## Micro Programmable Controller

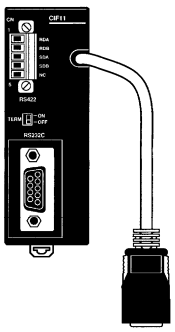
# CPM2C

Omron's powerful CPM2C micro controller redefines the traditional micro PLC. The CPM2C's 33 mm width allows it to fit into small spaces, offers 119 instructions, and has processing speeds rivaling many 'small' PLCs. The 20 I/O units with relay outputs are the smallest in the industry. Multiple communication options along with advanced motion control features enable the CPM2C to provide a powerful solution to virtually any small-scale control application.

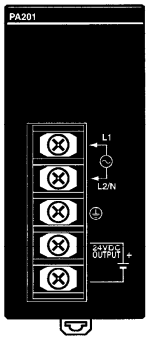
- Ultra compact design with 33 mm width
- Built-in combination RS-232C/Peripheral port
- Transistor Output types expand to 192 I/O (CPU + 5 Modules); Relay Output types expand to 180 I/O (CPU + 5 Modules)
- Screw terminal, Fujitsu and MIL (flat ribbon) style connections
- Connect high density MIL and Fujitsu models to Omron relay or terminal blocks for easy wiring and choice of I/O style
- 4K program memory, 2K data memory
- Synchronized pulse control allows synchronization of input devices to control devices
- Temperature sensor modules available
- Optional real-time clock
- Multiple high-speed counter inputs
- 10 kHz pulse outputs
- UL/CSA/CE

## Basic Configuration

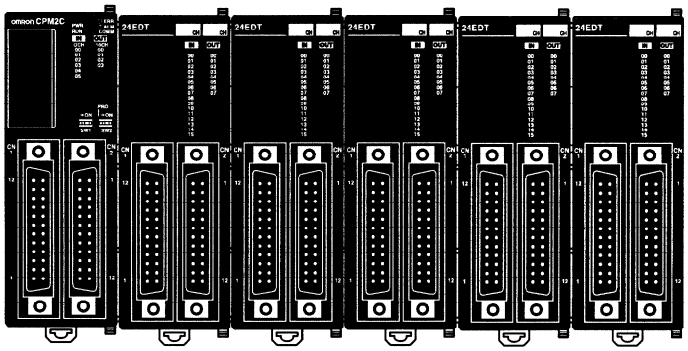
Up to five Expansion Modules or Expansion I/O Modules can be connected to a CPM2C CPU. The AC Power Supply Unit and the CPM2C-CIF01 or CPM2C-CIF11 Serial Communications Adapters can also be used with the CPU.




CPM2C-CIF01/CIF11 Serial Communications Adapters for the Mini-peripheral Port (optional)




AC Power Supply Unit




CPU

Up to 5 Expansion Modules or Expansion I/O Modules

# Ordering Information

## ■ PART NUMBER NOMENCLATURE

**CPM2C-□□□□□-□**
1 2 3 4 5 6

1. **Number of I/O**
2. **RTC = C1**
   **No RTC = C**
3. **Input Power**
4. **PNP = T1**
   **NPN = T**
5. **Relay = R**
   **MIL = M**
   **Connector = C**
6. **Power Supply**

## ■ CPU MODULES WITH 10 I/O POINTS

**Stock Note**: Shaded models are normally stocked.

| Description | CPU module | | | Inputs | Outputs | Clock | Part number |
|---|---|---|---|---|---|---|---|
| CPU with Relay Outputs via Terminal Block | 10 I/O points (6 inputs, 4 outputs) | I/O terminal block | | 6 inputs (24 VDC) | 4 relay outputs | No | **CPM2C-10CDR-D** |
| | | | | | | Yes | **CPM2C-10C1DR-D** |
| CPU with Transistor Outputs via Fujitsu-compatible Connector | | I/O connector | 2 Fujitsu connectors | 6 inputs (24 VDC) | 4 transistor outputs (sinking) | No | **CPM2C-10CDTC-D** |
| | | | | | | Yes | **CPM2C-10C1DTC-D** |
| | | | | | 4 transistor outputs (sourcing) | No | **CPM2C-10CDT1C-D** |
| | | | | | | Yes | **CPM2C-10C1DT1C-D** |
| CPU with Transistor Outputs via MIL Connector | | | 2 MIL connectors | 6 inputs (24 VDC) | 4 transistor outputs (sinking) | No | **CPM2C-10CDTM-D** |
| | | | | | | Yes | **CPM2C-10C1DTM-D** |
| | | | | | 4 transistor outputs (sourcing) | No | **CPM2C-10CDT1M-D** |
| | | | | | | Yes | **CPM2C-10C1DT1M-D** |

## ■ CPU MODULES WITH 20 I/O POINTS

**Stock Note**: Shaded models are normally stocked.

| Description | CPU module | | | Inputs | Outputs | Clock | Part number |
|---|---|---|---|---|---|---|---|
| CPU with Relay Outputs via Terminal Block | 20 I/O points (12 inputs, 8 outputs) | I/O terminal block | | 12 inputs (24 VDC) | 8 relay outputs | No | **CPM2C-20CDR-D** |
| | | | | | | Yes | **CPM2C-20C1DR-D** |
| CPU with Transistor Outputs via Fujitsu-compatible Connector | | I/O connector | 2 Fujitsu connectors | 12 inputs (24 VDC) | 8 transistor outputs (sinking) | No | **CPM2C-20CDTC-D** |
| | | | | | | Yes | **CPM2C-20C1DTC-D** |
| | | | | | 8 transistor outputs (sourcing) | No | **CPM2C-20CDT1C-D** |
| | | | | | | Yes | **CPM2C-20C1DT1C-D** |
| CPU with Transistor Outputs via MIL Connector | | | 2 MIL connectors | 12 inputs (24 VDC) | 8 transistor outputs (sinking) | No | **CPM2C-20CDTM-D** |
| | | | | | | Yes | **CPM2C-20C1DTM-D** |
| | | | | | 8 transistor outputs (sourcing) | No | **CPM2C-20CDT1M-D** |
| | | | | | | Yes | **CPM2C-20C1DT1M-D** |

## ■ CPU MODULES WITH 32 I/O POINTS

**Stock Note**: Shaded models are normally stocked.

| Description | CPU module | | | Inputs | Outputs | Clock | Part number |
|---|---|---|---|---|---|---|---|
| CPU with Transistor Outputs via Fujitsu-compatible Connector | 32 I/O points (16 inputs, 16 outputs) | I/O connector | 2 Fujitsu connectors | 16 inputs (24 VDC) | 16 transistor outputs (sinking) | No | **CPM2C-32CDTC-D** |
| | | | | | 16 transistor outputs (sourcing) | No | **CPM2C-32CDT1C-D** |
| CPU with Transistor Outputs via MIL Connector | | | 2 MIL connectors | 16 inputs (24 VDC) | 16 transistor outputs (sinking) | No | **CPM2C-32CDTM-D** |
| | | | | | 16 transistor outputs (sourcing) | No | **CPM2C-32CDT1M-D** |

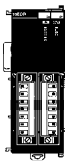
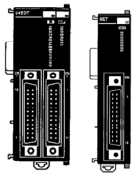
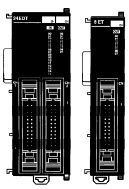
## ■ POWER SUPPLY MODULES

**Stock Note**: Shaded models are normally stocked.

| Description | Input | Output | Part number |
|---|---|---|---|
| Power Supply | 100 to 240 VAC | 24 VDC/600 mA | **CPM2C-PA201** |

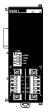
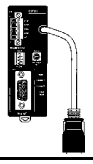
## ■ EXPANSION I/O MODULES

**Stock Note**: Shaded models are normally stocked.

| Description | I/O capacity | Inputs | Outputs | Part number |
|---|---|---|---|---|
| Units with terminal blocks  | 10 I/O points | 6 points (24 VDC) | 4 relay outputs | **CPM2C-10EDR** |
| | 20 I/O points | 12 points (24 VDC) | 8 relay outputs | **CPM2C-20EDR** |
| | 8 output points | — | 8 relay outputs | **CPM2C-8ER** |
| Units with Fujitsu-compatible connectors  | 24 I/O points | 16 points (24 VDC) | 8 transistor outputs (sinking) | **CPM2C-24EDTC** |
| | | | 8 transistor outputs (sourcing) | **CPM2C-24EDT1C** |
| | 32 I/O points | 16 points (24 VDC) | 16 transistor outputs (sinking) | **CPM2C-32EDTC** |
| | | | 16 transistor outputs (sourcing) | **CPM2C-32EDT1C** |
| | 8 input points | 8 points (24 VDC) | — | **CPM2C-8EDC** |
| | 16 input points | 16 points (24 VDC) | — | **CPM2C-16EDC** |
| | 8 output points | — | 8 transistor outputs (sinking) | **CPM2C-8ETC** |
| | | | 8 transistor outputs (sourcing) | **CPM2C-8ET1C** |
| | 16 output points | — | 16 transistor outputs (sinking) | **CPM2C-16ETC** |
| | | | 16 transistor outputs (sourcing) | **CPM2C-16ET1C** |
| Units with MIL connectors  | 24 I/O points | 16 points (24 VDC) | 8 transistor outputs (sinking) | **CPM2C-24EDTM** |
| | | | 8 transistor outputs (sourcing) | **CPM2C-24EDT1M** |
| | 32 I/O points | 16 points (24 VDC) | 16 transistor outputs (sinking) | **CPM2C-32EDTM** |
| | | | 16 transistor outputs (sourcing) | **CPM2C-32EDT1M** |
| | 8 input points | 8 points (24 VDC) | — | **CPM2C-8EDM** |
| | 16 input points | 16 points (24 VDC) | — | **CPM2C-16EDM** |
| | 8 output points | — | 8 transistor outputs (sinking) | **CPM2C-8ETM** |
| | | | 8 transistor outputs (sourcing) | **CPM2C-8ET1M** |
| | 16 output points | — | 16 transistor outputs (sinking) | **CPM2C-16ETM** |
| | | | 16 transistor outputs (sourcing) | **CPM2C-16ET1M** |

## ■ DEDICATED I/O MODULES

**Stock Note**: Shaded models are normally stocked.

| Description | Specifications | Part number |
|---|---|---|
| Analog I/O module  | 2 analog inputs and 1 analog output<br>Voltage I/O: 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC, or −10 to +10 VDC<br>Current I/O: 0 to 20 mA or 4 to 20 mA | **CPM2C-MAD11** |
| Temperature sensor input module | Two thermocouple inputs (Type K or Type J) | **CPM2C-TS001** |
| | Two platinum resistance thermometer inputs (Pt100 or JPt100) | **CPM2C-TS101** |
| CompoBus/S I/O Link Module | Operates as a CompoBus/S Slave and provides 8 inputs and 8 outputs to the Master. | **CPM2C-SRT21** |
| | Flat cable, 4-core , 0.75 $mm^2$; 100 m length | **SCA1-4F10** |
| | Twisted pair cable, 2-core x 0.75 $mm^2$; available commercially | Belden #9409 cable |
| CompoWay/F Serial Interface Module  | Transfer data between the CPU and up to 32 OMRON components equipped with CompoWay/F or SYSWAY communications. This eliminates the need for ladder programming to transfer data between temperature controllers and digital panel meters and the CPU. | **CPM2C-CIF21** |

## ■ FUJITSU-COMPATIBLE CONNECTORS (SEE NOTE)

Note: Fujitsu and MIL connector(s) not included with any of the units.

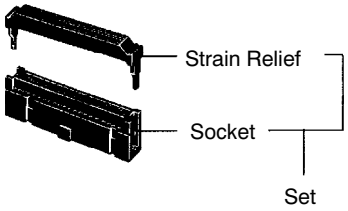
**Stock Note**: Shaded models are normally stocked.

| Description | | Part number |
|---|---|---|
| | 24-pin soldered connector with cover | **C500-CE241** |
| | 24-crimp connector with cover | **C500-CE242** |
| | 24-pin pressure connector | **C500-CE243** |

## ■ MIL FLAT CABLE CONNECTORS (SEE NOTE)

Note: Fujitsu and MIL connector(s) not included with any of the units.

**Stock Note**: Shaded models are normally stocked.

| Description | | Part number |
|---|---|---|
|  | Socket | **XG4M-2030** |
| | Strain relief | **XG4T-2004** |

## ■ CRIMP TOOLS (FOR MIL FLAT CABLE CONNECTORS)

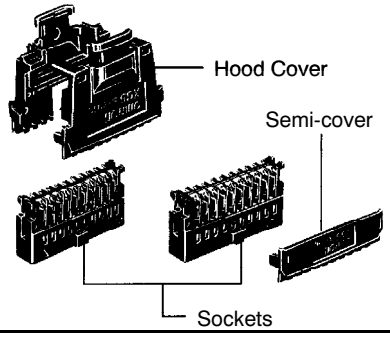
**Stock Note**: Shaded models are normally stocked.

| Description | Part number |
|---|---|
| Crimp tool | **XY2B-0002** |
| Attachment | **XY2B-1007** |

## ■ MIL LOOSE-WIRE, PRESSURE-FITTED CONNECTORS (SEE NOTE)

Note: Fujitsu and MIL connector(s) not included with any of the units.

**Stock Note**: Shaded models are normally stocked.

| Description | | | Part number |
|---|---|---|---|
|  | Socket | AWG24 | **XG5M-2032-N** |
| | | AWG26 to AWG28 | **XG5M-2035-N** |
| | Hood cover | | **XG5S-2012** |
| | Semi-cover<br>(Two required for each socket) | | **XG5S-1001** |

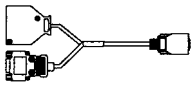
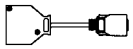
## ■ PRESSURE FITTING TOOL (FOR MIL LOOSE-WIRE, PRESSURE-FITTED CONNECTORS)

**Stock Note**: Shaded models are normally stocked.

| Description | Part number |
|---|---|
| Simple pressure fitting tool | **XY2B-7006** |

## ■ COMMUNICATIONS PORT CONNECTING CABLES

**Stock Note**: Shaded models are normally stocked.

| Connector | Description | Cable length | Part number |
|---|---|---|---|
|  | Converts the CPM2C CPU's mini-peripheral port to a peripheral port and RS-232C port. | 0.15 m (about 4 in) | **CPM2C-CN111** |
|  | Converts the CPM2C CPU's mini-peripheral port to a peripheral port. | 0.05 m (about 2 in) | **CS1W-CN114** |
| | Converts the CPM2C CPU's mini-peripheral port to an RS-232C port. | 0.1 m (about 2 in) | **CS1W-CN118** |

## ■ COMMUNICATION ADAPTERS AND CONNECTING CABLES

**Stock Note**: Shaded models are normally stocked.

| Using this port | Name | Description | Part number |
|---|---|---|---|
| Communications | RS-232C Adapter Unit | RS-232C port (DIN mount)<br>CPU's mini-peripheral port → Mini-peripheral port + RS-232C port | **CPM2C-CIF01-V1** |
| | RS-422/RS-232C Adapter Unit | RS-422/RS-232C adapter (DIN mount)<br>CPU's mini-peripheral port → RS422 port + RS-232C port | **CPM2C-CIF11** |
| | Direct CPM2C CPU to NT cable | NT21/31/631/20/600/11 and NS series to CS1/CJ1/CQM1H/CPM2C mini-peripheral port (2 m) | **XW2Z-200T-2** |
| | Direct CPM2C CPU to NT cable | NT21/31/631/20/600/11 and NS series to CS1/CJ1/CQM1H/CPM2C mini-peripheral port (5 m) | **XW2Z-500T-2** |
| | Direct CPM2C CPU to NT2S cable | NT2S-SF121- to CS1/CJ1/CQM1H/CPM2C mini-peripheral port (2 m) | **NT2S-CN223** |
| | Direct CPM2C CPU to NT2S cable | NT2S-SF122- and SF123- to CS1/CJ1/CQM1H/CPM2C mini-peripheral port (2 m) | **NT2S-CN224** |
| RS-232C | RS-232C cable | For 25-pin computer serial port (2 m) | **XW2Z-200S** |
| | | For 25-pin computer serial port (5 m) | **XW2Z-500S** |
| | | For a 9-pin computer serial port (2 m) | **XW2Z-200S-V** |
| | | For a 9-pin computer serial port (5 m) | **XW2Z-500S-V** |

## ■ PROGRAMMING CONSOLES AND CABLES

**Stock Note**: Shaded models are normally stocked.

| Product | | Part number |
|---|---|---|
| Programming Console with 2 m cable attached; connects directly to the peripheral port | | **CQM1-PRO01-E** |
| Programming Console (Requires separate cable) | | **C200H-PRO27-E** |
| Connecting Cable for C200H-PRO27-E; connects directly to a Peripheral port | 2 m length | **C200H-CN222** |
| | 4 m length | **C200H-CN422** |
| Connecting Cable for C200H-PRO27-E allows direct connection to the CPM2C CPU Communications port | 2 m length | **CS1W-CN224** |
| | 4 m length | **CS1W-CN624** |
| Connecting Cable used only from CPU's peripheral port to computer (D-sub 9-pin) | 2 m length | **CS1W-CN226** |
| | 6 m length | **CS1W-CN626** |

## ■ SUPPORT SOFTWARE

**Stock Note**: Shaded models are normally stocked.

| Item | Description | Part number |
|---|---|---|
| CX-Programmer Jr. | Windows based programming software for micro controllers | **WS02-CXPC1-EJ-V□.□** |
| CX-Programmer | Full programming software package for all controllers | **WS02-CXPC1-E-V□.□** |

## ■ PROGRAM TRANSFER EQUIPMENT

**Stock Note**: Shaded models are normally stocked.

| Product | Description | Part number |
|---|---|---|
| Expansion Memory Unit | Uploads and downloads program and setup memory areas to and from the controller. | **CPM1-EMU01-V1** |
| EEPROM (256 kbits) | Used with the Expansion Memory Unit | **EEPROM-CPM1-EMU01** |

## ■ MAINTENANCE ACCESSORIES

**Stock Note**: Shaded models are normally stocked.

| Product | Description | Part number |
|---|---|---|
| Battery | Backs up memory in the CPM2C CPU. (One battery is already installed in CPUs containing a clock.) | **CPM2C-BAT01** |

## ■ MANUALS

| Product | Description | Part number |
|---|---|---|
| Operation manual | CPM2C programmable controller operation manual | **W356** |
| Programming manual | CPM1/CPM1A/CPM2A/CPM2C programming manual | **W353** |

# Specifications

## ■ GENERAL SPECIFICATIONS FOR CPU AND EXPANSION UNITS

| Item | CPUs with 10/20 I/O points | | CPUs with 32 I/O points transistor outputs | Expansion I/O Units and Expansion Units |
|---|---|---|---|---|
| | Relay outputs | Transistor outputs | | |
| Supply voltage | 24 VDC | | | |
| Operating voltage range | 20.4 to 26.4 VDC | | | |
| Power consumption (See Note) | CPM2C-10C□DR-□: 4 W<br>CPM2C-10C□DT□C-D: 3 W<br>CPM2C-10C□DT□M-D: 3 W<br>CPM2C-20C□DR-□: 4 W<br>CPM2C-20C□DT□C-D: 3 W<br>CPM2C-20C□DT□M-D: 3 W<br>CPM2C-32CDT□C-D: 3 W<br>CPM2C-32CDT□M-D: 3 W<br>Note: The above values for CPU power consumption include the power consumption for Programming Consoles and Communications Adapter Units (CIF□□). | | | CPM2C-10EDR: 1 W<br>CPM2C-20EDR: 2 W<br>CPM2C-8ER: 2 W<br>CPM2C-24EDTC: 1 W<br>CPM2C-24EDT1C 1 W<br>CPM2C-32EDTC: 1 W<br>CPM2C-32EDT1C 1 W<br>CPM2C-8EDC: 1 W<br>CPM2C-16EDC: 1 W<br>CPM2C-8ETC: 1 W<br>CPM2C-8ET1C: 1 W<br>CPM2C-16ETC: 1 W<br>CPM2C-16ET1C: 1 W<br>CPM2C-24EDTM: 1 W<br>CPM2C-24EDT1M: 1 W<br>CPM2C-32EDTM: 1 W<br>CPM2C-32EDT1M: 1 W<br>CPM2C-8EDM: 1 W<br>CPM2C-16EDM: 1 W<br>CPM2C-8ETM: 1 W<br>CPM2C-8ET1M: 1 W<br>CPM2C-16ETM: 1 W<br>CPM2C-16ET1M: 1 W<br>CPM2C-MAD11: 3.5 W<br>CPM2C-TS001: 1.5 W<br>CPM2C-TS101: 1.5 W<br>CPM2C-SRT21: 1 W<br>CPM2C-CIF21: 1 W |
| Inrush current | 25 A max. | | | |
| Insulation resistance | 20 MΩ min. (at 500 VDC) between insulated circuits | | | |
| Dielectric strength | 2,300 VAC for 1 min (between insulated circuits) | | | |
| Noise immunity | Conforms to IEC61000-4-4; 2 kV (power lines) | | | |
| Vibration resistance | 10 to 57 Hz, 0.075-mm double amplitude, 57 to 150 Hz, acceleration: 9.8 $m/s^2$ in X, Y, and Z directions for 80 minutes each (Time coefficient; 8 minutes × coefficient factor 10 = total time 80 minutes) | | | |
| Shock resistance | 147 $m/s^2$ three times each in X, Y, and Z directions | | | |
| Ambient temperature | Operating: 0° to 55°C (32° to 131°F)<br>Storage: −20° to 75°C (−4° to 167°F) except for the battery | | | |
| Humidity | 10% to 90% (with no condensation) | | | |
| Atmosphere | Must be free from corrosive gas | | | |
| Power interrupt time | 2 ms min. | | | |
| Weight | 10 I/O: 200 g max.<br>20 I/O: 250 g max. | 200 g max. | 200 g max. | 8 and 16 inputs: 150 g<br>8 and 16 transistor outputs 150 g<br>8 relay outputs 200 g<br>10 I/O (relay outputs) 200 g<br>24 I/O (transistor outputs) 200 g<br>32 I/O (transistor outputs) 200 g<br>Peripheral/RS-232C Adapter 150 g<br>RS-422/RS-232C Adapter 150 g<br>AC power supply unit 250 g<br>Analog I/O, Temperature units 200 g<br>CompoBus/S unit 150 g |

Note: When calculating the total power consumption, it is necessary to include the power consumption of Programming Consoles, RS-232C Adapters and other devices.

## ■ CPU CHARACTERISTICS

| Item | | 10 I/O points (relay/transistor outputs) | 20 I/O points (relay/transistor outputs) | 32 I/O points (transistor outputs) |
|---|---|---|---|---|
| Control method | | Stored program method | | |
| I/O control method | | Cyclic scan with direct output (Immediate refreshing can be performed with IORF(97).) | | |
| Programming language | | Ladder diagram | | |
| Instruction length | | 1 step per instruction, 1 to 5 words per instruction | | |
| Instructions | | Basic instructions: 14<br>Special instructions: 105 instructions, 185 variations | | |
| Execution time | | Basic instructions: 0.64 μs (LD instruction)<br>Special instructions: 7.8 μs (MOV instruction) | | |
| Program capacity | | 4,096 words | | |
| User data memory capacity | | 2,048 words | | |
| I/O capacity | CPU only | 10 points | 20 points | 32 points |
| | With Expansion I/O Modules | 170 points max. | 180 points max. | 192 points max. |
| Clock function | | Shows the year, month, day of the week, day, hour, minute, and second. (Battery backup) CPUs with “C1” in the model number have a built-in clock. | | Not provided on CPUs with 32 I/O points. |
| Communications functions | | A CPM2C-CN111, CS1W-CN114 or CS1W-CN118 connecting cable is required to connect to the CPM2C’s communications port. The communications port can be used as both a peripheral and RS-232C port.<br>Peripheral port:<br>Supports Host Link, peripheral bus, no-protocol, or Programming Console connections.<br>RS-232C port:<br>Supports Host Link, no-protocol, 1:1 Slave Unit Link, 1:1 Master Unit Link, or 1:1 NT Link connections. | | |
| Memory protection (see notes 1 and 2) | | HR area, AR area, program contents, read/write DM area contents, and counter values are maintained during power interruptions. | | |
| Memory backup (see notes 1 and 2) | | Flash memory:<br>Program, read-only DM area, and PC Setup<br>Memory backup:<br>The read/write DM area, HR area, AR area, and counter values are backed up<br>CPU with clock (battery): 2-year lifetime at 25°C<br>CPU without clock (capacitor): 10-day backup at 25°C<br>CPU without clock (lithium battery): 5-year lifetime at 25°C | | |
| Self-diagnostic functions | | CPU failure (watchdog timer), I/O bus error, battery error, and memory failure | | |
| Program checks | | No END instruction, programming errors (checked when operation is started) | | |
| Basic interrupts | Interrupt processing | 2 interrupts | 4 interrupts | 4 interrupts |
| | | Shared by the external interrupt inputs (counter mode) and the quick-response inputs. | | |
| | Interval timer interrupts | 1 (Scheduled Interrupt Mode or Single Interrupt Mode) | | |
| High-speed counter | High-speed counter | One high-speed counter: 20 kHz single-phase or 5 kHz two-phase (linear count method)<br>Counter interrupt: 1 (set value comparison or set-value range comparison) | | |
| | Interrupt Inputs (Counter mode) | 2 inputs | 4 inputs | 4 inputs |
| | | Shared by the external interrupt inputs and the quick-response inputs. | | |
| Pulse output | | Two points with no acceleration/deceleration, 10 Hz to 10 kHz each, and no direction control.<br>One point with trapezoid acceleration/deceleration, 10 Hz to 10 kHz, and direction control.<br>Two points with variable duty-ratio outputs.<br>(Pulse outputs can be used with transistor outputs only, they cannot be used with relay outputs.) | | |
| Synchronized pulse control | | One point:<br>A pulse output can be created by combining the high-speed counter with pulse outputs and multiplying the frequency of the input pulses from the high-speed counter by a fixed factor.<br>(This output is possible with transistor outputs only, it cannot be used with relay outputs.) | | |
| Quick-response inputs | | 2 inputs | 4 inputs | 4 inputs |
| | | Shared by the external interrupt inputs and the interrupt inputs (counter mode).<br>Min. input pulse width: 50 μs max. | | |
| Input time constant (ON response time = OFF response time) | | Can be set for all input points.<br>(1 ms, 2 ms, 3 ms, 5 ms, 10 ms, 20 ms, 40 ms, or 80 ms) | | |

Notes are on the next page.

CPU Characteristics table notes:

Note: 1. The DM area, HR area, AR area, and counter values are backed up. If the backup battery or capacitor is discharged, the contents of these ares will be lost and the data values will revert to the defaults.

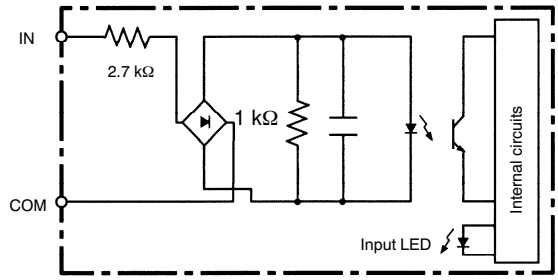
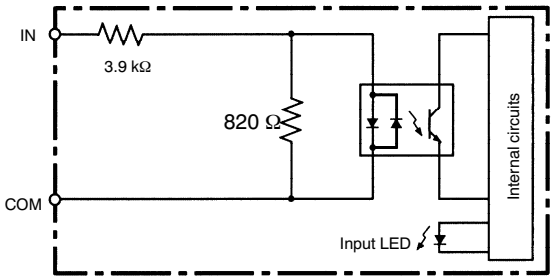
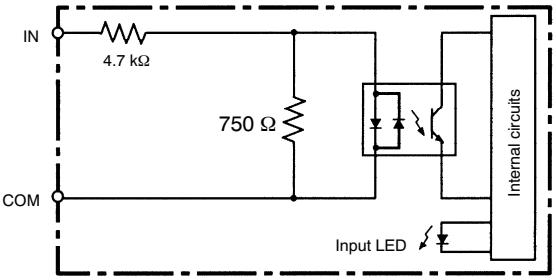
2. The contents of the program area, read-only DM area (DM 6144 to DM 6599), and PC setup (DM 6600 to DM 6655) are stored in flash memory. The contents of these areas will be read from flash memory the next time the power is turned ON, even if the backup battery or capacitor is discharged.
When data has been changed in any of these areas, write the new values to flash memory by switching the CMP2C to MONITOR or RUN mode, or by turning the power OFF and then ON again.

## ■ I/O ALLOCATION

| | |
|---|---|
| Input bits | IR 00000 to IR 00915 (Words not used for input bits can be used for work bits.) |
| Output bits | IR 01000 to IR 01915 (Words not used for output bits can be used for work bits.) |
| Work bits | 928 bits: IR 02000 to IR 04915 (Words IR 020 to IR 049) and<br>IR 20000 to IR 22715 (Words IR 200 to IR 227) |
| Special bits (SR area) | 448 bits: SR 22800 to SR 25515 |
| Temporary bits (TR area) | 8 bits (TR0 to TR7) |
| Holding bits (HR area) | 320 bits: HR 0000 to HR 1915 (Words HR 00 to HR 19) |
| Auxiliary bits (AR area) | 384 bits: AR 0000 to AR 2315 (Words AR 00 to AR 23) |
| Link bits (LR area) | 256 bits: LR 0000 to LR 1515 (Words LR 00 to LR 15) |
| Timers/Counters | 256 timers/counters (TIM/CNT 000 to TIM/CNT 255)<br>1-ms timers: TMHH(—)<br>10-ms timers: TIMH(15)<br>100-ms timers: TIM<br>1-s/10-s timers: TIML(—)<br>Decrementing counters: CNT<br>Reversible counters: CNTR(12) |
| Data memory | Read/Write: 2,048 words (DM 0000 to DM 2047)*<br>Read-only: 456 words (DM 6144 to DM 6599)<br>PC Setup: 56 words (DM 6600 to DM 6655)<br>*The Error Log is contained in DM 2000 to DM 2021. |

## ■ I/O SPECIFICATIONS

### CPU Input Specifications

| Item | Inputs | Specification | | |
|---|---|---|---|---|
| | | 10 I/O CPU | 20 I/O CPU | 32 I/O CPU |
| Input voltage | All | 24 VDC $^{+10\%}/_{-15\%}$ | | |
| Input impedance | IN00000 to IN00001 | 2.7 kΩ | | |
| | IN00002 to IN00004 | 3.9 kΩ | — | — |
| | IN00002 to IN00006 | — | 3.9 kΩ | 3.9 kΩ |
| | IN00005 | 4.7 kΩ | — | — |
| | IN00007 and up | — | 4.7 kΩ | 4.7 kΩ |
| Input current | IN00000 to IN00001 | 8 mA typical | | |
| | IN00002 to IN00004 | 6 mA typical | — | — |
| | IN00002 to IN00006 | — | 6 mA typical | 6 mA typical |
| | IN00005 and up | 5 mA typical | — | — |
| | IN00007 and up | — | 5 mA typical | — |
| | IN00007 | — | — | 5 mA typical |
| | IN00100 to IN00107 | — | — | 5 mA typical |
| ON voltage/current | IN00000 to IN00001 | 17 VDC min., 5.0 mA | | |
| | IN00002 and up | 14.4 VDC min., 3.5 mA | | |
| OFF voltage/current | All | 5.0 VDC max., 1.1 mA | | |
| ON delay | All | 1 to 80 ms max. Default: 10 ms (See Note) | | |
| OFF delay | All | 1 to 80 ms max. Default: 10 ms (See Note) | | |
| Circuit configuration | IN00000 to IN00001 |  | | |
| | CPUs with 10 I/O points: IN00002 to IN00004<br><br>CPUs with 20 or 32 I/O points: IN00002 to IN00006 |  | | |
| | CPUs with 10 I/O points: IN00005<br><br>CPUs with 20 I/O points: IN00007 to IN00011<br><br>CPUs with 32 I/O points: IN00007 and IN00100 to IN00107 |  | | |

Note: The input time constant can be set to 1, 2, 3, 5, 10, 20, 40, or 80 ms in the PLC Setup.

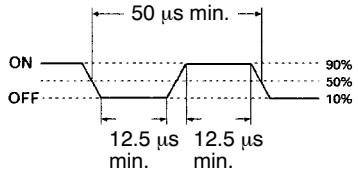
### High-speed Counter Inputs

The following CPU input bits can be used as high-speed counter inputs. The maximum count frequency is 5 kHz in differential phase mode and 20 kHz in the other modes.

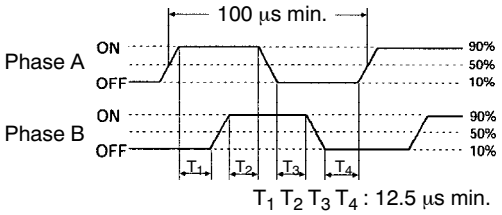
| Input | Function | | | |
|---|---|---|---|---|
| | Differential phase mode | Pulse plus direction input mode | Up/down input mode | Increment mode |
| IN00000 | A-phase pulse input | Pulse input | Increment pulse input | Increment pulse input |
| IN00001 | B-phase pulse input | Direction input | Decrement pulse input | Normal input |
| IN00002 | Z-phase pulse input or hardware reset input (IN00002 can be used as a normal input when it is not used as a high-speed counter input.) | | | |

Note: The minimum pulse widths for inputs IN00000 (A-phase input) and IN00001 (B-phase input) are as follows:

Pulse plus direction input mode, Up/down input mode, Increment mode

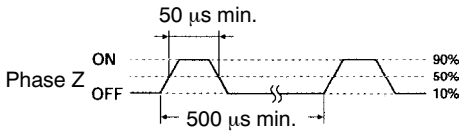



Differential phase mode




$T_1$ $T_2$ $T_3$ $T_4$ : 12.5 μs min.

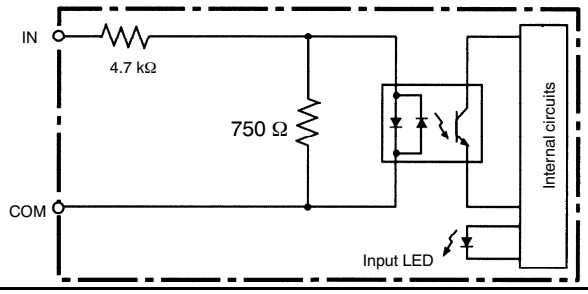
The minimum pulse width for input IN00002 (Z-phase input) is as follows:




### Interrupt Inputs

CPM2C PLCs have inputs that can be used as interrupt inputs (interrupt input mode or counter mode) and quick-response inputs. The minimum pulse width for these inputs is 50 μs.
In CPUs with 10 I/O points, inputs IN00003 and IN00004 can be used as interrupt inputs. In CPUs with 20 I/O points, inputs IN00003 through IN00006 can be used as interrupt inputs.

## ■ EXPANSION I/O MODULE INPUT SPECIFICATIONS

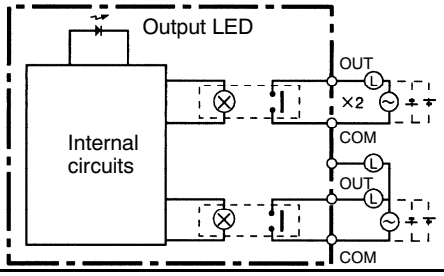
| Item | Specification |
|---|---|
| Input voltage | 24 VDC $^{+10\%}/_{-15\%}$ |
| Input impedance | 4.7 kΩ |
| Input current | 5 mA typical |
| ON voltage | 14.4 VDC min., 3.5 mA |
| OFF voltage | 5.0 VDC max., 1.1 mA |
| ON delay | 1 to 80 ms max. Default: 10 ms (See note.) |
| OFF delay | 1 to 80 ms max. Default: 10 ms (See note.) |
| Circuit configuration |  |



Note: The input time constant can be set to 1, 2, 3, 5, 10, 20, 40, or 80 ms in the PLC Setup.

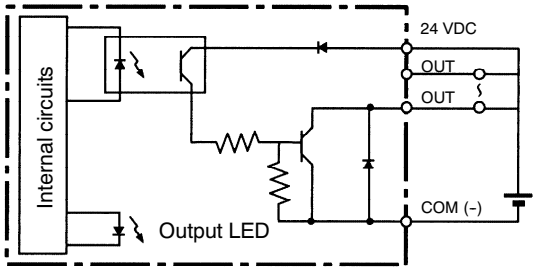
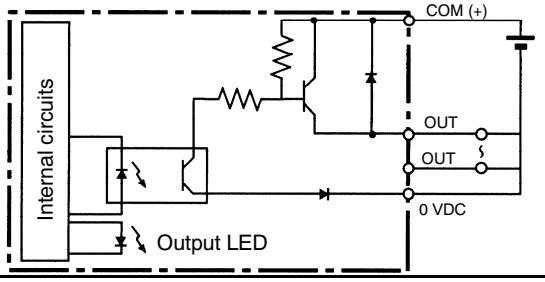
## ■ CPM2C OUTPUT SPECIFICATIONS (CPUs AND EXPANSION I/O MODULES)

**Relay Output**

| Item | Specification |
|---|---|
| Max. switching capacity | 2 A, 250 VAC (cosϕ = 1)<br>2 A, 24 VDC (4 A/common) |
| Min. switching capacity | 10 mA, 5 VDC |
| Service life of relay | Electrical: 150,000 operations (30-VDC resistive load)<br>100,000 operations (240-VAC inductive load, cosϕ = 0.4)<br>Mechanical: 20,000,000 operations |
| ON delay | 15 ms max. |
| OFF delay | 15 ms max. |
| Circuit configuration |  |

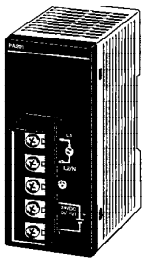
## ■ TRANSISTOR OUTPUTS (NPN OR PNP)

**For CPUs and Expansion I/O Modules**

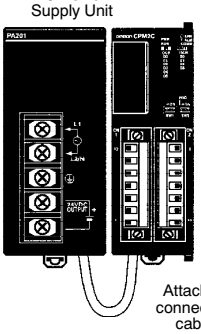
| Item | Specification |
|---|---|
| Max. switching capacity | CPUs with 10 or 20 I/O points:<br>OUT01000 to OUT01007: 40 mA/4.5 VDC to 300 mA/20.4 VDC, 300 mA (20.4 VDC to 26.4 VDC)<br>CPUs with 32 I/O points:<br>OUT01000 to OUT01007: 40 mA/4.5 VDC to 300 mA/20.4 VDC, 300 mA (20.4 VDC to 26.4 VDC)<br>OUT01100 to OUT01107: 40 mA/4.5 VDC to 100 mA/20.4 VDC, 100 mA (20.4 VDC to 26.4 VDC)<br>Expansion I/O Modules:<br>OUT01□00 to OUT01□07: 40 mA/4.5 VDC to 300 mA/20.4 VDC, 300 mA (20.4 VDC to 26.4 VDC)<br>OUT01□08 to OUT01□15: 40 mA/4.5 VDC to 100 mA/20.4 VDC, 100 mA (20.4 VDC to 26.4 VDC)<br>Note: When using OUT01000 or OUT01001 as a pulse output, connect a dummy resistor as required to bring the load current between 10 and 150 mA. If the load current is below 10 mA, the ON/OFF response time will be longer and high-speed pulses will not be output.<br>The transistor will heat if used at 150 mA or higher, possibly damaging elements. |
| Min. switching capacity | 0.5 mA |
| Max. inrush current | 0.9 A for 10 ms (charging and discharging waveform) |
| Leakage current | 0.1 mA max. |
| Residual voltage | 0.8 V max. |
| ON delay | OUT01000 and OUT01001: 20 μs max.<br>OUT01002 and up: 0.1 ms max. |
| OFF delay | OUT01000 and OUT01001: 40 μs max. for 10 to 300 mA<br>0.1 ms max. for 0.5 to 10 mA<br>OUT01002 and up: 1 ms max. |
| Fuse | 1 fuse for each 2 outputs (The fuse cannot be replaced by the user.) |
| Circuit configuration | **NPN Outputs**<br>  <br>**PNP Outputs**<br>  |

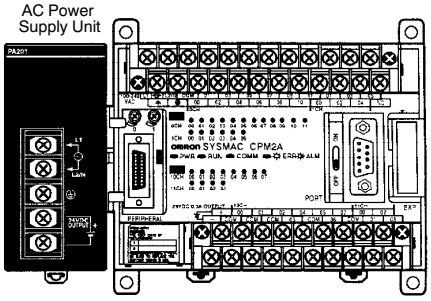
## ■ AC POWER SUPPLY UNIT

The slim, compact CPM2C-PA201 AC Power Supply Unit is the same shape as the CPM2C's CPU. It connects with a connecting cable (23 cm) provided. It can also be used for CPM1A and CPM2A CPUs and as display power supply (wired by the user).



Service power supply for external devices such as sensors (24 V).



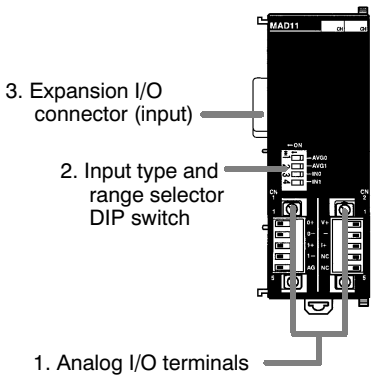

**CPM2C-PA201 AC Power Supply Unit Specifications**

| Item | | | Specification |
|---|---|---|---|
| Rated output | | | 15 W |
| Output voltage | | | 24 V |
| Output current | | | 600 mA |
| Efficiency | | | 75% min. (at rated output) |
| Input conditions | Rated voltage | | 100 to 240 VAC (85 to 264 VAC allowable voltage range) |
| | Frequency | | 47 to 63 Hz |
| | Current | 100 V | 0.4 A |
| | | 200 V | 0.2 A |
| | Leakage current | 100 V | 0.5 mA max. (at rated output) |
| | | 200 V | 1 mA max. (at rated output) |
| | Inrush current | 100 V | 15 A max. (at 25°C cold start) |
| | | 200 V | 30 A max. (at 25°C cold start) |
| Output characteristics | Output voltage accuracy | | 5%/–10%, 10%/–15% (including input, load, and temperature fluctuations) |
| | Minimum output current | | 30 mA |
| | Ripple noise voltage | | 2% (p-p) max. |
| | Input fluctuation | | 0.75% max. |
| | Load fluctuation | | 4% max. |
| | Temperature fluctuation | | 0.05%/°C max. |
| | Startup time | | 300 ms max. (at input voltage of 100 VAC or 200 VAC and the rated output) |
| | Output hold time | | 10 ms (at input voltage of 100 VAC or 200 VAC and the rated output) |
| Overcurrent protection | | | Self-resetting, operates at 105% to 335% of the rated current, suspended and independent operation |
| Overvoltage protection | | | None |
| Ambient operating temperature | | | 0° to 55°C (32° to 131°F) |
| Ambient storage temperature | | | –20° to 70°C (–4° to 158°F) |
| Ambient operating humidity | | | 10% to 90% (no condensation) |
| Dielectric strength | | | 2,000 V for 1 min between all inputs and GR<br>Leakage current: 10 mA<br>3,000 V for 1 min between all inputs and all outputs<br>Leakage current: 10 mA<br>1,000 V for 1 min between all outputs and GR<br>Leakage current: 10 mA |
| Insulation resistance | | | 100 MΩ min. at 500 VDC between all outputs and any input, and between all outputs and GR |
| Vibration resistance | | | 10 to 57 Hz, amplitude, 57 to 150 Hz, acceleration: 9.8 $m/s^2$ in X, Y, and Z directions for 80 minutes according<br>(Time coefficient: 8 minutes × coefficient factor 10 = total time 80 min.) |
| Shock resistance | | | 147 $m/s^2$ 3 times each in X, Y, and Z directions |
| Noise terminal voltage | | | FCC class A |
| Weight | | | 250 g max. |

## ■ DEDICATED I/O MODULES SPECIFICATIONS

### Mixed Analog I/O Module CPM2C-MAD11 (2 input and 1 output channels)

For process input variables such as pressure, flow, and humidity, use a Mixed Analog I/O Module. The single analog output can provide a signal for recording devices, valve controllers or a transfer output of the analog signal. Up to 4 Mixed Analog I/O Modules can be used in a CPM2C system with other Expansion I/O Modules. A maximum of 5 Expansion I/O Modules, including Dedicated I/O Modules, can be used in a CPM2C system.

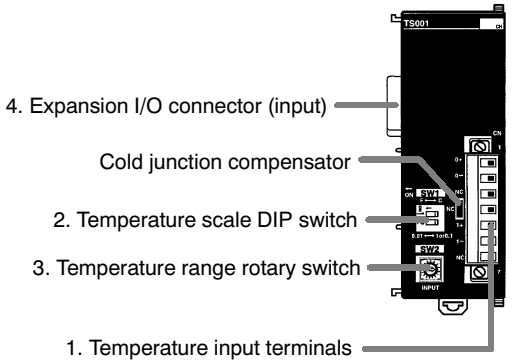



| Item | | | Voltage I/O | Current I/O |
|---|---|---|---|---|
| Analog input section | Number of inputs | | 2 inputs (2 words allocated) | |
| | Input signal range | | 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC, or −10 to +10 VDC | 0 to 20 mA or 4 to 20 mA |
| | Max. rated input | | ±15 V | ±30 mA |
| | External input impedance | | 1 MΩ min. | 250 Ω |
| | Resolution | | 1/6000 (full scale) | |
| | Overall accuracy | 25°C | 0.3% full scale | 0.4% full scale |
| | | 0 to 55°C | 0.6% full scale | 0.8% full scale |
| | A/D conversion data | | 16-bit binary (4-digit hexadecimal)<br>Full scale for −10 to +10 V: F448 to 0BB8 Hex<br>Full scale for other ranges: 0000 to 1770 Hex | |
| | Averaging function | | Supported (Settable for individual inputs via DIP switch) | |
| | Open-circuit detection function | | Supported | |
| Analog output section | Number of outputs | | 1 output (1 word allocated) | |
| | Output signal range | | 1 to 5 VDC, 0 to 10 VDC, or −10 to +10 VDC | 0 to 20 mA or 4 to 20 mA |
| | Allowable external output load resistance | | 1 kΩ min. | 600 Ω max. |
| | External output impedance | | 0.5 Ω max. | — |
| | Resolution | | 1/6000 (full scale) | |
| | Overall accuracy | 25°C | 0.4% full scale | |
| | | 0 to 55°C | 0.8% full scale | |
| | Set data (D/A conversion) | | 16-bit binary (4-digit hexadecimal)<br>Full scale for −10 to +10 V: F448 to 0BB8 Hex<br>Full scale for other ranges: 0000 to 1770 Hex | |
| Conversion time | | | 2 ms/point (6 ms/all points) | |
| Isolation method | | | Photocoupler isolation between analog I/O terminals and internal circuits. No isolation between analog I/O signals. | |

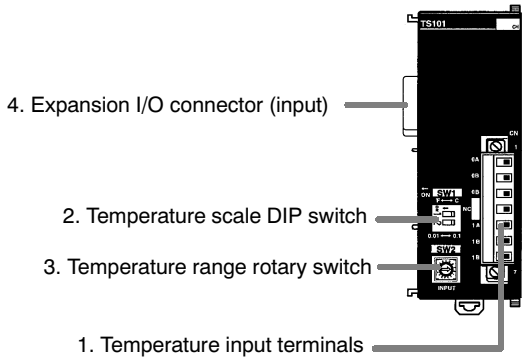
### Temperature Sensor Input Modules CPM2C-TS001 and CPM2C-TS101 (2 input channels)

By connecting a Temperature Sensor Module to the CPM2C, inputs can be received from thermocouples or platinum resistance thermometers. Inputs are converted to binary data (4-digit hexadecimal) and stored in the IR area. A maximum of four Temperature Sensor Input Modules can be used in a CPM2C system.

CPM2C-TS001




CPM2C-TS101

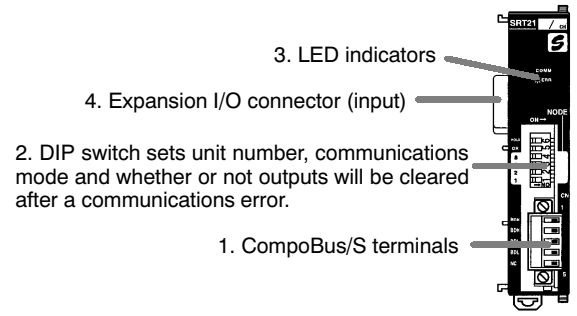



| Item | CPM2C-TS001 | CPM2C-TS101 |
|---|---|---|
| Temperature sensors | Thermocouples<br>Switchable between Types K and J, but same type must be used for all inputs. | Platinum resistance thermometer<br>Switchable between Pt100 and JPt100, but same type must be used for all inputs. |
| Number of inputs | 2 | |
| Allocated input words | 2 | |
| Max. number of modules | 4 | 4 |
| Temperature ranges | Type K: −200° to 1300°C, 0.0° to 500.0°C<br>−300° to 2300°F, 0.0° to 900.0°F<br>Type J: −100° to 850°C, 0.0° to 400.0°C<br>−100° to 1500°F, 0.0° to 750.0°F | Both Pt100 and JPt100:<br>−200.0° to 650.0°C<br>−300.0° to 1200.0°F |
| Accuracy (See Note 2) | The larger of ±0.5% of converted value or ±2°C, ±1 digit max. (See Note 1) | The larger of ±0.5% of converted value or ±1°C, ±1 digit max. |
| Conversion time | 250 ms for 2 input points | |
| Converted temperature data | 16-bit binary data (4-digit hexadecimal) | |
| Isolation | Photocouplers between all temperature input signals | |

Note: 1. Accuracy for a K-type sensor at −100°C or less is ±4°C ±1 digit max.
2. The error deviation for temperatures in °F is double that for °C.

### CompoBus/S I/O Link Module CPM2C-SRT21

The CPM2C controller can function as a Slave to a CompoBus/S Master Module when a CPM2C-SRT21 CompoBus/S I/O Link Module is connected. The CompoBus/S I/O Link Module links 8 inputs and 8 outputs between the Master Module and the CPM2C. Up to 5 Expansion I/O Modules or Expansion Modules can be connected to a CPM2C CPU.

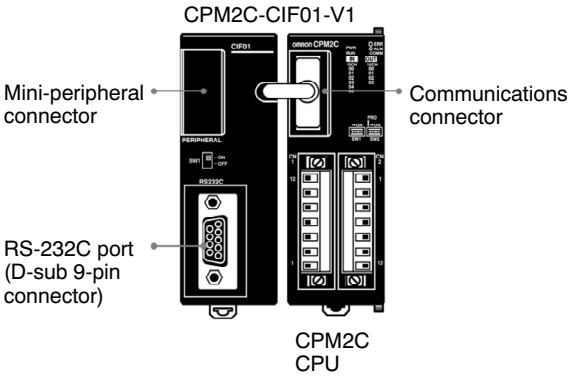



| | |
|---|---|
| Number of I/O bits | 8 input bits, 8 output bits |
| Max. number of connectable nodes | 16 |
| Number of words occupied in CPM2C I/O memory | 1 input word, 1 output word<br>(Allocated in the same way as other Expansion I/O Modules or Expansion Modules) |
| Node number setting | Set using the DIP switch. |

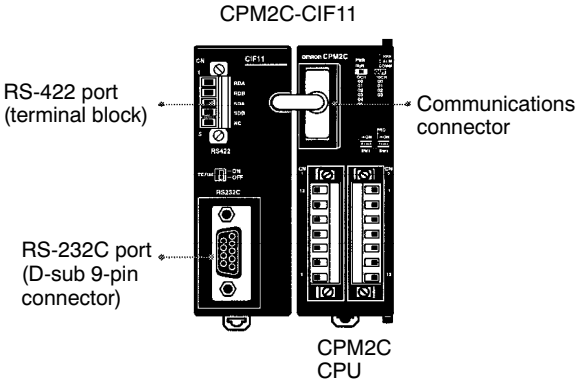
Note: See the CompoBus/S section of Omron's *Remote I/O and Wiring Solutions Catalog (GC RIO1*) for more details on CompoBus/S communications.

## ■ SERIAL COMMUNICATIONS MODULES

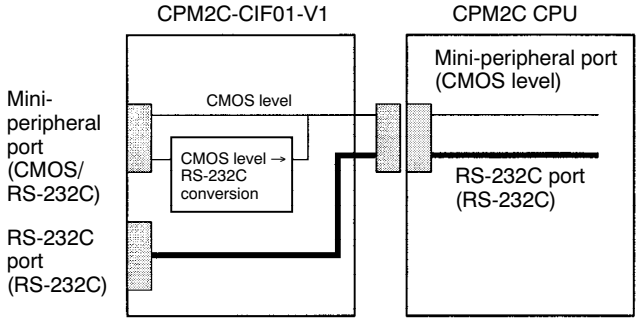
**CPM2C-CIF01-V1**
**Mini-peripheral/RS-232C Adapter Unit**



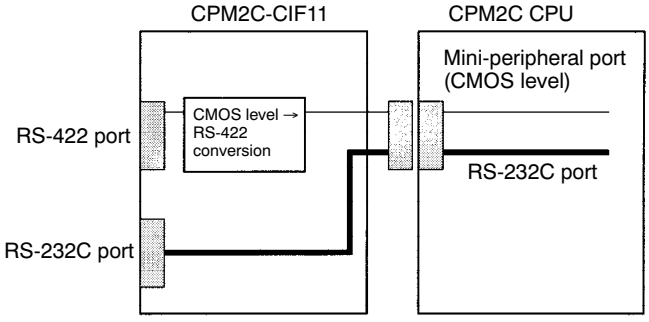

**CPM2C-CIF11**
**RS-422/RS-232C Adapter Unit**




**Internal Configuration**




Note: When using the CS1W-CN226/CN626 Connecting Cable for personal computer connection, turn ON the switch.




Note: A Programming Console cannot be connected to the RS-422 port.

**CPM2C-CIF01-V1/CIF11 Specifications**

| Item | | Specification | |
|---|---|---|---|
| | | CPM2C-CIF01-V1 | CPM2C-CIF11 |
| Upper port | Signal conversion | Outputs signals from the CPU's CMOS interface without conversion, or converts CMOS level (CPU side) to RS-232C (connected device side). | Converts CMOS level (CPU side) to RS-422 (connected device side). RS-422 (externally connected device) insulated using DC/DC converter or photocoupler. |
| | Function | Host Link, peripheral bus, no-protocol, or Programming Console connections. | Host Link, peripheral bus, or no-protocol connections. |
| Lower port | Signal conversion | Outputs signals from the CPU's CMOS interface without conversion. | Outputs signals from the CPU's CMOS interface without conversion. |
| | Function | Host Link, no-protocol, 1:1 Link, or 1:1 NT Link connections. | Host Link, no-protocol, 1:1 Link, or 1:1 NT Link connections. |
| Power supply | | Power supplied from CPU. | |
| Current consumption | | 0.3 A max. at 5 V | |
| Weight | | 150 g max. | |

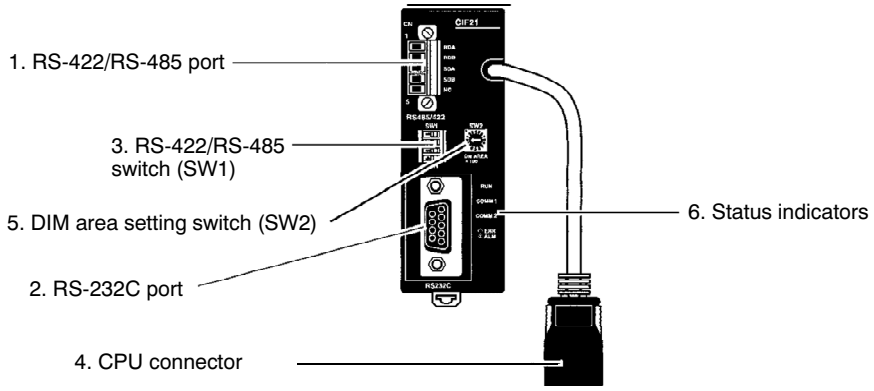
Note: Neither the CPM2C-CIF01-V1 nor the CPM2C-CIF11 can be used with any PC other than the CPM2C. A CPM2C-CIF11 or another CPM2C-CIF01-V1 cannot be connected to the CPM2C if a CPM2C-CIF01-V1 is already connected to it.

## ■ COMPOWAY/F SERIAL INTERFACE MODULE

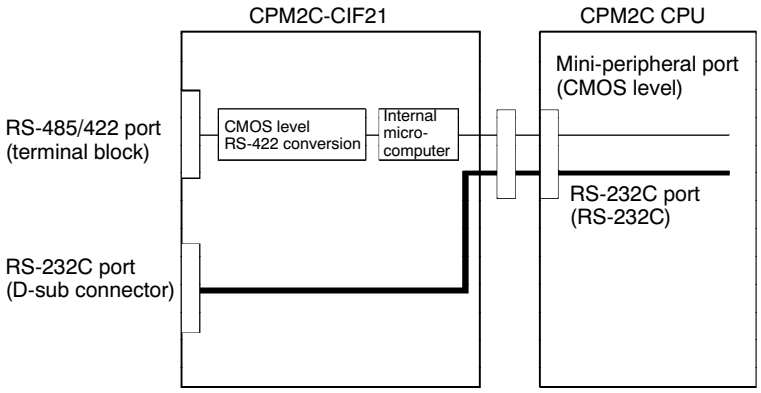
### CPM2C-CIF21

The CompoWay/F Serial Interface Module exchanges data between the CPU's DM area and OMRON components (temperature controllers, electronic timers/counters, and digital panel meters). This eliminates the need for ladder programming used to transfer data between the CPU and the supported OMRON components. Up to 32 OMRON components equipped with the CompoWay/F or SYSWAY communications can be connected.

**Front View**




**Internal Configuration**




**CPM2C-CIF21 Specifications**

| Item | | Specification |
|---|---|---|
| Applicable PLC | | CPM2C |
| RS-485/422 (top port) | Maximum number of connectable components | 32 |
| | Component connection port | Components connected to RS-485/422 terminal block. Connected to CPM2C CPU via peripheral port. |
| | Baud rate for connection to components | 9.6, 19.2, 38.4, or 57.6 kbps |
| | Baud rate for connection to CPU | 9.6 or 19.2 kbps |
| RS-232C (bottom port) | Signal conversion | Output from CPU's RS-232C interface with no conversions. |
| | Communications functions | One of the following: Host Link, no-protocol, 1:1 Link, 1:1 NT Link |
| Power supply | | From CPU |
| Power consumption | | 1 W |
| Weight | | 150 g max. |

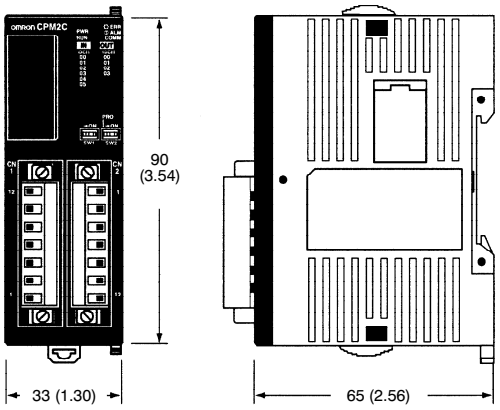
Note: The CPM2C-CIF21 can only be used with the CPM2C.

# Dimensions

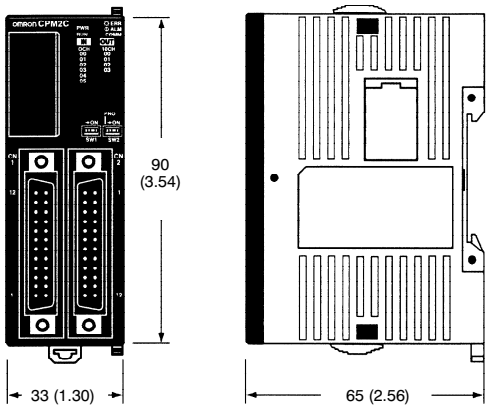
Unit: mm (inch)

## ■ CPUS

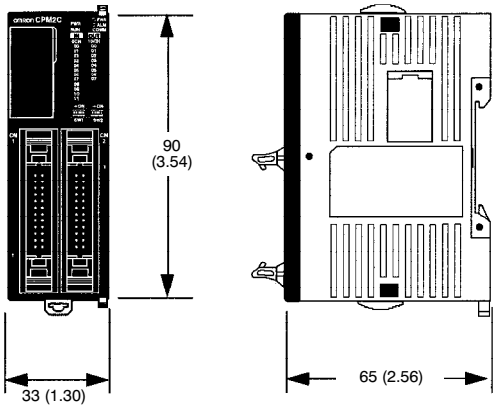
**CPU with Relay Outputs**
**(CPM2C-10CDR-D, CPM2C-10C1DR-D**
**CPM2C-20CDR-D, CPM2C-20C1DR-D)**




**CPU with Transistor Outputs and Fujitsu Connectors**
**(CPM2C-10/20/32CDTC-D, CPM2C-10/20/32C1DTC-D,**
**CPM2C-10/20CDT1C-D, CPM2C-10/20C1DT1C-D)**



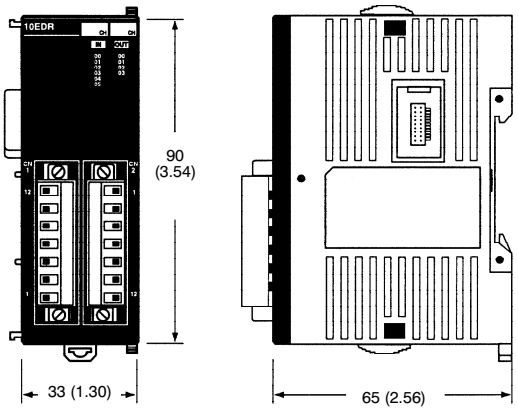

**CPU with Transistor Outputs and MIL Connectors**
**(CPM2C-10/20/32CDTM-D, CPM2C-10/20C1DTM-D,**
**CPM2C-10/20/32CDT1M-D, CPM2C-10/20C1DT1M-D)**



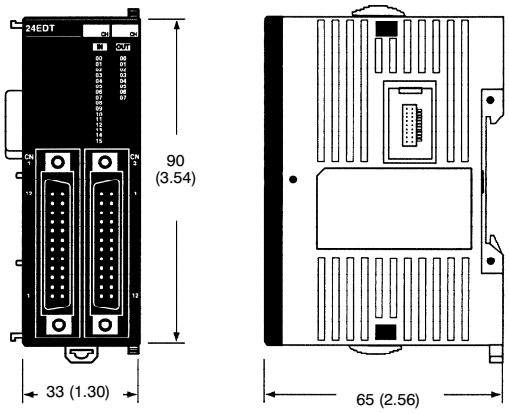
## ■ EXPANSION I/O MODULES

Unit: mm (inch)

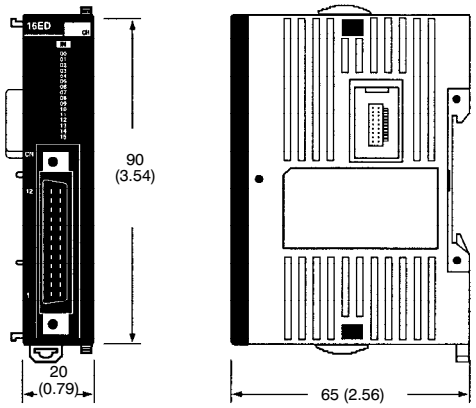
**Modules with Relay Outputs (CPM2C-8ER, CPM2C-10EDR)**



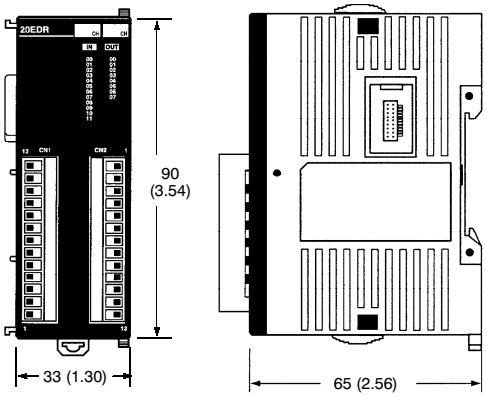

**Modules with Transistor Outputs (CPM2C-24/32EDTC, CPM2C-24/32EDT1C)**



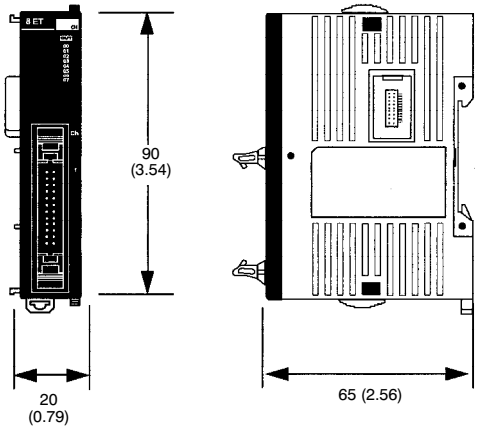

**Modules with Transistor Outputs Only and Modules with Inputs Only (CPM2C-8EDC, CPM2C-8ETC, CPM2C-8ET1C, CPM2C-16EDC, CPM2C-16ETC, CPM2C-16ET1C)**



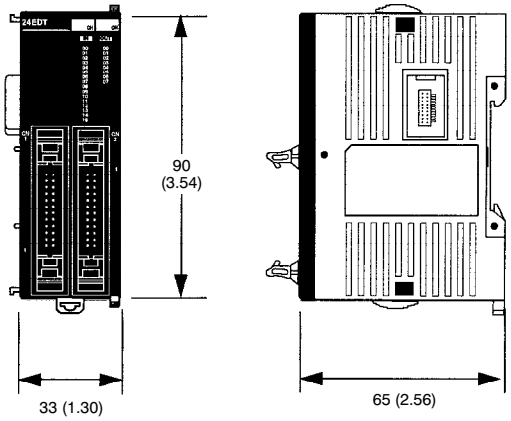

**Modules with 20 Relay I/O (CPM2C-20EDR-D)**




**Modules with Inputs or Outputs Only (CPM2C-8EDM, CPM2C-8ETM, CPM2C-8ET1M, CPM2C-16EDM, CPM2C-16ETM, CPM2C-16ET1M)**

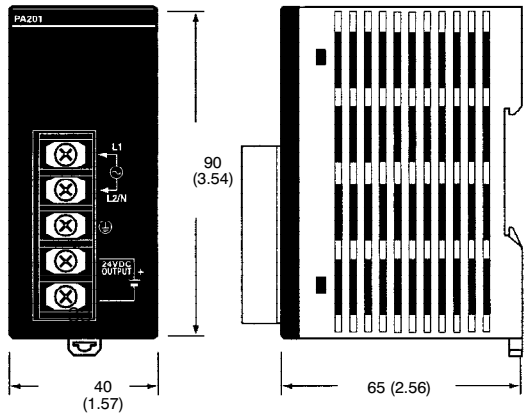



**Modules with Transistor Outputs and MIL Connectors (CPM2C-24/32EDTM, CPM2C-24/32EDT1M)**

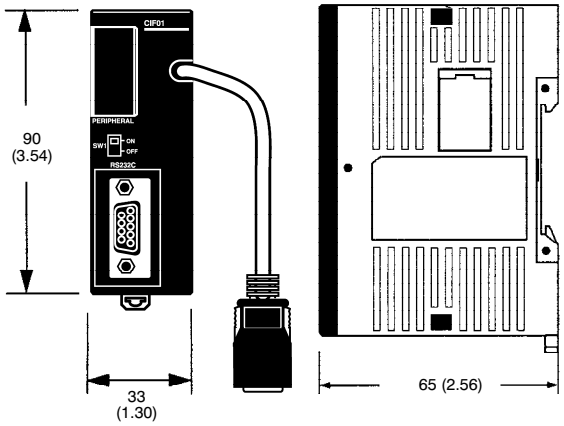


Unit: mm (inch)

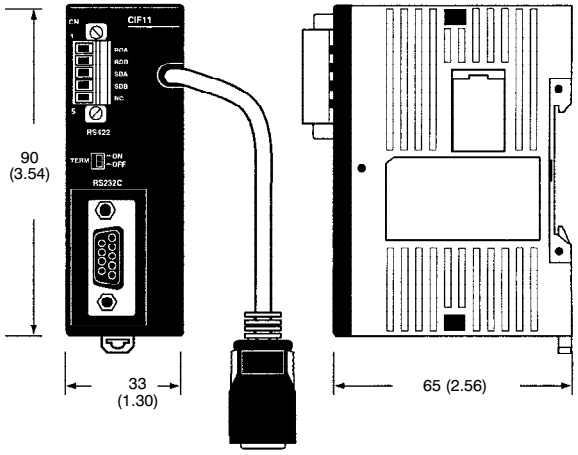
**AC Power Supply (CPM2C-PA201)**



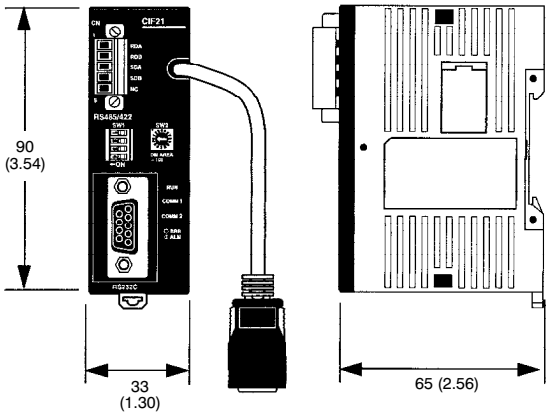

**Mini-peripheral/RS-232C Adapter Module (CPM2C-CIF01-V1)**




**RS-232C and RS-422/RS-485 Adapter Module (CPM2C-CIF11)**



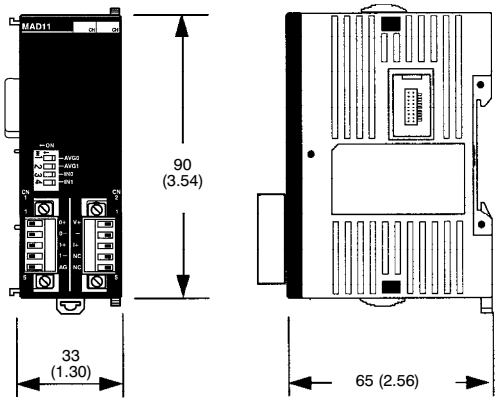

**CompoWay/F Serial Interface Module (CPM2C-CIF21)**



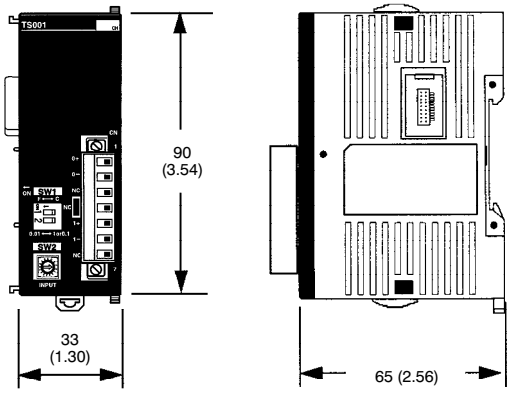
## ■ DEDICATED I/O MODULES

Unit: mm (inch)

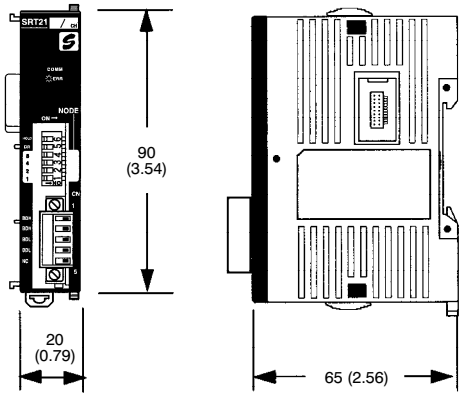
**CPM2C-MAD11 Analog I/O Module**




**CPM2C-TS001, CPM2C-TS101 Temperature Sensor Modules**



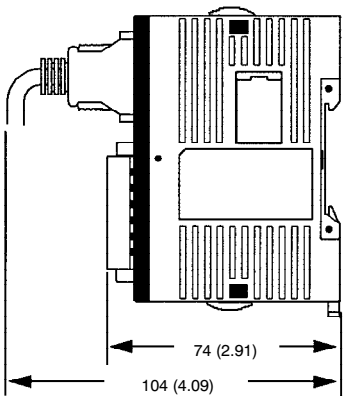

**CPM2C-SRT21 CompoBus/S I/O Link Module**



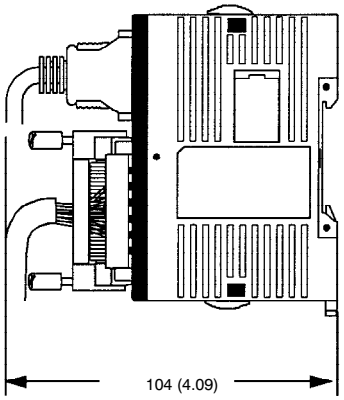
## ■ CPM2C MODULES WITH CONNECTORS ATTACHED

Unit: mm (inch)

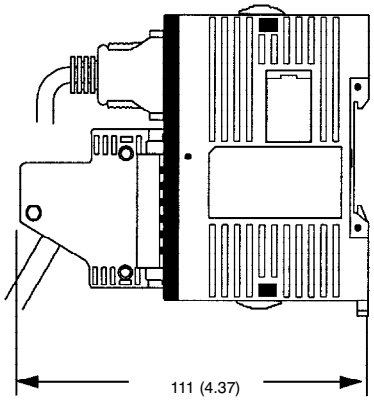
**Modules with Relay Outputs**



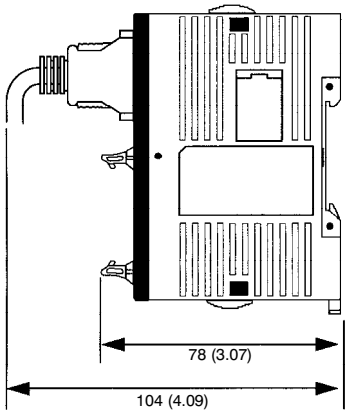

**Modules with Transistor Outputs (Using pressure connectors)**




**Modules with Transistor Outputs (Using soldered connectors)**




**Units with Transistor Outputs and MIL Connectors**

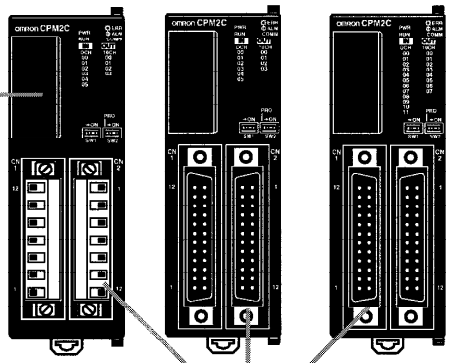


# Functions

The CPM2C programmable controllers offer a variety of features in a compact Unit, including synchronized pulse control, interrupt inputs, pulse outputs, and a clock function. The CPM2C CPU can handle a broad range of machine control applications and it is small enough to be incorporated as the control unit in almost any free-standing machine.

The full complement of communications functions lets you communicate with personal computers, other OMRON PLCs, and OMRON Programmable Terminals. These communications capabilities allow the user to design a low-cost, effective control system.

The communications port can be used simultaneously as two ports: Mini-peripheral and RS-232C. The mini-peripheral port supports Programming Devices, Host Link, and no-protocol communications. The RS-232C port supports Host Link, no-protocol (serial), 1:1 Link, and 1:1 NT Link communications.



CPUs with 10 I/O points (relay or transistor outputs) and 20 or 32 I/O points (transistor outputs only) are available. Expansion I/O Units can be connected to increase capacity to 192 I/O points.

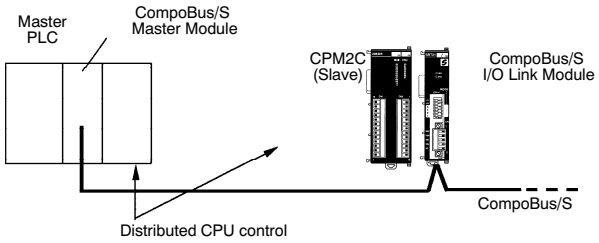
## ■ TIME-PROPORTIONAL CONTROL

The CPM2C performs simple-to-program, time-proportional control using up to four Analog I/O modules (maximum 8 analog inputs and 4 analog outputs) and the PID and PWM expansion instructions. These instructions set the parameters for PID control and a pulse output with variable duty ratio. For increased reliability, an open-circuit detection function can be used with the 1 to 5 VDC and 4 to 20 mA analog input settings.

For temperature monitoring applications, CPM2C accepts up to 8 inputs (two per module) from Temperature Sensor Input modules. The PID instruction can manipulate the input from either thermocouple or platinum resistance thermometer sensors.

## ■ DISTRIBUTED I/O CONTROL

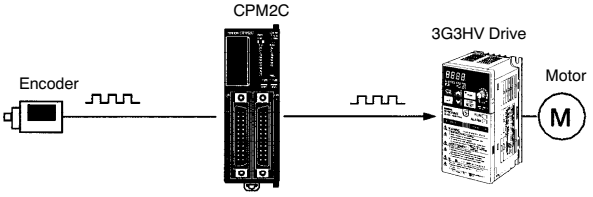
Omron's CompoBus/S I/O Link provides distributed CPU control based on a "PLC + compact PLC" configuration which provides improvements over distributed control based on "PLC + remote I/O" configurations. The distributed CPU control makes equipment module, so designs can be standardized, special needs can be addressed and modules can be replaced easily in the event of breakdown without affecting the main CPU.




## ■ BUILT-IN MOTOR CONTROL CAPABILITY

### Synchronized Pulse Control (Transistor Output Models Only)

Synchronized pulse control provides an easy way to synchronize the operation of a peripheral piece of equipment with the main equipment. The output pulse frequency can be controlled as some multiple of the input pulse frequency, allowing the speed of a peripheral piece of equipment (such as a supply conveyor) to be synchronized with the speed of the main piece of equipment.




Pulses are output as a fixed multiple of the input frequency.

## ■ HIGH-SPEED COUNTERS AND INTERRUPTS

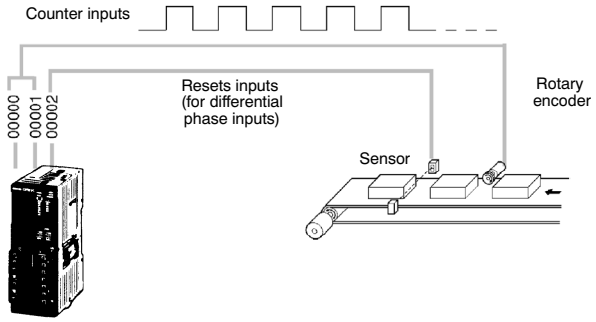
The CPM2C has up to four high-speed counter inputs. The one high-speed counter input has a response frequency of 20 kHz/5 kHz, and the four interrupt inputs (in counter mode) have a response frequency of 2 kHz.

### Four Input Modes

The high-speed counter can be used in any one of the four input modes: differential phase mode (5 kHz), pulse plus direction input mode (20 kHz), up/down pulse mode (20 kHz), or increment mode (20 kHz). Interrupts can be triggered when the count matches a set value or falls within a specified range.

### Interrupt Inputs

The interrupt inputs (counter mode) can be used for incrementing counters or decrementing counters (2 kHz) and trigger an interrupt (executing the interrupt program) when the count matches the target value. Use this for target-value comparison or range comparison control that is unaffected by the cycle time.




### Easy Position Control with Pulse Outputs (transistor output models only)

The CPM2C PLCs with transistor outputs have two outputs that can produce 10 Hz to 10 kHz pulses (single-phase outputs).

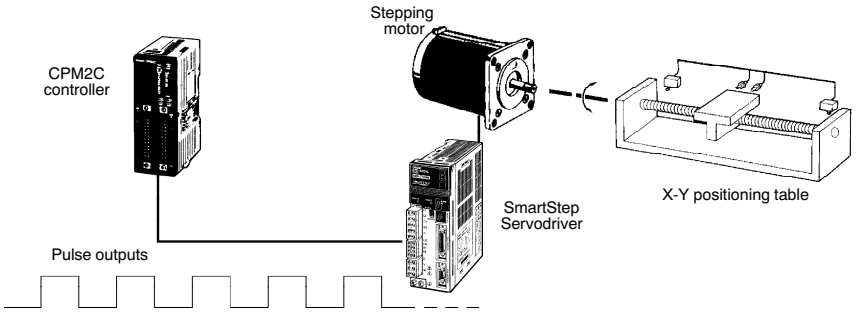
When used as single-phase pulse outputs, there can be two outputs with a frequency range of 10 Hz to 10 kHz with a fixed duty ratio or 0.1 to 999.9 Hz with a variable duty ratio (0 to 100% duty ratio).

When used as pulse plus direction or up/down pulse outputs, there can be just one output with a frequency range of 10 Hz to 10 kHz.

| Input | Response frequency | Input mode (count value) | Control method |
|---|---|---|---|
| 00000<br>00001<br>00002 | 5 kHz | Differential phase input mode (-8,388,608 to 8,388,607) | Target value comparison interrupts<br>Range comparison interrupts |
| | 20 kHz | Pulse + direction input mode (-8,388,608 to 8,388,607)<br>Up/down pulse input mode (-8,388,608 to 8,388,607)<br>Increment mode (0 to 16,777,215) | |

## ■ PULSE OUTPUTS (TRANSISTOR OUTPUT MODELS ONLY)

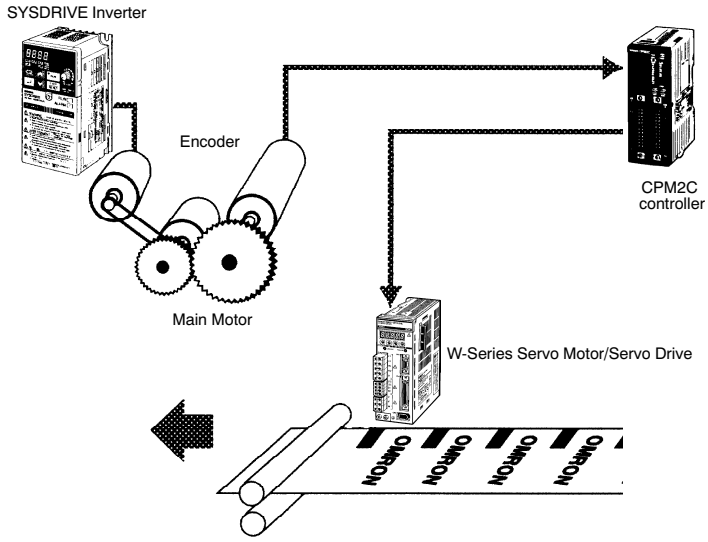
The CPM2C has two pulse outputs. You can configure these outputs as two single-phase outputs without acceleration and deceleration, two variable duty-ratio pulse outputs, or pulse outputs with trapezoidal acceleration/deceleration (one pulse + direction output and one up/down pulse output). The pulse output's PV coordinate system can also be specified in the PLC Setup as either relative or absolute.




| Item | | Single-phase pulse output without acceleration/deceleration | Variable duty-ratio pulse output | Single-phase pulse output with trapezoidal acceleration/deceleration | | | |
|---|---|---|---|---|---|---|---|
| | | | | Pulse + direction output | | Up/down pulse output | |
| Controlling instruction(s) | | PULS(65) and SPED(64) | PWM(--) | PULS(65) and ACC(--) | | | |
| Output number | 01000 | Pulse output 0 (See Note.) | Pulse output 0 (See Note.) | Pulse output 0 | Pulse output | Pulse output 0 | CW pulse output |
| | 01001 | Pulse output 1 (See Note.) | Pulse output 1 (See Note.) | | Direction output | | CCW pulse output |
| Output frequency range | | 10 Hz to 10 kHz | 0.1 Hz to 999.9 Hz | 10 Hz to 10 kHz | | 10 Hz to 10 kHz | |
| | Pitch | 10 Hz | 0.1 Hz | 10 Hz | | 10 Hz | |
| Duty ratio | | 50% | 0 to 100% | 50% | | 50% | |

Note: With single-phase pulse outputs, pulse outputs 0 and 1 can each be output independently.

**Application Example: Adjusting Film/Paper Web Speed in Packaging and Printing**




## ■ HIGH-SPEED INPUT CAPABILITIES FOR MACHINE CONTROL

### High-speed Interrupt Input Function

The 20- and 32-point CPUs have 4 inputs that can be used as interrupt inputs and the 10-point CPUs have 2 inputs that can be used as interrupt inputs. These inputs are shared with quick-response inputs and interrupt inputs in counter mode and have a minimum input signal width of 50 μs and response time of 0.3 ms. When an interrupt input goes ON, the main program is stopped and the interrupt program is executed.

### Quick-response Input Function

Regardless of the cycle time, the 20-point and 32-point CPUs have 4 inputs that can be used as quick-response inputs and the 10-point CPUs have 2 inputs that can be used as quick-response inputs. These inputs are shared with interrupt inputs and interrupt inputs in counter mode; they can reliably read input signals with a signal width as short as 50 μs.

### Stabilizing Input Filter Function

The input time constant for all inputs can be set to 1 ms, 2 ms, 3 ms, 5 ms, 10 ms, 20 ms, 40 ms, or 80 ms. The effects of chattering and external noise can be reduced by increasing the input time constant.

## ■ OTHER FUNCTIONS

### Analog Settings

There are two controls on the CPU that can be turned to change the analog settings (0 to 200 BCD) of timers and counters. These controls can be used to easily change or fine-tune machine settings such as a conveyor belt's pause time or feed rate.

### Calendar/Clock

The CPUs with a built-in clock (accuracy within 1 minute/month) can be read from the program to show the current year, month, day, day of the week, and time. The clock can be set from a programming device (such as a Programming Console) or the time can be adjusted by rounding up or down to the nearest minute.

### Long-term Timer

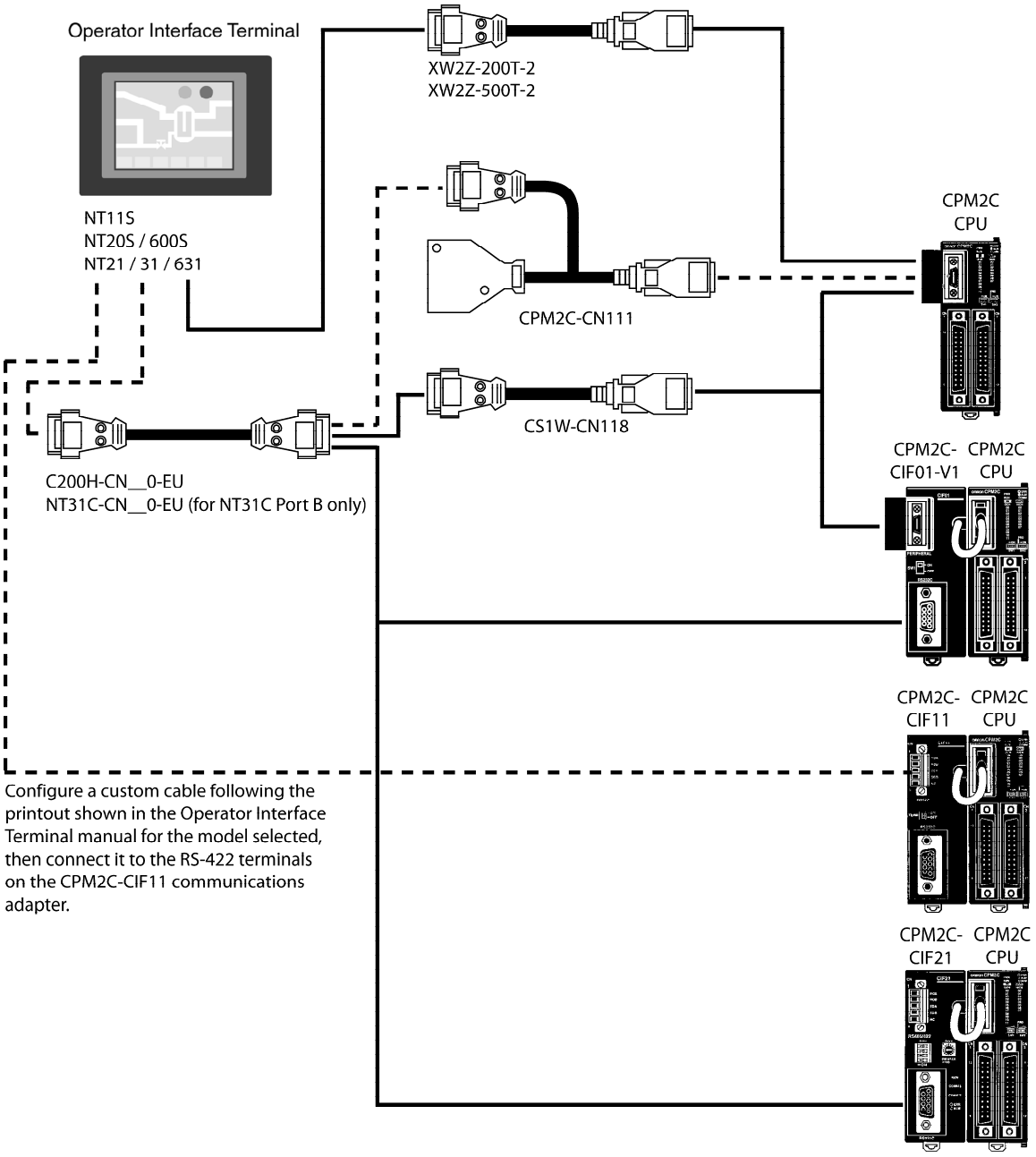
The long-term timer provides an easy way to control equipment scheduling. Use two instructions to set this up. The long-term timer instruction (TIML) lets you set values up to 99,990 seconds (27 hours, 46 minutes, 30 seconds) and the Seconds-to-Hours conversion instruction (HMS) lets you schedule this with other clock functions.

# Communications

## ■ CONNECTIONS TO OPERATOR INTERFACE TERMINALS

The CPM2C can be connected directly to an OMRON Operator Interface Terminal in NT Link Mode (1:1) for high speed transmission of data. No separate drivers are required. Use the communications port for the NT Link connection.

There are two ways to configure NT Link depending on the communications port's setting for single or dual transmission (host link style).



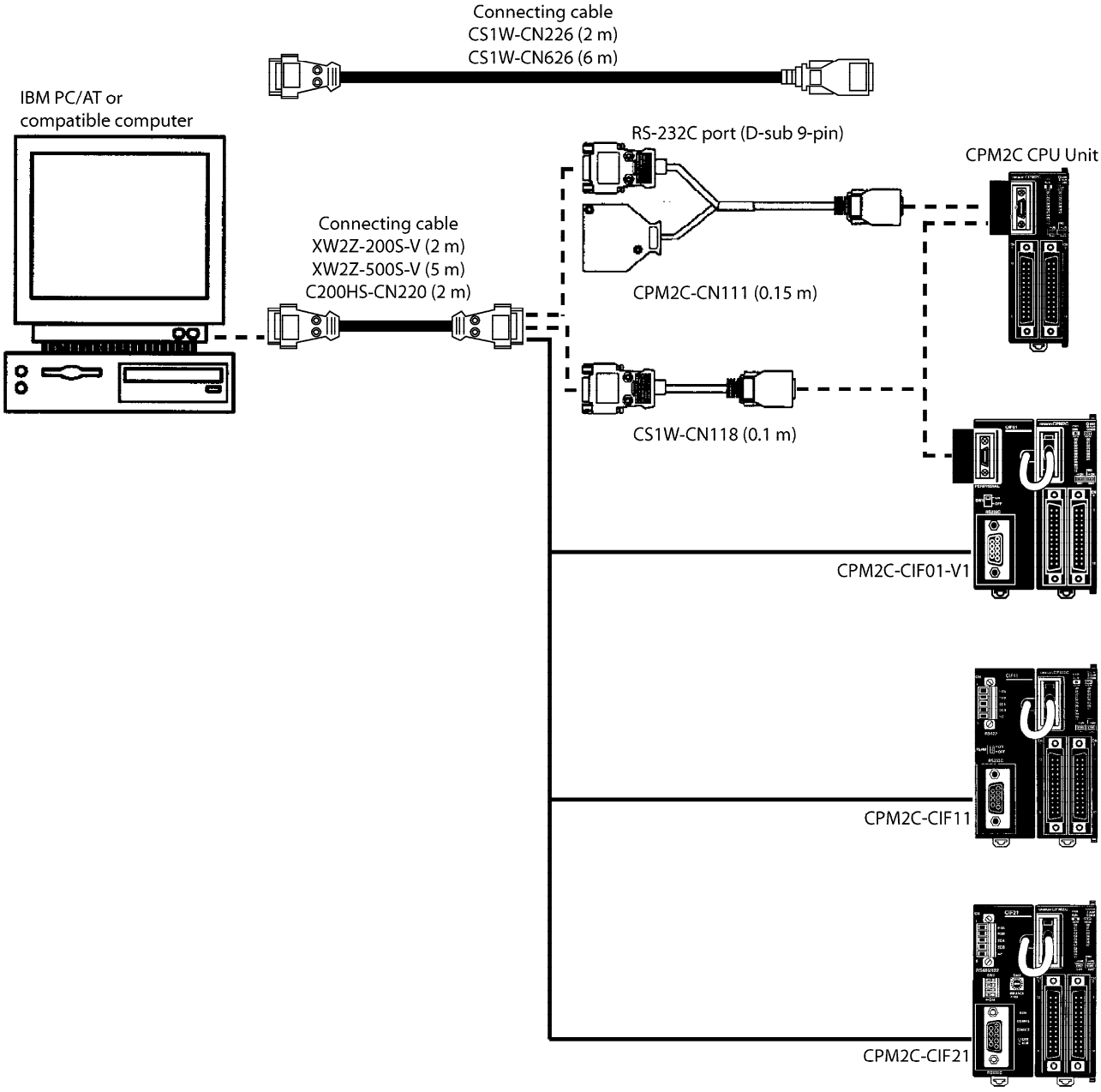

Note: The Operator Interface Terminal cannot be connected using a peripheral port connection when communicating via an NT Link.

## ■ HOST LINK

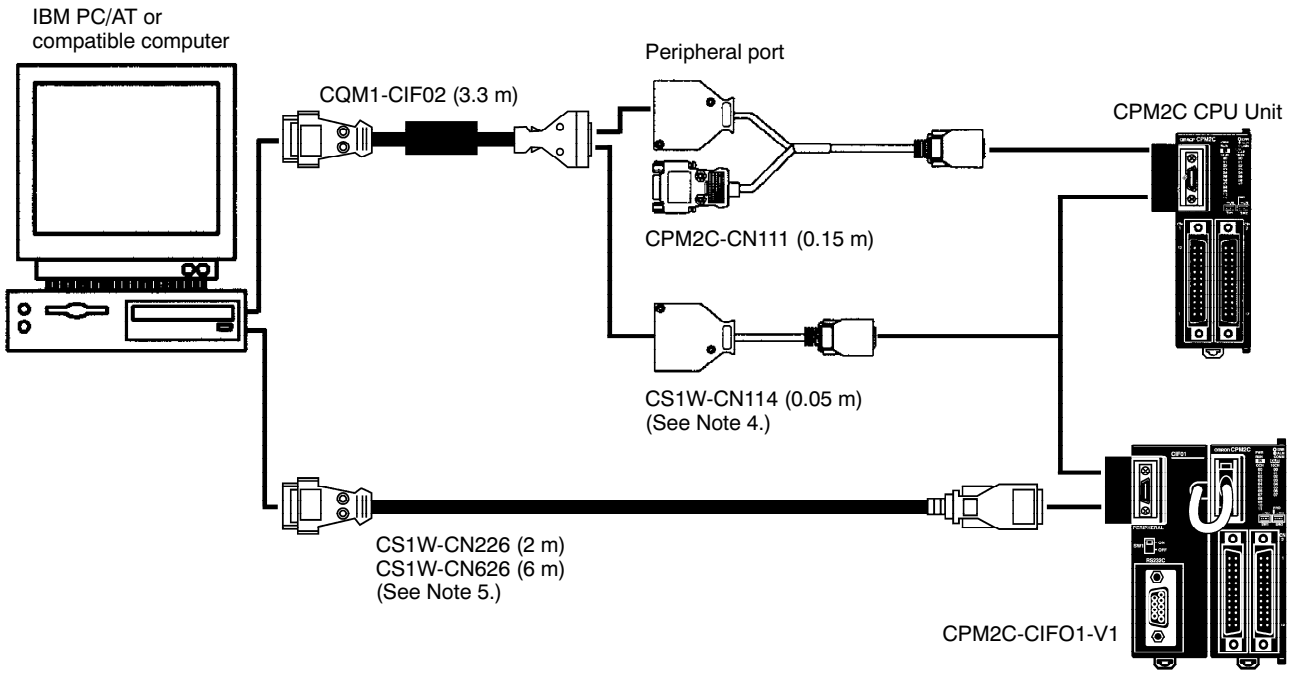
### 1:1 Connection

Use one of the connecting cables shown in the following diagram to connect a personal computer with Support Software to the CPM2C's communications port for 1:1 Host Link communications or no-protocol (serial) communications.

### RS-232C Port Connection



**Peripheral Port Connection**

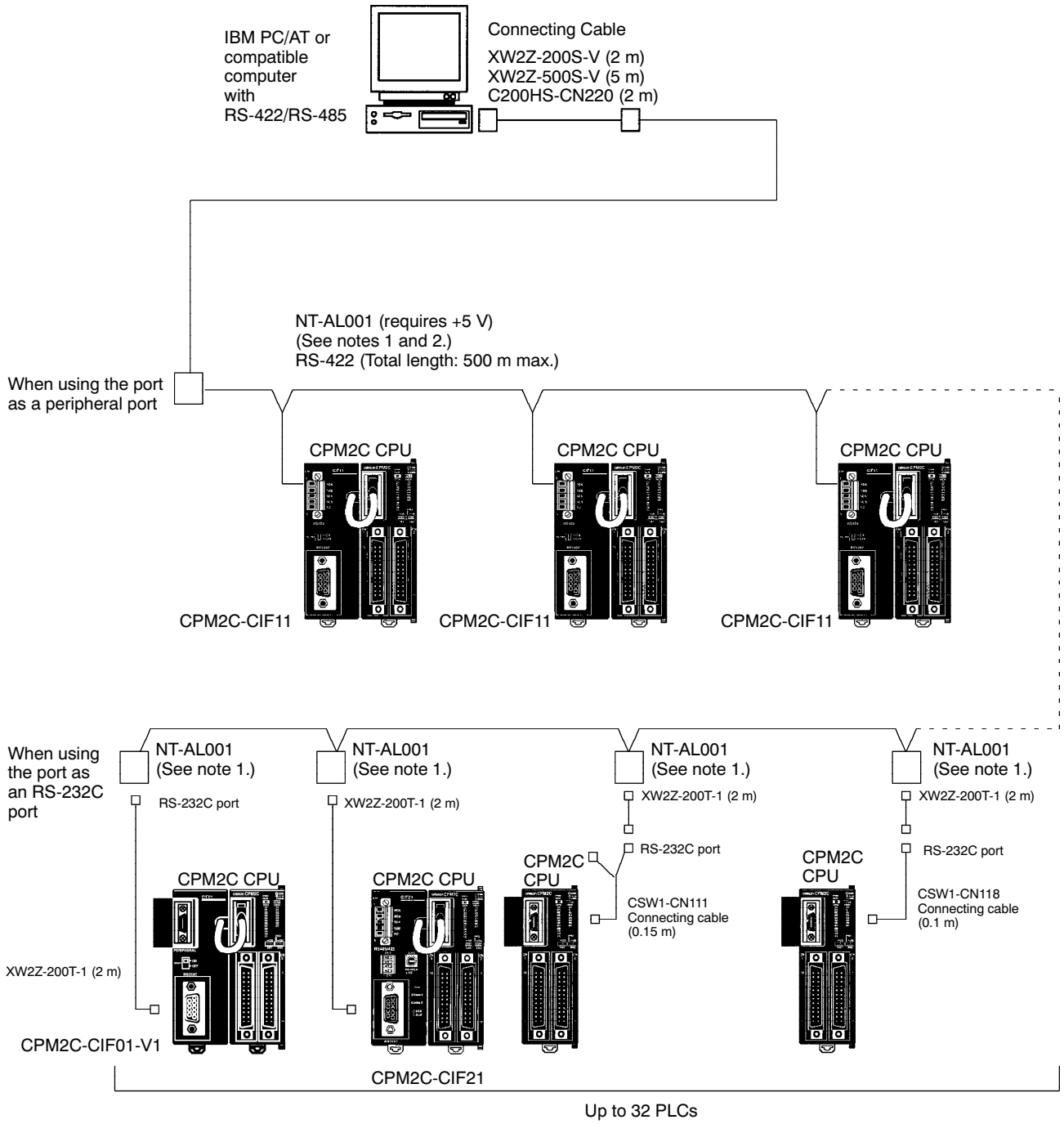



Note: 1. The CS1W-CN226/626 Connecting Cables cannot be used to connect to the CPM2C-CIF01. They can be used to connect to the CPM2C-CIF01-V1 only. Turn OFF the cable switch (SW1) on the front panel when using these cables. (Turn OFF SW1 when using any other cable.)

2. The CS1W-CN225/625 and CS1W-CN227/627 Connecting Cables cannot be used.
3. The CQM1-CIF11 Connecting Cable cannot be used. If one is connected, the CPM2C will not recognize it and, for this reason, the PC will enter RUN mode at startup if the PC Setup (DM 6600) is at the default settings (i.e., the start up mode depends on whether or not a Programming Device is connected).
4. When connecting the CS1W-CN118 to the mini-peripheral port of the CPM2C-CIF01-V1 Peripheral/RS-232C Adapter Unit, turn OFF the cable switch (SW1).
5. When connecting the CS1W-CN226/626 to the mini-peripheral port of the CPM2C-CIF01-V1 Peripheral/RS-232C Adapter Unit, turn ON the cable switch (SW1).

### 1:N Connection

Up to 32 OMRON PLCs, including CPM2C PLCs, can be connected to a host computer.

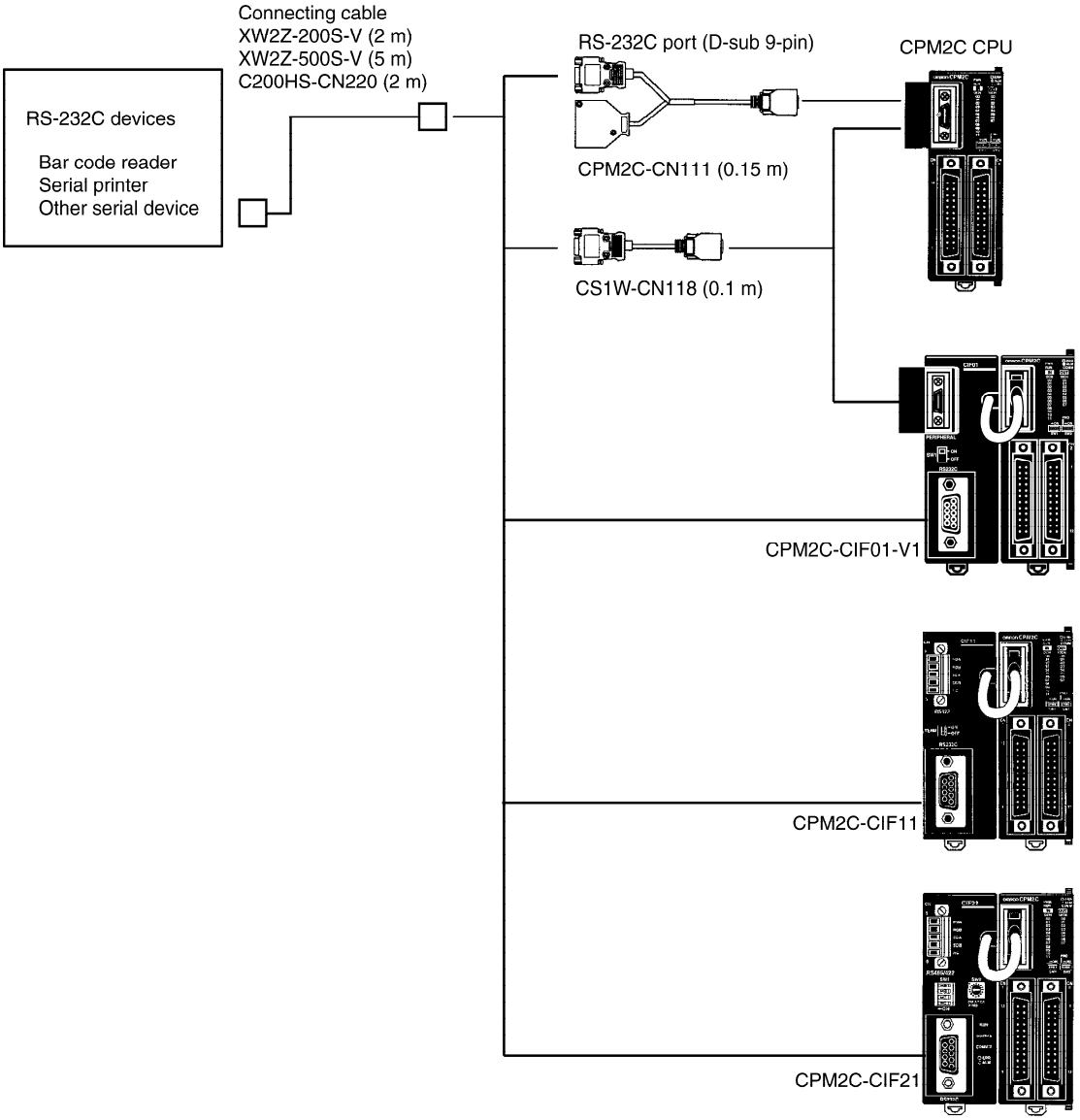



Note: 1. The NT-AL001 must be supplied externally with 5 VDC. When an NT-AL001 is connected to a CPM2C PC, pin 6 of the CPM2C's RS-232C port supplies +5 VDC and an external power supply is not necessary.

2. Be sure that the power supply requirements of the CPU, Expansion Modules, and Expansion I/O Modules do not exceed the available capacity. Only three Expansion I/O Modules and Expansion Modules can be connected when the NT-AL001 Adapter is connected to the RS-232C port.

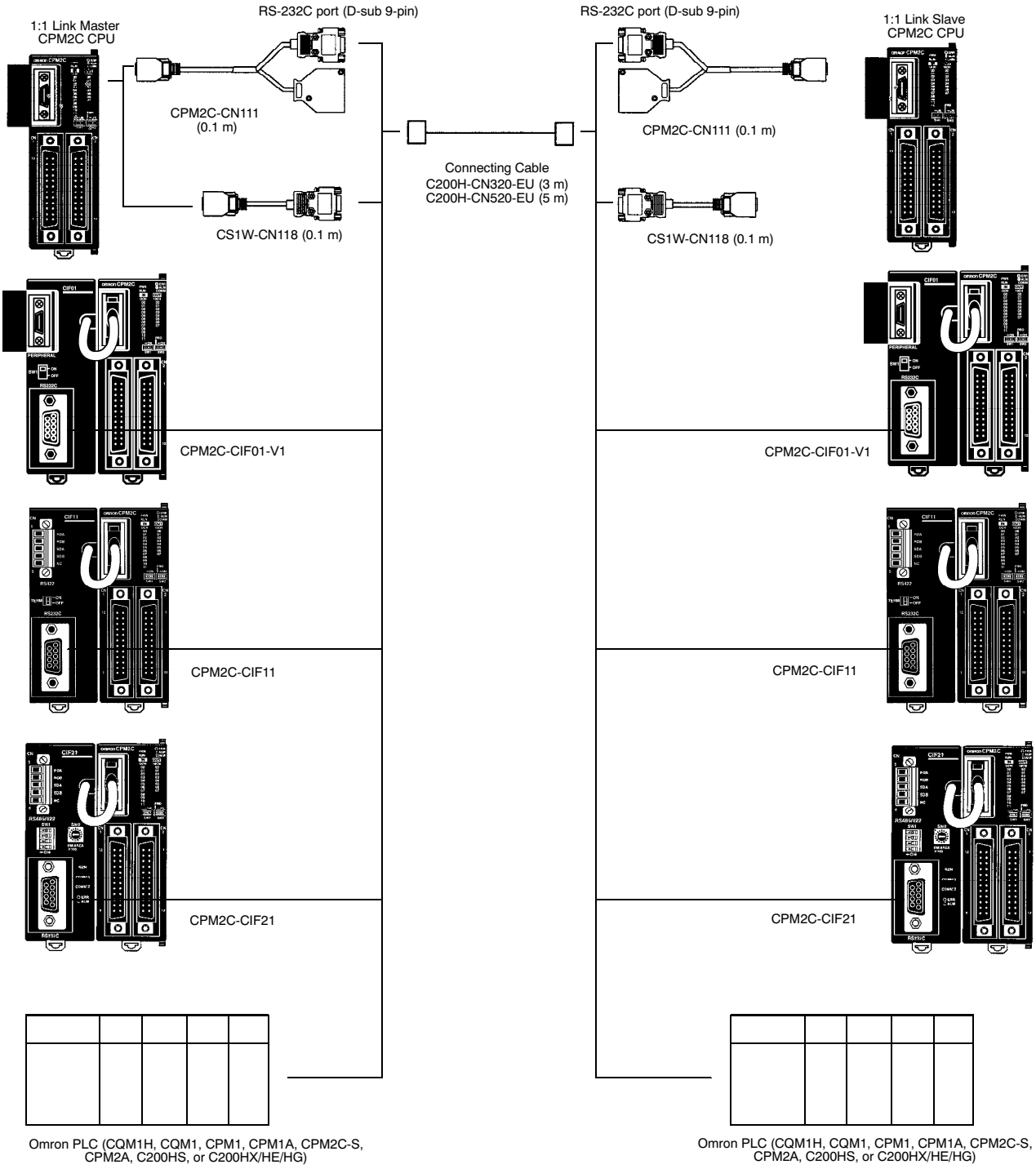
## ■ NO-PROTOCOL COMMUNICATIONS

The transmit TXD(48) and receive RXD(47) instructions can be used in no-protocol mode to exchange data with standard serial devices. For example, data can be received from a bar code reader or transmitted to a serial printer. The serial devices can be connected to the communications port as an RS-232C port or mini-peripheral port, as shown in the following diagrams. Some adapter cables may be required.



## ■ 1:1 LINK CONNECTIONS FOR DATA EXCHANGE

A CPM2C can be linked to another CPM2C, a CQM1, CPM1, CPM1A, CPM2A, C200HS, or C200HX/HE/HG PLC. The PLC must be connected using the communications port as an RS-232C port (not as a peripheral port).

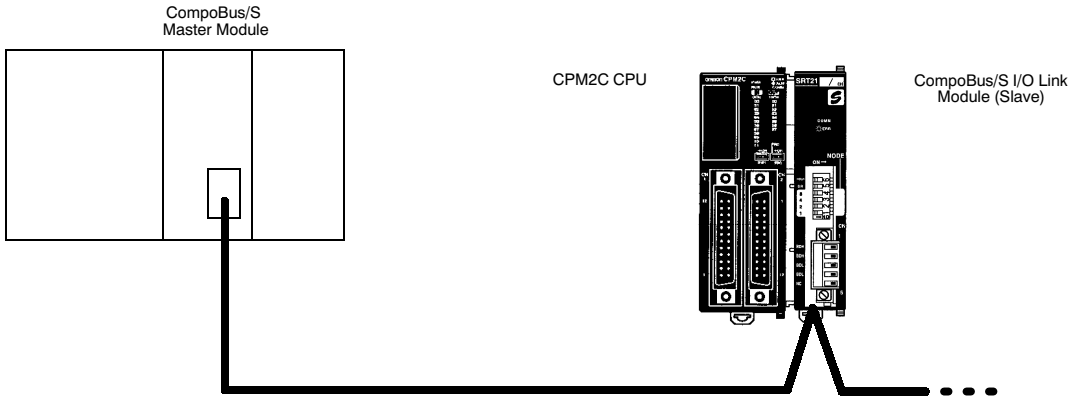



Note: Even though the peripheral port on the CPM2C-CIF01-V1 can output RS-232C, this port cannot be used for one-to-one link communications.

## ■ COMPOBUS/S I/O LINK CONNECTIONS

A CompoBus/S I/O Link can be used to create an I/O link (remote I/O) of 8 input points and 8 output points with a CompoBus/S Master Module. The connection is made through a CompoBus/S I/O Link Module.

From the standpoint of the CPM2C CPU, the area allocated to the CompoBus/S I/O Link Module can be treated just like the area allocated to an Expansion I/O Module. The difference is that the bits are not actual I/O points, but I/O bits in the Master Module.



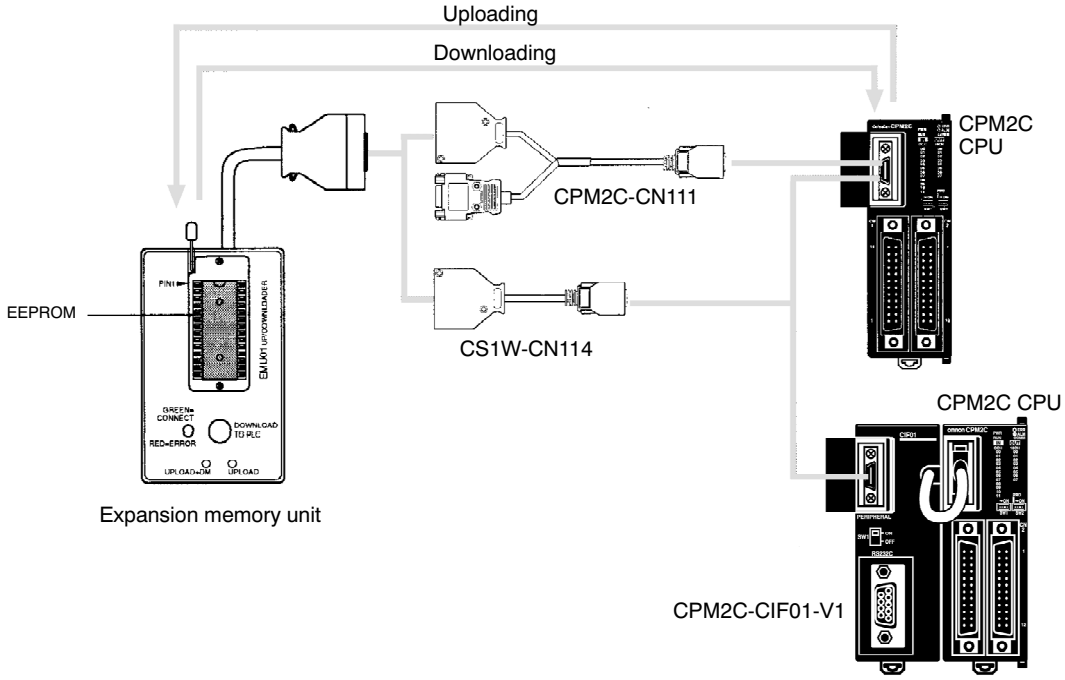

### Cables

Use SCA1-4F10 flat cable or twisted pair cable to connect the nodes in the CompoBus/S I/O Link. (The flat cables and twisted pair cables cannot be combined in the same system.)

| Description | Model | Specifications |
|---|---|---|
| Flat cable | SCA1-4F10 | 4-core flat cable, 0.75 $mm^2$; 100 m length |
| Twisted pair cable | Belden #9409 cable | 2-core x 0.75 $mm^2$; available commercially |

## ■ PROGRAM TRANSFER UNIT

Use Omron's EEPROM program transfer unit to update programs in machines or program multiple controllers with the same program. The CPM1-EMU01-V1 Expansion Memory Unit connects to the peripheral port of micro and small PLCs.




Note: The "PLC" in the "DOWNLOAD TO PLC" Button indicates PCs (Programmable Controllers).

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