

# CJ1W-MCH71

CSM\_CJ1W-MCH71\_DS\_E\_4\_1

## Improve Equipment Design Efficiency and Shorten Tact Time

- 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.

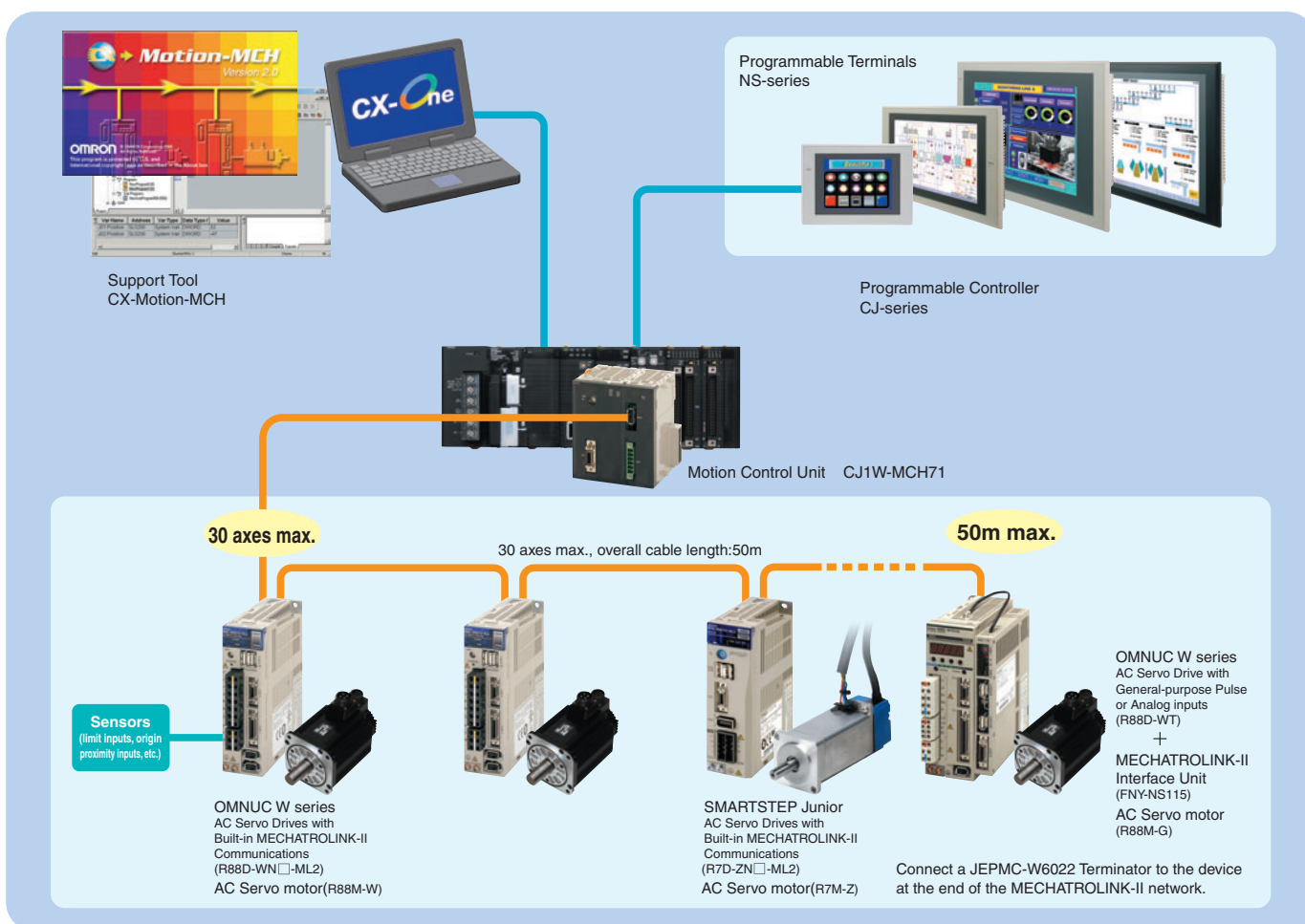


CJ1W-MCH71

## Features

- High-precision motion control with less wiring using MECHATROLINK-II Servo communications with superior concurrency.
- Many synchronization and axis control commands are supported to aid existing synchronized control applications and improve motion control tact time.
- Program control commands (such as branching commands) and various arithmetic operations are supported for maximum motion programming efficiency.

## System Configuration



**Note:** OMNUC G5 series and G series cannot be connected with CJ1W-MCH71.

## 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

| Unit type         | Product name                                                                                                                                   | Specifications                                                                                                                                                                                             | No. of unit numbers allocated | Current consumption (A) |      | Model      | Standards |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------|------|------------|-----------|
|                   |                                                                                                                                                |                                                                                                                                                                                                            |                               | 5 V                     | 24 V |            |           |
| CJ1 CPU Bus Units | <b>Motion Control Unit with MECHATROLINK-II interface</b><br> | Control modes : Position, speed, or torque control via MECHATROLINK-II<br>Control axes : 32 axes max. (30 physical axes, 2 virtual axes)<br>Internal programming language: Special motion control language | 1                             | 0.60                    | –    | CJ1W-MCH71 | UC1, CE   |

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

### Support Software

| Product name                                      | Specifications                                                                                                                                                                                                                                                                                                                                                                     | Number of licenses | Media     | Model          | Standards |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------|----------------|-----------|
| <b>FA Integrated Tool Package CX-One Ver. 4.□</b> | The CX-One is a comprehensive software package that integrates Support Software for OMRON PLCs and components. CX-One runs on the following OS.<br>OS: Windows XP (Service Pack 3 or higher), Vista or 7<br><b>Note:</b> Except for Windows XP 64-bit version<br><br>CX-One Ver. 4.□ includes CX-Motion-MCH Ver. 2.□.<br>For details, refer to the CX-One catalog (Cat. No. R134). | 1 license<br>*1    | DVD<br>*2 | CXONE-AL01D-V4 | –         |
| <b>CAM Data Creation Tool</b>                     | Windows 98SE/Me/NT4.0 (Service Pack6a)/ 2000 (Service Pack 3a or higher), or XP                                                                                                                                                                                                                                                                                                    | 1 licence          | CD        | WS02-MOPC2     | –         |

\*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 Interface Unit                                            | For W-series Servo Driver | FNY-NS115          | JUSP-NS115           |
| 24-VDC I/O Module                                                         | Input : 64<br>Output : 64 | FNY-IO2310         | JEPMC-IO2310         |
| Counter Module                                                            | Reversing Counter 2CH     | FNY-PL2900         | JEPMC-PL2900         |
| Pulse Output Module                                                       | Pulse Positioning 2CH     | FNY-PL2910         | JEPMC-PL2910         |
| MECHATROLINK-II Cables<br>(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-MCH71 | Not supported |                | 12 Units max per CPU Unit<br>(3 Units per Rack) |                     | 2 Units *   | Not supported  | 10 Units            |

\* A CP1W-EXT01 CJ Unit Adaptor is required.

# Specifications

## General Specifications

| Item                          | Specifications                                                                   |
|-------------------------------|----------------------------------------------------------------------------------|
| Model                         | CJ1W-MCH71                                                                       |
| Power supply voltage          | 5 VDC (from Backplane)<br>24 VDC (from external power supply)                    |
| Voltage fluctuation tolerance | 4.5 to 5.5 VDC (from Backplane)<br>21.6 to 26.4 VDC (from external power supply) |
| Internal current consumption  | 5 VDC 0.6 A max.                                                                 |
| Weight (Connectors excluded)  | 210 g max.                                                                       |
| Safety standards              | UL, CSA, C-TICK, and EC Directives.                                              |
| Dimensions (mm)               | 90 (H) × 79.8 (W) × 65 (D) (single)                                              |
| Altitude                      | At 2,000 m elevation or lower.                                                   |

Specifications other than those shown above conform to the general specifications for the CJ series.

## Functions and Performance Specifications

| Item                                                   | Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicable PLC                                         | CJ-series PLCs with CPU Units with unit version 2.0 or later                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Type of Unit                                           | CPU Bus Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Mounting                                               | CPU unit or expansion rack                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Number of Units                                        | One CJ1W-MCH71 Motion Control Unit requires the space of three standard Unit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Method for data transfer with CPU Unit                 | CIO Area for CPU Bus Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                        | Occupies the area for 1 unit (25 words)<br>For units and tasks: 11 to 25 words (Depending on the number of motion tasks)                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                        | DM Area for CPU Bus Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                        | Occupies the area for 1 unit (100 words)<br>For units and tasks: 32 to 74 words (Depending on the number of motion tasks)                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                        | Custom Bit Area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                        | For axes: 0-64 words (Depending on the greatest number of the axis used)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                        | Custom Data Area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                        | For axes: 0-128 words (Depending on the greatest number of the axis used)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                        | Custom Data Area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                        | For General I/O: 0-1280 words (Depending on setting)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Controlled Devices                                     | MECHATROLINK-II below supported <ul style="list-style-type: none"> <li>W-series Servo Driver with built-in communications functions</li> <li>W-series Servo Driver (OMRON) + Communications I/F Unit (YASKAWA)</li> <li>Various I/O units (YASKAWA)</li> <li>SMARTSTEP Junior Servo Drive</li> </ul> Up to 30 nodes<br>* When MECHATROLINK-II devices are connected up to 16 nodes (within 30 m) or 15 nodes (within 50m), a repeater unit is not required. A repeater unit is required to connect MECHATROLINK-II devices more than the cases described above. |
| Built-in program language                              | Dedicated motion control language                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Control                                                | Control method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                        | MECHATROLINK-II <ul style="list-style-type: none"> <li>Position commands, Speed commands, Torque commands</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                        | Number of controlled axes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                        | 32 axes max.<br>Physical axes/Virtual axes: 30 axes max. (Either can be selected for each axis)<br>Dedicated for virtual axes: 2 axes                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Operating modes                                        | RUN mode, CPU mode, Tool mode/System (Depending on the tool)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Automatic/Manual Mode                                  | Automatic mode: Executing built-in programs of MC Unit controls motion.<br>Manual mode: Executing commands from CPU Unit (PC interface area) controls motion.<br><b>Note:</b> The Automatic or Manual Mode is set according to the PC Interface area of the CPU Unit.                                                                                                                                                                                                                                                                                           |
| Control unit                                           | Minimum setting unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                        | 1, 0.1, 0.01, 0.001, 0.0001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                        | Units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                        | mm, inch, deg, pulse                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Maximum position command value                         | -2147483647 to 2147483647 pulses (signed 32-bit)<br>Mode for unlimited axes feeding is possible.<br>Example: With 16-bit encoder (65536 pulse/rev), Minimum setting unit: 0.001 mm, 10 mm/rev, the position command value range will be from -327679999 to 327679999 command units.                                                                                                                                                                                                                                                                             |
| Control operations based on commands from the CPU Unit | Servo lock/unlock                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                        | Executes Servo driver lock or unlock                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                        | Jogging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                        | Executes continuous feeding independently for each axis, by means of speed set in system parameter x override.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                        | STEP operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                        | Feeds a specified distance for a specified axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                        | Origin search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                        | Defines the machines origin according to the search method set in the system parameters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                        | Forced origin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                        | Forcibly sets the present position to 0 to establish it as the origin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                        | Absolute origin setting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                        | Sets the origin when an absolute encoder is used.<br>Offset value: Signed 32-bit (pulses)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                        | Error counter reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                        | Forcibly resets the error counter to 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                        | Present position preset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                        | Sets the present position to a user-specified value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                        | Machine lock                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                        | Prohibits the output of motion commands to the axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                        | Single block                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                        | Executes the motion program one block at a time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                        | Auto/manual change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                        | Switches between auto mode and manual mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|                                                | Item                                                         | Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Control Operations according to motion program | Positioning (PTP)                                            | Executes positioning independently for each axis at the speed set in the system parameters.<br>Simultaneous specification: 8 axes max. /block<br>Simultaneous execution: 32 blocks max. /unit                                                                                                                                                                                                                                                 |
|                                                | Linear interpolation                                         | Executes linear interpolation for up to 8 axes simultaneously at the specified interpolation speed.<br>Simultaneous specification: 8 axes max. /block<br>Simultaneous execution: 32 blocks max. /system                                                                                                                                                                                                                                       |
|                                                | Circular interpolation                                       | Executes clockwise or counterclockwise circular interpolation for two axes at their specified interpolation speed.<br>Simultaneous specification: 2 or 3 axes/block<br>Simultaneous execution: 16 blocks max. /system                                                                                                                                                                                                                         |
|                                                | Origin search                                                | Defines the machine origin according to the search method set in the system parameters.<br>An offset can be specified for the position after the origin search.<br>The absolute encoder can also execute origin search.                                                                                                                                                                                                                       |
|                                                | Interrupt feeding                                            | By means of inputs to the servo driver, moves a specified axis for a specified travel distance to perform positioning.                                                                                                                                                                                                                                                                                                                        |
|                                                | Time-specified Positioning                                   | Executes positioning with time specified.                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                | Traverse function                                            | Performs winding operation (traverse control) with two specified axes.                                                                                                                                                                                                                                                                                                                                                                        |
|                                                | Electronic Cam, Single Axis                                  | Execute cam operation according to the specified cam table data with reference to elapse of time.                                                                                                                                                                                                                                                                                                                                             |
|                                                | Synchronous Electronic cam                                   | Executes cam operation according to the specified cam table data with reference to the position of the specified axis.                                                                                                                                                                                                                                                                                                                        |
|                                                | Link operation                                               | Executes link operation according to set conditions with reference to the position of the specified axis.                                                                                                                                                                                                                                                                                                                                     |
|                                                | Electronic Shaft                                             | Executes synchronous operation at a speed calculated with the speed of the specified axis and gear ratio.                                                                                                                                                                                                                                                                                                                                     |
|                                                | Trailing synchronous operation                               | Executes trailing + synchronous operations with reference to the position of the specified axis.                                                                                                                                                                                                                                                                                                                                              |
|                                                | Speed command                                                | Outputs speed commands to the specified axis.                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                | Torque command                                               | Outputs torque commands to the specified axis.                                                                                                                                                                                                                                                                                                                                                                                                |
| Acceleration/deceleration curve                |                                                              | Trapezoidal or S-shape                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Acceleration/deceleration time                 | Acceleration/deceleration time                               | 60000 ms max.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                | S-shape time constant                                        | 30000 ms max.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| External I/O                                   | For high-speed servo communication bus                       | One port for MECHATROLINK-II                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                | Servo encoder                                                | Incremental rotary encoder<br>Absolute rotary encoder (Unlimited length ABS supported with some conditions)                                                                                                                                                                                                                                                                                                                                   |
|                                                | I/O                                                          | Deceleration stop input (or servo-OFF stop): 1 pt<br>General input: 2 pts<br>General output: 2 pts                                                                                                                                                                                                                                                                                                                                            |
|                                                | External power supply for I/O                                | 24 V                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Feed rate                                      | Rapid feed rate                                              | 1 to 2147483647 [Command unit/min]                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                | Interpolation feed rate                                      | 1 to 2147483647 [Command unit/min]                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                | Override                                                     | Changes the operation speed by applying a given factor to the speed specified by the system parameters or the motion program.<br>0.00 to 327.67% (Setting unit: 0.01%, can be specified for each axis or task)                                                                                                                                                                                                                                |
|                                                | Internal override (supported for unit version 3.1 and later) | The feed rate of the following commands can be set by the motion program.<br>Command      Rate to which override is applied<br>MOVE          Rapid feed rate<br>DATUM        Origin return feed rate<br>MOVEI        Rapid feed rate, external positioning rate<br>MOVET        Rapid feed rate<br>The actual feed rate is calculated using the following formula.<br>Actual feed rate = Axis feed rate × (Axis override + Internal override) |
| Axis control                                   | Backlash compensation                                        | Compensates mechanical backlash (the mechanical play between driving and driven axes) with a value registered in advance.<br>This function uses a parameter in the servo driver.                                                                                                                                                                                                                                                              |
|                                                | In-position                                                  | This function is used whether a positioning is completed or not.<br>This function uses a parameter in the servo driver.                                                                                                                                                                                                                                                                                                                       |
|                                                | Position loop gain                                           | This is the position loop gain of the servo driver.<br>This function uses a parameter in the servo driver.                                                                                                                                                                                                                                                                                                                                    |
|                                                | Feed forward gain                                            | The command values created in the MC Unit are multiplied by this feed forward gain.<br>This function uses a parameter in the Servo Driver.                                                                                                                                                                                                                                                                                                    |

| Item                                                                            |                                                         | Specifications                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Program                                                                         | Number of tasks                                         | Motion task: 8 tasks max.                                                                                                                                                                                                                                                                                                                                   |
|                                                                                 | Parallel branching in task                              | Motion task: 8 branches max.                                                                                                                                                                                                                                                                                                                                |
|                                                                                 | Number of programs                                      | 256 programs max. /unit<br>The program Nos. used for programs are from 0000 to 0999.                                                                                                                                                                                                                                                                        |
|                                                                                 | Program numbers                                         | 0000 to 0499: Main programs for motion tasks<br>0500 to 0999: Sub-programs for motion tasks                                                                                                                                                                                                                                                                 |
|                                                                                 | Program capacity                                        | 2 Mbytes<br>8000 blocks max. /unit by motion program conversion.                                                                                                                                                                                                                                                                                            |
|                                                                                 | Number of blocks                                        | 800 blocks/program                                                                                                                                                                                                                                                                                                                                          |
|                                                                                 | Position data capacity                                  | 10240 points/unit                                                                                                                                                                                                                                                                                                                                           |
|                                                                                 | Sub-program nesting                                     | 5 levels max.                                                                                                                                                                                                                                                                                                                                               |
|                                                                                 | Start                                                   | Starts program operation from program (of another task)                                                                                                                                                                                                                                                                                                     |
|                                                                                 | Start mode                                              | Motion task: Initial, continue, next                                                                                                                                                                                                                                                                                                                        |
|                                                                                 | Deceleration stop                                       | Motion task: Executes deceleration stop regardless of block                                                                                                                                                                                                                                                                                                 |
|                                                                                 | Block stop                                              | Motion task: Executes deceleration stop at the end of the block currently being executed.                                                                                                                                                                                                                                                                   |
|                                                                                 | Single-block mode                                       | Motion task: the program is executed one block at a time.                                                                                                                                                                                                                                                                                                   |
|                                                                                 | Breakpoints (supported for unit version 3.0 and later.) | Breakpoints can be set for any block using the Support Tool. When a breakpoint is set for a block, program execution will stop after that block has been executed.                                                                                                                                                                                          |
| Saving program data                                                             | MC Unit                                                 | Flash memory backup                                                                                                                                                                                                                                                                                                                                         |
| Zones (supported for unit version 3.0 and later.)                               |                                                         | The zone bit turns ON when any variable (including feedback present position, feedback speed, etc.) is within the set range, and OFF when outside of the set range.<br>A maximum of 32 zones can be set.                                                                                                                                                    |
| Data tracing (supported for unit version 3.0 and later.)                        |                                                         | A maximum of two groups can be simultaneously traced, with 1 to 16 data items in each group.<br><b>Note:</b> The items that can be traced are bits and data. These are each handled as a single item.<br>The number of data samples that can be collected is 2,048 samples when 16 items are set for tracing to 32,768 when only 1 item is set for tracing. |
| Self-diagnostic function                                                        |                                                         | Watchdog, FLASH-ROM check, RAM check, etc.                                                                                                                                                                                                                                                                                                                  |
| Error detection function                                                        |                                                         | Deceleration stop input, unit number error, CPU Unit error, software limit over errors, etc.                                                                                                                                                                                                                                                                |
| Error log function                                                              |                                                         | The error log is to be read from the CPU Unit by means of the IORD instructions as needed.                                                                                                                                                                                                                                                                  |
| Alarm reset                                                                     |                                                         | Alarm reset                                                                                                                                                                                                                                                                                                                                                 |
| Program and CAM data read protection (supported for unit version 3.1 and later) |                                                         | Third party access to program and CAM data can be restricted using the CX-Motion-MCH version 2.1 read protection function (password setting).                                                                                                                                                                                                               |

## Functions

### Electronic Shaft (Electronic Gear) (CONNECT)

This function synchronizes with the main axis at the specified gear ratio. It allows for reductions in mechanical functions and labor requirements for machinery maintenance.

### Electronic Cam (CAM, CAMBOX)

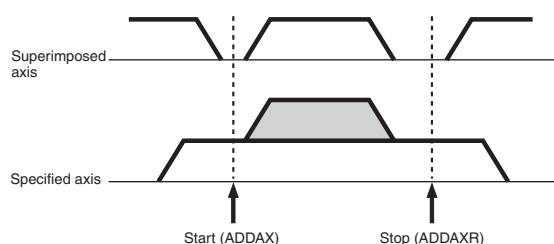
An independent electronic cam can be positioned according to execution times specified in the cam data, and a synchronized electronic cam can be operated according to a cam table in synchronization with a specified main axis. A total of 16,000 points for all Units combined can be included for the cam data, and 32 cam tables can be set, enabling complex operations.

### Virtual Axes

Any axis can be set as an axis performing an ideal movement. Setting it as the main axis for synchronized control simplifies design and debugging of programs and adjustment of synchronized operations. Also, when slippage occurs in motor operation and workpiece operation, the amount of compensation (for the amount of slippage) can be set as the target value for the virtual axis, and the compensation operation can be easily executed by means of the add axis travel function.

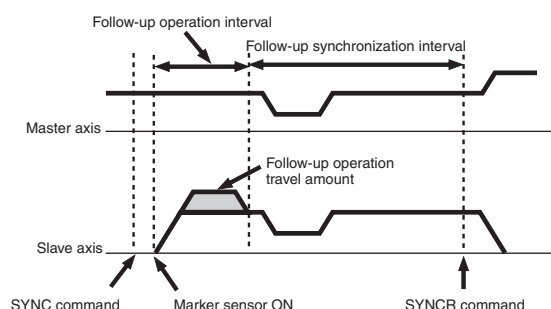
### Add Axis Travel (ADDAX, ADDAXR)

This function adds the operation of a superimposed axis to a specified axis, making it easy to perform compensation in feeder and synchronization operations.



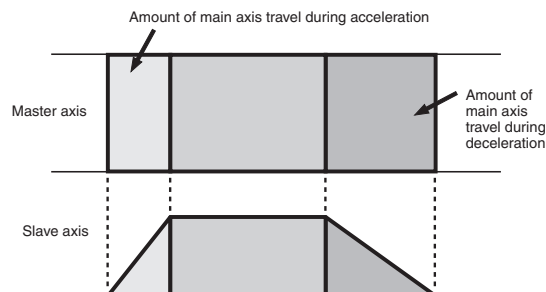
### Follow-up Synchronization (SYNC, SYNCR)

From standby status, this function starts follow-up operation when the marker sensor turns ON and executes follow-up synchronization with the main axis. This is ideal for applications that process workpieces without stopping the line.



### Electronic Links (SYNC)

This function enables the specified synchronized operation with acceleration at the start of synchronization, a ratio during synchronization, and deceleration at the end of synchronization. These specifications are specific for the actual application operation, enabling easy achievement of various types of synchronization operations.



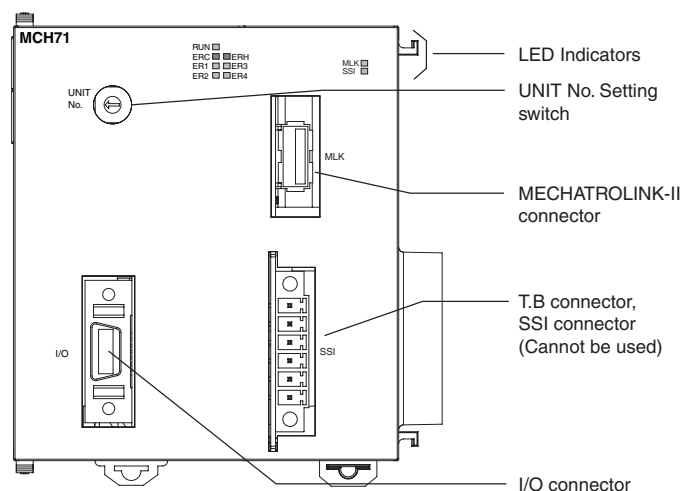
### Other Operations

Various applications are made possible by means of a wide range of commands, such as MOVE TIME (MOVET), CHANGE TARGET (MOVEMODI), LATCH (LATCH: With hardware latch and window functions), TRAVERSE (MOVETRAV), TORQUE (TORQUE, TORQUER), SPEED (SPEED, SPEEDR).

# Commands

| Classification                        | Name                                                                 | Command                            | Function                                                                                                      |
|---------------------------------------|----------------------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Axis movement                         | MOVE, LINEAR INTERPOLATION, CIRCULAR INTERPOLATION                   | MOVE, MOVEL, MOVEC                 | Moves axes individually, or using linear or circular interpolation.                                           |
|                                       | ORIGIN SEARCH                                                        | DATUM                              | Finds the machine origin according to input signals.                                                          |
|                                       | INTERRUPT INCHING                                                    | MOVEI                              | Changes the position by inching according to input signals.                                                   |
|                                       | MOVE TIME                                                            | MOVET                              | Positions according to a specified time.                                                                      |
|                                       | TRAVERSE                                                             | MOVETRAV                           | Executes a winding operation.                                                                                 |
|                                       | INDEPENDENT ELECTRONIC CAM                                           | CAM                                | Executes cam operations according to a table.                                                                 |
| Starting and stopping axis operations | LINK                                                                 | MOVELINK                           | Synchronizes with the main axis with acceleration and deceleration.                                           |
|                                       | SYNCHRONIZED ELECTRONIC CAM                                          | CAMBOX                             | Executes a cam operation according to a table and main axis.                                                  |
|                                       | ELECTRONIC SHAFT                                                     | CONNECT                            | Synchronizes at fixed rate to main axis.                                                                      |
|                                       | FOLLOW-UP SYNCHRONIZATION                                            | SYNC                               | Follows and synchronizes with the main axis.                                                                  |
|                                       | STOP SYNCHRONIZATION                                                 | SYNCR                              | Stops MOVELINK, CAMBOX, CONNECT, and SYNC.                                                                    |
|                                       | ADD AXIS TRAVEL                                                      | ADDAX, ADDAXR                      | Starts and stops the accumulation of travel amounts between axes.                                             |
|                                       | START SPEED, END SPEED                                               | SPEED, SPEEDR                      | Outputs and stops a speed reference.                                                                          |
|                                       | START TORQUE, END TORQUE                                             | TORQUE, TORQUER                    | Outputs and stops a torque reference.                                                                         |
| Settings                              | CHANGE TARGET                                                        | MOVEMODI                           | Changes the target position for the axis that is travelling.                                                  |
|                                       | ABSOLUTE SPECIFICATION, INCREMENTAL SPECIFICATION                    | ABL, INC                           | Handles coordinates as absolute or incremental values.                                                        |
|                                       | CHANGE PARAMETER                                                     | PARAM                              | Changes parameter values at one time.                                                                         |
|                                       | PASS MODE                                                            | PASSMODE                           | Specifies operations with interpolation blocks connected.                                                     |
|                                       | STOP MODE                                                            | STOPMODE                           | Waits for the interpolation block to be in position.                                                          |
|                                       | SELECT MACHINE COORDINATE SYSTEM, SELECT WORKPIECE COORDINATE SYSTEM | ORIGIN, WORK                       | Selects either the machine coordinate system or the workpiece coordinate system.                              |
|                                       | CHANGE WORKPIECE ORIGIN OFFSET                                       | OFFPOS                             | Changes the offset of the workpiece coordinate system.                                                        |
|                                       | LATCH                                                                | LATCH                              | Latches the present position.                                                                                 |
|                                       | IGNORE SINGLE BLOCK                                                  | NSTOP                              | Ignores single block mode.                                                                                    |
| Controls                              | PROGRAM START, PROGRAM END                                           | PROG, END                          | Marks the beginning or end of a program.                                                                      |
|                                       | SUBPROGRAM CALL, SUBPROGRAM END                                      | GOSUB, RETURN                      | Calls a subprogram or ends a subprogram and returns to the source of the call.                                |
|                                       | DWELL, WAIT                                                          | DWELL, WAIT                        | Waits for a specified length of time or for a specified condition to be met and then executes the next block. |
|                                       | OPTIONAL END                                                         | STOPOP                             | Stops the block being executed when a specified condition is met.                                             |
|                                       | Conditional Branching                                                | IF, ELS, ENDIF                     | Branches according to conditions.                                                                             |
|                                       | WHILE Repeat Commands                                                | WHILE, WEND                        | Repeats until any specified condition is met.                                                                 |
|                                       | FOR Repeat Commands                                                  | FOR, NEXT                          | Repeats until specified count (constant, variable, or immediate) is met.                                      |
|                                       | Parallel Execution                                                   | PARALLEL, JOINT, JWAIT             | Executes in parallel for the specified interval.                                                              |
|                                       | Selected Execution                                                   | SWITCH, CASE, BREAK, DEFAULT, SEND | Switches and executes the specified section according to conditions.                                          |
|                                       | NO OPERATION SINGLE, NO OPERATION MULTIPLE                           | NOPS, NOPM                         | Nothing is executed. (Single or multiple execution command)                                                   |
| Simple operations                     | SUBSTITUTION                                                         | =                                  | Substitutes values for variables.                                                                             |
|                                       | Arithmetic Operations                                                | +, -, *, / , ^                     | Performs addition, subtraction, multiplication, division, and power operations.                               |
|                                       | REMAINDER                                                            | %                                  | Finds the remainder in division operations.                                                                   |
| Logical operations                    | OR/XOR/AND/NOT                                                       | , ., &, !                          | Performs logical OR, XOR, AND, and NOT operations.                                                            |
| Functions                             | ABSOLUTE                                                             | ABS                                | Finds the absolute value.                                                                                     |
|                                       | SINE, COSINE, ASINE, ACOSINE                                         | SIN, COS, ASIN, ACOS               | Finds the sine, cosine, arcsine, or arccosine.                                                                |
|                                       | TANGENT, ATANGENT                                                    | TAN, ATAN                          | Finds the tangent or arctangent.                                                                              |
|                                       | SQUARE ROOT, EXPONENT, LOGARITHM                                     | SQR, EXP, LOG                      | Finds the square root, exponent, or logarithm.                                                                |
|                                       | FRACTION                                                             | FRAC                               | Finds the decimal portion.                                                                                    |
|                                       | SIGN                                                                 | SGN                                | 1 if greater than 0, and -1 if negative.                                                                      |
| Bit operations                        | BIT ON, BIT OFF                                                      | SET, RESET                         | Turns a specified bit ON or OFF.                                                                              |
|                                       | RIGHT SHIFT, LEFT SHIFT                                              | SFTR, SFTL                         | Shifts right or left for the specified number of bits.                                                        |
| Data operations                       | BCD → BIN/BIN → BCD                                                  | BIN, BCD                           | Converts from BCD to binary, or from binary to BCD.                                                           |
|                                       | BLOCK TRANSFER, BLOCK CLEAR                                          | XFER, CLEAR                        | Transfers or clears a block of data.                                                                          |

## External Interface



## LED Indicators



| Name                             | Color  | Status  | Content                                      |
|----------------------------------|--------|---------|----------------------------------------------|
| RUN<br>(RUN)                     | Green  | Lit     | Motion Control Unit is operating normally.   |
|                                  |        | Not lit | Not recognized by PLC, or MC Unit is broken. |
| ERC<br>(MC Unit Error)           | Red    | Lit     | An error has occurred in the MC Unit.        |
|                                  |        | Not lit | MC Unit is operating normally.               |
| ERH<br>(CPU Unit Error)          | Red    | Lit     | An error has occurred in the CPU Unit.       |
|                                  |        | Not lit | CPU Unit is operating normally.              |
| ER1 *<br>(Internal error status) | Yellow | Lit     | An internal error has occurred.              |
|                                  |        | Not lit | MC Unit is operating normally.               |
| ER2 *<br>(Internal error status) | Yellow | Lit     | An internal error has occurred.              |
|                                  |        | Not lit | MC Unit is operating normally.               |
| ER3 *<br>(Internal error status) | Yellow | Lit     | An internal error has occurred.              |
|                                  |        | Not lit | MC Unit is operating normally.               |
| ER4 *<br>(Internal error status) | Yellow | Lit     | An internal error has occurred.              |
|                                  |        | Not lit | MC Unit is operating normally.               |
| SSI                              | Yellow | Lit     | Not used.                                    |
|                                  |        | Not lit | Not used.                                    |
| MLK<br>(MECHATROLINK-II)         | Yellow | Lit     | MLK is operating normally.                   |
|                                  |        | Not lit | An error has occurred in the MLK.            |

\* When the ERC or ERH indicator is lit, these four indicators show the internal error status.

## Functions Supported by CJ1W-MCH71 Units Version 2.1 or Later

| Unit version                     |                                                                           | Unit Ver. 2.0                                                                                                                                                                                                                         | Unit Ver. 2.1 | Unit Ver. 3.0 | Unit Ver. 3.1 |
|----------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|---------------|
| Internal system software version |                                                                           | 1.05                                                                                                                                                                                                                                  | 1.06          | 1.07          | 1.09          |
| MC Unit model                    |                                                                           | CJ1W-MCH71                                                                                                                                                                                                                            |               |               |               |
| Functions                        | Reading unit version function                                             | Not supported                                                                                                                                                                                                                         | Supported     | Supported     | Supported     |
|                                  | Expanded allocations in Custom I/O Area                                   | Not supported                                                                                                                                                                                                                         | Supported     | Supported     | Supported     |
|                                  | Data tracing                                                              | Not supported                                                                                                                                                                                                                         | Not supported | Supported *1  | Supported *1  |
|                                  | Debugging                                                                 | Not supported                                                                                                                                                                                                                         | Not supported | Supported *1  | Supported *1  |
|                                  | Zones                                                                     | Not supported                                                                                                                                                                                                                         | Not supported | Supported *1  | Supported *1  |
|                                  | Signed master axis MOVELINK command                                       | Not supported                                                                                                                                                                                                                         | Not supported | Supported     | Supported     |
|                                  | Indirect writing of position data                                         | Not supported                                                                                                                                                                                                                         | Not supported | Supported     | Supported     |
|                                  | Setting the number of parallel branches for each task                     | Not supported                                                                                                                                                                                                                         | Not supported | Supported *1  | Supported *1  |
|                                  | Present position preset to establish origin                               | Not supported                                                                                                                                                                                                                         | Not supported | Supported *1  | Supported *1  |
|                                  | Status of program start bit                                               | Not supported                                                                                                                                                                                                                         | Not supported | Supported     | Supported     |
|                                  | Servo OFF for deceleration stop signal                                    | Not supported                                                                                                                                                                                                                         | Not supported | Supported *1  | Supported *1  |
|                                  | Re-execution of WAIT command                                              | Not supported                                                                                                                                                                                                                         | Not supported | Supported     | Supported     |
|                                  | Main power status                                                         | Not supported                                                                                                                                                                                                                         | Not supported | Supported     | Supported     |
|                                  | Servo Driver status                                                       | Not supported                                                                                                                                                                                                                         | Not supported | Supported     | Supported     |
|                                  | Increased precision of CAMBOX command                                     | Not supported                                                                                                                                                                                                                         | Not supported | Supported     | Supported     |
|                                  | Improved restarting after restoration                                     | —                                                                                                                                                                                                                                     | —             | —             | Supported     |
|                                  | Expanded bank switching for interpolation acceleration/deceleration times | —                                                                                                                                                                                                                                     | —             | —             | Supported     |
|                                  | Internal overrides                                                        | —                                                                                                                                                                                                                                     | —             | —             | Supported     |
|                                  | Connecting to SMARTSTEP Junior Servo Drivers                              | —                                                                                                                                                                                                                                     | —             | —             | Supported *2  |
|                                  | Improved backup and restore functions                                     | —                                                                                                                                                                                                                                     | —             | —             | Supported *2  |
|                                  | Program and CAM data read protection                                      | —                                                                                                                                                                                                                                     | —             | —             | Supported *2  |
| Applicable Support Tool          |                                                                           | CX-Motion-MCH<br>• Functions for unit version 3.0 indicated by “*1” can be used with CX-Motion-MCH version 2.0 or higher.<br>• Functions for unit version 3.1 indicated by “*2” can be used with CX-Motion-MCH version 2.1 or higher. |               |               |               |

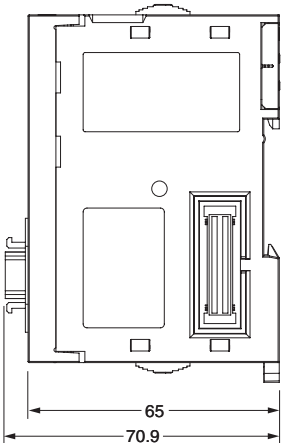
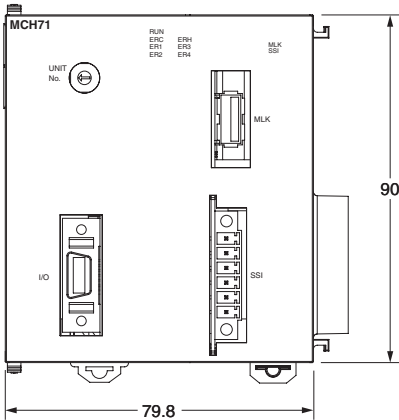
## CJ1W-MCH71 Unit Versions and Manufacturing Dates/Lot Numbers

| Classification | Type    | Model      | Manufacturing dates       |                                                 |                                                 |                                                 |
|----------------|---------|------------|---------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
|                |         |            | Up to early November 2004 | From middle of November 2004                    | From early June 2005                            | From early July 2007                            |
| CPU Bus Unit   | MC Unit | CJ1W-MCH71 | Unit version 2.0          | Unit version 2.1<br>(Lot No.: 041117 and later) | Unit version 3.0<br>(Lot No.: 050615 and later) | Unit version 3.1<br>(Lot No.: 070615 and later) |

Dimensions

(Unit: mm)

CJ1W-MCH71



Related Manual

| English Cat. No. | Japanese Cat. No. | Model                             | Name                                                                                               |
|------------------|-------------------|-----------------------------------|----------------------------------------------------------------------------------------------------|
| W435             | SBCE-327          | CS1W-MCH71/CJ1W-MCH71             | CS1W-MCH71/CJ1W-MCH71<br>CS/CJ-series MECHATROLINK-II-compatible Motion Control Unit User's Manual |
| W448             | SBCE-336          | CXONE-AL□□C-V□/<br>CXONE-AL□□D-V□ | CX-Motion-NCH<br>Operation Manual                                                                  |
| —                | SBCE-046          | CS1W-MCH71/CJ1W-MCH71             | CS1W-MCH71/CJ1W-MCH71<br>Motion Control Unit (ONNUC W-series) Technical Guide                      |

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