CS1W-MCH71 - MECHATROLINK-II

Motion control unit

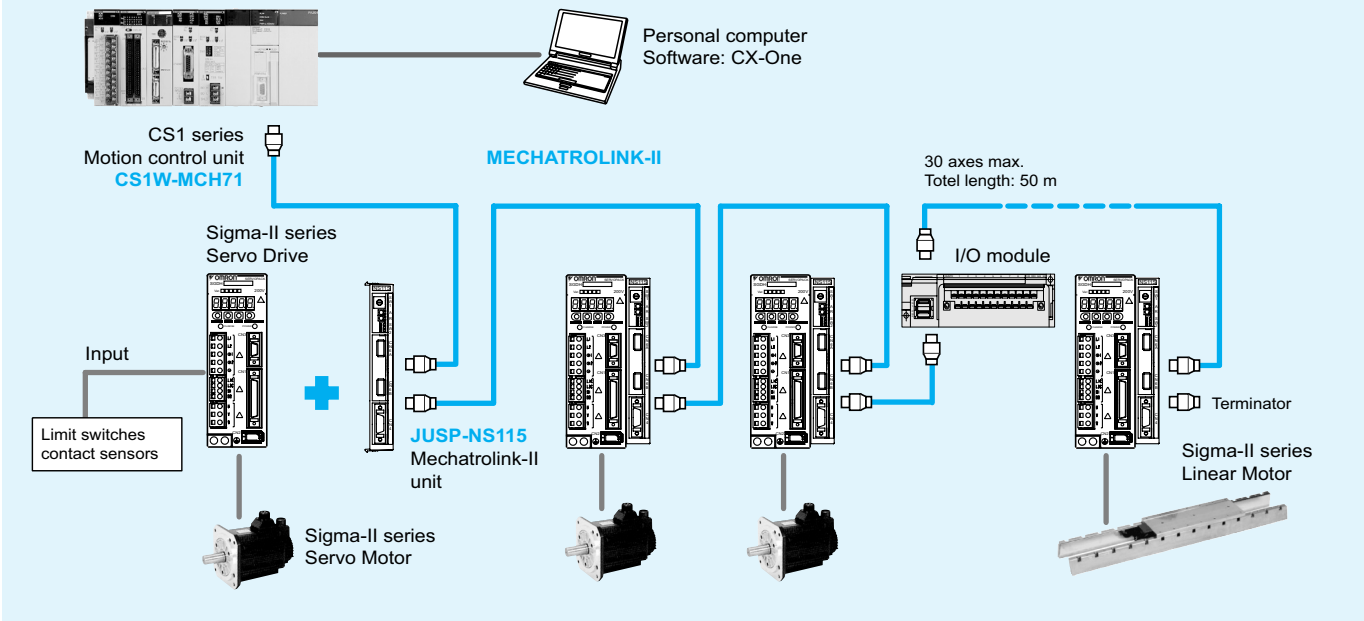
Multi-axes motion control via high-speed MECHATROLINK-II

- Up to 30 axes controlled with minimum wiring
- High-speed bus MECHATROLINK-II is specially designed for motion control
- Supports position, speed and torque control
- Electronic CAM profiles and axes synchronization
- Hardware registration input for every axis
- Program control commands, like multi-task, parallel programming and various arithmetic operations for maximum program efficiency
- Smart active parts for OMRON HMIs
- Access to the complete system from one point

Function

Multi-axes control is made easy by freely combining control axes. Up to 32 axes can be used, including 30 physical axes and two virtual axes, and each axis can be set individually. Position control, synchronized control (electronic gear, electronic cam, follow-up), speed control, and torque control are all supported, enabling a wide range of applications. By using the high-speed servo communications MECHATROLINK-II, motion programs, system parameters, system data, and servo drive parameters can be set and read from the software tool.

System configuration



Specifications

Motion control unit

Model		CS1W-MCH71
Classification		CS-series CPU bus unit
Applicable PLCs		CS-series, (CS1□-CPU□□H)
Backplanes on which MC unit can be mounted		CPU backplane or CS-series expansion I/O backplane
Control method		MECHATROLINK-II (position, speed and torque control)
Controlled devices		Sigma-II series servo drives (ver. 38 or later) with MECHATROLINK-II Interface, various I/O units and inverters V7, F7, G7 with MECHATROLINK-II interface (for inverter version support contact your OMRON sales office)
Programming language		BASIC type motion control language
Controlled axes		32 max, including 30 physical or virtual axes and 2 virtual axes
Operating modes		RUN mode, CPU mode, Tool mode/system (depending on tool)
Automatic/manual mode		Automatic mode: mode for executing programs in the unit Manual mode: mode for executing commands from the CPU unit (via allocated words)
Minimum setting unit		1, 0.1, 0.01, 0.001, 0.0001 (unit: mm, inch, degree, pulse)
Maximum command value		-2,147,483,648 to 2,147,483,647 pulses (32 bits with sign); infinite axis feed mode supported. Example: 16,384 pulses/rev after multiplication, a minimum setting unit of 0.001 mm and 1 mm/rev would result in -1,310,720,000 to 1,310,719,999 command units.
Control functions by command from CPU unit	Servo lock/unlock	Locks and unlocks the servo driver.
	Jogging	Executes continuous feeding for each axis independently at selectable speed.
	Origin search	Determines the machine origin in the direction set in the system parameters. Can be executed with an absolute encoder.
	Absolute origin setting	Sets the origin for when an absolute encoder is used. (Offset value: 32 bits [pulses] with sign)
	Machine lock	Stops the output of move commands to axes.
	Single block	Executes motion programs one block at a time.
Control functions by motion program	Positioning (PTP)	Executes positioning independently for each axis at a specified speed or the speed system parameter. (Simultaneous specification: up to eight axes/block, simultaneous execution: up to 32 blocks/unit)
	Linear interpolation	Executes linear interpolation for up to eight axes at a time at the specified interpolation feed speed. (Simultaneous specification: up to eight axes/block, simultaneous execution: up to 32 blocks/system)
	Circular interpolation	Executes circular interpolation for two axes in either clockwise or counterclockwise at the specified interpolation feed speed. Helical circular interpolation is also possible with single-axis linear interpolation added. (Simultaneous specification: two or three axes/block, simultaneous execution: up to 16 blocks/system)
	Other functions	Origin searches, interrupt feeding, timed positioning, traverse positioning, independent electronic CAM, synchronized electronic CAM, link operation, electronic gear, follow-up synchronization, speed reference, torque reference
Acceleration/deceleration curve, acceleration/deceleration time		Trapezoidal or S-curve, 60,000 ms max. (S-curve: constant 30,000 ms max.)
External I/O		One port for MECHATROLINK-II servo communications, one deceleration stop input, two general inputs, two general outputs
Feed rate		Rapid, interpolation feed rate: 1 to 2,147,483,647 (command units/min)
Override		0.00% to 327.67% (setting unit: 0.01%; can be set for each axis or task.)
Motion programs	Number of tasks, number of programs	Up to 8 tasks and 256 programs/unit (8 parallel branches per task max.)
	Program numbers	0000 to 0499 for main program; 0500 to 0999 for subroutine
	Program capacity	In motion program conversion, 8,000 blocks/unit max. (2 Mbytes); number of blocks: 800 per program
	Data capacity	Position data: 10,240 points/unit; cam data: 32 max.; 16,000 points/unit
	Subroutine nesting	Five levels max.
	Start	Programs in other tasks can be started from a program or from the PLC
	Deceleration stop	Decelerates to a stop regardless of the block.
	Block stop	Decelerates to a stop after the block being executed is ended.
	Single block	Executes the program one block at a time.
Data exchange with CPU unit	Unit BIT area	Uses one unit number (25 words). Used for unit and tasks: 11 to 25 words (depending on the number of tasks)
	Unit data area	Uses one unit number (100 words). Used for unit and tasks: 32 to 74 words (depending on the number of tasks)
	Axes BIT area	Axes: 0 to 64 words (depending on the maximum axis number used). User configurable.
	Axes data area	Axes: 0 to 128 words (depending on the maximum axis number used). User configurable.
	General purpose	General I/O: 0 to 1,280 words (depending on the settings). User configurable.
Saving programs and data		Memory card backup (in CPU unit, 100,000 times max.)
Self-diagnostic functions		Watchdog, RAM check, etc.
Error detection functions		Deceleration stop inputs, unit number errors, CPU errors, software limit errors, etc.
Error log function		Read by IORD instruction from CPU unit.
Support software		Microsoft Windows 2000 or NT 4.0 (Processor: Pentium, 100 MHz min., with at least 64 MB of memory)
External power supply voltage		24 VDC (21.6 to 26.4 VDC)
Internal current consumption		0.8 A or less for 5 VDC; 0.3 A or less for 24 VDC
Weight (not including connectors)		300 g max.

MECHATROLINK-II, servo drive interface unit (JUSP-NS115)

Item		Details	
Type		JUSP-NS115	
Applicable servo drive		SGDH-□□□E models (version 38 or later)	
Installation method		Mounted on the SGDH servo drive side: CN10.	
Basic specifications	Power supply method	Supplied from the servo drive control power supply.	
	Power consumption	2 W	
MECHATROLINK -II communications	Baud rate / transmission cycle	10 Mbps / 1 ms or more. MECHATROLINK-II communications	
Command format	Operation specification	Positioning using MECHATROLINK-I/II communications.	
	Reference input	MECHATROLINK-I/II communications Commands:position, speed, torque, parameter read/write, monitor output	
Position control functions	Acceleration/deceleration method	Linear first/second-step, asymmetric, exponential, S-curve	
	Fully closed control	Position control with fully closed feedback is possible.	
Fully closed system specifications	Encoder pulse output in the servo drive	5 V differential line-driver output (complies with EIA standard RS-422A)	
	Fully Closed Encoder Pulse Signal	A quad B line-driver	
	Maximum Receivable Frequency for Servo Drive	1 Mpps	
	Power Supply for Fully Closed Encoder	To be prepared by customer.	
Input signals in the servo drive	Signal allocation changes possible	Forward/reverse run prohibited, zero point return deceleration LS External latch signals 1, 2, 3 Forward/reverse torque control	
Internal functions	Position data latch function	Position data latching is possible using phase C, and external signals 1, 2, 3	
	Protection	Parameters damage, parameter setting errors, communications errors, WDT errors, fully closed encoder detecting disconnection	
	LED indicators	A: alarm, R: MECHATROLINK-I/II communicating	

MECHATROLINK-II, 64 point I/O module (IO2310)

Items	Specifications	Appearance
Model	JEPMC-IO2310	
I/O signals	Input: 64 points, 24 VDC, 5 mA, sink/source mode input Output: 64 points, 24 VDC, 50 mA when all points ON, (the max. rating is 100 mA per point) sink mode output (NPN)) Signal connection method: connector (FCN360 series)	
Module power supply	24 VDC (20.4 V to 28.8 V) Rated current: 0.5 A Inrush current: 1 A	
Weight	590 g	

MECHATROLINK-II, counter module (PL2900)

Items	Specifications	Appearance
Model	JEPMC-PL2900	
Number of input channels	2 (1 can be used with MCH)	
Functions	Pulse counter, notch output	
Pulse input method	Sign (1/2 multipliers), A/B (1/2/4 multipliers), UP/DOWN (1/2 multipliers)	
Max. counter speed	1200 kpps (x 4 multiplier)	
Pulse input voltage	3/5/12/24 VDC	
External power supply	24 VDC, 120 mA or less	
Weight	300 g	

MECHATROLINK-II, pulse output module (PL2910)

Items	Specifications	Appearance
Model	JEPMC-PL2910	
Number of output channels	2	
Functions	Pulse positioning, JOG run, zero-point return	
Pulse output method	CW, CCW pulse, sign	
Max. output speed	500 kpps	
Pulse output voltage	5 VDC	
Pulse interface circuit	Open collector output 5 VDC, 10 mA/circuit	
External control signal	Digital input: 8 points/module, 5 VDC x 4 points, 24 VDC x 4 points Digital output: 6 points/module, 5 VDC x 4 points, 24 VDC x 2 points	
Weight	300 g	

MECHATROLINK-II repeater

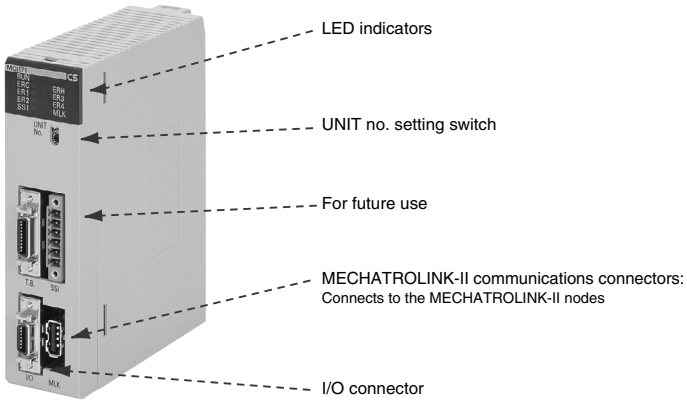
Items	Specifications	Appearance
Model	JEPMC-REP2000	
Communication type	MECHATROLINK-II	
Cable length	Between controller and repeater: 50 m., after repeater: 50 m	
Max. connected stations	Total stations on both sides of repeater: 30 (limited to the max. number of connectable stations of the controller (e.g., 30 stations for the CJ1W-MCH71)	
Restrictions	Between controller and repeater - Total cable length ≤ 30m: 15 stations max. including I/O and servo, etc. - 30 m < total cable length ≤ 50m: 14 stations max. including I/O and servo, etc. After repeater: - Total cable length ≤ 30m: 16 stations max. including I/O and servo, etc. - 30 m < total cable length ≤ 50m: 15 stations max. including I/O and servo, etc.	
Power supply	24VDC, 100 mA	
Weight	340 g	
Dimensions (mm)	30x160x77 (HxWxD)	

MECHATROLINK-II, frequency inverter interface units

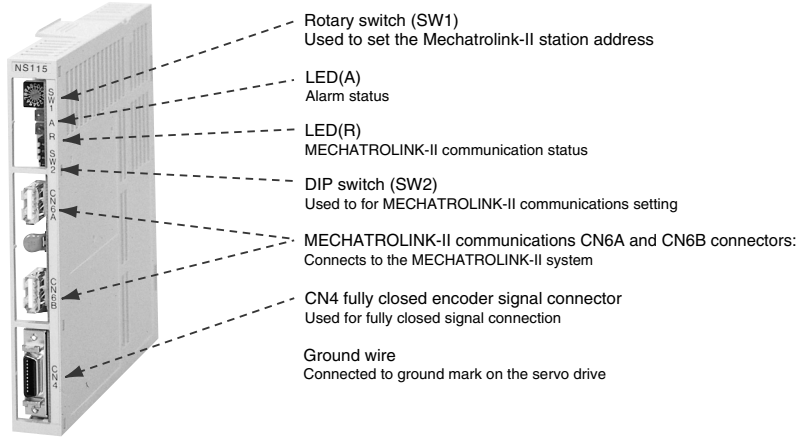
Item	Details	
Type	SI-T/V7	SI-T
Applicable inverter	CIMR-V7 / 3G3-MV (firmware 5740 or newer)	CIMR-G7 / CIMR-F7 (firmware 656x/for G7 / 4011 or newer for F7)
	Contact your OMRON sales office for information about firmware compatibility	
Installation method	Mounted on the inverter	
Power supply	Supplied from the inverter	
MECHATROLINK-II communications	10MHz, 0.5ms to 8ms for MECHATROLINK-II	
Operation	Read and write registers, read monitors, inverter operation, speed reference, torque reference (G7/F7 only).	
Inputs and outputs	The inputs and outputs in the inverter can be read and set by the MLII master	
Connectors	ML-II bus connector. DPRAM connector for the inverter	
Switches	Rotary switch for ML-II address (low byte) Dip switch for: ML-II address (high bit). ML-II/ML-I selection. 17 byte/32 byte data length selection.	

Nomenclature

CS1W-MCH71 - motion control unit



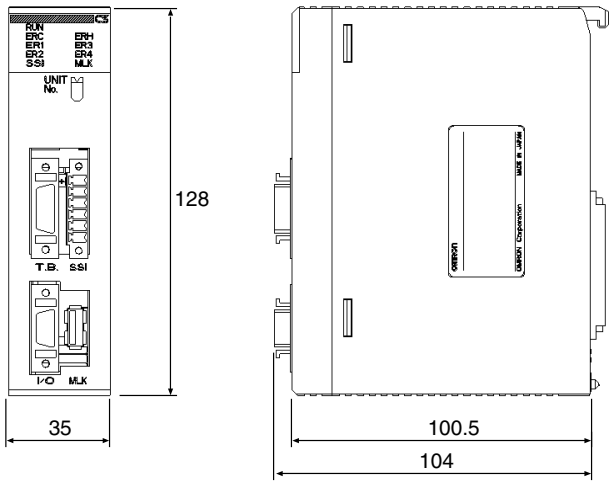
JUSP-NS115 - MECHATROLINK-II interface unit



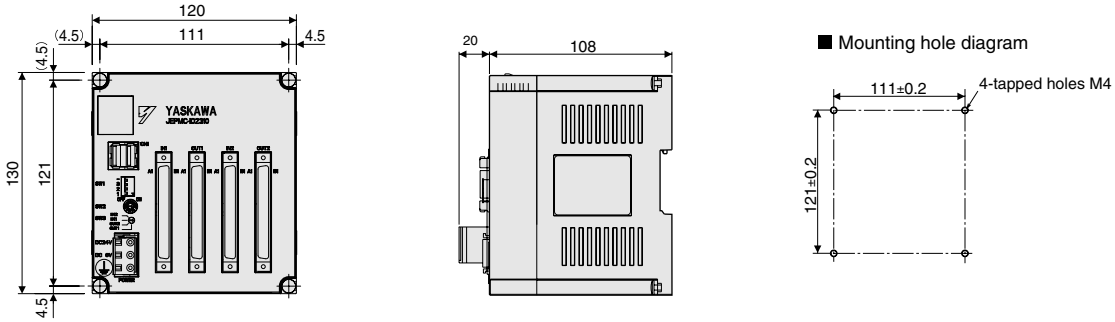
Dimensions

CS1W-MCH71 - motion control unit

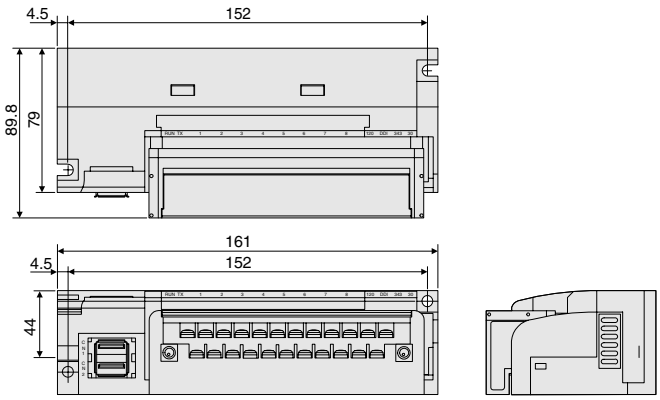
Units: mm Approx. weight: 0.3 kg



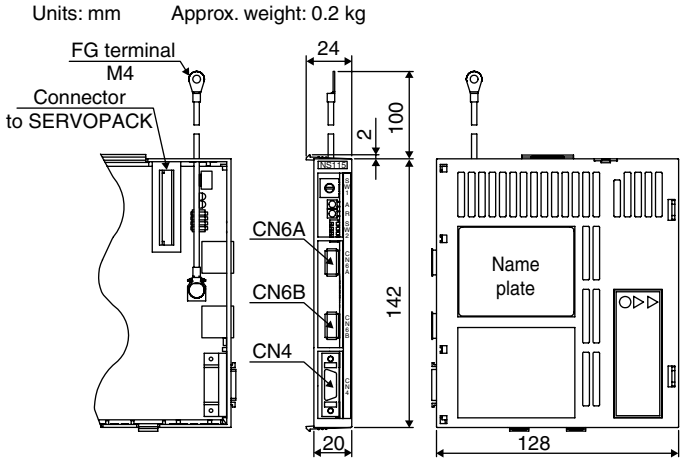
O2310 I/O module



I/O modules PL2900, PL2910

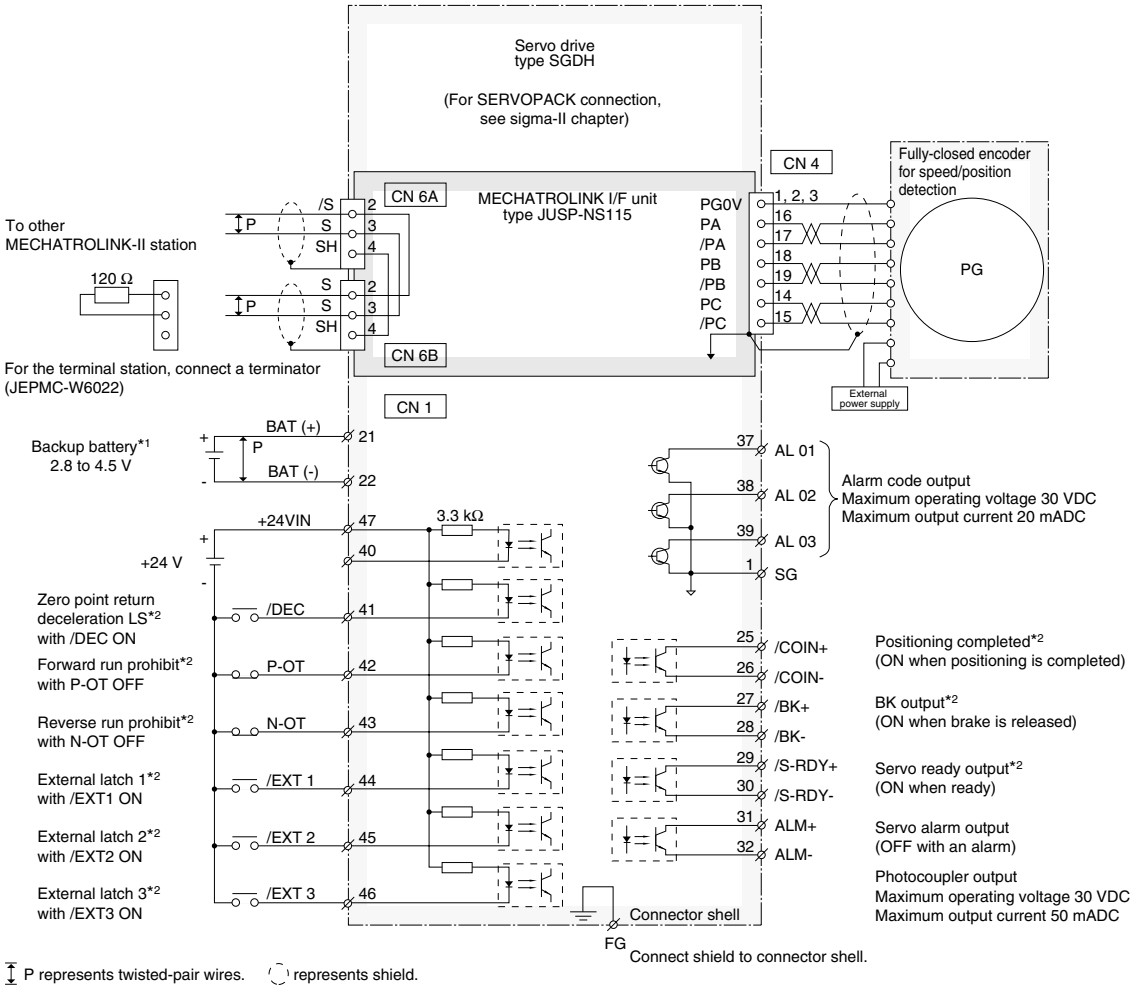


JUSP-NS115 - MECHATROLINK-II interface unit



Installation

MECHATROLINK-II interface connections



P represents twisted-pair wires. ◌ represents shield.

*1 Connect when using an absolute encoder and when the battery is not connected to CN8.

*2 Set the signal assignment with the user constants.

Ordering information

Motion controller

Name	Model
MECHATROLINK-II motion control unit	CS1W-MCH71

MECHATROLINK-II - related devices

Name	Remarks	Model
Distributed I/O modules	64 point input and 64 point output	JEPMC-IO2310
	Reversible counter: 2 channels	JEPMC-PL2900
	Pulse output: 2 channels	JEPMC-PL2910
MECHATROLINK-II cables	0.5 meter	JEPMC-W6003-A5
	1 meter	JEPMC-W6003-01
	3 meters	JEPMC-W6003-03
	5 meters	JEPMC-W6003-05
	10 meters	JEPMC-W6003-10
	20 meters	JEPMC-W6003-20
	30 meters	JEPMC-W6003-30
MECHATROLINK-II terminator	Terminating resistor	JEPMC-W6022
MECHATROLINK-II interface units	For Sigma-II series servo drives. (Firmware version 38 or later)	JUSP-NS115
	For Varispeed V7 inverter (for inverter version support contact your OMRON sales office)	SI-T/V7
	For Varispeed F7, G7 inverter (for inverter version support contact your OMRON sales office)	SI-T
MECHATROLINK-II repeater	When 17 or more axes are connected to the MECHATROLINK-II the repeater is required	JEPMC-REP2000

I/O cables

	Remarks	Length m	Model
I/O cable for IO2310	With connector on the IO2310 side	0.5	JEPMC-W5410-05
		1.0	JEPMC-W5410-10
		3.0	JEPMC-W5410-30

Servo system

Note: Refer to servo systems section for detailed information

Frequency inverters

Note: Refer to frequency inverters section for detailed information

Computer software

Specifications	Model
CX-One version 1.1 or higher	CX-One

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. I08E-EN-02