

CJ-series Position Control Unit with MECHATROLINK-II interface

CJ1W-NC□71

CSM_CJ1W-NC_71_DS_E_6_1

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.

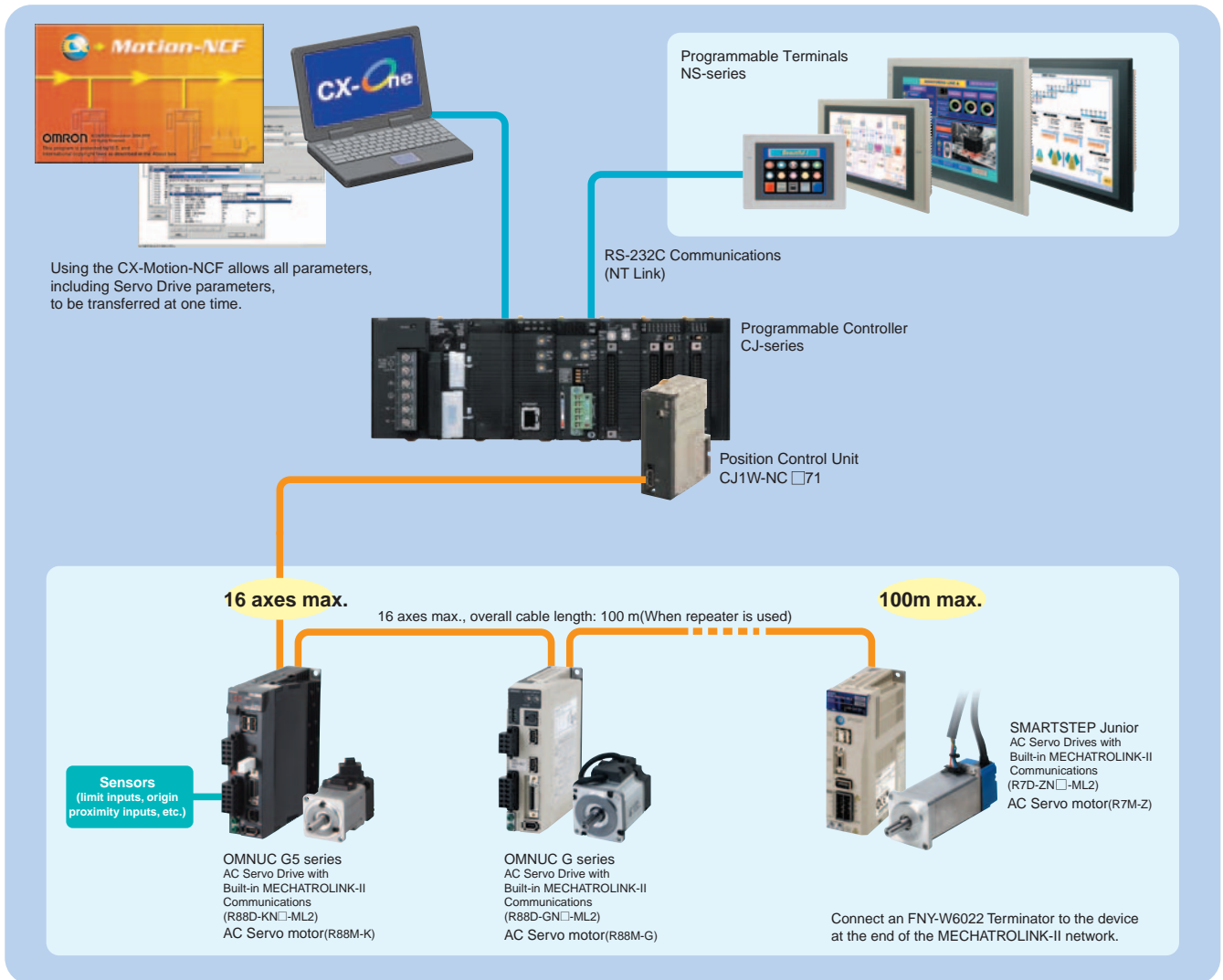


CJ1W-NCF71

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), Vista or 7 Note: Except for Windows XP 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 *1 | DVD *2 | CXONE-AL01D-V4 | - |

*1. Multi licenses are available for the CX-One (3, 10, 30, or 50 licenses).

*2. The CX-One is also available on CD (CXONE-AL□□C-V4).

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 | FNY-REP2000 | JEPMC-REP2000 |

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 | |
|------------------|---------------|----------------|-----------------------------|---------------------|-------------|----------------|---------------------|
| | 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 * | Not supported | 10 Units |

* 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 | <ul style="list-style-type: none"> • OMRON G5-series Servo Drives (Built-in MECHATROLINK-II communications) • OMRON G-series Servo Drives (Built-in MECHATROLINK-II communications) • OMRON SMARTSTEP Junior 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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. |

* SMARTSTEP Junior Servo Drive are supported by Position Control Units with unit version 2.0 or later.

| 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 |

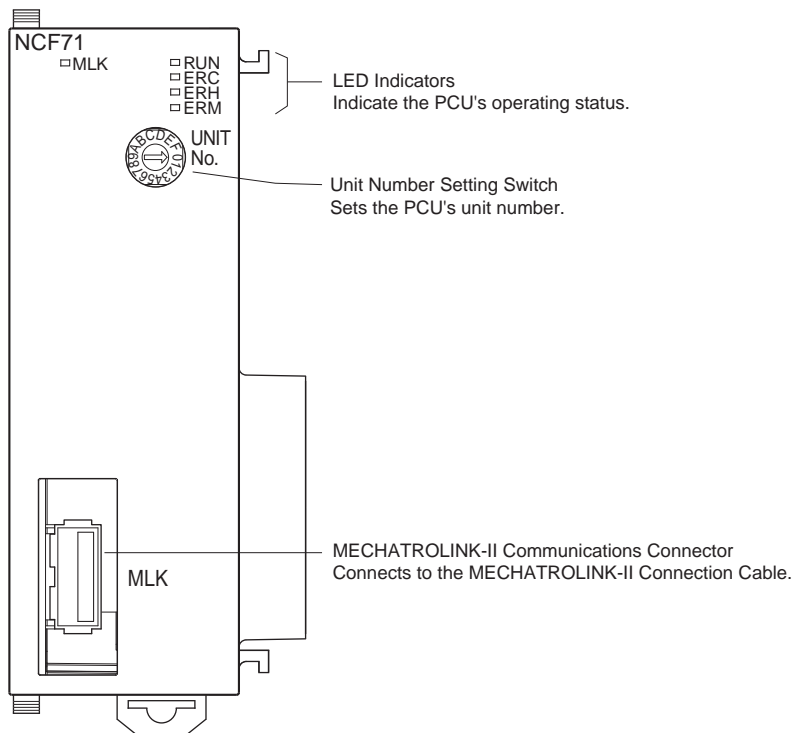
*1. This distance is the total length of the cable connected between devices. However, the maximum length depends on the number of devices connected and whether Repeaters are used.

*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 |

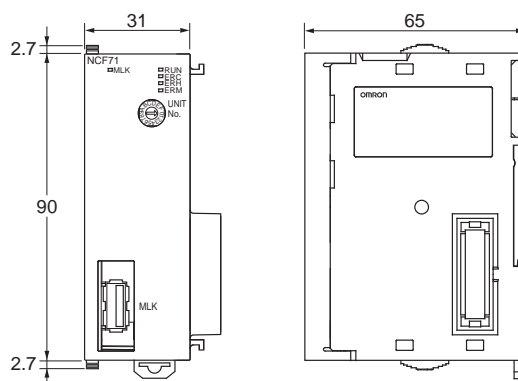
Functions Supported According to Position Control Unit Versions

| 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 supported models: SMARTSTEP Junior Servo Drives (R7D-ZN□-ML2) | – | – | – | – | 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

| English 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 Position Control Unit User's Manual |
| W436 | SBCE-328 | CXONE-AL□□C-V□/ CXONE-AL□□D-V□ | CX-Motion-NCF Operation Manual |
| – | SBCE-055 | CS1W-NCF71/CJ1W-NCF71 | CS1W-NCF71/CJ1W-NCF71 Position Control Unit(ONNUC G-series)Technical Guide |

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