

Machine Automation Controller NJ Series NJ Robotics CPU Unit

NJ501-4□□□

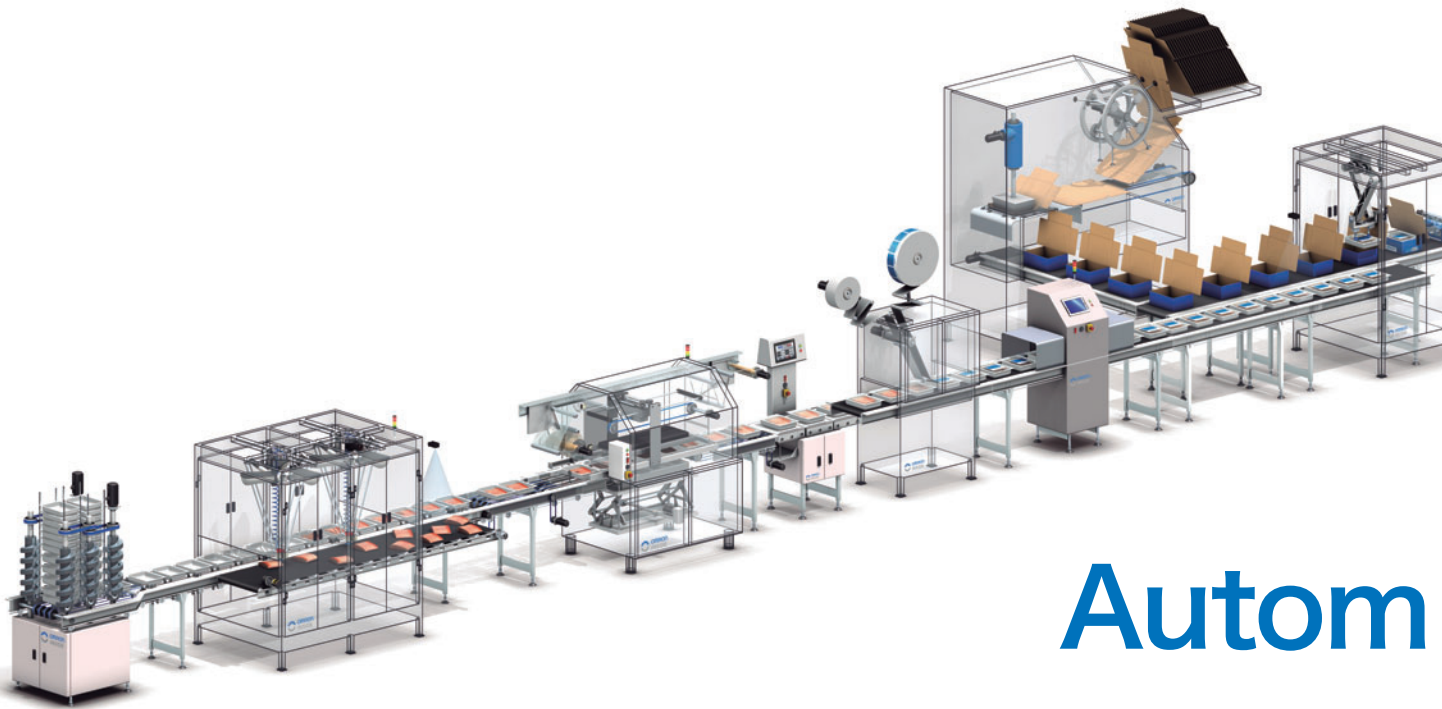


- Parallel, Cartesian and serial robot control functionality
- Increase machine control speed and precision
- Reduce machine development time
- Minimize machine footprint and maximize efficiency

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



Autom

Reduce development time

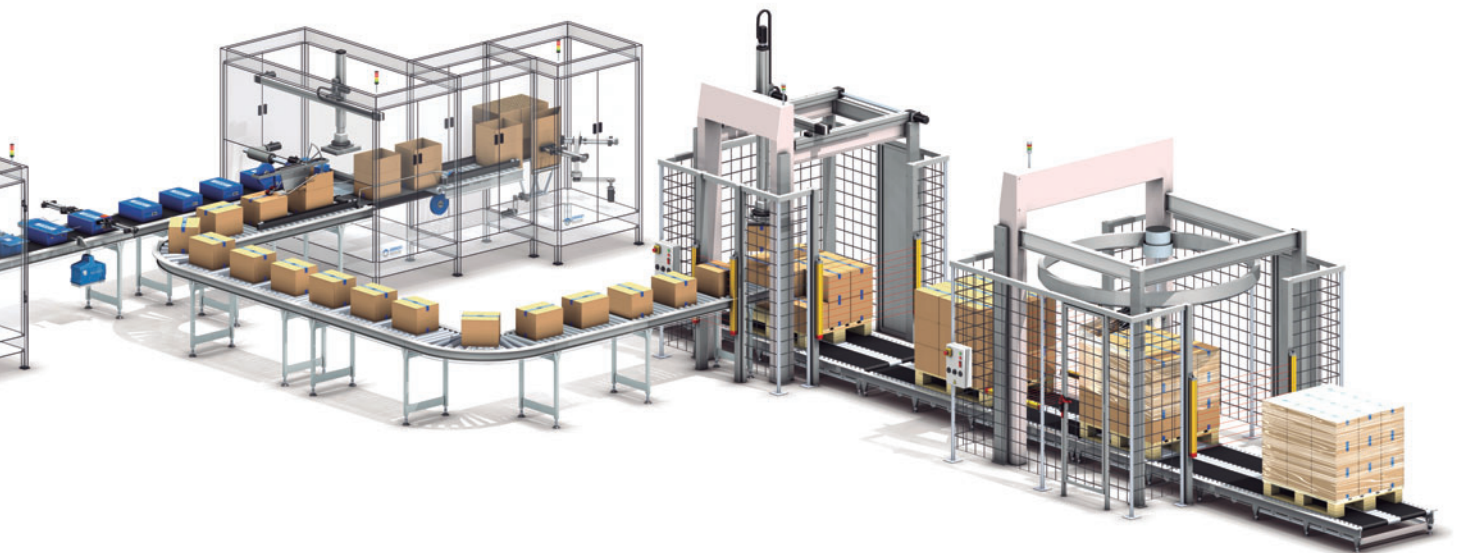
- One language used for programming, from sequence control to robot control
- One software Sysmac Studio to start devices including vision sensors and robots
- Standard IEC 61131-3 based instructions for motion and robot control
- Codes used during integrated simulation can be reused for the real machine
- 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.



ation Solution

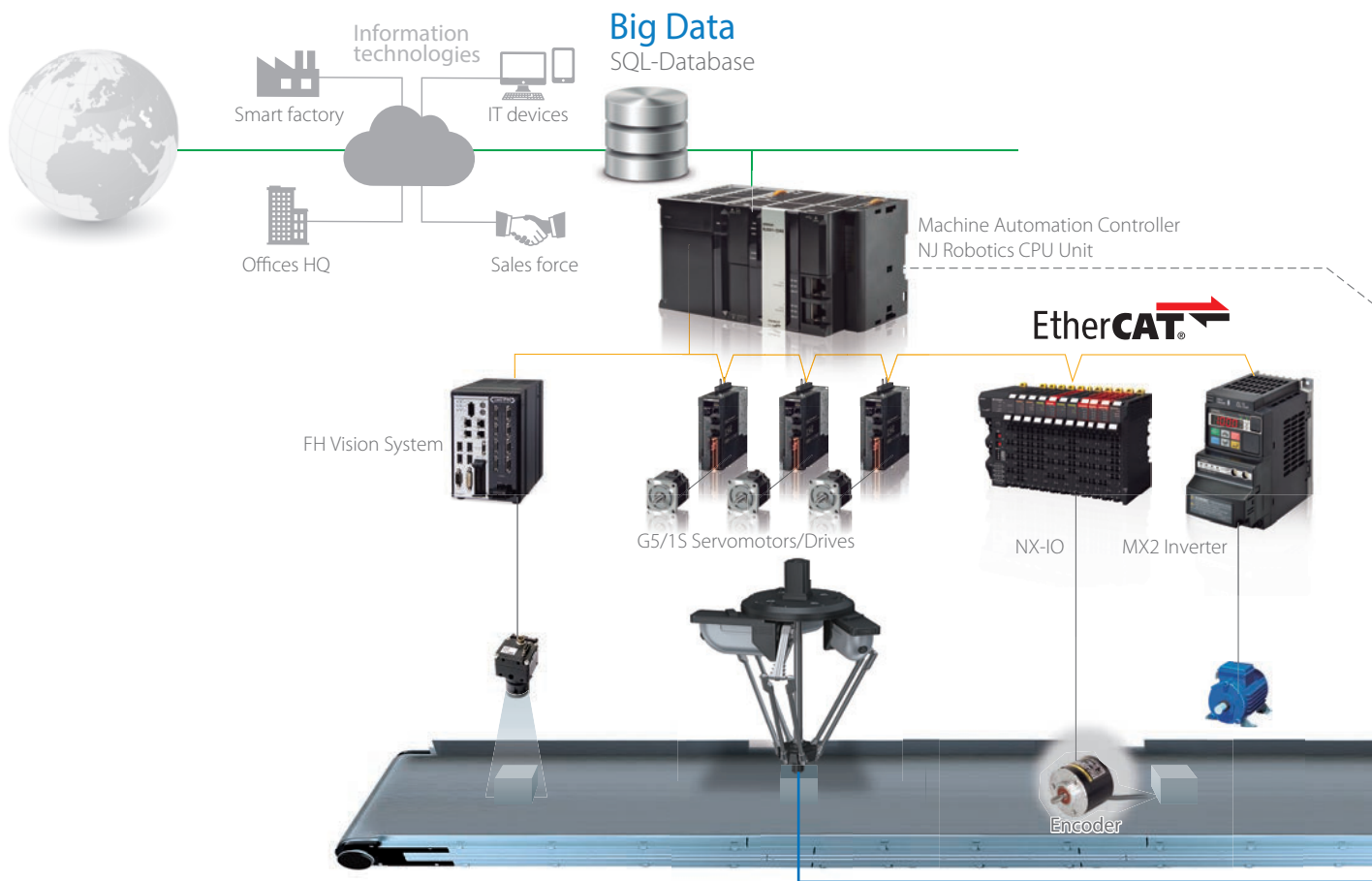


NJ Robotics CPU Unit
NJ501-4□□□

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.

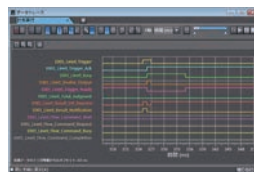
NEW Integrated simulation*

Machine movement can be simulated based on measurement results of vision systems.



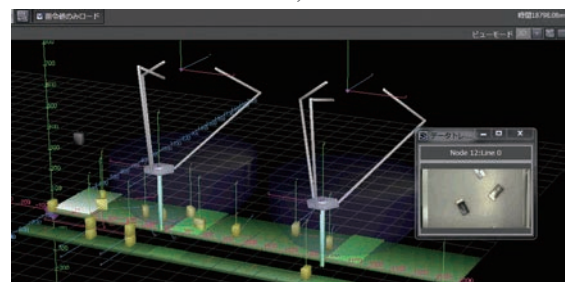
Vision system simulation

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.

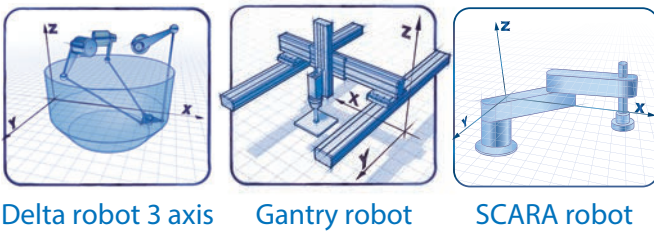


* Only Delta3 and Delta3R robots can be used for integrated simulation.

control and robot control,

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.



Parallel	Delta-3	
	Delta-3R	
	Delta-2	
Cartesian	Cartesian 3D	
	Cartesian 3D Gantry	
	Cartesian 2D (XY)	
	Cartesian 2D (XZ)	
	Cartesian 2D (YZ)	
	Cartesian 2D Gantry	
Serial NEW	SCARA RRP+R	
	SCARA PRR+R	
	3-AXES	

Pick & Place control
Robot instructions common to all robots

- Set Kinematics Transformation
- Group Monitor
- Inverse Kinematics
- Define Coordinate System

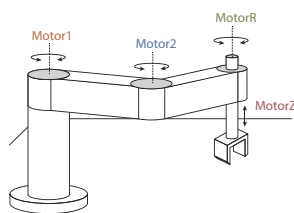
Multi-axis setup and tuning

NEW Multi axis tuning wizard

Several 15 servo drives can be tuned simultaneously in a short amount of time.

NEW Multi - drive window

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



Description	Units	Scale_M1	Scale_M2	Scale_R	Scale_Z
Fast Functions - Motor Rotation Direction Selection	%	1	1	1	1
Machine - Torque Ratio	%	1000	1000	400	400
Force Selection - Torque Actual Value	%	1000	1000	400	400
Torque Limit - Max Torque	%	2000	2000	1000	1000
Positive Drive Prohibition Input - Post Selection		2	2	2	2
Positive Drive Prohibition Input - Logic Selection		1	1	1	1
Negative Drive Prohibition Input - Post Selection		3	3	3	3
Negative Drive Prohibition Input - Logic Selection		1	1	1	1

Step 1
Setup and criteria

Step 2
Auto tune process

Step 3
Data trace and result

System Status

Tuning has been completed successfully.

- Drive Drive X: Stabilization time 3 ms (target: 3 ms), settings returned as per trial 5.
- Drive Drive Y: Stabilization time 3 ms (target: 3 ms), settings returned as per trial 5.
- Drive Drive Z: Stabilization time 3 ms (target: 3 ms), settings returned as per trial 5.

OK

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.

< VIRTUAL

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

PATENTED

PATENTED

3



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.

4



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.

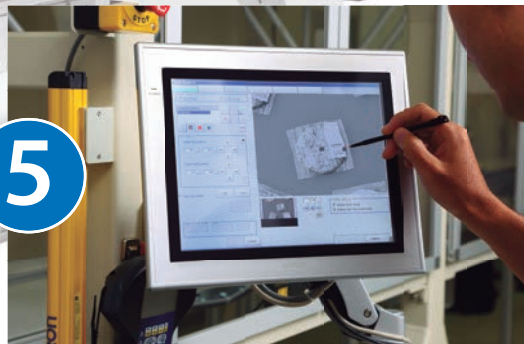
REAL >



1

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.



5

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.

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



Ordering Information

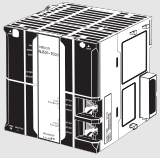
International Standards

- 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

Product Name	Specifications				Number of controlled robots	Database Connection function	Current consumption (A)		Model	Standards
	I/O capacity / maximum number of configuration Units (Expansion Racks)	Program capacity	Memory capacity for variables	Number of motion axes			5 VDC	24 VDC		
 NJ-series CPU Units	2,560 points / 40 Units (3 Expansion Racks)	20 MB	2 MB: Retained during power interruption 4 MB: Not retained during power interruption	64	8 max. *	No	1.90	-	NJ501-4500	UC1, N, L, CE, RCM, KC
				32					NJ501-4400	
				16					NJ501-4300	
				16	1	NJ501-4310				
				16	8 max. *	Yes	NJ501-4320			

* 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.

Product name	Specifications	Number of licenses		Media	Model	Standards
Sysmac Studio Standard Edition Ver.1.□□	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 8.1(32-bit/64-bit version)/Windows 10(32-bit/64-bit version)/Windows 11(64-bit version)	-	(Media only)	Sysmac Studio (32-bit) DVD	SYSMAC-SE200D	-
		1 license *1	-	-	SYSMAC-SE201L	-
Sysmac Studio Robot Additional Option *2 *3	Sysmac Studio Robot Additional Option is a license to enable the Vision & Robot integrated simulation.	1 license	-	-	SYSMAC-RA401L	-

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.

The Sysmac Studio version 1.14 or higher does not require the license number for a robot.

*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.

Item	Specification
Battery	CJ1W-BAT01
End Cover	CJ1W-TER01 (necessary to be connected to the right end of the CPU Rack.)
End Plate	PFP-M (2 pcs)

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

Terms and Conditions Agreement

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CSM_7_8 Printed in Japan
Cat. No. P085-E1-17 0922 (0912)