## CJ-series CJ2M CPU Units, Pulse I/O Modules

# CJ2M-CPU3□/-CPU1□/-MD21□

CSM_CJ2M-CPU3__-CPU1__-MD21__DS_E_11_3

**Since 2001, CJ1M-series PLCs are in control of a wide variety of applications worldwide.**

**The accumulated experience and advancements in technology now result in CJ2M; fully compatible, yet fully new.**

CJ2M-MD21□

CJ2M-CPU3□

CJ2M-CPU1□

- Increased performance, and increased memory capacity
- Up to 40 I/O unit on any CPU
- Pulse I/O Modules add position control functions to any CPU
- USB for plug-and-play access to the PLC
- All models available with or without Ethernet port
- Choice of serial port plug-in modules

## Features

- Five variations in program capacity from 5K steps to 60K steps; scale the CPU to your application needs.
- Faster processors; LD instruction execution time is reduced to 40 ns, floating point trigonometrics in less than 1 μs.
- Optional Pulse I/O Modules can be mounted to enable positioning functions for up to four axes. The module provides high-speed counters, interrupt inputs and pulse train/PWM outputs. (CJ2M CPU Units with Unit Version 2.0 or Later)
- Faster Function Block calls and execution, faster interrupt handling, less overhead time.
- Added execution memory for Function Blocks allows structured, object-oriented programming even in entry-level CPUs.
- General-purpose Ethernet port supports EtherNet/IP tag-based data links, connection to Support Software, communications between PLCs, FTP data transfers, and more (CJ2M-CPU3□).
- Standard USB port on all models allows Support Software to connect directly through standard USB cable.
- A Serial Option Module can be mounted to add RS-232C or RS-422A/485 communications ports (CJ2M-CPU3□).
- Compatible with all existing CJ1 power supply-, I/O-, control- and communication units.

# Ordering Information

**International Standards**

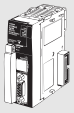
- The standards are abbreviated as follows: U: UL, U1: UL (Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, and CE: EC Directives.
- Contact your OMRON representative for further details and applicable conditions for these standards.

## CJ2M CPU Units (Built-in EtherNet/IP)

| Product name | Specifications | | | | | | Current consumption (A) | | Model | Standards |
|---|---|---|---|---|---|---|---|---|---|---|
| | I/O capacity/ Mountable Units (Expansion Racks) | Program capacity | Data memory capacity | LD instruction execution time | EtherNet/IP function | Option board slot | 5 V | 24 V | | |
| CJ2M (Built-in EtherNet/IP) CPU Units | 2,560 points/ 40 Units (3 Expansion Racks max.) | 60K steps | 160K words (DM: 32K words, EM: 32K words × 4 banks) | 0.04 μs | YES | YES | 0.7 (See note.) | – | CJ2M-CPU35 | UC1, N, L, CE |
| | | 30K steps | | | | | | | CJ2M-CPU34 | |
| | | 20K steps | 64K words (DM: 32K words, EM: 32K words × 1 bank) | | | | | | CJ2M-CPU33 | |
| | | 10K steps | | | | | | | CJ2M-CPU32 | |
| | | 5K steps | | | | | | | CJ2M-CPU31 | |

**Note:** Add 0.005A, 0.030A and 0.075A when using Serial Communications Option Boards (CP1W-CIF01/CIF11/CIF12-V1), respectively.
Add 0.15A/Unit when using NT-AL001 RS-232C/RS-422A Adapters.
Add 0.04A/Unit when using CJ1W-CIF11 RS-422A Adapters.
Add 0.20A/Unit when using NV3W-M□20L(-V1) Programmable Terminals.

## CJ2M CPU Units

| Product name | Specifications | | | | | | Current consumption (A) | | Model | Standards |
|---|---|---|---|---|---|---|---|---|---|---|
| | I/O capacity/ Mountable Units (Expansion Racks) | Program capacity | Data memory capacity | LD instruction execution time | EtherNet/IP function | Option board slot | 5 V | 24 V | | |
| CJ2M CPU Units  | 2,560 points/ 40 Units (3 Expansion Racks max.) | 60K steps | 160K words (DM: 32K words, EM: 32K words × 4 banks) | 0.04 μs | – | – | 0.5 (See note.) | – | CJ2M-CPU15 | UC1, N, L, CE |
| | | 30K steps | | | | | | | CJ2M-CPU14 | |
| | | 20K steps | 64K words (DM: 32K words, EM: 32K words × 1 bank) | | | | | | CJ2M-CPU13 | |
| | | 10K steps | | | | | | | CJ2M-CPU12 | |
| | | 5K steps | | | | | | | CJ2M-CPU11 | |

**Note:** Add 0.15A/Unit when using NT-AL001 RS-232C/RS-422A Adapters.
Add 0.04A/Unit when using CJ1W-CIF11 RS-422A Adapters.
Add 0.20A/Unit when using NV3W-M□20L(-V1) Programmable Terminals.

## Serial Communications Option Boards (Only CJ2M-CPU3□)

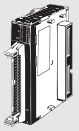
The serial communications port can be equipped by installing the serial communications option board to the option board slot in front of CPU unit.

| Product name | Specifications | Serial communications mode | Current consumption (A) | | Model | Standards |
|---|---|---|---|---|---|---|
| | | | 5 V | 24 V | | |
| RS-232C Option Board | One RS-232C port<br>Connector: D-Sub, 9 pin, female<br>Maximum transmission distance: 15m | Host Link, 1:N NT Link, No-protocol, Serial PLC Link Slave, Serial PLC Link Master, Serial Gateway converted to CompoWay/F, and Tool Bus ✻ | 0.005 | – | CP1W-CIF01 | UC1, N, L, CE |
| RS-422A/485 Option Board | One RS-422A/485 port<br>Terminal block: using ferrules<br>Maximum transmission distance: 50m | | 0.030 | – | CP1W-CIF11 | |
| RS-422A/485 Isolated-type Option Board | One RS-422A/485 port (Isolated)<br>Terminal block: using ferrules<br>Maximum transmission distance: 500m | | 0.075 | – | CP1W-CIF12-V1 | |

**Note:** It is not possible to use a CP-series Ethernet Option Board (CP1W-CIF41), LCD Option Board (CP1W-DAM01) with a CJ2M CPU Unit.
✻ The following modes cannot be used: 1:1 NT Link, Serial Gateway converted to Host Link FINS, 1:1 Link Master, and 1:1 Link Slave.

## Pulse I/O Modules (Only CJ2M CPU Unit with Unit Version 2.0 or Later)

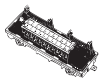
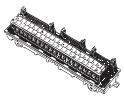
Optional Pulse I/O Modules can be mounted to enable pulse I/O. Up to two Pulse I/O Modules can be mounted to the left side of a CJ2M CPU Unit.

| Product name | Specifications | Current consumption (A) | | Model | Standards |
|---|---|---|---|---|---|
| | | 5 V | 24 V | | |
| **Pulse I/O Modules**  | Sinking outputs, MIL connector<br>10 inputs (including four interrupt/quickresponse inputs and two high-speed counter inputs)<br>6 outputs (including two pulse outputs and two PWM outputs) | 0.08 | --- | **CJ2M-MD211** | UC1, N, L, CE |
| | Sourcing outputs, MIL connector<br>10 inputs (including four interrupt/quickresponse inputs and two high-speed counter inputs)<br>6 outputs (including two pulse outputs and two PWM outputs) | 0.08 | --- | **CJ2M-MD212** | |

**Note:** Connectors are not provided with Pulse I/O Modules. Purchase the following Connector, an OMRON Cable with Connectors for Connector Terminal Block Conversion Units, or an OMRON Cable with Connectors for Servo Relay Units.

## Connecting to Pulse I/O Modules

On wiring, refer to Pulse I/O Modules 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** | Phillips screw (M3 screw terminals,40-terminals) | | **XW2R-J40G-T** | --- |
| | Slotted screw (M3 European type ,40-terminals) | | **XW2R-E40G-T** | |
| | Push-in spring(Clamp 40-terminals) | | **XW2R-P40G-T** | |
| **Cable for Connector-Terminal Block Conversion Unit** | | Cable length: 0.25 m | **XW2Z-C25K** | |
| | | Cable length: 0.5 m | **XW2Z-C50K** | |
| | | 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** | G5/G Series | Cable for Pulse I/O Modules | 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 Pulse I/O Modules | 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 Pulse I/O Modules | 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 Pulse I/O Modules | 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** | |

# Accessories

The following accessories come with CPU Unit:

| Item | Specification |
|---|---|
| **Battery** | CJ1W-BAT01 |
| **End Cover** | CJ1W-TER01 (necessary to be mounted at the right end of CPU Rack) |
| **End Plate** | PFP-M (2 pcs) |

**Note:** A serial port (RS-232C) connector is not provided. Purchase a connector separately for serial port connection.
XM3A-0921 (manufactured by OMRON) or equivalent
XM2S-0911-E (manufactured by OMRON) or equivalent

# General Specifications

| Item | | CJ2M- | |
|---|---|---|---|
| | | CPU1□ | CPU3□ |
| **Enclosure** | | Mounted in a panel | |
| **Grounding** | | Less than 100 Ω | |
| **CPU Unit Dimensions** | | 90 mm × 75 mm × 31 mm | 90 mm × 75 mm × 62 mm |
| **Weight ✻1** | | 130 g or less | 190 g or less ✻2 |
| **Current Consumption** | | 5 VDC, 0.5 A | 5 VDC, 0.7 A |
| **Operation Environment** | **Ambient Operating Temperature** | 0 to 55°C | |
| | **Ambient Operating Humidity** | 10% to 90% (with no condensation) | |
| | **Atmosphere** | Must be free from corrosive gases. | |
| | **Ambient Storage Temperature** | –20 to 70°C (excluding battery) | |
| | **Altitude** | 2,000 m or less | |
| | **Pollution Degree** | 2 or less: Conforms to JIS B3502 and IEC 61131-2. | |
| | **Noise Immunity** | 2 kV on power supply line (Conforms to IEC 61000-4-4.) | |
| | **Overvoltage Category** | Category II: Conforms to JIS B3502 and IEC 61131-2. | |
| | **EMC Immunity Level** | Zone B | |
| | **Vibration Resistance** | Conforms to IEC60068-2-6<br>5 to 8.4 Hz with 3.5-mm amplitude, 8.4 to 150 Hz<br>Acceleration of 9.8 $m/s^2$ for 100 min in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total) | |
| | **Shock Resistance** | Conforms to IEC60068-2-27<br>147 $m/s^2$, 3 times in X, Y, and Z directions (100 $m/s^2$ for Relay Output Units) | |
| **Battery** | **Life** | 5 years at 25°C | |
| | **Weight** | Approx. 10 g | |
| | **Model** | CJ1W-BAT01 | |
| **Applicable Standards** | | Conforms to cULus, NK, LR, and EC Directives. | |

**Note: 1.** Includes wight of end covers and battery.
**2.** Without a Serial Option Board.

# Performance Specifications

| Items | | | CJ2M- | | | | |
|---|---|---|---|---|---|---|---|
| | | | CPU11/31 | CPU12/32 | CPU13/33 | CPU14/34 | CPU15/35 |
| User Memory | | | 5K steps | 10K steps | 20K steps | 30K steps | 60K steps |
| I/O Bits | | | 2,560 bits | | | | |
| Processing Speed | Overhead Processing Time | | Normal Mode:<br>CJ2M-CPU3□: 270 μs ✻<br>CJ2M-CPU1□: 160 μs ✻<br>✻ The following time must be added when using EtherNet/IP tag data links for the CJ2M-CPU3□.<br>100 μs + (Number of words transferred × 1.8 μs)<br>The following time must be added when using Pulse I/O Modules with a CJ2M CPU Unit:<br>10 μs × Number of Pulse I/O Modules | | | | |
| | Execution Time | | Basic Instructions : 0.04 μs min.<br>Special Instructions : 0.06 μs min. | | | | |
| | Interrupts | I/O Interrupts and External Interrupts | Interrupt task startup time: 31 μs<br>Return time to cyclic task : 10 μs | | | | |
| | | Scheduled Interrupts | Minimum time interval : 0.4 ms (set in 0.1 ms increments) | | | | |
| | | | Interrupt task startup time: 30 μs<br>Return time to cyclic task : 11 μs | | | | |
| Maximum Number of Connectable Units | | | Total per CPU Rack or Expansion Rack: 10 Units max.;<br>Total per PLC: 40 Units max. | | | | |
| | Basic I/O Units | | No limit<br>However, a maximum of two CJ1W-INT01 Interrupt Input Units can be mounted. | | | | |
| | Special I/O Units | | Units for up to 96 unit numbers can be mounted. (Unit numbers run from 0 to 95. Units are allocated between 1 and 8 unit numbers.) | | | | |
| | CPU Bus Units | | CJ2M-CPU3□: 15 Units max.<br>CJ2M-CPU1□: 16 Units max. | | | | |
| | Pulse I/O Modules | | 2 Units max. ✻<br>✻ Supported only by CJ2M CPU Units with unit version 2.0 or later. A Pulse I/O Module must be mounted. | | | | |
| | Slots for which interrupts can be used | | Slots 0 to 4 on CPU Rack | | | | |
| Maximum Number of Expansion Racks | | | 3 max. | | | | |
| CIO Area | I/O Area | | 2,560 bits (160 words) : Words CIO 0000 to CIO 0159 | | | | |
| | Link Area | | 3,200 bits (200 words) : Words CIO 1000 to CIO 1199 | | | | |
| | CPU Bus Unit Area | | 6,400 bits (400 words) : Words CIO 1500 to CIO 1899 | | | | |
| | Special I/O Unit Area | | 15,360 bits (960 words): Words CIO 2000 to CIO 2959 | | | | |
| | Pulse I/O Area | | 20 inputs, 12 outputs (CIO 2960 to CIO 2963) ✻<br>✻ Supported only by CJ2M CPU Units with unit version 2.0 or later. A Pulse I/O Module must be mounted. | | | | |
| | Serial PLC Link Words | | 1,440 bits (90 words) : Words CIO 3100 to CIO 3189 | | | | |
| | DeviceNet Area | | 9,600 bits (600 words) : Words CIO 3200 to CIO 3799 | | | | |
| | Internal I/O Area | | 3,200 bits (200 words) : Words CIO 1300 to CIO 1499 (Cannot be used for external I/O.)<br>37,504 bits (2,344 words): Words CIO 3800 to CIO 6143 (Cannot be used for external I/O.) | | | | |
| Work Area | | | 8,192 bits (512 words): Words W000 to W511 (Cannot be used for external I/O.) | | | | |
| Holding Area | | | 8,192 bits (512 words): Words H000 to H511<br>Bits in this area maintain their ON/OFF status when PLC is turned OFF or operating mode is changed.<br>Words H512 to H1535: These words can be used only for function blocks. They can be used only for function block instances (i.e., they are allocated only for internal variables in function blocks). | | | | |
| Auxiliary Area | | | Read-only: 31,744 bits (1,984 words)<br>• 7,168 bits (448 words): Words A0 to A447<br>• 24,576 bits (1,536 words): Words A10000 to A11535 ✻<br>Read/write: 16,384 bits (1,024 words) in words A448 to A1471 ✻<br>✻ A960 to A1471 and A10000 to A11535 cannot be accessed by CPU Bus Units, Special I/O Units, PTs, and Support Software that do not specifically support the CJ2 CPU Units. | | | | |
| Temporary Area | | | 16 bits: TR0 to TR15 | | | | |
| Timer Area | | | 4,096 timer numbers (T0000 to T4095 (separate from counters)) | | | | |
| Counter Area | | | 4,096 counter numbers (C0000 to C4095 (separate from timers)) | | | | |
| DM Area | | | 32k words ✻<br>• DM Area words for Special I/O Units: D20000 to D29599 (100 words × 96 Units)<br>• DM Area words for CPU Bus Units: D30000 to D31599 (100 words × 16 Units)<br>✻ Bits in the EM Area can be addressed either by bit or by word. These bits cannot be addressed by CPU Bus Units, Special I/O Units, PTs, and Support Software that do not specifically support the CJ2 CPU Units. | | | | |
| EM Area | | | 32k words/bank × 4 banks max.: E00_00000 to E3_32767 max. ✻<br>✻ Bits in the EM Area can be addressed either by bit or by word. These bits cannot be addressed by CPU Bus Units, Special I/O Units, PTs, and Support Software that do not specifically support the CJ2 CPU Units. | | | | |
| | | | 32K words × 1 bank | | | 32K words × 4 banks | |
| | Force-S/R Enabled Banks ✻1 | | Bank 0 hex | | | Bank 0 to 3 hex | |
| Index Registers | | | IR0 to IR15<br>These are special registers for storing PLC memory addresses for indirect addressing. (Index Registers can be set so that they are unique in each task or so that they are shared by all tasks.) | | | | |
| Cyclic Task Flag Area | | | 128 flags | | | | |
| Memory Card | | | 128 MB, 256 MB, or 512 MB | | | | |
| Operating Modes | | | PROGRAM Mode: Programs are not executed. Preparations can be executed prior to program execution in this mode.<br>MONITOR Mode: Programs are executed, and some operations, such as online editing, and changes to present values in I/O memory, are enabled in this mode.<br>RUN Mode: Programs are executed. This is the normal operating mode. | | | | |

✻1. Force-setting/resetting bits in the EM Area is possible only for banks specified for the EM Area force-set/reset function.

| Items | | | CJ2M- | | | | |
|---|---|---|---|---|---|---|---|
| | | | CPU11/31 | CPU12/32 | CPU13/33 | CPU14/34 | CPU15/35 |
| Execution Mode | | | Normal Mode | | | | |
| Programming Languages | | | Ladder Logic (LD),<br>Sequential Function Charts (SFC),<br>Structured Text (ST), and<br>Instruction Lists (IL) | | | | |
| Function Blocks | Maximum number of definitions | | 256 | | | 2,048 | |
| | Maximum number of instances | | 256 | | | 2,048 | |
| FB Program Area | | | 20K steps | | | | |
| Tasks | Type of Tasks | | Cyclic tasks<br>Interrupt tasks (Power OFF interrupt tasks, scheduled interrupt tasks, I/O interrupt tasks, and external interrupt tasks, and input interrupt tasks ✻2) | | | | |
| | Number of Tasks | | Cyclic tasks: 128<br>Interrupt tasks: 256<br>(Interrupt tasks can be defined as cyclic tasks to create extra cyclic tasks. Therefore, the total number of cyclic tasks is actually 384 max.) | | | | |
| Symbols (Variables) | Type of Symbols | | • Local symbols: Can be used only within a single task in the PLC.<br>• Global symbols: Can be used in all tasks in the PLC.<br>• Network symbols (tags)✻: I/O memory in the CPU Unit can be externally accessed using symbols, depending on parameter settings.<br>✻ Supported only by the CJ2M-CPU3□. | | | | |
| | Data Type of Symbols | | • BOOL (bit)<br>• UINT (one-word unsigned binary)<br>• UDINT (two-word unsigned binary)<br>• ULINT (four-word unsigned binary)<br>• INT (one-word signed binary)<br>• DINT (two-word signed binary)<br>• LINT (four-word signed binary)<br>• UINT BCD (one-word unsigned BCD) ✻3<br>• UDINT BCD (two-word unsigned BCD) ✻3<br>• ULINT BCD (four-word unsigned BCD) ✻3<br>• REAL (two-word floating-point)<br>• LREAL (four-word floating-point)<br>• CHANNEL (word) ✻3<br>• NUMBER (constant or number) ✻3<br>• WORD (one-word hexadecimal)<br>• DWORD (two-word hexadecimal)<br>• LWORD (four-word hexadecimal)<br>• STRING (1 to 255 ASCII characters)<br>• TIMER (timer) ✻4<br>• COUNTER (counter) ✻4<br>• User defined data types (data structures) | | | | |
| | Maximum Size of Symbol | | 32k words | | | | |
| | Array Symbols (Array Variables) | | One-dimensional arrays | | | | |
| | Number of Array Elements | | 32,000 elements max. | | | | |
| | Number of Registrable Network Symbols (Tags) ✻5 | | 2,000 max. | | | | |
| | Length of Network Symbol (Tag) Name ✻5 | | 255 bytes max. | | | | |
| | Encoding of Network Symbols (Tags) ✻5 | | UTF-8 | | | | |
| Data Tracing | Memory Capacity | | 8,000 words<br>(The EM Area can be specified from the CX-Programmer to use up to 32K words multiplied by the number of banks supported by the CPU Unit model.) | | | | |
| | Number of Samplings | | Bits = 31, one-word data =16, two-word data = 8, four-word data = 4 | | | | |
| | Sampling Cycle | | 1 to 2,550 ms (Unit: 1 ms) | | | | |
| | Trigger Conditions | | ON/OFF of specified bit<br>Data comparison of specified word<br>Data size: 1 word, 2 words, 4 words<br>Comparison Method: Equals (=), Greater Than (>), Greater Than or Equals (≥), Less Than (<), Less Than or Equals (≤), Not Equal (≠) | | | | |
| | Delay Value | | –32,768 to +32,767 ms | | | | |
| File Memory | | | Memory Card (128, 256, or 512 Mbytes) (Use the Memory Cards provided by OMRON.)<br>EM file memory (Part of the EM Area can be converted for use as file memory.) | | | | |
| Source/ Comment Memory | Function block program memory, comment file, program index file, symbol tables | | Capacity: 1 Mbytes | | | | |
| Communications | Logical Ports for Communications | Logical Ports | 8 ports (Used for SEND, RECV, CMND, PMCR, TXDU, and RXDU instructions.) | | | | |
| | | Extended Logical Ports | 64 ports (Used for SEND2, RECV2, CMND2, and PMCR2 instructions.) | | | | |
| | CIP Communications Specification | Class 3 (Connection Type) | Number of connections: 64 | | | | |
| | | UCMM (Non-connection Type) | Maximum number of clients that can communicate at the same time: 32<br>Maximum number of servers that can communicate at the same time: 40 | | | | |

✻**2.** Supported only by CJ2M CPU Units with unit version 2.0 or later. A Pulse I/O Module must be mounted.
✻**3.** Cannot be used in Function blocks.
✻**4.** Can be used only in Function blocks.
✻**5.** Supported only by the CJ2M-CPU3□.

| Item | | | | CJ2M- | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | CPU11/31 | CPU12/32 | CPU13/33 | CPU14/34 | CPU15/35 |
| Communications | Peripheral (USB) Port | | | USB 2.0-compliant B-type connector | | | | |
| | | Baud Rate | | 12 Mbps max. | | | | |
| | | Transmission Distance | | 5 m max. | | | | |
| | Serial Port | | | • CJ2M-CPU1□ interface: Conforms to EIA RS-232C.<br>• CJ2M-CPU3□: No serial ports with default system<br>One of the following Serial Option Boards can be mounted.<br>• CP1W-CIF01 RS-232C Option Board<br>• CP1W-CIF11 RS-422A/485 Option Board (not isolated, max. transmission distance: 50 m)<br>• CP1W-CIF12-V1 RS-422A/485 Option Board (isolated, max. transmission distance: 500 m) | | | | |
| | | Communications Method | | Half-duplex | | | | |
| | | Synchronization Method | | Start-stop | | | | |
| | | Baud Rate | | 0.3, 0.6, 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, or 115.2 (kbps) | | | | |
| | | Transmission Distance | | 15 m max. | | | | |
| | EtherNet/IP Port ✻6 | | | – | | | | |
| | | Transmission Specifications | Media Access Method | CSMA/CD | | | | |
| | | | Modulation | Baseband | | | | |
| | | | Transmission Paths | Star | | | | |
| | | | Baud Rate | 100 Mbps (100Base-TX) | | | | |
| | | | Transmission Media | Shielded twisted-pair (STP) cable; Categories: 5, 5e | | | | |
| | | | Transmission Distance | 100 m (between ethernet switch and node) | | | | |
| | | | Number of Cascade Connections | No restrictions if ethernet switch is used. | | | | |
| | | Communications Specifications | CIP Communications: Tag Data Links | | | | | |
| | | | Number of Connections | 32 | | | | |
| | | | Packet Interval (Refresh period) | 1 to 10,000 ms (Unit: 0.5 ms)<br>Can be set for each connection. (Data will be refreshed at the set interval, regardless of the number of nodes.) | | | | |
| | | | Permissible Communications Band | 3,000 packets per second ✻7 | | | | |
| | | | Number of Registerable Tag | 32 | | | | |
| | | | Type of Tags | CIO, DM, EM, HR, WR, and Network symboles | | | | |
| | | | Number of Tags per Connection | 8 (Seven tags if PLC status is included in the segment.) | | | | |
| | | | Maximum Link Data Size per Node (total size of all tags) | 640 words | | | | |
| | | | Maximum Data Size per Connection | 640 words ✻8<br>(Data is synchronized within each connection.) | | | | |
| | | | Number of Registrable Tag Set | 32 (1 connection = 1 segment) | | | | |
| | | | Maximum Tag Set Size | 640 words ✻8<br>(One word is used when PLC status is included in the segment.) | | | | |
| | | | Maximum Number of Tags Refreshable in a Single Cycle of CPU Unit ✻9 | Output/send (CPU Unit to EtherNet/IP): 32<br>Input/receive (EtherNet/IP to CPU Unit): 32 | | | | |
| | | | Data Size Refreshable in a Single Cycle of CPU Unit ✻9 | Output/send (CPU to EtherNet/IP) : 640 words<br>Input/receive (EtherNet/IP to CPU): 640 words | | | | |
| | | | Change of Tag Data Link Parameter Settings during Operation | OK ✻10 | | | | |
| | | | Multi-cast Packet Filter ✻11 | OK | | | | |
| | | | CIP Communications: Explicit Messages | – | | | | |
| | | | Class 3 (Connection Type) | Number of connections: 128 | | | | |
| | | | UCMM (Non-connection Type) | Maximum number of clients that can communicate at the same time : 16<br>Maximum number of servers that can communicate at the same time: 16 | | | | |
| | | | CIP Routing | OK<br>(CIP routing is enabled for the following remote Units: CJ1W-EIP21, CJ2H-CPU6□-EIP, CJ2M-CPU3□, and CS1W-EIP21.) | | | | |
| | | | FINS Communications | – | | | | |
| | | | FINS/UDP | OK | | | | |
| | | | FINS/TCP | 16 connections max. | | | | |
| | | | EtherNet/IP Conformance Test | Conforms to A5. | | | | |
| | | | EtherNet/IP Interface | 10Base-T/100Base-TX<br>Auto Negotiation/Fixed Setting | | | | |

✻6. The EtherNet/IP port is built into CJ2M-CPU3□ only.
✻7. "Packets per second" is the number of communications packets that can be processed per second.
✻8. Unit version 2.0 of built-in EtherNet/IP section: 20 words.
✻9. If the maximum number is exceeded, refreshing will require more than one CPU Unit cycle.
✻10. When changing parameters, however, the EtherNet/IP port where the change is made will be restarted. In addition, a timeout will temporarily occur at the other node that was communicating with that port, and it will then recover automatically.
✻11. The EtherNet/IP port supports an IGMP client, so unnecessary multicast packets are filtered by using an Ethernet switch that supports IGMP snooping.

# Function Specifications

| Functions | | | | Description |
|---|---|---|---|---|
| Cycle Time Management | Minimum Cycle Time | | | A minimum cycle time can be set.<br>(0.2 to 32,000 ms; Unit: 0.1 ms)<br>The minimum cycle time setting can be changed in MONITOR mode. |
| | Cycle Time Monitoring | | | The cycle time is monitored.<br>(0.01 to 40,000 ms; Unit: 0.01 ms) |
| | Background Processing | | | Instructions with long execution times can be executed over multiple cycles to prevent fluctuations in the cycle time. |
| Unit (I/O) Management | Basic I/O Units, Special I/O Units, and CPU Bus Units | I/O Refreshing | Cyclic Refreshing | Cyclic refreshing of Basic I/O Units, Special I/O Units, and CPU Bus Units |
| | | | Immediate Refreshing | I/O refreshing by immediate refreshing instructions |
| | | | Refreshing by IORF | I/O refreshing by IORF instruction |
| | | Unit Recognition at Startup | | The number of units recognized when the power is turned ON is displayed. |
| | Basic I/O Units | Input Response Time Setting | | The input response times can be set for Basic I/O Units. The response time can be increased to reduce the effects of chattering and noise at input contacts. The response time can be decreased to enable detecting shorter input pulses. |
| | | Load OFF Function | | All of the outputs on Basic I/O Units can be turned OFF when an error occurs in RUN or MONITOR mode. |
| | | Basic I/O Unit Status Monitoring | | Alarm information can be read from Basic I/O Units and the number of Units recognized can be read. |
| | | Reading/writing data using instructions for specific Units | | Special instructions can be used to read/write required data for specific Units at high speed. |
| | Special I/O Units and CPU Bus Units | Unit Restart Bits to Restart Units | | A Special I/O Unit or CPU Bus Unit can be restarted. |
| | Configuration Management | Automatic I/O Allocation at Startup | | I/O words can be automatically allocated to the Basic I/O Units that are connected in the PLC to start operation automatically without registering Units into I/O tables. |
| | | I/O Table Creation | | The current unit configuration can be registered in I/O tables to prevent it from being changed, to reserve words, and to set words. |
| | | Rack/Slot First Word Settings | | The first words allocated to a Units on the Racks can be set. |
| Memory Management | Holding I/O Memory when Changing Operating Modes | | | The status of I/O memory can be held when the operating mode is changed or power is turned ON. The forced-set/reset status can be held when the operating mode is changed or power is turned ON. |
| | File Memory | | | Files (such as program files, data files, and symbol table files) can be stored in Memory Card, EM File Memory, or Comment Memory. |
| | Built-in Flash Memory | | | The user program and Parameter Area can be backed up to an internal flash memory when they are transferred to the CPU Unit. |
| | EM File Function | | | Parts of the EM Area can be treated as file memory. |
| | Storing Comments | | | I/O comments can be stored as symbol table files in a Memory Card, EM file memory, or comment memory. |
| | EM Configuration | | | EM Area can be set as trace memory or EM file memory. |
| Memory Cards | Automatic File Transfer at Startup | | | A program file and parameter files can be read from a Memory Card when the power is turned ON. |
| | Program Replacement during PLC Operation | | | User programs can be transferred from a Memory Card to CPU Unit during operation. |
| | Function for Reading and Writing Data from a Memory Card | | | Data in I/O memory in the CPU Unit can be written to a Memory Card in CSV/TXT format. Data in CSV/TXT format in the Memory Card can be read to I/O memory in the CPU Unit. |

| Function | | | | Description |
|---|---|---|---|---|
| **Communications** | | | | – |
| | **Peripheral (USB) Port** | | **Peripheral Bus** | Bus for communications with various kinds of Support Software running on a personal computer. High-speed communications are supported. |
| | **Serial Port (Option) ✻12** | | | Application is possible when a Serial Communications Option Board is mounted. |
| | | **Host Link (SYSWAY) Communications** | | Host Link commands or FINS commands placed between Host Link headers and terminators can be sent from a host computer or PT to read/write I/O memory, read/control the operating mode, and perform other operations for PLC. |
| | | **No-protocol Communications** | | I/O instructions for communications ports (such as TXD/RXD instructions) can be used for data transfer with peripheral devices such as bar code readers and printers. |
| | | **NT Link Communications** | | I/O memory in the PLC can be allocated and directly linked to various PT functions, including status control areas, status notification areas, touch switches, lamps, memory tables, and other objects. |
| | | **Peripheral Bus** | | Bus for communications with various kinds of Support Software running on a personal computer. High-speed communications are supported. |
| | | **Serial Gateway** | | This gateway enables receiving and automatically converting FINS to the CompoWay/F. |
| | | **Serial PLC Links** | | Data is exchanged between CPU Units using serial ports without communications programming. PTs set to the 1:N NT Link protocol can be included in the network. |
| | **EtherNet/IP Port ✻13** | | | 100Base-TX/10Base-T<br>Protocols: TCP/IP, UDP, ARP, ICMP (ping only), BOOTP<br>Applications: FINS, CIP, SNTP, DNS (Client), FTP (Server) |
| | | **CIP Communications Service** | **Tag Data Links** | Programless cyclic data exchanges with the devices on the EtherNet/IP network. |
| | | | **Message Communications** | Any CIP commands can be received from the devices on the EtherNet/IP network. |
| | | **FINS Communications Service** | **Message Communications** | Any FINS commands can be transferred with the devices on the EtherNet/IP network. |
| **Interrupt** | **Scheduled Interrupts** | | | Tasks can be executed at a specified interval (minimum of 0.2 ms, Unit: 0.1 ms). |
| | | **Resetting and restarting with MSKS(690)** | | When MSKS(690) is executed, the internal timer is restarted and the time to first interrupt is set to a fixed value. |
| | | **Reading present value of internal timer with MSKS(690)** | | MSKS(690) can be used to read the time that has elapsed until the schedule interrupt is started or since the previous scheduled interrupt. |
| | **Power OFF Interrupts** | | | A task can be executed when CPU Unit's power turns OFF. |
| | **I/O Interrupt Tasks** | | | A task can be executed when an input signal is input to an Interrupt Input Unit. |
| | **External Interrupt Tasks** | | | A task can be executed when interrupts are requested from a Special I/O Unit or a CPU Bus Unit. |
| **Clock** | **Clock Function** | | | Clock data is stored in memory.<br>Accuracy (Accuracy depends on the temperature.)<br>Ambient temperature of 55°C : –3.5 to +0.5 min error per month<br>Ambient temperature of 25°C : –1.5 to +1.5 min error per month<br>Ambient temperature of 0°C : –3 to +1 min error per month |
| | **Operation Start Time Storage** | | | The time when operating mode was last changed to RUN mode or MONITOR mode is stored. |
| | **Operation Stop Time Storage** | | | The last time a fatal error occurred or the last time the operating mode was changed to PROGRAM mode is stored. |
| | **Startup Time Storage** | | | The time when the power was turned ON is stored. |
| | **Power Interruption Time Storage** | | | The time when the power is turned OFF is stored. |
| | **Total Power ON Time Calculation** | | | The total time that the PLC has been ON is stored in increments of 10 hours. |
| | **Power ON Clock Data Storage** | | | A history of the times when the power was turned ON is stored. |
| | **User Program Overwritten Time Storage** | | | The time that the user program was last overwritten is stored. |
| | **Parameter Date Storage** | | | The time when the Parameter Area was overwritten is stored. |
| **Power Supply Management** | **Memory Protection** | | | Holding Area data, DM Area data, EM Area data, Counter Completion Flags, and counter present values are held even when power is turned OFF. CIO Area, Work Area, some Auxiliary Area data, and Timer Completion Flags, timer present values, index registers, and data registers can be protected by turning ON the IOM Hold Bit in the Auxiliary Area, and by also setting the IOM Hold Bit to “Hold” in the PLC Setup. |
| | **Power OFF Detection Time Setting** | | | The detection time for power interruptions can be set.<br>AC power supply: 10 to 25 ms (variable)<br>DC power supply: 2 to 5 ms (CJ1W-PD022) or 2 to 20 ms (CJ1W-PD025) |
| | **Power OFF Detection Delay Time** | | | The detection of power interruptions can be delayed: 0 to 10 ms<br>(Not supported by the CJ1W-PD022.) |
| | **Number of Power Interruptions Counter** | | | The number of times power has been interrupted is counted. |

**✻12.** A Serial Option Board is required to use a serial port for the CJ2M-CPU3□ CJ2M CPU Unit.
**✻13.** Supported only by the CJ2M-CPU3□.

| Function | | | Description |
|---|---|---|---|
| Function Blocks | | | Standard programming can be encapsulated as function blocks. |
| | Languages in Function Block Definitions | | Ladder programming or structured text |
| Debugging | Online Editing | | The program can be changed during operation (in MONITOR or PROGRAM mode), except for block programming areas. |
| | Force-Set/Reset | | Specified bits can be set or reset.<br>Force-set/reset to the EM Area is enabled by specifying a start bank in parameter setting. |
| | Differentiate Monitoring | | ON/OFF changes in specified bits can be monitored. |
| | Data Tracing | | The specified I/O memory data can be stored in the trace memory in the CPU Unit. The triggers can be set. |
| | | Continuous Tracing | The trace data can be uploaded during data tracing using CX-Programmer, which enables continuously logging the data by constantly uploading the trace data. |
| | | Automatically starting tracing when operation starts | Data tracing can be automatically started when operation is started (i.e., when the operating mode is changed from PROGRAM mode to MONITOR or RUN mode). |
| | Storing Location of Error when an Error Occurs | | The location and task number where execution stopped for a program error is recorded. |
| | Program Check | | The programs can be checked for items such as no END instruction and FALS/FAL errors at startup. |
| Self-diagnosis and Restoration | Error Log | | A function is provided to store predefined error codes in CPU Unit, error information, and time at which the error occurred. |
| | CPU Error Detection | | CPU Unit WDT errors are detected. |
| | User-defined Failure Diagnosis | | Errors can be generated for user-specified conditions: Non-fatal errors (FAL) and fatal errors (FALS).<br>Program section time diagnosis and program section logic diagnosis are supported (FPD instruction). |
| | Load OFF Function | | This function turns OFF all outputs from Output Units when an error occurs. |
| | RUN Output | | The RUN output from the CJ1W-PA205R turns ON while CPU Unit is in RUN mode or MONITOR mode. |
| | Basic I/O Load Short-circuit Detection | | This function provides alarm information from Basic I/O Units that have load short-circuit protection. |
| | Failure Point Detection | | The time and logic of an instruction block can be analyzes using the FPD instruction. |
| | CPU Standby Detection | | This function indicates when the CPU Unit is on standby because all Special I/O Units and CPU Bus Units have not been recognized at the startup in RUN or MONITOR mode. |
| | Non-fatal Error Detection | System FAL Error Detection (User-defined non-fatal error) | This function generates a non-fatal (FAL) error when the user-defined conditions are met in program. |
| | | Duplicate Refreshing Error Detection | This function detects an error when an immediate refreshing Instruction in an interrupt task is competing with I/O refreshing of a cyclic task. |
| | | Basic I/O Unit Error Detection | This function detects the errors in Basic I/O Units. |
| | | Backup Memory Error Detection | This function detects errors in the memory backup of the user programs and parameter area (backup memory). |
| | | PLC Setup Error Detection | This function detects setting errors in the PLC Setup. |
| | | CPU Bus Unit Error Detection | This function detects an error when there is an error in data exchange between the CPU Unit and a CPU Bus Unit. |
| | | Special I/O Unit Error Detection | This function detects an error when there is an error in data exchange between the CPU Unit and a Special I/O Unit. |
| | | Tag Memory Error Detection ✻14 | This function detects errors in tag memory. |
| | | Battery Error Detection | This function detects an error when a battery is not connected to the CPU Unit or when the battery voltage drops. |
| | | CPU Bus Unit Setting Error Detection | This function detects an error when the model of a CPU Bus Unit in the registered I/O tables does not agree with the model that is actually mounted in the PLC. |
| | | Special I/O Unit Setting Error Detection | This function detects an error when the model of a Special I/O Unit in the registered I/O tables does not agree with the model of Unit that is actually mounted. |
| | | Option Board Error Detection ✻14 | This function detects the errors in Serial Option Board mounting status. |
| | Fatal Error Detection | Memory Error Detection | This function detects errors that occur in memory of the CPU Unit. |
| | | I/O Bus Error Detection | This function detects when an error occurs in data transfers between the Units mounted in Rack slots and the CPU Unit and detects when the End Cover is not connected to the CPU Rack or an Expansion Rack. |
| | | Unit/Rack Number Duplication Error | This function detects an error when the same unit number is set for two or more Units, the same word is allocated to two or more Basic I/O Units, or the same rack number is set for two or more Racks. |
| | | Too Many I/O Points Error Detection | This function detects an error when the total number of I/O points set in the I/O tables or the number of Units per Rack exceeds the specified range. |
| | | I/O Setting Error Detection | This function detects an error when the number of Units in the registered I/O tables does not agree with the actual number of Units that is mounted, or an Interrupt Unit has been connected in the wrong position, i.e., not in slot 0 to 4. |

✻14.Supported only by the CJ2M-CPU3□.

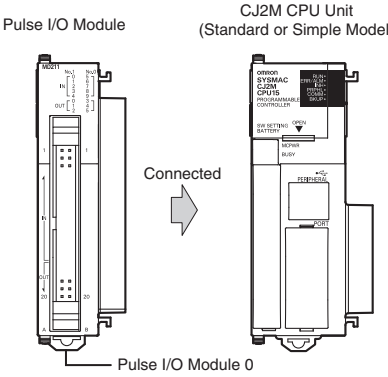
| Function | | | | Description |
|---|---|---|---|---|
| Self-diagnosis and Restoration | Fatal Error Detection | Program Error Detection | | This function detects errors in programs. |
| | | | Instruction Processing Error Detection | This function detects an error when the given data value is invalid when executing an instruction, or execution of instruction between tasks was attempted. |
| | | | Indirect DM/EM BCD Error Detection | This function detects an error when an indirect DM/EM address in BCD mode is not BCD. |
| | | | Illegal Area Access Error Detection | This function detects an error when an attempt is made to access an illegal area with an instruction operand. |
| | | | No END Error Detection | This function detects an error when there is no END instruction at the end of the program. |
| | | | Task Error Detection | This function detects an error when there are no tasks that can be executed in a cycle, there is no program for a task, or the execution condition for an interrupt task was met but there is no interrupt task with the specified number. |
| | | | Differentiation Overflow Error Detection | This function detects an error when too many differentiated instructions are entered or deleted during online editing (131,072 times or more). |
| | | | Invalid Instruction Error Detection | This function detects an error when an attempt is made to execute an instruction that is not defined in the system. |
| | | | User Program Area Overflow Error Detection | This function detects an error when instruction data is stored after the last address in user program area. |
| | | Cycle Time Exceeded Error Detection | | This function monitors the cycle time (10 to 40,000 ms) and stops the operation when the set value is exceeded. |
| | Fatal Error Detection (Continued from previous page) | System FALS Error Detection (User-defined Fatal Error) | | This function generates a fatal (FALS) error when the user-defined conditions are met in program. |
| | | Version Error Detection | | This function detects an error when a user program includes a function that is not supported by the current unit version. |
| | | Memory Card Transfer Error Detection | | This function detects an error when the automatic file transfer from Memory Card fails at startup. |
| Maintenance | Simple Backup Function | | | This function collectively backs up the data in CPU Unit (user programs, parameters, and I/O memory) and internal backup data in the I/O Units. |
| | Unsolicited Communications | | | A function that allows the PLC to use Network Communications Instruction to send required FINS commands to a computer connected via a Host Link |
| | 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. Communications across network layers can be performed.<br>Controller Link or Ethernet : 8 layers<br>DeviceNet or SYSMAC LINK : 3 layers |
| | Automatic Online Connection via Network | | Direct Serial Connection | This function enables automatically connecting to the PLC online when the CX-Programmer is directly connected by a serial connection (peripheral (USB) port or serial port). |
| | | | Via Networks | This function enables connecting the CX-Programmer online to a PLC that is connected via an EtherNet/IP network. |
| Security | Read Protection using Password | | | This function protects reading and displaying programs and tasks using passwords.<br>Write protection: Set using the DIP switch.<br>Read protection: Set a password using the CX-Programmer. |
| | FINS Write Protection | | | This function prohibits writing by using FINS commands sent over the network. |
| | Unit Name Function | | | This function allows the users to give any names to the Units. Names are verified at online connection to prevent wrong connection |
| | Hardware ID Using Lot Numbers | | | This function sets operation protection by identifying hardware using the user programs according to lot numbers stored in the Auxiliary Area. |

# Specifications for Pulse I/O Functions

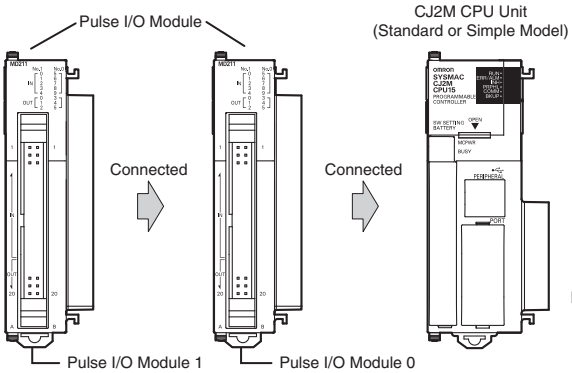
The following functions of CJ2M can be used by installing one or two Pulse I/O Modules. Each module has 10 high-speed inputs and 6 high-speed outputs. Pulse I/O Modules can be installed on CJ2M CPU Units with Unit Version 2.0 or Later.

- The inputs can be used as general-purpose inputs, interrupt inputs, quick-response inputs, high-speed counters, or origin search inputs.
- The outputs can be used as general-purpose outputs, pulse outputs, origin search outputs, or PWM outputs.

**One Pulse I/O Module can be mounted**




**Two Pulse I/O Modules can be mounted**




Note: The Pulse I/O Module closest to the CPU Unit is Pulse I/O Module 0 and the other one is Pulse I/O Module 1.

## Performance Specifications

| Item | | | Description |
|---|---|---|---|
| Pulse I/O | Model of Pulse I/O Modules | | CJ2M-MD211 (Sinking-type)<br>CJ2M-MD212 (Sourcing-type ) |
| | External Interface | | 40-pin MIL connector |
| | Pulse Inputs | | Can be used as normal inputs, interrupt inputs, quick-response inputs, or high-speed counter inputs.<br>(Function of each input must be selected in the PLC Setup.)<br>Input method: Line-driver input or 24-VDC input (selected by wiring) |
| | | Normal Inputs | 20 max. (10 per Pulse I/O Module)<br>Input constants: Set in the PLC Setup (0, 0.5, 1, 2, 4, 8, 16, or 32 ms). Default: 8 ms |
| | | Interrupt Inputs and Quick-response Inputs | 8 max. (4 per Pulse I/O Module)<br>Input signal minimum ON pulse width: 30 μs |
| | | High-speed Counter Inputs | 4 max. (2 per Pulse I/O Module)<br>Input method: Differential-phase (×4) pulses, pulse + direction, up/down pulses, or increment pulse<br>Maximum response frequency: 50 kHz for differential phases or 100 kHz for single phase<br>Counting mode: Linear mode or circular (ring) mode<br>Count value: 32 bits<br>Counter reset: Phase Z + software reset or software reset<br>Control method: Target-value comparison or range comparison<br>Gate function: Supported |
| | Pulse Outputs | | Can be used as normal outputs, pulse outputs, or PWM outputs. (Function of each output must be selected in the PLC Setup.)<br>Output method: Sinking or sourcing transistor outputs (The method is determined by Pulse I/O Module model.) |
| | | Normal Outputs | 12 max. (6 per Pulse I/O Module) |
| | | Pulse Outputs | 4 max. (2 per Pulse I/O Module)<br>Output method: CW/CCW or pulse + direction (The method is determined by the I/O wiring and the instructions used in the ladder program.)<br>Output frequency: 1 pps to 100 kpps (in increments of 1 pps)<br>Output Mode: Continuous mode (for speed control) or independent mode (for position control)<br>Output pulses: Relative coordinates: 0000 0000 to 7FFF FFFF hex (0 to 2,147,483,647 pulses)<br>Absolute coordinates: 8000 0000 to 7FFF FFFF hex (–2,147,483,648 to 2,147,483,647)<br>Acceleration/deceleration curves: Linear or S-curve<br>Origin search function: Supported |
| | | PWM Outputs | 4 max. (2 per Pulse I/O Module)<br>Output frequency: 0.1 to 6,553.5 Hz (in 0.1-Hz increments) or 1 to 32,800 Hz (in 1-Hz increments)<br>Duty ratio: 0.0% to 100.0% (in 0.1% increments) |

## Function Specifications

| Functions | | | Description |
|---|---|---|---|
| Pulse I/O Functions | Pulse Input Functions | Normal Inputs | Input signals are read during I/O refreshing and stored in I/O memory. |
| | | Interrupt Inputs | An interrupt task can be started when an input signal turns ON or turns OFF. |
| | | Quick-response Inputs | Input signals that are shorter than the cycle time are read and stored in I/O memory. |
| | | High-speed Counter Inputs | High-speed pulse signals are counted. Interrupt tasks can also be started. |
| | Pulse Output Functions | Normal Outputs | The status of I/O memory is output during I/O refreshing. |
| | | Pulse Outputs | A pulse signal is output with the specified frequency and number of pulses at a fixed duty ratio (50%). |
| | | PWM Outputs | A pulse signal is output at the specified duty ratio. |
| | Origin Searches | | The origin point of the machine is determined according to the specified origin search parameters while actually outputting pulses and using the origin and origin proximity input signals as conditions. (Pulse inputs and outputs are also used for this function.) |
| Interrupt | Input Interrupt Function | | A task is started for an interrupt input from a Pulse I/O Module or for a high-speed counter input. |
| | | Input Interrupts | Interrupt tasks are executed when the interrupt input turns ON or turns OFF.<br>Direct Mode: An interrupt task is executed each time an input signal changes.<br>Counter Mode: Changes in the input signal are counted up or down and the interrupt task is executed when the counter counts out. (The maximum response frequency is 3 kHz.) |
| | | High-speed Counter Interrupts | An interrupt task is executed when preset comparison conditions for a high-speed counter are met.<br>Target-value comparison: The interrupt task is executed when the count matches a specified value.<br>Range comparison: The interrupt task is executed when the count enters or leaves a specified range of values. |

# Allocating Functions I/O signals

## Pulse I/O Module 0 (on the right)

| Terminal symbol | | | IN 00 | IN 01 | IN 02 | IN 03 | IN 04 | IN 05 | IN 06 | IN 07 | IN 08 | IN 09 | OUT 00 | OUT 01 | OUT 02 | OUT0 3 | OUT 04 | OUT 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Address | | | 2960 | | | | | | | | | | 2961 | | | | | |
| Bit | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |
| Inputs | Normal inputs | | Normal input 0 | Normal input 1 | Normal input 2 | Normal input 3 | Normal input 4 | Normal input 5 | Normal input 6 | Normal input 7 | Normal input 8 | Normal input 9 | --- | --- | --- | --- | --- | --- |
| | Interrupt inputs (Direct Mode/ Counter Mode) | | 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 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | High-speed counters | | --- | --- | Highspeed counter 1 (phase- Z/ reset) | Highspeed counter 0 (phase- Z/ reset) | --- | --- | High-speed counter 1 (phase-A, increment, or count input) | High-speed counter 1 (phase-B, decrement, or direction input) | High-speed counter 0 (phase-A, increment, or count input) | High-speed counter 0 (phase-B, decrement, or direction input) | --- | --- | --- | --- | --- | --- |
| Out puts | Normal outputs | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | Normal output 0 | Normal output 1 | Normal output 2 | Normal output 3 | Normal output 4 | Normal output 5 |
| | Pulse out puts | CW/CCW outputs | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | Pulse output 0 (CW) | Pulse output 0 (CCW) | Pulse output 1 (CW) | Pulse output 1 (CCW) | --- | --- |
| | | Pulse + direction outputs | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | Pulse output 0 pulse) | Pulse output 1 (pulse) | Pulse output 0 (direction) | Pulse output 1 (direction) | --- | --- |
| | | Variable duty ratio outputs | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | PWM output 0 | PWM 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 (Positio ning Complet ed Signal) | Origin search 1 (Positio ning Complet ed Signal) | --- | --- | --- | --- | --- | --- | --- | --- | Pulse output 0 error counter reset output (operatio n modes 1 and 2) | Pulse output 1 error counter reset output (operatio n modes 1 and 2) |

## Pulse I/O Module 1 (on the left)

| Terminal symbol | | | IN 10 | IN 11 | IN 12 | IN 13 | IN 14 | IN 15 | IN 16 | IN 17 | IN 18 | IN 19 | OUT 10 | OUT 11 | OUT 12 | OUT 13 | OUT 14 | OUT 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Address | | | 2962 | | | | | | | | | | 2963 | | | | | |
| Bit | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |
| Inputs | Normal inputs | | Normal input 10 | Normal input 11 | Normal input 12 | Normal input 13 | Normal input 14 | Normal input 15 | Normal input 16 | Normal input 17 | Normal input 18 | Normal input 19 | --- | --- | --- | --- | --- | --- |
| | Interrupt inputs (Direct Mode/ Counter Mode) | | Interrupt input 4 | Interrupt input 5 | Interrupt input 6 | Interrupt input 7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Quick response inputs | | Quick response input 4 | Quick response input 5 | Quick response input 6 | Quick response input 7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | High-speed counters | | --- | --- | Highspeed counter 3 (phase- Z/ reset) | Highspeed counter 2 (phase- Z/ reset) | --- | --- | High-speed counter 3 (phase-A, increment, or count input) | High-speed counter 3 (phase-B, decrement, or direction input) | High-speed counter 2 (phase-A, increment, or count input) | High-speed counter 2 (phase-B, decrement, or direction input) | --- | --- | --- | --- | --- | --- |
| Out puts | Normal outputs | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | Normal output 6 | Normal output 7 | Normal output 8 | Normal output 9 | Normal output 10 | Normal output 11 |
| | Pulse out puts | CW/CCW outputs | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | Pulse output 2 (CW) | Pulse output 2 (CCW) | Pulse output 3 (CW) | Pulse output 3 (CCW) | --- | --- |
| | | Pulse + direction outputs | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | Pulse output 2 pulse) | Pulse output 3 (pulse) | Pulse output 2 (direction) | Pulse output 3 (direction) | --- | --- |
| | | Variable duty ratio outputs | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | PWM output 2 | PWM output 3 |
| Origin search | | | Origin search 2 (Origin Input Signal) | Origin search 2 (Origin Proximity Input Signal) | Origin search 3 (Origin Input Signal) | Origin search 3 (Origin Proximity Input Signal) | Origin search 2 (Positio ning Complet ed Signal) | Origin search 3 (Positio ning Complet ed Signal) | --- | --- | --- | --- | --- | --- | --- | --- | Pulse output 2 error counter reset output (operatio n modes 1 and 2) | Pulse output 3 error counter reset output (operatio n modes 1 and 2) |

# Specifications of Pulse Input Functions

## Interrupt Inputs

| Item | Direct Mode | Counter Mode |
|---|---|---|
| Number of interrupt inputs | Max. 8 inputs | |
| Allocated bit | CIO 2960 and CIO 2962, bits 00 to 03 | |
| Interrupt detection method | ON-to-OFF or OFF-to-ON transitions | |
| Interrupt task numbers | 140 to 147 (fixed) | |
| Counting method | --- | Incrimenting or decrementing<br>(Set with the MSKS(690) instruction.) |
| Counting range | --- | 0001 to FFFF hex (16 bits)<br>(Set in A532 to A535 and A544 to A547.) |
| Response frequency | --- | Single-phase: 3 kHz x 8 inputs |
| Storage locations for PVs for interrupt inputs in Counter Mode | --- | A536 to A539 and A548 to A551 |

## Quick-response inputs

| Item | Specifications |
|---|---|
| Number of Quick-response inputs | Max. 8 inputs |
| Quick-response inputs | Signals that are shorter than the cycle time are latched for one PLC cycle, so they can be detected in the PLC program.<br>Minimum detectable pulse width is 30 μs. |

## High-speed Counter Inputs

| Item | | Description | | | |
|---|---|---|---|---|---|
| Number of High-speed Counter Inputs | | Max. 4 inputs | | | |
| Pulse input method (counting mode) | | Incremental pulse inputs | Differential phase input (4×) | Up/down inputs | Pulse + direction inputs |
| Input signals | | Increment pulse | Phase A | Up pulse | Pulse |
| | | --- | Phase B | Down pulse | Direction |
| | | --- | Phase Z | Reset | Reset |
| Frequency and number of high-speed counters | | 100 kHz, 2 inputs × 2 I/O Modules | 50 kHz, 2 inputs × 2 I/O Modules | 100 kHz, 2 inputs × 2 I/O Modules | 100 kHz, 2 inputs × 2 I/O Modules |
| Counting mode | | Linear mode or ring mode | | | |
| Count value | | Linear mode: 8000 0000 to 7FFF FFFF hex<br>0000 0000 to FFFF FFFF hex (for increment pulse)<br>Ring mode: 0000 0000 to Max. ring value | | | |
| High-speed counter PV storage locations | | High-speed counter 0: A271 (upper 4 digits) and A270 (lower 4 digits)<br>High-speed counter 1: A273 (upper 4 digits) and A272 (lower 4 digits)<br>High-speed counter 2: A317 (upper 4 digits) and A316 (lower 4 digits)<br>High-speed counter 3: A319 (upper 4 digits) and A318 (lower 4 digits)<br>Refreshed during overseeing processing. Use PRV(881) to read the most recent PVs. | | | |
| | | Data format: 8 digit hexadecimal<br>• Linear mode: 8000 0000 to 7FFF FFFF hex<br>0000 0000 to FFFF FFFF hex (for increment pulse)<br>• Ring mode: 0000 0000 to Max. ring value | | | |
| Control method | Target value comparison | Up to 48 target values and corresponding interrupt task numbers can be registered. | | | |
| | Range Comparison | Up to 8 or up to 32 ranges can be registered, with a separate upper limit, lower limit, and interrupt task number for each range. | | | |
| Counter reset method | | • Phase-Z + Software reset<br>The counter is reset when the phase-Z input goes ON while the Reset Bit (A531.00 to A531.03) is ON.<br>• Software reset<br>The counter is reset when the Reset Bit (A531.00 to A531.03) is turned ON.<br>Operation can be set to stop or continue the comparison operation when the high-speed counter is reset. | | | |

# Specifications of Pulse Output Functions

## Position Control and Speed Control

| Item | Specifications |
|---|---|
| Number of Pulse Outputs | Max. 4 outputs (Pulse Output 00 to 03) |
| Output mode | Continuous mode (for speed control) or independent mode (for position control) |
| Positioning (independent mode) instructions | PULS (886) and SPED (885), PULS (886) and ACC (888), or PULS2 (887) instruction |
| Speed control (continuous mode) instructions | SPED (885) and ACC (888) instructions |
| Origin (origin search and origin return) instructions | ORG (889) instruction |
| Interrupt feeding instruction | IFEED (892) instruction |
| Output frequency | 1 pps to 100 kpps (1 pps units), two pulse outputs × 2 Pulse I/O Modules |
| Frequency acceleration and deceleration rates | Set in increments of 1 pps for acceleration/deceleration rates from 1 to 65,535 pps (every 4 ms).<br>The acceleration and deceleration rates can be set independently only with the PLS2 (887) instruction. |
| Changing SVs during instruction execution | The target frequency, acceleration/deceleration rate, and target position can be changed. |
| Pulse output method | CW/CCW or pulse + direction |
| Number of output pulses | Relative coordinates: 0000 0000 to 7FFF FFFF hex (Accelerating or decelerating in either direction: 2,147,483,647)<br>Absolute coordinates: 8000 0000 to 7FFF FFFF hex (–2,147,483,648 to 2,147,483,647) |
| Relative/absolute coordinate specifications for pulse output PVs | Absolute coordinates are specified automatically when the origin location has been defined by changing the pulse output PV with the INI (880) instruction or performing an origin search with the ORG(889) instruction. Relative coordinates must be used when the origin is undefined. |
| Relative pulse/absolute pulse specifications | The pulse type can be specified with an operand in the PULS (886) or PLS2 (887) instruction.<br>Absolute pulses can be used when absolute coordinates are specified for the pulse output PV, i.e. the origin location has been defined. Absolute pulse cannot be used when relative coordinates are specified, i.e., when the origin location is undefined. An instruction error will occur. |
| Pulse output PV's storage location | The following Auxiliary Area words contain the pulse output PVs<br>Pulse output 0: A277 (leftmost 4 digits) and A276 (rightmost 4 digits)<br>Pulse output 1: A279 (leftmost 4 digits) and A278 (rightmost 4 digits)<br>Pulse output 2: A323 (leftmost 4 digits) and A322 (rightmost 4 digits)<br>Pulse output 3: A325 (leftmost 4 digits) and A324 (rightmost 4 digits)<br>The PVs are refreshed during regular I/O refreshing. |

## Variable-duty Pulse Outputs (PWM)

| Item | Specifications |
|---|---|
| Number of PWM Outputs | Max. 4 outputs (PWM Output 00 to 03) |
| Duty ratio | 0.0% to 100.0% in 0.1% increments |
| Frequency | 0.1 Hz to 6,553.5 Hz (Set in 0.1-Hz increments.)<br>1 Hz to 32,800 Hz (Set in 1-Hz increments.) |
| Output mode | Continuous Mode |
| Instruction | PWM (891) instruction |

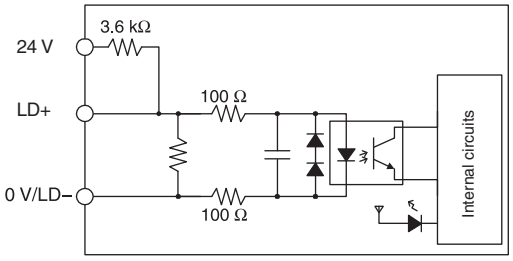
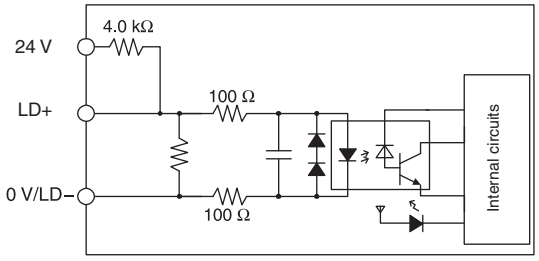
# Specifications of Pulse I/O Modules

## Input Specifications (IN00 to IN09/IN10 to IN19 )

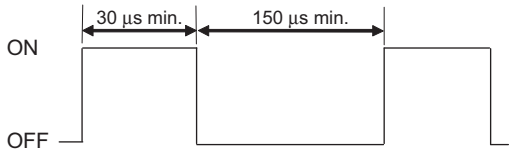
### Normal Inputs

| Inputs | IN00 to IN05 and IN10 to IN15 | IN06 to IN09 and IN16 to IN19 | IN00 to IN05 and IN10 to IN15 | IN06 to IN09 and IN16 to IN19 |
|---|---|---|---|---|
| Input form | 24 VDC inputs | | Line driver inputs | |
| Input current | 6.0 mA typical | 5.5 mA typical | 13 mA typical | 10 mA typical |
| Input voltage range | 24 VDC +10%/−15% | | 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 | --- | |
| Number of circuits | 1 common, 1 circuit | | | |
| ON voltage/current | 17.4 VDC min., 3 mA min. | | --- | |
| OFF voltage/current | 1 mA max. at 5 VDC max. | | --- | |
| ON response time | 8 ms max. (The input time constant can be set to 0, 0.5, 1, 2, 4, 8, 16, or 32 ms in the PLC Setup.) | | | |
| OFF response time | 8 ms max. (The input time constant can be set to 0, 0.5, 1, 2, 4, 8, 16, or 32 ms in the PLC Setup.) | | | |

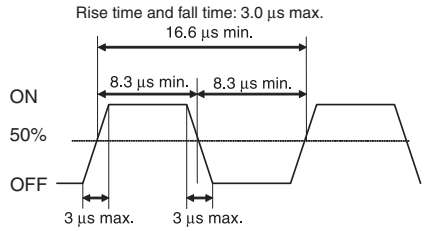
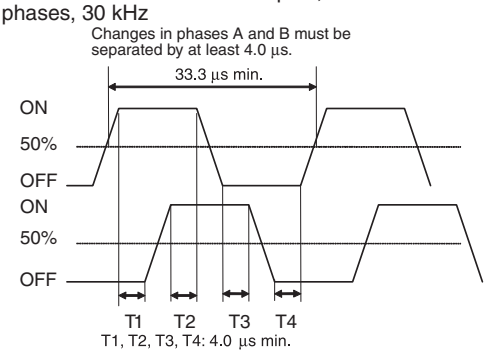
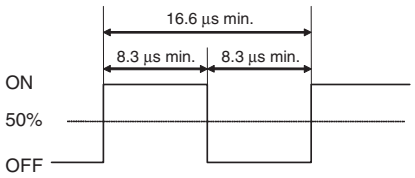
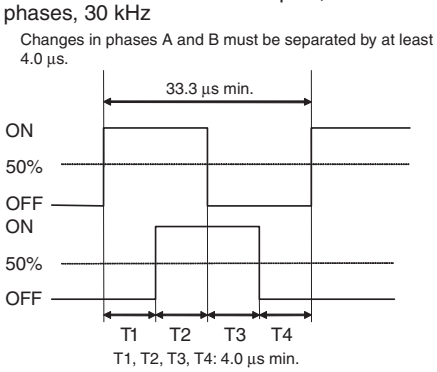
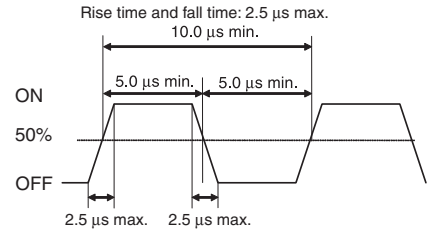
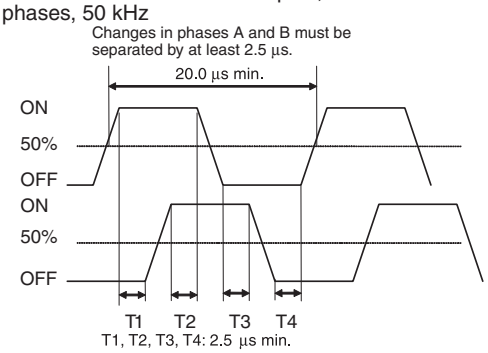
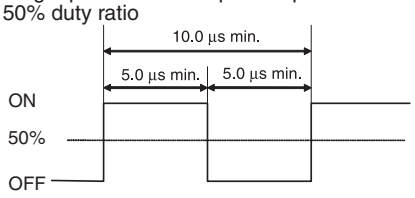
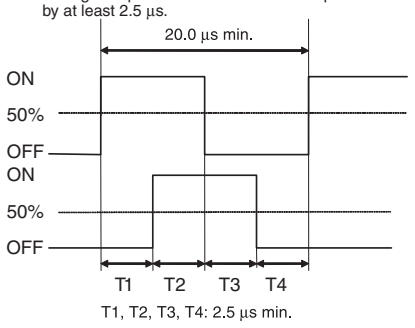
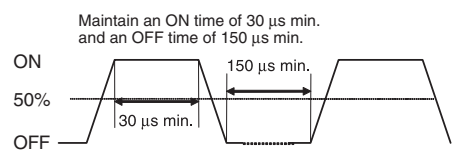
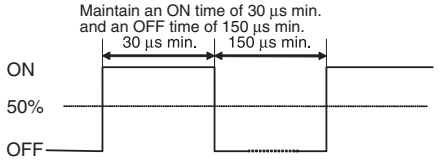
### Input Circuit Configuration

| Item | Specifications | |
|---|---|---|
| Input | IN00 to IN05/IN10 to IN15 | IN06 to IN09/IN16 to IN19 |
| Circuit configuration |  |  |

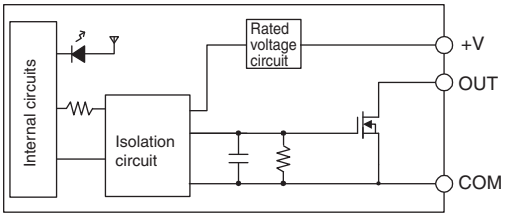
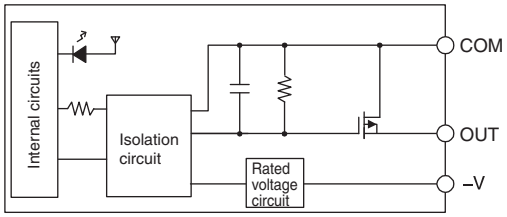
### Interrupt Input and Quick-response Input Specifications (IN00 to IN03 and IN10 to IN13)

| Item | Specifications |
|---|---|
| ON response time | 30 μs max. |
| OFF response time | 150 μs max. |
| Response pulse |  |

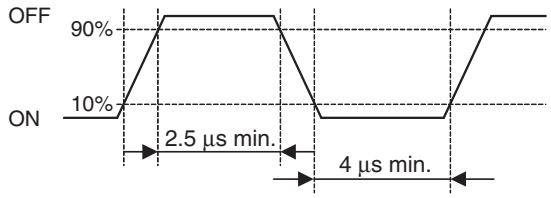
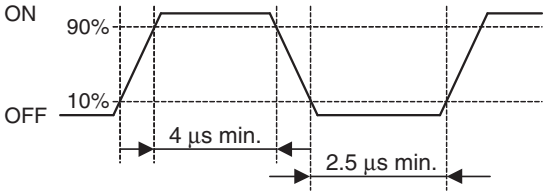
## High-speed Counter Input Specifications (IN06 to IN09 and IN16 to IN19)

| | 24-VDC input | Line driver input |
|---|---|---|
| **Set to 60 kHz** | Phase-A/Phase-B encoder input, Single-phase 60-kHz pulse input with 50% duty ratio<br>  <br>Phase-A/Phase-B encoder inputs, Differential phases, 30 kHz<br>  | Encoder input phase A or B, single-phase 60-kHz pulse input with 50% duty ratio<br>  <br>Phase-A/Phase-B encoder inputs, Differential phases, 30 kHz<br>  |
| **Set to 100 kHz** | Phase-A/Phase-B encoder input, Single-phase 100-kHz pulse input with 50% duty ratio<br>  <br>Phase-A/Phase-B encoder inputs, Differential phases, 50 kHz<br>  | Single-phase 100-kHz pulse input with 50% duty ratio<br>  <br>Differential-phase 50-kHz pulse input<br>  |
| **Phase Z/reset input** | Encoder input phase Z (IN02/IN03 or IN12/IN13)<br>  | Encoder input phase Z (IN02/IN03 or IN12/IN13)<br>  |

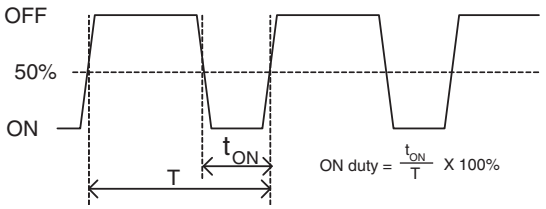
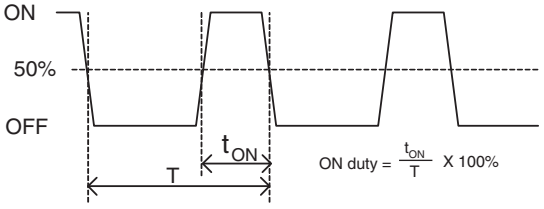
## Output Specifications (OUT00 to OUT05 and OUT10 to OUT15)

| Item | Specifications | |
|---|---|---|
| Output Specifications | Sinking-type (CJ2M-MD211) | Sourcing-type (CJ2M-MD212) |
| Rated voltage | 5 to 24 VDC | |
| Allowable voltage range | 4.75 to 26.4 VDC | |
| Maximum switching current | 0.3 A/output, 1.8 A/Unit | |
| Number of circuits | 6 outputs (6 outputs/common) | |
| Maximum inrush current | 3.0 A/output, 10 ms max. | 2.0 A/output, 10 ms max. |
| Leakage current | 0.1 mA max. | |
| Residual voltage | 0.6 V max. | |
| ON response time | 0.1 ms max. | |
| OFF response time | 0.1 ms max. | |
| Fuse | None | |
| External supply power (power supply input for outputs) | 10.2 to 26.4 VDC, 20 mA min. | |
| Circuit configuration |  |  |

### Pulse Outputs (OUT00 to OUT03 and OUT10 to OUT13)

| Item | Specifications | |
|---|---|---|
| Output Specifications | Sinking-type (CJ2M-MD211) | Sourcing-type (CJ2M-MD212) |
| Rated voltage | 5 to 24 VDC | |
| Allowable voltage range | 4.75 to 26.4 VDC | |
| Maximum switching capacity | 30 mA | |
| Minimum switching capacity | 7 mA | |
| Maximum output frequency | 100 kHz | |
| Output waveform |  |  |

### PWM Outputs (OUT04, OUT05, OUT14, and OUT15)

| Item | Specifications | |
|---|---|---|
| Output Specifications | Sinking-type (CJ2M-MD211) | Sourcing-type (CJ2M-MD212) |
| Rated voltage | 5 to 24 VDC | |
| Allowable voltage range | 4.75 to 26.4 VDC | |
| Maximum switching capacity | 6.5535 kHz or less: 300 mA, 6.5535 to 32.8 kHz: 100 mA | |
| Maximum output frequency | 32,800 Hz | |
| PWM output accuracy (for ON pulse width of 2 µs or longer) | ON duty at 6.5535 kHz or less: -0.2% to +1%,<br>ON duty at 32.8 kHz: -1% to +5%<br>(at switching current of 30 mA) | ON duty at 6.5535 kHz or less: ±0.5%,<br>ON duty at 32.8 kHz: +2.5%<br>(at switching current of 30 mA) |
| Output waveform |  |  |

# Unit Versions

| Units | Models | Unit version |
|---|---|---|
| CJ2M CPU Units | CJ2M-CPU3□ | CPU: Unit version 1.0 (Built-in EtherNet/IP section: Unit version 2.0) |
| | | CPU: Unit version 2.0 (Built-in EtherNet/IP section: Unit version 2.0) |
| | | CPU: Unit version 2.0 (Built-in EtherNet/IP section: Unit version 2.1) |
| | CJ2M-CPU1□ | CPU: Unit version 1.0 |
| | | CPU: Unit version 2.0 |

# Function Support by Unit Version

## Functions Supported for Unit Version 2.0 or Later

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

| CPU Unit | CJ2M CPU Unit | |
|---|---|---|
| Model | CJ2M-CPU□□ | |
| Unit Version / Function | Unit version 2.0 or higher | Unit version 1.0 |
| | OK | – |

✻ A Pulse I/O Module must be mounted for CJ2M CPU Units with unit version 2.0 or later.

# 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 | | Required Programming Device | | | |
|---|---|---|---|---|---|---|
| | | | CX-Programmer | | | Programming Console |
| | | | Ver. 9.0 or lower | Ver. 9.1 or higher | Ver. 9.12 or higher | |
| CJ2M-CPU□□ Unit version 1.0 | Functions for unit version 1.0 | | – | OK ✻1 | OK | – ✻3 |
| CJ2M-CPU□□ Unit version 2.0 | Functions added for unit version 2.0 | Using new functions | – | – | OK | |
| | | Not using new functions | – | OK ✻2 | OK | |

**✻1.** CX-Programmer version 9.1 or higher is required to use CJ2M CPU Units.
**✻2.** It is not necessary to upgrade the version of the CX-Programmer if functionality that was enhanced for the upgrade of the CPU Unit will not be used.
**✻3.** A Programming Console cannot be used with a CJ2M CPU Unit.

## Device Type Setting

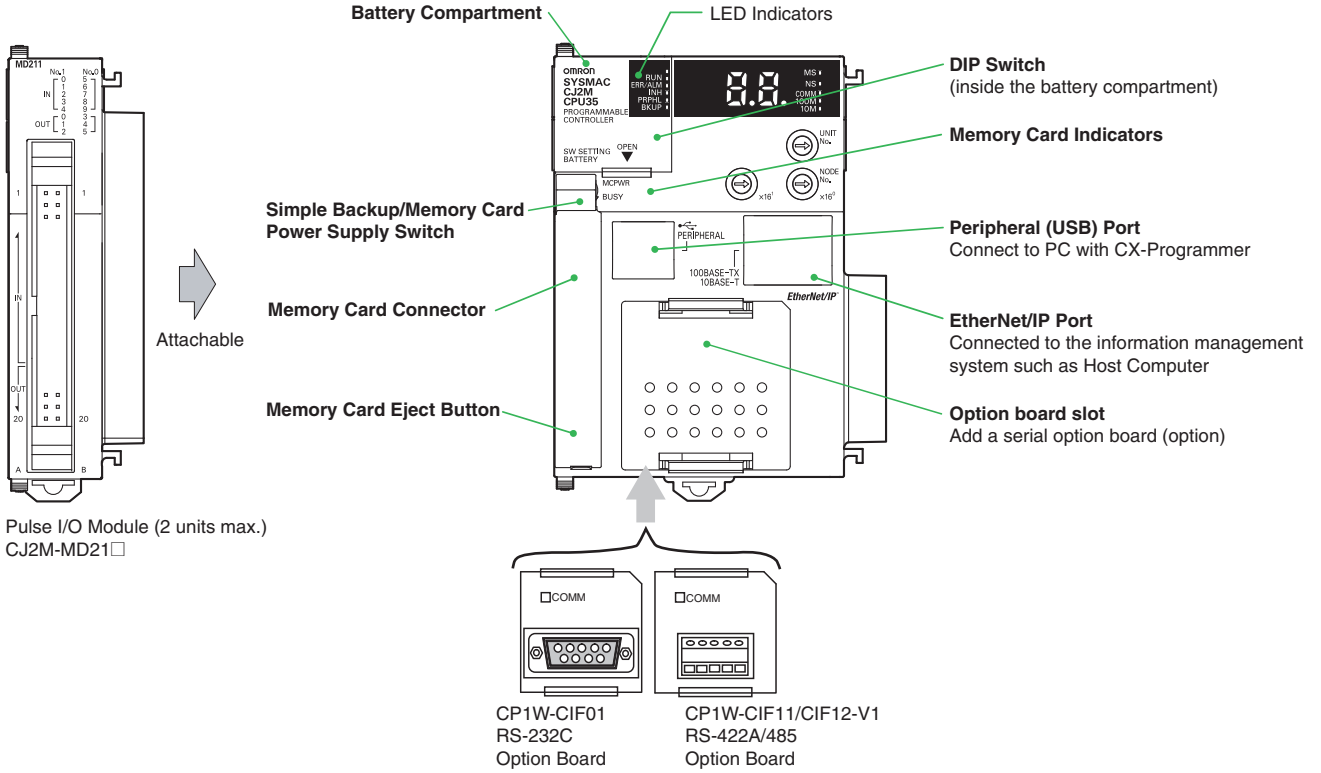
The unit version does not affect the setting made for the device type on the CX-Programmer. Select the device type as shown in the following table regardless of the unit version of the CPU Unit.

| Series | CPU Unit group | CPU Unit model | Device type setting on CX-Programmer Ver. 9.1 or higher |
|---|---|---|---|
| CJ Series | CJ2M CPU Units | CJ2M-CPU3□<br>CJ2M-CPU1□ | CJ2M |

# External Interface

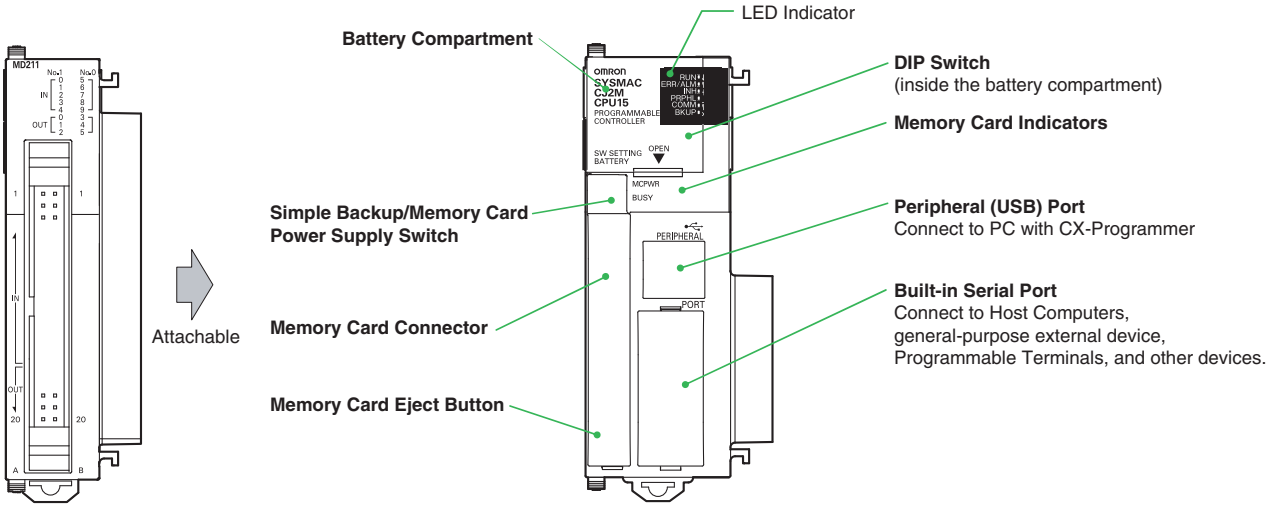
### CJ2M-CPU3□ (CJ2M with Built-in EtherNet/IP)

A CJ2M-CPU3□ provides two communications ports for external interfaces: a peripheral (USB) port and an EtherNet/IP port.
The Pulse I/O functions of the CJ2M can be used by mounting a Pulse I/O Module. Up to two Pulse I/O Modules can be connected to the left side of a CJ2M CPU Unit.
Serial ports can be added by mounting a Serial Communications Option Board (sold separately) in an option slot.




### CJ2M-CPU1□

A CJ2M-CPU1□ provides two communications ports for external interfaces: a peripheral (USB) port and a serial port.
The Pulse I/O of the CJ2M can be used by mounting a Pulse I/O Module. Up to two Pulse I/O Modules can be connected to the left side of a CJ2M CPU Unit.



### Peripheral (USB) Port

| Item | Specification |
|---|---|
| **Baud Rate** | 12 Mbps max. |
| **Transmission Distance** | 5 m max. |
| **Interface** | USB 2.0-compliant B-type connector |
| **Protocol** | Peripheral Bus |

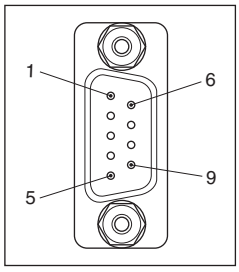
### EtherNet/IP Port

| Item | Specification |
|---|---|
| **Media Access Method** | CSMA/CD |
| **Modulation** | Baseband |
| **Transmission Paths** | Star |
| **Baud Rate** | 100 Mbps (100Base-TX) |
| **Transmission Media** | Shielded twisted-pair (STP) cable; Categories: 5, 5e |
| **Transmission Distance** | 100 m (between ethernet switch and node) |
| **Number of Cascade Connections** | No restrictions if ethernet switch is used. |
| **Communications** | CIP Communications (tag data links, Explicit Messages).<br>FINS communications |

### Built-in Serial Port (Only CJ2M-CPU1□)

| 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 ✻ |
| **Transmission distance** | 15 m max. |
| **Interface** | EIA RS-232C |
| **Protocol** | Host Link, NT Link, 1:N, No-protocol, or Peripheral Bus |

✻ 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 | 5 V | Power supply | – |
| 7 | DR (DSR) | Data set ready | Input |
| 8 | ER (DTR) | Data terminal ready | Output |
| 9 | SG (0 V) | Signal ground | – |
| Connector hood | FG | Protection earth | – |

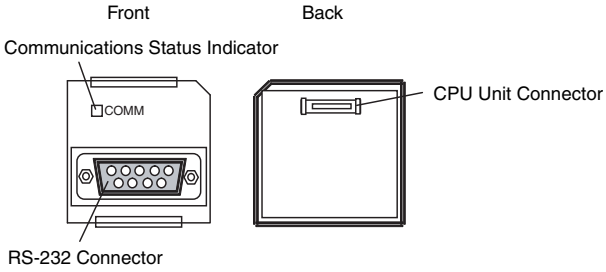
**Note:** Do not use the 5-V power from pin 6 of the RS-232C port for anything but CJ1W-CIF11 RS-422A Conversion Adapter, NT-AL001 RS-232C/RS-422A Conversion Adapter and NV3W-M_20L(-V1) Programmable Terminal. The external device or the CPU Unit may be damaged.

### Serial Option Board (Only CJ2M-CPU3□)

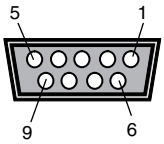
A Serial Option Board can be used with a CJ2M-CPU3□ CJ2M CPU Unit.

| Model | Port | Maximum transmission distance | Connection method |
|---|---|---|---|
| CP1W-CIF01 | One RS-232C port | 15 m | Connector: D-sub, 9-pin female |
| CP1W-CIF11 | One RS-422A/485 port (not isolated) | 50 m | Terminal block: Using ferrules |
| CP1W-CIF12-V1 | One RS-422A/485 port (isolated) | 500 m | Terminal block: Using ferrules |

#### CP1W-CIF01 RS-232C Option Board



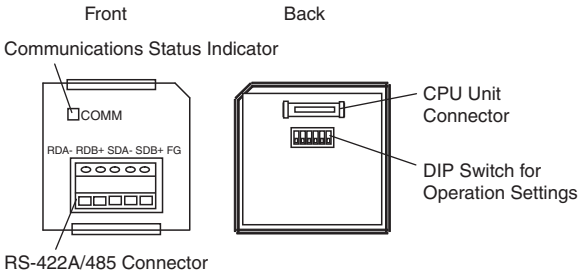

**●RS-232C Connector**



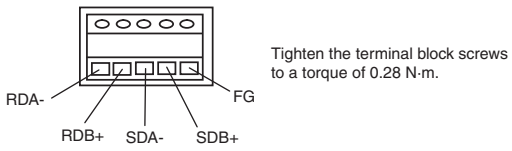

| Pin No. | Signal | Name | Direction |
|---|---|---|---|
| 1 | FG | Protection earth | – |
| 2 | SD (TXD) | Send data | Output |
| 3 | RD (RXD) | Receive data | Input |
| 4 | RS (RTS) | Request to send | Output |
| 5 | CS (CTS) | Clear to send | Input |
| 6 | 5 V | Power supply | – |
| 7 | DR (DSR) | Data set ready | Input |
| 8 | ER (DTR) | Data terminal ready | Output |
| 9 | SG (0 V) | 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 CJ1W-CIF11 RS-422A Conversion Adapter, NT-AL001 RS-232C/RS-422A Conversion Adapter and NV3W-M_20L(-V1) Programmable Terminal. The external device or the CPU Unit may be damaged.

#### CP1W-CIF11/CIF12-V1 RS-422A/485 Option Board

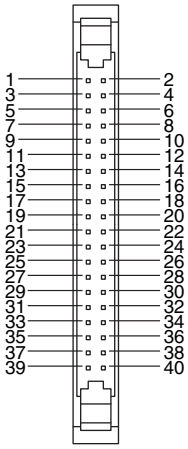



**●RS-422A/485 Terminal Block**



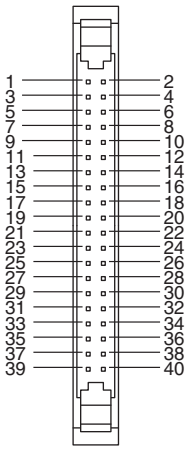
## Connector Pin Allocations of Pulse I/O Module (40 pins)

### Connector on Sinking-type I/O Module (CJ2M-MD211)

| Pin layout | Terminal symbol | Input signal type | Pin | ✻ | Terminal symbol | Input signal type | Pin | ✻ |
|---|---|---|---|---|---|---|---|---|
|  | IN00/IN10 | 24 VDC | 1 | A1 | IN01/IN11 | 24 VDC | 2 | B1 |
| | | LD+ | 3 | A2 | | LD+ | 4 | B2 |
| | | 0 V/LD– | 5 | A3 | | 0 V/LD– | 6 | B3 |
| | IN02/IN12 | 24 VDC | 7 | A4 | IN03/IN13 | 24 VDC | 8 | B4 |
| | | LD+ | 9 | A5 | | LD+ | 10 | B5 |
| | | 0 V/LD– | 11 | A6 | | 0 V/LD– | 12 | B6 |
| | IN04/IN14 | 24 VDC | 13 | A7 | IN05/IN15 | 24 VDC | 14 | B7 |
| | | LD+ | 15 | A8 | | LD+ | 16 | B8 |
| | | 0 V/LD– | 17 | A9 | | 0 V/LD– | 18 | B9 |
| | IN06/IN16 | 24 VDC | 19 | A10 | IN07/IN17 | 24 VDC | 20 | B10 |
| | | LD+ | 21 | A11 | | LD+ | 22 | B11 |
| | | 0 V/LD– | 23 | A12 | | 0 V/LD– | 24 | B12 |
| | IN08/IN18 | 24 VDC | 25 | A13 | IN09/IN19 | 24 VDC | 26 | B13 |
| | | LD+ | 27 | A14 | | LD+ | 28 | B14 |
| | | 0 V/LD– | 29 | A15 | | 0 V/LD– | 30 | B15 |
| | OUT00/OUT10 | --- | 31 | A16 | OUT01/OUT11 | --- | 32 | B16 |
| | OUT02/OUT12 | --- | 33 | A17 | OUT03/OUT13 | --- | 34 | B17 |
| | OUT04/OUT14 | --- | 35 | A18 | OUT05/OUT15 | --- | 36 | B18 |
| | Power supply input +V for outputs | --- | 37 | A19 | Power supply input +V for outputs | --- | 38 | B19 |
| | COM | --- | 39 | A20 | COM | --- | 40 | B20 |

✻ Terminals numbers on the XW2R-□40G-T Connector-Terminal Block Conversion Unit.

### Sourcing-type I/O Module (CJ2M-MD212)

| Pin layout | Terminal symbol | Input signal type | Pin | ✻ | Terminal symbol | Input signal type | Pin | ✻ |
|---|---|---|---|---|---|---|---|---|
|  | IN00/IN10 | 24 VDC | 1 | A1 | IN01/IN11 | 24 VDC | 2 | B1 |
| | | LD+ | 3 | A2 | | LD+ | 4 | B2 |
| | | 0 V/LD– | 5 | A3 | | 0 V/LD– | 6 | B3 |
| | IN02/IN12 | 24 VDC | 7 | A4 | IN03/IN13 | 24 VDC | 8 | B4 |
| | | LD+ | 9 | A5 | | LD+ | 10 | B5 |
| | | 0 V/LD– | 11 | A6 | | 0 V/LD– | 12 | B6 |
| | IN04/IN14 | 24 VDC | 13 | A7 | IN05/IN15 | 24 VDC | 14 | B7 |
| | | LD+ | 15 | A8 | | LD+ | 16 | B8 |
| | | 0 V/LD– | 17 | A9 | | 0 V/LD– | 18 | B9 |
| | IN06/IN16 | 24 VDC | 19 | A10 | IN07/IN17 | 24 VDC | 20 | B10 |
| | | LD+ | 21 | A11 | | LD+ | 22 | B11 |
| | | 0 V/LD– | 23 | A12 | | 0 V/LD– | 24 | B12 |
| | IN08/IN18 | 24 VDC | 25 | A13 | IN09/IN19 | 24 VDC | 26 | B13 |
| | | LD+ | 27 | A14 | | LD+ | 28 | B14 |
| | | 0 V/LD– | 29 | A15 | | 0 V/LD– | 30 | B15 |
| | OUT00/OUT10 | --- | 31 | A16 | OUT01/OUT11 | --- | 32 | B16 |
| | OUT02/OUT12 | --- | 33 | A17 | OUT03/OUT13 | --- | 34 | B17 |
| | OUT04/OUT14 | --- | 35 | A18 | OUT05/OUT15 | --- | 36 | B18 |
| | COM | --- | 37 | A19 | COM | --- | 38 | B19 |
| | Power supply input –V for outputs | --- | 39 | A20 | Power supply input –V for outputs | --- | 40 | B20 |

✻ Terminals numbers on the XW2R-□40G-T Connector-Terminal Block Conversion Unit.

# Pulse I/O Module MIL connector Wiring Methods

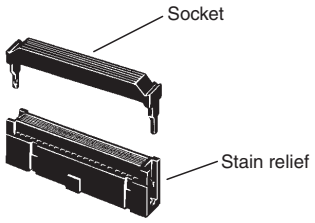
To connect to a Terminal Block, use an OMRON Cable preassembled with the special connector or attach the special connector (sold separately) to a cable yourself.

## Using User-made Cables with Connector

### Connector Models

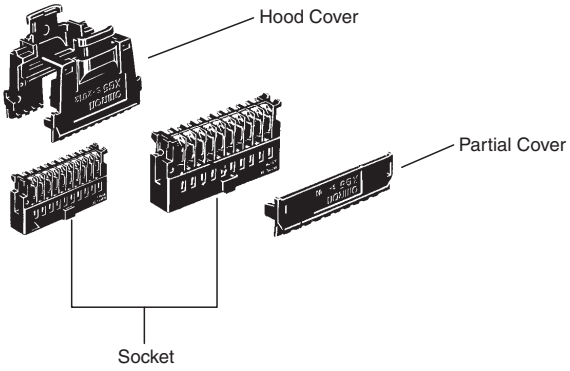
### Compatible Connector Specifications

- MIL Flat Cable Connectors (40-pin Pressure-fitted Connectors)




| Name | OMRON model number |
|---|---|
| Socket | XG4M-4030 |
| Stain Relief | XG4M-4004 |
| Set model number | XG4M-4030-T |
| Recommended Flat Cable | XY3A-200□ |

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




| 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

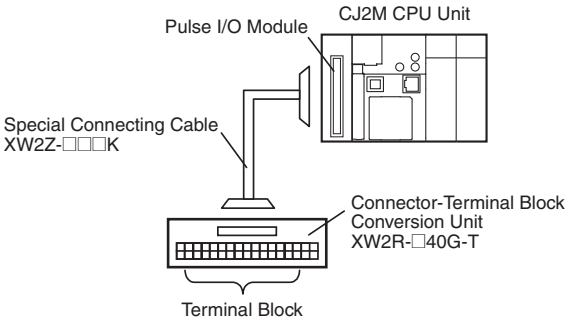
We recommend using a cable with wires sized between 28 and 24 AWG (0.2 to 0.08 $mm^2$). Use a wire with an outer diameter of 1.61 mm max.

### Compatible Terminal Blocks

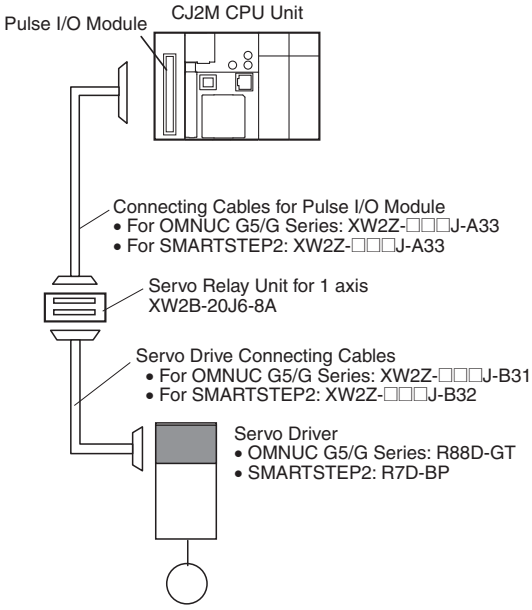
| Recommended Cable | Compatible Terminal Block | Wiring method | Number of terminals | Temperature (°C) |
|---|---|---|---|---|
| XW2Z-□□□K | XW2R-J40G-T | Phillips screw | 40 | 0 to 55 |
| | XW2R-E40G-T | Slotted screw (rise up) | | |
| | XW2R-P40G-T | Push-in spring | | |

## Using preassembled cables and terminal blocks.

### Connection of Pulse I/O module to a General-purpose Terminal Block



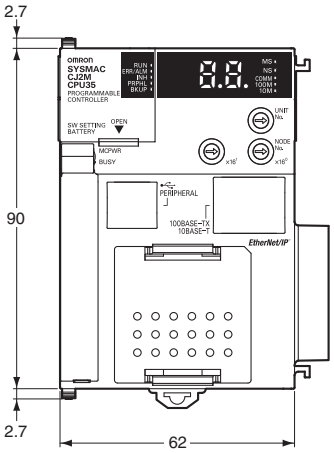

### Connection of Pulse I/O module to a Servo Drive Terminal Block

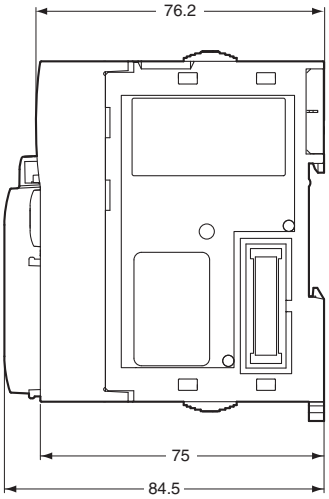


# Dimensions

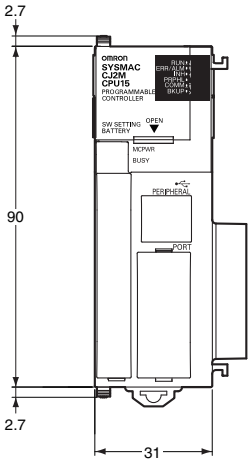
(Unit: mm)

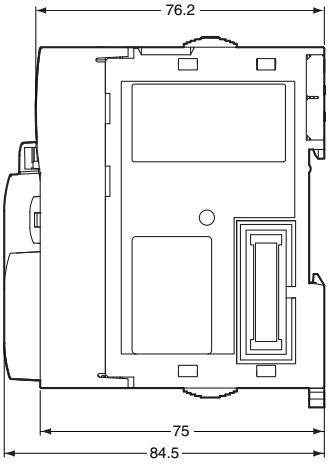
## CJ2M-CPU3□



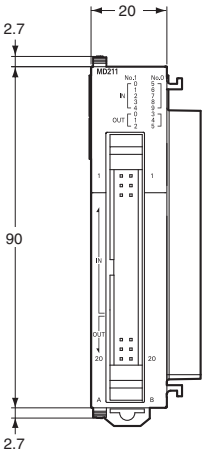



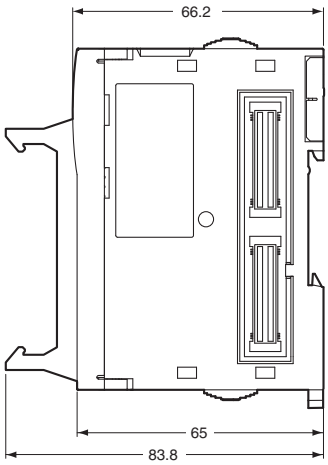

## CJ2M-CPU1□




## CJ2M-MD211/MD212



# Related Manuals

| Cat. No. | Model | Manual | Application | Description |
|---|---|---|---|---|
| W472 | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□<br>CJ2M-CPU□□ | CJ-series CJ2 CPU Unit Hardware User's Manual | Hardware specifications for CJ2 CPU Units | Describes the following for CJ2 CPU Units:<br>• Overview and features<br>• Basic system configuration<br>• Part nomenclature and functions<br>• Mounting and setting procedure<br>• Remedies for errors<br>• Also refer to the *Software User's Manual* (W473). |
| W473 | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□<br>CJ2M-CPU□□ | CJ-series CJ2 CPU Unit Software User's Manual | Software specifications for CJ2 CPU Units | Describes the following for CJ2 CPU Units:<br>• CPU Unit operation<br>• Internal memory<br>• Programming<br>• Settings<br>• Functions built into the CPU Unit<br>Also refer to the *Hardware User's Manual* (W472) |
| W486 | CJ2M-CPU□□<br>+<br>CJ2M-MD21□ | CJ-series CJ2M CPU Unit Pulse I/O Module User's Manual | Information on using Pulse I/O on CJ2M CPU Units | Provides the following information on the CJ2M CPU Units:<br>• Specifications and wiring methods<br>• I/O functions<br>• Quick-response inputs<br>• Interrupt functions<br>• High-speed counters<br>• Pulse outputs<br>• PWM outputs<br>When programming, use this manual together with the *Instructions Reference Manual* (Cat. No. W474). |
| W474 | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□<br>CJ2M-CPU3□<br>CJ2M-CPU1□<br>CS1G/H-CPU□□H<br>CS1G/H-CPU□□-V1<br>CJ1G/H-CPU□□H<br>CJ1G-CPU□□<br>CJ1M-CPU□□<br>NSJ□-□□□□(□)-□□□ | CS/CJ/NSJ-series Instructions Reference Manual | Information on instructions | Describes each programming instruction in detail.<br>Also refer to the *Software User's Manual* (W473) when you do programming. |
| W342 | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□<br>CJ2M-CPU□□<br>CS1G/H-CPU□□H<br>CS1G/H-CPU□□-V1<br>CS1D-CPU□□H<br>CS1D-CPU□□S<br>CS1W-SCU□□-V1<br>CS1W-SCB□□-V1<br>CJ1H-CPU□□H-R<br>CJ1G/H-CPU□□H<br>CJ1G-CPU□□P<br>CJ1M-CPU□□<br>CJ1G-CPU□□<br>CJ1W-SCU□□-V1<br>CP1H-X□□□□-□<br>CP1H-XA□□□□-□<br>CP1H-Y□□□□-□<br>CP1E-E/N□□D□-□<br>NSJ□-□□□□(□)-□□□ | CS/CJ/CP/NSJ-series Communications Command Reference Manual | Information on communications for CS/CJ/CP-series CPU Units and NSJ-series Controllers | Describes C-mode commands and FINS commands<br>Refer to this manual for a detailed description of commands for communications with the CPU Unit using C mode commands or FINS commands.<br>**Note:** This manual describes the communications commands that are addressed to CPU Units. The communications path that is used is not relevant and can include any of the following: serial ports on CPU Units, communications ports on Serial Communications Units/Boards, and Communications Units. For communications commands addressed to Special I/O Units or CPU Bus Units, refer to the operation manual for the related Unit. |
| W465 | CJ2H-CPU6□-EIP<br>CJ2M-CPU3□<br>CS1W-EIP21<br>CJ1W-EIP21 | CS and CJ Series EtherNet/IP Units CS1W-EIP21, CJ1W-EIP21, CJ2H-CPU6□-EIP, CJ2M-CPU3□ Operation Manual | Information for EtherNet/IP function of CJ2M built-in Ethernet port | Describes EtherNet/IP port/units. A basic setting, a tag data link, FINS communication, and other function are described. |
| W463 | CXONE-AL□□D-V□ | CX-One Setup Manual | Installing software from the CX-One | Provides an overview of the CX-One FA Integrated Tool Package and describes the installation procedure. |
| W446 | WS02-CXPC□-V□ | CX-Programmer Operation Manual | Support Software for Windows computers<br><br>CX-Programmer operating procedure | Describes operating procedures for the CX-Programmer.<br>Also refer to the *Software User's Manual* (W473) and *Instructions Reference Manual* (W474) when you do programming. |
| W447 | | CX-Programmer Operation Manual Functions Blocks/ Structured Text | | |
| W469 | | CX-Programmer Operation Manual SFC Programming | | |
| W366 | WS02-SIMC1-E | CS/CJ/CP/NSJ-series CX-Simulator Operation Manual | Operating procedures for CX-Simulator Simulation Support Software for Windows computers<br>Using simulation in the CX-Programmer with CX-Programmer version 6.1 or higher | Describes the operating procedures for the CX-Simulator.<br>When you do simulation, also refer to the *CX-Programmer Operation Manual* (W446), *Software User's Manual* (W473), and *CS/CJ/NSJ series Instructions Reference Manual* (W474). |
| W464 | CXONE-AL□□D-V□ | CS/CJ/CP/NSJ-series CX-Integrator Network Configuration Software Operation Manual | Network setup and monitoring | Describes the operating procedures for the CX-Integrator. |

## Terms and Conditions Agreement

Read and understand this catalog.
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**In the interest of product improvement, specifications are subject to change without notice.**

**OMRON Corporation**
**Industrial Automation Company**

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