OMRON

Easy Positioning with Direct Operation
A Fast, Easy-to-use, Multiple-axis Position Control System

Control of up to 4 axes with just one Unit.

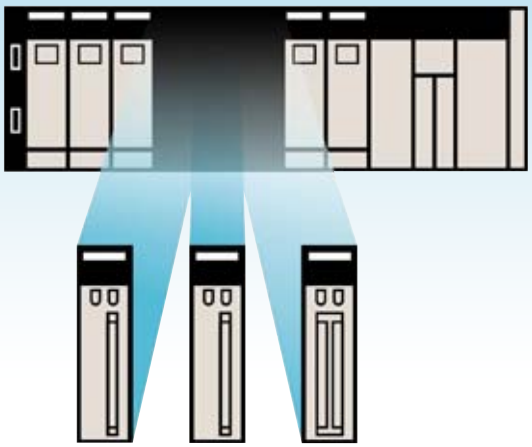
SYSMAC CS1
Position Control Units

CS1W-NC113/NC133/NC213/NC233/NC413/NC433

A Shorter Scan Time Means Faster Control Syst

Control for 1, 2, or 4 Axes with Compact, Single-slot Units

- Position control for up to 4 axes can be performed with just one, single-slot Unit.
- More than one Unit can be mounted to a CS1-series PC to save space when using a combination of Units for multiple-axis position control.



1-axis Unit 2-axis Unit 4-axis Unit

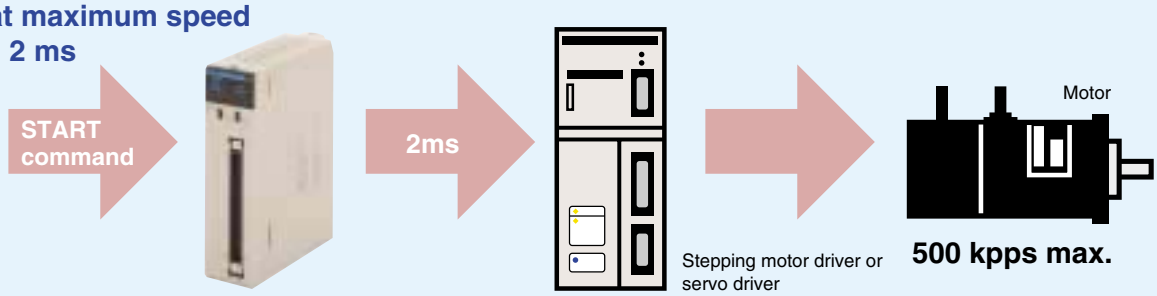
A Complete Selection of Units for a Wide Range of Applications

- Models available with open-collector or line-driver outputs.
- All 1-axis, 2-axis, and 4-axis models are available with either open-collector outputs or line-driver outputs. Choose the model according to the application. (All Units are the same size.)

Models with 1-axis, 2-axis, and 4-axis open-collector outputs

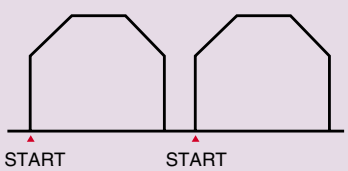
Models with 1-axis, 2-axis, and 4-axis line-driver outputs

Operation at maximum speed in less than 2 ms

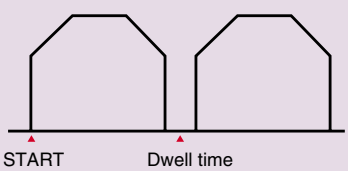


Memory Operation

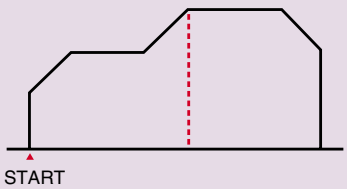
Independent positioning



Automatic positioning



Continuous positioning



ems

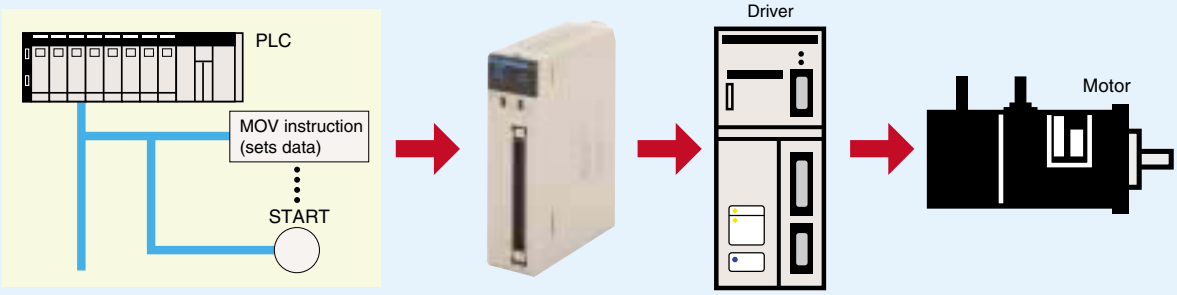
High-speed Startup and High-speed Positioning

- At maximum speed, operation starts within 2 ms in response to a command from the Programmable Controller (PLC). (Refer to the operation manual for details on conditions.)
- Speed data can be set in 1-pps units up to a maximum of 500 kpps, allowing precise control ranging from low to high speeds.
- High-speed data transfer is possible using INTELLIGENT I/O WRITE (IOWR) and INTELLIGENT I/O READ (IORD) instructions.

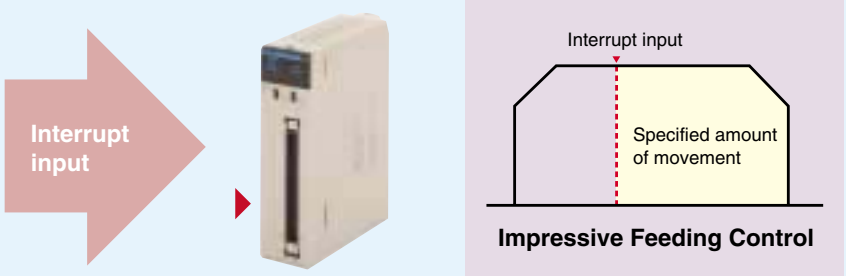
A Wide Range of Positioning Functions

- Positioning can be performed according to position, speed, acceleration, and deceleration data specified directly from the PLC's ladder program (direct operation). Control is possible even when the target position and speed are determined immediately before operation or according to a variety of different conditions. The target position and speed can also be changed during operation.
- With memory operation, positioning is executed according to positioning sequences stored in the PCU's internal memory. Independent positioning, automatic positioning, and continuous positioning patterns can be created from the positioning sequences by using the completion code set for each sequence.
- Interrupt feeding, where the axis is moved when an interrupt signal is input and then stopped after moving a set amount, is also available. The interrupt input signal can be taken at high speed (0.1 ms max.), and so high-precision interrupt positioning is possible. This functionality gives the CS1W-NC□□3 impressive feeding control.

Direct Operation

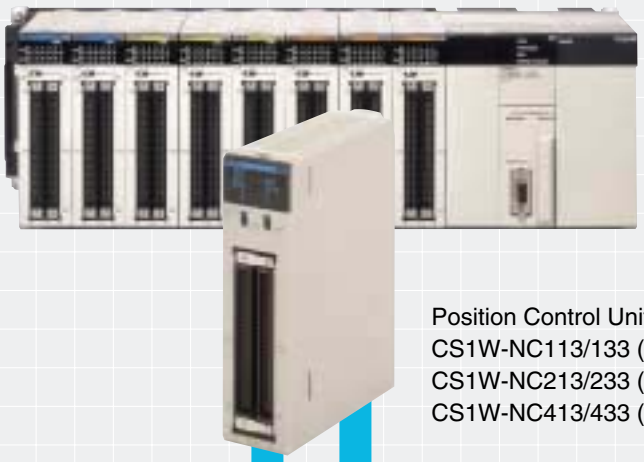


Interrupt Feeding



System Configuration Example

High-precision systems for a wide range of applications can be constructed by combining the Position Control Units with OMRON's high-speed, high-precision Servomotors and Servo Drivers.

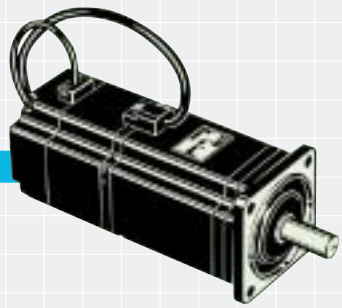


SYSMAC
CS1-series PLC

Position Control Unit
CS1W-NC113/133 (1-axis)
CS1W-NC213/233 (2-axis)
CS1W-NC413/433 (4-axis)

External input
(for 1 to 4 axes)
CCW limit input
CW limit input
Origin proximity input
Emergency stop input

OMNUC W-series
Servo Driver
R88D-WT□



OMNUC W-series
Servomotor
R88M-W□

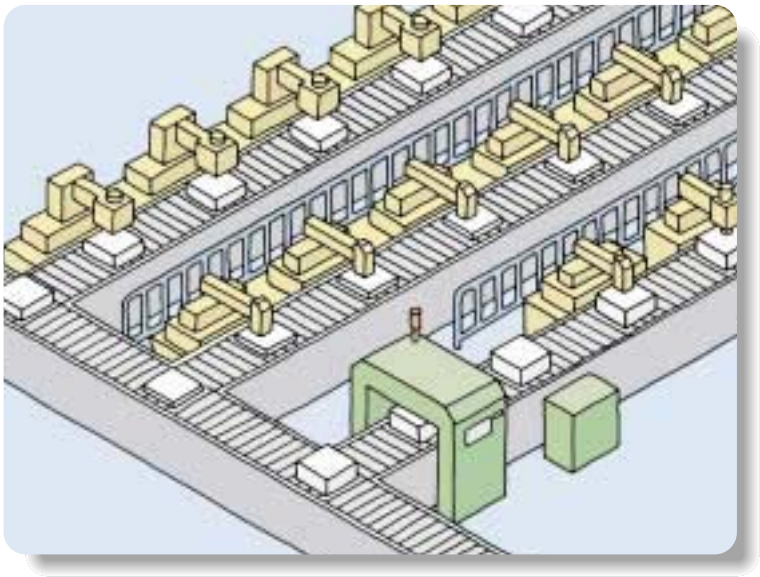
In addition to the OMRON W-series Servomotors and Servo Drivers given above, the Position Control Units can be connected to the following motors and drivers.

- OMNUC U-series AC Servomotors/Servo Drivers: R88D-U□/R88M-U□ (30 to 5,000 W)
- OMNUC U-series UE-model AC Servomotors/Servo Drivers: R88D-UEP□/R88M-UE□ (100 to 750 W)
- OMNUC H-series AC Servomotors/Servo Drivers: R88D-H□/R88M-H□ (50 to 1,100 W)
- OMNUC M-series AC Servomotors/Servo Drivers: R88D-MT□/R88M-M□ (60 to 7,200 W)
- Stepping motors/drivers

Application Example

Production Line

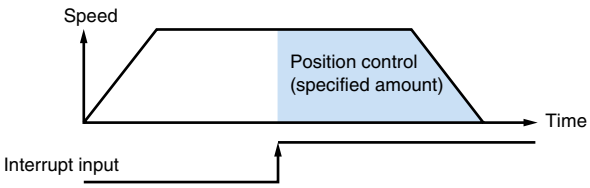
- The number of Position Control Units can be increased according to the number of controlled axes, enabling positioning for several axes with just one PLC.
- The versatility of the PLCs that contain the Position Control Units ensures easy management of different types of data.

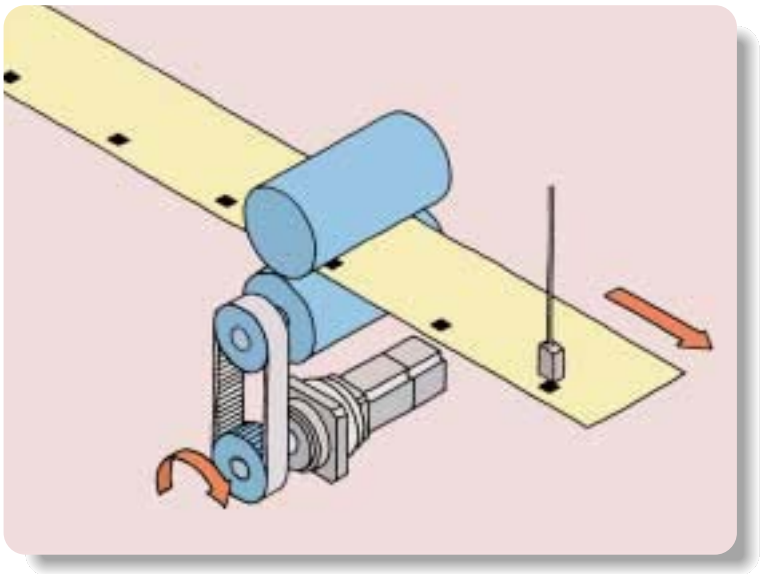


Feeding

- Feeding control, where the workpiece is moved upon detection of a marking position or the edge of a workpiece and then stopped after a set distance, can be achieved using the interrupt feeding function (see note).
- S-curve acceleration/deceleration can be used to reduce slippage of the workpiece or the roller during acceleration or deceleration and thus improve feeding accuracy.

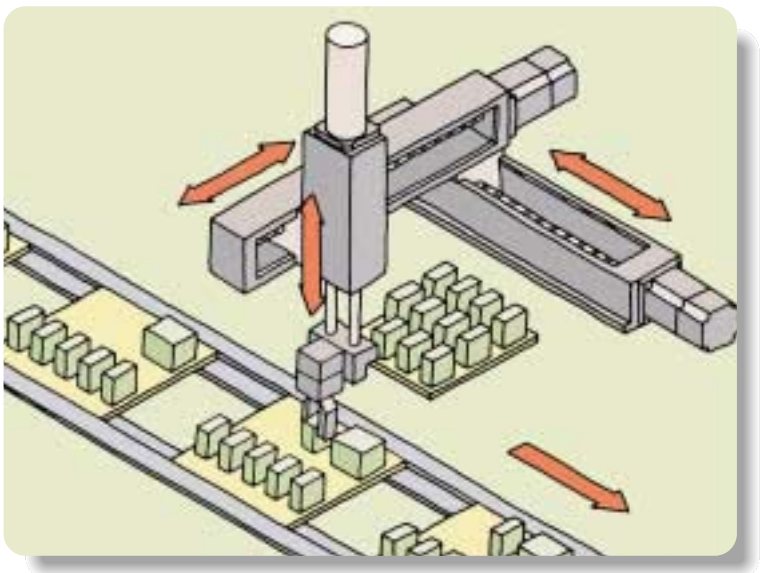
Note: Using the interrupt feeding function, the workpiece is moved a fixed distance when an external input signal is turned ON.





Simple Assembly Machinery

- Position up to 100 points for each axis.
- Operation in emergencies can be easily programmed using direct operation and forced interrupt.



Specifications

Performance Characteristics/Specifications

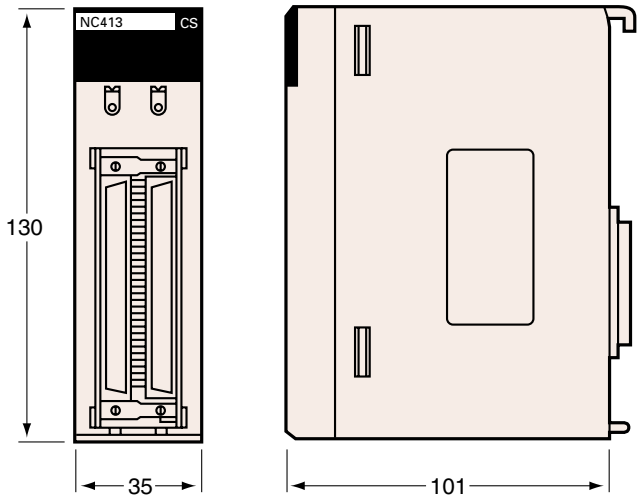
Specification item		Model		
		CS1W-NC113/133	CS1W-NC213/233	CS1W-NC413/433
Applicable PC models		CS1-series PCs		
I/O requirements	Words	5 words	10 words	20 words
	Slots	1 slot		
Controlled driver		Pulse-train input-type servomotor driver or stepping motor driver. NC113/213/413 models have open-collector output. NC133/233/433 models have line-driver output.		
Control	Control system	Open-loop control by pulse train output		
	Number of control axes	1 axis	2 axis	4 axis
Control unit		Pulse		
Positioning functions		Two modes: memory operation and direct operation		
	Independent	1 axis	2 independent axes	4 independent axes
	Linear interpolation	None	2 axes max.	4 axes max.
	Speed control	1 axis	2 independent axes	4 independent axes
	Interrupt feeding	1 axis	2 independent axes	4 independent axes
Positions	Range	-1,073,741,823 to 1,073,741,823 pulses		
	Data items	100/axis		
Speeds	Range	1 pps to 500 Kpps		
	Data items	100/axis		
Acceleration and deceleration times	Range	0 to 250 s, until maximum speed is reached.		
	Data items	9/axis for acceleration and deceleration each.		
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: -1,073,741,823 to 1,073,741,823 pulses Origin search speed: High-speed or proximity-speed can be set. Origin detection method: 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.		
	Dwell times	19/axis can be set from 0 to 9.99 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 present position is within a specified zone. Three zones can be set for each axis.		
	Software limits	Can be set within a range of -1,073,741,823 to 1,073,741,823 pulses.		
	Backlash compensation	0 to 9,999 pulses. Compensation speed can also be set.		
	Teaching	With a command from the PC, the present position can be taken as the position data.		
	Deceleration stop	The STOP command causes positioning to decelerate to a stop according to the specified deceleration time.		
	Emergency stop	Pulse outputs are stopped by an external emergency stop command.		
	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 1% to 999% (by an increment of 1%).		
	Data saving	1) Saving to flash memory. (Can be written 100,000 times.) 2) Reading to PC area by data reading instruction. 3) Reading by Support Software and saving to personal computer hard disk or floppy disk.		
External I/O	Inputs	Prepare the following inputs for each axis: CW and CCW limit input signals, origin proximity input signal, origin input signal, emergency stop input signal, positioning completed signal, interrupt input signal		
	Outputs	Prepare the following outputs for each axis: Pulse outputs, CW/CCW pulses, pulse outputs, and direction outputs can be switched. Either error counter reset or origin-adjustment command outputs can be selected depending on the mode.		
Pulse output distribution period		4 to 8 ms		
Response time		2 ms min. (For details, refer to the Operation Manual.)		
Self-diagnostic functions		Flash memory check, memory loss check, CPU bus check		
Error detection functions		Overtravel, CPU error, software limit over, emergency stop		

Available Models

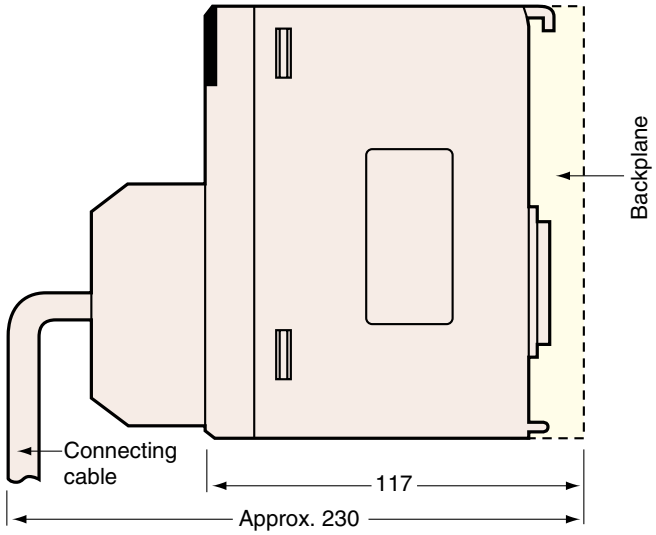
Model number	Specifications
CS1W-NC113	1-axis, open-collector output
CS1W-NC213	2-axis, open-collector output
CS1W-NC413	4-axis, open-collector output
CS1W-NC133	1-axis, line-driver output
CS1W-NC233	2-axis, line-driver output
CS1W-NC433	4-axis, line-driver output

Dimensions

CS1W-NC113/NC133/NC213/NC233/NC413/NC433



Mounted Dimensions



Note: The above diagram shows the CS1W-NC413 as an example.

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

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