceNet Vendor Association).
*2: Registered trademark of MEI (Motion Engineering Inc.).
*3: Registered trademark of Xerox Corporation.
### Die bonders

- Equipment for attaching the chip to a lead frame.

**System Features**

1. Multi-axis system with simple wiring
   - Improved use of space with the multi-axis distributed system (Total wiring length: 50m max.)
2. Synchronous motion for 9-axis operation for 1ms of control cycle and for 16-axis operation for 2ms (With MP2100).
   - High-speed response when acceleration, deceleration, or gain is changed.
3. High tact with high-performance $\Sigma$-$\nu$ servo drive (Less deviation and damping control).
4. High maintenance system
   - Easy servo adjustments with SigmaWin+, the engineering tool for PCs
   - Servo adjustments without changing the connection because of connection to network.
   - One controller manages all servo states.

### Flip Chip Bonders

- Equipment for attaching the chip to a substrate.

**System Features**

1. Multi-axis system with simple wiring
   - Improved use of space with the multi-axis distributed system (Total wiring length: 50m max.)
2. Synchronous motion for 9-axis operation for 1ms of control cycle and for 16-axis operation for 2ms (With MP2100).
3. High tact with high-performance $\Sigma$-$\nu$ servo drive.
4. High maintenance system
   - Easy servo adjustments with SigmaWin+, the engineering tool for PCs
   - Servo adjustments without changing the connection because of connection to network.
   - One controller manages all servo states.
Clean-room use | SEMISTAR-M Series | For 200-mm or 300-mm Bridge Tools

Clean Robots for Smooth Transfers and High Reliability

Yaskawa’s uniquely designed robot enables high accuracy and smooth wafer transfers at high speeds.

Dual-arm Clean Robot enables high throughput and selection of arm function.

A rotary axis for an end effector operates without a traverse axis, contributing to a two-FOUP system and a parallel process system.

With a rotary axis for two end effectors, a single arm can be used for a two-FOUP system to improve wafer-handling efficiency.

Manipulator’s Basic Specifications

<table>
<thead>
<tr>
<th>Name</th>
<th>SEMISTAR-M101 (Single-arm Clean Robot)</th>
<th>SEMISTAR-M201 (Dual-arm Clean Robot)</th>
<th>SEMISTAR-M112 (Single-arm Clean Robot with Rotary Axis)</th>
<th>SEMISTAR-M122 (Single-arm Clean Robot with Rotary Axis for Two End Effectors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>XU-RC350S-C03</td>
<td>XU-RC350D-C03</td>
<td>XU-RC400M-C03</td>
<td>XU-RC400M-D03</td>
</tr>
<tr>
<td>Water Size</td>
<td>200 mm/300 mm</td>
<td>200 mm/300 mm</td>
<td>200 mm/300 mm</td>
<td>200 mm/300 mm</td>
</tr>
<tr>
<td>End Effector</td>
<td>Vacuum/Edge-gripping</td>
<td>Vacuum/Edge-gripping</td>
<td>Vacuum/Edge-gripping</td>
<td>Vacuum/Edge-gripping</td>
</tr>
<tr>
<td>Controlled Axes</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Arm Type</td>
<td>Single arm</td>
<td>Dual arm</td>
<td>Single arm</td>
<td>Single arm</td>
</tr>
<tr>
<td>Extension (R-axis)</td>
<td>650</td>
<td>647</td>
<td>737</td>
<td>737</td>
</tr>
<tr>
<td>Rotation (R-axis)</td>
<td>360</td>
<td>360</td>
<td>332</td>
<td>332</td>
</tr>
<tr>
<td>Up/Down (Z-axis)</td>
<td>380</td>
<td>380</td>
<td>355</td>
<td>355</td>
</tr>
<tr>
<td>Minimum Diameter of Rotation*2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Length of End Effector*3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-axis</td>
<td>295</td>
<td>295</td>
<td>295</td>
<td>295</td>
</tr>
<tr>
<td>B-axis</td>
<td>330</td>
<td>330</td>
<td>257</td>
<td>257</td>
</tr>
<tr>
<td>Z-axis</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Linear Motion with Offset*3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-axis</td>
<td>mm</td>
<td>0.1 (P-P)</td>
<td>0.1 (P-P)</td>
<td>0.1 (P-P)</td>
</tr>
<tr>
<td>B-axis</td>
<td>mm</td>
<td>0.1 (P-P)</td>
<td>0.1 (P-P)</td>
<td>0.1 (P-P)</td>
</tr>
<tr>
<td>Z-axis</td>
<td>mm</td>
<td>0.1 (P-P)</td>
<td>0.1 (P-P)</td>
<td>0.1 (P-P)</td>
</tr>
<tr>
<td>Clean Class*4</td>
<td>ISO class 1</td>
<td>ISO class 1</td>
<td>ISO class 1</td>
<td>ISO class 1</td>
</tr>
<tr>
<td>Payload</td>
<td>kg</td>
<td>0.5</td>
<td>0.5/arm</td>
<td>0.5</td>
</tr>
<tr>
<td>Approx. Mass</td>
<td>kg</td>
<td>37</td>
<td>45</td>
<td>55</td>
</tr>
</tbody>
</table>

*1: Distance from the center of rotation to the center of the wafer.
*2: Distance from the end effector’s point of attachment to the center of the wafer.
*3: ISO class 2 with an edge-gripping end effector.

Contact the Semiconductor Robotics Division, Yaskawa Electric Corporation for details of products on this page.
Traverse Axis for High-speed Transfers with AC Linear Motor

**Features**

An AC linear motor drives the traverse axis for high-speed transfers with minimal particles, vibration, and noise.

**Basic Specifications**

<table>
<thead>
<tr>
<th>Name</th>
<th>TL1010 (For 3 FOUPs)</th>
<th>TL1515 (For 4 FOUPs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>XU-ACT101L-C10</td>
<td>XU-ACT152L-C10</td>
</tr>
<tr>
<td>Range of Motion</td>
<td>1010 mm</td>
<td>1515 mm</td>
</tr>
<tr>
<td>Maximum Speed</td>
<td>850 mm/s</td>
<td>1500 mm/s</td>
</tr>
<tr>
<td>Positioning Control Accuracy</td>
<td>0.1 (P-P)</td>
<td>0.1 (P-P)</td>
</tr>
<tr>
<td>Load</td>
<td>45 kg</td>
<td>65 kg</td>
</tr>
<tr>
<td>Approx. Mass</td>
<td>14 kg</td>
<td>141 kg</td>
</tr>
</tbody>
</table>

* : When a driver box for an external axis is used.

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**NXC100 Controller**

**Features**

1. Compact and can be vertically or horizontally installed.
2. Nine-axis model is available as well as a standard six-axis model.
3. Conforms to SEMI standards such as SEMI S2, S8, and F47.
4. Compact teaching pendant with great operability.

**NXC100 Specifications**

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>ERCR-NS01-B004</td>
</tr>
<tr>
<td>Configuration</td>
<td>Free standing (Vertical or horizontal)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>425(W) × 133(H) × 385(D) mm</td>
</tr>
<tr>
<td>Approx. Mass</td>
<td>14 kg</td>
</tr>
<tr>
<td>Cooling System</td>
<td>Forced air-cooling (Front air inlet and rear air outlet)</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>During operation: 0°C to +40°C, During storage: -10°C to +60°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>90% max. (non-condensing)</td>
</tr>
<tr>
<td>Power Supply</td>
<td>Single-phase 100/110 VAC (±10%) at 50/60Hz, Rated current: 2 A Single-phase 200/220 VAC (±10%) at 50/60Hz, Rated current: 1 A Specify the input power voltage when ordering.</td>
</tr>
<tr>
<td>Grounding</td>
<td>Grounding resistance: 100 Q or less</td>
</tr>
<tr>
<td>Digital I/Os</td>
<td>For host controller: 12 input signals and 14 output signals For manipulator: 8 input signals and 6 output signals</td>
</tr>
<tr>
<td>Positioning System</td>
<td>By serial encoder</td>
</tr>
<tr>
<td>LAN (Connection to Host)</td>
<td>1 (10Base-T/100Base-TX) (Option)</td>
</tr>
<tr>
<td>Interface</td>
<td>RS-232C : 1ch</td>
</tr>
<tr>
<td>Control Method</td>
<td>Software servo control</td>
</tr>
</tbody>
</table>
Clean-room use  Prealigner  |  For 300-mm Wafers

Compact Prealigner for High Speeds and High Accuracy

1-axis Prealigner  

3-axis Prealigner  

Edge-grip Prealigner

Features
- Small footprint and thin
- High speed and high accuracy
- Applicable for glass wafers

Features
- For wafer notch alignment and centering
- High speed and high accuracy
- Applicable for glass wafers

Features
- Edge gripper to prevent particles from attaching to the reverse of the wafers
- Compact and light-weight
- Sensor for determining wafer alignment provided, and grippers are easy to change

Basic Specifications

Model  XU-ACP130-A13  
Wafer Size  300 mm
Range of Motion  θ-axis  Endless
Notch Alignment Accuracy  ± 0.1 deg
Alignment Time  Less than 3.5 s
Sensor  CCD
Light  LED
Chuck Method kg  Vacuum
Approx. Mass mm  3.9
Dimensions  115(W)×171(H)×328(D)

Basic Specifications

Model  XU-ACP330-A22  
Wafer Size  200 mm/300 mm
Range of Motion  θ-axis  Endless
Notch Alignment Accuracy  ± 0.1 deg
Alignment Time  Less than 5 s
Sensor  CCD
Light  LED
Chuck Method kg  Vacuum
Approx. Mass mm  4.9
Dimensions  235(W)×289(H)×320(D)

Basic Specifications

Model  XU-ACP330-C10  
Wafer Size  300 mm
Range of Motion  θ-axis  Endless
Notch Alignment Accuracy  ± 0.1 deg
Alignment Time  Less than 5.5 s
Sensor  LED
Light  Edge-gripping
Chuck Method kg  Edge-gripping
Approx. Mass mm  9
Dimensions  301(W)×232(H)×410(D)

Clean-room use  Clean Hollow-shaft Motor for Spin Control

Features
- Sharp acceleration/deceleration curves and high accuracy required for spin control
- Hollow shaft for reduced size and greater efficiency of equipment
- AC servomotor enables quick, exact alignment for orientation flats and notches

Applications
- Cleaning equipment and Coater

Motor Specifications

Model  XU-MSS0200  XU-MSS05000
Motor Type  AC servomotor
Rated Power W  200  500
Rated Torque N·m  1.19  2.17
Rated Speed min⁻¹  1600  2200
Maximum Speed min⁻¹  3000
Positioning Control Accuracy °  ±0.1
Encoder Resolution P/R  4736
Maximum Wafer Size mm  300 mm
Diameter of Hollow Shaft mm  51
Approx. Mass kg  12.4  17.0
Dimensions mm  206 dia.×153(H)  206 dia.×180(H)

Driver Specifications

Model  XU-DS0700  XU-DS1300
Main Power Supply  Three phase, 200 VAC
Control Power Supply  Single phase, 200 VAC
Command Interface  Analog voltage: Pulse train
Approx. Mass kg  4.0  5.0
Dimensions mm  110(W)×250(H)×225(D)  135(W)×250(H)×225(D)

Encoder Signal Process Unit Specifications

Model  XU-ED0100T
Input Power Supply  24 VDC
Approx. Mass kg  0.85
Dimensions mm  250(W)×30(H)×160(D)

*  Necessary for connecting a magnetic encoder to a driver

For 300-mm Wafers

Contact the Semiconductor Robotics Division, Yaskawa Electric Corporation for details of products on this page.
### MOTOMAN-CR3X

#### Features
Nine cables run through the arm to the wrist and three air systems (two inlets and one outlet) and two solenoid valves for driving the robot's hand are built-in to prevent the accumulation of dust.

#### Applications
Wafer handling

### MOTOMAN-CR20

#### Features
With its compact, lightweight body and a small interference area, the MOTOMAN-CR20 can be combined with manufacturing devices to save space.

#### Applications
FOUP handling, Large LCD handling, Wafer cassette handling

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### Manipulator's Basic Specifications: CR Series

<table>
<thead>
<tr>
<th>Model</th>
<th>MOTOMAN-CR3X</th>
<th>MOTOMAN-CR20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>YR-CR3-J00</td>
<td>YR-CR20-A00</td>
</tr>
<tr>
<td>Structure</td>
<td>(Vertically articulated)</td>
<td>(Vertically articulated)</td>
</tr>
<tr>
<td>Range of Motion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-axis (turning)</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>L-axis (lower arm)</td>
<td>±150, -45</td>
<td>±120, -90</td>
</tr>
<tr>
<td>U-axis (upper arm)</td>
<td>+190, -70</td>
<td>+90, -80</td>
</tr>
<tr>
<td>S-axis (wrist pitch/yaw)</td>
<td>±165</td>
<td>±165</td>
</tr>
<tr>
<td>T-axis (turning)</td>
<td>±135</td>
<td>±230, -50</td>
</tr>
<tr>
<td>Maximum Speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-axis (rad/s)</td>
<td>3.66 (210)</td>
<td>2.88 (165)</td>
</tr>
<tr>
<td>L-axis (rad/s)</td>
<td>2.97 (170)</td>
<td>2.88 (165)</td>
</tr>
<tr>
<td>U-axis (rad/s)</td>
<td>3.93 (225)</td>
<td>2.88 (165)</td>
</tr>
<tr>
<td>R-axis (rad/s)</td>
<td>5.23 (300)</td>
<td>3.49 (200)</td>
</tr>
<tr>
<td>B-axis (rad/s)</td>
<td>5.23 (300)</td>
<td>3.49 (200)</td>
</tr>
<tr>
<td>T-axis (rad/s)</td>
<td>7.33 (420)</td>
<td>3.49 (200)</td>
</tr>
</tbody>
</table>

### YASANAC XRC Specifications

- **Configuration**: Free-standing (Vertical or horizontal)
- **Dimensions**: 470(W) x 760(H) x 320(D) mm
- **Approx. Mass**: 70 kg
- **Cooling System**: Indirect cooling
- **Ambient Temperature**: During operation: 0°C to +40°C
- **Ambient Relative Humidity**: 90% max. (non-condensing)
- **Power Supply**: Single-phase, 200/220 VAC (±10% to ±15%) at 50/60Hz
- **Grounding**: Grounding resistance: 100Ω or less exclusive grounding

### Programming Pendant Specifications

- **Material**: Reinforced plastics (with strap)
- **Dimensions**: 200(W) x 325(H) x 77(D) mm
- **Operation Device**: Teach lock key, top menu, select, axes keys, numerical/application keys, emergency stop, deadman switch (option)
- **Display**: LCD (with backlight), 40 columns x 12 lines, Alphabet, Chinese characters, Japanese letters, Hankul alphabets

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*1: Option includes standard signals.
*2: DeviceNet is a registered trademark of Open DeviceNet Vendors Association.
*3: Separated type is also available.

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Contact your Yaskawa representative for details of products on this page.
## Front End Module | For 300-mm Wafers

### EFEM with Small Footprint and High Throughput

YASKAWA's integrated technology that is used in our core products such as clean robots or servo drivers, our control systems and other products offer the best Equipment Front End Module (EFEM) solutions.

### Features

1. **Small footprint**
   Integrating a prealigner with a clean robot results in a small footprint, which allows the available space to be used with great efficiency.

2. **High throughput**
   The clean robot with an end effector on a rotary axis operates without a traverse axis, contributing to a high throughput.

### EFEM Specifications (Standard model)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>mm</td>
</tr>
<tr>
<td>Number of FOUPs</td>
<td>2</td>
</tr>
<tr>
<td>Clean Class</td>
<td>ISO level 1</td>
</tr>
<tr>
<td>Transfer Level</td>
<td>mm 944</td>
</tr>
</tbody>
</table>

### Wafer Sorter | For 300-mm Wafers

### Wafer Sorter with Highest Throughput

### Features

1. **High Throughput**
   The high-speed robot with a traverse axis driven by a linear motor and a high-speed prealigner realizes the world’s top class throughput of 300 wafers per hour.

2. **ISO Class 1 Cleanliness**
   With an edge gripper on the end effector for both the robot and the prealigner for backside handling of the wafers to prevent contact of the face of the wafer, particles are greatly reduced during transfer. Also, the load port with the world’s top level of cleanliness ensures Class 1 cleanliness in the entire system.

### ESFM Specifications (Standard model)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>mm</td>
</tr>
<tr>
<td>Number of FOUPs</td>
<td>2</td>
</tr>
<tr>
<td>Clean Class</td>
<td>ISO class 1</td>
</tr>
</tbody>
</table>

### YASKAWA’s High-performance Load Port Conforming to SEMI Standards

### Features

- Simple design for high reliability
- Particle-free design including a space between the FOUP and the load port frame
- Conforms to SEMI standards such as SEMI E15.1, E57, E62, and E63 and to communications standards such as SECS and SECS2
- Optional mapping sensor, carrier ID reader, and AMHS interface

### Load Port Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>XU-LF300-A00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion Axis</td>
<td>Clamp, Dock, Latch, Open/Close, and Elevation</td>
</tr>
<tr>
<td>Motion Time</td>
<td>From clamping to opening of door: 12 s From closing of door to unclamped: 12 s</td>
</tr>
<tr>
<td>Positioning Control Accuracy</td>
<td>Dock Axis: ≤±0.1 mm or less, Door Opening Axis: ≤±0.1 mm or less</td>
</tr>
<tr>
<td>Number of Wafers in FOUP</td>
<td>25</td>
</tr>
<tr>
<td>Input Power</td>
<td>24 VDC±10%, Max. current 1.2 A</td>
</tr>
<tr>
<td>Air Supply Pressure</td>
<td>0.52 to 0.6 MPa</td>
</tr>
<tr>
<td>Base Vacuum</td>
<td>kPa 17 to 40</td>
</tr>
<tr>
<td>Approx. Mass</td>
<td>kg 65</td>
</tr>
<tr>
<td>Dimensions</td>
<td>mm 472(W)×1385(H)×(472+94) (D)</td>
</tr>
</tbody>
</table>

### Load Port with Rotational Axis

### Features

1. A load port with a rotational axis to turn a carrier stage 180° can be used as an interface tool between a device and an FOUP such as a stocker that faces in the opposite direction when loading or unloading wafers.

2. The highly reliable and flat load port can be easily docked with a stocker – the best fit for inline applications.

### Load Port Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>XU-LF300-F54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion Axis</td>
<td>Clamp, Dock, Latch, Door Open/Close, Door Up/down, and Door Rotate</td>
</tr>
<tr>
<td>Motion Time</td>
<td>From retraction of coupling pins to opening of door: 20 s From closing of door to protruding of coupling pins: 20 s</td>
</tr>
<tr>
<td>Positioning Control Accuracy</td>
<td>Dock Axis: ≤±0.1 mm or less, Door Opening Axis: ≤±0.1 mm or less</td>
</tr>
<tr>
<td>Number of Wafers in FOUP</td>
<td>25</td>
</tr>
<tr>
<td>Input Power</td>
<td>24 VDC±10%, Max. current 1.2 A</td>
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<tr>
<td>Air Supply Pressure</td>
<td>0.52 to 0.6 MPa</td>
</tr>
<tr>
<td>Base Vacuum</td>
<td>kPa 17 to 40</td>
</tr>
<tr>
<td>Approx. Mass</td>
<td>kg 90</td>
</tr>
<tr>
<td>Dimensions</td>
<td>mm 472(W)×1385(H)×(566+98) (D)</td>
</tr>
</tbody>
</table>

*Contact the Semiconductor Robotics Division, Yaskawa Electric Corporation for details of products on this page.*
**Clean-room use  AC Servo Drive : \( \Sigma \)-VSeries (Note)**

AC servo drive for frequent high-speed and high-precision positioning

The \( \Sigma \)-V series offers the best amplifier response \( 1.6 \text{kHz} \) in the industry as well as stable control, enabling high-precision positioning and fine processing. Additionally, start-up and servo adjustment times have been slashed, allowing improved operability.

**Features**

1. Best amplifier response in the industry slashes setting time (in-house comparison: 1/12th).
2. Includes enhanced vibration minimizing functions.
3. Simple start-up made possible by new functions such as parameter set-up with wizard-aided input, and quick on-screen wiring check.
4. New tuning-less function for quick running after hooking up with motor. Quick servo adjustment through enhanced autotuning function for fine-tuning.

**Applications**

CMP systems, Die bonders, and Handlers

**Clean-room use  Direct-drive \( \Sigma \) Series (Note)**

Direct drive for high torque at low speeds

Driving a load directly without gears simplifies a machine’s structure and achieves powerful and smooth operation at any speed without any noise.

**Features**

1. High-precision indexing of 1,000,000 pulses per rotation \( (P/R) \) is available.
2. The size of the machine’s drive section is reduced because of the unique motor’s design and the hollow space in the motor.
3. The optimal model for your machine is available from a wide variety of products in our lineup.

- Instantaneous peak torque: \( 6 \text{ N\cdotm} \) to \( 600 \text{ N\cdotm} \)
- Maximum motor speed: \( 250 \text{min}^{-1} \) to \( 500 \text{min}^{-1} \)

**Applications**

CMP systems and Die bonders

**Clean-room use  Linear \( \Sigma \) Series (Note)**

Linear servo drive for assuring high-speed and high-precision positioning

A linear motor is directly coupled to the load for high-speed and high-precision positioning. The simple feeding mechanism improves operability by generating less noise and less heat.

**Features**

1. Because these drives have no rotating parts and no grease to spatter, a clean work environment is easily realized.
2. An improvement of 5 m/s in the speed and submicron positioning are possible.
3. Three types of linear servomotors are available so that the optimal positioning system is constructed for any applications.

**Applications**

Dicing saws, Die bonders, and Scribers (liquid crystal)
Simple machine controllers for advanced motion control

High-speed communications of CPU and a motion network using MECHATROLINK-II improve the control performance of the machine controller.

**Features**

- High-speed image processing with YASKAWA's original ASIC, various cameras, and high-performance CPUs.
- High-accuracy positioning based on the image processing combined with servo control technology and detection of the workpiece's position.
- Applicable to the Ethernet and MECHATROLINK-II for space-saving and flexible system layouts.

**Applications**

- Dicing saws, CMP systems, Die bonders, and Scribers (liquid crystal)

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**MYVIS YV250 Machine Vision System**

High-speed and high-accuracy vision system for field networks

An image-processing unit for high-speed and high-accuracy positioning combined with innovative servo control technology.

**Features**

- High-speed image processing with YASKAWA's original ASIC, various cameras, and high-performance CPUs.
- High-accuracy positioning based on the image processing combined with servo control technology and detection of the workpiece's position.
- Applicable to the Ethernet and MECHATROLINK-II for space-saving and flexible system layouts.

**Applications**

- COGs, COFs, OLBs, FLBs, Wafer provers, Scribers (liquid crystal), Folder tapers, and Connector testing devices
As a solution for developing semiconductor equipment, we at Yaskawa not only provide innovative technology and highly reliable products but we also provide support with a global network for your technical information. Yaskawa subsidiaries and representatives are available worldwide to provide solutions that fit your individual facilities.

YASKAWA Subsidiaries and Service Points

1. YASKAWA ELECTRIC AMERICA Inc.
   Chicago Technical Office (U.S.A)
   TEL. +1-847-887-7000
   FAX. +1-847-887-7370

2. YASKAWA ELECTRIC AMERICA Inc.
   Ohio Office (U.S.A)
   TEL. +1-614-716-4200
   FAX. +1-614-718-4222

3. YASKAWA ELECTRIC AMERICA Inc.
   Los Angeles Office (U.S.A)
   TEL. +1-714-484-2230
   FAX. +1-714-828-1165

4. YASKAWA ELECTRIC AMERICA Inc.
   New Jersey Office (U.S.A)
   TEL. +1-973-663-4800
   FAX. +1-973-663-5543

5. YASKAWA ELECTRIC AMERICA Inc.
   Boston Office (U.S.A)
   TEL. +1-978-392-2111
   FAX. +1-978-392-5844

6. YASKAWA ELECTRIC AMERICA Inc.
   San Francisco Office (U.S.A)
   TEL. +1-415-495-2636
   FAX. +1-510-651-7131

7. MOTOMAN Inc.
   Tokyo Head Office (U.S.A)
   TEL. +1-937-847-6200
   FAX. +1-937-847-6277

8. YASKAWA MOTOMAN CANADA Ltd.
   (Canada)
   TEL. +1-905-569-6886
   FAX. +1-905-831-5911

9. YASKAWA MOTOMAN MEXICO.S.A.de C.V.
   (Mexico)
   TEL. +52-449-73-1170
   FAX. +52-449-73-1171

10. YASKAWA MOTOMAN BRAZIL
    (Brazil)
    TEL. +55-11-5071-2552
    FAX. +55-11-5581-8795

11. VARIADORES Ltd.A.
    (Colombia)
    TEL. +57-91-635-7460
    FAX. +57-91-635-7460

12. YASKAWA ELECTRIC EUROPE GmbH
    (Germany)
    TEL. +49-6196-569-300
    FAX. +49-6196-569-312

13. YASKAWA ENGINEERING EUROPE GmbH
    (Germany)
    TEL. +49-6196-569-520
    FAX. +49-6196-888-598

14. MOTOMAN ROBOTICS Europe AB
    (Sweden)
    TEL. +46-480-417800
    FAX. +46-480-417999

15. MOTOMAN ROBOTEC GmbH
    (Germany)
    TEL. +49-8166-90-100
    FAX. +49-8166-90-103

16. YASKAWA ENGINEERING EUROPE
    (UK)
    TEL. +44-1908-565-811
    FAX. +44-1908-565-938

17. YASKAWA ELECTRIC ENGINEERING Corp.
    Head Office (Japan)
    TEL. +81-4-2966-1590
    FAX. +81-4-2966-8481

18. YASKAWA ELECTRIC ENGINEERING Corp.
    Osaka Office (Japan)
    TEL. +81-6-6378-6526
    FAX. +81-6-6378-6531

19. YASKAWA ELECTRIC ENGINEERING Corp.
    Nagoya Office (Japan)
    TEL. +81-52-331-5318
    FAX. +81-52-331-5347

20. YASKAWA ELECTRIC ENGINEERING Corp.
    Kyushu Office (Japan)
    TEL. +81-93-663-5105
    FAX. +81-93-288-4432

21. Yaskawa SIEMENS AUTOMATION & DRIVERS Corp.
    (Japan)
    TEL. +81-930-25-4357
    FAX. +81-930-25-4358

22. YASKAWA ELECTRIC KOREA Corp.
    (South Korea)
    TEL. +82-2-784-7944
    FAX. +82-2-784-8495

23. YASKAWA ENGINEERING KOREA Corp.
    (South Korea)
    TEL. +82-2-3775-0337
    FAX. +82-2-3775-0338

24. ROCKWELL SAMSUNG AUTOMATION Co.,Ltd.
    (South Korea)
    TEL. +82-31-200-2981
    FAX. +82-31-200-2970

25. Y-TECH Corporation
    (South Korea)
    TEL. +82-54-293-4445
    FAX. +82-54-293-4446

26. Shuangxi Motoman Robot Co., Ltd.
    (China)
    TEL. +86-10-6788-0541
    FAX. +86-10-6788-0542

27. YATEC ENGINEERING Corp.
    (Taiwan)
    TEL. +886-2-2298-3676
    FAX. +886-2-2298-3677

28. YASKAWA ELECTRIC TAIWAN Corp.
    (Taiwan)
    TEL. +886-2-2502-5003
    FAX. +886-2-2502-1280

29. MIME AUTOMATION Corp.
    (Taiwan)
    TEL. +886-3-578-3280
    FAX. +886-3-578-7426

30. YASKAWA ELECTRIC (Singapore) Pte. Ltd.
    (Singapore)
    TEL. +65-6282-3003
    FAX. +65-6282-3003

31. YASKAWA ENGINEERING ASIA-PACIFIC Pte., Ltd.
    (Singapore)
    TEL. +65-6282-1601
    FAX. +65-6382-3668

32. YASKAWA ELECTRIC (THAILAND) Co., Ltd.
    (Thailand)
    TEL. +66-2-693-2200
    FAX. +66-2-693-2204

33. YASKAWA ELECTRIC (Singapore) Pte. Ltd.
    Malaysia Representative Office (Malaysia)
    TEL. +60-3-5031-5311
    FAX. +60-3-5031-5312

34. LARSEN&TOURBO Ltd. C&A Service Center
    (India)
    TEL. +91-22-76833511
    FAX. +91-22-76833525

35. ROBOTIC AUTOMATION Pty.Ltd.
    Sydney Office (Australia)
    TEL. +61-2-9748-3788
    FAX. +61-2-9748-3817

36. ROBOTIC AUTOMATION Pty.Ltd.
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