

SYSMAC CP-series Programmable Controllers

Safety Precautions

OMRON Corporation

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Thank you for purchasing an OMRON Programmable Controller (PLC). 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, petrochemical plants, 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 Precautions

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 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 (CPU Unit including associated Units; referred to as "PLC"), in order to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC 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 PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. Unexpected operation, however, may still occur for errors in the I/O control section, errors in I/O memory, and other errors that cannot be detected by the self-diagnosis function. As a countermeasure for such all errors, external safety measures must be provided to ensure safety in the system.

• The PLC 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 PLC) 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 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. Not doing so may result in serious accidents.

⚠ WARNING Do not apply the voltage or current outside the specified range to this unit. It may cause a malfunction or fire.

⚠ Caution Pay careful attention to the polarities (+/−) when wiring the DC power supply. A wrong connection may cause malfunction of the system.

⚠ 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 Confirm safety at the destination node before transferring a program to another node or editing the I/O area. Doing either of these without confirming safety may result in injury.

⚠ 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

Do not touch anywhere near the power supply parts or I/O terminals while the power is ON, and immediately after turning OFF the power. The hot surface may cause burn injury.

⚠ Caution

After programming (or re-programming) using the IOWR instruction, confirm that correct operation is possible with the new ladder program and data before starting actual operation. Any irregularities may cause the product to stop operating, resulting in unexpected operation in machinery or equipment.

⚠ Caution

The contents of user program or parameter are saved in non-volatile memory even when the battery is low or when no battery is inserted in the CPU Unit. (Operation will not stop due to a memory error.) Accordingly, the PLC System can be operated even when the battery is low or no battery is inserted. The I/O memory areas backed up by the battery (including the current value of holding relay or counter, up flag and data memory), however, will be unstable in this condition. If the contents of power-off holding areas about the current value of holding relay or counter, up flag and data memory are output by the ladder program, use the Battery Error Flag(A402.04) when 1(ON) to take suitable actions, such as stopping the outputs.

■ 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 Please fit it as foreign matter such as chips or wiring rubbish inside the unit. It becomes a cause of damage by fire, failure and malfunction. Especially during construction, please take measures.

⚠ Caution

The operating environment of the PLC 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 PLC 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 100 Ω or less when installing the Units. Not connecting to a ground of 100 Ω or less may result in electric shock.
- Always turn OFF the power supply to the PLC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
 - Mounting or dismounting Expansion Units or any other Units
 - Connecting or removing the Memory Cassette or Option Board
 - 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 PLC or the system, or could damage the PLC or PLC Units. Always heed these precautions.

- 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 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.
- Be sure to use class-D grounding (The 3rd grounding) during installation work.
- Install the Unit properly as specified in the operation manual. Improper installation of the Unit may result in malfunction.
- Be sure that all the terminal screws and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- The applicable tightening torque is 2.5 Lb In. (0.28 N-m) for CP1W-CIF11/CIF12.
- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- Wire correctly and double-check all the wiring or the setting switches before turning ON the power supply. Incorrect wiring may result in burning.
- Mount the Unit only after checking the connectors and terminal blocks completely.
- Be sure that the terminal blocks, connectors, Option Boards, and other items with locking devices are properly locked into place. Improper locking 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.
- Check that the DIP switches and data memory (DM) are properly set before starting 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 PLC (including the setting of the startup operating mode).
 - 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 and/or Special I/O Units the contents of the DM, HR, and CNT 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.
- 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 built-up. Not doing so may result in malfunction or damage.
- Do not touch the Expansion I/O Unit Connecting Cable while the power is being supplied in order to prevent malfunction due to static electricity.
- Do not turn OFF the power supply to the Unit while data is being transferred.
- When transporting or storing the product, cover the PCBs and the Units or put there in the antistatic bag with electrically conductive materials to prevent LSI and ICs from being damaged by static electricity, and also keep the product within the specified storage temperature range.

- Do not touch the mounted parts or the rear surface of PCBs because PCBs have sharp edges such as electrical leads.
- Double-check the pin numbers when assembling and wiring the connectors.
- Wire correctly according to specified procedures.
- Do not connect pin 6 (+5V) on the RS-232C Option Board on the CPU Unit to any external device other than the NT-AL001 or CJ1W-CIF11 Conversion Adapter or NV3W-M□20L Programmable terminal. The external device and the CPU Unit may be damaged.
- Use the dedicated connecting cables specified in operation manuals to connect the Units. Using commercially available RS-232C computer cables may cause failures in external devices or the CPU Unit.
- Check that data link tables and parameters are properly set before starting operation. Not doing so may result in unexpected operation. Even if the tables and parameters are properly set, confirm that no adverse effects will occur in the system before running or stopping data links.
- Transfer a routing table to the CPU Unit only after confirming that no adverse effects will be caused by restarting CPU Bus Units, which is automatically done to make the new tables effective.

- The user program and parameter area data in the CPU Unit is backed up in the built-in flash memory. The BKUP indicator will light on the front of the CPU Unit when the backup operation is in progress. Do not turn OFF the power supply to the CPU Unit when the BKUP indicator is lit. The data will not be backed up if power is turned OFF.
- Do not turn OFF the power supply to the PLC while the Memory Cassette is being accessed. Doing so may corrupt the data in the Memory Cassette. The 7-segment LED will light to indicate writing progress and the BKUP indicator will light while the Memory Cassette is being accessed. Wait for the 7-segment LED display and the BKUP indicator to go out before turning OFF the power supply to the PLC.

- When replacing the battery for a Unit, be sure to follow the procedure described in that Unit's operation manual.
- Always use the following size wire when connecting I/O Units, Special I/O Units, and CPU Bus Units: AWG22 to AWG18 (0.32 to 0.82 mm²).
- Dispose of the product and batteries according to local ordinances as they apply. Have qualified specialists properly dispose of used batteries as industrial waste.

- The following precaution must be displayed on all products containing lithium primary batteries with a perchlorate content of 6 ppb or higher when exporting them to or shipping them through California, USA. Perchlorate Material - special handling may apply. See <http://www.dtsc.ca.gov/hazardouswaste/perchlorate>
- The CP1 Series PLC contains a lithium primary battery with a perchlorate content of 6 ppb or higher. When exporting a product containing the CP1 Series PLC to or shipping such a product through California, USA, label all packing and shipping containers appropriately.
- To avoid malfunction and static damage to precision components of the CPU Unit, we recommend that the battery replacement work should be implemented unpowered state. It is possible to replace the battery without having to turn OFF the power while the power is on, in which case, please enter the replacement after discharge static electricity from your body such as by touching a grounded metal object.

- It is defined by UL standard that battery replacement should be performed by the skilled engineer. The skilled engineer needs to take the charge of the replacement. Moreover, please exchange the method indicated in the manual.
- Never short-circuit the positive and negative terminals of a battery or charge, disassemble, heat or incinerate the battery. Do not subject the battery to strong shocks or deform the battery by applying pressure. 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.
- This product is EMC compliant when assembled in a complete PLC system of the specified PLC Series. For earthing, selection of cable, and any other conditions for EMC compliance, refer to the manual for installation.
- This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.
- Don't push the buttons and LCD with sharp things.

■ Optional Products

- Be sure to install the following optional products in the PLC before use.

Optional product	Applicable PLC			
	CP1E-□□	CP1L-E□□	CP1L-□□	CP1H-□□
RS-232C Option Board CP1W-CIF01	Can be used	Can be used	Can be used	Can be used
RS-422A/485 Option Board CP1W-CIF11/CIF12				
Ethernet Option Board CP1W-CIF41	Can be used version 2.0 or later	Can not be used		
Analog Option Board CP1W-MAB221/AD B21/DAB21V	Can be used*	Can be used	Can not be used	Can not be used
Data Access Module CP1W-DM01	Can not be used		Can be used	Can be used
Memory Cassette CP1W-ME05M				
I/O Connection Cable CP1W-CN811	Can be used			
CJ-series Unit Adapter CP1W-EXT01	Can not be used	Can not be used	Can not be used	

*Note: Can be used only CP1E unit version 1.2 or later

■ CJ-series Unit Connection Precautions

- When connecting the CJ-series Unit Adapter to a CJ-series Special I/O Unit, or CPU Bus Unit, slide the upper and lower sliders until a click sound is heard to lock them securely. Desired functionality may not be achieved unless Units are securely locked in place.
- Be sure to mount the end cover supplied with the CJ-series Unit Adapter to the rightmost CJ-series Unit. Unless the end cover is properly mounted, the Units may not function properly.

■ Reference Manuals

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

Name	Cat No.
SYSMAC CP-series CP1H Programmable Controllers Operation Manual	W450
SYSMAC CP-series CP1L Programmable Controllers Introduction Manual	W461
SYSMAC CP-series CP1L Programmable Controllers Operation Manual	W462
SYSMAC CP-series CP1H/CP1L Programmable Controllers Programming Manual	W451
SYSMAC CP-series CP1L-EL/EM Programmable Controllers Operation Manual	W516
SYSMAC CP Series CP1E CPU Unit Hardware User's Manual	W479
SYSMAC CP Series CP1E CPU Unit Software User's Manual	W480
SYSMAC CP Series CP1E CPU Unit Instructions Reference Manual	W483
SYSMAC CS/CJ-series Communications Commands Reference Manual CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1W-SCB21-V1/41-V1, CS1W-SCU21-V1, CJ1G-CPU□□, CJ1G/H-CPU□□H, CJ1M-CPU□□, CJ1W-SCU21-V1/41-V1, CP1H-X40DD-□, CP1H-XA40DD-□, CP1H-Y20TD-D	W342
SYSMAC CJ-series Position Control Units Operation Manual CJ1W-NCF71	W426
SYSMAC CJ-series Motion Control Units Operation Manual CJ1W-MCH71	W435
SYSMAC CX-Programmer Ver. 9 Operation Manual CXONE-AL□□C-V4/AL□□D-V4	W446
SYSMAC CX-Programmer Ver. 9.□ Operation Manual Function Blocks/Structured Texts CXONE-AL□□C-V4/AL□□D-V4	W447
SYSMAC CX-Protocol Ver. 1.9 Operation Manual WS02-PSTC1-E	W344
SYSMAC CX-Simulator Ver. 1.9 Operation Manual WS02-SIMC1-E	W366

Conformance to KC

This is a Class A product (for industrial environments). In a residential environment, it may cause radio interference, in which case the user may be required to take appropriate measures.

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Note: Specifications subject to change without notice.

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