

## SYSMAC CJ Series

Position Control Units (High-Speed type)

**CJ1W-NC214/NC414**

Open-collector Outputs

**CJ1W-NC234/NC434**

Line-driver Outputs



Motion Control at higher Speeds and for Synchronous Systems

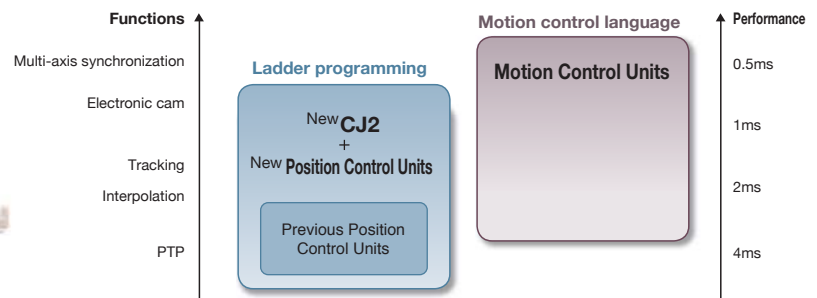
# High-Speed Startup and Synchronous System Enable A Range of Applications from High-Speed Position Control to Synchronous Control.

NEW

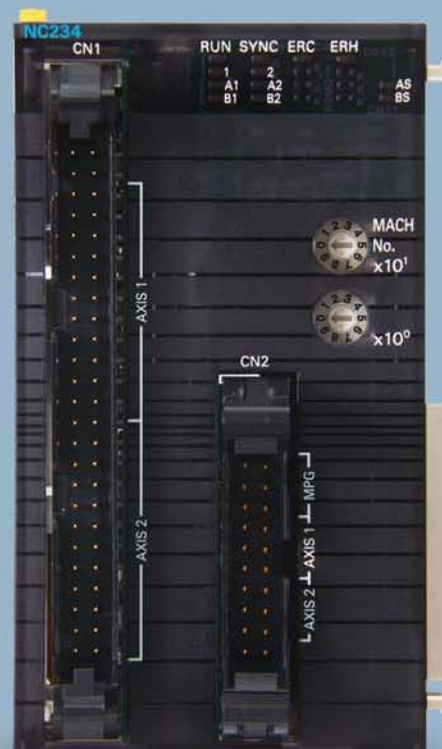
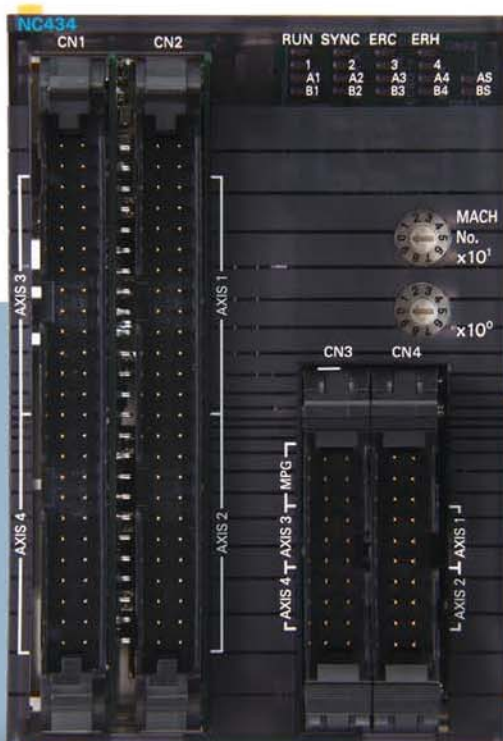
Support for Everything from Position Control to Synchronous Control

Controller Standardization for Motion Applications

Up to 20 axes



The CJ2 Position Control Units support advanced applications.



Applicable with SYSMAC CJ1 or CJ2

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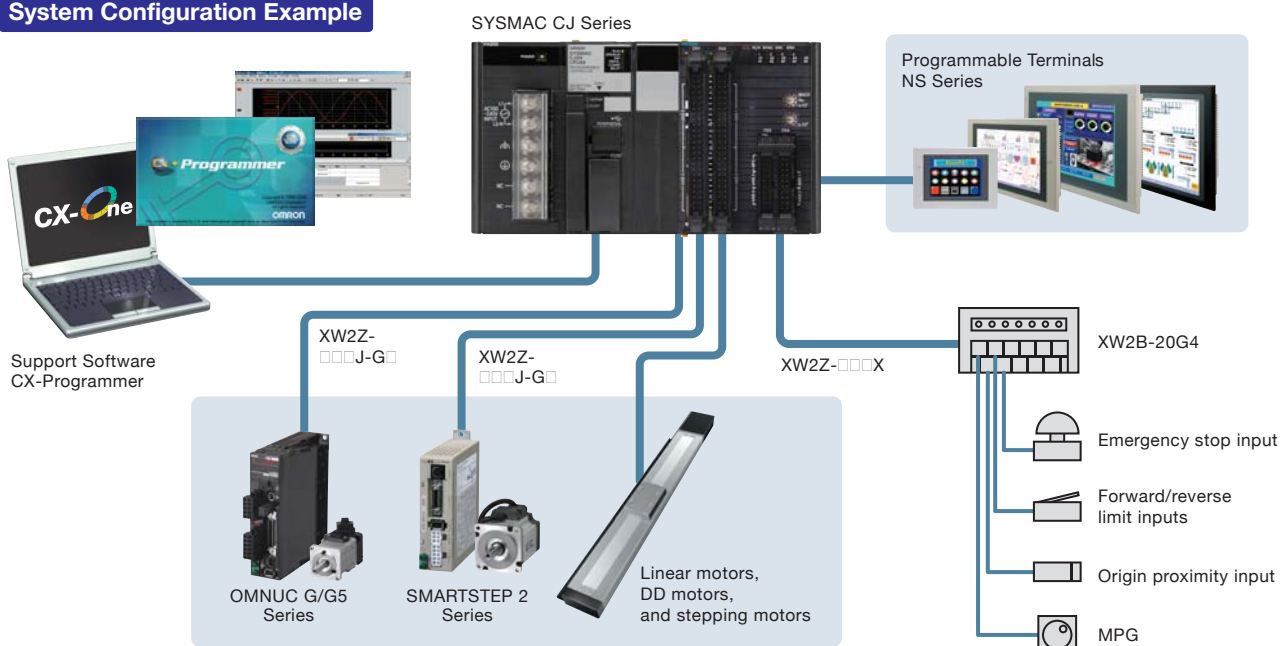
**High-P  
Interfa  
Com  
A**

- Unit operati
- Direct ope
- Multi-poin
- 500points
- Interpolati
- Compatible

# -SPEED, SYNCHRONIZE POSITION CONTROL

ms  
speed

## System Configuration Example



## A New-generation Standard for High Speed and High Precision

- Faster startup.
- Higher speeds and higher precision with High-Speed pulse outputs.
- Built-in feedback counters.
- Compatible with absolute encoders.

## New-generation Position Control Units Help to Improve Productivity

## Performance I/O for Improved Compatibility with Applications

on synchronized with CPU Unit.  
eration and memory operation.  
t position control with  
for each axis.  
on and MPG functions.  
with synchronous control systems.

## Programming Environment and Hardware Configuration to Reduce TCO

- Integrated and enhanced NC Support Software.
- Integrated interface for standardization of programming.
- Support for function blocks expanded to all functions.
- Hardware configuration to reduce wiring work.

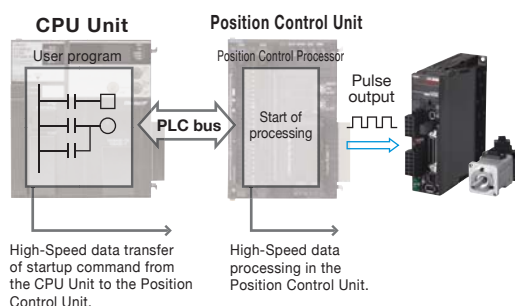
A New-generation  
Standard for  
High Speed  
and High Precision

# Improved Equipment Productivity with High-Speed Position Control

## Faster Startups

### Helps Reduce Equipment Tact Time

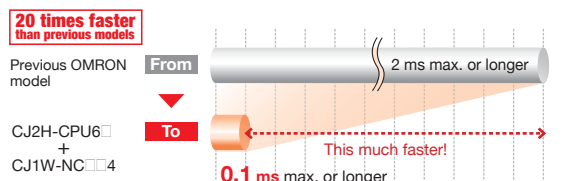
The Position Control Units have a High-Speed startup time of 0.1 ms max. (for 1-axis startup), which is approximately 20 times faster than previous models.



#### ■ Startup Time (for 1-axis Startup)

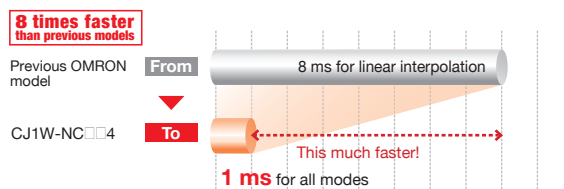
Pulse output starts 0.1 ms after the High-Speed startup command is executed.

Note: Using a CJ2H CPU Unit (unit version 1.1 or later).



#### ■ Pulse Output Distribution Cycle

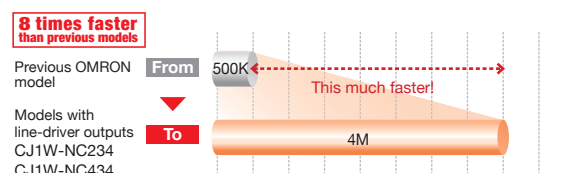
Smooth acceleration and deceleration and fast speed changes.



## High-Speed, High-Precision Position Control

### High-Speed pulse outputs, built-in feedback counters, and support for absolute encoders

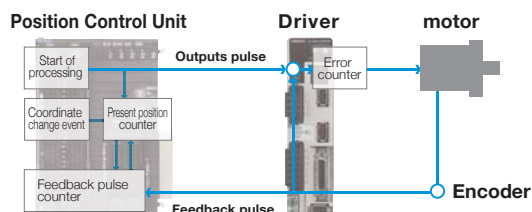
A pulse output of up to 4 Mpps for a line driver output enables performing High-Speed movements at High resolution with linear motors and DD motors equipped with a High-resolution scale encoders.



## Built-in High-Speed Counters

### Monitor the present motor positions and build absolute value systems

The High-Speed counters enable building position control systems using only a Position Control Unit. The High-Speed counters are compatible with pulse inputs with a maximum frequency of up to 4 MHz. Also, monitoring between axes enables multi-axis control for up to four axes to convey large workpieces.



## Build Absolute Encoder Systems

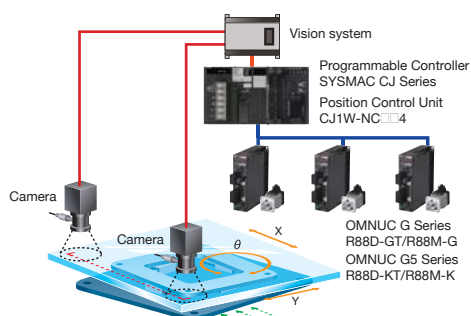
- Operating rates are improved because it is not necessary to search for the origin after the power is interrupted.
- OMNUC G/G5-series/W-series Absolute Servomotors are available.

## Application Examples

### High-Speed, High-Precision Position Control

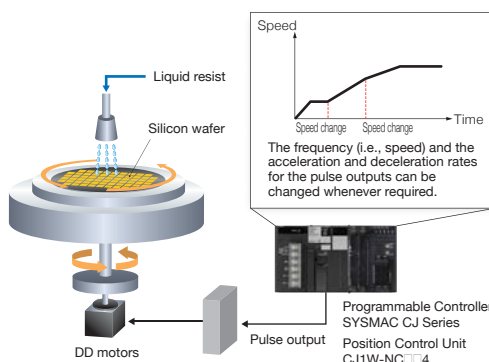
- High-Speed, High-Precision Position Control Using Camera Compensation
- The pulse output startup time of 0.1 ms enables High-Speed camera compensation.

Note: Using a CJ2 CPU Unit (unit version 1.1 or later).



### High-Speed Response Control

- Versatile pulse outputs enable flexible speed control.
- A pulse distribution cycle of 1 ms enables High-frequency speed changes.





# Flexibility in Building a Wide Variety of Position Control Applications Increases Added Value for Equipment.

High-Performance  
I/O Interface for  
Improved Compatibility  
with Applications

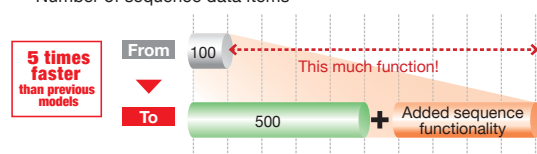
## Direct operation and memory operation are supported.

### Flexible Support for Ideal Position Control

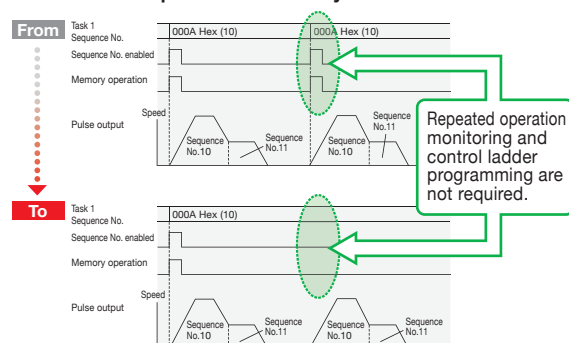
The CJ1W-NC□□4 supports both direct operation and memory operation. Direct operation performs position control by directly specifying position data, speed data, and acceleration/deceleration data in the PLC ladder programming. Memory operation performs position control by setting operation patterns in the Position Control Unit. The CJ1W-NC□□4 also supports complicated motion control, such as that using repeat commands and jump commands.

### Enhanced Functionality for Memory Operation

Number of sequence data items



### Enhanced Sequence Functionality



## Pulse Rate Functionality

- Data setting is easy with functional units: pulse, mm, inch, and degree.

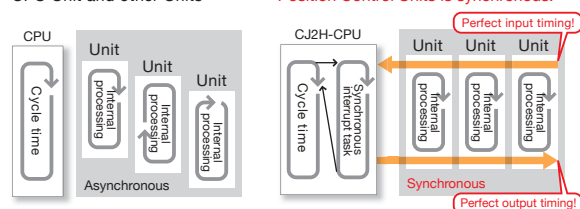
## Synchronization of Position Control Unit Processing (See note.)

Note:  
Using a CJ2H CPU Unit (unit version 1.1 or later).

### Synchronize the CPU Unit and Position Control Units

A High-Speed bus between the CPU Unit and the Position Control Units enables synchronous systems. Synchronous unit operation can be performed for up to five Units (20 axes max.). Also, the electronic cams enable a wide variety of synchronous applications.

From Asynchronous operation between CPU Unit and other Units To Operation between the CJ2H CPU Unit and Position Control Units is synchronous.

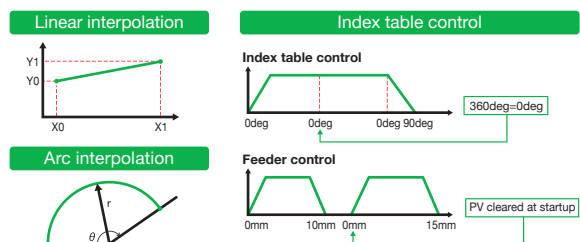


Synchronous unit operation can be performed with High precision in positions and speeds by limiting the fluctuation in the cycle time to 10  $\mu$ s max.

## Equipped with Interpolation Control, MPG, and Infinite Axes

### High-efficiency Control with a Wide Variety of Patterns

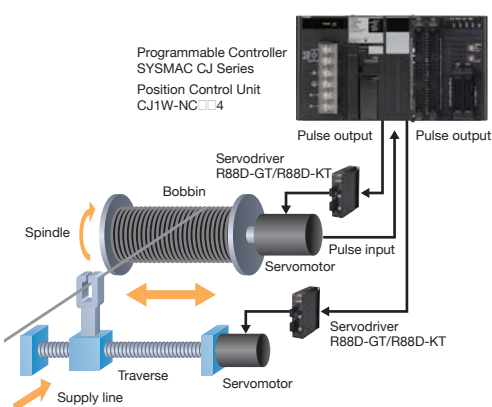
Functions performed with Motion Control Units can be performed with Position Control Units with the addition of arc interpolation, index table control, feeder control, and MPG (manual pulse generator), in addition to linear interpolation.



## Application Examples

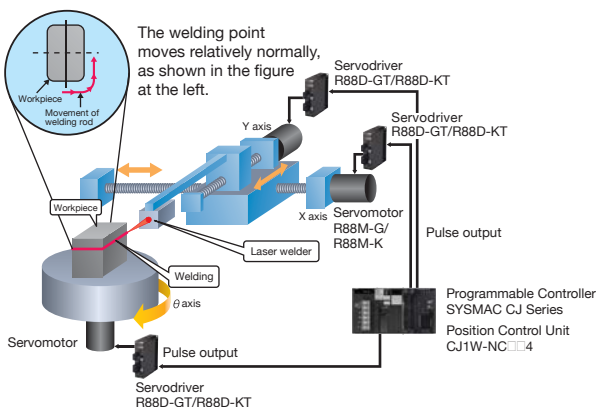
### Electronic Cam Synchronous Control

#### Thread Winding at an Exact Pitch



### Electronic Cam Synchronous Control

#### Electronic Cam Synchronous Control with Non-stop Processing



## Greatly Reduced Work for Programming and Debugging, As Well As Wiring

**From**

5 VDC for pulse outputs

24 VDC for I/O

External control I/O

Servomotor driver

The diagram shows a 5VDC pulse output module connected to a 24VDC I/O module. The 24VDC I/O module is connected to an external control I/O terminal block. The external control I/O terminal block is connected to a servomotor driver.

1 Electronic cam	4 Trailing Synchronization
2 Electronic shaft	5 Link Operation
3 Virtual Pulse	

The diagram illustrates the Workpiece Marking System (WMS) control and mechanical components. It is divided into two main sections: the control system and the mechanical assembly.

**Control System:**

- Programmable Controller:** SYSMAC CJ Series.
- Position Control Unit:** CJ1W-NC004.
- Servodriver:** R88D-GT/R88D-KT.
- Servomotor:** R88M-G/R88M-K.

**Mechanical Assembly:**

- Feed roll:** The initial roll of material.
- Measuring roll:** A roll that measures the material thickness.
- Rotary encoder:** A sensor that provides position feedback.
- Travel motion:** The movement of the material along the rolls.
- Cutter:** A cutting tool that marks the material.
- Film:** A thin layer of material used for marking.
- Mark:** The result of the cutting process.

**Control Flow:**

- The **Programmable Controller** sends a **Pulse output** to the **Servodriver**.
- The **Servodriver** sends a **Pulse output** to the **Servomotor**.
- The **Servomotor** provides **Travel motion** to the **Cutter**.
- The **Measuring roll** provides a **Pulse input** to the **Programmable Controller**.
- The **Rotary encoder** provides a **General-purpose input** to the **Programmable Controller**.

**Details in The Workpiece Marking System:**

- The **Workpiece** is fed into the **Cutter**.
- The **Cutter** marks the **Film** on the **Workpiece**.
- The **Mark** is detected by the **Measuring roll**.

**Travel motion synchronization:**

- The **Feed roll** and **Measuring roll** are synchronized with the **Travel motion**.
- The **Travel motion** is synchronized with the **Cutter**.

## Performance Specifications

Item		Position Control Unit (High-Speed type)	
		Model	
		CJ1W-NC214/234	CJ1W-NC414/434
Applicable PLC models		SYSMAC CJ1/CJ2	
Number of occupied inputs/outputs	Number of words	18CH*1	
Controlled drivers (or Control target actuator)		Servo Drive of pulse train input type, linear motor, DD motor, or stepping motor driver NC214/414 : Open collector output type NC234/434 : Line driver output type	
Pulse output method		Phase difference pulse output, forward/reverse direction pulse output, pulse + direction output	
Controls	Control method	Open-loop control by pulse train output	
	Absolute encoder	OMNUC W Series and G Series Servomotors with absolute encoder	
	Number of controlled axes	2 axes	4 axes
Units of control		Pulse, mm, inch, degree	
		Memory operation, direct operation	
Positioning functions	Independent operation	Independent, 2 axes	Independent, 4 axes
	Linear interpolation	2 axes maximum	4 axes maximum
	Arc interpolation	2 axes maximum	2 axes maximum
	Speed control	Independent, 2 axes	Independent, 4 axes
	Interrupt Constant-pitch Feed	Independent, 2 axes	Independent, 4 axes
	Synchronous operation between units	5 units maximum [20 axes maximum] (when CJ2-CPU Ver1.1 or later is used)	
Position command	Data	-2147483648 to 2147483647 command unit	
	Number of data	500 per task (4 tasks per unit)	
Speed command	Data	Position control : 1 to 2147483647 command unit/s      Speed control : -2147483648 to 2147483647 command unit/s However, this limits the maximum output frequency based on whether the maximum speed is 4 Mpps (NC234/434) or 500 kpps (NC214/414)	
	Number of data	500 per task (4 tasks per unit)	
Memory operation sequence function		JUMP, FOR, NEXT (50 nests per task), PSET, and PRSET	
Acceleration/ deceleration time	Data	0 to 250000 ms	
	Number of data	500 per task	
Functions	Origin Search	Origin proximity input signal : selectable (absent, N.O. or N.C. contact) Origin input signal : selectable (N.O. or N.C. contact) Origin compensation : -2147483648 to 2147483647 command unit Origin search speed : Origin search speed or origin search approach speed can be set Origin search method : Origin fix performed by the combination of the origin proximity input, limit input and origin input. Origin fix performed by holding May be set to stop upon origin input signal after proximity input signal has turned ON, to stop upon origin input signal after proximity input signal has turned OFF, to stop upon origin input signal without using proximity input signal, or to stop upon origin input signal after limit input signal has turned OFF N.O. = Normally open N.C. = Normally closed	
	Jogging	Jogging can be executed at a specified speed	
	Inching operation	Operation can be performed for the commanded travel amount by one operation	
	Dwell times	500 per task can be set from 0 to 10.00 s (unit : 0.01 s)	
	Acceleration/deceleration curves	Trapezoidal or S-curve (Can be set separately for each axis)	
	Zones	Zone Flag turns ON when the present position is within a specified zone. Three zones can be set for each axis	
	Software limits	-2147483647 to 2147483646 command unit (The travel motion range can be set with this value)	
	Backlash Compensation	0 to 50000 command unit (The compensation speed can also be set)	
	Teaching	With a command from the PLC, the present position can be taken in the specified position data (command/feedback)	
	Deceleration stop	Deceleration stop is made according to the deceleration time by the deceleration stop command	
	Emergency stop	Pulse outputs are stopped by the emergency stop input	
	Present position preset	The PRESENT POSITION PRESET command can be used to change the present position to a specified value	
	Override	When the override enabling command is executed during positioning, the target speed is changed by applying the override coefficient. Possible to set to a value from 0.01 to 500.00% (by an increment of 0.01%)	
	Data saving	1) Saving to flash memory (Can be written 100,000 times.) 2) Reading from PLC area by data reading instruction 3) Reading by CX-Programmer and saving to personal computer hard disk or floppy disk.	
External I/O	Inputs	Prepare the following inputs for each axis : Forward/reverse direction limit input, origin proximity input, origin input, emergency stop input, positioning completed input, interrupt input, alarm input, general purpose input	
	Outputs	Prepare the following outputs for each axis: Pulse outputs Forward / reverse direction pulse, pulse outputs and direction outputs, and 90°phase difference output can be switched RUN output, error counter reset output, alarm reset output, torque limit output, general purpose output	
Pulse input		• One MPG input (phase difference input : 500kHz, quadruple : 2MHz) The following inputs are prepared for each axis • Encoder input phase A/B/Z NC214/414 Phase difference input : 125kHz (quadruple : 500kHz) NC234/434 Phase difference input : 1MHz (quadruple : 4MHz)	
Pulse output distribution period		Ordinary operation : 1ms Synchronous operation : In accordance with the CPU synchronous operation cycle	
Response time		High-Speed PTP startup : 0.1ms (1 axis) (when CJ2-CPU Ver1.1 or later is used) Ordinary startup : 2ms maximum (4 axes)	
Self-diagnostic function		Flash memory check, memory loss check, CPU bus check	
Error detection function		Overtravel, CPU error, software limit over, emergency stop	

\*1. This indicates the number of occupied words of special I/O Unit area. In addition, this occupies areas that correspond to up to 144 words according to the number of axes and functions which you use.

## Mountable Racks

Model	CJ1/CJ2 Systems		CP1H System	NSJ System	
	CPU Rack	Expansion Rack	CP1H PLC	NSJ Controller	Expansion Rack
CJ1W-NC214/234/414/434	5 Units	5 Units (per 1 Expansion Rack)	Not Supported	Not Supported	5 Units

Note : For this unit, 1 unit must be counted as 2 component unit.

## Ordering Information

### ● CJ-series Units

Unit classification	Name	Specifications		No. of unit numbers allocated	Model	Standards
		Control output interface	No. of axes			
CJ1 Special I/O Units	Position Control Units <b>High-speed type</b>	Pulse-train open-collector output with Pulse Counter Function	2 axes	2	<b>CJ1W-NC214</b>	CE, UL
			4 axes		<b>CJ1W-NC414</b>	
		Pulse-train line-driver output with Pulse Counter Function	2 axes		<b>CJ1W-NC234</b>	
			4 axes		<b>CJ1W-NC434</b>	

Note: The connector is not bundled. Please arrange separately when a special cable is not bought.

### ● Software

Name	Specifications	Model Standards	Model
CX-One FA Integrated Tool Package Ver. 4.□	The CX-One is a package that integrates the Support Software for OMRON PLCs and components  CX-One runs on the following OS: Windows 2000/Service Pack 4 or higher, XP, Vista or 7 Note: Except for 64-bit version. CX-One Ver. 4.□ includes CX-Programmer Ver. 9.□ For details, refer to the CX-One catalog (Cat. No. R134)	1 license * CD	<b>CXONE -AL01C-V4</b>
		1 license * DVD	<b>CXONE -AL01D-V4</b>

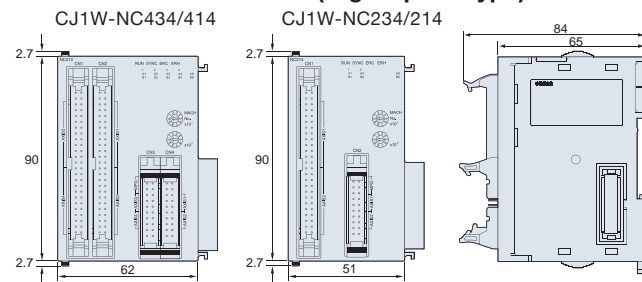
\* Site licenses are available for the CX-One (3, 10, 30, or 50 licenses).  
For details, refer to the CX-One catalog (Cat. No. R134)

### 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, and CE: EC Directives.
- Ask your OMRON representative for the conditions under which the standards were met.

## Dimensions

### ● Position Control Units (High-Speed type)



### Warranty and Limitations of Liability

#### WARRANTY

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### ● Connecting Cables

Name	Applicable units	Applicable drivers	Number of control axes	Cable length	Model
NC214/414: Open collector output type	R88D-GT	R7D-BP	1 axes	1m	<b>XW2Z-100J-G13</b>
			2 axes		<b>XW2Z-100J-G5</b>
	R88D-GT	R7D-BP	1 axes		<b>XW2Z-100J-G16</b>
			2 axes		<b>XW2Z-100J-G8</b>
NC234/434: Line driver output type	R88D-GT	R7D-BP	1 axes		<b>XW2Z-100J-G9</b>
			2 axes		<b>XW2Z-100J-G1</b>
	R88D-GT	R7D-BP	1 axes		<b>XW2Z-100J-G12</b>
			2 axes		<b>XW2Z-100J-G4</b>

Note : Separate cables are also available with the following lengths:  
3 m (for open-collector outputs), 5 m, 10 m (for line-driver outputs).

### ● Devices for External Signal Connection

Name	Specifications	Model
Connecting Cables for Connector Terminal Block	Cable length :2m	<b>XW2Z-200X</b>
Connector Terminal Block	20 Poles	<b>XW2B-20G4</b>
Connector Socket for Servo Drive	applicable wire: AWG 24	<b>XG5M-5032-N</b>
Connector Cover for Servo Drive		<b>XG5S-5022</b>
Cables with Crimp Terminals	20 Poles/2m	<b>XW2Z-100F</b>

Note : Connecting cables for connector terminal block of 0.5m, 1m, 2m, 3m, 5m and 10m are available.  
Use the XG5M/XG5S when making cables on your own.  
Do not use the connecting cables when the XG5M/XG5S are used.  
The XW2B-20G5 and XW2D-20G6 can also be used as the connector terminal block.  
Cables with crimp terminals of 1m, 1.5m, 2m, 3m, 5m, 10m, 15m and 20m are available.

## ■ Related product catalog

<p>AC Servomotors/Servo Drives <b>OMNUC G</b> Cat. No. I814</p>	<p>AC Servomotors/Servo Drives <b>OMNUC G5</b> Cat. No. I815</p>	<p>AC Servomotors/Servo Drives <b>SMARTSTEP 2</b> Cat. No. I813</p>	<p>Programmable Controllers <b>SYSMAC C2</b> Cat. No. P059</p>
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- The application examples provided in this catalog are for reference only. Check functions and safety of the equipment before use.
- Never use the products for any application requiring special safety requirements, such as nuclear energy control systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, or other application involving serious risk to life or property, without ensuring that the system as a whole has been designed to address the risks, and that the OMRON products are properly rated and installed for the intended use within the overall equipment or system.

Note : Do not use this document to operate the Unit.

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