CJ1M-CPU2□

Compact, Applications-oriented Controllers with Built-in Pulse I/O for High Potential

- The compact, high-potential SYSMAC CJ1M PLCs provide built-in pulse I/O for high-precision performance
- Pulse I/O for two axes to achieve higher machine precision.

CJ1M-CPU21

Features

Two 100-kHz Pulse Outputs

- Use special instructions to easily implement various types of positioning, such as positioning with trapezoidal acceleration/deceleration, positioning with different acceleration/deceleration rates, and triangular control.
- Combine positioning instructions to handle many different applications, such as interrupt feeding and target position changes during positioning.
- Pulse startup is as fast as 46 μs and is 70 μs even for trapezoidal acceleration/deceleration.

Two Pulse Inputs

- Two high-speed counters and four interrupt inputs are also built in. The high-speed counters operate at up to 100 kHz for single-phase and 50 kHz for differential-phase operation. These inputs enable controlling with high-speed response.

Use the Rich Lineup of CJ1 Units

- Handle a wide range of applications with the rich lineup of CJ1 Units, including Ethernet and other Communications Units and Analog I/O Units.
- Easier maintenance is also possible using Memory Cards.

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.
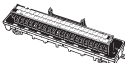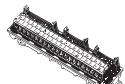
CJ1M CPU Units (with Built-in I/O)

Product name		Specifications					Current consumption (A)		Model	Standards
		I/O capacity/ Mountable Units (Expansion Racks)	Program capacity	Data memory capacity	LD instruction execution time	Built-in I/O	5 V	24 V		
CJ1M CPU Units	Built-in I/O (See note 2.)	640 points/20 Units (1 Expansion Racks max.)	20K steps	32K words (DM: 32K words, EM: None)	0.1 μs	10 inputs and 6 outputs, 2 counter inputs, 2 pulse outputs	0.64 (See note 1.)	–	CJ1M-CPU23 (See note 3.)	UC1, N, L, CE
		320points/10 Units (No Expansion Rack)	10K steps				0.64 (See note 1.)	–	CJ1M-CPU22 (See note 3.)	
		160 points/10 Units (No Expansion Rack)	5K steps				0.64 (See note 1.)	–	CJ1M-CPU21 (See notes 2 and 3.)	

Note: 1. Current consumptions include current for a Programming Console. Add 0.15 A per Adapter when using NT-AL001 RS-232C/RS-232A Adapters. Add 0.04 A per Adapter when using CJ1W-CIF11 RS-422A Adapters.
2. Some of the specifications for the low-end CJ1M CPU Units (CJ1M-CPU11(-ETN)/21) are different from the specifications for the other CJ1M CPU Units (CJ1M-CPU12(-ETN)/13(-ETN)/22/23), including the specifications for overhead time, pulse start time, the number of subroutines and jumps, the number of scheduled interrupt tasks, and the number of PWM outputs. For details, refer to the *SYSMAC CJ Series Programmable Controllers Operation Manual* (Cat. No. 393) and the *SYSMAC CJ Series Built-in I/O Operation Manual* (Cat. No. 395).
3. The connector for built-in I/O in the CJ1M-CPU21/22/23 is not included. Purchase one of the connectors or connector cables in the following table separately.

Connector Cables for Built-in I/O in CJ1M-CPU2☐ CPU Units

The connector for built-in I/O in the CJ1M-CPU21/22/23 is not included.
Purchase one of the connectors or connector cables in the following table separately.
For details, refer to *Built-in I/O MIL Connector Wiring Methods*.

Product name	Specifications		Model	Standards
Applicable Connector	MIL Flat Cable Connectors (Pressure-fitted Connectors)		**XG4M-4030-T**	–
Connector-Terminal Block Conversion Units	Slim type (M3 screw terminals, 40-pin)		**XW2D-40G6**	–
	Through type (M3 screw terminals, 40-pin)		**XW2B-40G4**	
	Through type (M3.5 screw terminals, 40-pin)		**XW2B-40G5**	
Cable for Connector-Terminal Block Conversion Unit		Cable length: 1 m	**XW2Z-100K**	
		Cable length: 1.5 m	**XW2Z-150K**	
		Cable length: 2 m	**XW2Z-200K**	
		Cable length: 3 m	**XW2Z-300K**	
		Cable length: 5 m	**XW2Z-500K**	
Servo Relay Units	Servo Relay Unit for 1 axis		**XW2B-20J6-8A**	–
	Servo Relay Unit for 2 axes		**XW2B-40J6-9A**	

Product name	Specifications			Model	Standards
Cables for Servo Relay Units	OMNUC G Series	Cable for CJ1M CPU Unit	Cable length: 0.5 m	**XW2Z-050J-A33**	–
			Cable length: 1 m	**XW2Z-100J-A33**	
		Servo Driver Connecting Cables	Cable length: 1 m	**XW2Z-100J-B31**	
			Cable length: 2 m	**XW2Z-200J-B31**	
	SMARTSTEP2	Cable for CJ1M CPU Unit	Cable length: 0.5 m	**XW2Z-050J-A33**	
			Cable length: 1 m	**XW2Z-100J-A33**	
		Servo Driver Connecting Cables	Cable length: 1 m	**XW2Z-100J-B32**	
			Cable length: 2 m	**XW2Z-200J-B32**	
	SMARTSTEP Junior	Cable for CJ1M CPU Unit	Cable length: 1 m	**XW2Z-100J-A26**	
		Servo Driver Connecting Cables	Cable length: 1 m	**XW2Z-100J-B17**	
			Cable length: 2 m	**XW2Z-200J-B17**	
	SMARTSTEP A Series	Cable for CJ1M CPU Unit	Cable length: 1 m	**XW2Z-100J-A26**	
		Servo Driver Connecting Cables	Cable length: 1 m	**XW2Z-100J-B5**	
			Cable length: 2 m	**XW2Z-200J-B5**	
	OMNUC W Series	Cable for CJ1M CPU Unit	Cable length: 0.5 m	**XW2Z-050J-A27**	
			Cable length: 1 m	**XW2Z-100J-A27**	
		Servo Driver Connecting Cables	Cable length: 1 m	**XW2Z-100J-B4**	
			Cable length: 2 m	**XW2Z-200J-B4**	

Accessories

The following accessories come with CPU Unit:

Item	Specification
Battery	CJ1W-BAT01
End Cover	CJ1W-TER01 (necessary to be mouned at the right end of CPU Rack)
End Plate	PFP-M (2 pcs)
Serial Port (RS-232C) Connector	Connector set for serial port connection (D-SUB 9-pin male connector)

Specifications

Common Specifications

Item	Specifications	
Control method	Stored program	
I/O control method	Cyclic scan and immediate processing are both possible.	
Programming	LD (Ladder), SFC (Sequential Function Chart), ST (Structured Text), Mnemonic	
CPU processing mode	Normal Mode or Peripheral Servicing Priority Mode	
Instruction length	1 to 7 steps per instruction	
Ladder instructions	Approx. 400 (3-digit function codes)	
Execution time	Basic instructions: 0.10 μs min. Special instructions: 0.15 μs min.	
Overhead time	• CJ1M CPU Units (CPU22/23): 0.5 ms min. • CJ1M CPU Units (CPU21): 0.7 ms min.	
Unit connection method	No Backplane: Units connected directly to each other.	
Mounting method	DIN Track (screw mounting not possible)	
Maximum number of connectable Units	Total of 20 Units in the System, including 10 Units on CPU Rack and 10 Units on one Expansion Rack.	
Maximum number of Expansion Racks	• CJ1M CPU Units (CPU 13/23 only): 1 max. (An I/O Control Unit is required on the CPU Rack and an I/O Interface Unit is required on the Expansion Rack.) • CJ1M CPU Units (CPU11/12/21/22): Expansion is not possible.	
Number of tasks	288 (cyclic tasks: 32, interrupt tasks: 256) Interrupt tasks can be defined as cyclic tasks called "extra cyclic tasks." Including these, up to 288 cyclic tasks can be used. **Note: 1.** Cyclic tasks are executed each cycle and are controlled with TKON(820) and TKOF(821) instructions. **2.** The following 4 types of interrupt tasks are supported. Power OFF interrupt tasks: 1 max. Scheduled interrupt tasks: 2 max. I/O interrupt tasks: 32 max. External interrupt tasks: 256 max.	
Interrupt types	Scheduled Interrupts: Interrupts generated at a time scheduled by the CPU Unit's built-in timer. (See note. 1) I/O Interrupts: Interrupts from Interrupt Input Units. Power OFF Interrupts (See note 2.): Interrupts executed when the CPU Unit's power is turned OFF. External I/O Interrupts: Interrupts from the Special I/O Units or CPU Bus Units. **Note: 1.** Scheduled interrupt time interval is 0.5 ms to 999.9 ms (in increments of 0.1 ms), 1 ms to 9,999 ms (in increments of 1 ms), or 10 ms to 99,990 ms (in increments of 10 ms) **2.** Not supported when the CJ1W-PD022 Power Supply Unit is mounted.	
Calling subroutines from more than one task	Supported (called "global subroutines").	
Function blocks (CPU Unit with unit version 3.0 or later only)	Languages in function block definitions: ladder programming, structured text	

		Specifications	
CIO (Core I/O) Area	**I/O Area**	1,280: CIO 000000 to CIO 007915 (80 words from CIO 0000 to CIO 0079) The setting of the first word can be changed from the default (CIO 0000) so that CIO 0000 to CIO 0999 can be used. I/O bits are allocated to Basic I/O Units.	
	Link Area	3,200 (200 words): CIO 10000 to CIO 119915 (words CIO 1000 to CIO 1199) Link bits are used for data links and are allocated to Units in Controller Link Systems.	
	CPU Bus Unit Area	6,400 (400 words): CIO 150000 to CIO 189915 (words CIO 1500 to CIO 1899) CPU Bus Unit bits store the operating status of CPU Bus Units. (25 words per Unit, 16 Units max.)	
	Special I/O Unit Area	15,360 (960 words): CIO 200000 to CIO 295915 (words CIO 2000 to CIO 2959) Special I/O Unit bits are allocated to Special I/O Units. (10 words per Unit, 96 Units max.) **Note:** Special I/O Units are I/O Units that belong to a special group called "Special I/O Units." Example:CJ1W-AD081 Analog Input Unit	The CIO Area can be used as work bits if the bits are not used as shown here.
	Serial PLC Link Area	1,440 (90 words): CIO 310000 to CIO 318915 (words CIO 3100 to CIO 3189)	
	DeviceNet Area	9,600 (600 words): CIO 320000 to CIO 379915 (words CIO 3200 to CIO 3799) DeviceNet bits are allocated to Slaves for DeviceNet Unit remote I/O communications when the Master function is used with fixed allocations. Fixed allocation setting 1 — Outputs: CIO 3200 to CIO 3263 / Inputs: CIO 3300 to CIO 3363 Fixed allocation setting 2 — Outputs: CIO 3400 to CIO 3463 / Inputs: CIO 3500 to CIO 3563 Fixed allocation setting 3 — Outputs: CIO 3600 to CIO 3663 / Inputs: CIO 3700 to CIO 3763 The following words are allocated to the Master function even when the DeviceNet Unit is used as a Slave. Fixed allocation setting 1 — Outputs: CIO 3370 (Slave to Master) / Inputs: CIO 3270 (Master to Slave) Fixed allocation setting 2 — Outputs: CIO 3570 (Slave to Master) / Inputs: CIO 3470 (Master to Slave) Fixed allocation setting 3 — Outputs: CIO 3770 (Slave to Master) / Inputs: CIO 3670 (Master to Slave)	
	Internal I/O Area	4,800 (300 words): CIO 120000 to CIO 149915 (words CIO 1200 to CIO 1499) 37,504 (2,344 words): CIO 380000 to CIO 614315 (words CIO 3800 to CIO 6143) These bits in the CIO Area are used as work bits in programming to control program execution. They cannot be used for external I/O.	

Item	Specifications
Work Area	8,192 bits (512 words): W00000 to W51115 (W000 to W511) Controls the programs only. (I/O from external I/O terminals is not possible.) **Note:** When using work bits in programming, use the bits in the Work Area first before using bits from other areas.
Holding Area	8,192 bits (512 words): H00000 to H51115 (H000 to H511) Holding bits are used to control the execution of the program, and maintain their ON/OFF status when the PLC is turned OFF or theoperating mode is changed. **Note:** The Function Block Holding Area words are allocated from H512 to H1535. These words can be used only for the function block instance area (internally allocated variable area).
Auxiliary Area	Read only: 7,168 bits (448 words): A00000 to A44715 (words A000 to A447) Read/write: 8,192 bits (512 words): A44800 to A95915 (words A448 to A959) Auxiliary bits are allocated specific functions.
Temporary Area	16 bits (TR0 to TR15) Temporary bits are used to temporarily store the ON/OFF execution conditions at program branches.
Timer Area	4,096: T0000 to T4095 (used for timers only)
Counter Area	4,096: C0000 to C4095 (used for counters only)
DM Area	32 Kwords: D00000 to D32767 Used as a general-purpose data area for reading and writing data in word units (16 bits). Words in the DM Area maintain their status when the PLC is turned OFF or the operating mode is changed. Internal Special I/O Unit DM Area: D20000 to D29599 (100 words × 96 Units) Used to set parameters for Special I/O Units. CPU Bus Unit DM Area: D30000 to D31599 (100 words × 16 Units) Used to set parameters for CPU Bus Units.
EM Area	None
Index Registers	IR0 to IR15 Store PLC memory addresses for indirect addressing. Index registers can be used independently in each task. One register is 32 bits (2words). Setting to use index registers either independently in each task or to share them between tasks.
Task Flag Area	32 (TK0000 to TK0031) Task Flags are read-only flags that are ON when the corresponding cyclic task is executable and OFF when the corresponding task is not executable or in standby status.
Trace Memory	4,000 words (trace data: 31 bits, 6 words)
File Memory	Memory Cards: Compact flash memory cards can be used (MS-DOS format). OMRON Memory Cards can be used.

Function Specifications

Item	Specifications	
Constant cycle time	1 to 32,000 ms (Unit: 1 ms)	
Cycle time monitoring	Possible (Unit stops operating if the cycle is too long): 10 to 40,000 ms (Unit: 10 ms)	
I/O refreshing	Cyclic refreshing, immediate refreshing, refreshing by IORF(097). IORF(097) refreshes I/O bits allocated to Basic I/O Units and Special I/O Units. The CPU BUS UNIT I/O REFRESH (DLNK(226)) instruction can be used to refresh bits allocated to CPU Bus Units in the CIO and DM Areas whenever required.	
Timing of special refreshing for CPU Bus Units	Data links for Controller Link Units and SYSMAC LINK Units, remote I/O for DeviceNet Units, and other special refreshing for CPU Bus Units is performed at the following times: I/O refresh period and when the CPU BUS UNIT I/O REFRESH (DLNK(226)) instruction is executed.	
I/O memory holding when changing operating modes	Depends on the ON/OFF status of the IOM Hold Bit in the Auxiliary Area.	
Load OFF	All outputs on Output Units can be turned OFF when the CPU Unit is operating in RUN, MONITOR, or PROGRAM mode.	
Timer/Counter PV refresh method	BCD or binary (CX-Programmer Ver. 3.0 or higher).	
Input response time setting	Time constants can be set for inputs from Basic I/O Units. The time constant can be increased to reduce the influence of noise and chattering or it can be decreased to detect shorter pulses on the inputs.	
Mode setting at power-up	Possible (By default, the CPU Unit will start in RUN mode if a Programming Console is not connected.)	
Flash memory	The user program and parameter area data (e.g., PLC Setup) are always backed up automatically in flash memory. (automatic backup and restore.) • CPU Units with unit version 3.0 or later only: When downloading projects from CX-Programmer Ver. 5.0 or higher, symbol table files (including CX-Programmer symbol names, I/O comments), comment files (CX-Programmer rung comments, other comments), and program index files (CX-Programmer section names, section comments, or program comments) are stored in comment memory within the flash memory.	
Memory Card functions	Automatically reading programs (autoboot) from the Memory Card when the power is turned ON.	Possible
	Program replacement during PLC operation	Possible
	Format in which data is stored in Memory Card	User program: Program file format PLC Setup and other parameters: Data file format I/O memory: Data file format (binary format), text format, or CSV format
	Functions for which Memory Card read/write is supported	User program instructions, Programming Devices (including CX-Programmer and Programming Consoles), Host Link computers, AR Area control bits, easy backup operation
Filing	Memory Card data and the EM (Extended Data Memory) Area can be handled as files.	
Debugging	Control set/reset, differential monitoring, data tracing (scheduled, each cycle, or when instruction is executed), instruction error tracing, storing location generating error when a program error occurs.	

Item	Specifications
Online editing	When the CPU Unit is in MONITOR or PROGRAM mode, multiple program sections ("circuits") of the user program can be edited together. This function is not supported for block programming areas. (With the CX-Programmer is used, multiple program sections of the user program can be edited together. When a Programming Console is used, the program can be edited in mnemonics only.)
Program protection	Overwrite protection: Set using DIP switch. Copy protection: Password set using CX-Programmer or Programming Consoles.
Error check	User-defined errors (i.e., user can define fatal errors and non-fatal errors) The FPD(269) instruction can be used to check the execution time and logic of each programming block. FAL and FALS instructions can be used with the CJ1M CPU Units to simulate errors.
Error log	Up to 20 errors are stored in the error log. Information includes the error code, error details, and the time the error occurred. A CJ1M CPU Unit can be set so that user-defined FAL errors are not stored in the error log.
Serial communications	Built-in peripheral port: Programming Device (including Programming Console) connections, Host Links, NT Links Built-in RS-232C port: Programming Device (excluding Programming Console) connections, Host Links, no-protocol communications, NT Links, Serial Gateway (Compoway/F master)
	Serial Communications Unit (sold separately): Protocol macros, Host Links, NT Links, Modbus-RTU slave, No-protocol, Serial Gateway (Compoway/F master, Modbus master)

Clock	Provided on all models.
	Accuracy: Ambient temperature Monthly error
	                 55°C −3.5 min to +0.5 min
	                  25°C −1.5 min to +1.5 min
	                   0°C −3 min to +1 min
	Note: Used to store the time when power is turned ON and when errors occur.

Power OFF detection time	AC Power Supply Unit: 10 to 25 ms (not fixed) DC Power Supply Unit PD025: 2 to 5 ms; PD022: 2 to 10 ms
Power OFF detection delay time	0 to 10 ms (user-defined, default: 0 ms) **Note:** Not supported when the CJ1W-PD022 Power Supply Unit is mounted.
Memory protection	Held Areas: Holding bits, contents of Data Memory and Extended Data Memory, and status of the counter Completion Flags and present values. **Note:** If the IOM Hold Bit in the Auxiliary Area is turned ON, and the PLC Setup is set to maintain the IOM Hold Bit status when power to the PLC is turned ON, the contents of the CIO Area, the Work Area, part of the Auxiliary Area, timer Completion Flag and PVs, Index Registers, and the Data Registers will be saved for up to 20 days.
Sending commands to a Host Link computer	FINS commands can be sent to a computer connected via the Host Link System by executing Network Communications Instructions from the PLC.
Remote programming and monitoring	Host Link communications can be used for remote programming and remote monitoring through a Controller Link, Ethernet, DeviceNet, or SYSMAC LINK network.
Communicating across network levels	Remote programming and monitoring from Support Software and FINS message communications can be performed across different network levels, even for different types of network. Pre-Ver. 2.0: Three levels Version 2.0 or later: Eight levels for Controller Link and Ethernet networks (See note.), three levels for other networks. **Note:** To communicate across eight levels, the CX-Integrator or the CX-Net in CX-Programmer version 4.0 or higher must be used to set the routing tables.
Storing comments in CPU Unit	I/O comments can be stored as symbol table files in the Memory Card, EM file memory, or comment memory (see note). **Note:** Comment memory is supported for CX-Programmer version 5.0 or higher and CS/CJ-series CPU Units with unit version 3.0 or later only.
Program check	Program checks are performed at the beginning of operation for items such as no END instruction and instruction errors. CX-Programmer can also be used to check programs.
Control output signals	RUN output: The internal contacts will turn ON (close) while the CPU Unit is operating (CJ1W-PA205R).
Battery life	Battery Set for CJ1M CPU Units: CJ1W-BAT01
Self-diagnostics	CPU errors (watchdog timer), I/O bus errors, memory errors, and battery errors.
Other functions	Storage of number of times power has been interrupted. (Stored in A514.)

I/O Specifications of CJ1M CPU Units (CJ1M-CPU21/22/23)

- CJ1M-CPU2□ CPU Units have 10 built-in inputs and 6 built-in outputs.
- The 10 inputs can be used as general-purpose inputs, interrupt inputs, quick-response inputs, high-speed counters, or origin search origin input signals.
- The 6 outputs can be used as general-purpose outputs, pulse outputs, or origin search deviation counter reset outputs.

Data Area Allocations for Built-in I/O

I/O Code		IN 0	IN 1	IN 2	IN 3	IN 4	IN 5	IN 6	IN 7	IN 8	IN 9	OUT 0	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5
Address		2960										2961					
Bit		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
Inputs	General purpose inputs	General purpose input 0	General purpose input 1	General purpose input 2	General purpose input 3	General purpose input 4	General purpose input 5	General purpose input 6	General purpose input 7	General purpose input 8	General purpose input 9	–	–	–	–	–	–
	Interrupt inputs	Interrupt input 0	Interrupt input 1	Interrupt input 2	Interrupt input 3	–	–	–	–	–	–	–	–	–	–	–	–
	Quick response inputs	Quick response input 0	Quick response input 1	Quick response input 2	Quick response input 3	–	–	–	–	–	–	–	–	–	–	–	–
	Highspeed counters	–	–	High-speed counter 1 (phase- Z/ reset)	High-speed counter 0 (phase- Z/ reset)	–	–	High-speed counter 1 (phase-A, incre-ment, or count in-put)	High-speed counter 1 (phase-B, decre-ment, or direction input)	High-speed counter 0 (phase-A, incre-ment, or count in-put)	High-speed counter 0 (phase-B, decre-ment, or direction input)	–	–	–	–	–	–
Outputs	General-purpose outputs	–	–	–	–	–	–	–	–	–	–	General-purpose output 0	General-purpose output 1	General-purpose output 2	General-purpose output 3	General-purpose output 4	General-purpose output 5
	Pulse outputs / CW/CCW outputs	–	–	–	–	–	–	–	–	–	–	Pulse output 0 (CW)	Pulse output 0 (CCW)	Pulse output 1 (CW)	Pulse output 1 (CCW)	–	–
	Pulse outputs / Pulse + direction outputs	–	–	–	–	–	–	–	–	–	–	Pulse output 0 pulse)	Pulse output 1 (pulse)	Pulse output 0 (direc-tion)	Pulse output 1 (direc-tion)	–	–
	Pulse outputs / Variable duty ratio outputs	–	–	–	–	–	–	–	–	–	–	–	–	–	–	PWM (891) output 0	PWM (891) output 1
Origin search		Origin search 0 (Origin Input Signal)	Origin search 0 (Origin Proximity Input Signal)	Origin search 1 (Origin Input Signal)	Origin search 1 (Origin Proximity Input Signal)	Origin search 0 (Posi-tioning Com-pleted Signal)	Origin search 1 (Posi-tioning Com-pleted Signal)	–	–	–	–	–	–	–	–	Origin search 0 (Error Counter Reset Output)	Origin search 1 (Error Counter Reset Output)

Note: CJ1M-CPU21 CPU Units have one PWM output only and do not have PWM output 1.

Built-in Input Specifications

Interrupt Inputs and Quick-response Inputs

Item		Specifications
No. of interrupt inputs/ quick-response inputs		4 total
Input interrupts	Direct (Input Interrupt) Mode	Execution of an interrupt task is started at the interrupt input's rising or falling edge. Interrupt numbers 140 to 143 are used (fixed). Response time from meeting input condition to start of interrupt task execution: 93 μs min.
	High-speed Counter Mode	Rising or falling edges of the interrupt are counted using either an incrementing or decrementing counter, and an interrupt task is started when the input count reaches the set value. Interrupt numbers 140 to 143 are used (fixed). I/O response frequency: 1 kHz
Quick-response inputs		Signals that are shorted than the cycle time (30 μs min.) can be read and treated the same as signals that are one for more than one cycle time.

High-speed Counter Inputs

Item		Specifications			
Number of high-speed counters		2 (High-speed counters 0 and 1)			
Pulse input mode (Selected in PLC Setup)		Differential phase inputs (phase-A, phase-B, and phase-Z input)	Up/down inputs (up inputs, down inputs, reset inputs)	Pulse + direction inputs (pulse inputs, direction inputs, reset inputs)	Increment inputs (increment inputs, reset inputs)
Response frequency	Line-driver inputs	50 kHz	100 kHz	100 kHz	100 kHz
	24-V DC inputs	30 kHz	60 kHz	60 kHz	60 kHz
Counting mode		Linear mode or Ring mode (Select in the PLC Setup.)			

Item	Specifications
Count value	Linear mode: 80000000 to 7FFFFFFF hex Ring mode: 00000000 to Ring SV (The Ring SV is set in the PLC Setup and the setting range is 00000001 to FFFFFFFF hex.)
High-speed counter PV storage locations	High-speed counter 0: A271 (leftmost 4 digits) and A270 (rightmost 4 digits) High-speed counter 1: A273 (leftmost 4 digits) and A272 (rightmost 4 digits) Target value comparison interrupts or range comparison interrupts can be executed based on these PVs. **Note:** The PVs are refreshed in the overseeing processes at the beginning of each cycle. Use the PRV(881) instruction to read the most recent PVs.
Control method — Target value comparison	Up to 48 target values and corresponding interrupt task numbers can be registered.
Control method — Range comparison	Up to 8 ranges can be registered, with an upper limit, lower limit, and interrupt task number for each.
Counter reset method	Phase-Z + Software reset: Counter is reset when phase-Z input goes ON while Reset Bit is ON. Software reset: Counter is reset when Reset Bit goes ON. Reset Bits: High-speed Counter 0 Reset Bit is A53100, Counter 1 Reset Bit is A53101.

Built-in Output Specifications

Position Control and Speed Control

Item	Specifications
Number of pulse outputs	2 (Pulse output 0 or 1)
Output frequency	1 Hz to 100 kHz (1-Hz units from 1 to 100 Hz, 10-Hz units from 100 Hz to 4 kHz, and 100-Hz units from 4 to 100 kHz)
Frequency acceleration and deceleration rates	Set in 1 Hz units for acceleration/deceleration rates from 1 Hz to 2 kHz (every 4 ms). The acceleration and deceleration rates can be set separately only with PLS2(887).
Changing SVs during instruction execution	The target frequency, acceleration/deceleration rate, and target position can be changed. Changes to the target frequency and acceleration/deceleration rate must be made at constant speed.
Pulse output method	CW/CCW inputs or Pulse + direction inputs
Number of output pulses	Relative coordinates: 00000000 to 7FFFFFFF hex (Each direction accelerating or decelerating: 2,147,483,647) Absolute coordinates: 80000000 to 7FFFFFFF hex (−2,147,483,648 to 2,147,483,647)
Instruction used for origin searches and returns	ORIGIN SEARCH (ORG(889)): Origin search and origin return operations according to set parameters
Instructions used for position and speed control	PULSE OUTPUT (PLS2(887)): Trapezoidal output control with separate acceleration and deceleration rate SET PULSES (PULS(886)): Setting the number of pulses for pulse output SPEED OUTPUT (SPED(885)): Pulse output without acceleration or deceleration (Number of pulses must be set in advance with PULS(886) for position control.) ACCELERATION CONTROL (ACC(888)): Changes frequency or pulse output with acceleration and deceleration MODE CONTROL (INI(880)): Stopping pulse output
Pulse output PV's storage location	The following Auxiliary Area words contain the pulse output PVs: Pulse output 0: A277 (leftmost 4 digits) and A276 (rightmost 4 digits) Pulse output 1: A279 (leftmost 4 digits) and A278 (rightmost 4 digits) The PVs are refreshed during regular I/O refreshing. PVs can be read to user-specified words with the PRV(881) instruction.

Variable-duty Pulse Outputs (PWM)

Item	Specifications
Number of PWM outputs	CJ1M-CPU22/23: 2 (PWM output 0 or 1) CJ1M-CPU21: 1 (PWM output 0)
Duty ratio	0% to 100%, set in 0.1% units (See note.)
Frequency	0.1 Hz to 999.9 Hz, Set in 0.1 Hz units.
Instruction	PULSE WITH VARIABLE DUTY RATIO (PWM(891)): Sets duty ratio and outputs pulses.

Note: CJ1M CPU Unit Ver. 2.0 or later only. (0% to 100%, set in 1% units for Pre-Ver. 2.0 CPU Units.)

Hardware Specifications

Input Specifications

Item		Specifications			
Number of inputs		10 inputs			
Input method		24-V DC inputs or line driver (wiring changed to select)			
Input voltage specifications		24 V DC		Line driver	
		IN0 to IN5	IN6 to IN9	IN0 to IN5	IN6 to IN9
Input voltage		20.4 to 26.4 V DCV		RS-422A or RS-422 line driver (conforming to AM26LS31), Power supply voltage of 5 V ± 5%	
Input impedance		3.6 kΩ	4.0 kΩ	–	
Input current (typical)		6.2 mA	4.1 mA	13 mA	10 mA
Minimum ON voltage		17.4 V DC/3 mA min.		–	
Maximum OFF voltage		5.0 V DC/1 mA max.		–	
Response speed (for general-purpose inputs)	ON response time	Default setting: 8 ms max. (The input time constant can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup.)			
	OFF response time	Default setting: 8 ms max. (The input time constant can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup.)			

Input Circuit Configuration

Item	Specifications	
Input	IN0 to IN5	IN6 to IN9
Circuit configuration		

General-purpose Output Specifications for Transistor Outputs (Sinking)

Item	Specifications	
Output	OUT0 to OUT3	OUT4 to OUT5
Rated voltage	5 to 24 V DC	
Allowable voltage range	4.75 to 26.4 V DC	
Max. switching capacity	0.3 A/output; 1.8 A/Unit	
Number of circuits	6 outputs (6 outputs/common)	
Max. inrush current	3.0 A/output, 10 ms max.	
Leakage current	0.1 mA max.	
Residual voltage	0.6 V max.	
ON delay	0.1 mA max.	
OFF delay	0.1 mA max.	
Fuse	None	
External power supply	10.2 to 26.4 V DC 50 mA min.	
Circuit configuration		

Pulse Output Specifications (OUT0 to OUT3)

Item	Specifications
Max. switching capacity	30 mA, 4.75 to 26.4 V DC
Min. switching capacity	7 mA, 4.75 to 26.4 V DC
Max. output frequency	100 kHz
Output waveform	

CJ1-H-R, CJ1-H, CJ1M, and CJ1 CPU Unit Comparison

Item			CJ1-H-R CPU Unit	CJ1-H CPU Unit		CJ1M CPU Unit	CJ1 CPU Unit
			CJ1H-CPU6□H-R	CJ1H-CPU6□H	CJ1G-CPU4□H	CJ1M-CPU2□/1□	CJ1G-CPU4□
Instruction executions times	Basic instructions	LD	0.016 μs	0.02 μs	0.04 μs	0.10 μs	0.08 μs
		OUT	0.016 μs	0.02 μs	0.04 μs	0.35 μs	0.21 μs
	Special instructions	Examples					
		XFER	240.1 μs (for 1,000 words)	300.1 μs (for 1,000 words)	380.1 μs (for 1,000 words)	650.2 μs (for 1,000 words)	633.5 μs (for 1,000 words)
		BSET	140.2 μs (for 1,000 words)	200.1 μs (for 1,000 words)	220.1 μs (for 1,000 words)	400.2 μs (for 1,000 words)	278.3 μs (for 1,000 words)
		BCD arithmetic	7.6 μs min.	8.2 μs min.	8.4 μs min.	• CPU11/21 21.5 μs min. • Other CPU Units 18.9 μs min.	14.0 μs min.
		Binary arithmetic	0.18 μs min.	0.18 μs min.	0.20 μs min.	0.30 μs min.	0.37 μs min.
		Floatingpoint math	0.24 μs min.	8.0 μs min.	9.2 μs min.	• CPU11/21 15.7 μs min. • Other CPU Units 13.3 μs min.	10.2 μs min.
		SBS/RET	1.33 μs	2.12 μs	3.56 μs	3.84 μs	37.6 μs
Overhead time			Normal mode: 0.13 ms Parallel mode: 0.28 ms	Normal mode: 0.3 ms Parallel mode: 0.3 ms	0.5 ms	• CPU11/21 0.7 ms • Other CPU Units 0.5 ms	0.5 ms
Execution timing	CPU execution processing modes		Any of the following four modes: 1. Normal (instructions and peripheral servicing performed consecutively) 2. Peripheral Servicing Priority Mode (instruction execution interrupted to service peripherals at a specific cycle and time; consecutive refreshing also performed) 3. Parallel Processing Mode with Synchronous Memory Access (instruction executed and peripheral services in parallel while synchronizing access to I/O memory) 4. Parallel Processing Mode with Asynchronous Memory Access (instruction executed and peripheral services in parallel without synchronizing access to I/O memory)			Either of following two modes: 1. Either of following two modes: Normal (instructions and peripheral servicing performed consecutively) 2. Peripheral Servicing Priority Mode (instruction execution interrupted to service peripherals at a specific cycle and time; consecutive refreshing also performed)	
	CPU Bus Unit special refreshing	Data links	During I/O refresh period or via special CPU BUS UNIT I/O REFRESH instruction (DLNK(226))				During I/O refresh period
		DeviceNet remote I/O					
		Protocol macro send/ receive data					
	Refreshing of CIO and DM Areas words allocated to CPU Bus Unit						
Tasks	Cyclic execution of interrupt tasks via TKON instruction (called "extra cyclic tasks")		Supported. (Up to 256 extra cyclic tasks, increasing the total number of cyclic tasks to 288 max.)				Not supported. (No extra cyclic tasks; 32 cyclic tasks max.)
	Independent/shared specifications for index and data registers		Supported. The time to switch between tasks can be reduced if shared registers are used.				Not supported. (Only independent registers for each task.)
	Initialization when tasks are started		Supported. Task Startup Flags supported.				Only Task Flag for first execution.
	Starting subroutines from multiple tasks		Global subroutines can be defined that can be called from more than one task.				Not supported.
	Scheduled interrupt interval for scheduled interrupt tasks		0.2 ms to 999.9 ms (in increments of 0.1 ms), 1 ms to 9,999 ms (in increments of 1 ms), or 10 ms to 99,990 ms (in increments of 10 ms)	1 ms to 9,999 ms (in increments of 1 ms) or 10 ms to 99,990 ms (in increments of 10 ms)		0.5 ms to 999.9 ms (in increments of 0.1 ms), 1 ms to 9,999 ms (in increments of 1 ms), or 10 ms to 99,990 ms (in increments of 10 ms)	1 ms to 9,999 ms (in increments of 1 ms) or 10 ms to 99,990 ms (in increments of 10 ms)
	Interrupt task execution timing during instruction execution	For instructions Other than the following ones	Any instruction that is being executed is interrupted when interrupt task conditions are met to start the interrupt task. If the cyclic task (including extra cyclic tasks) accesses the same data area words as the instruction that was interrupted, data may not be concurrent. To ensure data concurrency, the DI and EI instructions must be used to disable and enable interrupts during a specific part of the program.				
		For BIT COUNTER (BCNT) or BLOCK TRANSFER (XFER) instructions	Interrupt tasks are started only after execution of the instruction has been completed, ensuring data concurrency even when the same data area words are accessed from the instruction and the interrupt task.				

Item		CJ1-H-R CPU Unit	CJ1-H CPU Unit		CJ1M CPU Unit	CJ1 CPU Unit
		CJ1H-CPU6□H-R	CJ1H-CPU6□H	CJ1G-CPU4□H	CJ1M-CPU2□/1□	CJ1G-CPU4□
Debugging	Backup to Memory Cards (simple backup function)	In addition to the data listed at the right, data from Units mounted to the CPU Rack or Expansion Racks can also be backed up to the Memory Card (via pushbutton on front panel). This is very effective when replacing Units. Backup data includes scan lists for DeviceNet Units, protocol macros for Serial Communications Units, etc.				Only the user program, parameters, and I/O memory in the CPU Unit.
	Automatic user program and parameter area backup to flash memory	Supported (enabling battery-free operation without a Memory Card) The user program and parameter area data are automatically backed up the flash memory whenever they are transferred to the CPU Unit from the CX-Programmer, file memory, etc.				Not supported.
I/O tables	Detailed information on I/O table creation errors	Detailed I/O table error information is stored in A261 whenever the I/O tables cannot be created for any reason.				Not supported.
	Displaying presence of first rack word setting on Programming Console	It's possible to confirm if the first rack word has been specified for the system on the Programming Console display. The first rack word is specified from the CX-Programmer, making it previously impossible to confirm the setting from the Programming Console.				Not supported.
Built-in I/O		Not supported.			CJ1M-CPU2□	Not supported.
Serial PLC Link		Not supported.			Supported.	Not supported.
Scheduled interrupts set in increments of 0.1 ms		Supported.	Not supported.		Supported.	Not supported.
Battery		CPM2A-BAT01			CJ1W-BAT01	CPM2A-BAT01
Operation when Unit doesn't complete startup process	CPU Unit startup	Starting or not starting (standby) the CPU Unit in MONITOR or RUN mode even if a Unit has not completed startup processing can be specified in the PLC Setup.				CPU Unit standby (fixed)
Sequence instructions	Differentiated LD NOT, AND NOT, and OR NOT instructions	Supported.				Not supported. (The same results can be achieved by combining differentiated LD, AND, and OR instructions with the NOT instruction.)
	OUTB, SETB, and RSTB instructions to manipulate individual bits in DM and EM Area words	Supported.				Not supported.
Timer/ counter instructions	TIMU (0.1-ms, BCD), TIMUX (0.1-ms, binary), TMUH (0.01-ms, BCD), TMUHX (0.01-ms, binary)	Supported. Either BCD or binary can be selected (with CX-Programmer Ver.7.1 or higher).	Not supported.			
	Format for updating PVs for TIM, TIMH, TMHH, TTIM, TIML, MTIM, CNT, CNTR, CNR, TIMW, TMHW, CNTW instructions	Supported. Either BCD or binary can be selected (with CX-Programmer Ver. 3.0 or higher).				BCD only
Special math instructions	32-bit signed data line coordinates and X axis starting point specification for APR instruction	Supported.				Not supported.
Floating-point decimal instructions	High-speed trigonometric functions: SINQ, COSQ, and TANQ instructions	Supported (with CX-Programmer Ver. 7.1 or higher).	Not supported.			
	Single-precision calculations and conversions	Supported (enabling standard deviation calculations).				Not supported.
	Conversions between single-precision floating point and ASCII	Supported. Floating point can be converted to ASCII for display on PTs. ASCII text strings from measurement devices can be converted to floating-point decimal for use in calculations.				Not supported.
	Double-precision calculations and conversions	Supported (enabling high-precision positioning).				Not supported.
Text string, table data, and data shift instructions	Text string and table data processing instruction execution	Data processing can be performed normally or in the background (specified for each instruction). (Using time slices to process instruction over several cycles reduces the effect of these instructions on the cycle time.).				Normal processing only.
	Stack insertions/deletions/ replacements and stack counts with table processing instructions	Supported. Effective for tracking workpieces on conveyor lines.				Not supported.
Data control instructions	PID with autotuning	Supported (eliminating the need to adjust PID constants).				Not supported.
Subroutine instructions	Global subroutines	Supported (GSBS, GSBN, and GRET instructions) Enables easier structuring of subroutines.				Not supported.

Item		CJ1-H-R CPU Unit	CJ1-H CPU Unit		CJ1M CPU Unit	CJ1 CPU Unit
		CJ1H-CPU6□H-R	CJ1H-CPU6□H	CJ1G-CPU4□H	CJ1M-CPU2□/1□	CJ1G-CPU4□
Failure diagnosis instructions	Error log storage for FAL	Supported. FAL can be executed without placing an entry in the error log. (Only system FAL errors will be placed in the error log.)				Not supported.
	Error simulation with FAL/FALS	Supported. Fatal and nonfatal errors can be simulated in the system to aid in debugging.				Not supported.
Data comparisonin structions	AREA RANGE COMPARE (ZCP) and DOUBLE RANGE COMPARE (ZCPL)	Supported.				Not supported.
Index register real I/O address conversion for CVM1/CV	Program and real I/O memory address compatibility with CVM1/CVseries PLCs	CVM1/CV-series real I/O memory addresses can be converted to CJ-series addresses and placed in index registers or CJ-series real I/O memory addresses in index registers can be converted to CVM1/CV-series addresses.				Not supported.
Condition Flag saving and loading	Compatibility with CVM1/CV-series PLCs	Condition Flag status can be saved or loading using the SAVE CONDITION FLAGS (CCS) and LOAD CONDITION FLAGS (CCL) instructions, enabling applications where Condition Flag status must be passed between different program locations, tasks, or cycles.				Not supported.
Disabling power interruptions in program sections		Supported. Instructions between DI and EI are executed without performing power OFF processing even if a power interruption has been detected and confirmed.				Not supported.
Condition Flag operation		The statuses of the Equals, Negative, and Error Flags are maintained for execution of the following instructions. TIM, TIMH, TMHH, CNT, IL, ILC, JMP0, JME0, XCHG, XCGL, MOVR, input comparison instructions, CMP, CMPL, CPS, CPSL, TST, TSTN, STC, and CLC.				The Equals, Negative, and Error Flags are turned OFF after executing the following instructions.TIM, TIMH, TMHH, CNT, IL,ILC, JMP0, JME0, XCHG, XCGL, MOVR, input comparison instructions, CMP, CMPL, CPS, CPSL, TST, and TSTN.

Unit Versions

Units	Models	Unit version
CJ1M CPU Units	CJ1M-CPU12/13 CJ1M-CPU22/23	Unit version 4.0
		Unit version 3.0
		Unit version 2.0
		Pre-Ver. 2.0
	CJ1M-CPU11/21	Unit version 4.0
		Unit version 3.0
		Unit version 2.0

Function Support by Unit Version

Functions Supported for Unit Version 4.0 or Later

CX-Programmer 7.0 or higher must be used to enable using the functions added for unit version 4.0.
Additional functions are supported if CX-Programmer version 7.2 or higher is used.

CJ1-H/CJ1M CPU Units

Function		CJ1H-CPU□□H-R, CJ1□-CPU□□H, CJ1G-CPU□□P, CJ1M-CPU□□	
		Unit version 4.0 or later	Other unit versions
Online editing of function blocks **Note:** This function cannot be used for simulations on the CX-Simulator.		OK	–
Input-output variables in function blocks		OK	–
Text strings in function blocks		OK	–
New application instructions	Number-Text String Conversion Instructions: NUM4, NUM8, NUM16, STR4, STR8, and STR16	OK	–
	TEXT FILE WRITE (TWRIT)	OK	–
ST programming in task programs		OK with CX-Programmer version 7.2 or higher	–
SFC programming in task programs		OK with CX-Programmer version 7.2 or higher	–

User programs that contain functions supported only by CPU Units with unit version 4.0 or later cannot be used on CS/CJ-series CPU Units with unit version 3.0 or earlier. An error message will be displayed if an attempt is made to download programs containing unit version 4.0 functions to a CPU Unit with a unit version of 3.0 or earlier, and the download will not be possible.
If an object program file (.OBJ) using these functions is transferred to a CPU Unit with a unit version of 3.0 or earlier, a program error will occur when operation is started or when the unit version 4.0 function is executed, and CPU Unit operation will stop.

Functions Supported for Unit Version 3.0 or Later

CX-Programmer 5.0 or higher must be used to enable using the functions added for unit version 3.0.

CJ1-H/CJ1M CPU Units

Function		CJ1H-CPU□□H-R, CJ1□-CPU□□H, CJ1G-CPU□□P, CJ1M-CPU□□	
		Unit version 3.0 or later	Other unit versions
Function blocks		OK	–
Serial Gateway (converting FINS commands to CompoWay/F commands at the built-in serial port)		OK	–
Comment memory (in internal flash memory)		OK	–
Expanded simple backup data		OK	–
New application instructions	TXDU(256), RXDU(255) (support no-protocol communications with Serial Communications Units with unit version 1.2 or later)	OK	–
	Model conversion instructions: XFERC(565), DISTC(566), COLLC(567), MOVBC(568), BCNTC(621)	OK	–
	Special function block instructions: GETID(286)	OK	–
Additional instruction functions	PRV(881) and PRV2(883) instructions: Added high-frequency calculation methods for calculating pulse frequency. (CJ1M CPU Units only)	OK	–

User programs that contain functions supported only by CPU Units with unit version 3.0 or later cannot be used on CS/CJ-series CPU Units with unit version 2.0 or earlier. An error message will be displayed if an attempt is made to download programs containing unit version 3.0 functions to a CPU Unit with a unit version of 2.0 or earlier, and the download will not be possible.
If an object program file (.OBJ) using these functions is transferred to a CPU Unit with a unit version of 2.0 or earlier, a program error will occur when operation is started or when the unit version 3.0 function is executed, and CPU Unit operation will stop.

Functions Supported for Unit Version 2.0 or Later

CX-Programmer 4.0 or higher must be used to enable using the functions added for unit version 2.0.

CJ1-H/CJ1M CPU Units

Function		CJ1-H CPU Units		CJ1M CPU Units		
		(CJ1H-CPU□□H-R) (CJ1□-CPU□□H) (CJ1G-CPU□□P)		CJ1M-CPU12/13/22/23		CJ1M-CPU11/21
		Unit version 2.0 or later	Other unit versions	Unit version 2.0 or later	Other unit versions	Unit version 2.0 or later
Downloading and Uploading Individual Tasks		OK	–	OK	–	OK
Improved Read Protection Using Passwords		OK	–	OK	–	OK
Write Protection from FINS Commands Sent to CPU Units via Networks		OK	–	OK	–	OK
Online Network Connections without I/O Tables		OK	– (Supported if I/O tables are automatically generated at startup.)	OK	– (Supported if I/O tables are automatically generated at startup.)	OK
Communications through a Maximum of 8 Network Levels		OK	–	OK	–	OK
Connecting Online to PLCs via NS-series PTs		OK	OK from lot number 030201	OK	OK from lot number 030201	OK
Setting First Slot Words		OK for up to 64 groups	OK for up to 8 groups	OK for up to 64 groups	OK for up to 8 groups	OK for up to 64 groups
Automatic Transfers at Power ON without a Parameter File		OK	–	OK	–	OK
Automatic Detection of I/O Allocation Method for Automatic Transfer at Power ON		OK	–	OK	–	OK
Operation Start/End Times		OK	–	OK	–	OK
New Application Instructions	MILH, MILR, MILC	OK	–	OK	–	OK
	=DT, <>DT, <DT, <=DT, >DT, >=DT	OK	–	OK	–	OK
	BCMP2	OK	–	OK	OK	OK
	GRY	OK	OK from lot number 030201	OK	OK from lot number 030201	OK
	TPO	OK	–	OK	–	OK
	DSW, TKY, HKY, MTR, 7SEG	OK	–	OK	–	OK
	EXPLT, EGATR, ESATR, ECHRD, ECHWR	OK	–	OK	–	OK
	Reading/Writing CPU Bus Units with IORD/IOWR	OK	–	OK	–	OK
	PRV2	–	–	OK, but only for CPU Units with built-in I/O	–	OK, but only for CPU Units with built-in I/O

User programs that contain functions supported only by CPU Units with unit version 2.0 or later cannot be used on CS/CJ-series Pre-Ver. 2.0 CPU Units. An error message will be displayed if an attempt is made to download programs containing unit version s.0 functions to a Pre-Ver. 2.0 CPU Unit, and the download will not be possible.

If an object program file (.OBJ) using these functions is transferred to a Pre- Ver. 2.0 CPU Unit, a program error will occur when operation is started or when the unit version 2.0 function is executed, and CPU Unit operation will stop.

Unit Versions and Programming Devices

The following tables show the relationship between unit versions and CX-Programmer versions.

Unit Versions and Programming Devices

CPU Unit	Functions (See note 1.)		CX-Programmer				Programming Console
			Ver. 3.3	Ver. 4.0	Ver. 5.0 Ver. 6.0	Ver. 7.0 or higher	
CS/CJ-series unit Ver. 4.0	Functions added for unit version 4.0	Using new functions	–	–	–	OK (See note 2 and 3.)	No restrictions
		Not using new functions	OK	OK	OK	OK	
CS/CJ-series unit Ver. 3.0	Functions added for unit version 3.0	Using new functions	–	–	OK	OK	
		Not using new functions	OK	OK	OK	OK	
CS/CJ-series unit Ver. 2.0	Functions added for unit version 2.0	Using new functions	–	OK	OK	OK	
		Not using new functions	OK	OK	OK	OK	

Note: 1. As shown above, there is no need to upgrade to CX-Programmer version as long as the functions added for unit versions are not used.
2. CX-Programmer version 7.1 or higher is required to use the new functionality of CJ1-H-R CPU Units.
When using CJ1-H-R CPU unit Ver.4.1, use CX-Programmer Ver.7.2 or later (Check the CX-Programmer version in "Version Information").
3. CX-Programmer version 7.0 or higher is required to use the functional improvements made for unit version 4.0 of the CS/CJ-series CPU Units. With CX-Programmer version 7.2 or higher, you can use even more expanded functionality.

Device Type Setting

The unit version does not affect the setting made for the device type on the CX-Programmer. Select the device type as shown in the following table regardless of the unit version of the CPU Unit.

Series	CPU Unit group	CPU Unit model	Device type setting on CX-Programmer Ver. 4.0 or higher
CJ Series	CJ1M CPU Units	CJ1M-CPU□□	CJ1M

External Interface

A CJ-series CJ1M CPU Unit (with Built-in I/O) provides two communications ports (a peripheral port and an RS-232C port) and one built-in I/O port (40-pin MIL Connector).

LED Indicators

Battery Compartment

Memory Card Power Supply Switch
Press the power supply switch to disconnect power before removing the Memory Card. Also, press the Memory Card Power Supply Switch to perform an easy backup operation.

DIP Switch
(Inside the battery compartment)
Used for initial settings.

I/O Indicator
Indicates ON/OFF status of signals to actual built-in inputs and outputs.

Memory Card Indicators
MCPWR (green): Lit when power is supplied to Memory Card.
BUSY (orange): Lit when Memory Card is being accessed.

Built-in I/O
MIL connector (40 pins)

Peripheral Port
Connected to Programming Devices, such as a Programming Console or host computers.

Memory Card Connector
Connects the Memory Card to the CPU Unit.

RS-232C Port
Connected to Programming Devices (excluding Programming Consoles), Host Computers, general-purpose external devices, Programmable Terminals, and other devices.

Memory Card Eject Button
Press the eject button to remove te Memory Card from the CPU Unit.

Peripheral port

The peripheral port is used to connect a Programming Device (including a Programming Console) or a host computer. It can also be used as an RS-232C port by connecting a suitable cable, such as the CS1W-CN118 or CS1W-CN□26. The connector pin arrangement when using a connecting cable for an RS-232C port is shown below.

CS1W-CN118
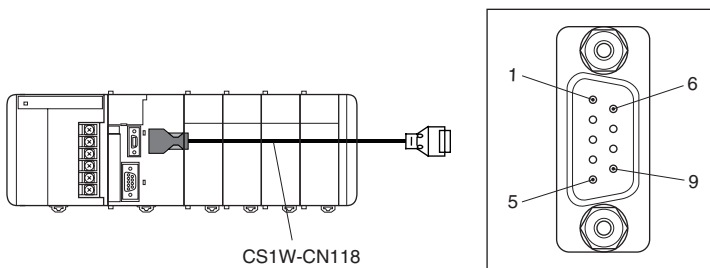
Pin No.	Signal	Name	Direction
1	–	–	–
2	SD (TXD)	Send data	Output
3	RD (RXD)	Receive data	Input
4	RS (RTS)	Request to send	Output
5	CS (CTS)	Clear to send	Input
6	Reserved	None	–
7	–	–	–
8	–	–	–
9	SG (0V)	Signal ground	–
Connector hood	FG	Protection earth	–

RS-232C Port

Item	Specification
Communications method	Half duplex
Synchronization	Start-stop
Baud rate	0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4/57.6/115.2 kbps (See note.)
Transmission distance	15 m max.
Interface	EIA RS-232C
Protocol	Host Link, NT Link, 1:N, No-protocol, or Peripheral Bus

Note: Baud rates for the RS-232C are specified only up to 19.2 kbps. The CJ Series supports serial communications from 38.4 kbps to 115.2 kbps, but some computers cannot support these speeds. Lower the baud rate if necessary.
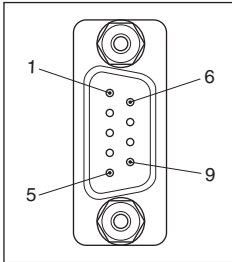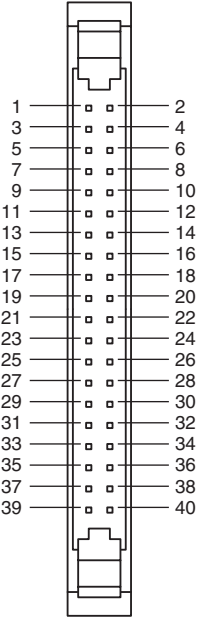
Pin No.	Signal	Name	Direction
1	FG	Protection earth	–
2	SD (TXD)	Send data	Output
3	RD (RXD)	Receive data	Input
4	RS (RTS)	Request to send	Output
5	CS (CTS)	Clear to send	Input
6	5V	Power supply	–
7	DR (DSR)	Data set ready	Input
8	ER (DTR)	Data terminal ready	Output
9	SG (0V)	Signal ground	–
Connector hood	FG	Protection earth	–

Note: Do not use the 5-V power from pin 6 of the RS-232C port for anything but the NT-AL001-E Link Adapter. Using this power supply for any other external device may damage the CPU Unit or the external device.

Built-in I/O MIL connector (40 pins)

Connector Pin Allocations

Pin layout	Code	Name	Input signal type	Pin No.	*1	Code	Name	Input signal type	Pin No.	*1

	IN0	• General-purpose input 0
		• Interrupt input 0
		• Quick-response input 0
		• Origin search 0
		  (Origin Input Signal)
			24 V DC	1	A1	IN1	• General-purpose input 0
							• Interrupt input 0
							• Quick-response input 0
							• Origin search 0
							  (Origin Proximity Input Signal)
								24 V DC	2	B1

			LD+	3	A2			LD+	4	B2
			0 V/LD−	5	A3			0 V/LD−	6	B3

	IN2	• General-purpose input 2
		• Interrupt input 2
		• Quick-response input 2
		• High-speed counter 1
		  (Phase-Z/Reset input)
		• Origin search 1
		  (Origin Input Signal)
			24 V DC	7	A4	IN3	• General-purpose input 3
							• Interrupt input 3
							• Quick-response input 3
							• High-speed counter 0
							  (Phase-Z/Reset input)
							• Origin search 1
							  (Origin Proximity Input Signal)
								24 V DC	8	B4

			LD+	9	A5			LD+	10	B5
			0 V/LD−	11	A6			0 V/LD−	12	B6

	IN4	• General-purpose input 4
		• Origin search 0
		  (Positioning Completed Signal)
			24 V DC	13	A7	IN5	• General-purpose input 5
							• Origin search 1
							  (Positioning Completed Signal)
								24 V DC	14	B7

			LD+	15	A8			LD+	16	B8
			0 V/LD−	17	A9			0 V/LD−	18	B9

	IN6	• General-purpose input 6
		• High-speed counter 1
		  (Phase-A, Increment, or Count input)
			24 V DC	19	A10	IN7	• General-purpose input 7
							• High-speed counter 1
							  (Phase-B, Decrement, or Direction input)
								24 V DC	20	B10

			LD+	21	A11			LD+	22	B11
			0 V/LD−	23	A12			0 V/LD−	24	B12

	IN8	• General-purpose input 8
		• High-speed counter 0
		  (Phase-A, Increment, or Count input)
			24 V DC	25	A13	IN9	• General-purpose input 9
							• High-speed counter 0
							  (Phase-B, Decrement, or Direction input)
								24 V DC	26	B13

			LD+	27	A14			LD+	28	B14
			0 V/LD−	29	A15			0 V/LD−	30	B15

	OUT0	General-purpose output 0
		• In CW/CCW mode:
		  Pulse output 0 (CW)
		• In Pulse + Direction mode:
		  Pulse output 0 (pulse)
			−	31	A16	OUT1	General-purpose output 1
							• In CW/CCW mode:
							  Pulse output 0 (CCW)
							• In Pulse + Direction mode:
							  Pulse output 1 (pulse)
								−	32	B16

	OUT2	General-purpose output 2
		• In CW/CCW mode:
		  Pulse output 1 (CW)
		• In Pulse + Direction mode:
		  Pulse output 0 (direction)
			−	33	A17	OUT3	General-purpose output 3
							• In CW/CCW mode:
							  Pulse output 1 (CCW)
							• In Pulse + Direction mode:
							  Pulse output 1 (direction)
								−	34	B17

	OUT4	• General-purpose output 4
		• Origin search 0
		  (Error Counter Reset Output)
		• PWM(891) output 0
			−	35	A18	OUT5	• General-purpose output 5
							• Origin search 1
							  (Error Counter Reset Output)
							• PWM(891) output 1 *2
								−	36	B18

	−	Power supply input (+V) for the output	−	37	A19	−	Not used	−	38	B19
	−	Output COM	−	39	A20	−	Output COM	−	40	B20

*1. These are the pins on the XW2D-□□G□ Terminal Block.
*2. PWM(891) output 1 can be used only with the CJ1M-CPU22/CPU23.

Built-in I/O MIL connector Wiring Methods

To connect to a Terminal Block, use an OMRON Cable preassembled with the special connector or attach the special connector (sold separately) to a cable yourself.

Using User-made Cables with Connector
Connector Models
Compatible Connector Specifications
- MIL Flat Cable Connectors (40-pin Pressure-fitted Connectors)

Socket
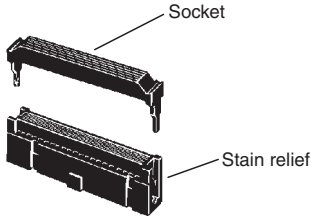
Stain relief

Name	OMRON model number	Daiichi Electronics model number
Socket	XG4M-4030	FRC5-AO40-3TON
Stain Relief	XG4M-4004	–
Set model number	XG4M-4030-T	FRC5-AO40-3TOS
Recommended Flat Cable	XY3A-200□	–

- MIL Loose Wire Crimp Connectors (40-pin Pressure-fitted Connectors)

Hood Cover

Partial Cover
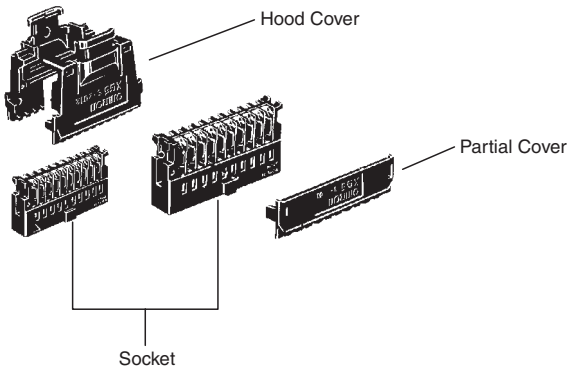
Socket

Name		OMRON model number
Socket	AWG24	XG5M-4032-N
	AWG26 to AWG28	XG5M-4035-N
Spare Contacts (See note 1.)	AWG24	XG5W-0031-N
	AWG26 to AWG28	XG5W-0034-N
Hood Cover (See note 2.)		XG5S-4022
Partial Cover (See note 2.) (2 required for each socket)		XG5S-2001

Note: 1. Contacts are included with the Socket.
2. Select either the Hood Cover or the Partial Cover.

Wiring
We recommend using a cable with wires sized between 28 and 24 AWG (0.2 to 0.08 mm^2). Use a wire with an outer diameter of 1.61 mm max.

Compatible Terminal Blocks

Recommended Cable	Compatible Terminal Block	Number of pins	Size	Temperature (°C)
XW2Z-□□□K	XW2D-40G6	40	Small	0 to 55
	XW2B-40G5		Standard	−25 to 80
	XW2B-40G4			

Using an OMRON Cable preassembled with the special connector

Connection to Connector-Terminal Block Conversion Unit with Built-in I/O

CJ1M-CPU2□ (with Built-in I/O)

Built-in I/O Connector

Special Connecting Cable
XW2Z-□□□K

Connector-Terminal Block
Conversion Unit
XW2□-40G□

Terminal Block
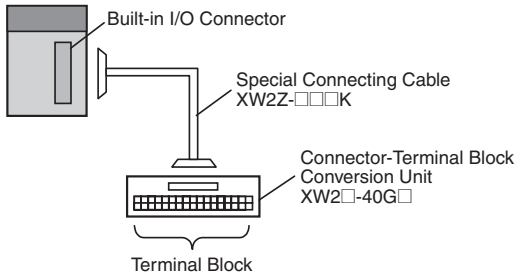
Connection to Servo Driver with Built-in I/O

CJ1M-CPU2□ (with Built-in I/O)

Built-in I/O Connector

Connecting Cables for CJ1M CPU Units
• For OMNUC G Series: XW2Z-□□□J-A33
• For SMARTSTEP2: XW2Z-□□□J-A33

Servo Relay Unit for 1 axis
XW2B-20J6-8A

Servo Driver Connecting Cables
• For OMNUC G Series: XW2Z-□□□J-B31
• For SMARTSTEP2: XW2Z-□□□J-B32

Servo Driver
• OMNUC G Series: R88D-GT
• SMARTSTEP2: R7D-BP
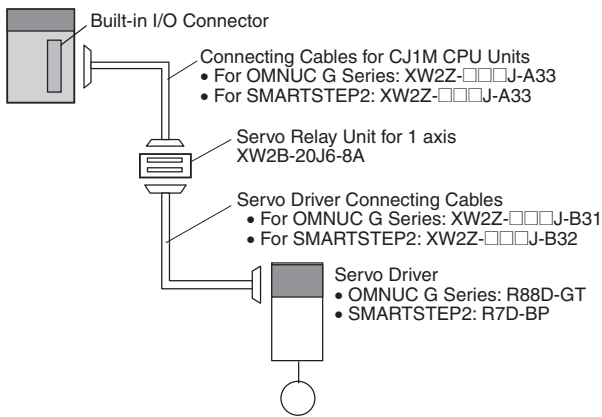
When two axes are used, two Connecting Cables are required at the Servo Driver for each Servo Relay Unit.

Dimensions

CJ1M CPU Units (with Built-in I/O)
CJ1M-CPU21/22/23
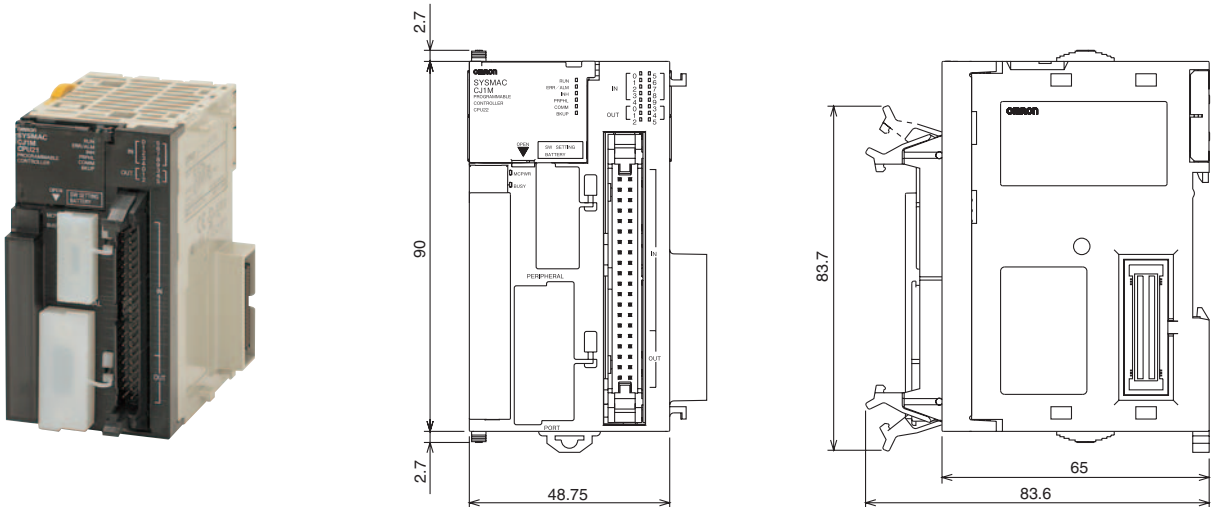
About Manuals

Name	Cat. No.	Contents
SYSMAC CJ/NSJ Series CJ1H-CPU□□H-R, CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H Programmable Controllers Operation Manual	W393	Provides an outlines of and describes the design, installation, maintenance, and other basic operations for the CJ-series PLCs.
SYSMAC CS/CJ/NSJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1H-CPU□□H-R, CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D Programmable Controllers Programming Manual	W394	This manual describes programming and other methods to use the functions of the CS/CJ-series and NSJ-series PLCs.
SYSMAC CJ Series CJ1M-CPU21/22/23 Built-in I/O Operation Manual	W395	Describes the functions of the built-in I/O for CJ1M CPU Units.
SYSMAC CS/CJ/NSJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1H-CPU□□H-R, CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D Programmable Controllers Instructions Reference Manual	W340	Describes the ladder diagram programming instructions supported by CS/CJ-series and NSJ-series PLCs
SYSMAC CS/CJ Series CQM1H-PRO01-E, C200H-PRO27-E, CQM1-PRO01-E Programming Consoles Operation Manual	W341	Provides information on how to program and operate CS/CJ-series PLCs using a Programming Console.
SYSMAC CS/CJ/NSJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, CS1W-SCB□□-V1, CS1W-SCU□□-V1, CJ1W-SCU□□-V1, CP1H-X□□□□-□, CP1H-XA□□□□-□, CP1H-Y□□□□-□, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D Communications Commands Reference Manual	W342	Describes the C-series (Host Link) and FINS communications commands used with CS/CJ-series PLCs.
SYSMAC WS02-CX□□-V□ CX-Programmer Operation Manual	W446	Provides information on how to use the CX-Programmer for all functionality except for function blocks.
SYSMAC WS02-CX□□-V□ CX-Programmer Operation Manual Function Blocks (CS1G-CPU□□H, CS1H-CPU□□H, CJ1G-CPU□□H, CJ1H-CPU□□H, CJ1M-CPU□□, CP1H-X□□□□-□, CP1H-XA□□□□-□, CP1H-Y□□□□-□ CPU Units)	W447	Describes the functionality unique to the CX-Programmer Ver. 7.0 and CP-series CPU Units or CS/CJ-series CPU Units with unit version 3.0 or later based on function blocks. Functionality that is the same as that of the CX-Programmer is described in W446 (enclosed).
CXONE-AL□□C-V□/ CXONE-AL□□D-V□ CX-Integrator Operation Manual	W464	Describes operating procedures for the CX-Integrator Network Configuration Tool for CS-, CJ-, CP-, and NSJ-series Controllers.
CXONE-AL□□C-V□/AL□□D-V□ CX-One FA Integrated Tool Package Setup Manual	W463	Installation and overview of CX-One FA Integrated Tool Package.