

**SYSMAC
CPM2A**

Programmable Controllers

OPERATION MANUAL

OMRON

CPM2A Programmable Controllers


Operation Manual


Revised December 1999


Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PC” means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

© OMRON, 1999

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of OMRON.

No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

TABLE OF CONTENTS

PRECAUTIONS	xi
1 Intended Audience	xii
2 General Precautions	xii
3 Safety Precautions	xii
4 Operating Environment Precautions	xiii
5 Application Precautions	xiii
6 EC Directives	xv
SECTION 1	
Introduction	1
1-1 CPM2A Features and Functions	2
1-2 Basic System Configurations	8
1-3 Structure and Operation	10
1-4 Functions Listed by Usage	16
1-5 Comparison with the CPM1A	18
1-6 Preparation for Operation	24
SECTION 2	
Unit Specifications and Components	27
2-1 Specifications	28
2-2 Unit Components	35
SECTION 3	
Installation and Wiring	43
3-1 Design Precautions	44
3-2 Selecting an Installation Site	44
3-3 Installing the CPM2A	46
3-4 Wiring and Connections	49
SECTION 4	
Using Programming Devices	83
4-1 SYSMAC-CPT Support Software	84
4-2 SYSMAC Support Software (SSS)	92
4-3 Using a Programming Console	95
4-4 Programming Console Operations	101
4-5 Programming Example	124
SECTION 5	
Test Runs and Error Processing	131
5-1 Initial System Checks and Test Run Procedure	132
5-2 Self-diagnostic Functions	133
5-3 Programming Console Operation Errors	136
5-4 Programming Errors	136
5-5 Troubleshooting Flowcharts	137
5-6 Maintenance Inspections	145
5-7 Battery Replacement	146
SECTION 6	
Expansion Memory Unit	149
6-1 Overview	150
6-2 Specifications and Nomenclature	151
6-3 Handling	152

TABLE OF CONTENTS

Appendices

A Standard Models	159
B Dimensions	163

Index	171
--------------------	------------

Revision History	175
-------------------------------	------------

About this Manual:

The CPM2A is a compact, high-speed Programmable Controller (PC) designed for control operations in systems requiring from 10 to 120 I/O points per PC. There are two manuals describing the setup and operation of the CPM2A: The *CPM2A Operation Manual* (this manual) and the *CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual* (W353). (The *CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual* is referred to as simply the *Programming Manual* in this manual.)

This manual describes the system configuration and installation of the CPM2A and provides a basic explanation of operating procedures for the Programming Consoles. It also introduces the capabilities of the SYSMAC Support Software (SSS) and SYSMAC-CPT Support Software. Read this manual first to acquaint yourself with the CPM2A.

The *Programming Manual* (W353) provides detailed descriptions of the CPM2A's programming functions. The *SYSMAC Support Software Operation Manuals: Basics and C-series PCs* (W247 and W248) provide descriptions of SSS operations for the CPM2A and other SYSMAC C-series PCs. The *SYSMAC-CPT Support Software Quick Start Guide* (W332) and *User Manual* (W333) provide descriptions of ladder diagram operations in the Windows environment. The *WS02-CXPC1-E CX-Programmer User Manual* (W361) and the *CX-Server User Manual* (W362) provide details of operations for the WS02-CXPC1-E CX-Programmer.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the CPM2A.

Section 1 gives a brief overview of the steps involved in developing of a CPM2A System, describes the possible system configurations, and describes the CPM2A's special features and functions.

Section 2 provides the technical specifications of the Units that go together to create a CPM2A PC and describes the main components of the Units.

Section 3 describes how to install and wire a CPM2A PC.

Section 4 describes SYSMAC and SYSMAC-CPT Support Software capabilities, how to connect the Programming Console, and how to perform the various programming operations.

Section 5 describes how to perform a test run and how to diagnose and correct the hardware and software errors that can occur during PC operation.

Section 6 describes how to use the CPM1-EMU01-V1 Expansion Memory Unit. Follow the handling precautions and procedures to properly use the Unit.

Appendix A provides tables of CPM2A Units and related products.

Appendix B provides the dimensions of CPM2A Units.



WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

PRECAUTIONS

This section provides general precautions for using the Programmable Controller (PC) and related devices.

The information contained in this section is important for the safe and reliable application of the Programmable Controller. You must read this section and understand the information contained before attempting to set up or operate a PC system.

1 Intended Audience	xii
2 General Precautions	xii
3 Safety Precautions	xii
4 Operating Environment Precautions	xiii
5 Application Precautions	xiii
6 EC Directives	xv

1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.


2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.


Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.


Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.


This manual provides information for programming and operating the Unit. Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during operation.


 **WARNING** It is extremely important that a PC and all PC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PC System to the above-mentioned applications.

3 Safety Precautions

 **WARNING** Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.


 **WARNING** Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.


 **WARNING** Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.


 **WARNING** Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, in order to ensure safety in the system if an abnormality occurs due to malfunction of the PC or another external factor affecting the PC operation. Not doing so may result in serious accidents.

- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.


- The PC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-VDC output (service power supply to the PC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

 **WARNING** When transferring programs to other nodes, or when making changes to I/O memory, confirm the safety of the destination node before transfer. Not doing so may result in injury.


 **Caution** Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

 **Caution** Tighten the screws on the terminal block of the AC Power Supply Unit to the torque specified in the operation manual. The loose screws may result in burning or malfunction.


4 Operating Environment Precautions

 **Caution** Do not operate the control system in the following places:

- Locations subject to direct sunlight.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation as the result of severe changes in temperature.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to exposure to water, oil, or chemicals.
- Locations subject to shock or vibration.


 **Caution** Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power supplies.

 **Caution** The operating environment of the PC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the PC System.

 **WARNING** Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always connect to a ground such that the grounding resistance does not exceed 100 Ω when installing the Units. Not connecting to the correct ground may result in electric shock.

- Always turn OFF the power supply to the PC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
 - Mounting or dismounting I/O Units, CPU Units, Memory Cassettes, or any other Units.
 - Assembling the Units.
 - Setting DIP switches or rotary switches.
 - Connecting or wiring the cables.
 - Connecting or disconnecting the connectors.

**Caution**

Failure to abide by the following precautions could lead to faulty operation of the PC or the system, or could damage the PC or PC Units. Always heed these precautions.

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- Construct a control circuit so that power supply for the I/O circuits does not come ON before power supply for the Unit. If power supply for the I/O circuits comes ON before power supply for the Unit, normal operation may be temporarily interrupted.
- If the operating mode is changed from RUN or MONITOR mode to PROGRAM mode, with the IOM Hold Bit ON, the output will hold the most recent status. In such a case, ensure that the external load does not exceed specifications. (If operation is stopped because of an operation error (including FALS instructions), the values in the internal memory of the CPU Unit will be saved, but the outputs will all turn OFF.)
- Always use the power supply voltage specified in the operation manuals. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Do not apply voltages to the input terminals in excess of the rated input voltage. Excess voltages may result in burning.
- Do not apply voltages or connect loads to the output terminals in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- Disconnect the functional ground terminal when performing withstand voltage tests. Not disconnecting the functional ground terminal may result in burning.
- Install the Unit properly as specified in the operation manual. Improper installation of the Unit may result in malfunction.
- Be sure that all the mounting screws, terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Be sure to leave the labels attached at the time of shipment on the CPM1 or CPM2A when wiring in order to prevent wiring cuttings from entering the Unit.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Be sure to perform wiring in accordance with the relevant operation manual. Incorrect wiring may result in burning.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.

- Double-check all the wiring before turning ON the power supply. Incorrect wiring may result in burning.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Be sure that terminal blocks and connectors are connected in the specified direction with the correct polarity. Not doing so may result in malfunction.
- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in an unexpected operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
 - Changing the operating mode of the PC.
 - Force-setting/force-resetting any bit in memory.
 - Changing the present value of any word or any set value in memory.
- Resume operation only after transferring to the new CPU Unit the contents of the DM and HR Areas required for resuming operation. Not doing so may result in an unexpected operation.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables. Doing so may break the cables.
- Under no circumstances should batteries be short-circuited between positive (+) and negative (–) terminals, charged, disassembled, heated, or thrown into fire.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.
- Before touching the Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up. Not doing so may result in malfunction or damage.
- Do not touch the expansion I/O connecting cable while the power is being supplied in order to prevent any malfunction due to static electricity.
- When using a thermocouple-input type Temperature Sensor Unit, observe the following precautions:
 - Do not remove the cold junction compensator attached at the time of delivery. If the cold junction compensator is removed the Unit will not be able to measure temperatures correctly.
 - Each of the input circuits is calibrated with the cold junction compensator attached to the Unit. If the Unit is used with the cold junction compensator from other Units, the Unit will not be able to measure temperatures correctly.
 - Do not touch the cold junction compensator. Doing so may result in incorrect temperature measurement.

6 EC Directives

6-1 Applicable Directives

- EMC Directives
- Low Voltage Directive

6-2 Concepts

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 checked 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.

Note Applicable EMC (Electromagnetic Compatibility) standards are as follows:

EMS (Electromagnetic Susceptibility): EN61131-2
EMI (Electromagnetic Interference): EN50081-2
(Radiated emission: 10-m regulations)

Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 VAC and 75 to 1,500 VDC meet the required safety standards for the PC (EN61131-2).

6-3 Conformance to EC Directives

The CPM2A PCs comply with EC Directives. To ensure that the machine or device in which the CPM2A PC is used complies with EC directives, the PC must be installed as follows:

- 1, 2, 3...** 1. The CPM2A PC must be installed within a control panel.
2. Reinforced insulation or double insulation must be used for the DC power supplies used for the communications and I/O power supplies.
3. CPM2A PCs complying with EC Directives also conform to the Common Emission Standard (EN50081-2). Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment complies with EC Directives.

6-4 Relay Output Noise Reduction Methods

The CPM2A PCs conform to the Common Emission Standards (EN50081-2) of the EMC Directives. However, the noise generated when the PC is switched ON or OFF using the relay output may not satisfy these standards. In such a case, a noise filter must be connected to the load side or other appropriate countermeasures must be provided external to the PC.

Countermeasures taken to satisfy the standards vary depending on the devices on the load side, wiring, configuration of machines, etc. Following are examples of countermeasures for reducing the generated noise.

Countermeasures

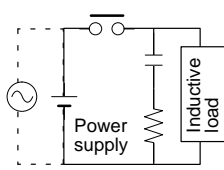
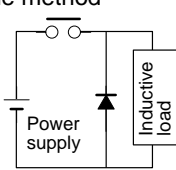
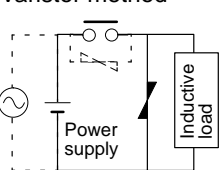
(Refer to EN50081-2 for more details.)

Countermeasures are not required if the frequency of load switching for the whole system with the PC included is less than 5 times per minute.

Countermeasures are required if the frequency of load switching for the whole system with the PC included is 5 times or more per minute.

Countermeasure Examples

When switching an inductive load, connect a surge protector, diodes, etc., in parallel with the load or contact as shown below.

Circuit	Current		Characteristic	Required element
	AC	DC		
<p>CR method</p> 	Yes	Yes	<p>If the load is a relay or solenoid, there is a time lag between the moment the circuit is opened and the moment the load is reset.</p> <p>If the supply voltage is 24 to 48 V, insert the surge protector in parallel with the load. If the supply voltage is 100 to 200 V, insert the surge protector between the contacts.</p>	<p>The capacitance of the capacitor must be 1 to 0.5 μF per contact current of 1 A and resistance of the resistor must be 0.5 to 1 Ω per contact voltage of 1 V. These values, however, vary with the load and the characteristics of the relay. Decide these values from experiments, and take into consideration that the capacitance suppresses spark discharge when the contacts are separated and the resistance limits the current that flows into the load when the circuit is closed again.</p> <p>The dielectric strength of the capacitor must be 200 to 300 V. If the circuit is an AC circuit, use a capacitor with no polarity.</p>
<p>Diode method</p> 	No	Yes	<p>The diode connected in parallel with the load changes energy accumulated by the coil into a current, which then flows into the coil so that the current will be converted into Joule heat by the resistance of the inductive load.</p> <p>This time lag, between the moment the circuit is opened and the moment the load is reset, caused by this method is longer than that caused by the CR method.</p>	<p>The reversed dielectric strength value of the diode must be at least 10 times as large as the circuit voltage value. The forward current of the diode must be the same as or larger than the load current.</p> <p>The reversed dielectric strength value of the diode may be two to three times larger than the supply voltage if the surge protector is applied to electronic circuits with low circuit voltages.</p>
<p>Varistor method</p> 	Yes	Yes	<p>The varistor method prevents the imposition of high voltage between the contacts by using the constant voltage characteristic of the varistor. There is time lag between the moment the circuit is opened and the moment the load is reset.</p> <p>If the supply voltage is 24 to 48 V, insert the varistor in parallel with the load. If the supply voltage is 100 to 200 V, insert the varistor between the contacts.</p>	---

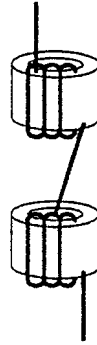
6-5 CPM1A-MAD01 Conformance to EMC Directives

Immunity testing conditions when using the current I/O of the CPM1A-MAD01 are as follows.

- Total accuracy: +10%/-1%
- Insert the following core in each line as shown below.

Recommended core: 2643-002402

Manufacturer: Fair Rite Products Corp.



SECTION 1

Introduction

This section describes the CPM2A's special features and functions, shows the possible system configurations, and outlines the steps required before operation. Read this section first when using the CPM2A for the first time.

Refer to the *CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual (W353)* for details on programming operation.

1-1	CPM2A Features and Functions	2
1-1-1	CPM2A Features	2
1-1-2	Overview of CPM2A Functions	7
1-2	Basic System Configurations	8
1-2-1	Stand-alone CPU Unit	8
1-2-2	CPU Unit, Expansion Units, and Expansion I/O Units	8
1-3	Structure and Operation	10
1-3-1	CPU Unit Structure	10
1-3-2	Operating Modes	11
1-3-3	Operating Mode at Startup	11
1-3-4	PC Operation at Startup	12
1-3-5	Cyclic Operation and Interrupts	13
1-4	Functions Listed by Usage	16
1-5	Comparison with the CPM1A	18
1-6	Preparation for Operation	24

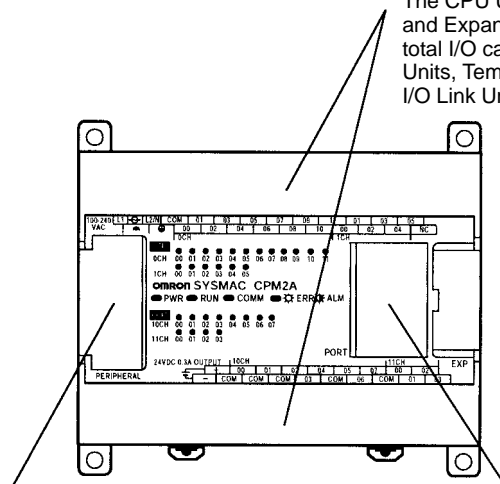
1-1 CPM2A Features and Functions

1-1-1 CPM2A Features

The CPM2A PCs incorporate a variety of features in a compact Unit, including synchronized pulse control, interrupt inputs, pulse outputs, analog settings, and a clock function. Also, the CPM2A CPU Unit is a stand-alone Unit that can handle a broad range of machine control applications, so it is ideal for use as a built-in control unit in equipment.

The full complement of communications functions provide communications with personal computers, other OMRON PCs, and OMRON Programmable Terminals. These communications capabilities allow the user to design a low-cost distributed production system.

The CPU Unit contains 20, 30, 40, or 60 I/O points and Expansion I/O Units can be added to provide a total I/O capacity of up to 120 I/O points. Analog I/O Units, Temperature Sensor Units, and CompoBus/S I/O Link Units can also be connected.



Peripheral Port
Programming Devices are compatible with other models of OMRON PCs. This port can also be used for Host Link or no-protocol communications.

RS-232C Port
This port can be used for a Host Link, no-protocol, 1:1 PC Link, or 1:1 NT Link communications.

Basic Functions

CPU Unit Variations

The CPM2A PCs are one-piece PCs with 20, 30, 40, or 60 built-in I/O terminals. There are 3 types of outputs available (relay outputs, sinking transistor outputs, and sourcing transistor outputs) and 2 types of power supplies available (100/240 VAC or 24 VDC).

Expansion I/O Units

Up to 3 Expansion I/O Units can be connected to the CPU Unit to increase the PC's I/O capacity to a maximum of 120 I/O points. There are 3 types of Expansion I/O Units available: a 20-point I/O Unit, an 8-point Input Unit, and an 8-point Output Unit. The maximum I/O capacity of 120 I/O points is achieved by connecting three 20-point I/O Units to a CPU Unit with 60 built-in I/O terminals.

Analog I/O Units

Up to 3 Analog I/O Units can be connected to provide analog inputs and outputs. Each Unit provides 2 analog inputs and 1 analog output, so a maximum of 6 analog inputs and 3 analog outputs can be achieved by connecting 3 Analog I/O Units. (Time-proportional control can be performed by combining the analog I/O points with the PID(—) and PWM(—) instructions.)

- The analog input range can be set to 0 to 10 VDC, 1 to 5 VDC, or 4 to 20 mA with a resolution of 1/256. (The open-circuit detection function can be used with the 1 to 5 VDC and 4 to 20 mA settings.)
- The analog output range can be set to 0 to 10 VDC, -10 to 10 VDC, or 4 to 20 mA with a resolution of 1/256.

Temperature Sensor Units

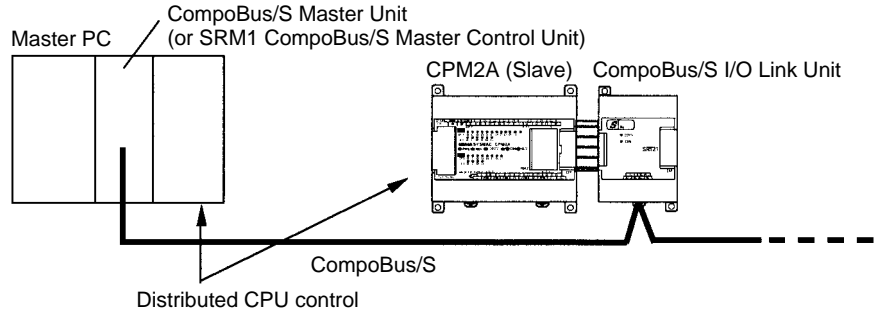
A Temperature Sensor Unit can be connected to provide up to 6 inputs for temperature input from sensors, such as thermocouples or platinum resistance

CompoBus/S I/O Link Units

thermometers. The PID(—) instruction can be used with a Temperature Sensor Unit for easy temperature monitoring.

CompoBus/S I/O Link Units can be connected to make the CPM2A a Slave Device in a CompoBus/S Network. The I/O Link Unit has 8 input bits (internal) and 8 output bits (internal).

The CompoBus/S Network provides distributed CPU control based on a “PC + compact PC” configuration, which is an improvement on the earlier distributed I/O control based on a “PC + remote I/O” configuration. The distributed CPU control makes equipment modular, so designs can be standardized, special needs can be addressed, and modules can be replaced easily in the event of a breakdown.



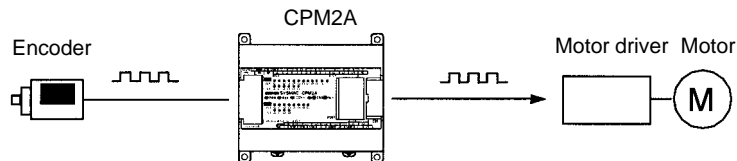
Share Programming Devices

The same Programming Devices, such as Programming Consoles and Support Software, can be used for the C200H, C200HS, C200HX/HG/HE, CQM1, CPM1, CPM1A, CPM2C, and SRM1 (-V2) PCs, so existing ladder program resources can be used effectively.

Built-in Motor Control Capability

Synchronized Pulse Control (Transistor Outputs 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 CPM2A has a total of five 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.

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.

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.

Easy Position Control with Pulse Outputs (Transistor Outputs Only)

CPM2A PCs 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.

High-speed Input Capabilities for Machine Control

High-speed Interrupt Input Function	There are four inputs used for interrupt inputs (shared with quick-response inputs and interrupt inputs in counter mode) with a minimum input signal width of 50 μ s 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	There are four inputs used for quick-response inputs (shared with interrupt inputs and interrupt inputs in counter mode) that can reliably read input signals with a signal width as short as 50 μ s.
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.

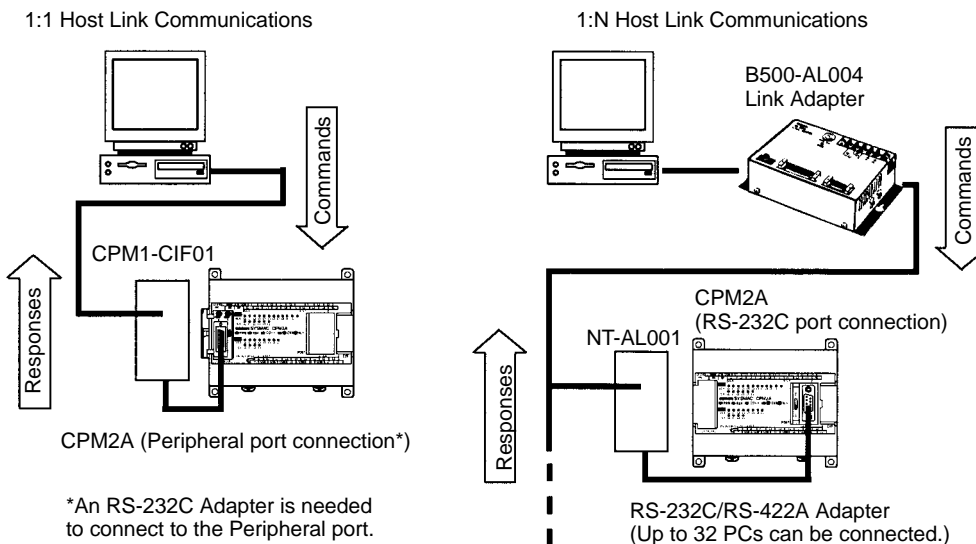
Other Functions

Interval Timer Interrupts	The interval timer can be set between 0.5 and 319,968 ms and can be set to generate just one interrupt (one-shot mode) or periodic interrupts (scheduled interrupt mode).
Analog Settings	There are two controls on the CPU Unit that can be turned to change the analog settings (0 to 200 BCD) in IR 250 and IR 251. 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 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	TIML(—) is a long-term timer that accommodates set values up to 99,990 seconds (27 hours, 46 minutes, 30 seconds). When combined with the SECONDS TO HOURS conversion instruction (HMS(—)), the long-term timer provides an easy way to control equipment scheduling.
Analog PID Control	The PID(—) instruction can be used with an Analog I/O Unit to control analog I/O.

Complete Communications Capabilities

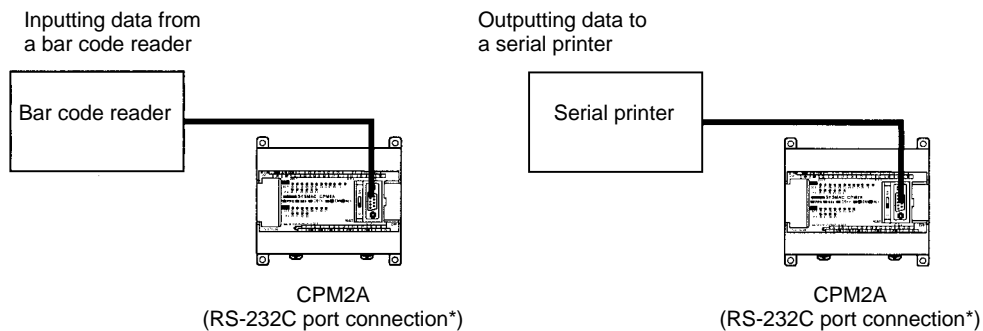
Host Link	A Host Link connection can be made through the PC's RS-232C port or Peripheral port. A personal computer or Programmable Terminal connected in Host
------------------	---

Link mode can be used for operations such as reading/writing data in the PC's I/O memory or reading/changing the PC's operating mode.



No-protocol Communications

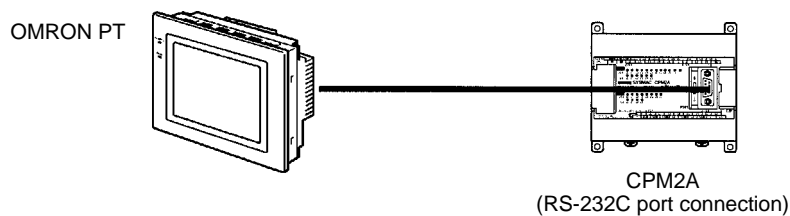
The TXD(48) and RXD(47) instructions can be used in no-protocol mode to exchange data with standard serial devices. For example, data can be received from a bar code reader or transmitted to a serial printer. The serial devices can be connected to the RS-232C port or Peripheral port.



*An RS-232C Adapter is needed to connect to the Peripheral port.

High-speed 1:1 NT Link Communications

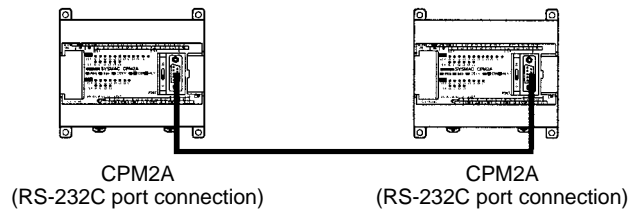
In a 1:1 NT Link, an OMRON Programmable Terminal (PT) can be connected directly to the CPM2A. The PT must be connected to the RS-232C port; it cannot be connected to the Peripheral port.



One-to-one PC Link

A CPM2A can be linked directly to another CPM2A, CQM1, CPM1, CPM1A, CPM2C, SRM1(-V2), or a C200HS or C200HX/HG/HE PC. The 1:1 PC Link al-

allows automatic data link connections. The PC must be connected through the RS-232C port; it cannot be connected through the Peripheral port.



Expansion Memory Unit

The CPM1-EMU01-V1 Expansion Memory Unit is a program loader for small-size or micro PLCs. Using the CPM1-EMU01-V1, simple on-site transfer of user programs and data memory is possible with PLCs.

