

CPM1/CPM1A/CPM2A/CPM2B Programmable Controllers

Safety Precautions

OMRON Corporation

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Thank you for purchasing an OMRON Programmable Controller (PC). To ensure safe operation, please be sure to read the safety precautions provided in this document along with all of the user manuals for the Programmable Controller. Please be sure you are using the most recent versions of the user manuals. Contact your nearest OMRON representative to obtain manuals. Keep these safety precautions and all user manuals in a safe location and be sure that they are readily available to the final user of the products.

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.

Safety Precaution

Definition of Precautionary Information

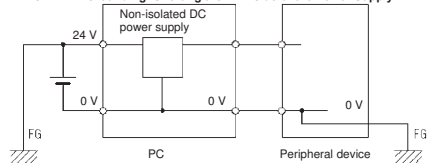
- ! DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
- ! WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- ! Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Warnings and Cautions

- ! 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, terminal blocks or, for the CPM2B, the CPU board or expansion I/O board 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.
- ! WARNING** When handling the Memory Backup Battery, never drop, disassemble, distort, short-circuit, recharge, heat to a temperature exceeding 100 °C, or throw into fire. Otherwise the Battery may explode, catch fire, or leak fluid.
- ! 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.
- ! Caution** When connecting the PC to a personal computer or other peripheral device, either ground the 0-V side of the PC or do not ground the PC at all. Although some grounding methods short the 24-V side, as shown in the following diagram, never do so with the PC.

INCORRECT Grounding: Shorting the 24-V side of the Power Supply



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.

Application Precautions

- ! 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, Expansion I/O Boards, CPU Units or Boards, 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. Inefficient 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, CPM1A-V1, or CPM2A when wiring in order to prevent wiring cuttings from entering the Unit.
- Be sure to attach supplied labels on the CPM1A when wiring the CPU Unit of CPM1A in order to prevent wiring cuttings from entering the CPU Unit.

- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- When wiring the CPM2B, take countermeasures to prevent wiring cuttings from coming into contact with the product, such as covering the whole product with a dustproof cover. If wiring cuttings adhere to the PCB or circuit elements they may cause short-circuiting.
- Be sure to perform wiring in accordance with the relevant operation manual. Incorrect wiring may result in burning.
- Use crimp terminals to wire terminal blocks. 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, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Check that the terminal arrangement is correct before assembling and wiring the connectors and the terminal block. Not doing so 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.
- Use the specified connectors and wiring materials to connect to the Board.
- 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.
- Do not touch the battery terminals or charge, disassemble, heat, or incinerate the battery. Do not subject the battery to strong shocks. Doing any of these may result in leakage, rupture, heat generation, or ignition of the battery. Dispose of any battery that has been dropped on the floor or otherwise subjected to excessive shock. Batteries that have been subjected to shock may leak if they are used.
- 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 or Board, be sure to first touch a grounded metallic object in order to discharge any static built-up. Not doing so may result in malfunction or damage.
- When transporting or storing the CPM2B, cover the circuit boards in antistatic material to protect them from static electricity and maintain the proper storage temperature.
- When transporting Units or Boards, always pack them in the boxes specially designed for them, and do not subject them to excessive vibration or shock during transportation. Also, do not drop them.
- Store Boards within the following temperature and humidity ranges.
 - Storage temperature: -20 to 75 °C
 - Storage humidity: 10% to 90% (with no icing or condensation)
- Do not touch the Expansion I/O Unit Connecting Cable while the power is being supplied in order to prevent any malfunction due to static electricity.
- Do not touch CPM2B circuit boards or the components mounted to them with your bare hands. There are sharp leads and other parts on the boards that may cause injury if handled improperly.
- 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.
- Surrounding Air Temperature: 55°C

Reference Manuals

Please be sure to read the related user manuals in order to use the PC safely and properly. Be sure you are using the most current version of the manual.

Name	Cat No.
CPM1 Operation Manual	W262
CPM1A (-V1) Operation Manual	W317
CPM2A Operation Manual	W352
CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual	W353
WS02-CXP1-E CX-Programmer User Manual	W361
SYSMAC-CPT Support Software Quick Start Guide	W332
SYSMAC-CPT Support Software User Manual	W333
SYSMAC Support Software Operation Manual: Basics	W247
SYSMAC Support Software Operation Manual: C-series PCs	W248

Conformance to EU Directives

- Applicable Directives
- EMC Directives
 - Low Voltage Directive

Concepts

EMC Directives

OMRON devices that comply with EU Directives also conform to the related EMC standards so that they can be more easily built into other devices or machines. 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 EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel in which the OMRON devices are installed. The customer must, therefore, perform final checks 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 or 75 to 1,500 VDC meet the required safety standards for the PC (EN61131-2).

Conformance to EU Directives

The CPM1, CPM2A, and version-1 (-V1) CPM1A CPU Units comply with EU Directives. Pre-V1 CPM1A CPU Units comply with EU Directives with the following restrictions.

- Relay Output Units and Transistor Output Units of pre-V1 CPM1A PCs with DC power supplies conform to EU Directives. Relay Output Units, however, conform to EU Directives only when the output load power supply is outside the ranges specified for the Low Voltage Directive (less than 75 VDC or less than 50 VAC).
- Relay Output Units and Transistor Output Units of pre-V1 CPU Units with AC power supplies do not conform to EU Directives.

Expansion I/O Units except for the CM1A-20EDR also comply with EU Directives.

To ensure that the machine or device in which the PC is used complies with EU Directives, the PC must be installed as follows:

- 1, 2, 3...
- The PC must be installed within a control panel.
- Reinforced insulation or double insulation must be used for the DC power supplies used for the PC and I/O power supplies.
- PCs complying with EU Directives (except for pre-V1 CPM1A Relay Output Units) 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 EU Directives even when using PCs that comply with EU Directives.

Relay Output Noise Reduction Methods

The CPM1, CPM2A, and CPM1A CPU Units (except for pre-V1 CPM1A Relay Output Units) conform to the Common Emission Standards (EN50081-2) of the EMC Directives. However, noise generated by relay output switching 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. For more 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 including the PC is less than 5 times per minute.
- Countermeasures are required if the frequency of load switching for the whole system including the PC is 5 or more times per minute.

Countermeasure Examples

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

For examples of circuits, refer to the related operation manuals.

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Note: Specifications subject to change without notice.