CJ-series Position Control Unit with MECHATROLINK-II interface

CJ1W-NC□71

CSM_CJ1W-NC_71_DS_E_9_6

Decrease TCO with Simple Operation, Reduced Wiring, Batch Settings, and Batch Management

- Control Servos for up to 16 axes in a motion network with one Position Control Unit that supports MECHATROLINK-II *.

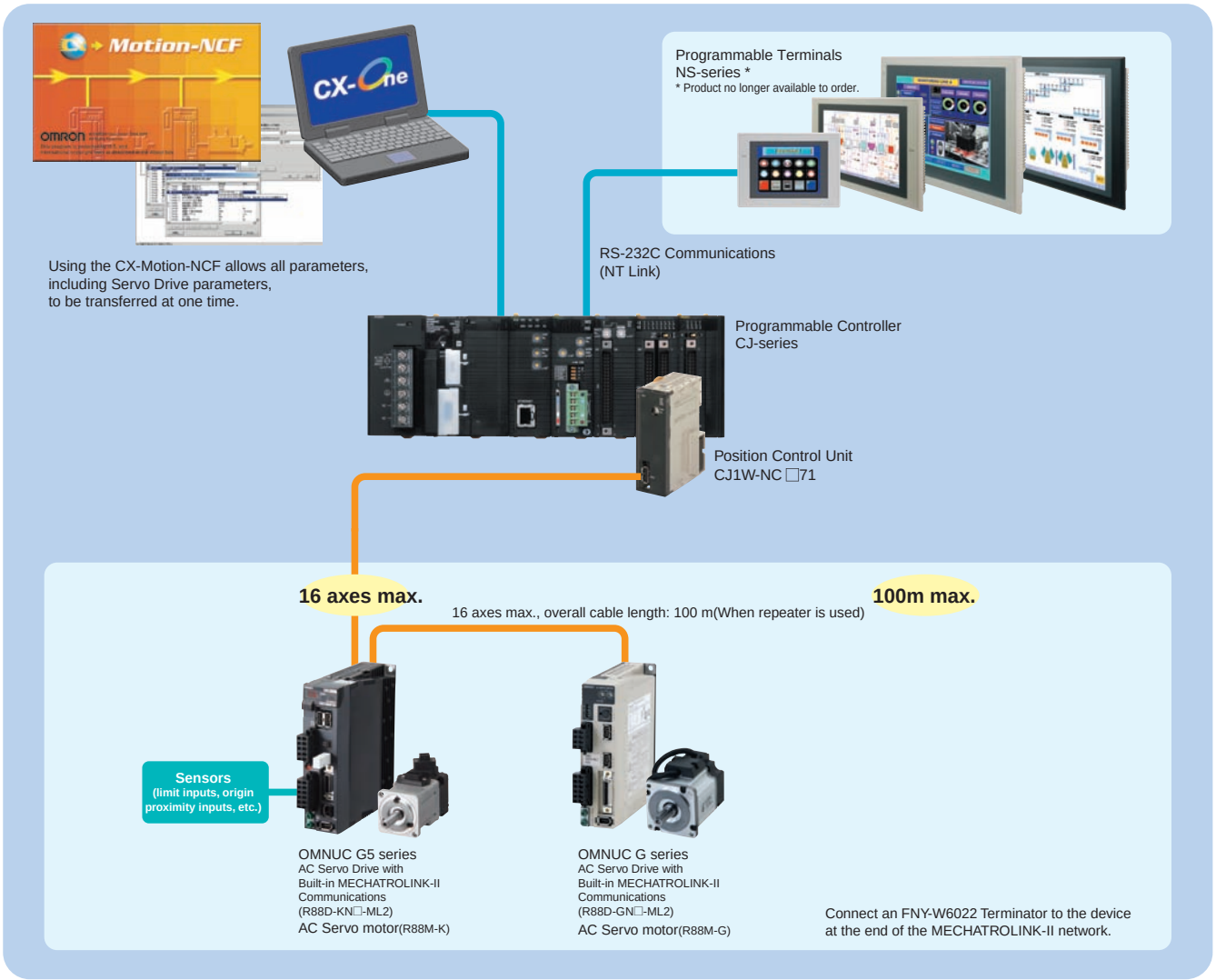
* MECHATROLINK-II is a registered trademark of the MECHATROLINK Members Association.

CJ1W-NCF71

Features

- **Even Smaller**
  Positioning of up to 16 axes can be controlled with a body the size of one CJ-series Unit.
  The compact body provides a perfect fit to meet the need for downsizing of equipment for multi-axis control.
- **Single-cable Connection with Flexible Wiring Placement**
  With MECHATROLINK-II, connecting to the Servo Drive is easy. Just use a single cable (2-core shielded twisted-pair cable). Reduced wiring, with a total cable length of 50 m (or 30 m for 16 axes), allows more freedom in constructing systems.
- **Less Time Spent on Startup and Maintenance**
  Servo parameters can be set from the PLC.
  This means that settings and adjustments can be performed from one location rather than having to connect to each Servo Drive separately.
- **Simple Expansion**
  An easily expandable system can be constructed that is just as efficient now with a few axes or later with up to 16 axes.
- **Linked Operation of Multiple Axes with MA Functionality**
  The addition of an Interpolation Compensation Axis Stop Mode Setting and Interaxial Allowance Deviation Setting to linear interpolation compensation enables easier setting of linked operation between axes.

System Configuration



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, and CE: EC Directives.
- Contact your OMRON representative for further details and applicable conditions for these standards.

CJ-series Units

Unit type	Product name	Specifications		No. of unit numbers allocated	Current consumption (A)		Model	Standards
		Control output interface	No. of axes		5 V	24 V		
CJ1 CPU Bus Units	Position Control Unit with MECHATROLINK-II interface 	Control commands executed by MECHATROLINK-II synchronous communications. Direct operation by ladder programming. Control mode: Position control, speed control, or torque control	2	1	0.36	–	CJ1W-NC271	UC1, CE
			4				CJ1W-NC471	
			16				CJ1W-NCF71	
			16				CJ1W-NCF71-MA	

Note: This unit cannot be used with the Machine Automation Controller NJ-series.

Support Software

Product name	Specifications	Number of licenses	Media	Model	Standards
FA Integrated Tool Package CX-One Ver. 4.□	The CX-One is a comprehensive software package that integrates Support Software for OMRON PLCs and components. CX-One runs on the following OS. OS: Windows XP (Service Pack 3 or higher, 32-bit version) / Windows Vista (32-bit/64-bit version) / 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) CX-One Ver. 4.□ includes CX-Motion-NCF Ver. 1.□. For details, refer to the CX-One catalog (Cat. No. R134).	1 license*	DVD	CXONE-AL01D-V4	–

* Multi licenses (3, 10, 30, or 50 licenses) and DVD media without licenses are also available for the CX-One.

MECHATROLINK-related Devices and Cables (Manufactured by Yaskawa Corporation)

Name		OMRON model number	Yaskawa model number
MECHATROLINK-II Cables (with ring core and USB connector on both ends)	0.5 m	FNY-W6003-A5	JEPMC-W6003-A5
	1.0 m	FNY-W6003-01	JEPMC-W6003-01
	3.0 m	FNY-W6003-03	JEPMC-W6003-03
	5.0 m	FNY-W6003-05	JEPMC-W6003-05
	10.0 m	FNY-W6003-10	JEPMC-W6003-10
	20.0 m	FNY-W6003-20	JEPMC-W6003-20
	30.0 m	FNY-W6003-30	JEPMC-W6003-30
MECHATROLINK-II Terminating Resistor	Terminating resistance	FNY-W6022	JEPMC-W6022
MECHATROLINK-II Repeater	Communications Repeater	---	JEPMC-REP2000-E

Note: MECHATROLINK-related Devices and Cables are manufactured by Yaskawa Corporation, but they can be ordered directly from OMRON using the OMRON model numbers. (Yaskawa-brand products will be delivered even when they are ordered from OMRON.)

Accessories

None

Mountable Racks

Model	NJ system		CJ system (CJ1, CJ2)		CP1H system	NSJ system *1	
	CPU Rack	Expansion Rack	CPU Rack	Expansion Backplane	CP1H PLC	NSJ Controller	Expansion Backplane
CJ1W-NC□71 (-MA)	Not Supported		16 Units max. (10 per Rack)		2 Units *2	Not supported	10 Units

*1. Product no longer available to order.
*2. A CP1W-EXT01 CJ Unit Adaptor is required.

Specifications

General Specifications

Item	Specifications
Model	CJ1W-NC271/471/F71 (-MA)
Internal current consumption	360 mA max. at 5 V DC
Dimensions	31 × 90 × 65 mm (W × H × D)
Weight	95 g max.
Ambient operating temperature	0 to 55°C
Approved standards	CE, cULus, and C-tick

Specifications not listed above conform to general CJ Series specifications.

Functions and Specifications

Item		Specifications
Unit classification		CPU Bus Unit
Applicable PLCs		CJ Series
Possible unit number settings		0 to F
I/O allocations	**Common Operating Memory Area**	Words allocated in CPU Bus Unit Area: 25 words (15 output words, 10 input words)
	Axis Operating Memory Area	Allocated in one of the following areas (user-specified): CIO, Work, Auxiliary, Holding, DM, or EM Area. Number of words allocated: 50 words (25 output words, 25 input words) × Highest axis No. used
Compatible devices		• OMRON G5-series Servo Drives (Built-in MECHATROLINK-II communications) • OMRON G-series Servo Drives (Built-in MECHATROLINK-II communications)
Control method		Control commands executed using MECHATROLINK-II synchronous communications.
Maximum number of controlled axes		CJ1W-NC271: 2 axes, CJ1W-NC471: 4 axes, CJ1W-NCF71: 16 axes
Control units	**Position command unit**	Command unit: Depends on the Electronic Gear Setting in the Servo Parameters. Default setting: Pulses
	Speed command unit for position control	Command units/s
	Acceleration/deceleration speeds for position control	10,000 command units/s^2
	Speed command unit for speed control	0.001% of the motor's momentary maximum rotation speed
	Torque command unit for torque control	0.001% of the motor's momentary maximum torque
Control command range	**Position command range**	-2,147,483,648 to 2,147,483,647 (command units)
	Speed command range for position control	0 to 2,147,483,647 (command units/s)
	Acceleration/deceleration speeds for position control	1 to 65,535 (10,000 command units/s^2)
	Speed command range for speed control	-199.999% to 199.999% The upper limit of the speed command range depends on the specifications of the Servo Drive.
	Torque command range for torque control	-199.999% to 199.999% The upper limit of the torque command range depends on the specifications of the Servo Drive.
Control functions	**Servo lock/unlock**	Creates (Servo lock) or releases (Servo unlock) the position loop on the PCU.
	Position control	Positions to an absolute position or relative position according to the target position and target speed specified from the ladder program.
	Origin determination	• Origin search: Establishes the origin using the specified search method. • Present position preset: Changes the present position to a specified position to establish the origin. • Origin return: Returns the axis from any position to the established origin. • Absolute encoder origin: Establishes the origin using a Servomotor that has an absolute encoder, without having to use an origin search.
	Jogging	Outputs pulses at a fixed speed in the forward rotation or reverse rotation direction.
	Interrupt feeding	Performs positioning by moving the axis a fixed amount when an external interrupt input is received while the axis is moving.
	Speed control	Performs speed control by sending a command to the Servo Drive speed loop.
	Torque control	Performs torque control by sending a command to the Servo Drive current loop.
	Stop functions	• Deceleration stop: Decelerates the moving axis to a stop. • Emergency stop: Positions the moving axis for the number of pulses remaining in the deviation counter and then stops the axis.

Item		Specifications
Auxiliary functions	Acceleration/deceleration curves	Sets one of the following: a trapezoidal (linear) curve, an exponential curve, or an S-curve (moving average).
	Torque limit	Restricts the output torque during axis operation.
	Override	Multiplies the axis command speed by a specified ratio. Override: 0.01% to 327.67%
	Servo parameter transfer	Reads and writes the Servo Drive parameters from the ladder program in the CPU Unit.
	Monitoring function	Monitors the control status of the Servo Drive, such as the command coordinate positions, feedback position, current speed, and torque.
	Software limits	Limits software operation within the positioning range during position control.
	Backlash compensation	Compensates for the amount of play in the mechanical system according to a set value.
	Deviation counter reset	The position deviation in the Servo Drive's deviation counter can be reset to 0 (unit version 1.3 or later).
External I/O	Position Control Unit	One MECHATROLINK-II interface port
	Servo Drive I/O	Forward/reverse rotation limit inputs, origin proximity inputs, external interrupt inputs 1 to 3 (can be used as external origin inputs)
Self-diagnostic functions		Watchdog, flash memory check, memory corruption check
Error detection functions		Overtravel, Servo Drive alarm detection, CPU error, MECHATROLINK communications error, Unit setting error

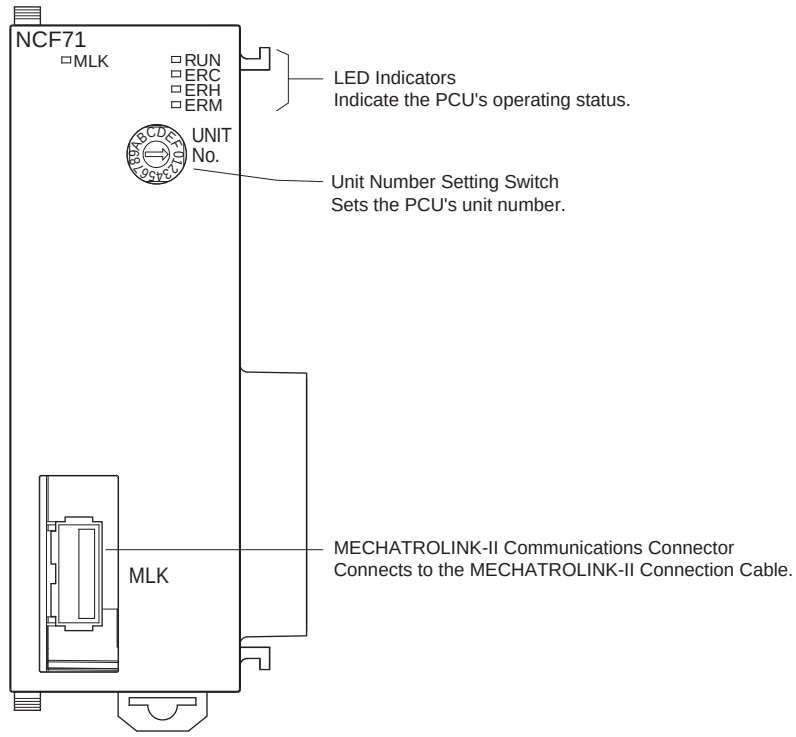
MECHATROLINK Specifications

Item	Specifications
Communications protocol	MECHATROLINK-II
Baud rate	10 Mbps
Maximum transmission distance	50 m *1
Minimum distance between stations	0.5 m
Transmission media	Shielded, twisted-pair cables
Maximum No. of stations	30 slave stations max. *2
Topology	Bus
Transfer cycle	250 μs to 8 ms
Communications method	Master-slave, totally synchronous
Encoding	Manchester encoding
Data length	17 bytes/32 bytes selectable *3

*1. This distance is the total length of the cable connected between devices. However, the maximum length depends on the number of devices connected and whether Repeaters are used.
*2. Up to 16 devices can be connected to the CJ1W-NCF71 (-MA), up to 2 devices can be connected to the CJ1W-NC271, and up to 4 devices can be connected to the CJ1W-NC471.
*3. The PCU data length is fixed at 32 bytes.

External Interface

CJ1W-NC□71 (-MA)



LED Indicators

LED	Name	Color	Status	Details
RUN	Run	Green	Lit	The PCU is operating normally.
			Not lit	Other condition
ERC	Unit Error	Red	Lit	A fatal error has occurred in the PCU and operation cannot continue.
			Flashing	A non-fatal error has occurred in the PCU and operation can continue.
			Not lit	Other condition
ERH	CPU Unit Error	Red	Lit	An error has occurred in the PLC.
			Not lit	Other condition
ERM	MECHATROLINK Device Error	Red	Lit	An error has occurred in MECHATROLINK communications.
			Flashing	An error has occurred in a connected MECHATROLINK device.
			Not lit	Other condition
MLK	MECHATROLINK Communications Status	Yellow	Lit	MECHATROLINK communications in progress
			Not lit	MECHATROLINK communications stopped

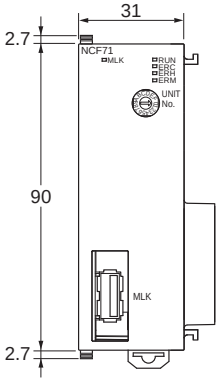
Functions Supported According to Position Control Unit Versions

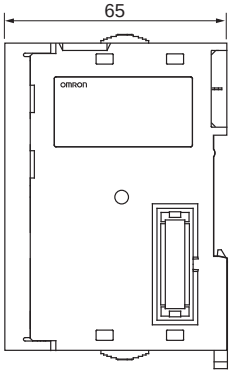
Model	CJ1W-NC□71 (-MA)					
	Unit Ver. 1.0	Unit Ver. 1.1	Unit Ver. 1.2	Unit Ver. 1.3	Unit Ver. 2.0	Unit Ver. 2.1
Linear interpolation	–	Supported.	Supported.	Supported.	Supported.	Supported.
Absolute encoder setup function	–	–	Supported.	Supported.	Supported.	Supported.
Deviation counter reset	–	–	–	Supported.	Supported.	Supported.
Establishing connections even when there are unconnected axes or axes with alarms that cannot be cleared	–	–	–	Supported.	Supported.	Supported.
Transferring servo parameters even when there is an axis error	–	–	–	Supported.	Supported.	Supported.
Creating servo locks during software limit detection when an absolute encoder is used	–	–	–	Supported.	Supported.	Supported.
Driver main circuit OFF error detection only when the servo is locked	–	–	–	Supported.	Supported.	Supported.
Using Holding Area address H512 and onwards for function block address allocations	–	–	–	Supported.	Supported.	Supported.
Addition of rejoin function	–	–	–	–	Supported.	Supported.
Eliminating connection restriction when Servo Drive alarms occur (enabling connection when alarm A.C90 occurs)	–	–	–	–	Supported.	Supported.
Addition of origin search operation modes	–	–	–	–	Supported.	Supported.
Addition of origin search preset function	–	–	–	–	Supported.	Supported.
Faster setting for transfer cycle and communications cycle when setting the absolute encoder PG zero point position offset with an origin search	–	–	–	–	–	Supported.

Dimensions

(Unit: mm)

CJ1W-NC271
CJ1W-NC471
CJ1W-NCF71
CJ1W-NCF71-MA





Related Manuals

Engilsh Cat.No.	Japanese Cat.No.	Model	Name
W426	SBCE-323	CS1W-NC□71/ CJ1W-NC□71(-MA)	CS1W/CJ1W-NC□71(-MA) CS/CJ-series MECHATROLINK-II-compatible Postion Controll Unit User's Manual
W436	SBCE-328	CXONE-AL□□D-V□	CX-Motion-NCF Operation Manual
–	SBCE-055	CS1W-NCF71/CJ1W-NCF71	CS1W-NCF71/CJ1W-NCF71 Position Controll Unit(ONNUC G-series)Technical Guide

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