Parallel, Cartesian and serial robot control functionality
Increase machine control speed and precision
Reduce machine development time
Minimize machine footprint and maximize efficiency
Robot control technology adds flexibility to manufacturing processes: reconfigurable

Increase control speed and precision
- One machine control to ensure high precision synchronization between conveyor and robot
- High-speed control, from sensor inputs to robot control
- Control of even manipulators synchronized with robot motion via EtherCAT

Reduce development time
- One language used for programming, from sequence control to robot control
- One software Sysmac Studio to start devices including vision sensors and robots
- Standard IEC 61131-3 based instructions for motion and robot control
- Codes used during integrated simulation can be reused for the real machine
- Easy conveyor tracking by using parallel/Cartesian/SCARA robots
machines and quick changeovers

Minimize footprint and maximize efficiency

- One controller to control up to 8* parallel, Cartesian, and serial robots in total
- One network EtherCAT to connect all machine network devices
- One controller system to improve maintenance efficiency

* The number of controlled robots varies according to the number of axes used for the system.

NJ Robotics CPU Unit
NJ501-4

ation Solution
The NJ Robotics controller integrates machine bringing new flexibility to build machines

NJ Robotics controller at the heart of the system

- One controller can connect up to 64 axes including robots
- The control system integrates vision sensors, I/O, safety controllers, and robots within one EtherCAT network
- The database connection model can upload system information to host

Efficient preliminary verification with integrated simulation

You can perform integrated simulations linked to motion control for robots and inspection and measurement by vision systems. The virtual environment allows to visualize the machine motion. The simulation of the synchronization between robots makes complex operation verification easy.

- **Vision system simulation**
  Inspection and measurement by vision systems can be simulated from the Sysmac Studio.

- **Data tracing**
  Inputs and outputs of vision systems can be traced as a time series.

*NEW Integrated simulation*
Machine movement can be simulated based on measurement results of vision systems.

*Only Delta3 and Delta3R robots can be used for integrated simulation.*
Scalable and easy programming of any type of robots

When building conveyor tracking applications, you can program Pick & Place control systems by using the same program structure in the same programming manner regardless of the robot type: parallel, Cartesian, or SCARA robot.

**Pick & Place control**
- Robot instructions common to all robots
  - Set Kinematics Transformation
  - Group Monitor
  - Inverse Kinematics
  - Define Coordinate System

**Multi-axis setup and tuning**

Adjusting, monitoring parameters of the robot’s drives is done easily in a single view.

**Multi-axis tuning wizard**

Several 1S servo drives can be tuned simultaneously in a short amount of time.
Build a vision-guided robots in 5 steps

Since the beginning, our main goal for this new development was very clear: Making Pick & Place machine programming easier.

Far from the old and rigid top-down programming manner our solution is based on Wizards that guide the user through the main steps using a graphical interface to operate with an unique software tool capable to manage Robotics and Vision seamlessly at the same time.

1. Import the pictures into Sysmac Studio wizard
   • Using the Sysmac Studio wizard you can define the layout of the Pick & Place machine, selecting how many robots and conveyors you have and choose between the most typical layout templates.

2. 3D Simulation
   • Sysmac Studio generates the 3D simulation environment according to the parameters defined in the previous steps.
   • The integrated graphical environment enables visualizing the Pick & Place machine and the Vision simulation at the same time.
   • Moreover, the images captured in the Step 1 are automatically converted into the corresponding virtual products that run over the picking conveyor.

3. Reuse of codes
   • The 3D simulation is very reliable since it is based on the real system cores so you can reuse the whole programming to control the real machine by significantly shortening the commissioning time.
Virtualize your Pick & Place machine into the integrated 3D Simulator and make it Real in 5 simple steps, guided by intuitive wizards.

**Benefits** include time optimization and reduction for the complete project.

- **Project proposal and Concept**: 30%  
  - SAVE 70%
- **Design, Engineering and Test run**: 50%  
  - SAVE 50%
- **Commissioning and Maintenance**: 60%  
  - SAVE 40%

**Image capturing**
- The first step is to take the pictures of the products to handle. Yes just as easy as it sounds!
- The wide portfolio of our FH cameras allows to optimize your choice.

**Easy tuning on site P&P and FH Vision**
- The finalization of your project is guided by a Vision system wizard that calibrates the Virtual machine against the Real machine.
- It take just few minutes to place a matrix calibration sheet into the machine and follow the wizard that will align the robots and the vision systems to minimize any kind of measurement error.
Ordering Information

International Standards
- The standards are abbreviated as follows: U: UL, U1: UL(Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, CE: EU Directives, RCM: Regulatory Compliance Mark and KC: KC Registration.
- Contact your OMRON representative for further details and applicable conditions for these standards.

Use for robot systems
Contact your OMRON representative for further details and conditions for robot systems.

NJ-series CPU Units

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Specifications</th>
<th>Model</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJ-series CPU Units</td>
<td>I/O capacity / maximum number of configuration Units (Expansion Racks)</td>
<td>2,560 points / 40 Units (3 Expansion Racks)</td>
<td>20 MB</td>
</tr>
<tr>
<td></td>
<td>Program capacity</td>
<td>64</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Memory capacity for variables</td>
<td>64</td>
<td>32</td>
</tr>
</tbody>
</table>

* The number of controlled robots varies according to the number of axes used for the system.

Automation Software Sysmac Studio

Please purchase a DVD and required number of licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. Each model of licenses does not include any DVD.

The license number for a robot is required to use this CPU Unit. Please contact your OMRON sales representative for details.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Specifications</th>
<th>Number of licenses</th>
<th>Media</th>
<th>Model</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sysmac Studio Standard Edition Ver.1</td>
<td>The Sysmac Studio is the software that provides an integrated environment for setting, programming, debugging and maintenance of machine automation controllers including the NJ/NX-series CPU Units, NY-series Industrial PC, EtherCat Slave, and the HMI. Sysmac Studio runs on the following OS. Windows 7(32-bit/64-bit version)/Windows 8(32-bit/64-bit version)/Windows 8.1(32-bit/64-bit version)/Windows 10(32-bit/64-bit version)</td>
<td>–</td>
<td>(Media only)</td>
<td>Sysmac Studio (32-bit) DVD</td>
<td>SYSMAC-SE200D</td>
</tr>
<tr>
<td></td>
<td>The Sysmac Studio Standard Edition DVD includes Support Software to set up EtherNet/IP Units, DeviceNet slaves, Serial Communications Units, and Support Software for creating screens on HMIs (CX-Designer). Refer to your OMRON website for details.</td>
<td>1 license *1</td>
<td>–</td>
<td>SYSMAC-SE201L</td>
<td>–</td>
</tr>
<tr>
<td>Sysmac Studio Robot Additional Option *2 *3</td>
<td>Sysmac Studio Robot Additional Option is a license to enable the Vision &amp; Robot integrated simulation.</td>
<td>1 license</td>
<td>–</td>
<td>SYSMAC-RA401L</td>
<td>–</td>
</tr>
</tbody>
</table>

Note: The license number for a robot is required to use this CPU Unit with the Sysmac Studio version 1.13 or lower. Please contact your OMRON sales representative for details.

*1. Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licenses).
*2. Sysmac Studio Standard Edition is required to use this option.
*3. Robot Additional Option is supported by Sysmac Studio (32 bit).

Accessories

The following accessories come with the CPU Unit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>CJ1W-BAT01</td>
</tr>
<tr>
<td>End Cover</td>
<td>CJ1W-TER01 (necessary to be connected to the right end of the CPU Rack.)</td>
</tr>
<tr>
<td>End Plate</td>
<td>PFP-M (2 pcs)</td>
</tr>
</tbody>
</table>

For details, refer to the data sheet of the Machine Automation Controller NJ-Series (Cat. No. P140).
Terms and Conditions Agreement

Read and understand this catalog.

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.

(a) Exclusive Warranty. Omron’s exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

(b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

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Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

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NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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Omron Companies shall not be responsible for the user’s programming of a programmable Product, or any consequence thereof.

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Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron’s representative at any time to confirm actual specifications of purchased Product.

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