

# CPM2C Specifications

## ■ CPM2C General Specifications

Item	CPU Units with 10 I/O points		CPU Units with 20 I/O points (Transistor outputs)
	Relay outputs	Transistor outputs	
Supply voltage	24 VDC		
Operating voltage range	20.4 to 26.4 VDC		
Power consumption	4 W (CPU Unit only) Expansion VP 32		
Inrush current	25 A max.		
Insulation resistance	20 MΩ min. (at 500 VDC) between insulated circuits		
Dielectric strength	1,500 VAC for 1 min (between insulated circuits)		
Noise immunity	1,500 Vp-p, pulse width: 0.1 to 1 μs, rise time: 1-ns pulse (via noise simulator)		
Vibration resistance	10 to 57 Hz, 0.075-mm amplitude, 57 to 150 Hz, acceleration: 9.8 m/s <sup>2</sup> 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 <sup>2</sup> three times each in X, Y, and Z directions		
Ambient temperature	Operating: 0° to 55°C Storage: -20° to 75°C (except for the battery)		
Humidity	10% to 90% (with no condensation)		
Atmosphere	Must be free from corrosive gas		
I/O interface	Terminal block	Connector	
Power interrupt time	2 ms min.		
Weight	200 g max.	200 g max.	300 g max.
	Expansion I/O Unit with 10 I/O points (relay outputs)		200 g
	Expansion I/O Units with 24 I/O points (transistor outputs)		300 g
	Expansion I/O Unit with 8 input points		150 g
	Expansion I/O Unit with 16 input points		150 g
	Expansion I/O Units with 8 output points (transistor outputs)		150 g
	Expansion I/O Units with 16 output points (transistor outputs)		150 g
	Expansion I/O Unit with 8 output points (relay outputs)		200 g
	Peripheral/RS232C Adapter Unit		150 g
	RS422/RS232C Adapter Unit		150 g
AC Power Supply Unit		250 g	

# CPM2C Specifications

## ■ CPM2C Characteristics

Item		CPU Unit Specification		
		10 I/O points (Relay outputs)	10 I/O points (Transistor outputs)	20 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 Special instructions: 105 instructions, 185 variations		
Execution time		Basic instructions: 0.64 $\mu$ s (LD instruction) Special instructions: 7.8 $\mu$ s (MOV instruction)		
Program capacity		4,096 words		
I/O capacity	CPU Unit only	10 points		20 points
	With Expansion I/O Units	130 points max.		140 points max.
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 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)  1-ms timers: TMHH(—) 10-ms timers: TIMH(15) 100-ms timers: TIM 1-s/10-s timers: TIML(—) Decrementing counters: CNT Reversible counters: CNTR(12)		
Data memory		Read/Write: 2,048 words (DM 0000 to DM 2047)* Read-only: 456 words (DM 6144 to DM 6599) PC Setup: 56 words (DM 6600 to DM 6655)  *The Error Log is contained in DM 2000 to DM 2021.		
Basic interrupts	Interrupt processing	2 interrupts	2 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) Counter interrupt: 1 (set value comparison or set-value range comparison)		
	Interrupt Inputs (Counter mode)	2 inputs	2 inputs	4 inputs
		Shared by the external interrupt inputs and the quick-response inputs. Count-up interrupts: 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. One point with trapezoid acceleration/deceleration, 10 Hz to 10 kHz, and direction control. Two points with variable duty-ratio outputs (using PWM(—)).  (Pulse outputs can be used with transistor outputs only, they cannot be used with relay outputs.)		

# CPM2C Specifications

Item	CPU Unit Specification		
	10 I/O points (Relay outputs)	10 I/O points (Transistor outputs)	20 I/O points (Transistor outputs)
Synchronized pulse control	One point: 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. (This output is possible with transistor outputs only, it cannot be used with relay outputs.)		
Quick-response inputs	2 inputs	2 inputs	4 inputs
	Shared by the external interrupt inputs and the interrupt inputs (counter mode). Min. input pulse width: 50 $\mu$ s max.		
Input time constant (ON response time = OFF response time)	Can be set for all input points. (1 ms, 2 ms, 3 ms, 5 ms, 10 ms, 20 ms, 40 ms, or 80 ms)		
Clock function	Shows the year, month, day of the week, day, hour, minute, and second. (Battery backup) The following CPU Units have a built-in clock: CPM2C-10C1DR-D, CPM2C-10C1DTC-D, CPM2C-10C1DT1C-D, CPM2C-20C1DTC-D, and CPM2C-20C1DT1C-D.		
Communications functions	Peripheral port: Supports Host Link, peripheral bus, no-protocol, or Programming Console connections. RS-232C port: Supports Host Link, no-protocol, 1:1 Slave Unit Link, 1:1 Master Unit Link, or 1:1 NT Link connections. A CPM2C-CN111, CS1W-CN114, or CS1W-CN118 Connecting Cable is required to connect to the CPM2C's communications port.		
Memory protection	HR area, AR area, program contents, read/write DM area contents, and counter values are maintained during power interruptions.		
Memory backup	Flash memory: Program, read-only DM area, and PC Setup Memory backup: The read/write DM area, HR area, AR area, and counter values are backed up. When a battery is installed, its lifetime is approximately 2 years at 25°C. When a battery is not installed, the internal capacitor will backup memory for 10 days at 25°C. (See note.)		
Self-diagnostic functions	CPU Unit failure (watchdog timer), I/O bus error, battery error, and memory failure		
Program checks	No END instruction, programming errors (checked when operation is started)		

**Note:** A CPM2C-BAT01 Battery can be installed in CPU Units that are not equipped with a clock to backup the contents of the read/write DM area, HR area, AR area, and counter values. Memory can be backed up for up to 2 years.

# CPM2C Specifications

## ■ CPM2C I/O Specifications

### 1. CPU Unit Input Specifications

Item	Inputs	Specification
Input voltage	All	24 VDC $+10\%/_{-15\%}$
Input impedance	IN00000 to IN00001	2.7 k $\Omega$
	IN00002 to IN00006	3.9 k $\Omega$
	IN00007 and up	4.7 k $\Omega$
Input current	IN00000 to IN00001	8 mA typical
	IN00002 to IN00006	6 mA typical
	IN00007 and up	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	
	IN00002 to IN00006	
	IN00007 to IN00011	

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

### High-speed Counter Inputs

The following CPU Unit 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.)			

### Interrupt Inputs

CPM2C PCs 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  $\mu$ s.

In CPU Units with 10 I/O points, inputs IN00003 and IN00004 can be used as interrupt inputs. In CPU Units with 20 I/O points, inputs IN00003 through IN00006 can be used as interrupt inputs.

# CPM2C Specifications

## 2. Expansion I/O Unit Input Specifications

Item	Specification
Input voltage	24 VDC $+10\%/-15\%$
Input impedance	4.7 k $\Omega$
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 PC Setup.

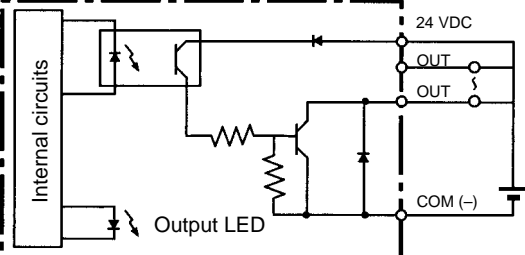
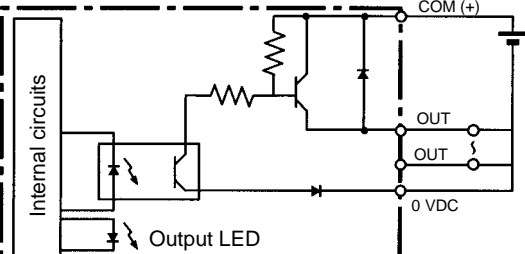
## ■ CPM2C Output Specifications (CPU Units and Expansion I/O Units)

### 1. Relay Output

Item	Specification
Max. switching capacity	2 A, 250 VAC ( $\cos\phi = 1$ ) 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) 100,000 operations (240-VAC inductive load, $\cos\phi = 0.4$ ) Mechanical: 20,000,000 operations
ON delay	15 ms max.
OFF delay	15 ms max.
Circuit configuration	

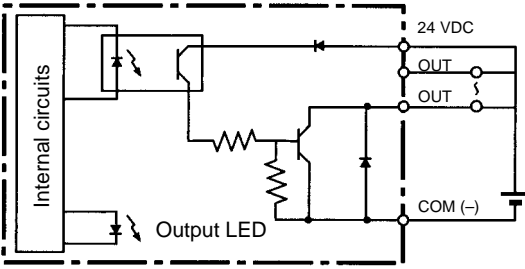
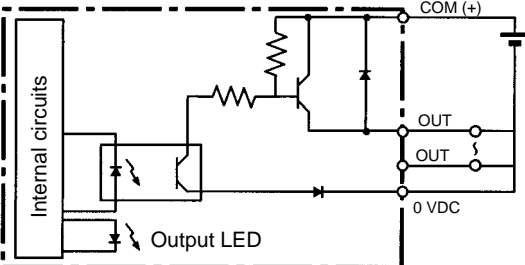
# CPM2C Specifications

## 2. Transistor Outputs (Sinking or Sourcing) for CPU Units and CPM2C-24EDT(1)C/8ET(1)C Expansion I/O Units

Item	Specification
Max. switching capacity	40 mA/4.5 VDC to 300 mA/20.4 VDC, 300 mA (20.4 VDC to 26.4 VDC)
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 $\mu$ s max. OUT01002 and up: 0.1 ms max.
OFF delay	OUT01000 and OUT01001: 40 $\mu$ s max. for 4.5 to 26.5 V, 10 to 300 mA 0.1 ms max. for 4.5 to 30 V, 0.5 to 10 mA OUT01002 and up: 1 ms max.
Fuse	1 fuse for each 2 outputs (The fuse cannot be replaced by the user.)
Circuit configuration	<p><b>Sinking Outputs</b></p>  <p><b>Sourcing Outputs</b></p> 

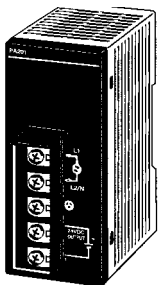
# CPM2C Specifications

## 3. Transistor Output (Sinking or Sourcing) for CPM2C-16ET(1)C Expansion I/O Units

Item	Specification
Max. switching capacity	OUT01□00 to 01□07: 40 mA/4.5 VDC to 300 mA/20.4 VDC, 300 mA (20.4 VDC to 26.4 VDC) OUT01□00 to 01□15: 40 mA/4.5 VDC to 100 mA/20.4 VDC, 100 mA (20.4 VDC to 26.4 VDC)
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	0.1 ms max.
OFF delay	1 ms max.
Fuse	1 fuse for each 2 outputs (The fuse cannot be replaced by the user.)
Circuit configuration	<p><b>Sinking Outputs</b></p>  <p><b>Sourcing Outputs</b></p> 

### ■ CPM2C-PA201 AC Power Supply Unit

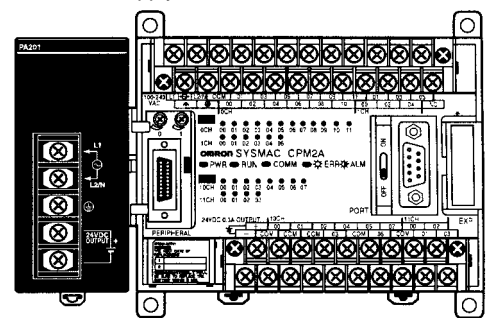
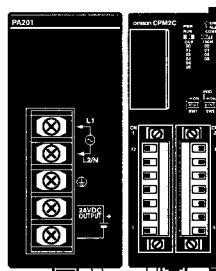
The CPM2C-PA201 is a slim and compact AC Power Supply Unit of the same shape as the CPM2C's CPU Unit. It can be connected simply using the connecting cable (23 cm) provided. It can also be used for CPM1A and CPM2A CPU Units and as display power supply (wired by the user).



AC Power Supply Unit

AC Power Supply Unit

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



Attached connecting cable

# CPM2C Specifications

## ■ 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
	Allowable voltage range		85 to 264 VAC
	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	
Ambient storage temperature		–20° to 70°C	
Ambient operating humidity		10% to 90% (no condensation)	
Dielectric strength		2,000 V for 1 min between all inputs and GR Leakage current: 10 mA 3,000 V for 1 min between all inputs and all outputs Leakage current: 10 mA 1,000 V for 1 min between all outputs and GR 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 <sup>2</sup> in X, Y, and Z directions for 80 minutes according (Time coefficient: 8 minutes × coefficient factor 10 = total time 80 min.)	
Shock resistance		147 m/s <sup>2</sup> 3 times each in X, Y, and Z directions	
Noise terminal voltage		FCC class A	
Weight		250 g max.	



# CPM2C Specifications

## Power Consumption

Use the following power consumption tables to calculate the total power capacity required when using a CPM2C, CPM2A, or CPM1A PC. The rated output for the CPM2C-PA201 AC Power Supply Unit is 15 W. Any surplus power not required for the PC directly can be used as service power supply for sensors and other devices.

### CPM2C

CPU Unit	Power consumption (W)
CPM2C-10C(1)DR-D	4
CPM2C-10C(1)DT(1)C-D	4
CPM2C-20C(1)DT(1)C-D	4

When Expansion I/O Units are used in addition to the CPU Unit, add the power consumptions shown in the following table as appropriate to find the total power consumption.

Expansion I/O Unit	Power consumption (W)
CPM2C-10EDR	1
CPM2C-24EDT(1)C	1
CPM2C-8EDC, 16EDC	1
CPM2C-8ER	2
CPM2C-8ET(1)C, 16ET(1)C	1

### CPM2A and CPM1A CPU Units with DC Power Supplies

CPM2A CPU Unit	Power consumption (W)
CPM2A-20CDR-D	4
CPM2A-30CDR-D	4.5
CPM2A-40CDR-D	6
CPM2A-60CDR-D	7.5
CPM2A-20CDT/T1-D	3.5
CPM2A-30CDT/T1-D	4
CPM2A-40CDT/T1-D	4.5
CPM2A-60CDT/T1-D	5

CPM1A CPU Unit	Power consumption (W)	Connecting Expansion I/O Units or Expansion Units
CPM1A-10CDR-D	3.5	Not supported
CPM1A-20CDR-D	4.5	Not supported
CPM1A-30CDR-D	5.5	Supported
CPM1A-40CDR-D	6.5	Supported
CPM1A-10CDT/T1-D	3	Not supported
CPM1A-20CDT/T1-D	3.5	Not supported
CPM1A-30CDT/T1-D	4	Supported
CPM1A-40CDT/T1-D	4.5	Supported

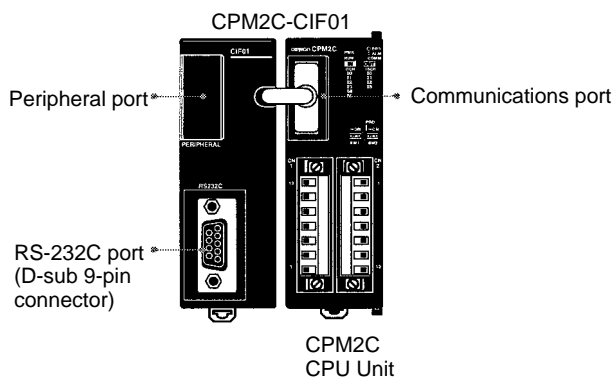
When Expansion I/O Units or Expansion Units are used in addition to the CPM1A CPU Unit, add the power consumptions shown in the following table as appropriate to find the total power consumption.

CPM1A Expansion I/O Unit or Expansion Unit	Power consumption (W)
CPM1A-20EDR1	2.5
CPM1A-20EDT/T1	1.5
CPM1A-8ED	1
CPM1A-8ER	2
CPM1A-8ET/T1	1
CPM1A-SRT21	1
CPM1A-MAD01	3.5
CPM1A-TS001/TS101	3
CPM1A-TS002/TS102	3

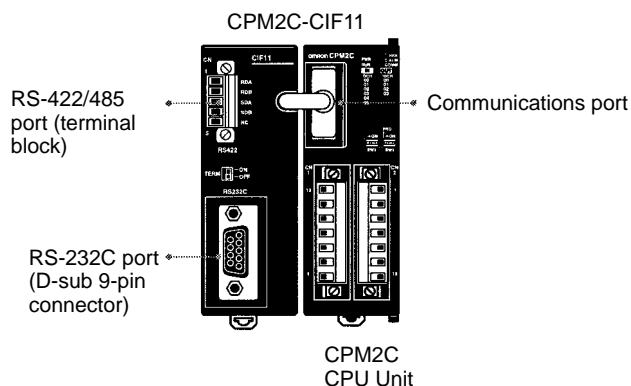
**Note:** When calculating the total power consumption, it is also necessary to include the power consumption of Programming Consoles, RS-232C Adapter Units, and other devices.

# CPM2C Specifications

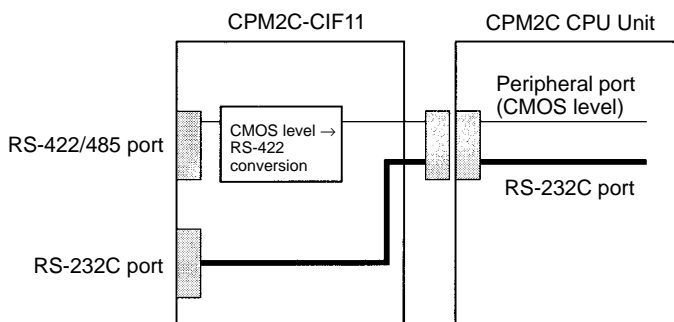
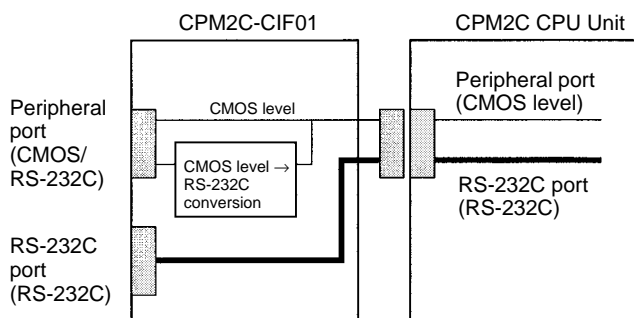
## CPM2C-CIF01 Peripheral/RS-232C Adapter Unit



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



## Internal Configuration



**Note:** The signal levels for the peripheral port will change automatically with the connecting cable used. For example, if a connecting cable from a Programming Console is connected, the signal level will switch to CMOS level, whereas if the CS1W-CN□26 Connecting Cable for a personal computer is connected, the signal level will switch to RS-232C.

**Note:** A Programming Console cannot be connected to the RS-422/485 port.

## CPM2C-CIF01/CIF11 Specifications

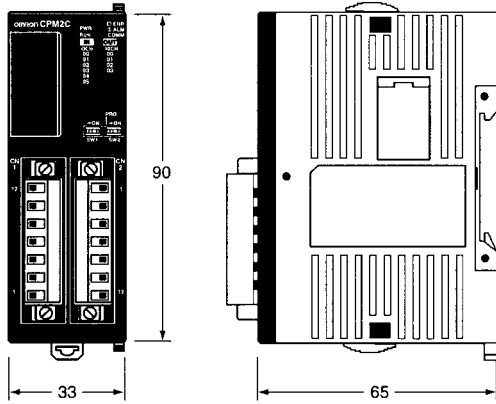
Item		Specification	
		CPM2C-CIF01	CPM2C-CIF11
Upper port	Signal conversion	Outputs signals from the CPU Unit's CMOS interface without conversion, or converts CMOS level (CPU Unit side) to RS-232C (connected device side).	Converts CMOS level (CPU Unit side) to RS-422 (connected device side). RS-422 (externally 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 Unit's CMOS interface without conversion.	Outputs signals from the CPU Unit'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 Unit.	
Current consumption		0.3 A max. at 5 V	
Weight		150 g max.	

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

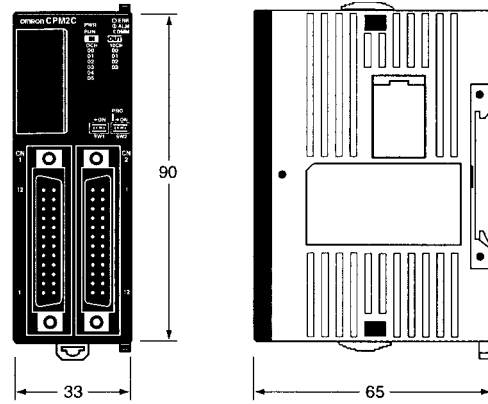
# CPM2C Dimensions

## CPU Units

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

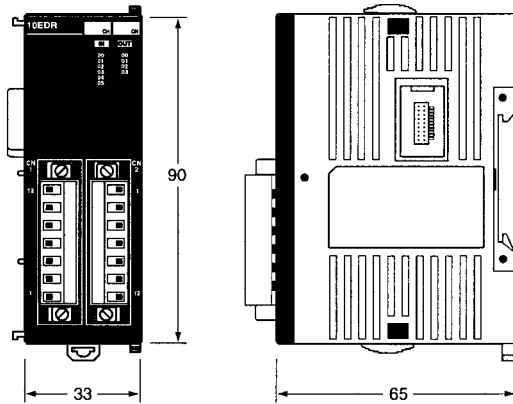


**CPU Units with Transistor Outputs**  
(CPM2C-10/20CDTC-D, CPM2C-10/20C1DTC-D,  
CPM2C-10/20CDT1C-D, CPM2C-10/20C1DT1C-D)

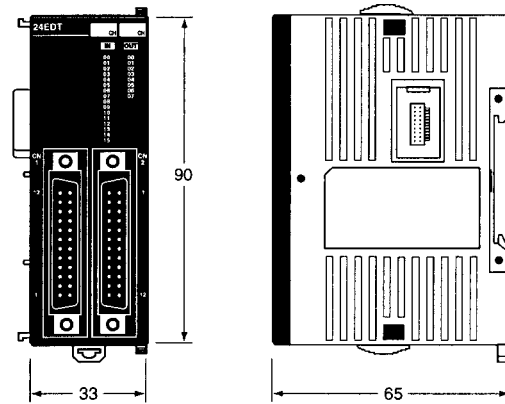


## Expansion I/O Units

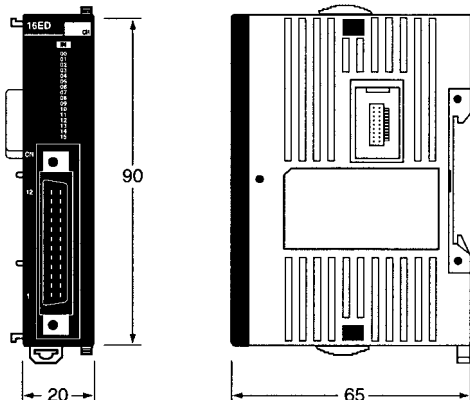
**Units with Relay Outputs**  
(CPM2C-8ER, CPM2C-10EDR)



**Units with Transistor Outputs**  
(CPM2C-24EDTC, CPM2C-24EDT1C)



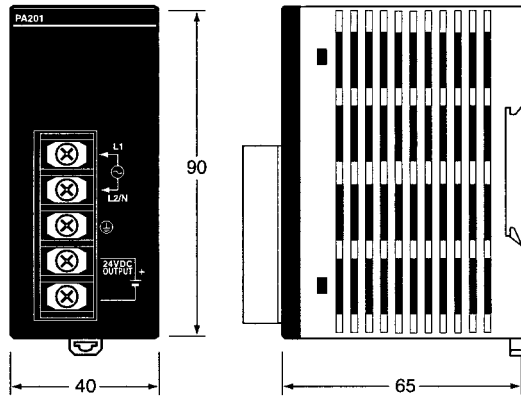
**Units with Transistor Outputs Only and Units with Inputs Only**  
(CPM2C-8EDC, CPM2C-8ETC, CPM2C-8ET1C,  
CPM2C-16EDC, CPM2C-16ETC, CPM2C-16ET1C)



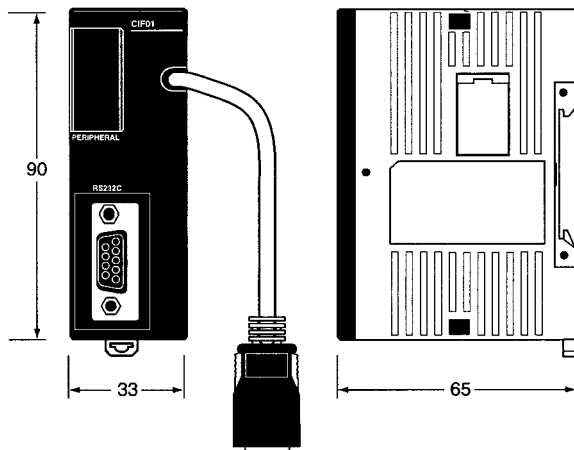
**Note:** All dimensions are in mm.

# Dimensions

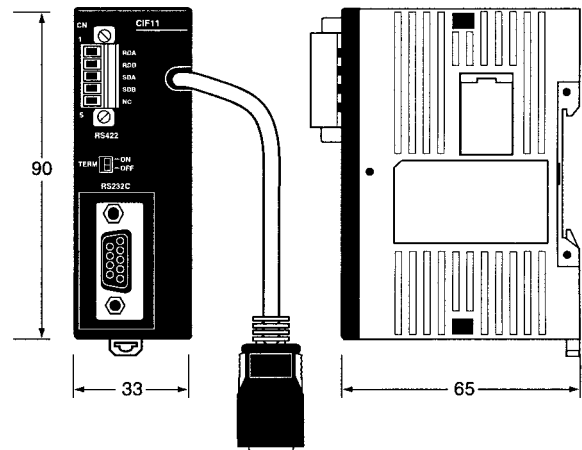
**AC Power Supply Unit  
(CPM2C-PA201)**



**Peripheral/RS-232C Adapter Unit  
(CPM2C-CIF01)**

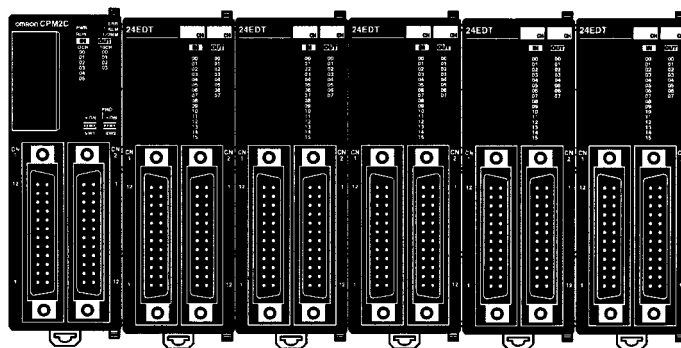


**RS-422/RS-232C Adapter Unit  
(CPM2C-CIF11)**



## **Example CPM2C System Configuration**

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



CPU Unit    Expansion Unit or Expansion I/O Unit    Expansion Unit or Expansion I/O Unit    Expansion Unit or Expansion I/O Unit    Expansion Unit or Expansion I/O Unit    Expansion Unit or Expansion I/O Unit

# Functions

*The illustrations in this section show CPM2A PCs, but the same functions are available in CPM2C PCs unless otherwise stated.*

## ■ Interrupts

The CPM2A and CPM2C provide the following kinds of interrupt processing.

### Interrupt Inputs

Interrupt programs are executed when inputs to the CPU Unit's built-in input points (00003 to 00006) are turned from OFF to ON. Interrupt subroutine numbers 000 to 003 are allocated to input points 00003 to 00006.

### Interval Timer Interrupts

Interval timer interrupt programs are executed with a precision of 0.1 ms. Interrupt subroutine numbers 000 to 049 are allocated by instructions.

### Count-up Interrupts

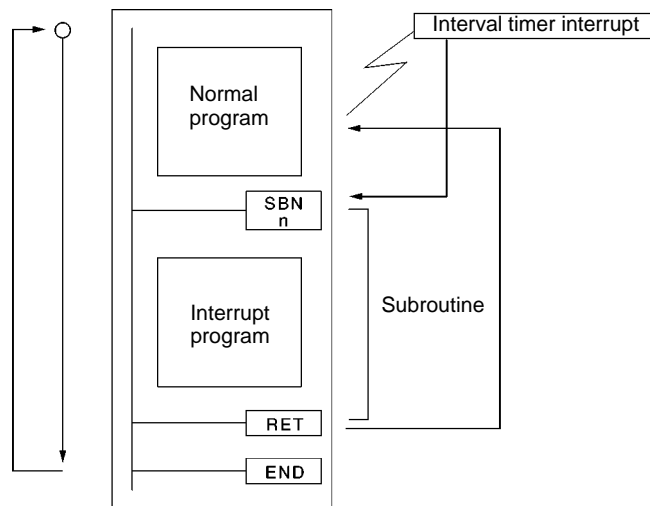
Input signals to the CPU Unit's built-in input points (00003 to 00006) are counted at high speed (up to 2 kHz), and the normal program is stopped and an interrupt program is executed when the count reaches the SV. Interrupt subroutine numbers 000 to 003 are allocated to input points 00003 to 00006.

### Count-check Interrupts Using the High-speed Counter

Pulse inputs to the CPU Unit's built-in input points (00000 to 00002) are counted at high speed (up to 20 kHz or 5 kHz), and an interrupt program is executed when the present value matches the target value or falls within a given range. Interrupt subroutine numbers 000 to 049 are allocated by instructions.

## ■ Interval Timer Interrupts

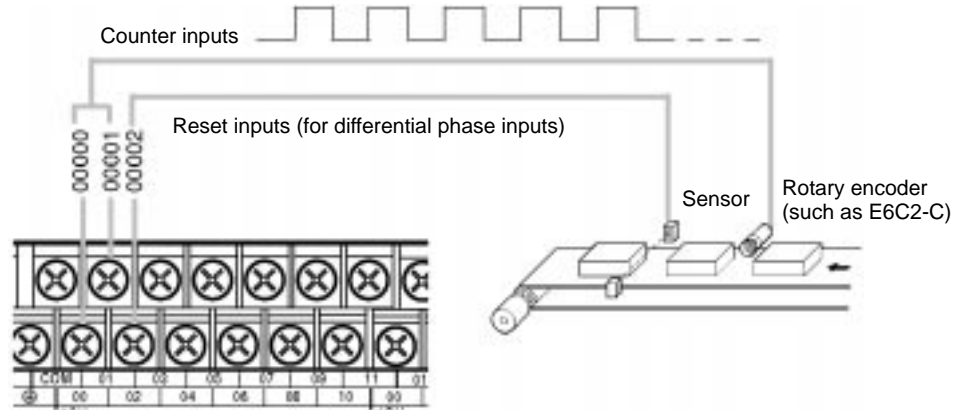
The CPM2A/CPM2C has one interval timer (precision: 0.1 ms) that can be set from 0.5 ms to 319,968 ms. There are two interrupt modes: the single-interrupt mode, in which a single interrupt is executed when the time is up, and the scheduled-interrupt mode, in which interrupts are executed at regular intervals.



Item	Single-interrupt mode	Scheduled-interrupt mode
Operation	Interrupt is executed once when time has elapsed.	Interrupts are executed at regular intervals.
Set time	0.5 to 319,968 ms (Unit: 0.1 ms)	
Interrupt response time	0.3 ms (from when time has elapsed until execution of interrupt program)	

## ■ High-speed Counters

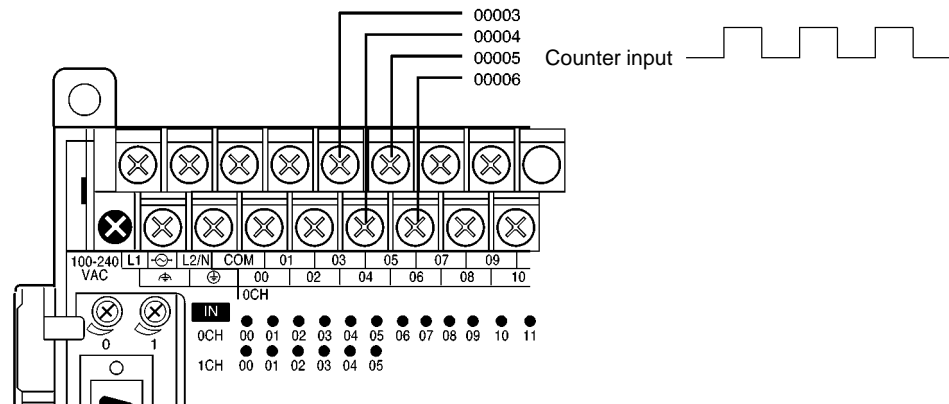
The CPM2A/CPM2C CPU Unit has a built-in high-speed counter that can count input pulses at up to 20 kHz. When combined with the interrupt function, the high-speed counter can be used for target-value comparison or range comparison control that is unaffected by the cycle time.



Input	Response frequency	Input mode (count value)	Counter PV Storage	Control method
00000	5 kHz	Differential phase input mode (-8,388,608 to 8,388,607)	SR 248 and SR 249	Target value comparison interrupts Range comparison interrupts
00001	20 kHz	Pulse + direction input mode (-8,388,608 to 8,388,607)		
00002		Up/down pulse input mode (-8,388,608 to 8,388,607) Increment mode (0 to 16,777,215)		

## ■ Interrupt Inputs (Counter Mode)

The four built-in interrupt inputs in the CPM2A/CPM2C's CPU Unit can be used in counter mode to count inputs of up to 2 kHz. These inputs can be used as either incrementing counters or decrementing counters and can trigger an interrupt (i.e., execute an interrupt subroutine) when the count matches the set value.

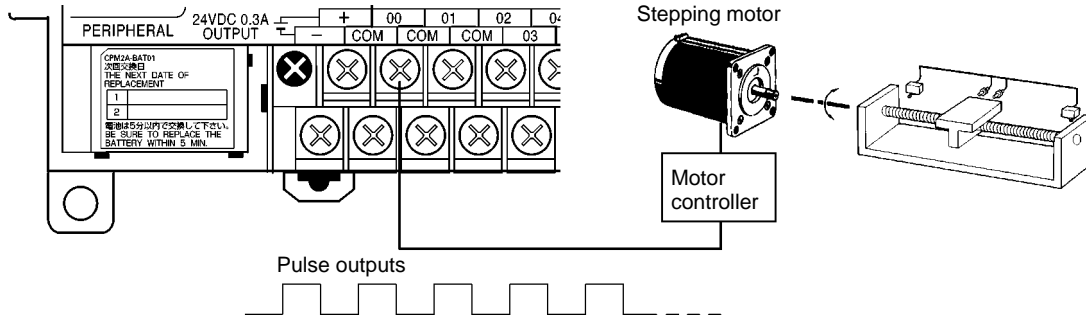


Input	Counter number	Set value location	Present value location	Response frequency	Input mode (count value)	Control method
00003	Counter 0	SR 240	SR 244	2 kHz	Incrementing counter (0000 to FFFF) Decrementing counter (0000 to FFFF)	Count-up interrupts
00004	Counter 1	SR 241	SR 245			
00005	Counter 2	SR 242	SR 246			
00006	Counter 3	SR 243	SR 247			

# Functions

## ■ Pulse Outputs

The CPM2A/CPM2C has two pulse outputs. The PC Setup can be set to use 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 PC Setup as either relative or absolute.

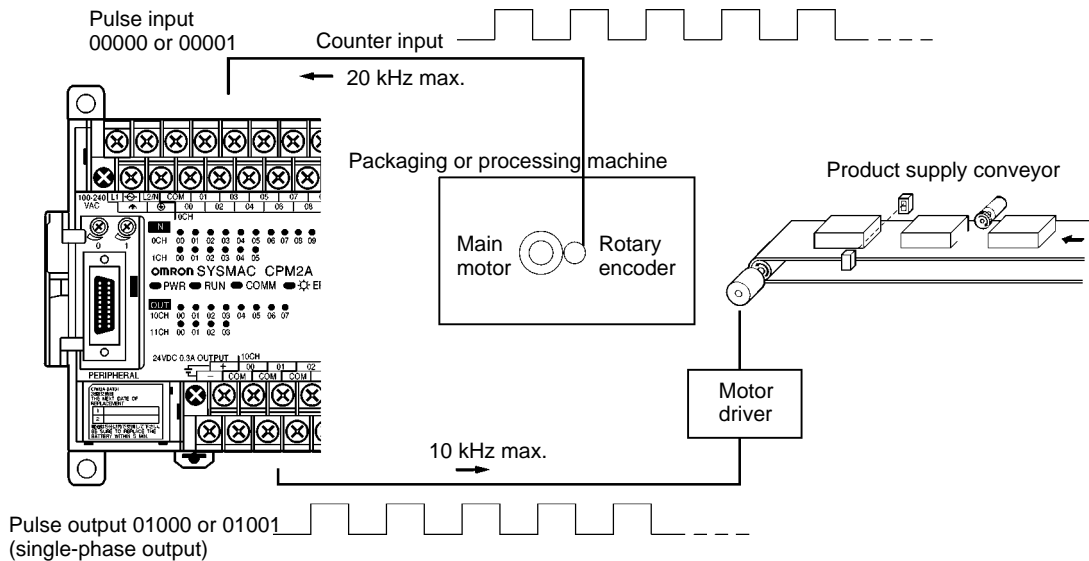


Item		Single-phase pulse output without accel/decel	Variable duty-ratio pulse output	Single-phase pulse output with trapezoidal acceleration/deceleration			
				Pulse + direction output		Up/down pulse output	
Controlling instruction(s)		PULS(65) and SPED(64)	PWM(—)	PULS(65) and ACC(—)			
Output number	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.

## ■ Synchronized Pulse Control

The CPM2A/CPM2C's high-speed counter function can be combined with the pulse output function to generate an output pulse at a specified multiple of the input pulse frequency. (This function is supported only by the SSS.)

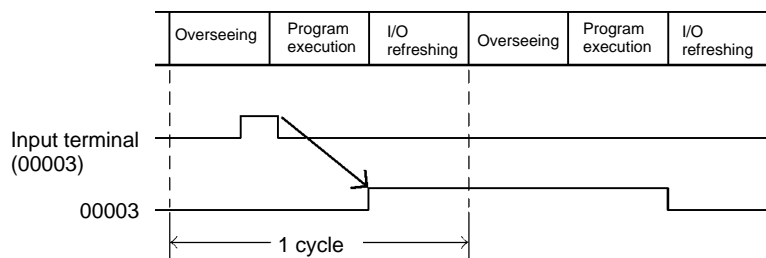


Item		Input mode			
		Phase differential input mode	Pulse + direction input mode	Up/down pulse input mode	Increment mode
Input number	00000	A-phase input	Count input	CW input	Count input
	00001	B-phase input	Direction input	CCW input	See note 1.
Input method		Phase differential quadruple input	Single-phase input	Single-phase input	Single-phase input
Input frequency range		10 Hz to 500 Hz (accuracy $\pm 1$ Hz) 20 Hz to 1 kHz (accuracy $\pm 1$ Hz) 300 Hz to 20 kHz (accuracy $\pm 25$ Hz) (See note 2.)			
Output frequency range		10 Hz to 10 kHz (accuracy 10 Hz)			
Frequency ratio (scaling factor)		1 % to 1,000% (Can be specified in units of 1%.)			
Synchronized control cycle		10 ms			

- Note**
1. Can be used as an ordinary input.
  2. The accuracy is  $\pm 10$  Hz when the input frequency is 10 kHz or less.

## ■ Quick-response Inputs

The CPM2A CPU Units and CPM2C CPU Units with 20 I/O points have four inputs that can be used for quick-response inputs. The CPM2C CPU Units with 10 I/O points have two inputs that can be used for quick response inputs. These inputs are shared with interrupt inputs and 2-kHz high-speed counter inputs. Quick-response inputs are received into an internal buffer, so signals that change status within a cycle can be received.



Inputs 00003 through 00006 can be used as interrupt inputs, 2-kHz high-speed counter inputs, or quick-response inputs. These inputs can be used as ordinary inputs if they are not used as interrupt inputs, 2-kHz high-speed counter inputs, or quick-response inputs.

Inputs 00005 and 00006 cannot be used with the CPM2C CPU Unit with 10 I/O points.



# Functions

## ■ Analog Controls (CPM2A Only)

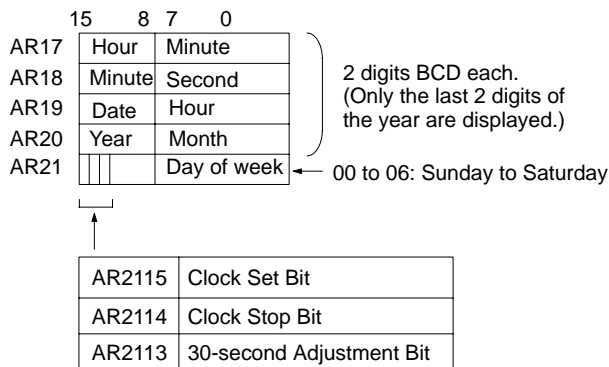
The CPM2A CPU Unit has two analog controls that can be used for a wide range of timer and counter analog settings. As these controls are turned, values from 0 to 200 (BCD) are stored in the SR Area.

Control	Storage area	Set value (BCD)
Analog control 0	SR 250	0000 to 0200
Analog control 1	SR 251	0000 to 0200

## ■ Clock Function

The CPM2A and some CPM2Cs have a built-in clock (accuracy:  $\pm 1$  minute/month) that allows the date and time to be read from the ladder program. The time can be overwritten from a Programming Console or other Programming Device, but the CPM2A is also equipped with a 30-second Compensation Bit. The time will be rounded off to the nearest minute when this bit is turned ON, so the time can be set very accurately by turning ON this bit when the "time tone" is heard on the radio.

(The CPM2C CPU Units have models with the clock function and models without.)



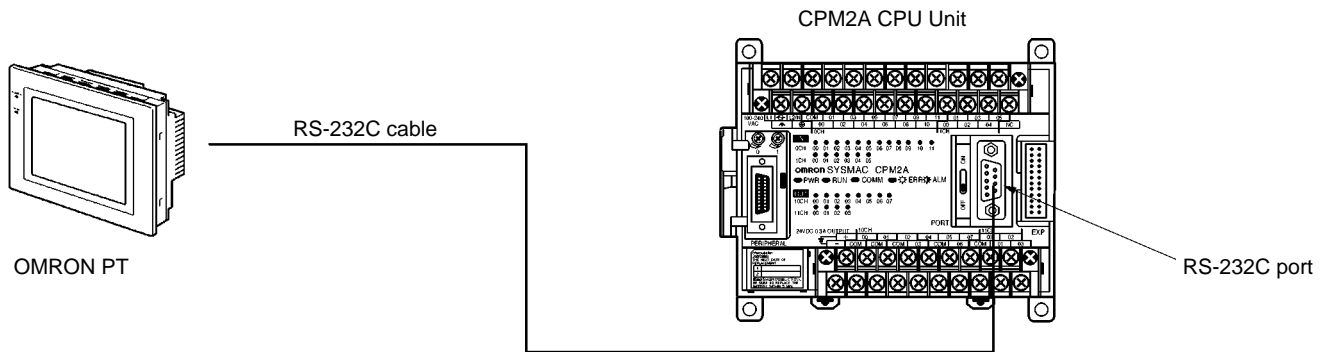
## ■ Additional Timer Functions

VERY HIGH-SPEED TIMER (Units: 1 ms)	Starts a very high-speed decrementing ON-delay timer with the specified timer number. The set value can be 0 to 9,999 ms. (Set in 1-ms units.)
LONG TIMER (Units: 1 s or 10 s)	Starts a long-term decrementing ON-delay timer with the specified timer number. The set value can be 0 to 9,999 s (when set in 1-s units) or 0 to 99,990 s (when set in 10-s units).

**Note:** This function is supported only by the SSS.

## ■ NT Link

The CPM2A/CPM2C can be connected to an OMRON PT (Programmable Terminal) in NT Link mode (1:1). A communications program is not required in the CPM2A/CPM2C. The RS-232C port can be used for the NT Link.



# Instructions

The CPM2A and CPM2C support 119 basic and special instructions.

## ■ Ladder Diagram Instructions

Name	Mnemonic	Variations
LOAD	LD	---
LOAD NOT	LD NOT	---
AND	AND	---
AND NOT	AND NOT	---
OR	OR	---
OR NOT	OR NOT	---
AND LOAD	AND LD	---
OR LOAD	OR LD	---

## ■ Bit Control Instructions

Name	Mnemonic	Variations
OUTPUT	OUT	---
OUTPUT NOT	OUT NOT	---
SET	SET	---
RESET	RSET	---
KEEP	KEEP(11)	---
DIFFERENTIATE UP	DIFU(13)	---
DIFFERENTIATE DOWN	DIFD(14)	---

## ■ Sequence Control Instructions

Name	Mnemonic	Variations
NO OPERATION	NOP(00)	---
END	END(01)	---
INTERLOCK	IL(02)	---
INTERLOCK CLEAR	ILC(03)	---
JUMP	JMP(04)	---
JUMP END	JME(05)	---

## ■ Timer and Counter Instructions

Name	Mnemonic	Variations
TIMER	TIM	---
COUNTER	CNT	---
REVERSIBLE COUNTER	CNTR(12)	---
HIGH-SPEED TIMER	TIMH(15)	---
ONE-MS TIMER	TMHH(— <sup>1</sup> ) <sup>2, 3</sup>	---
LONG TIMER	TIML(— <sup>1</sup> ) <sup>2, 3</sup>	---

## ■ Comparison Instructions

Name	Mnemonic	Variations
COMPARE	CMP(20)	---
TABLE COMPARE	TCMP(85)	@
DOUBLE COMPARE	CMPL(60) <sup>1</sup>	---
BLOCK COMPARE	BCMP(68) <sup>1</sup>	@
AREA RANGE COMPARE	ZCP(— <sup>1</sup> ) <sup>2</sup>	---
DOUBLE AREA RANGE COMPARE	ZCPL(— <sup>1</sup> ) <sup>2</sup>	---

## ■ Data Movement Instructions

Name	Mnemonic	Variations
MOVE	MOV(21)	@
MOVE NOT	MVN(22)	@
BLOCK TRANSFER	XFER(70)	@
BLOCK SET	BSET(71)	@
DATA EXCHANGE	XCHG(73)	@
SINGLE WORD DISTRIBUTE	DIST(80)	@
DATA COLLECT	COLL(81)	@
MOVE BIT	MOVB(82)	@
MOVE DIGIT	MOVD(83)	@

## ■ Shift Instructions

Name	Mnemonic	Variations
SHIFT REGISTER	SFT(10)	---
WORD SHIFT	WSFT(16)	@
ARITHMETIC SHIFT LEFT	ASL(25)	@
ARITHMETIC SHIFT RIGHT	ASR(26)	@
ROTATE LEFT	ROL(27)	@
ROTATE RIGHT	ROR(28)	@
ONE DIGIT SHIFT LEFT	SLD(74)	@
ONE DIGIT SHIFT RIGHT	SRD(75)	@
REVERSIBLE SHIFT REGISTER	SFTR(84)	@
ASYNCHRONOUS SHIFT REGISTER	ASFT(17) <sup>1</sup>	@

## ■ Increment/Decrement Instructions

Name	Mnemonic	Variations
INCREMENT	INC(38)	@
DECREMENT	DEC(39)	@

## ■ Calculation Instructions

Name	Mnemonic	Variations
BCD ADD	ADD(30)	@
BCD SUBTRACT	SUB(31)	@
BCD MULTIPLY	MUL(32)	@
BCD DIVIDE	DIV(33)	@
BINARY ADD	ADB(50)	@
BINARY SUBTRACT	SBB(51)	@
BINARY MULTIPLY	MLB(52)	@
BINARY DIVIDE	DVB(53)	@
DOUBLE BCD ADD	ADDL(54)	@
DOUBLE BCD SUBTRACT	SUBL(55)	@
DOUBLE BCD MULTIPLY	MULL(56)	@
DOUBLE BCD DIVIDE	DIVL(57)	@

- Note**
1. Expansion instructions with default function codes.
  2. Instructions not supported by the CPM1A.
  3. Supported only by the SSS.

# Instructions

## ■ Conversion Instructions

Name	Mnemonic	Variations
BCD-TO-BINARY	BIN(23)	@
BINARY-TO-BCD	BCD(24)	@
DOUBLE BCD-TO-DOUBLE BINARY	BINL(58) <sup>2</sup>	@
DOUBLE BINARY-TO-DOUBLE BCD	BCDL(59) <sup>2</sup>	@
DATA DECODER	MLPX(76)	@
DATA ENCODER	DMPX(77)	@
ASCII CONVERT	ASC(86)	@
ASCII-TO-HEXADECIMAL	HEX(—) <sup>1,2</sup>	@
2'S COMPLEMENT	NEG(—) <sup>1,2</sup>	@
HOURS-TO-SECONDS	SEC(—) <sup>1,2</sup>	@
SECONDS-TO-HOURS	HMS(—) <sup>1,2</sup>	@

## ■ Table Data Manipulation Instructions

Name	Mnemonic	Variations
FRAME CHECKSUM	FCS(—) <sup>1,2</sup>	@
SUM	SUM(—) <sup>1,2</sup>	@
DATA SEARCH	SRCH(—) <sup>1,2</sup>	@
FIND MAXIMUM	MAX(—) <sup>1,2</sup>	@
FIND MINIMUM	MIN(—) <sup>1,2</sup>	@

## ■ Data Control Instructions

Name	Mnemonic	Variations
SCALING	SCL(66) <sup>1,2</sup>	@
SCALING 2	SCL2(—) <sup>1,2</sup>	@
SCALING 3	SCL3(—) <sup>1,2</sup>	@
PID CONTROL	PID(—) <sup>1,2</sup>	---
AVERAGE VALUE	AVG(—) <sup>1,2</sup>	---

## ■ Logic Instructions

Name	Mnemonic	Variations
COMPLEMENT	COM(29)	@
LOGICAL AND	ANDW(34)	@
LOGICAL OR	ORW(35)	@
EXCLUSIVE OR	XORW(36)	@
EXCLUSIVE NOR	XNRW(37)	@

## ■ Special Calculation Instructions

Name	Mnemonic	Variations
BIT COUNTER	BCNT(67) <sup>1</sup>	@

## ■ Subroutine Instructions

Name	Mnemonic	Variations
SUBROUTINE CALL	SBS(91)	@
SUBROUTINE ENTRY	SBN(92)	---
SUBROUTINE RETURN	RET(93)	---
MACRO	MCRO(99)	@

## ■ Interrupt Control Instructions

Name	Mnemonic	Variations
INTERRUPT CONTROL	STIM(69) <sup>1</sup>	@
INTERVAL TIMER	INT(89) <sup>1,3</sup>	@

## ■ Pulse Control Instructions

Name	Mnemonic	Variations
MODE CONTROL	INI(61) <sup>1,3</sup>	@
HIGH-SPEED COUNTER PV READ	PRV(62) <sup>1,3</sup>	@
REGISTER COMPARISON TABLE	CTBL(63) <sup>1,3</sup>	@

## ■ Pulse Output Control Instructions

Name	Mnemonic	Variations
SPEED OUTPUT	SPED(64) <sup>1,3</sup>	@
SET PULSES	PULS(65) <sup>1,3</sup>	@
PULSE W/ VARIABLE DUTY RATIO	PWM(—) <sup>1,2</sup>	@
ACCELERATION CONTROL	ACC(—) <sup>1,2</sup>	@
SYNCHRONIZED PULSE CONTROL	SYNC(—) <sup>1,2,4</sup>	@

## ■ I/O Unit Instructions

Name	Mnemonic	Variations
7-SEGMENT DECODER	SDEC(78)	@
I/O REFRESH	IORF(97)	@

## ■ Communications Instructions

Name	Mnemonic	Variations
RECEIVE	RXD(47) <sup>1,2</sup>	@
TRANSMIT	TXD(48) <sup>1,2</sup>	@
CHANGE RS-232C SETUP	STUP(—) <sup>1,2</sup>	@

## ■ Step Instructions

Name	Mnemonic	Variations
STEP DEFINE	STEP(08)	---
STEP START	SNXT(09)	---

## ■ User Error Instructions

Name	Mnemonic	Variations
FAILURE ALARM AND RESET	FAL(06)	@
SEVERE FAILURE ALARM	FALS(07)	---

## ■ Display Instructions

Name	Mnemonic	Variations
MESSAGE DISPLAY	MSG(46)	@

## ■ Carry Flag Instructions

Name	Mnemonic	Variations
SET CARRY	STC(40)	@
CLEAR CARRY	CLC(41)	@

- Note**
1. Expansion instructions with default function codes.
  2. Instructions not supported by the CPM1A.
  3. Instructions improved in the CPM2A/CPM2C.
  4. Supported only by the SSS.

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# ORDERING GUIDE

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## **International Standards**

The products shown in the attached tables are those that conform to the UL, CSA, NK, Lloyd's Register, and EC Directives as of the end of December 1999.

(U: UL, C: CSA, N: NK, L: Lloyd, CE: EC Directives)

Please contact OMRON representative for application conditions.

## **EMC Directives**

OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards (see the following note). Whether the products conform to the standards in the system used by the customer, however, must be confirmed by the customer.

EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

## **Applicable EMC Standards**

EMS (Electromagnetic Susceptibility):

EN61131-2

EMI (Electromagnetic Interference):

EN50081-2

(Radiated emission: 10-m regulations)

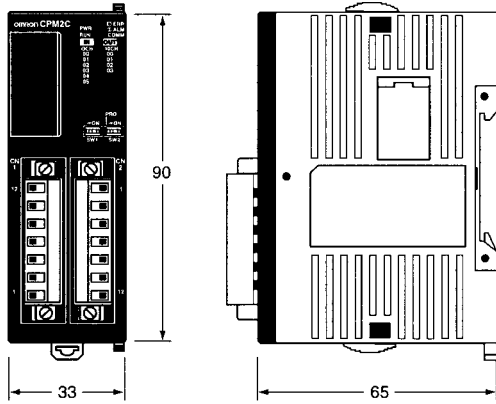
## **Low Voltage Directive**

OMRON Power Supply Units and I/O Units have been determined safe when operating at voltages of 50 to 1,000 VAC and 75 to 1,500 VDC according to the safety standards in EN61131-2.

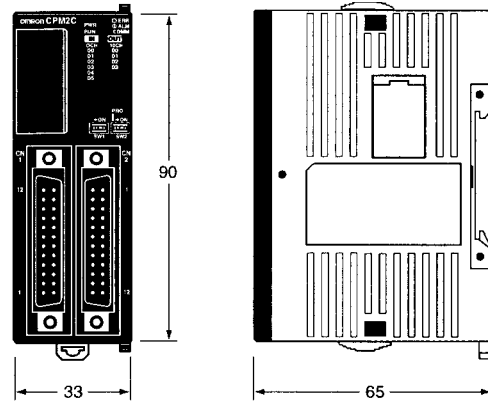
# CPM2C Dimensions

## CPU Units

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

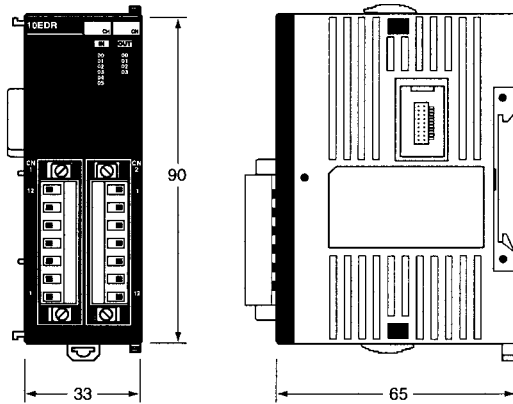


**CPU Units with Transistor Outputs**  
(CPM2C-10/20CDTC-D, CPM2C-10/20C1DTC-D,  
CPM2C-10/20CDT1C-D, CPM2C-10/20C1DT1C-D)

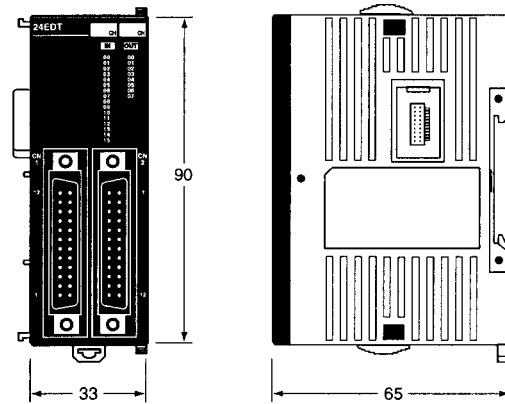


## Expansion I/O Units

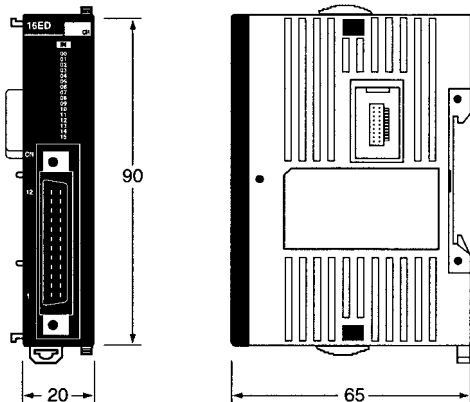
**Units with Relay Outputs**  
(CPM2C-8ER, CPM2C-10EDR)



**Units with Transistor Outputs**  
(CPM2C-24EDTC, CPM2C-24EDT1C)



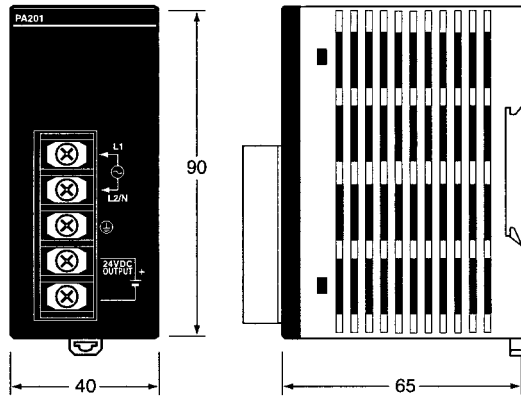
**Units with Transistor Outputs Only and Units with Inputs Only**  
(CPM2C-8EDC, CPM2C-8ETC, CPM2C-8ET1C,  
CPM2C-16EDC, CPM2C-16ETC, CPM2C-16ET1C)



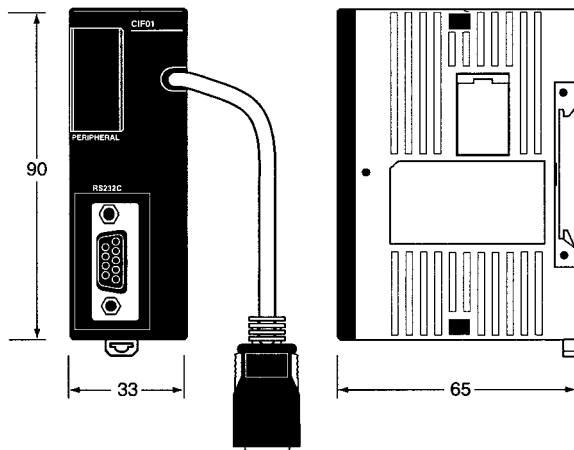
**Note:** All dimensions are in mm.

# Dimensions

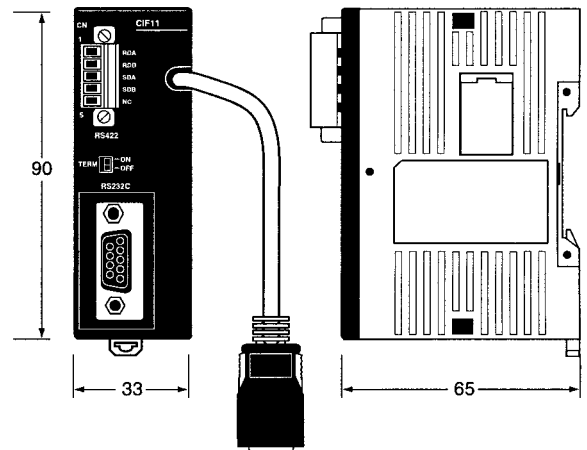
**AC Power Supply Unit  
(CPM2C-PA201)**



**Peripheral/RS-232C Adapter Unit  
(CPM2C-CIF01)**

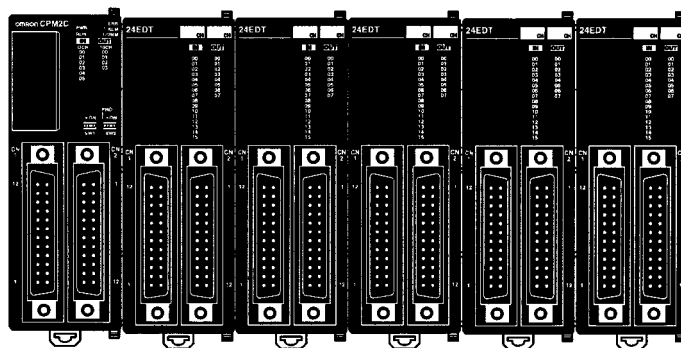


**RS-422/RS-232C Adapter Unit  
(CPM2C-CIF11)**



## **Example CPM2C System Configuration**

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

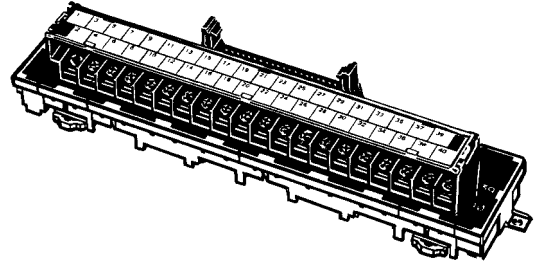
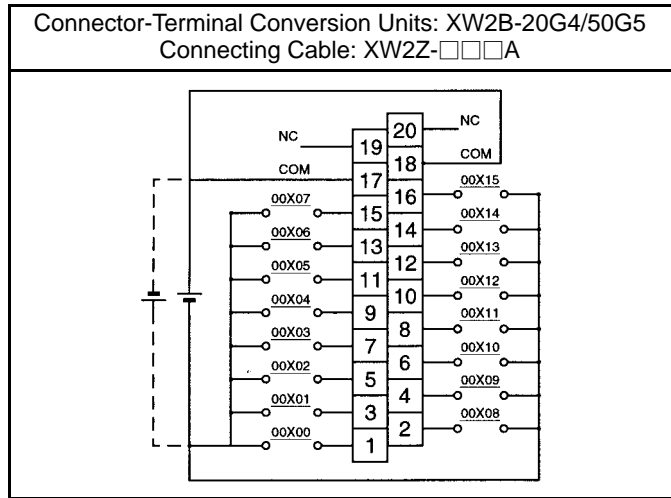


CPU Unit    Expansion Unit or Expansion I/O Unit    Expansion Unit or Expansion I/O Unit    Expansion Unit or Expansion I/O Unit    Expansion Unit or Expansion I/O Unit    Expansion Unit or Expansion I/O Unit

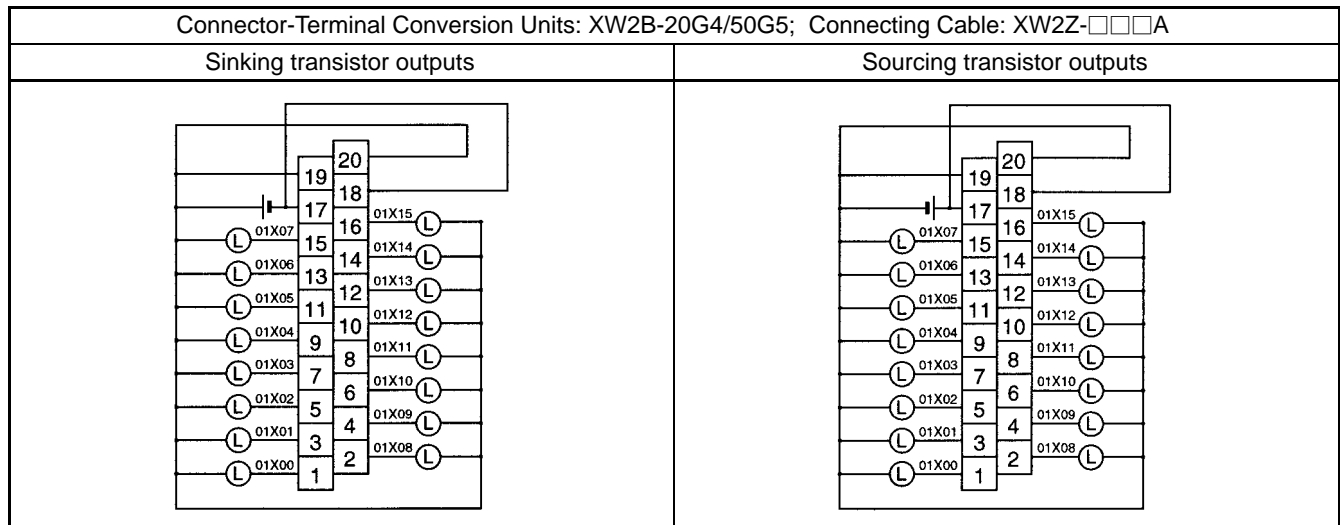
# CPM2C Peripheral Devices

## ■ Connector-Terminal Conversion Unit Wiring

The wiring for input terminals is as shown below.



The wiring for output terminals is as shown below.



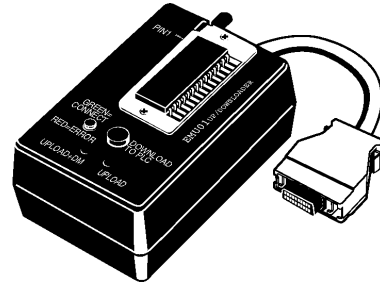
**Note:** The relay numbers that can be used vary with the Unit used, as shown in the following table.

Unit	Input relay numbers	Output relay numbers
CPU Unit with 10 I/O points	00X00 to 00X05	01X00 to 01X03
CPU Unit with 20 I/O points	00X00 to 00X11	01X00 to 01X07
Expansion I/O Unit with 10 I/O points	00X00 to 00X05	01X00 to 01X03
Expansion I/O Unit with 24 I/O points	00X00 to 00X15	01X00 to 01X07
Expansion I/O Unit with 8 input points	00X00 to 00X07	---
Expansion I/O Unit with 16 input points	00X00 to 00X15	---
Expansion I/O Unit with 8 output points	---	01X00 to 01X07
Expansion I/O Unit with 16 output points	---	01X00 to 01X15

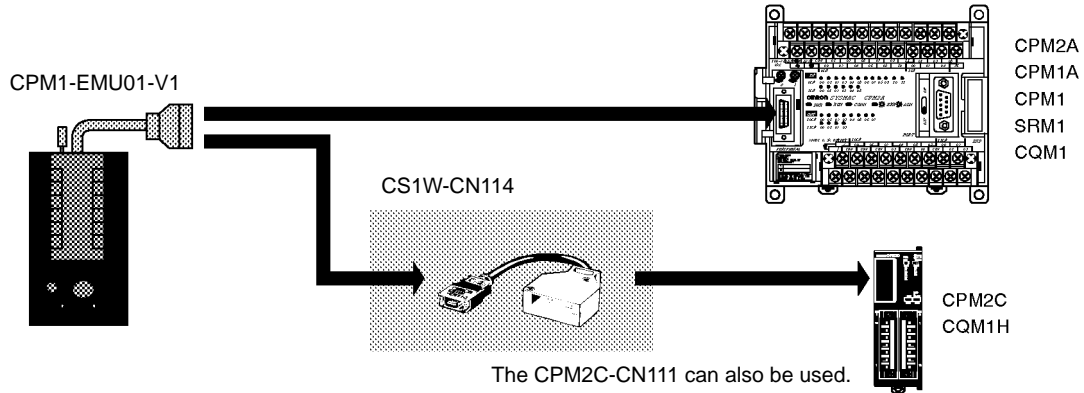
# CPM2C Peripheral Devices

## ■ Expansion Memory Unit

The Expansion Memory Unit can be used to upload and download user programs and data memory with the press of a button allowing simply program maintenance.



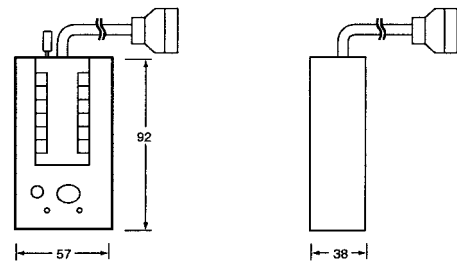
## ■ Connections



## ■ Specifications

Item	Specification
Supported PCs	CPM1, CPM1A, CPM2A, CPM2C, SRM1 (-V2), CQM1, CQM1H
Read/Write memory areas	User program: 15.2 Kwords max. Data memory: DM 6144 to DM 6655 (Read-only DM and PC Setup) Expansion instructions: 18 instructions
Connector	Connector compatible with peripheral port on CPM1, CPM1A, CPM2A, SRM1 (-V2), and CQM1 PCs.  For CPM2C and CQM1H PCs, connect via CS1W-CN114 or CPM2C-CN111 Connecting Cable.
EEPROM (See note.)	256-Kbit EEPROM ATMEL: AT28C256 OMRON: EEROM-JD
Current consumption	129 mA max.
Dimensions	Main body (not including cables or connectors): 57 × 92 × 38 mm (W × H × D)
Weight	200 g max. (not including EEPROM)

## ■ Dimensions



**Note:** The EEPROM must be purchased separately.

## ■ Memory Areas

The memory areas that are uploaded or downloaded vary with the button used as shown in the following table.

Area	Button		
	UPLOAD + DM	UPLOAD	DOWNLOAD TO PLC
Ladder program and expansion instructions	Read from PC to EEPROM.	Read from PC to EEPROM.	All contents of EEPROM written to PC.
DM 6144 to 6655		Not affected.	

For details on program size, DM area, and the availability of expansion instructions, refer to the relevant PC manual.