## **SYSMAC CJ Series**

CJ2H-CPU6□-EIP

CJ2H-CPU6□

CJ2M-CPU□□

# **CJ2 CPU Unit Hardware**

# **USER'S MANUAL**

OMRON

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SYSMAC CJ Series
CJ2H-CPU6□-EIP
CJ2H-CPU6□
CJ2M-CPU□□
CJ2 CPU Unit Hardware

**User's Manual** 

Revised July 2017

## Introduction

Thank you for purchasing a CJ-series CJ2H-CPU6 (-EIP) or CJ2M-CPU Programmable Controller. This manual contains information required to use the CJ2H-CPU6 (-EIP) and CJ2M-CPU Please thoroughly read and understand this manual before you use the CJ2H-CPU6 (-EIP).

### **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.

## **Applicable Products**

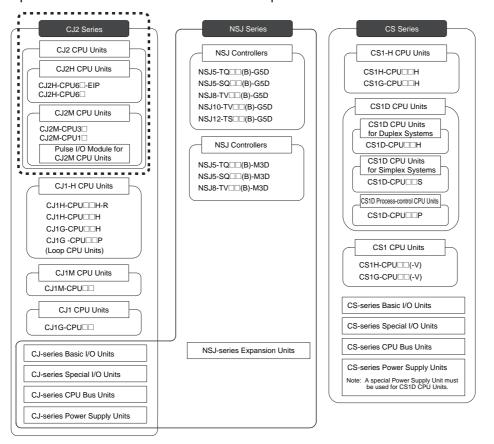
CJ-series CJ2 CPU Units

- CJ2H-CPU6□-EIP
- CJ2H-CPU6□
- CJ2M-CPU3□
- CJ2M-CPU1□

In this manual, the following notation is used to indicate the CPU Units.

- CJ2H-CPU6□(-EIP): Indicates the CJ2H-CPU6□-EIP and CJ2H-CPU6□ CPU Units.
- CJ2M-CPU□□: Indicates the CJ2M-CPU3□ and CJ2M-CPU1□ CPU Units.

Optional Pulse I/O Modules can be used for pulse I/O with a CJ2M CPU Unit.



## **CJ2 CPU Unit Manuals**

Information on the CJ2 CPU Units is provided in the following manuals. Refer to the appropriate manual for the information that is required.

Mounting and Setting Hardware	This Manual CJ-series CJ2 CPU Unit Hardware User's Manual (Cat. No. W472)	CJ-series CJ2 CPU Unit Software User's Manual (Cat. No. W473)  CS/CJ/NSJ Series Instructions Reference Manual (Cat. No. W474)	CJ2M CPU Unit Pulse I/O Module User's Manual (Cat. No. W486)
2 Wiring	Unit part names and specifications Basic system configuration Unit mounting procedure Setting procedure for DIP switch and rotary switches on the front of the CPU Unit For details on built-in EtherNet/IP port, refer to the EtherNet/IP Unit Operation Manual (W465)		Specifications and wiring of Pulse I/O Modules Available pulse I/O functions and allocations
Connecting Online to the PLC	Wiring the Power Supply Unit Wring Basic I/O Units and external I/O devices		Pulse I/O Module specifications Wiring methods between Pulse I/O Modules and external I/O devices
Software Setup	CX-Programmer Support Software Connecting Cables	Procedures for connecting the CX-Programmer Support Software	
Creating the 5 Program	e	Software setting methods for the CPU Unit (including I/O memory allocation, PLC Setup settings, Special I/O Unit parameters, CPU Bus Unit parameters, and routing tables.)  For details on built-in EtherNet/IP port, refer to the EtherNet/IP Unit Operation Manual (W465).	Software setting procedures for Pulse I/O Modules (I/O memory allocations and PLC Setup settings)
Checking and Debugging 6 Operation		Program types and basic information CPU Unit operation Internal memory Data management using file memory in the CPU Unit Built-in CPU functions Settings	Pulse I/O functions
Maintenanc and Troubleshoo		Checking I/O wiring, setting the Auxiliary Area settings, and performing trial operation Monitoring and debugging with the CX-Programmer	
	Error codes and remedies if a problem occurs		

## **Manual Configuration**

The CJ2 CPU manuals are organized in the sections listed in the following tables. Refer to the appropriate section in the manuals as required.

### Hardware User's Manual (Cat. No. W472) (This Manual)

Section	Content
Section 1 Overview	This section gives an overview of the CJ2 CPU Units and describes the features and specifications.
Section 2 Basic System Configuration and Devices	This section describes the system configuration for the CJ2 CPU Unit.
Section 3 Nomenclature and Functions	This section describes the part names and functions of the CPU Unit and Configuration Units.
Section 4 Support Software	This section describes the types of Support Software to use to perform programming and debugging and how to connect the PLC to the Support Software.
Section 5 Installation	This section describes the installation locations and how to wire CPU Units and Configuration Units.
Section 6 Troubleshooting	This section describes how to check the status for errors that occur during system operation and the remedies for those errors.
Section 7 Inspection and Maintenance	This section describes periodic inspection, the service life of the Battery and Power Supply Unit, and how to replace the Battery.
Section 8 Backup Operations	This section describes the procedure to back up PLC data.
Appendices	The appendices provide Unit dimensions, details on fatal and non-fatal errors, information on connecting to serial ports on the CPU Unit, the procedure for installing the USB driver on a computer, and information on load short-circuit protection and line disconnection detection.

### Software User's Manual (Cat. No. W473)

Section	Content
Section 1 Overview	This section gives an overview of the CJ2 CPU Units and describes the features and specifications.
Section 2 Internal Memory in the CPU Unit	This section describes the types of memory in the CPU Unit and the data that is stored.
Section 3 CPU Unit Operation	This section describes the internal operation of the CPU Unit.
Section 4 CPU Unit Initialization	This section describes the initial setup of the CPU Unit.
Section 5 Understanding Programming	This section describes program types and programming details, such as symbols and programming instructions.
Section 6 I/O Memory Areas	This section describes the I/O memory areas in the CPU Unit.
Section 7 File Operations	This section describes the files that can be stored in the CPU Unit, the storage destination for those files, and file operations.
Section 8 I/O Allocations and Unit Settings	This section describes the I/O allocations used to exchange data between the CPU Unit and other Units.
Section 9 PLC Setup	This section describes details on the PLC Setup settings, which are used to perform basic settings for the CPU Unit.
Section 10 CPU Unit Functions	This section describes functions that are built into the CPU Unit.
Section 11 Programming Devices and Communications	This section describes the procedure for connecting the CJ2 CPU Unit to the CX-Programmer or other Support Software and to other devices.
Section 12 CPU Unit Cycle Time	This section describes how to monitor and calculate the cycle time.
Appendices	The appendices provide information on programming instructions, execution times, number of steps, Auxiliary Area words and bits, a memory map of the continuous PLC memory addresses, I/O memory operation when power is interrupted, and a comparison of CJ-series and CS-series PLCs.

## Instructions Reference Manual (Cat. No. W474)

Section	Content
Section 1 Basic Understanding of Instructions	This section provides basic information on designing ladder programs for a CS/CJ/NSJ-series CPU Unit.
Section 2 Summary of Instructions	This section provides a summary of instructions used with a CS/CJ/NSJ-series CPU Unit.
Section 3 Instructions	This section describes the functions, operands and sample programs of the instructions that are supported by a CS/CJ/NSJ-series CPU Unit.
Section 4 Instruction Execution Times and Number of Steps	This section provides the instruction execution times for each CS/CJ/NSJ-series CPU Unit instruction.
Appendices	The appendices provide a list of instructions by function code and by mnemonic and an ASCII table for the CS/CJ/NSJ-series CPU Units.

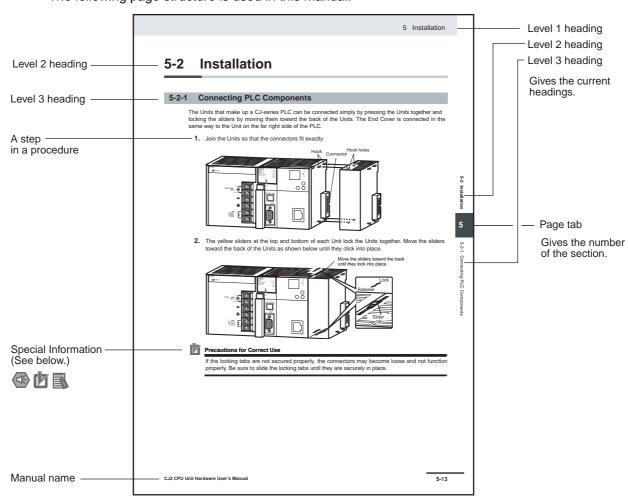
## Pulse I/O Module User's Manual (Cat. No. W486)

Section	Content
Section 1 Overview	This section gives an overview of the Pulse I/O Modules and the pulse I/O functions of the CJ2M.
Section 2 I/O Application Procedures and Function Allocations	This section lists the pulse functions of the CJ2M CPU Units and describes the overall application flow and the allocation of the functions.
Section 3 I/O Specifications and Wiring for Pulse I/O Modules	This section provides the I/O specifications and describes the wiring of the Pulse I/O Module.
Section 4 General-purpose I/O	This section describes the general-purpose I/O.
Section 5 Quick-response Inputs	This section describes the quick-response function that can be used to input signals that are shorter than the cycle time.
Section 6 Interrupts	This section describes the interrupt input function.
Section 7 High-speed Counters	This section describes the high-speed counter inputs and high-speed counter interrupts.
Section 8 Pulse Outputs	This section describes positioning functions, such as trapezoidal control, S-curve control, jogging, and origin search functions.
Section 9 PWM Outputs	This section describes the variable-duty-factor (PWM) outputs.
Appendices	The appendices provide a table of flag changes for pulse outputs, a comparison table with other models, and a performance table.

## **Manual Structure**

### **Page Structure**

The following page structure is used in this manual.



This illustration is provided only as a sample and may not literally appear in this manual.

## **Special Information**

Special information in this manual is classified as follows:



#### **Precautions for Safe Use**

Precautions on what to do and what not to do to ensure using the product safely.



### **Precautions for Correct Use**

Precautions on what to do and what not to do to ensure proper operation and performance.



#### **Additional Information**

Additional information to increase understanding or make operation easier.

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### Warranty, Limitations of Liability

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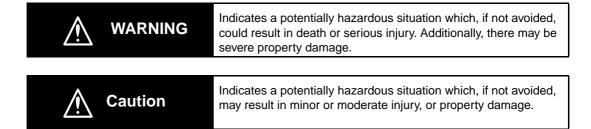
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## **Safety Precautions**

### **Definition of Precautionary Information**

The following notation is used in this manual to provide precautions required to ensure safe usage of a CJ-series PLC. The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.





Indicates precautions on what to do and what not to do to ensure using the product safely.

## Precautions for Correct Use

Indicates precautions on what to do and what not to do to ensure proper operation and performance.

### **Symbols**



The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for electric shock.



The circle and slash symbol indicates operations that you must not do. The specific operation is shown in the circle and explained in text.



The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.



The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution.



The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for hot surfaces.

## **M** WARNING

Do not attempt to take any Unit apart or touch the inside of any Unit while the power is being supplied. Doing so may result in electric shock.



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



Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the Programmable Controller or another external factor affecting the operation of the Programmable Controller. "Programmable Controller" indicates the CPU Unit and all other Units and is abbreviated "PLC" in this manual. 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 all such 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.
- Provide measures in the computer system and programming to ensure safety in the overall system even if communications errors or malfunctions occur in data link communications or remote I/O communications.

Confirm safety before transferring data files stored in the file memory (Memory Card or EM file memory) to the I/O area (CIO) of the CPU Unit using a peripheral tool. Otherwise, the devices connected to the output unit may malfunction regardless of the operation mode of the CPU Unit.



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. Serious accidents may result from abnormal operation if proper measures are not provided.



## **⚠** 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.



Confirm safety at the destination node before transferring a program, PLC Setup, I/O tables, I/O memory contents, or parameters to another node or changing contents of the any of these items. Transferring or changing data can result in unexpected system operation.



The CJ2 CPU Units automatically back up the user program and parameter data to flash memory when these are written to the CPU Unit. I/O memory including the DM, EM, and Holding Areas), however, is not written to flash memory.



The DM, EM, and Holding Areas can be held during power interruptions with a battery. If there is a battery error, the contents of these areas may not be accurate after a power interruption. If the contents of the DM, EM, and Holding Areas are used to control external outputs, prevent inappropriate outputs from being made whenever the Battery Error Flag (A402.04) is ON.

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



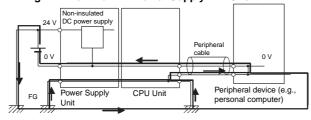
Do not touch the Power Supply Unit when power is being supplied or immediately after the power supply is turned OFF. The Power Supply Unit will be hot and you may be burned.



When connecting a personal computer or other peripheral device to a PLC to which a non-insulated Power Supply Unit (CJ1W-PD022) is mounted, either ground the 0 V side of the external power supply or do not ground the external power supply at all ground. A short-circuit will occur in the external power supply if incorrect grounding methods are used. Never ground the 24 V side, as shown below.



Wiring in Which the 24-V Power Supply Will Short



## **Application Precautions**

Observe the following precautions when using a CJ-series PLC.

#### Power Supply

- Always use the power supply voltages specified in the user's manuals. An incorrect voltage may result in malfunction or burning.
- Exceeding the capacity of the Power Supply Unit may prevent the CPU Unit or other Units from starting.
- 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.
- 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 Power Supply Units, I/O Units, CPU Units, Option Boards, Pulse I/O Modules or any other Units.
  - · Assembling the Units.
  - Setting DIP switches or rotary switches.
  - Connecting cables or wiring the system.
  - Connecting or disconnecting the connectors.
- When cross-wiring terminals, the total current for all the terminal will flow in the wire. Make sure that the current capacity of the wire is sufficient.
- Observe the following precautions when using a Power Supply Unit that supports the Replacement Notification Function.
  - Replace the Power Supply Unit within six months if the display on the front of the Power Supply Unit alternates between 0.0 and A02, or if the alarm output automatically turns OFF.
  - · Keep the alarm output cable separated from power line and high-voltage lines.
  - Do not apply a voltage or connect a load exceeding the specifications to the alarm output.
  - When storing the Power Supply Unit for more than three months, store it at –20 to 30°C and 25% to 70% humidity to preserve the Replacement Notification Function.
  - If the Power Supply Unit is not installed properly, heat buildup may cause the replacement notification signal to appear at the wrong time or may cause interior elements to deteriorate or become damaged. Use only the standard installation method.
- Do not touch the terminals on the Power Supply Unit immediately after turning OFF the power supply. Residual voltage may cause electrical shock.
- Observe the following precautions to prevent failure due to difference in electrical potential if the computer is connected to the PLC.
  - Before connecting a laptop computer to the PLC, disconnect the power supply plug of the computer from the AC outlet. Residual current in the AC adaptor may cause difference in electrical potential to occur between the computer and the PLC. After you connect the computer and PLC, supply the power again from the AC adaptor.
  - If the computer has an FG terminal, make the connections so that it has the same electrical potential as the FG (GR) terminal on the PLC.
- If the computer is grounded to a separate location, difference in electrical potential may occur depending on the grounding conditions.

#### Installation

- Do not install the PLC near sources of strong high-frequency noise.
- Before touching a 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.

- Be sure that the terminal blocks, connectors, Memory Cards, Option Boards, Pulse I/O Modules, expansion cables, and other items with locking devices are properly locked into place.
- The sliders on the tops and bottoms of the Power Supply Unit, CPU Unit, I/O Units, Special I/O Units, CPU Bus Units, and Pulse I/O Modules must be completely locked (until they click into place) after connecting to adjacent Units.

The Unit may not operate properly if the sliders are not locked in place.

#### Wiring

- Follow the instructions in this manual to correctly perform wiring.
- Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring
  may result in burning.
- Be sure that all terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Mount terminal blocks and connectors only after checking the mounting location carefully.
- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction if foreign matter enters the Unit.
- 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.
- Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.
- Always connect to a ground of 100 Ω or less when installing the Units. Not connecting to a ground of 100 Ω or less may result in electric shock.
   A ground of 100 Ω or less must be installed when shorting the GR and LG terminals on the Power Supply Unit.
- Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- 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 or other wiring lines. Doing so may break the cables.
- Do not use commercially available RS-232C personal computer cables. Always use the special cables listed in this manual or make cables according to manual specifications. Using commercially available cables may damage the external devices or CPU Unit.
- Never connect pin 6 (5-V power supply) on the RS-232C port on the CPU Unit to any device other than an NT-AL001 Link Adapter, CJ1W-CIF11 Converter, and Programmable Terminals (NV3W-M□20L). The external device or the CPU Unit may be damaged.

### Handling

- The Power Supply Unit may possibly be damaged if the entire voltage for a dielectric strength test
  is applied or shut OFF suddenly using a switch. Use a variable resistor to gradually increase and
  decrease the voltage.
- Separate the line ground terminal (LG) from the functional ground terminal (GR) on the Power Supply Unit before performing withstand voltage tests or insulation resistance tests. Not doing so may result in burning.
- Make sure that the DIP switches and DM Area are set correctly before starting operation.
- After replacing the CPU Unit, a Special I/O Unit, or a CPU Bus Unit, make sure that the required data for the DM Area, Holding Area, and other memory areas has been transferred to the new Unit before restarting 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.
- Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.
- Do not drop the PLC or subject abnormal vibration or shock to it.
- The life of the battery will be reduced if the PLC is left for a period of time without a battery installed and without power supply, and then a battery is installed without turning ON the power supply.
- Replace the battery as soon as a battery error occurs or as soon as the specified battery backup time expires. Be sure to install a replacement battery within two years of the production date shown on the battery's label.
- Before replacing the battery, turn ON power for at least 5 minutes before starting the replacement procedure and complete replacing the battery within 5 minutes of turning OFF the power supply.
   Memory contents may be corrupted if this precaution is not obeyed.
- If the Battery Error Flag is used in programming the application, confirm system safety even if the system detects a battery error before you replace the battery while the power is ON.
- Do not short 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.
- UL standards require that only an experienced engineer can replace the battery. Make sure that
  an experienced engineer is in charge of battery replacement. Follow the procedure for battery
  replacement given in this manual.
- · Dispose of the product and batteries according to local ordinances as they apply.



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- If the I/O Hold Bit is turned ON, the outputs from the PLC will not be turned OFF and will maintain
  their previous status when the PLC is switched from RUN or MONITOR mode to PROGRAM
  mode. Make sure that the external loads will not produce dangerous conditions when this occurs.
  (When operation stops for a fatal error, including those produced with the FALS(007) instruction,
  all outputs from Output Unit will be turned OFF and only the internal output status will be maintained.)
- Unexpected operation may result if inappropriate data link tables or parameters are set. Even if appropriate data link tables and parameters have been set, confirm that the controlled system will not be adversely affected before starting or stopping data links.
- Write programs so that any data that is received for data link communications is used only if there
  are no errors in the CPU Units that are the sources of the data. Use the CPU Unit error information in the status flags to check for errors in the source CPU Units. If there are errors in source
  CPU Units, they may send incorrect data.
- All CPU Bus Units will be restarted when routing tables are transferred from a Programming Device to the CPU Unit. Restarting these Units is required to read and enable the new routing tables. Confirm that the system will not be adversely affected before transferring the routing tables.
- Tag data links will stop between related nodes while tag data link parameters are being transferred during PLC operation. Confirm that the system will not be adversely affected before transferring the tag data link parameters.
- If there is interference with network communications, output status will depend on the devices that
  are being used. When using devices with outputs, confirm the operation that will occur when there
  is interference with communications, and implement safety measures as required.

- When creating an AUTOEXEC.IOM file from a Programming Device (a Programming Console or the CX-Programmer) to automatically transfer data at startup, set the first write address to D20000 and be sure that the size of data written does not exceed the size of the DM Area. When the data file is read from the Memory Card at startup, data will be written in the CPU Unit starting at D20000 even if another address was set when the AUTOEXEC.IOM file was created. Also, if the DM Area is exceeded (which is possible when the CX-Programmer is used), the remaining data will be written to the EM Area.
- The user program and parameter area data in the CJ2 CPU Units are 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.
- Check the user program and Unit parameter settings for proper execution before actually running them on the Unit. Not checking the program and parameter settings may result in an unexpected operation.
- When setting a Special I/O Unit or CPU Bus Unit in the I/O tables, carefully check the safety of the devices at the connection target before restarting the Unit.
- Do not turn OFF the power supply to the PLC when reading or writing a Memory Card. Also, do not remove the Memory Card when the BUSY indicator is lit. Doing so may make the Memory Card unusable.
  - To remove a Memory Card, first press the memory card power supply switch and then wait for the BUSY indicator to go out before removing the Memory Card.
- When restoring data, carefully check that the selected data is the correct data to be restored before executing the restore operation. Depending on the contents of the selected data, the control system may operate unexpectedly after the data is restored.
- Some Special I/O Units and CPU Bus Units operate with parameters stored in the CPU Unit (e.g., words allocated in DM Area, data link tables, or Ethernet settings). Information on restrictions will be displayed in the Information Area in the PLC Backup Tool if there are any restrictions for the selected CPU Bus Unit or Special I/O Unit. Check the restrictions, and then be sure to select both the CPU Unit and the CPU Bus Unit or Special I/O Unit when backing up or restoring data. The control system may operate unexpectedly if the equipment is started with the data backed up or restored without selecting both Units.
- Information on restrictions will be displayed in the Information Area in the PLC Backup Tool if the
  data to be stored includes a Unit that has restrictions on backup. Check the information on restrictions and take the required countermeasures. The control system may operate unexpectedly
  when the equipment is operated after the data is restored
- Before restoring data during PLC operation, be sure that there will be no problem if PLC operation stops. If the PLC stops at an unexpected time, the control system may operate unexpectedly.
- Be sure to turn the PLC power supply OFF and then back ON after restoring data. If the power is not reset, the system may not be updated with the restored data, and the control system may operate unexpectedly.
- Data on forced status can be backed up but it cannot be restored. Perform the procedure to forceset or force-reset bits from the CX-Programmer as required before starting operation after restoring data that includes forced status. Depending on the difference in the forced status, the control system may operate unexpectedly.
- If a symbol or memory address (only symbols are allowed for ST programming) is specified for the suffix of an array variable in ladder or ST programming, be sure that the specified element number does not exceed the maximum memory area range.
   Specifying an element number that exceeds the maximum range of the memory area specified for the symbol will result accessing data in a different memory area, and may result in unexpected
- If a symbol or address is specified for an offset in a ladder diagram, program so that the memory
  area of the start address is not exceeded when the offset is specified indirectly using a word
  address or symbol.
  - If an indirect specification causes the address to exceed the area of the start address, the system will access data in other area, and unexpected operation may occur.

operation.

### • External Circuits

- Always turn ON power to the PLC before turning ON power to the control system. If the PLC power supply is turned ON after the control power supply, temporary errors may result in control system signals because the output terminals on DC Output Units and other Units will momentarily turn ON when power is turned ON to the PLC.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.

## **Operating Environment Precautions**

- Follow the instructions in this manual to correctly perform installation.
- Do not operate the control system in the following locations:
  - · 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.
- 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.

## **Regulations and Standards**

### **Conformance to EC Directives**

### **Applicable Directives**

- EMC Directives
- · Low Voltage Directive

### **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.

\* Applicable EMC (Electromagnetic Compatibility) standards are as follows:

EMS (Electromagnetic Susceptibility):

CS Series: EN 61131-2 and EN 61000-6-2

CJ Series: EN 61000-6-2

\* EMI (Electromagnetic Interference):

EN 61000-6-4 (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 PLC (EN 61131-2).

#### Conformance to EC Directives

The CJ-series PLCs comply with EC Directives. To ensure that the machine or device in which the CJ-series PLC is used complies with EC Directives, the PLC must be installed as follows:

- The CJ-series PLC must be installed within a control panel.
- You must use reinforced insulation or double insulation for the DC power supplies connected to DC Power Supply Units and I/O Units.
- CJ-series PLCs complying with EC Directives also conform to the Common Emission Standard (EN 61000-6-4). 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.

### **Conformance to Shipbuilding Standards**

This product conforms to the following shipbuilding standards. Applicability to the shipbuilding standards is based on certain usage conditions. It may not be possible to use the product in some locations. Contact your OMRON representative before attempting to use a PLC on a ship.

### Usage Conditions for NK and LR Shipbuilding Standards

### • Usage Conditions for Applications Other Than on the Bridge or Deck

- The PLC must be installed in a control panel.
- Gaps in the door to the control panel must be completely filled or covered with gaskets or other material.

### Usage Conditions for Bridge and Deck (Certified Only by NK)

- The PLC must be installed in a control panel.
- Gaps in the door to the control panel must be completely filled or covered with gaskets or other material.
- The following noise filter must be connected to the power supply line.

#### **Noise Filter**

Manufacturer	Cosel Co., Ltd.
Model	TAH-06-683

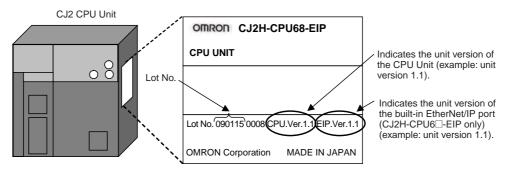
## **Unit Versions of CJ2 CPU Units**

### **Unit Versions**

A "unit version" has been introduced to manage CJ2 CPU Units according to differences in functionality accompanying version upgrades.

### **Notation of Unit Versions on Products**

The unit version is given to the right of the lot number on the nameplate of the products for which unit versions are being managed, as shown below.



## **Confirming Unit Versions with Support Software**

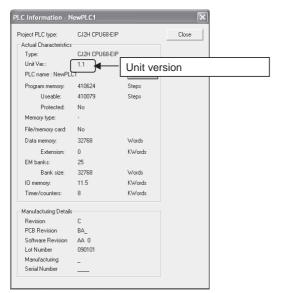
CX-Programmer can be used to confirm the unit version using one of the following two methods.

- Using the PLC Information
- Using the *Unit Manufacturing Information* (This method can be used for Special I/O Units and CPU Bus Units as well.)

#### PLC Information

- **1** Use one of the following methods to display the PLC Information Dialog Box.
- If you know the device type and CPU type, select them in the *Change PLC* Dialog Box, go online, and select *PLC Edit Information* from the menus.
- If you don't know the device type and CPU type, but are connected directly to the CPU Unit on a serial line, select PLC - Auto Online to go online, and then select PLC - Edit - Information from the menus.

2 In either case, the following *PLC Information* Dialog Box will be displayed.



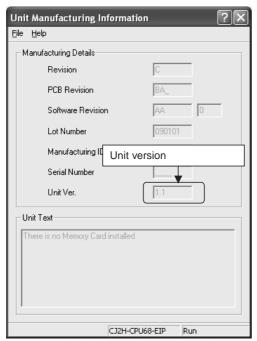
Use the above display to confirm the unit version of the CPU Unit.

### Unit Manufacturing Information

1 In the IO Table Window, right-click and select Unit Manufacturing information - CPU Unit.



**2** The following *Unit Manufacturing information* Dialog Box will be displayed.



Use the above display to confirm the unit version of the CPU Unit connected online.

## **3** Using the Unit Version Labels

The following unit version labels are provided with the CPU Unit.



These labels can be attached to the front of previous CPU Units to differentiate between CPU Units of different unit versions.

## **Unit Versions**

Item	Models	Unit version			
CJ2H CPU Unit	CJ2H-CPU6□-EIP	Unit version 1.0 (Built-in EtherNet/IP section: Unit version 2.0)			
		Unit version 1.1 (Built-in EtherNet/IP section: Unit version 2.0)			
		Unit version 1.2 (Built-in EtherNet/IP section: Unit version 2.0)			
		Unit version 1.3 (Built-in EtherNet/IP section: Unit version 2.0)			
		Unit version 1.4 (Built-in EtherNet/IP section: Unit version 2.0)			
		Unit version 1.5 (Built-in EtherNet/IP section: Unit version 3.0)			
	CJ2H-CPU6□	Unit version 1.1			
		Unit version 1.2			
		Unit version 1.3			
		Unit version 1.4			
		Unit version 1.5			
CJ2M CPU Unit	CJ2M-CPU3□	Unit version 1.0 (Built-in EtherNet/IP section: Unit version 2.0)			
		Unit version 2.0 (Built-in EtherNet/IP section: Unit version 2.0)			
		Unit version 2.0 (Built-in EtherNet/IP section: Unit version 2.1)			
		Unit version 2.1 (Built-in EtherNet/IP section: Unit version 2.1)			
	CJ2M-CPU1□	Unit version 1.0			
		Unit version 2.0			
		Unit version 2.1			

## Unit Versions and Programming Devices

The following tables show the relationship between unit versions and CX-Programmer versions. Refer to *A-8 Functions Supported for Unit Versions* for the functions supported by each unit version.

### Unit Versions and Programming Devices

						Required Programming Device								
CPU Unit		Functions		CX-Programmer										
				Ver. 7.1 or lower	Ver. 8.0	Ver. 8.2 or higher	Ver. 9.0	Ver. 9.1	Ver. 9.2	Ver. 9.3	Ver. 9.6	- Program- ming Console		
CJ2H	2H CJ2H-CPU6□-EIP Function Unit version 1.0		Functions for unit version 1.0		OK	OK	ОК	OK	OK	OK	OK	*3		
	CJ2H-CPU6□-EIP Unit version 1.1	Functions added for unit version 1.1	Using new functions			OK*2	ОК	ОК	ОК	ОК	ОК			
			Not using new functions		OK*1	ОК	ОК	ОК	OK	ОК	ОК			
	CJ2H-CPU6□ Unit version 1.1	Functions added for unit version 1.1	Using new functions			OK*2	OK	OK	OK	OK	OK			
			Not using new functions			ОК	ОК	ОК	ОК	ОК	ОК			
	CJ2H-CPU6□-(EIP) Unit version 1.2	Functions added for unit version 1.2	Using new functions				OK	OK	OK	OK	OK			
			Not using new functions		OK*1	OK*1	ОК	ОК	OK	OK	ОК			
	CJ2H-CPU6□-(EIP) Unit version 1.3	Functions added for unit version 1.3	Using new functions					ОК	ОК	ОК	ОК	- -		
			Not using new functions		OK*1	OK*1	ОК	ОК	OK	ОК	ОК			
	CJ2H-CPU6□-(EIP) Unit version 1.4	Functions added for unit version 1.4	Using new functions							ОК	ОК			
			Not using new functions		OK*1	OK*1	ОК	ОК	ОК	ОК	ОК			
	CJ2H-CPU6□-(EIP) Unit version 1.5	Functions added for unit version 1.5	Using new functions								ОК			
			Not using new functions		OK*1	OK*1	ОК	ОК	OK	ОК	ОК			
CJ2M	CJ2M-CPU□□ Unit version 1.0	Functions for unit version 1.0						ОК	OK	OK	OK			
Vé C.	CJ2M-CPU□□ Unit version 2.0	Functions added for unit version 2.0	Using new functions						ОК	ОК	ОК			
			Not using new functions					OK*1	OK	ОК	OK			
	CJ2M-CPU□□ Unit version 2.1	Functions added for unit version 2.1	Using new functions								OK			
			Not using new functions					OK*1	OK	OK	OK			

<sup>\*1</sup> It is not necessary to upgrade the version of the CX-Programmer if functionality that was enhanced for the upgrade of the CPU Unit will not be used.

<sup>\*2</sup> CX-Programmer version 8.2 or higher is required to use the functions added for unit version 1.1. The high-speed interrupt function and changing the minimum cycle time setting in MONITOR mode, however, are also supported by CX-Programmer version 8.02.

<sup>\*3</sup> A Programming Console cannot be used with a CJ2 CPU Unit.

### • Pull-down List for PLC Models

Unit versions are not differentiated in the pull-down list for PLC models in the Change PLC Dialog Box of the CX-Programmer. Select as shown in the following table regardless of the unit version.

Series	CPU Unit	Model number	PLC model in Change PLC Dialog Box in CX-Programmer version 9.0 or higher
CJ Series	CJ2H CPU Unit	CJ2H-CPU6□-EIP CJ2H-CPU6□	CJ2H
	CJ2M CPU Unit	CJ2M-CPU3□ CJ2M-CPU1□	CJ2M

### <u>Troubleshooting Problems with Unit Versions on the CX-Programmer</u>

Problem	Cause	Solution		
Unable to download program(s). Errors found during compilation  OK  After the above message is displayed, a compiling error will be displayed on the Compile Tab Page in the Output Window.	An attempt was made to download a program containing instructions supported only by later unit versions or a CPU Unit to a previous unit version.	Check the program or change to a CPU Unit with a later unit version.		
It selve to trans.   It selve to transfer the settings seen they include cetting them with the total supported by the common graph Chit see   Sheet the review of the taken Chit see the following ELC Settings, and therefore the pestings again.     FIRST Protection Settings for FIRST write protection via network.     OR.     OR.     OR.     OR.     OR.     OR.     OR.     OR.       OR.         OR.	An attempt was to download a PLC Setup containing settings supported only by later unit versions or a CPU Unit to a previous unit version.	Check the settings in the PLC Setup or change to a CPU Unit with a later unit version.		
"????" is displayed in a program transferred from the PLC to the CX-Programmer.	An attempt was made to upload a program containing instructions supported only by higher versions of CX-Programmer to a lower version.	New instructions cannot be uploaded to lower versions of CX-Programmer. Use a higher version of CX-Programmer.		
CX-Programmer v8.1  The setting items, created by CX-Programmer v8.2, which are of unit version: 1.2 of a C12-series P.C. are included.  These settings cannot be read by this version of CX-Programmer. Do you wish to containe?  Yes No  The above error is displayed when a project file is read.	An attempt was made to read a project file for an unsupported unit version.	Click the <b>Yes</b> Button to initialize unsupported settings and read the file. Click the <b>No</b> Button to cancel reading the project file.		
The above warning is displayed when going online.	An attempt was made to go online with an earlier version of a CPU Unit for a project file that contains an extended read protection setting that is supported only by a newer version of the CPU Unit.	Change the protection setting in the PLC Properties Dialog Box. Or, replace the CPU Unit with which you need to go online with a higher version of CPU Unit.		

# **Related Manuals**

Manuals related to a PLC built using a CJ-series CJ2 CPU Unit are listed in the following table. Use these manuals for reference.

Manual	Cat. No.	Model	Application	Description
CJ-series CJ2 CPU Unit Hardware User's Manual (this manual)	W472	CJ2H-CPU6□-EIP CJ2H-CPU6□ CJ2M-CPU□□	Hardware specifications for CJ2 CPU Units	Describes the following for CJ2 CPU Units:  Overview and features Basic system configuration Part nomenclature and functions Mounting and setting procedure Remedies for errors Also refer to the Software User's Manual (W473).
CJ-series CJ2 CPU Unit Software User's Manual	W473	CJ2H-CPU6□-EIP CJ2H-CPU6□ CJ2M-CPU□□	Software specifications for CJ2 CPU Units	Describes the following for CJ2 CPU Units:  CPU Unit operation  Internal memory  Programming  Settings  Functions built into the CPU Unit  Also refer to the Hardware User's Manual (W472)
CS/CJ-series Ether- Net/IP <sup>TM</sup> Units Operation Manual	W465	CJ2H-CPU6□-EIP CJ2M-CPU3□ CS1W-EIP21 CJ1W-EIP21	Using the built-in Ether- Net/IP port of the CJ2 CPU Unit	Describes the built-in EtherNet/IP port and EtherNet/IP Units.  Describes basic settings, tag data links, FINS communications, and other functions.
CJ-series CJ2M CPU Unit Pulse I/O Module User's Man- ual	W486	CJ2M-CPU□□ + CJ2M-MD21□	Information on using built- in I/O on CJ2M CPU Units	Provides the following information on the CJ2M CPU Units:  • Specifications and wiring methods  • I/O functions  • Quick-response inputs  • Interrupt functions  • High-speed counters  • Pulse outputs  • PWM outputs  When programming, use this manual together with the Instructions Reference Manual (Cat. No. W474).
CS/CJ/NSJ-series Instructions Refer- ence Manual	W474	CJ2H-CPU6 - EIP CJ2H-CPU6 - CJ2M-CPU - CS1G/H-CPU - H CS1G/H-CPU - H CS1D-CPU - H CS1D-CPU - H CS1D-CPU - H CS1G/H-CPU - H CJ1G-CPU - H CJ1G-CPU - P CJ1G-CPU - CJ1M-CPU - NSJ (B)-G5D NSJ (B)-M3D	Information on instructions	Describes each programming instruction in detail.  Also refer to the Software User's Manual (W473) when you do programming.

Manual	Cat. No.	Model	Application	Description
CS/CJ/CP/NSJ- series Communica- tions Command Ref- erence Manual	W342	CJ2H-CPU6 - EIP CJ2H-CPU6 - EIP CJ2H-CPU6 - CJ2M-CPU - H CS1G/H-CPU - H CS1D-CPU - H CS1D-CPU - S CS1W-SCU - V1 CS1W-SCB - V1 CJ1H-CPU - H CJ1G-CPU - P CJ1M-CPU - P CJ1M-CPU - CJ1W-SCU - V1 CJ1H-CPU - CJ1W-SCU - V1 CJ1H-CPU - CJ1W-CPU - CJ1W-CPU - CJ1W-CPU - CJ1W-CPU - CJ1W-SCU - CJ1W-	Information on communications for CS/CJ/CP-series CPU Units and NSJ-series Controllers	Describes C-mode commands and FINS commands Refer to this manual for a detailed description of commands for communications with the CPU Unit using C mode commands or FINS commands.  Note This manual describes the communications commands that are addressed to CPU Units. The communications path that is used is not relevant and can include any of the following: serial ports on CPU Units, communications ports on Serial Communications Units/Boards, and Communications Units. For communications commands addressed to Special I/O Units or CPU Bus Units, refer to the operation manual for the related Unit.
CX-One Setup Manual	W463	CXONE-AL D-V4/	Installing software from the CX-One	Provides an overview of the CX-One FA Integrated Tool Package and describes the installation procedure.
CX-Programmer Operation Manual	W446	CXONE-AL□□D-V4	Support Software for Windows computers	Describes operating procedures for the CX-Programmer.
CX-Programmer Operation Manual Functions Blocks/Structured Text	W447		CX-Programmer operating procedure	Also refer to the Software User's Manual (W473) and CS/CJ/NSJ-series Instructions Reference Manual (W474) when you do programming.
CX-Programmer Operation Manual SFC Programming	W469			
CS/CJ/CP/NSJ- series CX-Simulator Operation Manual	W366		Operating procedures for CX-Simulator Simulation Support Software for Windows computers Using simulation in the CX-Programmer with CX-Programmer version 6.1 or higher	Describes the operating procedures for the CX-Simulator.  When you do simulation, also refer to the CX-Programmer Operation Manual (W446), Software User's Manual (W473), and CS/CJ/NSJ-series Instructions Reference Manual (W474).
CS/CJ/CP/NSJ- series CX-Integrator Network Configura- tion Software Opera- tion Manual	W464		Network setup and monitoring	Describes the operating procedures for the CX-Integrator.



# **Overview**

This section provides an overview of the CJ2 CPU Units.

1-1	Overv	iew of CJ2 CPU Units
	1-1-1	Overview
	1-1-2	CJ2 CPU Unit Features 1-4
1-2	Basic	Operating Procedure 1-12
1-3	Speci	fications
	1-3-1	General Specifications
	1-3-2	Performance Specifications
	1-3-3	Function Specifications

#### **Overview of CJ2 CPU Units** 1-1

#### 1-1-1 **Overview**

The SYSMAC CJ2-series CPU Units are multi-functional CPU Units that provide the following features.

#### Fast, with Large Memory Capacity

Basic performance is faster and memory capacity has been increased to provide ample capability for machine control.

## ■ Built-in EtherNet/IP Port (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

The CJ2 CPU Units support the EtherNet/IP open network as a standard feature. Universal Ethernet communications, such as data links between PLCs, message communications between PLCs, and FTP transfers, are all possible from a peripheral device connection.

#### General-purpose Networks for Support Software Interface

Support Software and devices can be easily connected using commercially available cable to general-purpose networks via USB and EtherNet/IP ports. (The EtherNet/IP port is provided only on the CJ2H-CPU6□-EIP and CJ2M-CPU3□.)

# Tag Access (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

CJ2 CPU Units have a tag name server to manage tag names and I/O addresses. This enables access from external devices using tag names, without needing to know the I/O addresses.

#### Synchronous Unit Operation (CJ2H CPU Unit with Unit Version 1.1 or Later)

The timing of processing performed by CPU Bus Units and Special I/O Units can be synchronized. This minimizes fluctuations in timing from input and processing to outputs, making it easier to ensure application performance.

#### Easier Programming

CJ2 CPU Units offer a highly readable programming environment, including features such as addressing DM and EM Area bits, setting address offsets, and using array variables.

#### Improved Debugging

Online editing and data tracing have been improved, greatly increasing the efficiency of debugging.

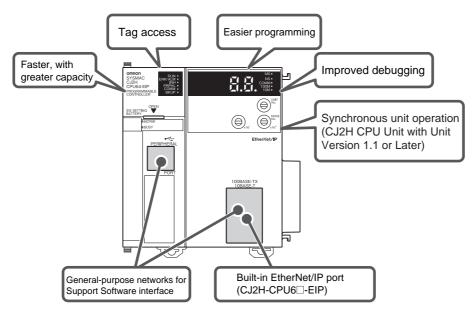
# ■ Increased Pulse I/O Capacity (CJ2M CPU Unit with Unit Version 2.0 or Later)

With the CJ2M CPU Units, optional Pulse I/O Modules can be mounted to enable pulse I/O for up to four axes.

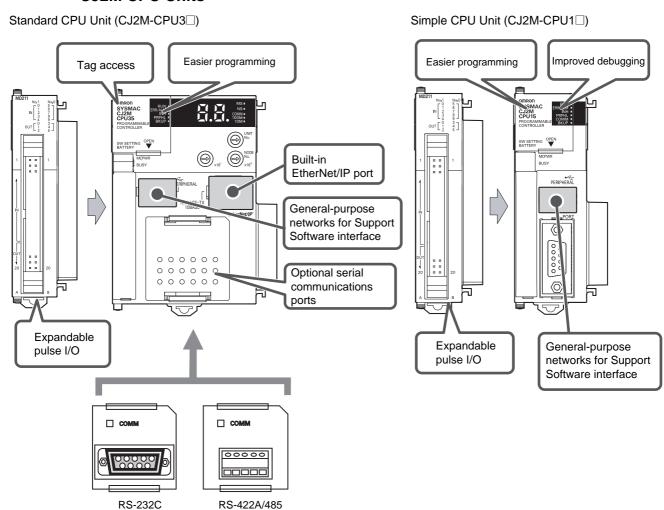
#### More Serial Communications Ports (CJ2M-CPU3□ Only)

With the standard CJ2M CPU Unit (CJ2M-CPU3□) you can add an RS-232C or RS-422A/485 Option Board to the standard-feature EtherNet/IP port to increase the number of serial communications ports.

#### **CJ2H CPU Units**



#### **CJ2M CPU Units**



#### **CJ2 CPU Unit Features** 1-1-2

# Fast, with Large Memory Capacity

## High-speed Processing

High-speed processing is possible for basic instructions (0.016 µs min. for CJ2H and 0.04 µs min. for CJ2M), special instructions (0.05 μs min. for CJ2H and 0.06 μs min. for CJ2M), and immediate refreshing (0.99 μs min. for CJ2H and 1.26 μs min. for CJ2M).

#### Large Program Capacity

The CJ2 CPU Units provide a large program capacity of up to 400 Ksteps.

## Special Function Block Definition Area (CJ2M Only)

With a CJ2M CPU Unit, a special area called the FB Program Area is provided to store function block definitions. (The FB Program Area holds 20K steps.) This allows you to use function blocks to make program components and structures from previous programs while reducing the usage of the User Program Area. And any function block definitions that would exceed the FB Program Area are stored in the User Program Area.

#### Large Data Memory Capacity

The CJ2 CPU Units provide a large EM Area capacity of up to 800 Kwords (25 banks).

# Up to 128 Cyclic Tasks

The user program can be divided into up to 128 tasks. Using smaller task programs makes it easier to structure programs and contributes to shorter cycle times.

# Enhanced Performance for Executing Interrupt Tasks (CJ2H CPU Units with **Unit Version 1.1 or Later)**

With CJ2H CPU Units with unit version 1.1, overhead time for interrupt tasks is approximately 20% less than for unit version 1.0 even for normal usage. Also, by using High-speed interrupt function, it is possible to improve execution performance as shown below with certain restrictions.

 Greatly reduce overhead time for interrupt tasks (interrupt task startup time + return time to cyclic tasks).

Example: For I/O interrupt tasks, the time for normal operation is 37  $\mu$ s but the time is 25  $\mu$ s if High-speed interrupt function is used.

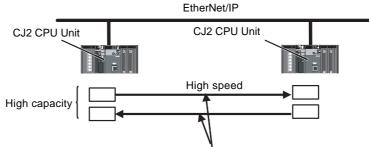
 Minimum interval setting of 0.1 ms for one of Scheduled Interrupt Tasks (For unit version 1.0, the minimum interval is 0.2 ms.)

# Built-in EtherNet/IP Port (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

The CJ2 CPU Units provide as standard equipment a built-in EtherNet/IP port that supports the same FINS Ethernet functions as an Ethernet Unit (including features such as an FTP server and time coordination) as well as the EtherNet/IP open network.

# High-speed, High-capacity Data Links with User-set Refresh Cycles

The CJ2 CPU Units provide high-speed, high-capacity data links, and refresh cycles can be set individually for each data link area.



The refresh cycle can be set individually for each area.

In addition, using the EtherNet/IP DataLink Tool makes it possible to set the data links using an interface similar to that of the Controller Link automatic data link setup.

# **General-purpose Networks for Support Software Interface**

#### Built-in USB and EtherNet/IP Ports

A commercially available USB cable can be used to connect to the PLC directly from a USB port on a personal computer. In addition, with the CJ2H-CPU6□-EIP or CJ2M-CPU3□, a PLC on the Ether-Net/IP network can be accessed via USB.

# Prevent Connecting to the Wrong PLC by Using PLC Names from Support Software

A user-set PLC name can be recorded in a CJ2 CPU Unit. When using Support Software to connect online to a PLC, verification of the PLC name prevents incorrect connections from the Support Software.

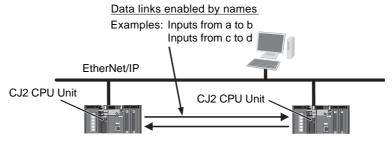
# Tag Access (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

# Network Symbols (Tags) for Flexible Support of Program Changes

The CJ2 CPU Units support network symbols (tags). They have an internal tag name server that enables them to store tag names and addresses in advance in symbol tables in the CPU Units. Tags enable the following features.

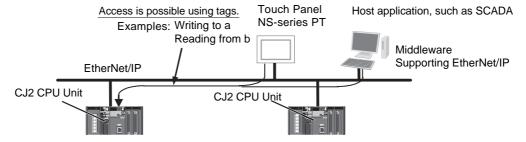
# Data links can be set using tags.

With data links on an EtherNet/IP network, send and receive areas can be specified using symbols rather than addresses. This enables flexible support for design changes by allowing the data link areas set by tags to remain unchanged, while simply changing the symbol tables that contain the tag names and addresses.



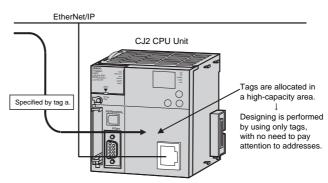
## Access from host devices is enabled using tags.

Tags can be used for access from host devices, such as touch panel NS-series Programmable Terminals. This makes the creation of host screens and programs at devices such as PTs much more convenient.



#### Automatic tag allocation makes it unnecessary to know the addresses.

Automatic allocation of tags in the high-capacity EM Area, using automatic address allocation in CX-Programmer symbol tables, enables data link design and access from host devices without having to pay attention to addresses.

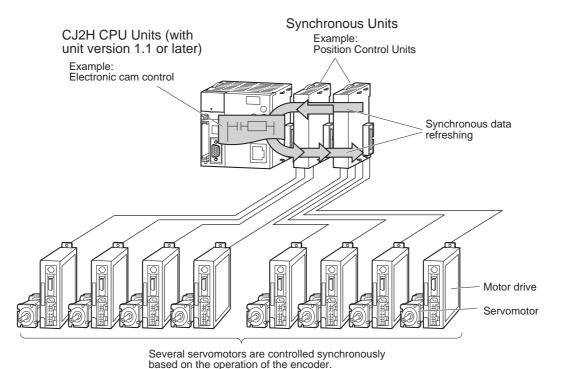


# Synchronous Unit Operation (CJ2H CPU Units with Unit Version 1.1 or Later)

# A CJ2 CPU Unit can synchronize the start of the processing performed by CPU Bus Units and Special I/O Units to a specified cycle.

Synchronous data refreshing can be used between the CJ2H CPU Unit and Synchronous Units,\* and the refreshed data can be used in operations in a synchronous interrupt task. This enables multiaxis control with minimal fluctuations in the timing from inputs and processing to outputs. This provides support for motion applications that require precise timing, such as electronic cam control.

\* Synchronous Units are CPU Bus Units and Special I/O Units that support the synchronous unit operation function. The following Synchronous Units are available as of July 2010: CJ1W-NC214/234/414/434 Position Control Units.



# **Easier Programming**

#### Address offsets can be specified.

When an address is specified for an instruction operand, an offset can be specified in brackets after the address to offset it. For example, by setting a word address in brackets to specify the offset, the address can be dynamically specified according to the contents of that word.

#### Example

W0.00[D0]: W0.00 is the starting address and the contents of D0 is the offset. If D0 is &3, then W0.03 is specified.

#### Symbols can be specified for array variable subscripts.

By specifying symbols for array variable subscripts, elements can be dynamically specified according to the values of the symbols.

#### Example

a[b]: The value of symbol b specifies the element for array variable a[].

#### Create and Use Data Structures

With CX-Programmer version 9.0 or higher, data structures can be created and used. This enables easily using I/O memory in the CPU Unit as a database or for library data.

#### Bit addresses can be used in the DM Area and EM Area.

Previously the DM Area and the EM Area could be addressed only by words, and bit addresses could not be specified. The work area for bits can now be expanded by enabling bit addresses in the DM and EM Areas.

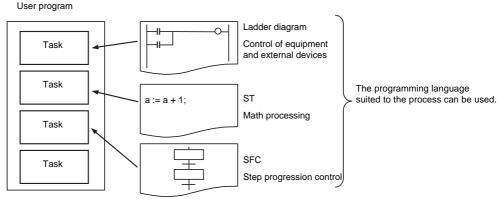
For example, D10.00 specifies bit 00 of D10.

#### • The format for timer/counter PV refreshing can be selected individually for each instruction.

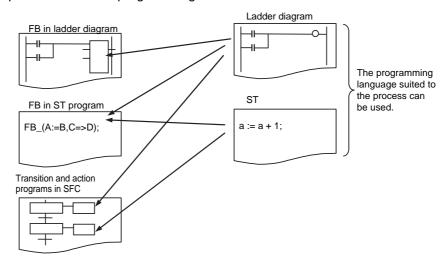
Either BCD or binary can be selected individually for each instruction as the format for timer/counter PV refreshing. For example, the TIM (BCD) and TIMX (binary) instructions can be used together.

#### The optimum languages can be combined for structured programming.

Ladder diagrams, ST, and SFC languages can be freely combined in the user program. Being able to use the optimum languages for a particular process helps reduce the time involved in programming.



In addition, ladder diagrams and ST language can be freely used for function blocks (FBs) in ladder diagrams and ST programs, and for transition and action programs in SFC. This feature makes it possible to optimize structured programming.



# Improved Debugging

#### Reduced Effect on Cycle Time from Online Editing

The additional cycle time due to online editing has been reduced to approx. 1 ms, minimizing the effects on equipment operation during debugging.

# • Fast, High-capacity Data Tracing

Up to 32 Kwords of data can be traced (8 times more than previously), with ample trigger conditions, and data can be traced continuously for long periods of time.

# I/O Module Auxiliary Area Selection with CX-Programmer 9.12 or Higher (CJ2M CPU Units Only)

With CX-Programmer version 9.12 or higher, data to be traced can be easily selected from lists.

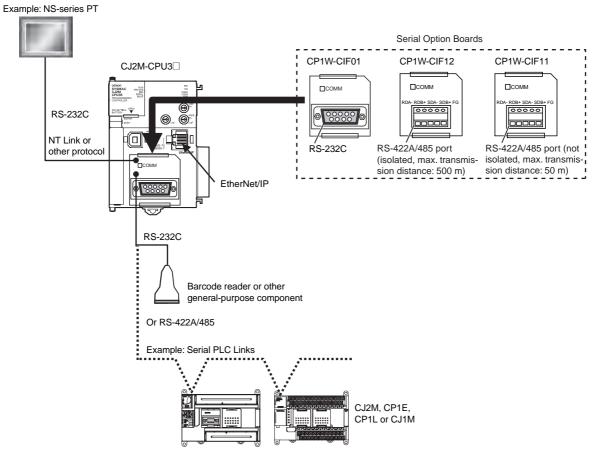
#### Force-set/Reset Bits in Specified EM Area Banks

With CX-Programmer version 8.3 or higher, a parameter can be set to enable force-setting/resetting bits in specified EM Area banks. (This function is supported only by CJ2H CPU Units with unit version 1.2 or later and CJ2M CPU Units.)

# Add a Serial Option Board (CJ2M-CPU3□ Only)

With the CJ2M-CPU3□, one Serial Communications Option Board with one RS-232C port or one RS-422A/485 port can be added.

With the serial port, it is easy to connect to general components, such as barcode readers, and other components such as PTs, other CJ/CP-series PLCs, and Inverters.

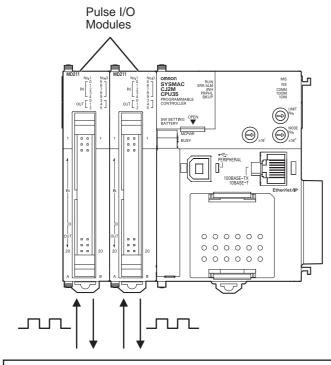


Note In this manual, unless otherwise specified, "CP1W-CIF12" refers to the CP1W-CIF12 and CP1W-CIF12-V1 Option Boards.

# Use Pulse I/O and Interrupt Inputs (CJ2M CPU Units Only)

With the CJ2M CPU Units, up to two Pulse I/O Modules can be mounted.

This enables input functions, such as normal inputs, interrupt inputs, high-speed counter inputs, and quick-response inputs, and output functions, such as normal outputs, pulse outputs, and variable duty factor pulse outputs. This provides support for many different types of applications.



- Normal inputs: 20 (10 per Pulse I/O Module)
- Interrupt inputs: 8 (4 per Pulse I/O Module)
- Quick-response inputs: 8 (4 per Pulse I/O Module)
- Normal outputs: 12 (6 per Pulse I/O Module)
- Pulse outputs: 4 (2 per Pulse I/O Module)
- High-speed counter inputs: 4 (2 per Pulse I/O Module) Variable duty factor pulse outputs: 4 (2 per Pulse I/O Module)

# 1-2 Basic Operating Procedure

In general, use the following procedure.

#### 1. Setting Devices and Hardware

Mount the Power Supply Unit, the CPU Unit, the other Units, and the End Covers. Set the DIP switch and rotary switches as required.

Refer to Section 3 Nomenclature and Functions and Section 5 Installation in the CJ2 CPU Unit Hardware User's Manual (Cat. No. W472).

#### 2. Wiring

Wire the power supply, I/O, and communications. Refer to the following manuals.

Refer to Section 5 Installation in the CJ2 CPU Unit Hardware User's Manual (Cat. No. W472). Refer to Section 11 Programming Devices and Communications in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).

Refer to Section 3 I/O Specifications and Wiring for Pulse I/O Module in the CJ2M CPU Unit Pulse I/O Module User's Manual (Cat. No. W486).

#### 3. Connecting Online to the PLC

Connect the personal computer online to the PLC.

Refer to Section 4 Support Software in the CJ2 CPU Unit Hardware User's Manual (Cat. No. W472)

Set the internal clock before you use the CPU Unit for the first time.

Refer to PART 2: CX-Server PLC Tools CHAPTER 9 - PLC Clock Tool in The CX-Programmer Operation Manual (Cat. No. W446)

#### 4. I/O Allocations -

Using the CX-Programmer, allocate I/O memory in the CPU Unit to the mounted Units.

Refer to Section 8 I/O Allocations and Unit Settings in the CJ2 CPU Unit Software User's Manual (Cat. No. W473)

Refer to Section 2 I/O Application Procedures and Function Allocations in the CJ2M CPU Unit Pulse I/O Module User's Manual (Cat. No. W486).

#### 5. Software Setup

Make the PLC software settings.

- CPU Unit initialization: Refer to Section 4 CPU Unit Initialization in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).
- DM Area Settings for Special I/O Units and CPU Bus Units: Refer to Section 8 I/O Allocations and Unit Settings in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).
- PLC Setup: Refer to Section 9 PLC Setup in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).

#### Creating the Program -

Create the program using the CX-Programmer.

Refer to Section 5 Understanding Programming in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).

#### 7. Checking Operation -

Check the I/O wiring and the AR Area settings, and perform trial operation. The CX-Programmer can be used for monitoring and debugging.

Refer to 10-7 Debugging in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).

#### 8. Basic Program Operation

Set the operating mode to RUN mode to start operation.

# 1-3 Specifications

# 1-3-1 General Specifications

				CJ2H-			C1	2M-			
	Item	CPU64(-EIP)	CPU65(-EIP)	CPU66(-EIP)	CPU67(-EIP)	CPU68(-EIP)	CPU1□	CPU3□			
Enclosure		Mounted in a p	anel					•			
Grounding		Less than 100	Ω								
CPU Unit Dimensi	ons	CJ2H-CPU6□ CJ2H-CPU6□		< 65 mm × 80 mm < 65 mm × 49 mm	. ,		90 mm × 75 mm × 31 mm (H × D × W)	90 mm × 75 mm × 62 mm (H × D × W)			
Weight*1		CJ2H-CPU6□:       280 g or less       130 g or less       190 g or less </td									
Current Consumpt	ion		CJ2H-CPU6□-EIP: 5 VDC, 0.82 A 5 VDC, CJ2H-CPU6□: 5 VDC, 0.42 A 5 VDC, 0.5 A 0.7 A								
Use Environment	Ambient Operating Temperature	0 to 55°C									
	Ambient Operating Humidity	10% to 90% (v	vith no condensa	ation)							
	Atmosphere	Must be free from corrosive gases.									
	Ambient Storage Temperature	-20 to 70°C (excluding battery)									
	Altitude	2,000 m or less									
	Pollution Degree	2 or less: Conforms to JIS B3502 and IEC 61131-2.									
	Noise Immunity	2 kV on power	supply line (Cor	nforms to IEC 61	000-4-4.)						
	Overvoltage Category	Category II: Co	onforms to JIS B	3502 and IEC 6	1131-2.						
	EMC Immunity Level	Zone B									
	Vibration Resistance	Conforms to IE	C60068-2-6.								
		5 to 8.4 Hz wit	h 3.5-mm amplit	ude, 8.4 to 150	Hz						
		Acceleration of	f 9.8 m/s <sup>2</sup> for 10	0 min in X, Y, and	d Z directions (1	0 sweeps of 10 n	nin each = 10	00 min total)			
	Shock Resistance	Conforms to IEC60068-2-27.									
		147 m/s <sup>2</sup> , 3 times in X, Y, and Z directions (100 m/s <sup>2</sup> for Relay Output Units)									
Battery	Life	5 years at 25°C									
	Weight	Approx. 10 g									
	Model	CJ1W-BAT01									
Applicable Standa	rds	Conforms to cULus, NK, LR, and EC Directives.									

<sup>\*1</sup> Includes the weights of the End Cover and the battery.

<sup>\*2</sup> Without a Serial Option Board

#### **Performance Specifications** 1-3-2

					CJ2H-			CJ2M-						
	Items		CPU64 (-EIP)	CPU65 (-EIP)	CPU66 (-EIP)	CPU67 (-EIP)	CPU68 (-EIP)	CPU 11/31	CPU 12/32	CPU 13/33	CPU 14/34	CPU 15/35		
User Memo	ory		50K steps	100K steps	150K steps	250K steps	400K steps	5K steps	10K steps	20K steps	30K steps	60K steps		
I/O Bits			2,560 bits											
Process- ing Speed	Overhead P Time*1	rocessing	Normal M		2H-CPU□□- 2H-CPU□□:	•		Normal Mode: CJ2M-CPU3□: 270 μs CJ2M-CPU1□: 160 μs						
	Execution T	ime			016 μs min.; 0.048 μs mir			Basic Instructions: 0.04 μs min.; Special Instructions: 0.06 μs min.						
	Interrupts	I/O Inter- rupts and External Interrupts	unit versio	n 1.0) nes to cyclic	time: 26 μs tasks: 11 μ		•		Interrupt task startup time: 31 μs Return times to cyclic tasks: 10 μs					
		Scheduled Interrupts		time interva -ms increm	ll: 0.2 ms or ents)	0.1 ms*2		Minimum t	ime interva	l: 0.4 ms (se	t in 0.1-ms	increments)		
			unit versio	n 1.0) ie to cyclic t	time: 22 μs ask: 11 μs c	. `	•		ask startup e to cyclic t	time: 30 μs task: 11 μs				
Maximum N	Number of Cor	nnectable Units		CPU Rack o PLC: 40 Uni	or Expansion its max.	n Rack: 10 L	Jnits max.;							
	Basic I/O Ur	nits	No limit However,	No limit However, a maximum of two CJ1W-INT01 Interrupt Input Units can be mounted.										
	Special I/O	Units		Units for up to 96 unit numbers can be mounted. (Unit numbers run from 0 to 95. Units are allocated between 1 a 8 unit numbers.)										
	CPU Bus Ur	nits		J6□-EIP: 1 J6□: 16 Un	5 Units max iits max.				J3⊟: 15 Ur J1⊟: 16 Ur					
	Pulse I/O Me	odules						2 max.*3						
	Slots for whi	ch interrupts			lots 0 to 3 o 0 to 4 on CF		<	Slots 0 to 4 on CPU Rack						
Maximum N	Number of Exp	ansion Racks	3 max.											
CIO Area	I/O Area		2,560 bits	(160 words	s): Words CI	O 0000 to C	IO 0159							
	Link Area		3,200 bits	(200 words	s): Words CI	O 1000 to C	IO 1199							
	Synchronou Area	s Data Refresh	1,536 bits	(96 words)	: Words CIC	1200 to CI	O 1295							
	CPU Bus Ur	nit Area	6,400 bits	(400 words	): Words Cl	O 1500 to C	IO 1899							
	Special I/O	Unit Area	15,360 bit	s (960 word	ls): Words C	CIO 2000 to	CIO 2959							
	Pulse I/O Ar	ea						20 inputs,	12 outputs	(CIO 2960 to	o CIO 2963)	1		
	Serial PLC L	ink Words				(90 words):	: Words CIO	3100 to CIO	O 3189					
	DeviceNet A	rea	9,600 bits (600 words): Words CIO 3200 to CIO 3799											
	Internal I/O	Area	3,200 bits (200 words): Words CIO 1300 to CIO 1499 (Cannot be used for external I/O.) 37,504 bits (2,344 words): Words CIO 3800 to CIO 6143 (Cannot be used for external I/O.)											
Work Area			8,192 bits	(512 words	s): Words W	000 to W51	1 (Cannot b	e used for ex	kternal I/O.)	ı				
Holding Are	ea			-	s): Words H0									
			Bits in this area maintain their ON/OFF status when PLC is turned OFF or operating mode is changed.  Words H512 to H1535: These words can be used only for function blocks. They can be used only for function block instances (i.e., they are allocated only for internal variables in function blocks).											

<sup>\*1</sup> The following times are added if EtherNet/IP data tag links are used for the CJ2H-CPU6□-EIP.

Normal operation: 100  $\mu$ s + Number of transfer words x 0.33  $\mu$ s

High-speed interrupt function enabled: 100  $\mu$ s + Number of transfer words  $\times$  0.87  $\mu$ s

The following time must be added when using EtherNet/IP tag data links for the CJ2M-CPU3 ...

100  $\mu s$  + (Number of words transferred  $\times$  1.8  $\mu s$ )

The following time must be added when using Pulse I/O Modules with a CJ2M CPU Unit:

10  $\mu s \times Number$  of Pulse I/O Modules

<sup>\*2</sup> This applies when high-speed interrupts are used.

<sup>\*3</sup> Supported only by CJ2M CPU Units with unit version 2.0 or later. A Pulse I/O Module must be mounted.

					CJ2H-			CJ2M-					
	Items		CPU64 (-EIP)	CPU65 (-EIP)	CPU66 (-EIP)	CPU67 (-EIP)	CPU68 (-EIP)	CPU 11/31	CPU 12/32	CPU 13/33	CPU 14/34	CPU 15/35	
Auxiliary A	rea		Read-only: 31,744 bits (1,984 words)										
			7,168 bits (448 words): Words A0 to A447										
			• 24,576 bits (1,536 words): Words A10000 to A11535*4										
			Read/write: 16,384 bits (1,024 words) in words A448 to A1471*4										
Temporary	Area		16 bits: TR0 to TR15										
Timer Area	l		4,096 time	r numbers (	T0000 to T4	095 (separa	te from cour	nters))					
Counter Ar	ea		4,096 cour	nter number	s (C0000 to	C4095 (sepa	arate from ti	mers))					
DM Area			32k words	*5									
					•	Inits: D2000 its: D30000		•		s)			
EM Area			32k words	/bank × 25 b	anks max.:	E00_00000	to	32k words	s/bank × 4 b	anks max.:	E00_00000	) to	
			E18_3276	7 max.*5, *6				E3_32767	′ max.*5				
			32K words × 4 banks	32K words × 4 banks	32K words × 10 banks	32K words × 15 banks	32K words × 25 banks	32K words	s×1 bank		32K words banks	s×4	
	Banks for which bits can be force-	Using EM Area force- setting/reset- ting	Banks 0 to 3 hex	Banks 0 to 3 hex	Banks 0 to 9 hex	Banks 0 to E hex	Banks 0 to 18 hex	Bank 0 he	×X		Banks 0 to	o 3 hex	
	set/reset*7	Using auto- matic address allo- cation speci- fications	Bank 3 hex	Bank 3 hex	Banks 6 to 9 hex	Banks 7 to E hex	Banks 11 to 18 hex						
Index Regis	sters	l.	IR0 to IR15										
			These are special registers for storing PLC memory addresses for indirect addressing. (Index Registers can be set so that they are unique in each task or so that they are shared by all tasks.)										
Cyclic Task	Flag Area		128 flags										
Memory Ca	ard		128 MB, 2	56 MB, or 5	12 MB								
Operating I	Modes		PROGRA		ograms are	not executed	d. Preparation	ons can be e	executed pri	or to progra	am executio	n in this	
			MONITOR Mode: Programs are executed, and some operations, such as online editing, and changes to present values in I/O memory, are enabled in this mode.										
			RUN Mode	e: Pr	ograms are	executed. Th	nis is the no	rmal operati	ng mode.				
Execution I	Mode		Normal Mo	ode									
Programmi	ng Languages	3	Ladder Logic (LD) Sequential Function Charts (SFC) Structured Text (ST) Instruction Lists (IL)										
Function Blocks	Maximum nu	umber of defini-	2,048				256 2,048						
	Maximum nu	umber of	2,048					256			2,048		
			20K steps										

<sup>\*4</sup> A960 to A1471 and A10000 to A11535 cannot be accessed by CPU Bus Units, Special I/O Units, PTs, and Support Software that do not specifically support the CJ2 CPU Units.

<sup>\*5</sup> Bits in the EM Area can be addressed either by bit or by word. These bits cannot be addressed by CPU Bus Units, Special I/O Units, PTs, and Support Software that do not specifically support the CJ2 CPU Units.

<sup>\*6</sup> EM banks D to 18 cannot be accessed by CPU Bus Units, Special I/O Units, PTs, and Support Software that do not specifically support the CJ2 CPU Units.

<sup>\*7</sup> With CJ2H CPU Units with unit version 1.2 or later, force-setting/resetting bits in the EM Area is possible either for banks that have been specified for automatic address allocation or for banks specified for the EM Area force-set/reset function. With CJ2M CPU Units, force-setting/resetting bits in the EM Area is possible only for banks specified for the EM Area force-set/reset function.

		CJ2H- CJ2M-									
	Items	CPU64 (-EIP)	CPU65 (-EIP)	CPU66 (-EIP)	CPU67 (-EIP)	CPU68 (-EIP)	CPU 11/31	CPU 12/32	CPU 13/33	CPU 14/34	CPU 15/35
Tasks	Type of Tasks		tasks (Po		nterrupt ta errupt task		duled inter	rupt tasks	s, I/O interr	upt tasks,	external
	Number of Tasks	Cyclic tasks: 128 Interrupt tasks: 256 (Interrupt tasks can be defined as cyclic tasks to create extra cyclic tasks. Therefore, the total number of cyclic tasks is actually 384 max.)									
Symbols (Variables)	Type of Symbols	Global sy Network	ymbols: C	an be use (tags)* <sup>8</sup> : I/	ed in all tas	•	PLC.		rnally acce	essed usin	ıg sym-
	Data Type of Symbols	UDINT (I ULINT (FOL INT (ONE DINT (FOL UINT BC UDINT B ULINT B REAL (IV LREAL (IV CHANNE NUMBER WORD (IV DWORD LWORD STRING TIMER (II COUNTE	ne-word u two-word our-word sig vo-word sig vo-word si ur-word si cD (one-w BCD (two- CD (four- wo-word fl four-word EL (word) R (constai one-word one-word (four-word (four-word (two-word (two-word (to 255 timer)*10 ER (count	word unsigned under u	binary) binary) // ry) ry) med BCD) gned BCD int) oint) oint) ber) mal) cimal)	)*9 )*9					
	Maximum Size of Symbol	32k word	ds								
	Array Symbols (Array Variables)	One-dimensional arrays									
	Number of Array Elements	32,000 e	lements r	nax.			1				
	Number of Registrable Network Symbols (Tags)*8	20,000 m	nax.				2,000 m	ax.			
	Length of Network Symbol (Tag) Name*8	255 byte	s max.								
	Encoding of Network Symbols (Tags)*8	UTF-8									

<sup>\*8</sup> Supported only by the CJ2H-CPU6 $\square$ -EIP and CJ2M-CPU3 $\square$ .

<sup>\*9</sup> This data type cannot be used in Function blocks.

<sup>\*10</sup> This data type can be used only in Function blocks.

<sup>\*11</sup> Supported only when CX-Programmer version 9.0 or higher is used.

				CJ2H-			CJ2M-					
	Items	CPU64 (-EIP)	CPU65 (-EIP)	CPU66 (-EIP)	CPU67 (-EIP)	CPU68 (-EIP)	CPU 11/31	CPU 12/32	CPU 13/33	CPU 14/34	CPU 15/35	
Data Tracing	Memory Capacity	8,000 wo	ords	16,000 words	32,000 v	vords	8,000 wo	ords				
		(Up to 32k words x the maximum bank number for the CPU Unit when EM is specified in CX-Programmer)										
	Number of Samplings	Bits = 31	, one-wor	d data =16	6, two-wor	d data = 8	, four-wor	d data = 4	•		_	
	Sampling Cycle	1 to 2,55	0 ms (Un	it: 1 ms)								
	Trigger Conditions	Data cor Data size Compari	e: 1 word, son Meth	ed bit of specified 2 words, 4 od: Equals als (≤), No	4 words s (=), Grea		(>), Greate	er Than or	Equals (≥	), Less Th	an (<),	
	Delay Value	-32,768 to +32,767 ms										
File Memory		Memory Card (128, 256, or 512 Mbytes) (Use the Memory Cards provided by OMRON.)									)	
		EM file memory (Part of the EM Area can be converted for use as file memory.)							.)			
Source/Com- ment Memory	Program source, comments, program index, and symbol table	Capacity: 3.5 Mbytes Capacity: 1 Mbytes										

						CJ2H-			CJ2M-					
		Item		CPU64 (-EIP)	CPU65 (-EIP)	CPU66 (-EIP)	CPU67 (-EIP)	CPU68 (-EIP)	CPU 11/31	CPU 12/32	CPU 13/33	CPU 14/34	CPU 15/35	
Commu-		Ports for	Logical Ports	8 ports (	Used for S	SEND, RE	CV, CMNE	, PMCR,	TXDU, and	RXDU i	instruction	s.)		
nications	Commi	unications	Extended Logical Ports	64 ports	(Used for	SEND2, F	RECV2, C	MND2, an	d PMCR2	instructio	ons.)			
		ommunica- pecification	Class 3 (Number of Connections)	Number	of connec	tions: 64								
			UCMM (Non-connection Type)	Maximum number of clients that can communicate at the same time: 32 Maximum number of servers that can communicate at the same time: 40										
	Periphe	eral (USB) Port		USB 2.0	-complian	t B-type co	onnector							
	Bau	ıd Rate		12 Mbps	max.									
	Trai	nsmission Dista	nce	5 m max										
	Serial F	Port		Interface	: Conform	is to EIA R	RS-232C.		RS-23	2C.		Conforms		
									syster	n				
									be mour		ng Seriai (	Option Boa	ards can	
											Option Boa			
											185 Optior mission di			
									• CP1W			185 Option sion distan		
	Cor	mmunications M	ethod	Half-duplex										
	Syn	nchronization Me	ethod	Start-sto	p									
	Bau	ıd Rate		0.3, 0.6,	1.2, 2.4, 4	1.8, 9.6, 19	9.2, 38.4, 5	57.6, or 11	5.2 (kbps)	1				
	Tran	nsmission Dista	nce	15 m ma	ıx.									
	EtherN	et/IP Port*12												
	SU	Media Access I	Method	CSMA/C	D									
	Specifications	Modulation		Baseban	nd									
	cific	Transmission P	aths	Star										
		Baud Rate		100 Mbp	s (100Bas	se-TX)								
	sion	Transmission M	ledia	Shielded	l twisted-p	air (STP)	cable; Cat	egories: 5	, 5e					
	smis	Transmission D	istance	100 m (b	etween E	thernet sw	itch and n	iode)						
	Transmission	Number of Cas	cade Connections	No restri	ctions if E	thernet sw	itch is use	ed.						
		CIP Communic	ations: Tag Data Links											
	Number of Cor		Connections	256					32					
			val (Refresh period)	Can be s	set for eac	Unit: 0.5 m h connecti et interval,	ion. (Data		Can be s	set for ea	ch connectet interval	ncrements ction. (Dat , regardle	a will be	
	catic	Permissible	Communications Band	6,000 pa	ickets per	second*13	3		3,000 pa	ckets pe	r second*	13		
	iunu	Number of F	Registrable Tags	256 32										
	Somr	Type of Tags		CIO, DM, EM, HR, WR, and network symbols										
	Number of Tags per Connection				8 (Seven tags if PLC status is included in the segment.)									

<sup>\*12</sup> The EtherNet/IP port is built into the CJ2H-CPU6 $\square$ -EIP and CJ2M-CPU3 $\square$  only.

<sup>\*13 &</sup>quot;Packets per second" is the number of communications packets that can be processed per second.

						CJ2H-			CJ2M-						
			ltem	CPU64 (-EIP)	CPU65 (-EIP)	CPU66 (-EIP)	CPU67 (-EIP)	CPU68 (-EIP)	CPU 11/31	CPU 12/32	CPU 13/33	CPU 14/34	CPU 15/35		
Commu-			Maximum Link Data Size per Node	184,832	words	•	•	•	640 wor	ds	•	•			
nications			Maximum Data Size per Connection		22 words* synchronia		each con	nection.)	640 wor		is synchro	onized with	nin each		
			Number of Registrable Tag Set	256 (1 c	onnection	= 1 segm	ent)		32 (1 cc	nnection	= 1 segm	ent)			
			Maximum Tag Set Size		ds (One wo		d when PL	C status	640 words (One word is used when PLC status is included in the segment.)*15						
			Maximum Number of Tags Refreshable in a Single Cycle of CPU Unit*16		end (CPU ceive (Ethe		,			,		EtherNet/II to CPU Ur	,		
	ions		Data Size Refreshable in a Single Cycle of CPU Unit*16	words	end (CPU		, ,		words	,		EtherNet/II	,		
	Specifications		Change of Tag Data Link Parameter Settings during Operation	OK*17											
			Multi-cast Packet Filter*18	OK											
	tions	С	IP Communications: Explicit Messages												
	nica		Class 3 (Number of Connections)	Number	of connec	tions: 128			_						
	Communications		UCMM (Non-connection Type)	cate at the	cate at the same time: 32 nicate  Maximum number of servers that can commu-  Maximum						e time: 16	rs that car			
			CIP Routing	OK (CIP routing is enabled for the following remote Units: CJ1W-EIP21, CJ2H-CPU6□-EIP, C.CPU3□, and CS1W-EIP21.)							, CJ2M-				
		FI	NS Communications												
			FINS/UDP	OK											
			FINS/TCP	16 conne	ections ma	ax.									
		Et	therNet/IP Conformance Test	Conforms to A5.											
		Et	therNet/IP Interface	10Base-T/100Base-TX Auto Negotiation/Fixed Setting											

<sup>\*14</sup> Large Forward Open (CIP optional specification) must be supported in order for 505 to 1,444 bytes to be used as the data size. Application is supported between CS/CJ-series PLCs. When connecting to devices from other manufacturers, make sure that the devices support the Large Forward Open specification.

<sup>\*15</sup> Unit version 2.0 of built-in EtherNet/IP section: 20 words

<sup>\*16</sup> If the maximum number is exceeded, refreshing will require more than one CPU Unit cycle.

<sup>\*17</sup> When changing parameters, however, the EtherNet/IP port where the change is made will be restarted. In addition, a timeout will temporarily occur at the other node that was communicating with that port, and it will then recover automatically.

<sup>\*18</sup> The EtherNet/IP port supports an IGMP client, so unnecessary multicast packets are filtered by using an Ethernet switch that supports IGMP snooping.

			CJ2H-					CJ2M-					
		Item	CPU64 (-EIP)	CPU65 (-EIP)	CPU66 (-EIP)	CPU67 (-EIP)	CPU68 (-EIP)	CPU 11/31	CPU 12/32	CPU 13/33	CPU 14/34	CPU 15/35	
Pulse I/O*3	Ex	ternal interface								CJ2M-MD2 L connecto		I/O Mod-	
	Pu	ulse Inputs	-					Can be a quick-resinputs. (	used as no sponse in Functions I in the PL	ormal inpu puts, or hig of each in	ts, interrup gh-speed o put must b	counter	
		[N	_						d by wiring				
		Normal inputs						Input co	nstants: S	ulse I/O M et in the P 2 ms). Defa	LC Setup	(0, 0.5,	
		Interrupt inputs and quick- response inputs						,	•	se I/O Mod ium ON pu	,	30 μs	
		High-speed counter inputs						4 max. (	2 per Puls	se I/O Mod	ule)		
										erential-ph up/down pu			
									-	se frequenc r 100 kHz i	-		
								Counting mode	g mode: L	inear mode	e or circula	ar (ring)	
									alue: 32 bi				
								Counter ware res		ase Z + sol	ftware rese	et or soft-	
									method: Ta omparison	arget-value	e comparis	son or	
			_					Gate fur	nction: Sup	oported			
	Pu	ulse Outputs						or PWM	outputs. (	ormal outp Functions in the PLC	of each or		
								outputs		inking or so nod is dete .)	-		
		Normal outputs						12 max.	(6 per Pu	lse I/O Mo	dule)		
		Pulse outputs						4 max. (	2 per Puls	se I/O Mod	ule)		
								(The me	thod is de	W/CCW or etermined b as used in	by the I/O	wiring	
								Output f		1 pps to 1	00 kpps (i	n incre-	
										ntinuous m ndent mod			
										lative coord (0 to 2,14			
										tes: 8000 ( ,483,648 t			
								Accelera curve	ation/dece	leration cu	rves: Line	ar or S-	
								Origin se	earch fund	tion: Supp	orted		
		PWM outputs						,		se I/O Mod	,		
										0.1 to 6,59 o 32,800 H			
								Duty rati ments)	io: 0.0% to	100.0% (	in 0.1% in	cre-	

# 1-3-3 Function Specifications

	ı	Functions		Description					
Cycle Time Man-	Minimum Cyc	ele Time		A minimum cycle time can be set. (0.2 to 32,000 ms; Unit: 0.1 ms)					
agement				The minimum cycle time setting can be changed in MONITOR mode*1					
	Cycle Time M	lonitoring		The cycle time is monitored. (0.01 to 40,000 ms; Unit: 0.01 ms)					
	Background Processing			Instructions with long execution times can be executed over multiple cycles to prevent fluctuations in the cycle time.					
Unit (I/O) Manage-	Basic I/O Units, Spe-	I/O Refresh-	Cyclic Refreshing	Cyclic refreshing of Basic I/O Units, Special I/O Units, and CPU Bus Units					
ment	cial I/O Units, and	ing	Immediate Refreshing	I/O refreshing by immediate refreshing instructions					
	CPU Bus		Refreshing by IORF	I/O refreshing by IORF instruction					
	Units	Unit Recog	gnition at Startup	The number of units recognized when the power is turned ON is displayed.					
	Basic I/O Units	Input Resp	oonse Time Setting	The input response times can be set for Basic I/O Units. The response time can be increased to reduce the effects of chattering and noise at input contacts. The response time can be decreased to enable detecting shorter input pulses.					
		Load OFF	Function	All of the outputs on Basic I/O Units can be turned OFF when an error occurs in RUN or MONITOR mode.					
		Basic I/O U	Jnit Status Monitoring	Alarm information can be read from Basic I/O Units and the number of Units recognized can be read.					
			riting data using instructed in the contract of the contract o	Special instructions can be used to read/write required data for specific Units at high speed.					
	Special I/O	Unit Resta	rt Bits to Restart Units	A Special I/O Unit or CPU Bus Unit can be restarted.					
	Units and CPU Bus Units	Synchrono	ous Unit Operation*2	The start of processing for all the specified Units can be synchronized at a fixed interval.					
	Office			Maximum number of Units: 10 Units (Only Units that support Synchronous Operation Mode can be used.)					
				Synchronous operation cycle: 0.5 to 10 ms (default: 2 ms)					
				Maximum number of words for synchronous data refreshing: 96 words (total of all Units)					
	Configura- tion Man- agement	Automatic	I/O Allocation at Startup	I/O words can be automatically allocated to the Basic I/O Units that are connected in the PLC to start operation automatically without registering Units into I/O tables.					
		I/O Table 0	Creation	The current unit configuration can be registered in I/O tables to prevent it from being changed, to reserve words, and to set words.					
		Rack/Slot	First Word Settings	The first words allocated to a Units on the Racks can be set.					

<sup>\*1</sup> Supported only by CJ2H CPU Units with unit version 1.1 or later and CJ2M CPU Units.

<sup>\*2</sup> Supported only by CJ2H CPU Units with unit version 1.1 or later.

Functions			Description			
Pulse I/O	Pulse Input	Normal Inputs	Input signals are read during I/O refreshing and stored in I/O memory.			
Func- tions <sup>*3</sup>	Functions	Interrupt Inputs	An interrupt task can be started when an input signal turns ON or turns OFF.			
		Quick-response Inputs	Input signals that are shorter than the cycle time are read and stored in I/O memory.			
		High-speed Counter Inputs	High-speed pulse signals are counted. Interrupt tasks can also be started.			
	Pulse Out-	Normal Outputs	The status of I/O memory is output during I/O refreshing.			
	put Func- tions	Pulse Outputs	A pulse signal is output with the specified frequency and number of pulses at a fixed duty ratio (50%).			
		PWM Outputs	A pulse signal is output at the specified duty ratio.			
	Origin Searc	hes	The origin point of the machine is determined according to the specified origin search parameters while actually outputting pulses and using the origin and origin proximity input signals as conditions. (Pulse inputs and outputs are also used for this function.)			
Memory Manage- ment	Holding I/O Modes	Memory when Changing Operating	The status of I/O memory can be held when the operating mode is changed or power is turned ON. The forced-set/reset status can be held when the operating mode is changed or power is turned ON.			
	File Memory		Files (such as program files, data files, and symbol table files) can be stored in Memory Card, EM File Memory, or Comment Memory.			
	Built-in Flash	Memory	The user program and Parameter Area can be backed up to an internal flash memory when they are transferred to the CPU Unit.			
	EM File Fund	ction	Parts of the EM Area can be treated as file memory.			
	Storing Com	ments	I/O comments can be stored as symbol table files in a Memory Card, EM file memory, or comment memory.			
	EM Configura	ation	EM Area can be set as trace memory or EM file memory.			
Memory Cards	Automatic Fil	e Transfer at Startup	A program file and parameter files can be read from a Memory Card when the power is turned ON.			
	Program Rep	placement during PLC Operation	User programs can be transferred from a Memory Card to CPU Unit during operation.			
	Function for Memory Care	Reading and Writing Data from a d	Data in I/O memory in the CPU Unit can be written to a Memory Card in CSV/TXT format. Data in CSV/TXT format in the Memory Card can be read to I/O memory in the CPU Unit.			

<sup>\*3</sup> Supported only by CJ2M CPU Unit with unit version 2.0 or later. A Pulse I/O Module must be mounted.

Function			Description			
Communica	ations					
	Peripheral (USB) Port	Peripheral Bus	Bus for communications with various kinds of Support Software running on a personal computer. High-speed communications are supported.			
	Serial Port*4					
	Host Link (S)	'SWAY) Communications	Host Link commands or FINS commands placed between Host Link headers and terminators can be sent from a host computer or PT to read/write I/O memory, read/control the operating mode, and perform other operations for PLC.			
	No-protocol (	Communications	I/O instructions for communications ports (such as TXD/RXD instructions) can be used for data transfer with peripheral devices such as bar code readers and printers.			
	NT Link Com	munications	I/O memory in the PLC can be allocated and directly linked to various PT functions, including status control areas, status notification areas, touch switches, lamps, memory tables, and other objects.			
	Peripheral Bu	s	Bus for communications with various kinds of Support Software running on a personal computer. High-speed communications are supported.			
	Serial Gateway		This gateway enables receiving and automatically converting FINS to the CompoWay/F.			
	Serial PLC Li	nks	Data is exchanged between CPU Units using serial ports without communications programming. PTs set to the 1:N NT Link protocol can be included in the network.			
	EtherNet/IP Port*5		100Base-TX/10Base-T Protocols: TCP/IP, UDP, ARP, ICMP (ping only), BOOTP			
			Applications: FINS, CIP, SNTP, DNS (Client), FTP (Server)			
	CIP Communications	Tag Data Links	Programless cyclic data exchanges with the devices on the EtherNet/IP network.			
	Service	Message Communications	Any CIP commands can be received from the devices on the EtherNet/IP network.			
	FINS Com- munications Service	Message Communications	Any FINS commands can be transferred with the devices on the EtherNet/IP network.			

<sup>\*4</sup> A Serial Option Board is required to use a serial port for the CJ2M-CPU3  $\square$  CPU Unit.

<sup>\*5</sup> Supported only by CJ2H-CPU6□-EIP and CJ2M-CPU3□.

	Function	Description				
Interrupt	Scheduled Interrupts	A task is executed at a specified interval.				
	Resetting and restarting with MSKS(690)*6	When MSKS(690) is executed, the internal timer is restarted and the time to first interrupt is set to a fixed value.				
	Reading present value of internal timer with MSKS(690)*6	MSKS(690) can be used to read the time that has elapsed until the scheduled interrupt is started or since the previous scheduled interrupt.				
	Power OFF Interrupts	A task can be executed when CPU Unit's power turns OFF.				
	I/O Interrupts	A task can be executed when an input signal is input to an Interrupt Input Unit.				
	External Interrupts	A task can be executed when interrupts are requested from a Special I/O Unit or a CPU Bus Unit.				
	Input Interrupt Function*7	A task is started for an interrupt input from a Pulse I/O Module or for a high-speed counter input.				
	Input Interrupts	Interrupt tasks are executed when the interrupt input turns ON or turns OFF.				
		Direct Mode: An interrupt task is executed each time an input signal changes.				
		Counter Mode: Changes in the input signal are counted up or down and the interrupt task is executed when the counter counts out. (The maximum response frequency is 3 kHz.)				
	High-speed Counter Interrupts	An interrupt task is executed when preset comparison conditions for a high-speed counter are met.				
		Target-value comparison: The interrupt task is executed when the count matches a specified value.				
		Range comparison: The interrupt task is executed when the count enters or leaves a specified range of values.				
	High-speed Interrupt Function*8	Improves performance for executing interrupt tasks with certain restrictions.				
Clock	Clock Function	Clock data is stored in memory.				
		Accuracy (Accuracy depends on the temperature.)  Ambient temperature of 55°C: –3.5 to +0.5 min error per month  Ambient temperature of 25°C: –1.5 to +1.5 min error per month  Ambient temperature of 0°C: –3 to +1 min error per month				
	Operation Start Time Storage	The time when operating mode was last changed to RUN mode or MONITO mode is stored.				
	Operation Stop Time Storage	The last time a fatal error occurred or the last time the operating mode was changed to PROGRAM mode is stored.				
	Startup Time Storage	The time when the power was turned ON is stored.				
	Power Interruption Time Storage	The time when the power is turned OFF is stored.				
	Total Power ON Time Calculation	The total time that the PLC has been ON is stored in increments of 10 hours.				
	Power ON Clock Data Storage	A history of the times when the power was turned ON is stored.				
	User Program Overwritten Time Storage	The time that the user program was last overwritten is stored.				
	Parameter Date Storage	The time when the Parameter Area was overwritten is stored.				

<sup>\*6</sup> Supported only by the CJ2M CPU Units.

<sup>\*7</sup> Pulse I/O Modules are supported only by CJ2M CPU Units with unit version 2.0 or later.

<sup>\*8</sup> Supported only by CJ2H CPU Units with unit version 1.1 or later.

	Function	Description				
Power Supply Manage- ment	Memory Protection	Holding Area data, DM Area data, EM Area data, Counter Completion Flags, and counter present values are held even when power is turned OFF. CIO Area, Work Area, some Auxiliary Area data, and Timer Completion Flags, timer present values, index registers, and data registers can be protected by turning ON the IOM Hold Bit in the Auxiliary Area, and by also setting the IOM Hold Bit to "Hold" in the PLC Setup.				
	Power OFF Detection Time Setting	The detection time for power interruptions can be set.  AC power supply: 10 to 25 ms (variable)  DC power supply: 2 to 5 ms (CJ1W-PD022) or 2 to 20 ms (CJ1W-PD025)				
	Power OFF Detection Delay Time	The detection of power interruptions can be delayed: 0 to 10 ms				
		(Not supported by the CJ1W-PD022.)				
	Number of Power Interruptions Counter	The number of times power has been interrupted is counted.				
Function E		Standard programming can be encapsulated as function blocks.				
	Languages in Function Block Definitions	Ladder programming or structured text				
Debug- ging	Online Editing	The program can be changed during operation (in MONITOR or PROGRAM mode), except for block programming areas.				
	Force-Set/Reset	Specified bits can be set or reset.				
		A parameter can be set to enable force-setting/resetting bits in EM Area banks. Force-setting/resetting is enabled for the specified bank and all the banks after it.*9				
	Differentiate Monitoring	ON/OFF changes in specified bits can be monitored.				
	Data Tracing	The specified I/O memory data can be stored in the trace memory in the CPU Unit. The triggers can be set.				
	Continuous Tracing	The trace data can be uploaded during data tracing using the CX-Programmer. This enables continuously logging the data by constantly uploading the trace data.				
	Automatically starting tracing when operation starts	Data tracing can be automatically started when operation is started (i.e., when the operating mode is changed from PROGRAM mode to MONITOR or RUN mode).				
	Storing Location of Error when an Error Occurs	The location and task number where execution stopped for a program error is recorded.				
	Program Check	The programs can be checked for items such as no END instruction and FALS/FAL errors at startup.				
Self-diag- nosis and	Error Log	A function is provided to store predefined error codes in CPU Unit, error information, and time at which the error occurred.				
Restora- tion	CPU Error Detection	CPU Unit WDT errors are detected.				
tion	User-defined Failure Diagnosis	Errors can be generated for user-specified conditions: Non-fatal errors (FAL) and fatal errors (FALS).				
		Program section time diagnosis and program section logic diagnosis are supported (FPD instruction).				
	Load OFF Function	This function turns OFF all outputs from Output Units when an error occurs.				
	RUN Output	The RUN output from the CJ1W-PA205R turns ON while CPU Unit is in RUN mode or MONITOR mode.				
	Basic I/O Load Short-circuit Detection	This function provides alarm information from Basic I/O Units that have load short-circuit protection.				
	Failure Point Detection	The time and logic of an instruction block can be analyzes using the FPD instruction.				
	CPU Standby Detection	This function indicates when the CPU Unit is on standby because all Special I/O Units and CPU Bus Units have not been recognized at the startup in RUN or MONITOR mode.				

<sup>\*9</sup> Supported only by CJ2H CPU Units with unit version 1.2 or later and CJ2M CPU Units.

	Fund	ction	Description			
Self-diag- nosis and Restora-	Non-fatal Error Detection	System FAL Error Detection (User-defined non-fatal error)	This function generates a non-fatal (FAL) error when the user-defined conditions are met in program.			
tion (Contin- ued from		Duplicated Refreshing Error Detection	This function detects an error when an immediate refreshing Instruction in an interrupt task is competing with I/O refreshing of a cyclic task.			
previous page)		Basic I/O Unit Error Detection	This function detects the errors in Basic I/O Units.			
, ,		Backup Memory Error Detection	This function detects errors in the memory backup of the user programs and parameter area (backup memory).			
		PLC Setup Error Detection	This function detects setting errors in the PLC Setup.			
		CPU Bus Unit Error Detection	This function detects an error when there is an error in data exchange between the CPU Unit and a CPU Bus Unit.			
		Special I/O Unit Error Detection	This function detects an error when there is an error in data exchange between the CPU Unit and a Special I/O Unit.			
		Tag Memory Error Detection*10	This function detects errors in tag memory.			
		Battery Error Detection	This function detects an error when a battery is not connected to the CPU Unit or when the battery voltage drops.			
		CPU Bus Unit Setting Error Detection	This function detects an error when the model of a CPU Bus Unit in the registered I/O tables does not agree with the model that is actually mounted in the PLC.			
		Special I/O Unit Setting Error Detection	This function detects an error when the model of a Special I/O Unit in the registered I/O tables does not agree with the model of Unit that is actually mounted.			
		Option Board Error Detection*11	This function detects the errors in Serial Option Board mounting status.			
	Fatal Error	Memory Error Detection	This function detects errors that occur in memory of the CPU Unit.			
	Detection	I/O Bus Error Detection	This function detects when an error occurs in data transfers between the Units mounted in Rack slots and the CPU Unit and detects when the End Cover is not connected to the CPU Rack or an Expansion Rack.			
		Unit/Rack Number Duplication Error	This function detects an error when the same unit number is set for two or more Units, the same word is allocated to two or more Basic I/O Units, or the same rack number is set for two or more Racks.			
		Too Many I/O Points Error Detection	This function detects an error when the total number of I/O points set in the I/O tables or the number of Units per Rack exceeds the specified range.			
		I/O Setting Error Detection	The registered I/O tables are used to detect errors if the number of Units in the registered I/O tables does not agree with the actual number of Units that are connected or an Interrupt Unit has been connected in the wrong position.			
		Program Error Detection	This function detects errors in programs.			
		Instruction Processing Error Detection	This function detects an error when the given data value is invalid when executing an instruction, or execution of instruction between tasks was attempted.			
		Indirect DM/EM BCD Error Detection	This function detects an error when an indirect DM/EM address in BCD mode is not BCD.			
		Illegal Area Access Error Detection	This function detects an error when an attempt is made to access an illegal area with an instruction operand.			
		No END Error Detection	This function detects an error when there is no END instruction at the end of the program.			
		Task Error Detection	This function detects an error when there are no tasks that can be executed in a cycle, there is no program for a task, or the execution condition for an interrupt task was met but there is no interrupt task with the specified number.			
		Differentiation Over- flow Error Detection	This function detects an error when too many differentiated instructions are entered or deleted during online editing (131,072 times or more).			
		Invalid Instruction Error Detection	This function detects an error when an attempt is made to execute an instruction that is not defined in the system.			
		User Program Area Overflow Error Detection	This function detects an error when instruction data is stored after the last address in user program area.			

<sup>\*10</sup> Supported only by CJ2H-CPU6□-EIP and CJ2M-CPU3□.

<sup>\*11</sup> Supported only by the CJ2M-CPU3 $\square$ .

	Fund	ction		Description		
Self-diag- nosis and	Fatal Error Detection	Cycle Time Ex Error Detection		This function monitors the cycle time (10 to 40,000 ms) and stops the operation when the set value is exceeded.		
Restora- tion (Contin- ued from		System FALS Error Detection (User-defined Fatal Error)		This function generates a fatal (FALS) error when the user-defined conditions are met in program.		
previous page)		Version Error D	etection	This function detects an error when a user program includes a function that is not supported by the current unit version.		
		Memory Card Transfer Error Detection		This function detects an error when the automatic file transfer from Memory Card fails at startup.		
	Memory Self-restoration Function			This function performs a parity check on the user program area and self-restoration data.*12		
Mainte- nance	Simple Backup F	unction		This function collectively backs up the data in CPU Unit (user programs, parameters, and I/O memory) and internal backup data in the I/O Units.		
	Unsolicited Communications			A function that allows the PLC to use Network Communications Instruction to send required FINS commands to a computer connected via a Host Link		
	Remote Programming and Monitoring			Host Link communications can be used for remote programming and remote monitoring through a Controller Link, Ethernet, DeviceNet, or SYSMAC LINK Network. Communications across network layers can be performed.		
				Controller Link or Ethernet: 8 layers DeviceNet or SYSMAC LINK: 3 layers		
	Network Seri Con tion		Direct Serial Connec- tion	This function enables automatically connecting to the PLC online when the CX-Programmer is directly connected by a serial connection (peripheral (USB) port or serial port).		
			Via Net- works	This function enables connecting the CX-Programmer online to a PLC that is connected via an EtherNet/IP network.		
Security	Read Protection	using Password		This function protects reading and displaying programs and tasks using passwords.		
						Write protection: Set using the DIP switch. Read protection: Set a password using the CX-Programmer.
	FINS Write Protection			This function prohibits writing by using FINS commands sent over the netwo		
	Unit Name Function			This function allows the users to give any names to the Units. Names are verified at online connection to prevent wrong connection		
	Hardware ID Using Lot Numbers			This function sets operation protection by identifying hardware using the user programs according to lot numbers stored in the Auxiliary Area.		

<sup>\*12</sup> This function can be used only with CJ2H CPU Units.



# **Basic System Configuration and Devices**

This section describes the basic system configuration and devices used in a CJ2 PLC. The CJ Series supports the following two types of system configuration.

- Basic System Configuration:
   System consisting of CPU Rack and Expansion Racks.
- Expanded System Configuration:
   System connected via CPU Unit built-in serial port and PLC Units, such as Communications Units.

2-1	Basic	System Configuration 2-2
	2-1-1	Basic System Configuration
	2-1-2	CPU Rack
	2-1-3	Expansion Racks
	2-1-4	Configuration Units
	2-1-5	Calculating Unit Current Consumption 2-22
	2-1-6	Calculating Power Consumption
2-2	Expan	ded System Configuration 2-27
	2-2-1	Serial Communications
	2-2-2	Communications Networks

#### **Basic System Configuration** 2-1

#### **Basic System Configuration** 2-1-1

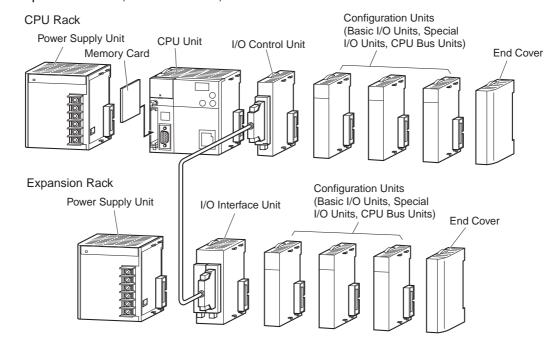
#### CPU Rack

A CPU Rack can consist of a CJ2 CPU Unit, a CJ-series Power Supply Unit, CJ-series Configuration Units (Basic I/O Units, Special I/O Units, CPU Bus Units), and a CJ-series End Cover. The same CJseries Power Supply Units and CJ-series Configuration Units that are used with CJ1 CPU Units are used with CJ2 CPU Units.\* An I/O Control Unit is required to connect a CJ-series Expansion Rack. A Memory Card is optional.

- \* All CJ-series Units can be used as Configuration Units, but only Units that specifically support the CJ2 CPU Unit can access the expanded portions of the I/O memory areas of the CJ2 CPU Units (i.e., A960 to A1471, A10000 to A11535, and EM banks D to 18). Only the following CJ1 Units specifically support the CJ2 CPU Units.
  - EtherNet/IP Unit: CJ1W-EIP21
  - Position Control Units: CJ1W-NC214, CJ1W-NC234, CJ1W-NC281, CJ1W-NC414, CJ1W-NC434, CJ1W-NC454, CJ1W-NC454, CJ1W-NC454, CJ1W-NC454, CJ1W-NC454, CJ1W-NC454, CJ1W-NC454, CJ1W-NC454, CJ1W-NC454, CJ1W-N NC481, and CJ1W-NC881
  - Analog Input Unit: CJ1W-AD042
  - Analog Output Unit: CJ1W-DA042V
  - Serial Communications Units: CJ1W-SCU22, CJ1W-SCU32, and CJ1W-SCU42

#### Expansion Racks

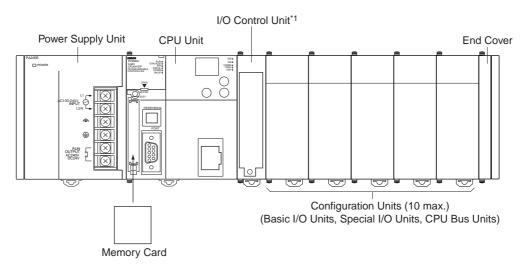
A CJ-series Expansion Rack can be connected to the CPU Rack or another CJ-series Expansion Rack. An Expansion Rack can consist of an I/O Interface Unit, a Power Supply Unit, Basic I/O Units, Special I/O Units, CPU Bus Units, and an End Cover.



# 2-1-2 **CPU Rack**

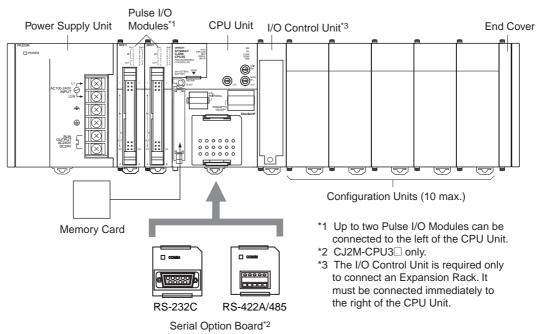
The CPU Rack consists of a CJ2 CPU Unit, a CJ-series Power Supply Unit, CJ-series Configuration Units, and a CJ-series End Cover. Up to 10 Configuration Units can be connected.

#### CJ2H CPU Units



\*1 The I/O Control Unit is required only to connect an Expansion Rack. It must be connected next to the CPU Unit.

#### CJ2M CPU Units



Even though the CJ-series PLCs do not have Backplanes, the term "slot" is still used to refer to the location of Units. Slot numbers are assigned in order to Units from left to right on the CPU Rack (slot 0, slot 1, slot 2, etc.).

Although the CJ-series PLCs do not require Backplanes, the term "slot" is still used to refer to the relative position of a Unit in the Rack. Slot numbers increase toward the right side of the Rack.

Name	Co	nfiguration	Remarks		
CJ-series	CPU Unit	CJ2H CPU Units	One required for every CPU Rack.		
CPU Rack		CJ2M CPU Units	One required for every CPU Rack.		
		Pulse I/O Mod- ule (Can be connected only with a CJ2M CPU Unit.)	Connected to use pulse I/O.  Up to two Pulse I/O Modules can be connected. They must be connected to the immediate left of the CPU Unit. The Pulse I/O Module closest to the CPU Unit is Pulse I/O Module 0 and the other one is Pulse I/O Module 1.		
		Serial Option Board (Can be mounted only with the CJ2M-CPU3□.)	One Serial Option Board can be mounted in the CJ2M-CPU3.		
		Memory Card	Install as required.		
	CJ-series Power Supply Unit		One required for every CPU Rack.		
	I/O Control Unit		Required to connect an Expansion Rack. Must be connected immediately to the right of the CPU Unit.		
	Configu- ration	CJ-series Basic I/O Units	A total of up to 10 Units can be connected to the CPU Rack and to each of the Expansion Racks. (An error will occur if 11 or more		
	Units	CJ-series Special I/O Units	Units are connected.)		
		CJ-series CPU Bus Units			
	End Cover	_	Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit.		
			A fatal error will occur if the End Cover is not connected.		

# Units

#### • CJ2H CPU Units

Model	I/O capacity	Program	DM Area capacity		nsumption A)	Weight
	. ,	capacity	. ,	5 VDC	24 VDC	
CJ2H-CPU68-EIP	2,560 points	400 Ksteps	832 Kwords (DM: 32 Kwords, EM: 32 Kwords × 25 banks)	0.82*1		280 g max.*2
CJ2H-CPU67-EIP		250 Ksteps	512 Kwords (DM: 32 Kwords, EM: 32 Kwords × 15 banks)			
CJ2H-CPU66-EIP		150 Ksteps	352 Kwords (DM: 32 Kwords, EM: 32 Kwords × 10 banks)			
CJ2H-CPU65-EIP		100 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			
CJ2H-CPU64-EIP		50 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			
CJ2H-CPU68	2,560 points	400 Ksteps	832 Kwords (DM: 32 Kwords, EM: 32 Kwords × 25 banks)	0.42*1		190 g max.*2
CJ2H-CPU67		250 Ksteps	512 Kwords (DM: 32 Kwords, EM: 32 Kwords × 15 banks)			
CJ2H-CPU66		150 Ksteps	352 Kwords (DM: 32 Kwords, EM: 32 Kwords × 10 banks)			
CJ2H-CPU65		100 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			
CJ2H-CPU64		50 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			

<sup>\*1</sup> Increases by 0.15 A/Unit when an NT-AL001 Link Adapter is used.
Increases by 0.04 A/Unit when a CJ1W-CIF11 RS-422A Converter is used.
Increases by 0.20 A/Unit when an NV3W-M□20L Programmable Terminal is used.

<sup>\*2</sup> Includes the weights of the End Cover and the battery.

#### • CJ2M CPU Units

Model	I/O capacity	Program	DM Area capacity	Current co	Weight	
		capacity		5 VDC	24 VDC	
CJ2M-CPU35	2,560 points	60 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)	0.7*1		190 g max.*2, *3
CJ2M-CPU34		30 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			
CJ2M-CPU33		20 Ksteps	64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)			
CJ2M-CPU32		10 Ksteps	64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)			
CJ2M-CPU31		5 Ksteps	64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)			
CJ2M-CPU15	2,560 points	60 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			
CJ2M-CPU14		30 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			
CJ2M-CPU13		20 Ksteps	64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)			
CJ2M-CPU12		10 Ksteps	64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)			
CJ2M-CPU11		5 Ksteps	64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)			

<sup>\*1</sup> Increases by 0.15 A/Unit when an NT-AL001 Link Adapter is used. Increases by 0.04 A/Unit when a CJ1W-CIF11 RS-422A Converter is used. Increases by 0.20 A/Unit when an NV3W-M□20L Programmable Terminal is used.

<sup>\*2</sup> Includes the weights of the End Cover and the battery.

<sup>\*3</sup> The weight of a Serial Option Board is not included.

#### Pulse I/O Modules (CJ2M CPU Unit Only)

Model	Specifications	Current cons	Weight	
Woder	Model Specifications		24 VDC	vveignt
CJ2M-MD211	Sinking outputs, MIL connector 10 inputs (including four interrupt/quick- response inputs and two high-speed counter inputs) 6 outputs (including two pulse outputs and two PWM outputs)	0.08		70 g
CJ2M-MD212	Sourcing outputs, MIL connector 10 inputs (including four interrupt/quick- response inputs and two high-speed counter inputs) 6 outputs (including two pulse outputs and two PWM outputs)	0.08		70 g

#### Serial Option Boards (CJ2M-CPU3□ Only)

Name	Model	Specifications	Serial com- munications	(4)		Weight
			mode	5 VDC	24 VDC	
RS-232C Option Board	CP1W-CIF01	Mounted in the Option Board slot in the CJ2M-CPU3□ to enable using an RS- 232C port. Maximum transmis- sion distance: 15 m	Host Link, 1:N NT Link, No- protocol, Serial PLC Link Slave, Serial PLC Link Mas- ter, Serial	0.005 A		20 g
RS-422A/485 Option Board	CP1W-CIF11	Mounted in the Option Board slot in the CJ2M-CPU3□ to enable using an RS- 422A/485 port. Maximum transmis- sion distance: 50 m	Gateway converted to CompoWay/F, and Tool Bus*	0.030 A		20 g
Isolated RS- 422A/485 Option Board	CP1W-CIF12	Mounted in the Option Board slot in the CJ2M-CPU3□ to enable using an RS- 422A/485 port. Maximum transmis- sion distance: 500 m		0.075 A		30 g

<sup>\*</sup> The following modes cannot be used: 1:1 NT Link, Serial Gateway converted to Host Link FINS, 1:1 Link Master, and 1:1 Link Slave.

### • CJ-series Power Supply Units

Model	Power supply	Output	capacity	Additional	Weight	
Wiodei	voltage	5 VDC	24 VDC	functions		
CJ1W-PA205R	100 to 240 VAC	5.0 A	0.8 A	RUN output	350 g max.	
CJ1W-PA205C	100 to 240 VAC	4.6 A	0.8 A	Replacement notification	400 g max.	
CJ1W-PA202	100 to 240 VAC	2.8 A	0.4 A		200 g max.	
CJ1W-PD025	24 VDC	5.0 A	0.8 A		335 g max.	
CJ1W-PD022	24 VDC (non- insulated type)	2.0 A	0.4 A		130 g max.	

### Memory Cards

Model	Specifications		
HMC-EF183	Flash memory, 128 MB		
HMC-EF283	Flash memory, 256 MB		
HMC-EF583	Flash memory, 512 MB		
HMC-AP001	Memory Card Adapter (for PCMIA slot in personal computer)		

#### • I/O Control Unit

Model	Specifications		Current consump- tion (A)	
		5 VDC	24 VDC	
CJ1W-IC101	Required to connect a CJ-series Expansion Rack to a CJ-series CPU Rack. Must be connected immediately to the right of the CPU Unit. Connect to the I/O Interface Unit (CJ1W-II101) on the first Expansion Rack with a CS/CJ-series I/O Connecting Cable.	0.020 A		70 g max.

#### End Cover

Model	Specifications	Current con- sumption (A)	Weight
CJ1W-TER01	9	Included with CPU Unit and I/O Interface Unit.	

<sup>\*1</sup> One End Cover is provided with the CPU Unit and with an I/O Interface Unit.

# Others

Name	Model	Specifications
DIN Track	PFP-50N	Track length: 50 cm, height: 7.3 mm
	PFP-100N	Track length: 1 m, height: 7.3 mm
	PFP-100N2	Track length: 1 m, height: 16 mm
	PFP-M	Stopper to prevent Units from moving on the track.
		Two each are provided with the CPU Unit and with an I/O Interface Unit.
Programming Device Connecting Cable for peripheral (USB) port	Commercially available USB cable	USB 2.0 (or 1.1) cable (A connector - B connector), 5.0 m max.
Programming Device Connecting	XW2Z-200S-CV	Connects to IBM PC/AT computer
Cables for serial port		D-Sub 9-pin connector (Cable length: 2.0 m).
		Uses static-resistant connector.
	XW2Z-500S-CV	Connects to IBM PC/AT computer
		D-Sub 9-pin connector (Cable length: 5.0 m).
		Uses static-resistant connector.
	XW2Z-200S-V	Connects to IBM PC/AT computer
		D-Sub 9-pin connector. (Cable length: 2.0 m)
	XW2Z-500S-V	Connects to IBM PC/AT computer
		D-Sub 9-pin connector. (Cable length: 5.0 m)
Connecting Cable for EtherNet/IP	Commercially avail-	Recommended: Fujikura F-LINK-E 0.5 mm × 4P
port*	able 100Base-TX twisted-pair cable	Twisted-pair cable with RJ45 Modular Connectors on both ends. Connect between EtherNet/IP Unit or built-in EtherNet/IP port and Ethernet switch.
		Use STP (shielded twisted-pair) cable of category 5 or 5e.
Communications Adaptor (RS-422A Converter)	CJ1W-CIF11	Current consumption at 5 V: 0.04 A
RS-232C/RS-422A Link Adapter	NT-AL001	Maximum distance: 500 m; only RS-422A is supported. Current consumption at 5 V: 0.15 A
MIL Flat Cable Connector for Pulse I/O Modules	XG4M-4030-T	40-pin MIL connector, pressure-welded type (This connector is used by user to make a cable.)
Connector-Terminal Block Conver-	XW2D-40G6	Slim model (M3 screw terminals), 40 terminals
sion Units	XW2B-40G5	Through model (M3 screw terminals), 40 terminals
	XW2B-40G4	Through model (M3.5 screw terminals), 40 terminals
Connector-Terminal Block Conver-	XW2Z-C25K	Cable length: 0.25 m
sion Cables	XW2Z-C50K	Cable length: 0.5 m
	XW2Z-100K	Cable length: 1 m
	XW2Z-150K	Cable length: 1.5 m
	XW2Z-200K	Cable length: 2 m
	XW2Z-300K	Cable length: 3 m
	XW2Z-500K	Cable length: 5 m
Servo Relay Units	XW2B-20J6-8A	To connect one axis

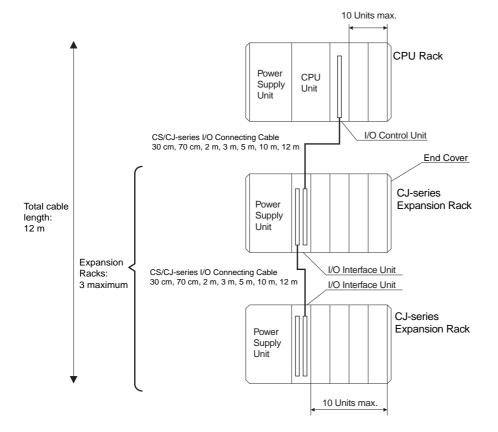
<sup>\*</sup> CJ2H-CPU6 $\square$ -EIP or CJ2M-CPU3 $\square$  only.

	Name		Model	Specifications
Servo	OMNUC	CJ2M Pulse	XW2Z-050J-A33	Cable length: 0.5 m
Relay Unit Connec-	G Series	I/O Module side	XW2Z-100J-A33	Cable length: 1 m
tion		Servo Drive	XW2Z-100J-B31	Cable length: 1 m
Cables		side	XW2Z-200J-B31	Cable length: 2 m
	OMNUC	CJ2M Pulse	XW2Z-050J-A33	Cable length: 0.5 m
	G5 Series	I/O Module side	XW2Z-100J-A33	Cable length: 1 m
		Servo Drive	XW2Z-100J-B31	Cable length: 1 m
		side	XW2Z-200J-B31	Cable length: 2 m
	SMART-	CJ2M Pulse	XW2Z-050J-A33	Cable length: 0.5 m
	STEP 2 Series	I/O Module side	XW2Z-100J-A33	Cable length: 1 m
		Servo Drive	XW2Z-100J-B32	Cable length: 1 m
		side	XW2Z-200J-B32	Cable length: 2 m
	SMART- STEP A Series	CJ2M Pulse I/O Module side	XW2Z-100J-A26	Cable length: 1 m
		Servo Drive	XW2Z-100J-B5	Cable length: 1 m
		side	XW2Z-200J-B5	Cable length: 2 m
	SMART- STEP Junior	CJ2M Pulse I/O Module side	XW2Z-100J-A26	Cable length: 1 m
		Servo Drive side	XW2Z-100J-B17	Cable length: 1 m
			XW2Z-200J-B17	Cable length: 2 m
	OMNUC	CJ2M Pulse	XW2Z-050J-A27	Cable length: 0.5 m
	W Series	ries I/O Module side	XW2Z-100J-A27	Cable length: 1 m
		Servo Drive	XW2Z-100J-B4	Cable length: 1 m
		side	XW2Z-200J-B4	Cable length: 2 m
Battery Set			CJ1W-BAT01	For CJ2 CPU Unit
Support So	ntware	CX-One	CXONE-AL□□D-V□	CX-One is an FA Integrated Tool Package that integrates the PLC, network, HMI, components, motion control, and PLC-based process control.  CX-Programmer  CX-Integrator  SwitchBox Utility  CX-Simulator  CX-Protocol
				<ul> <li>CX-Designer</li> <li>CX-Thermo</li> <li>CX-Position</li> <li>CX-Motion/CX-Motion-NCF/CX-Motion-MCH</li> <li>CX-Drive</li> <li>CX-Process Tool</li> <li>NS Faceplate Auto-Builder</li> <li>CX-FLnet</li> <li>Network Configurator</li> </ul>

### 2-1-3 Expansion Racks

CJ-series Expansion Racks can be connected to the CPU Rack to expand the number of Units in the System beyond the CPU Rack. Up to 10 I/O Units can be mounted to each Expansion Rack and a total of 3 Expansion Racks can be connected.

Mount an I/O Control Unit immediately to the right of the CPU Unit, and mount the I/O Interface Unit immediately to the right of the Power Supply Unit on the Expansion Rack. Mounting them in other locations may cause malfunctions.



CS/CJ-series I/O Connecting Cables

Cable	Length
CS1W-CN313	0.3 m
CS1W-CN713	0.7 m
CS1W-CN223	2 m
CS1W-CN323	3 m
CS1W-CN523	5 m
CS1W-CN133	10 m
CS1W-CN133B2	12 m

## **Maximum Number of Expansion Racks**

Expansion pattern	Maximum number of Racks	Remarks
CJ-series CPU Rack plus CJ-series Expansion Racks	3 Racks	The total length of I/O Connecting Cable between the CPU Rack and an Expansion Rack, and between all Expansion Racks, must be no more than 12 m.

# Units

## • Units for CJ-series Expansion Racks

Rack	Configuration	Remarks
CJ-series	CJ-series Power Supply Unit	One required for each Expansion Rack. (An I/O Control
Expansion Racks	I/O Interface Unit (one End Cover included.)	Unit is required on the CJ-series CPU Rack.)
	CJ-series Basic I/O Units	A total of up to 10 Units can be connected to the CPU
	CJ-series Special I/O Units	Rack and to each of the Expansion Racks. (An error will occur if 11 or more Units are connected.)
	CJ-series CPU Bus Units	occur ii 11 or more oring are connected.)
	End Cover	Must be connected to the right end of the Expansion Rack. (One End Cover is provided with the I/O Interface Unit. A fatal error will occur if the End Cover is not connected.)
	CS/CJ-series I/O Connecting Cable	Required to connect the I/O Interface Unit to the I/O Control Unit or previous I/O Interface Unit.

# • CJ-series Power Supply Unit

Model	Power supply	Output capacity		Functions
Wodei	voltage	5 VDC	24 VDC	Functions
CJ1W-PA205R	100 to 240 VAC	5.0 A	0.8 A	RUN output
CJ1W-PA205C	100 to 240 VAC	5.0 A	0.8 A	Replacement notification
CJ1W-PA202	100 to 240 VAC	2.8 A	0.4 A	
CJ1W-PD025	24 VDC	5.0 A	0.8 A	
CJ1W-PD022	24 VDC (non-insulated type)	2.0 A	0.4 A	

### • I/O Interface Unit

Model	Specifications	Current of tion	Weight	
		5 VDC	24 VDC	
CJ1W-II101	One Interface Unit is required for each CJ-series Expansion Rack. One End Cover is provided with each Unit.	0.13 A		130 g max.*1

<sup>\*1</sup> Includes the weight of the End Cover.

#### • End Cover

Model	Specifications	Current con- sumption (A)	Weight
CJ1W-TER01	Must be connected to the right end of the CPU Rack. (A fatal error will occur if the End Cover is not connected to the right end of the Rack.)  One End Cover is provided with the CPU Unit and with an I/O Interface Unit.	Included with the CPU Unit or I/O Interface Unit.	

# ● CS/CJ-series I/O Connecting Cables

Model	Specifications	Cable length
CS1W-CN313	An I/O Connecting Cable connects an I/O Control Unit (CJ1W-IC101) to an	0.3 m
CS1W-CN713	I/O Interface Unit (CJ1W-II101), or connects an I/O Interface Unit to another I/O Interface Unit.	0.7 m
CS1W-CN223		2 m
CS1W-CN323		3 m
CS1W-CN523		5 m
CS1W-CN133		10 m
CS1W-CN133B2		12 m

#### **Configuration Units** 2-1-4

# **Maximum Number of Units**

A maximum of 10 Units can be connected to the CPU Rack for a CJ2 CPU Unit or to an Expansion Rack. There are no restrictions in the number of each model of Unit based on location.

Note A fatal error will occur and the CPU Unit will not operate if more than the allowable number of Units is connected to a CJ2 CPU Rack or to an Expansion Rack.

### **Models of Configuration Units**

The Configuration Units with which the CJ2 CPU Unit can exchange data are classified into three groups. The number of Units that can be mounted depends on the type of Unit.

Units	Description	Unit identifica- tion method	Number of mountable Units
Basic I/O Units	Basic I/O Units are used for discrete inputs and outputs.	Identified by the CPU Unit according to mounting position.	Up to 40 Basic I/O Units can be mounted.
Special I/O Units	Special I/O Units are more advanced than Basic I/O Units. They support functions other than discrete inputs and outputs.  Examples: Analog I/O Units and High-speed Counter Units Special I/O Units have a smaller area for exchanging data with the CPU Unit than CPU Bus Units (including Network Communications Units).	Identified by the CPU Unit using unit numbers 0 to 95 set with the rotary switches on the front panel of the Unit.	Up to 40 Special I/O Units can be mounted. (Depending on the model, more than one unit number is used for one Unit.)
CPU Bus Unit	CPU Units are advanced units that exchange data with the CPU Unit via the CPU bus.  Examples: Network Communications Units and Serial Communications Units  CPU Bus Units have a larger area for exchanging data with the CPU Unit than Special I/O Units.	Identified by the CPU Unit using unit number 0 to F set with the rotary switch on the front panel of the Unit.	Up to 16 CPU Bus Units can be mounted.

### **Configuration Units**

#### CJ-series Basic I/O Units

#### **Input Units**

Name	Specifications	Model	Number of bits allo-		onsumption A)	Weight	
			cated	5 VDC	24 VDC		
DC Input Units	Terminal block 12 to 24 VDC, 8 inputs	CJ1W-ID201	16 <sup>*1</sup>	0.08		110 g max.	
	Terminal block	CJ1W-ID211*2	16	0.08		110 g max.	
	24 VDC, 16 inputs	CJ1W-ID212*2	16	0.13		110 g max.	
	Fujitsu-compatible connector 24 VDC, 32 inputs	CJ1W-ID231*3	32	0.09		70 g max.	
	MIL connector 24 VDC, 32 inputs	CJ1W- ID232*2*3	32	0.09		70 g max.	
	Faither and the same	CJ1W- ID233*2*3	32	0.20		70 g max.	
	Fujitsu-compatible connector 24 VDC, 64 inputs	CJ1W-ID261*3	64	0.09		110 g max.	
	MIL connector 24 VDC, 64 inputs	CJ1W-ID262*3	64	0.09		110 g max.	
AC Input Units	200 to 240 VAC, 8 inputs	CJ1W-IA201	16 <sup>*1</sup>	0.08		130 g max.	
	100 to 120 VAC, 16 inputs	CJ1W-IA111	16	0.09		130 g max.	
Interrupt Input Units	24 VDC, 16 inputs	CJ1W-INT01*4	16	0.08		110 g max.	
Quick- response Input Units	24 VDC, 16 inputs	CJ1W-IDP01	16	0.08		110 g max.	
B7A Interface Units	64 inputs	CJ1W-B7A14	64	0.09		80 g max.	

<sup>\*1</sup> Although 16 I/O bits are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

- ON response time: 20 μs improved to 15 μs
- OFF response time: 400 μs improved to 90 μs
- \*3 The cable-side connector is not provided with Units equipped with cables. Purchase the connector separately (Refer to 5-3-3 Wiring Basic I/O Units with Connectors.), or use an OMRON Connector-Terminal Block Conversion Unit or I/O Terminal (Refer to 5-3-4 Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals.).
- \*4 An Interrupt Input Unit can be connected only in a CJ-series CPU Rack. Connect the Interrupt Input Units in following slots on the CPU Rack. An I/O setting error will occur if an Interrupt Input Unit is connected in other positions on the CPU Rack or to any position on an Expansion Rack. Up to two Interrupt Input Units can be connected.
  - CJ2H-CPU6□-EIP: Slots 0 to 3
  - CJ2H-CPU6□ or CJ2M-CPU□□: Slots 0 to 4

<sup>\*2</sup> The ON/OFF response time for the CJ1W-ID212/CJ1W-ID233 is shorter than for the CJ1W-ID211/CJ1W-ID232, as shown below.

#### **Output Units**

Nar	ne	Specifications	Model	Number of bits	Curren	t consumption (A)	Weight
		·		allocated	5 VDC	24 VDC	
Relay Outp	out Units	Terminal block, 250 VAC/24 VDC, 2 A; 8 points, independent contacts			0.09	0.048 (0.006 × Number of ON outputs)	140 g max.
		Terminal block, 250 VAC/24 VDC, 2 A; 16 points	CJ1W-OC211	16	0.11	0.096 (0.006 × Number of ON outputs)	170 g max.
Triac Outpo	ut Unit	Terminal block, 250 VAC, 0.6 A; 8 points	CJ1W-OA201	16 <sup>*1</sup>	0.22		150 g max.
Transis- tor Out-	Sinking outputs	Terminal block, 12 to 24 VDC, 2 A; 8 outputs	CJ1W-OD201	16 <sup>*1</sup>	0.09		110 g max.
put Units		Terminal block, 12 to 24 VDC, 0.5 A; 8 outputs	CJ1W-OD203	16 <sup>*1</sup>	0.10		110 g max.
		Terminal block, 12 to 24 VDC, 0.5 A; 16 outputs	CJ1W-OD211*2	16	0.10		110 g max.
		Terminal block, 24 VDC, 0.5 A; 16 outputs	CJ1W-OD213*2	16	0.15		110 g max.
		Fujitsu-compatible connector, 12 to 24 VDC, 0.5 A; 32 outputs	CJ1W-OD231*3	32	0.14		70 g max.
		MIL connector, 12 to 24 VDC, 0.5 A; 32 outputs	CJ1W- OD233*2*3	32	0.14		70 g max.
		MIL connector, 24 VDC, 0.5 A; 32 outputs	CJ1W- OD234*2*3	32	0.22		70 g max.
		Fujitsu-compatible connector, 12 to 24 VDC, 0.3 A; 64 outputs	CJ1W-OD261*3	64	0.17		110 g max.
		MIL connector, 12 to 24 VDC, 0.3 A; 64 outputs	CJ1W-OD263*3	64	0.17		110 g max.
	Sourc- ing out- puts	Terminal block, 24 VDC, 2 A; 8 outputs, load short-circuit pro- tection and disconnected line detection	CJ1W-OD202	16 <sup>*1</sup>	0.11		120 g max.
		Terminal block, 24 VDC, 0.5 A; 8 outputs, load short-circuit pro- tection	CJ1W-OD204	16 <sup>*1</sup>	0.10		120 g max.
		Terminal block, 24 VDC, 0.5 A; 16 outputs, load short-circuit pro- tection	CJ1W-OD212	16	0.10		120 g max.
		MIL connector, 24 VDC, 0.5 A; 32 outputs, load short-circuit pro- tection	CJ1W-OD232*3	32	0.15		80 g max.
		MIL connector, 12 to 24 VDC, 0.3 A; 64 outputs	CJ1W-OD262*3	64	0.17		110 g max.
B7A Interfa	ace Units	64 outputs	CJ1W-B7A04	64	0.07		80 g max.

<sup>\*1</sup> Although 16 I/O bits are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

- ON response time: 0.1 ms improved to 0.015 ms
- OFF response time: 0.8 ms improved to 0.08 ms

<sup>\*2</sup> The ON/OFF response time for the CJ1W-OD213/CJ1W-OD234 is shorter than for the CJ1W-OD211/CJ1W-OD233, as shown below.

<sup>\*3</sup> The cable-side connector is not provided with Units equipped with cables. Purchase the connector separately (Refer to 5-3-3 Wiring Basic I/O Units with Connectors.), or use an OMRON Connector-Terminal Block Conversion Unit or I/O Terminal (Refer to 5-3-4 Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals.).

#### Mixed I/O Units

Na	me	Specifications	Model	Number of bits allo-		consump- n (A)	Weight
				cated	5 VDC	24 VDC	
24-VDC Input/ Transis- tor Out-	Sinking	Fujitsu-compatible connector Inputs: 24 VDC, 16 inputs	CJ1W-MD231*1	32	0.13		90 g max.
put Units		Outputs: 12 to 24 VDC, 0.5 A; 16 outputs					
		Fujitsu-compatible connector	CJ1W-MD261*1	64	0.14		110 g max.
		Inputs: 24 VDC, 32 inputs					
		Outputs: 12 to 24 VDC, 0.3 A; 32 outputs					
		MIL connector Inputs: 24 VDC, 16 inputs	CJ1W-MD233*1	32	0.13		90 g max.
		Outputs: 12 to 24 VDC, 0.5 A; 16 outputs					
		MIL connector Inputs: 24 VDC, 32 inputs	CJ1W-MD263*1	64	0.14		110 g max.
		Outputs: 12 to 24 VDC, 0.3 A; 32 outputs					
	Sourcing	MIL connector Inputs: 24 VDC, 16 inputs	CJ1W-MD232*1	32	0.13		80 g max.
		Outputs: 24 VDC, 0.5 A; 16 outputs					
		Load-short circuit protection					
TTL I/O U	nits	MIL connector	CJ1W-MD563*1	64	0.19		110 g max.
		Inputs: TTL (5 VDC), 32 inputs					
		Outputs: TTL (5 VDC, 35 mA), 32 outputs					
B7A Interf	ace Units	32 inputs, 32 outputs	CJ1W-B7A22	64	0.07		80 g max.

<sup>\*1</sup> The cable-side connector is not provided with Units equipped with cables. Purchase the connector separately (Refer to 5-3-3 Wiring Basic I/O Units with Connectors.), or use an OMRON Connector-Terminal Block Conversion Unit or I/O Terminal (Refer to 5-3-4 Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals.).

# • CJ-series Special I/O Units

				Number of words allo-	Number of words allo-		Num- ber		nt con- tion (A)	
Туре	Name	Specifications	Model	cated (CIO 2000 to CIO 2959)	cated (D20000 to D29599)	Unit No.	of moun table Units	5 VDC	24 VDC	Weight
Special I/O Units	General-pur- pose Univer- sal Analog Input Unit	4 inputs, fully universal	CJ1W-AD04U	10 words	100 words	0 to 95	40 Units	0.32		150 g max.
	Analog Input Units	8 inputs (4 to 20 mA, 1 to 5 V, etc.)	CJ1W-AD081-V1	10 words	100 words	0 to 95	40 Units	0.42		140 g max.
		4 inputs (4 to 20 mA, 1 to 5 V, etc.)	CJ1W-AD041-V1	10 words	100 words	0 to 95	40 Units	0.42		140 g max.
		4 inputs (4 to 20 mA, 1 to 5 V, etc.)	CJ1W-AD042	10 words	100 words	0 to 95	40 Units	0.52		150 g max.
	Analog Out- put Units	4 outputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-DA041	10 words	100 words	0 to 95	40 Units	0.12		150 g max.
		2 outputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-DA021	10 words	100 words	0 to 95	40 Units	0.12		150 g max.
		8 outputs (1 to 5 V, 0 to 10 V, etc.)	CJ1W-DA08V	10 words	100 words	0 to 95	40 Units	0.14		150 g max.
		8 outputs (4 to 20 mA)	CJ1W-DA08C	10 words	100 words	0 to 95	40 Units	0.14		150 g max.
		4 outputs (1 to 5 V, 0 to 10 V, etc.)	CJ1W-DA042V	10 words	100 words	0 to 95	40 Units	0.40		150 g max.
	Analog I/O Unit	4 inputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-MAD42	10 words	100 words	0 to 95	40 Units	0.58		150 g max.
		2 outputs (1 to 5 V, 4 to 20 mA, etc.)								
	Isolated-type High-resolu- tion Univer- sal Input Unit	4 inputs, fully universal Resolution: 1/256,000, 1/64,000, 1/16,000	CJ1W-PH41U	10 words	100 words	0 to 95	40 Units	0.30		150 g max.
	Isolated-type Thermocou- ple Input Units	4 thermocouple inputs	CJ1W-PTS51	10 words	100 words	0 to 95	40 Units	0.25		150 g max.
		2 thermocouple inputs	CJ1W-PTS15	10 words	100 words	0 to 95	40 Units	0.18		150 g max.
	Isolated-type Resistance	4 resistance thermometer inputs	CJ1W-PTS52	10 words	100 words	0 to 95	40 Units	0.25		150 g max.
	Thermome- ter Input Units	2 resistance thermometer inputs	CJ1W-PTS16	10 words	100 words	0 to 95	40 Units	0.18		150 g max.
	Direct Cur- rent Input Unit	DC voltage or DC current, 2 inputs	CJ1W-PDC15	10 words	100 words	0 to 95	40 Units	0.18		150 g max.
	Temperature Control Units	4 control loops, ther- mocouple inputs, NPN outputs	CJ1W-TC001	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.25		150 g max.
		4 control loops, ther- mocouple inputs, PNP outputs	CJ1W-TC002	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.25		150 g max.
		2 control loops, ther- mocouple inputs, NPN outputs, heater burn- out detection	CJ1W-TC003	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.25		150 g max.
		2 control loops, ther- mocouple inputs, PNP outputs, heater burn- out detection	CJ1W-TC004	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.25		150 g max.

				Number of words allo-	Number of words allo-		Num- ber		nt con- tion (A)	
Туре	Name	Specifications	Model	cated (CIO 2000 to CIO 2959)	cated (D20000 to D29599)	Unit No.	of moun table Units	5 VDC	24 VDC	Weight
Special I/O Units	Temperature Control Units	4 control loops, tem- perature- resistance thermometer inputs, NPN outputs	CJ1W-TC101	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.25		150 g max.
		4 control loops, tem- perature- resistance thermometer inputs, PNP outputs	CJ1W-TC102	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.25		150 g max.
		2 control loops, tem- perature-resistance thermometer inputs, NPN outputs, heater burnout detection	CJ1W-TC103	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.25		150 g max.
		2 control loops, tem- perature-resistance thermometer inputs, PNP outputs, heater burnout detection	CJ1W-TC104	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.25		150 g max.
	Position Con- trol Units	1 axis, pulse output; open collector output	CJ1W-NC113	10 words	100 words	0 to 95	40 Units	0.25		100 g max.
		2 axes, pulse outputs; open collector outputs	CJ1W-NC213	10 words	100 words	0 to 95	40 Units	0.25		100 g max.
			CJ1W- NC214*1*2	18 words*3	None	0 to 94 (uses words for 2 unit numbers)	5 Units/ Rack	0.27		170 g max.
		4 axes, pulse outputs; open collector outputs	CJ1W-NC413	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.36		150 g max.
			CJ1W- NC414*1*2	18 words*3	None	0 to 94 (uses words for 2 unit numbers)	5 Units/ Rack	0.31		220 g max.
		1 axis, pulse output; line driver output	CJ1W-NC133	10 words	100 words	0 to 95	40 Units	0.25		100 g max.
		2 axes, pulse outputs; line driver outputs	CJ1W-NC233	10 words	100 words	0 to 95	40 Units	0.25		100 g max.
			CJ1W- NC234*1*2	18 words*3	None	0 to 94 (uses words for 2 unit numbers)	5 Units/ Rack	0.27		170 g max.
		4 axes, pulse outputs; line driver outputs	CJ1W-NC433	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.36		150 g max.
			CJ1W- NC434*1*2	18 words* <sup>3</sup>	None	0 to 94 (uses words for 2 unit numbers)	5 Units/ Rack	0.31		220 g max.
		Space Unit*4	CJ1W-SP001	None	None					50 g max.

				Number of words allo-	Number of words allo-		Num- ber		nt con- tion (A)		
Туре	Name	Specifications	Model	cated (CIO 2000 to CIO 2959)	cated (D20000 to D29599)	Unit No.	of moun table Units	5 VDC	24 VDC	Weight	
Special I/O Units	ID Sensor Units	V600-series single- head type	CJ1W-V600C11	10 words	100 words	0 to 95	40 Units	0.26	0.12	120 g max.	
		V600-series two-head type	CJ1W-V600C12	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	40 Units	0.32	0.24	130 g max.	
		V680-series single- head type	CJ1W-V680C11	10 words	100 words	0 to 95	40 Units	0.26	0.13	120 g max.	
		V680-series two-head type	CJ1W-V680C12	20 words	200 words	O to 94 (uses words for 2 unit numbers)	40 Units	0.32	0.26	130 g max.	
	High-speed Counter Unit	Number of counter channels: 2, Maximum input frequency: 500 kHz, line driver compatible*5	CJ1W-CT021*6	40 words	400 words	O to 92 (uses words for 4 unit numbers)	24 Units	0.28		100 g max.	
	Compo- Bus/S Mas- ter Units	CompoBus/S remote I/O, 256 bits max.	CJ1W-SRM21	10 words or 20 words	None	0 to 95 or 0 to 94	40 Units	0.15		66 g max.*7	
	CompoNet	CompoNet remote I/O	CJ1W-CRM21							130 g max.	
	Master Unit	Master Unit	Communications mode No. 0: 128 inputs/ 128 outputs for Word Slaves		20 words	None	0 to 94 (uses words for 2 unit numbers)	40 Units	0.40		
			Communications mode No. 1: 256 inputs/ 256 outputs for Word Slaves		40 words	None	O to 92 (uses words for 4 unit numbers)	24 Units	0.40		
		Communications mode No. 2: 512 inputs/ 512 outputs for Word Slaves		80 words	None	O to 88 (uses words for 8 unit numbers)	12 Units	0.40			
			Communications mode No. 3: 256 inputs/ 256 outputs for Word Slaves and 128 inputs/ 128 outputs for Bit Slaves		80 words	None	0 to 88 (uses words for 8 unit numbers)	12 Units	0.40		
		Communications mode No. 8: 1,024 inputs/ 1,024 outputs for Word Slaves and 256 inputs/ 256 outputs for Bit Slaves maximum		10 words	Depends on setting	0 to 95 (uses words for 1 unit number)	40 Units	0.40			

With a CJ2 CPU Unit, up to 10 Configuration Units can be connected in the CPU Rack and in each Expansion Rack. The CJ1W-NC = 4, however, must be counted as two Units. Configure the Units to satisfy the following formula. Number of CJ1W-NC□□4 Units × 2 + Number of other Units ≤ 10 For example, if five CJ1W-NC□□4 Units are connected to one Rack, no other Units can be connected.

The Units must be mounted on the CPU Rack to use synchronous unit operation.

- CJ2H-CPU6□-EIP: Slots 0 to 3
- CJ2H-CPU6□ or CJ2M-CPU□□: Slots 0 to 4
- Use the CJ1W-CT021 with the lot number 030121 (unit version 1.06) or later when using it in combination with the CJ2 CPU Unit.
- Includes the weight of accessory connectors.

In addition to the words allocated in the Special I/O Unit Area, up to 144 words are allocated according to the number of axes and functions uses. Word allocations are set using the CX-Programmer.

The Space Unit is for Position Control Units.

If interrupts to the CPU Unit are used, mount the Interrupt Input Unit in one of the following slots on the CPU Rack.

### • CJ-series CPU Bus Units

				Number of words allo-		Maximum		ent con- tion (A)	
Туре	Name	Specifications	Model	cated (CIO 1500 to CIO 1899)	Unit No.	number of Units*1	5 VDC	24 VDC	Weight
CPU Bus Units*1	High-speed Analog Input Unit	4 inputs: 80 μs/2 inputs, 160 μs/4 inputs	CJ1W-ADG41*2	25 words	0 to F	16 Units*3	0.65		150 g max.
	Controller Link Units	Wired data links	CJ1W-CLK23	25 words	0 to F	8 Units	0.35		110 g max.
	Serial Commu- nications Units	One RS-232C port and one RS-422A/485 port	CJ1W-SCU41-V1	25 words	0 to F	16 Units*3	0.38*4		110 g max.
		Two RS-232C ports	CJ1W-SCU21-V1				0.28*4		
		Two RS-422A/485 ports	CJ1W-SCU31-V1				0.38		
		Two RS-232C ports High-speed models	CJ1W-SCU22			16 Units*3	0.28*4		160 g max.
		Two RS-422A/485 ports High-speed models	CJ1W-SCU32				0.4		120 g max.
		One RS-232C port and one RS-422A/485 port High-speed models	CJ1W-SCU42				0.36*4		140 g max.
	Ethernet Units	100Base-TX, FINS communications, socket service, FTP server, and mail communica- tions	CJ1W-ETN21	25 words	0 to F	4 Units	0.37		100 g max.
	EtherNet/IP Unit	Tag data links, FINS communications, CIP message communications, FTP server, etc.	CJ1W-EIP21	25 words	0 to F	*5	0.41		94 g max.
	FL-net Unit	100Base-TX cyclic transmissions and mes- sage transmissions	CJ1W-FLN22	25 words	0 to F	4 Units	0.37		100 g max.
	DeviceNet Unit	DeviceNet remote I/O, 2,048 points; Both Mas- ter and Slave functions, Automatic allocation possible without Config- urator	CJ1W-DRM21	25 words*6	0 to F	16 Units*3	0.29		118 g max.*7
	EtherCAT-com-	2 servo axes	CJ1W-NC281	25 words	0 to F	16 Units*3	0.46		110 g max.
	patible Position Control Units*8	4 servo axes	CJ1W-NC481						
	Control Chits	8 servo axes	CJ1W-NC881						
		16 servo axes	CJ1W-NCF81	-					
		4 servo axes and 64 I/O slaves	CJ1W-NC482						
		8 servo axes and 64 I/O slaves	CJ1W-NC882						
	Position Control Units support- ing MECHA- TROLINK-II communications	MECHATROLINK-II, 16 axes max.	CJ1W-NCF71 (-MA)	25 words	0 to F	16 Units*3	0.36		95 g max.
	Motion Control Units support- ing MECHA- TROLINK-II communications	MECHATROLINK-II, Real axes: 30 max., Virtual axes: 2 max., Special motion control language	CJ1W-MCH71	25 words	0 to F	3 Units/Rack *9	0.60		210 g max.
	SYSMAC SPU Unit (High- speed Storage and Processing Unit)	One CF card type I/II slot (used with OMRON HMC-EF□□□ Memory Card), one Ethernet port	CJ1W-SPU01- V2*10	Not used.	0 to F	16 Units*3	0.56		180 g max.

- \*1 Some CJ-series CPU Bus Units are allocated words in the CPU Bus Unit Setup Area. The system must be designed so that the number of words allocated in the CPU Bus Unit Setup Area does not exceed its capacity. Refer to 4-6-2 CPU Bus Unit Setup Area in CJ2 CPU Unit Software User's Manual (Cat. No. W473).
  - There may also be limits due to the capacity of the Power Supply Unit that you are using or the maximum number of Units to which memory can be allocated in the CPU But Unit Setup Area.
- \*2 If interrupts to the CPU Unit are used, mount the Interrupt Input Unit in one of the following slots on the CPU Rack.
  - CJ2H-CPU6□-EIP: Slots 0 to 3
  - CJ2H-CPU6□ or CJ2M-CPU□□: Slots 0 to 4
- \*3 Up to 15 Units can be connected for a CJ2H-CPU6□-EIP or CJ2M-CPU3□ CPU Unit.
- Increases by 0.15 A/Unit when an NT-AL001 RS-232C/RS-422A Link Adapter is used. Increases by 0.04 A/Unit when a CJ1W-CIF11 RS-422A Converter is used. Increases by 0.20 A/Unit when an NV3W-M□20L Programmable Terminal is
- \*5 Up to seven Units can be connected for a CJ2H-CPU6□-EIP CPU Unit, up to eight Units can be connected for a CJ2H-CPU6□ CPU Unit, and up to two Units can be connected for a CJ2M CPU Unit.
- \*6 Slave I/O are allocated in DeviceNet Area (CIO 3200 to CIO 3799).
- Includes the weight of accessory connectors.
- Only OMNUC G5-series Servo Drives with Built-in EtherCAT can be connected.
- When mounting to a CJ-series CPU Rack or a CJ-series Expansion Rack, one of these Units uses the space of three
- \*10 Use version 2 or higher of the SYSMAC SPU Unit with a CJ2 CPU Unit.

#### 2-1-5 **Calculating Unit Current Consumption**

The amount of current/power that can be supplied to the Units mounted in a Rack is limited by the capacity of the Rack's Power Supply Unit. Refer to the following tables when designing your system so that the total current consumption of the mounted Units does not exceed the maximum current for each voltage group and the total power consumption does not exceed the maximum for the Power Supply

For details on calculating the current consumption of Units, refer to 2-1-2 CPU Rack, 2-1-3 Expansion Racks, and 2-1-4 Configuration Units.

### Maximum Current and Power Supplied by Power Supply Units

The following table shows the maximum currents and power that can be supplied by Power Supply Units in CPU Racks and Expansion Racks.

- Note 1 When calculating current/power consumption in a CPU Rack, be sure to include the power required by the CPU Unit itself, as well as the I/O Control Unit if one or more Expansion Racks is connected.
  - 2 Be sure to include the power required by the I/O Interface Unit when calculating current/power consumption in an Expansion Rack.

	Ma	ax. current consumpti	ion	Max. total power
Power Supply Unit	5-V group (internal logic)	24-V group (relays)	24-V group (service)	consumption
CJ1W-PA205R	5.0 A	0.8 A	None	25 W
CJ1W-PA205C	5.0 A	0.8 A	None	25 W
CJ1W-PA202	2.8 A	0.4 A	None	14 W
CJ1W-PD025	5.0 A	0.8 A	None	25 W
CJ1W-PD022	2.0 A	0.4 A	None	19.6 W

# **Example Calculations**

Example 1: In this example, the following Units are mounted to a CPU Rack with a CJ1W-PA205R Power Supply Unit.

Unit	Model	Ouantitu	Voltage group		
Unit	Wiodei	Quantity	5-V	24-V	
CPU Unit	CJ2H-CPU68-EIP	1	0.820 A		
I/O Control Unit	CJ1W-IC101	1	0.020 A		
Input Units	CJ1W-ID211	2	0.080 A		
	CJ1W-ID231	2	0.090 A		
Output Unit	CJ1W-OC201	2	0.090 A	0.048 A	
Special I/O Unit	CJ1W-DA041	1	0.120 A		
CPU Bus Unit	CJ1W-CLK23	1	0.350 A		
Current consumption	Calculation		0.820 A + 0.020 A + 0.080 A × 2 + 0.090 A × 2 + 0.090 A × 2 + 0.120 A + 0.350 A	0.048 A × 2	
Result			1.83 A (≤5.0 A)	0.096 A (≤0.8 A)	
Power consump-	Calculation		1.83 A × 5 V = 9.15 W	0.096 A × 24 V = 2.304 W	
tion	Result		9.15 W + 2.30 W = 11.45 W (≤25 W)		

Example 2: In this example, the following Units are mounted to a CJ-series Expansion Rack with a CJ1W-PA205R Power Supply Unit.

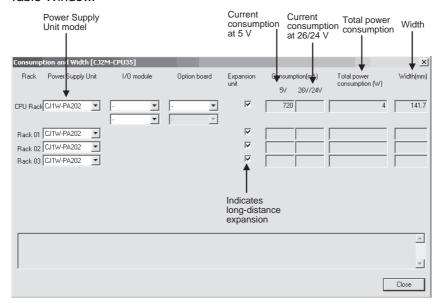
Unit	Unit Model	Quantity	Voltage group		
Onic	Wodei	Quantity	5-V	24-V	
I/O Interface Unit	CJ1W-II101	1	0.130 A		
Input Unit	CJ1W-ID211	2	0.080 A		
Output Unit	CJ1W-OD231	8	0.140 A		
Current consumption	Calculation		0.130 A + 0.080 A × 2 + 0.140 A × 8		
	Result		1.41 A (≤5.0 A)		
Power consumption	Calculation		1.41 A × 5 V = 7.05 W		
	Result		7.05 W (≤25 W)	•	



#### **Additional Information**

Rack Current Consumption and Width Display

To display the current consumption and width of Units connected in the CPU Rack or Expansion Rack, select Current Consumption and Width from the Options Menu in the CJ2 CPU Unit I/O Table Window.



If the capacity of a Power Supply Unit is exceeded, it will be displayed in red.

### 2-1-6 Calculating Power Consumption

The ambient operating temperature at the control panel for mounting a CJ-series PLC must be no higher than 55°C. This section describes how to calculate the power consumption of a CPU Rack for use in the thermal design of the control panel.

### **Calculating Power Consumption**

Use the following equation to calculate the average power consumption (W) of a CJ-series CPU Rack.

### Basic PLC Power Consumption (W\_PLC)

The basic PLC power consumption is calculated based on the overall power consumption of the PLC and the power conversion rate of the Power Supply Unit.

$$W_PLC = W_unit \div \eta$$

• W\_unit:

Total power consumption of Units mounted to the CPU Rack. For details on the current consumption and voltage of individual Units, refer to 2-1-4 Configuration Units.

• η:

Power Supply Unit power conversion rate.

The rate is 70% for the CJ Series, so use "0.7" in the calculation.

#### Basic I/O Unit Power Consumption (W\_IO\_ONOFF)

The Basic I/O Unit power consumption is the total consumption for the Input Units and the Output Units.

• Input Units

Rated input voltage × Input current × Number of input points

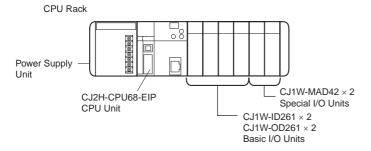
• Output Units

Residual voltage  $\times$  Maximum load current  $\times$  Number of output points

**Note** For a CJ-series Basic I/O Unit with transistor outputs, use a residual voltage of 0.1 V in the calculation. For a CJ-series Basic I/O Unit with relay or triac outputs, use a residual voltage of 0 V in the calculation.

### **Calculation Examples**

These examples show how to calculate the power consumption (W) for the following system.



Units	Model	Quantity	5 VDC	Other
CPU Unit	CJ2H-CPU68-EIP	1 Unit	0.82 A	
Input Units	CJ1W-ID261	2 Units	0.09 A	Rated input voltage: 24 V
				Input current: 4.1 mA
				Number of input points: 64
Output Unit	CJ1W-OD261	2 Units	0.17 A	Residual voltage: 0.1 V
				Maximum load current: 0.3 A per point 6.4 A per Unit
				Number of output points: 64
Special I/O Units	CJ1W-MAD42	2 Units	0.58 A	

#### Basic PLC Power Consumption (W\_PLC)

 $W_PLC = (0.82 + 0.09 \times 2 + 0.17 \times 2 + 0.58 \times 2) A \times 5 V \div 0.7 = 17.86 W$ 

#### Basic I/O Unit Power Consumption (W\_IO\_ONOFF)

W\_IO\_ONOFF = 24 V  $\times$  0.0041 A  $\times$  64 points  $\times$  2 Units + 0.1 V  $\times$  6.4 A  $\times$  2 Units = 13.88 W\*

#### Average Power Consumption (W)

W = W\_PLC + W\_IO\_ONOFF = 31.74 W

<sup>\*</sup> The maximum load current of an Output Unit is limited for each Unit.

# 2-2 Expanded System Configuration

This section describes the system configurations that can be connected by using the serial port that is built into the CJ2 CPU Unit, along with Communications Units and other Configuration Units.

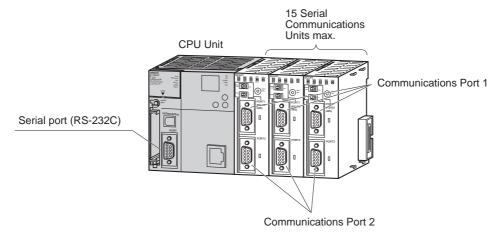
#### 2-2-1 Serial Communications

This expanded system can be connected via the CJ2 CPU Unit's built-in serial communications port or a Serial Communications Unit.

Various protocols, including Host Link and NT Link, can be used with the serial communications port. A particular protocol can be supported by switching the mode of the serial communications port.

For details on the serial communications modes that are supported, refer to 11-2 Serial Communications in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).

Note Protocol macros are supported only for Serial Communications Units.



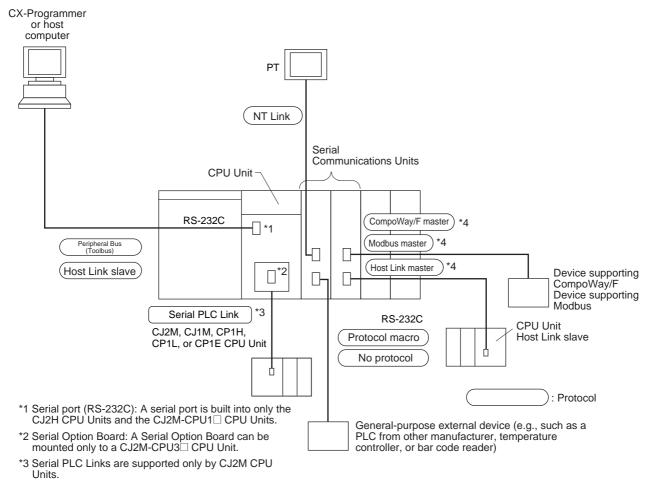


#### **Precautions for Correct Use**

A Serial Option Board is required to use a serial communications for the CJ2M-CPU3. Refer to *Serial Option Boards* on page 2-7 for information on Serial Option Boards.

### **System Configuration Example**

The host computer or a Programming Device, such as the CX-Programmer, is connected via the serial port on the CPU Unit or, with the CJ2M-CPU3, on the Serial Option Board. In addition, up to 15 Serial Communications Units can be connected to a single CPU Unit, making it possible to configure a flexible serial communications system by connecting devices with RS-232C or RS-422/485 ports (such as PLCs from other manufacturers, temperature controllers, bar code readers, ID systems, personal computers, board computers, and components).



\*4 This is connected using the Serial Gateway. The Serial Gateway is supported for Serial Communications Units with unit version 1.2 or later.

> For details on the protocol modes that can be selected for each port, refer to 11-2-1 Overview of Serial Communications in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).



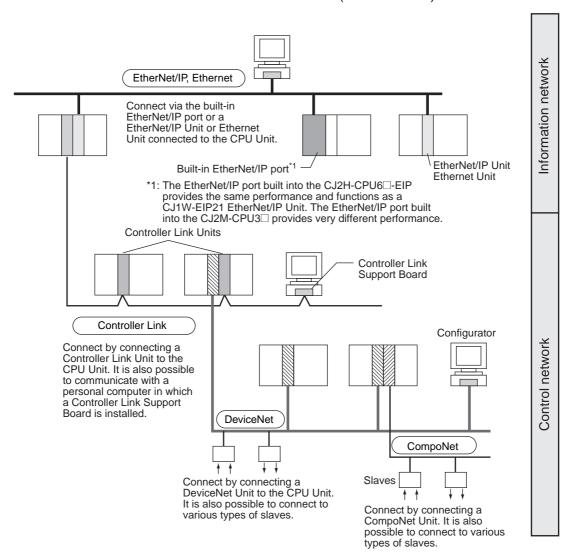
#### **Additional Information**

Use the Peripheral Bus to connect the CJ2 CPU Unit to the CX-Programmer via serial communications.

#### 2-2-2 Communications Networks

### **Communications Network Systems**

The CJ Series supports the following communications networks. Select the appropriate network according to the applications. For details on communications networks, refer to 11-3 Communications Networks in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).



# **Communications Network Overview**

System	Network	Function	Communications	Communications Device	
	EtherNet/IP	Between Host computer and PLC.	FINS message communications	Built-in EtherNet/IP port on CJ2H-CPU6□-EIP or CJ2M-	
		Between PLCs.		CPU3□, or EtherNet/IP Unit	
Information networks		Between Host computer and Memory Card installed in CPU Unit.	FTP server		
	Controller Link	Between PLC and personal	FINS message communications	Controller Link Support	
RS-232C → C		computer directly connected to the Network.	Data link (offset, simple settings)	Board or Controller Link Unit	
	RS-232C → Controller Link	Between Host Link computer and PLC on the Network.	Host Link commands and gateway.	RS-232C cables and Controller Link Unit	
	EtherNet/IP	Between PLCs.	Tag data links	Built-in EtherNet/IP port on CJ2H-CPU6□-EIP, CJ2M-CPU3□ or EtherNet/IP Unit	
	Controller Link	Between PLCs.	FINS message communications	Controller Link Unit	
			Data link (offset, simple settings)		
Control networks	DeviceNet		FINS message communications in an open network.	DeviceNet Master Unit and Configurator	
	DeviceNet	Between PLC and Network devices (Slaves).	Large-capacity remote I/O (fixed or free allocation) in an open network	DeviceNet Master Unit and Configurator	
	CompoNet		High-speed, multi-point, multi- node remote I/O in an open net- work	CompoNet Master Unit	



# **Nomenclature and Functions**

This section gives the parts of a CJ2 PLC and describes the functions of the parts.

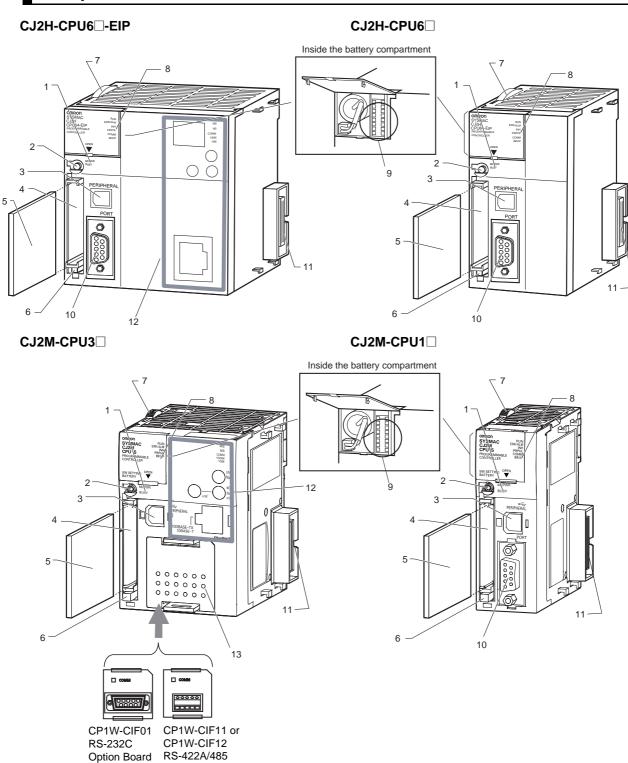
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# 3-1 CPU Units

### 3-1-1 CPU Section

## **Components and Functions**

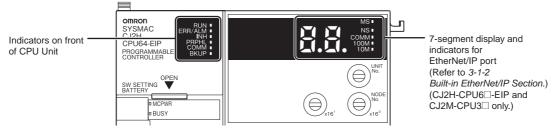


Option Board

- 1. Memory Card Indicators (Refer to 3-2 Memory Card.) Indicates the Memory Card status (access and power supply).
- 2. Simple Backup/Memory Card Power Supply Switch (Refer to 3-2 Memory Card.) Used to back up Memory Card data or turn OFF the power when removing the Memory Card.
- 3. Peripheral (USB) Port Connected to Programming Devices, such as the CX-Programmer
- 4. Memory Card Connector (Refer to 3-2 Memory Card.) Connects the Memory Card to the CPU Unit.
- 5. Memory Card (Refer to 3-2 Memory Card.) All CPU Unit data can be copied to a Memory Card to back up the data. If a Memory Card Adapter is used, the Memory Card can be mounted in the PCMIA slot in a personal computer.
- 6. Memory Card Eject Button (Refer to 3-2 Memory Card.) Press the eject button to remove the Memory Card from the CPU Unit.
- 7. Slider Secures the CPU Unit to the next Unit.

- 8. LED Indicators (Refer to the next page.) These indicators show the status of the CPU Unit:
- Normal operation
- Errors
- · Output OFF status
- · Communications status for the peripheral (USB) and RS-232C ports
- Backup status between RAM and built-in flash memory
- 9. DIP Switch (Refer to a following page.) Sets operations, such as user memory protection, automatic program transfer by Memory Card, serial port communications mode, and simple backup.
- 10. RS-232C Serial Port (Refer to A-4 Connecting to a Serial Port on the CPU Unit.) Connected to Programming Devices, Host Computers, general-purpose external devices, Programmable Terminals, and other devices.
- 11. Connector Connected to the next Unit.
- 12. Built-in EtherNet/IP Section (CJ2H-CPU6□-EIP only) Refer to 3-1-2 Built-in EtherNet/IP Section (CJ2H-CPU6□-EIP only) for information on the built-in Ether-Net/IP Section.
- 13. Serial Option Boards (CJ2M-CPU3□ Only) An Option Board can be connected to the slot.
  - CP1W-CIF01 RS-232C Option Board
  - RS-422A/485 Option Board (CP1W-CIF11 (Maximum transmission distance: 50 m) or CP1W-CIF12 (Maximum transmission distance: 500 m))

# **CPU Unit Status Indicators**



The CJ2 CPU Unit status can be checked with the indicators at the top of the front panel of the Unit. The following table describes these indicators.

Indicator	Color	Status	Meaning
RUN	Green	ON	Lights when the PLC is operating normally in MONITOR or RUN mode. The program is being executed.
		Flashing	System download mode error or DIP switch settings error.
		OFF	PLC has stopped operating while in PROGRAM mode, or has stopped operating due to a fatal error, or is downloading data from the system.
ERR/ALM	Red	ON	A fatal error (including FALS(007) instruction execution) or a hardware error (watchdog timer error) was found in self-diagnosis.
			The CJ2 CPU Unit will stop operating, and the outputs from all Output Units will turn OFF.
		Flashing	A non-fatal error was found (including FAL(006) instruction execution) in the self-diagnosis.
			The CJ2 CPU Unit will continue operating.
		OFF	The CJ2 CPU Unit is operating normally.
INH Yellow		ON	Output OFF Bit (A500.15) has been turned ON.
			The outputs from all Output Units will turn OFF.
		OFF	Output OFF Bit (A500.15) has been turned OFF.
PRPHL	Yellow	Flashing	The CJ2 CPU Unit is communicating (sending or receiving) via the peripheral (USB) port.
		OFF	The CJ2 CPU Unit is not communicating via the peripheral (USB) port.
COMM*1	Yellow	Flashing	The CJ2 CPU Unit is communicating (sending or receiving) via the serial port (RS-232C).
		OFF	The CJ2 CPU Unit is not communicating via the serial port
			(RS-232C).
BKUP	Yellow	ON	User program and parameter area data is being backed up to flash memory in the CPU Unit or being restored from flash memory after the power supply to the PLC was turned ON. *2
		OFF	Data is not being written to flash memory.

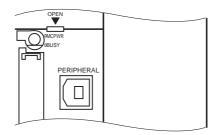
<sup>\*1</sup> The CJ2M-CPU3□ does not have this indicator.

<sup>\*2</sup> Do not turn OFF the power supply to the PLC while this indicator is lit.

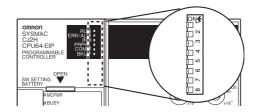
# **Memory Card Indicators**

The status of a Memory Card mounted in the CJ2 CPU Unit can be checked with the indicators in the middle of the front panel of the Unit. The following table describes these indicators.

Indicator	Color	Status	Meaning	
MCPWR	Green	Lit	Power is being supplied to the Memory Card.	
		Flashing Flashes once: Simple backup read, write, or verify normal		
			Flashes five times: Simple backup read malfunction	
		Flashes continuously: Simple backup write or verify malfunction		
		Not lit	Power is not being supplied to the Memory Card.	
BUSY	Yellow	Flashing Memory Card is being accessed.		
		Not lit	Memory Card is not being accessed.	



#### **DIP Switch**



Pin no.	Usage	Setting	Function	Default
SW1	Used to prevent programs from being	ON	Writing disabled for user program memory.*1	OFF
	accidentally overwritten from Programming Devices (including the CX-Programmer).		Writing enabled for user program memory.	
SW2	Set to ON to read the program (AUTOEXEC.OBJ file) and parameter area (AUTOEXEC.STD file) from the	ON	The user program is automatically transferred from the Memory Card when power is turned ON.	OFF
	Memory Card to the CPU Unit when power is turned ON.*2	OFF	The user program is not automatically transferred from the Memory Card when power is	
	Used to store the programs in the Memory Card to switch operations, or to automatically transfer programs at startup (Memory Card ROM operation).*3		turned ON.	
SW3	Not used.			OFF
SW4	Not used.			OFF
SW5		ON	Serial port (RS-232C) communications condition: Automatically detect CX-Programmer (peripheral bus only) baud rate.	OFF
(RS-232C).*4,*5		OFF	Serial port (RS-232C) communications condition: According to CX-Programmer communications settings in PLC Setup. (Refer to <i>Table 1.</i> )	
SW6	Set pin 6 to ON or OFF and use A395.12 in the program to create a user-defined	ON	User-defined pin. Turns ON the User DIP Switch Pin Flag (A395.12).	OFF
condition wi	condition without using an Input Unit.	OFF	User-defined pin. Turns OFF the User DIP Switch Pin Flag (A395.12).	
SW7	Set the simple backup type. (Refer to Table 2 below.)		Specifies the simple backup type.	OFF
SW8		Always OFF.		OFF

- \*1 The following data cannot be overwritten when pin 1 is ON:
  - All parts of the user program (programs in all tasks)
  - All data in the parameter area (such as the PLC Setup and I/O table)
     When pin 1 is ON, the user program and parameter area will not be cleared when the memory clear operation is performed from a Programming Device.
- \*2 I/O memory files (AUTOEXEC.IOM and ATEXEC□□.IOM) are automatically transferred when power is turned ON if pin 2 is set to ON. Both the program (AUTOEXEC.OBJ) and parameter area (AUTOEXEC.STD) files must be stored on the Memory Card. It is not necessary for the I/O memory files (AUTOEXEC.IOM and ATEXEC□□.IOM) to be stored on the Memory Card.
- \*3 When pin 7 is ON, simple backup reading from the Memory Card is given priority, so even if pin 2 is ON, the user program is not automatically transferred from the Memory Card when power is turned ON.
- \*4 Connecting to the PLC is not possible from the CX-One Support Software using SYSMAC WAY even if pin 5 on the DIP switch is OFF and the PLC Setup is set to the Host Link protocol (i.e., the default setting).
- \*5 With the CJ2M-CPU3□, pin 5 can be set only when a Serial Option Board is mounted.

Table 1

Connection	Setting	Pin 5 of DIP switch on front panel	PLC Setup (Serial port (RS-232C))*1
Peripheral bus     (automatic detection)		ON	
2. Peripheral bus		OFF (default)	Peripheral bus
3. Host Link*2		OFF (default)	Host Link (default)
4. NT Link		OFF (default)	NT Link
5. No-protocol		OFF (default)	No-protocol
6. Serial Gateway		OFF (default)	Serial Gateway

<sup>\*1</sup> Set using the CX-Programmer.

Table 2

	DIP Switch		
Simple backup type	SW7	Required operation	
Backing up all PLC data on the Memory Card:  Memory Card  All PLC data  Backup	ON	Press the Memory Card Power Supply Switch for 3 s.	
Restoring all PLC data from the Memory Card:  Memory Card  All PLC data  Restore		Turn ON the power to the PLC.*1	
Comparing the Memory Card and the CPU Unit:  Memory Card  All PLC data  Compare	OFF	Press the Memory Card Power Supply Switch for 3 s.	

<sup>\*1</sup> This operation is given priority over automatic transfer at startup (pin 2 set to ON).

Note After the simple backup operation has been used to restore data from the Memory Card to the PLC, the operation mode will remain in PROGRAM mode and cannot be changed to MONITOR or RUN mode until the PLC power is turned OFF. After restoring the data, turn OFF the power, change the setting of DIP switch pin 7 to OFF, and then turn the power back ON.

<sup>\*2</sup> Connection is not possible from CX-One Support Software using the SYSMAC WAY protocol.

# 3-1-2 Built-in EtherNet/IP Section (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

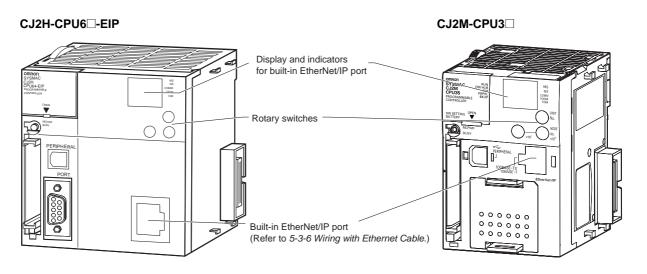
This section describes the components related to the EtherNet/IP port section that is built into the CJ2H-CPU6—EIP and CJ2M-CPU3—.



#### **Additional Information**

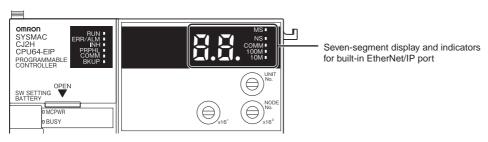
The built-in EtherNet/IP port on the CJ2H-CPU6 — EIP provides the same performance and functions as a CJ1W-EIP21 EtherNet/IP Unit. (The performance of the built-in EtherNet/IP port on the CJ2M-CPU3 — is very different.) Set the unit number and node address with the rotary switches on the front panel of the CPU Unit, and set the communications parameters with the Edit Parameters menu command for the Special I/O Unit. For details on the Edit Parameters, refer to 8-2 Setting CPU Bus Units and Special I/O Units in the CJ2 CPU Unit Software User's Manual (Cat. No. W473). For details on specifications and settings for the built-in EtherNet/IP port, refer to the CS/CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465).

### **Nomenclature and Functions**



## Display and Indicators for Built-in EtherNet/IP Port

With a CJ2 CPU Unit, Ethernet node status and Ethernet network status can be monitored by checking the display and indicators at the upper right of the front of the CPU Unit.



#### Status Indicators: MS, NS, COMM, 100M, and 10M



The MS (Module Status) indicator indicates the status of the built-in EtherNet/IP port itself and the NS (Network Status) indicator indicates the status of the network.

The COMM, 100M, and 10M indicators indicate the status of Ethernet communications.

The MS and NS indicators can be green or red. The COMM, 100M, and 10M indicators are yellow. These indicators can be lit, flashing, or not lit. The following table shows the meaning of these indicator conditions.

Refer to SECTION 6 Troubleshooting for details on using these indicators for troubleshooting.

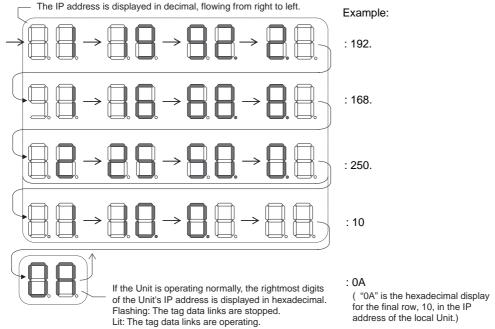
Indicator	Name	Color	Status	Meaning
MS	Module Status	Red	Lit	Fatal error
			Flashing	Recoverable error
		Green	Lit	Normal
			Not lit	Power supply OFF
NS	Network Status	Red	Lit	Fatal error
			Flashing	Recoverable error
		Green	Lit	Tag data link and message connections established
			Flashing	Tag data link and message connections not established
			Not lit	Offline or power supply OFF
COMM	Communication	Yellow	Lit	Transferring data
			Not lit	Not transferring data
100M	100 Mbps	Yellow	Lit	100Base-TX link established
			Not lit	100Base-TX link not established
10M	10 Mbps	Yellow	Lit	10Base-TX link established
			Not lit	10Base-TX link not established

#### Seven-segment Display



When the power supply to the PLC is turned ON or the CPU Unit is reset, all of the segments will flash twice, and then the IP address set for the built-in EtherNet/IP port will be displayed on the 7segment display from right to left. After the entire IP address is displayed, the lower 8 bits of the IP address (node address) will be displayed in hexadecimal.

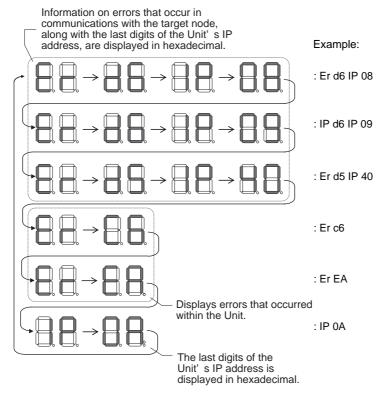
For example, the display will change as follows if the IP address is 192.168.250.10:



If an error occurs, the error code will be displayed alternately with the rightmost byte of the affected device's IP address. For details on error codes, refer to 6-2-2 Checking Error Status at the Ether-Net/IP Port Seven-segment Display.

The following examples show the displays for errors.

- A d6 error (failure to connect) has occurred in communications with IP address 192.168.250.8.
- A d6 error (failure to connect) has occurred in communications with IP address 192.168.250.9.
- A d5 error (verification error; target missing) has occurred in communications with IP address 192.168.250.40.
- A C6 error (multiple switches ON) and an EA error (EtherNet/IP expansion setting error) have occurred at the built-in EtherNet/IP port (192.168.250.10).



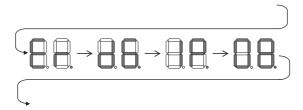
• There is no priority to the order in which the errors are displayed. All of the errors are displayed repeatedly in sequence.

#### Left/Right Dot LEDs

If an error occurs at multiple devices for which the rightmost 8 bits in the IP addresses are the same, this is indicated by the dots on the right side in display on the target devices.

The following examples show the displays for multiple errors.

- d6 errors (failure to connect) have occurred in communications with IP address 10.0.1.8.
- d6 errors (failure to connect) have occurred in communications with IP address 10.0.2.8.



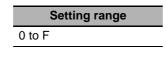
### **Rotary Switches**

The unit number and node address for the CJ2 CPU Unit built-in EtherNet/IP port are set using the rotary switches. The unit number and node address are allocated in the same way as for a CPU Bus Unit. According to the unit number that is set, words are automatically allocated in the CIO Area and DM Area. For details, refer to the CJ2 CPU Unit Software User's Manual (Cat. No. W473).

#### Setting the Unit Number

Set a unique unit number for the CJ2 CPU Unit built-in EtherNet/IP port. The same unit number cannot be used by any other CPU Bus Unit connected to the CJ2 CPU Unit.

Use a small screwdriver to make the setting, and be sure not to damage the rotary switch. The unit number is factory-set to 0.







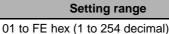
#### **Precautions for Correct Use**

- Always turn OFF the PLC's power supply before setting the unit number.
- · When setting the unit number for the first time or when changing the setting, create the PLC's I/O tables.

## Node Address Setting Switches

Set a FINS address for the built-in EtherNet/IP port. With the FINS communications service, multiple EtherNet/IP Units (including the CJ2 Unit built-in EtherNet/IP port) connected by Ethernet are identified by their node addresses. Using the node address switches, set a unique node address in hexadecimal. The same node address cannot be used by any other EtherNet/IP Unit or Ethernet Unit connected on the same Ethernet network.

As long as it does not duplicate any other address, the node address can be set from 01 to FE (1 to 254 in decimal).







**Note** The node address is factory-set to 01. With the default setting, the values set on these switches become the last two digits of the built-in EtherNet/IP port's IP address.

The default IP address is 192.168.250.*node\_address*. With the factory-set node address of 01, the default IP address is 192.168.250.1.

The node address can be set to any number in the setting range (01 to FE), as long as the same address is not set on another node in the network.



## **Precautions for Correct Use**

- Always turn OFF the PLC's power supply before setting the unit number.
- When setting the unit number for the first time or when changing the setting, create the PLC's I/O tables.



## **Additional Information**

• If the node address setting is changed during operation, the MS Indicator will flash red.

## Relationship with IP Address

When using the automatic generation method (dynamic/static) for IP address conversion, the right-most byte of the IP address that is set for the built-in EtherNet/IP port must be set to the same value as the node address. If it cannot be set to the same value as the node address, then the address conversion method must be set to the IP address table method or the IP address + automatic generation method. For details, refer to the *CS/CJ Series EtherNet/IP Units Operation Manual* (Cat. No. W465).

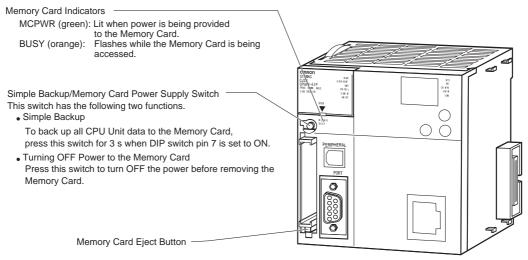
## **Memory Card** 3-2

### **Models and Specifications** 3-2-1

Use the following OMRON-specified Memory Card. Operation may not be correct if memory cards from other companies are used.

Model number		HMC-EF583	HMC-EF283	HMC-EF183
Memory Card capacity		512 Mbytes	256 Mbytes	128 Mbytes
	Dimensions	42.8 × 36.4 × 3.3 mm (W × H × T)		
	Weight	15 g max.		
Common specifications	Current consumption	Approx. 30 mA (when used with PLC)		
	Environmental specifications	Same as general specifications of PLC		
	No. of writes	100,000 (guaranteed value)		
Factory specifications  No. of files writable to root directory  File system		511		
		FAT16		

### 3-2-2 **Operating Procedures**





## **Additional Information**

Simple Backup

The simple backup function copies all CPU Unit data (user program, parameters, and I/O memory) to a Memory Card, without having to use a Programming Device.

For details, refer to 8-3 Simple Backup.

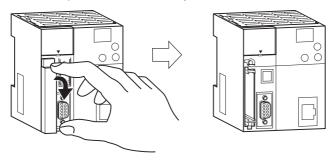
# 3-2-3 Installing and Removing

# **Before Using a Memory Card**

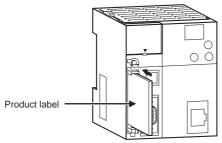
- Observe the following precautions while the Memory Card is being accessed. The Memory Card may become unusable if these precautions are not followed.
  - · Never turn OFF the PLC while the CPU is accessing the Memory Card.
  - Never remove the Memory Card while the CPU is accessing the Memory Card. Press the Memory Card power supply switch and wait for the BUSY indicator to go OFF before removing the Memory Card.
- Never insert the Memory Card facing the wrong way. If the Memory Card is inserted forcibly, it may become unusable.
- To delete all the data on the Memory Card by formatting the Memory Card, insert the Memory Card in the CPU Unit and perform the operation from the CX-Programmer.

# **Installing the Memory Card**

1 Pull the top end of the Memory Card cover forward and remove from the Unit.

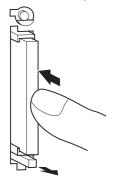


**2** Insert the Memory Card with the label facing to the left. (Insert with the  $\Delta$  on the Memory Card label and the  $\Delta$  on the CPU Unit facing each other.)



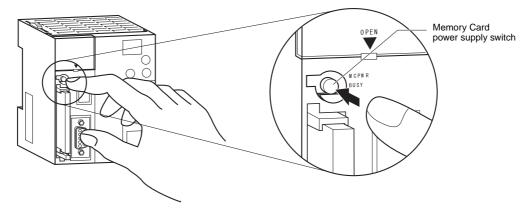
**3** Push the Memory Card securely into the compartment.

If the Memory Card is inserted correctly, the Memory Card eject button will be pushed out.



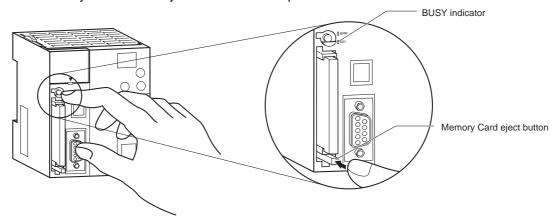
# Removing the Memory Card

1 Press the Memory Card power supply switch.

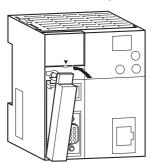


**2** Press the Memory Card eject button after the BUSY indicator is no longer lit.

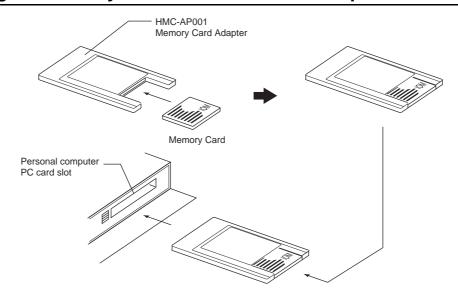
The Memory Card will be ejected from the compartment.



- Pull out the Memory Card.
- Install the Memory Card cover when a Memory Card is not being used.



# Installing the Memory Card into a Personal Computer



# Pulse I/O Modules (CJ2M CPU Unit 3-3 Only)

### 3-3-1 **Models and Specifications**

Model	Type of transis- tor outputs	Specifications
CJ2M-MD211	Sinking outputs	1 MIL connector
CJ2M-MD212	Sourcing outputs	10 inputs (four interrupt/quick-response inputs or two high-speed counter inputs)
		6 outputs (two pulse outputs or two PWM outputs)

Note Connectors are not provided with Pulse I/O Modules.

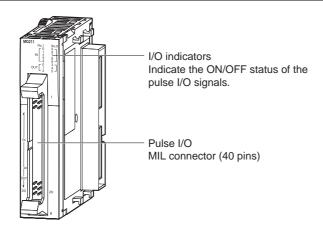
Purchase the following Connector, an OMRON Cable with Connectors for Connector-Terminal Block Conversion Units, or an OMRON Cable with Connectors for Servo Relay Units.

Name	Model	Specifications
MIL Flat Cable Connector for Pulse I/O Modules	XG4M-4030-T	40-pin MIL connector, pressure- welded type (This connector is used by user to make a cable.)

(Refer to the 2-1-2 CPU Rack, 5-3 Wiring, or the CJ2M CPU Unit Pulse I/O Module User's Manual (Cat. No. W486) for details.)

### **Part Names and Functions** 3-3-2

## **Part Names**

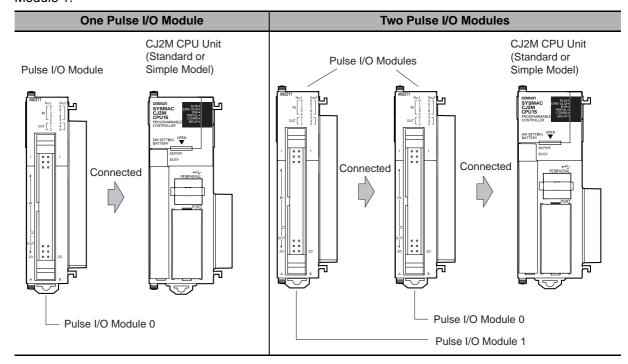


# Connecting Pulse I/O Modules to the CPU Unit

Up to two Pulse I/O Modules can be connected to a CJ2M CPU Unit.

They must be connected immediately to the left of the CPU Unit.

The Pulse I/O Module closest to the CPU Unit is Pulse I/O Module 0 and the other one is Pulse I/O Module 1.

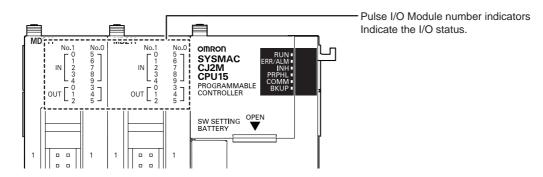


## **Pulse I/O Module Detection**

The CPU Unit will automatically detect the Pulse I/O Modules that are connected when the power supply is turned ON. The Pulse I/O Modules are therefore not registered in the I/O tables.

An error will not occur when power is turned ON even if there is a different number of Pulse I/O Modules connected or different models of Pulse I/O Modules connected.

## **Pulse I/O Module Status Indicators**



Up to two Pulse I/O Modules can be connected.

The indicators on the front panel of a Pulse I/O Module indicate whether the Block is number 0 or number 1 and indicate the I/O status.

The following table describes these indicators.

m: Lit, 1:Not lit

Indicator	Color	Status	Meaning
No. 0	Green m		This is the Pulse I/O Module that is connected directly to the CPU Unit. It is Pulse I/O Module number 0.
		1	Not connected.
No. 1	Green	m	This is the Pulse I/O Module that is connected next to the Power Supply Unit when two Pulse I/O Modules are connected. It is Pulse I/O Module number 1.
		1	Not connected.
IN0 to IN9	Yellow	m	The allocated input is ON.
		1	The allocated input is OFF.
OUT0 to	Yellow	m	The allocated output is ON.
OUT5		1	The allocated output is OFF.



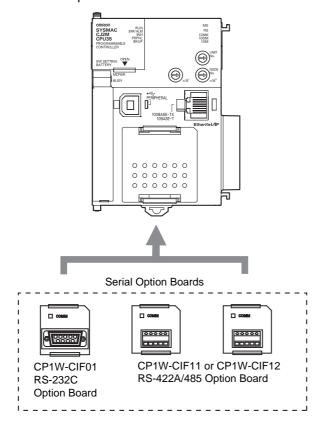
## **Precautions for Correct Use**

A maximum of two Pulse I/O Modules can be connected. Do not connect more than this. If three or more Pulse I/O Modules are connected, a too many I/O points error (fatal error) will occur. If this error occurs, turn OFF the power supply to the PLC and remove all but two Pulse I/O Modules.

# 3-4 Serial Option Boards (CJ2M-CPU3□ Only)

## 3-4-1 Overview

A Serial Option Board can be used with a CJ2M-CPU3 CPU Unit.



## Serial Option Boards

Model	Port	Maximum transmission distance	Connection method
CP1W-CIF01	One RS-232C port	15 m	Connector: D-sub, 9-pin female
CP1W-CIF11	One RS-422A/485 port (not isolated)	50 m	Terminal block: Using ferrules
CP1W-CIF12	One RS-422A/485 port (isolated)	500 m	Terminal block: Using ferrules

## Mounting an Option Board

When mounting an Option Board, first remove the slot cover. Grasp the lock levers at the top and bottom of the cover at the same time to unlock the cover, and then pull the cover out. Then to mount the Option Board, check the alignment and firmly press it in until it snaps into place.



## **Precautions for Correct Use**

Always turn OFF the power supply to the PLC before mounting or removing an Option Board.

## 3-5 **Power Supply Units**

### **Models and Specifications** 3-5-1

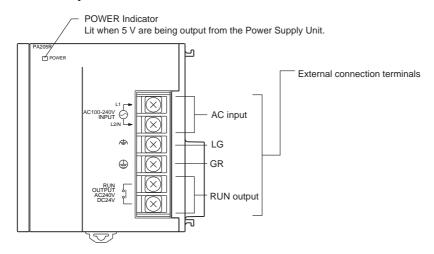
Item			Specifications		
Power Supply Unit	CJ1W-PA205R	CJ1W-PA205C	CJ1W-PA202	CJ1W-PD025	CJ1W-PD022
Supply voltage	100 to 240 VAC (wide-range), 50/60 Hz			24 VDC	
Operating voltage and frequency ranges	85 to 264 VAC, 47 to 63 Hz			19.2 to 28.8 VDC	21.6 to 26.4 VDC
Power consumption	100 VA max.		50 VA max.	50 W max.	35 W max.
Inrush current*1	At 100 to 120 VAC: 15 A/8 ms max. for cold start at room temperature At 200 to 240 VAC: 30 A/8 ms max. for cold start at room temperature		At 100 to 120 VAC: 20 A/8 ms max. for cold start at room temperature At 200 to 240 VAC: 40 A/8 ms max. for cold start at room temperature	At 24 VDC: 30 A/20 ms max. for temperature	or cold start at room
Output capacity*7	5.0 A, 5 VDC (including supply to CPU Unit)  0.8 A, 24 VDC  Total: 25 W max.  Not provided		2.8 A, 5 VDC (including supply to CPU Unit)	5.0 A, 5 VDC (including supply to CPU Unit)	2.0 A, 5 VDC (including supply to CPU Unit)
			0.4 A, 24 VDC	0.8 A, 24 VDC	0.4 A, 24 VDC
			Total: 14 W max.	Total: 25 W max.	Total: 19.6 W max.
Output terminal (service supply)					
RUN output*2	Contact configuration: SPST-NO Switch capacity: 250 VAC, 2 A (resistive load) 120 VAC, 0.5 A (inductive load), 24 VDC, 2A (resistive load) 24 VDC, 2 A (inductive load)	Not provided.	Not provided.	Not provided.	Not provided.
Replacement notification function	Not provided.	With Alarm output (open col- lector output) 30 VDC max., 50 mA max.	Not provided.	Not provided.	Not provided.

Item			Specifications		
Insulation resistance	20 MΩ min. (at 500 VDC) between AC external and GR terminals*3	<ul> <li>20 MΩ min.         <ul> <li>(at 500 VDC)</li> <li>between all external terminals and GR</li> <li>terminal*3, and between all alarm output terminals.</li> </ul> </li> <li>20 MΩ min.         <ul> <li>(at 250 VDC)</li> <li>between all alarm output terminals and GR terminal*3.</li> </ul> </li> </ul>	20 MΩ min. (at 500 VDC) between AC external and GR terminals*3	20 MΩ min. (at 500 VDC) between DC external and GR terminals*3	*6
Dielectric strength*4	2,300 VAC 50/60 Hz for 1 min between AC external and GR terminals*3 Leakage current: 10 mA max.	2,300 VAC, 50/60 Hz for 1 min between all external terminals and GR terminals with a leakage current of 10 mA max.     1,000 VAC, 50/60 Hz for 1 min between all alarm output terminals and GR terminals and GR terminals and GR terminals and terminals	2,300 VAC 50/60 Hz for 1 min between AC external and GR terminals*3 Leakage current: 10 mA max.	1,000 VAC 50/60 Hz for 1 min between DC external and GR terminals*3 Leakage current: 10 mA max.	*6
	Leakage current: 1				
Noise immunity  Vibration resistance	2 kV on power supply line (Conforms to IEC61000-4-4.)  5 to 8.4 Hz, 3.5-mm amplitude, 8.4 to 150 Hz, acceleration: 9.8 m/s <sup>2</sup> in X, Y, and Z directions for 100 minutes (Time coefficient: 10 minutes × coefficient factor 10 = total time 100 min.) (according to JIS C60068-2-6)				
Shock resistance	147 m/s <sup>2</sup> 3 times each in X, Y, and Z directions (Relay Output Unit: 100 m/s <sup>2</sup> ) (according to JIS C60068-2-27)			ccording to JIS	
Ambient operating temperature	0 to 55°C				
Ambient operating humidity	10% to 90% (with no condensation)	10% to 90% (with no condensa- tion)*5	10% to 90% (with r	no condensation)	
Atmosphere	Must be free from o	corrosive gases.			
Ambient storage temperature	-20 to 75°C (excluding bat- tery)	–20 to 75°C*5	-20 to 75°C (exclud	ding battery)	

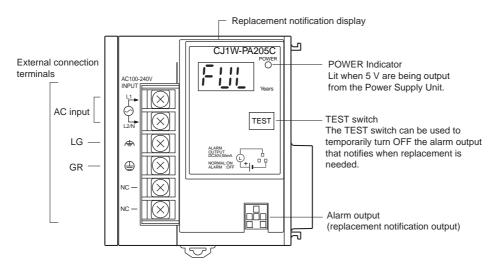
- \*1 The AC and DC values above are given for a cold start, and the AC values are at room temperature. The AC inrush control circuit uses a thermistor element with a low-temperature current control characteristic. If the ambient temperature is high or the PLC is hot-started, the thermistor will not be sufficiently cool, and the inrush current given in the table may be exceeded by up to twice the given value. When selecting fuses or breakers for external circuits, allow sufficient margin in shut-off performance. The DC inrush control circuit uses a capacitor-charging delay circuit. If the power is OFF for only a short time for a hot-start, the capacitor will not sufficiently charge and the inrush current given in the table may be exceeded by up to twice the given value.
- \*2 Supported only when mounted to CPU Rack.
- \*3 Disconnect the Power Supply Unit's LG terminal from the GR terminal when testing insulation and dielectric strength. Testing the insulation and dielectric strength with the LG terminal and the GR terminals connected will damage internal circuits in the CPU Unit.
- Change the applied voltage gradually using the adjuster on the Tester. If the full dielectric strength voltage is applied or turned OFF using the switch on the Tester, the generated impulse voltage may damage the Power Supply Unit.
- Maintain an ambient storage temperature of -25 to 30°C and relative humidity of 25% to 70% when storing the Unit for longer than 3 months to keep the replacement notification function in optimum working condition.
- \*6 CJ1W-PD022 is not insulated between the primary DC power and secondary DC power.
- Internal components in the Power Supply Unit will deteriorate or be damaged if the Power Supply Unit is used for an extended period of time exceeding the power supply output capacity or if the outputs are shorted.

## 3-5-2 Components

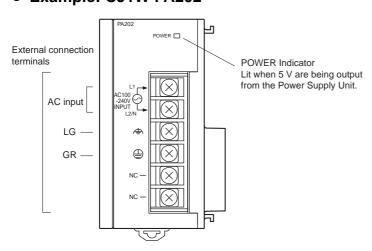
## • Example: CJ1W-PA205R



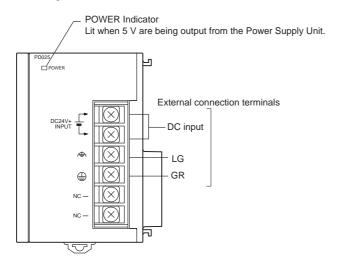
## • Example: CJ1W-PA205C



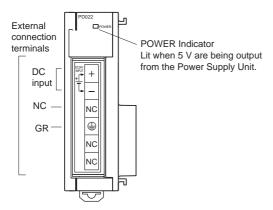
## • Example: CJ1W-PA202



## • Example: CJ1W-PD025



## Example: CJ1W-PD022



# **AC Input**

Supply 100 to 240 VAC (allowable: 85 to 264 VAC).

Note The CJ1W-PA205R, CJ1W-PA205C, and CJ1W-PA202 have a wide input range, so they do not have voltage switching terminals.

# **DC Input**

Supply 24 VDC.

Model	Allowable power supply voltage fluctuation range
CJ1W-PD025	19.2 to 28.8 VDC (±20%)
CJ1W-PD022	21.6 to 26.4 VDC (±10%)

## LG

Ground to a resistance of 100  $\Omega$  or less to increase noise resistance and avoid electric shock.

# **GR**

Ground to a resistance of 100  $\Omega$  or less to avoid electric shock.

# RUN Output (CJ1W-PA205R Only)

The internal contact turns ON when the CJ2 CPU Unit is operating (RUN or MONITOR mode). The Power Supply Unit must be in the CPU Rack to use this output.

# Alarm Output (CJ1W-PA205C Only)

The alarm output is used to notify when Power Supply Unit replacement is required. The output is normally ON. The output turns OFF when the time until replacement is 6 months or less.

### **Selecting a Power Supply Unit** 3-5-3

After determining what power supply voltage is required, whether power output terminals and a RUN output are required, and whether replacement notification is required, calculate the current and power requirements for each Rack.

## **Condition 1: Current Requirements**

There are two voltage groups for internal power consumption: 5 VDC and 24 VDC.

For details on the current consumption of individual Units, refer to 2-1-4 Configuration Units.

## Current Consumption at 5 VDC

The following table shows the current that can be supplied to Units (including the CJ2 CPU Unit) that use 5-VDC power.

Model	Maximum current at 5 VDC
CJ1W-PA205R/205C	5.0 A
CJ1W-PA202	2.8 A
CJ1W-PD025	5.0 A
CJ1W-PD022	2.0 A

## Current Consumption at 24 VDC

The following table shows the current that can be supplied to Units that use 24-VDC power supply.

Model	Maximum current at 24 VDC
CJ1W-PA205R/205C	0.8 A
CJ1W-PA202	0.4 A
CJ1W-PD025	0.8 A
CJ1W-PD022	0.4 A

# **Condition 2: Power Requirements**

The following table shows the maximum total power that can be supplied at 5 VDC and 24 VDC.

Model	Maximum total power output
CJ1W-PA205R/205C	25 W
CJ1W-PA202	14 W
CJ1W-PD025	25 W
CJ1W-PD022	19.6 W

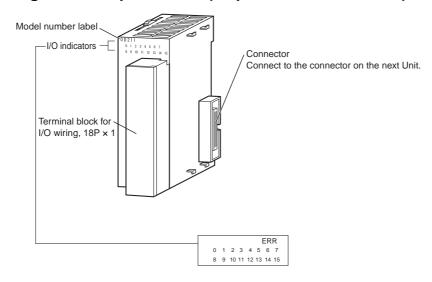
For details on the current consumption of individual Units, refer to 2-1-2 CPU Rack, 2-1-3 Expansion Racks, and 2-1-4 Configuration Units. Refer to 2-1-5 Calculating Unit Current Consumption for an example of calculating the current consumption.

# 3-6 CJ-series Basic I/O Units

## 3-6-1 Basic I/O Units with Terminal Blocks

## **Part Names and Functions**

## • Eight/sixteen-point Units (18-point Terminal Blocks)

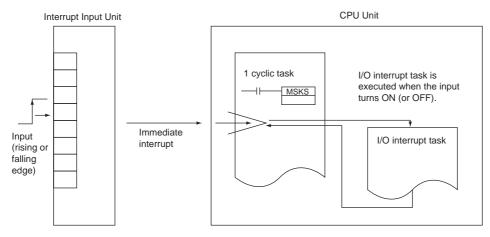


Note The CJ1W-OD202, CJ1W-OD204, and CJ1W-OD212 also have an ERR indicator for the load short-circuit alarm.

# **Interrupt Input Units**

## Functions

Interrupt Input Units are used to execute interrupt programs on the rising or falling edge of an input signal. When the specified interrupt input turns ON (or OFF), execution of the cyclic program in the CPU Unit is interrupted and an I/O interrupt task (task number 100 to 131) is executed. When execution of the I/O interrupt task has been completed, the cyclic program is again executed starting from the instruction after which it was interrupted.

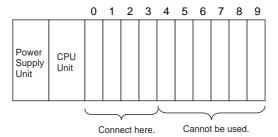


## Application Precautions

Interrupt Input Units must be mounted in the locations described below.

When using a CJ2H-CPU6□-EIP CPU Unit, all Interrupt Input Units must be connected in any of the four positions immediately to the right of the CPU Unit, i.e., slots 0 to 3 on the CPU Rack. When using a CJ2H-CPU6□ CPU Unit or CJ2M-CPU□□ Unit, all Interrupt Input Units must be connected in any of the five positions immediately to the right of the CPU Unit, i.e., slots 0 to 4 on the CPU Rack. If an Interrupt Input Unit is connected in any other position on the CPU Rack or anywhere on an Expansion Rack, and I/O setting error (fatal) will occur.

Example: CJ2H-CPU6□-EIP



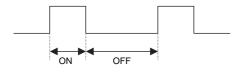
• The Interrupt Input Units must be connected in the slot ranges specified above even when the I/O tables are edited using the CX-Programmer. If the Interrupt Input Units are not connected in the correct positions, an error will occur when the I/O tables are generated from the CX-Programmer. A401.10 will turn ON to indicate an I/O setting error and A405.08 will turn ON to indicate that an Interrupt Input Unit is in the wrong position.

Note Even if a Unit is physically in one of the correct positions, a Dummy Unit can be registered in the I/O tables, causing a Unit to be defined in a position different from its physical position.

- There are limits to the number of Interrupt Input Units that can be mounted. If these limits are exceeded, a too many I/O points error (fatal error) will occur.
- The input response time cannot be changed for the CJ1W-INT01, and the related portions of the Basic I/O Unit input time constants in the PLC Setup, and the setting status in A220 to A259 will not be valid.

## Input Signal Width

Input signals must meet the following conditions.



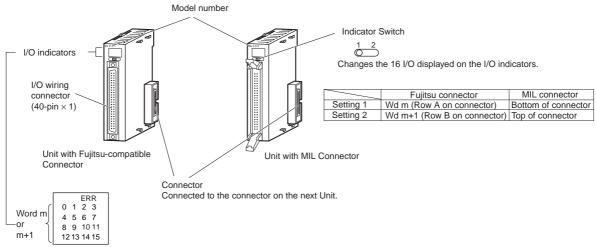
Unit	ON time	OFF time
CJ1W-INT01	0.05 ms min.	0.5 ms min.

# 3-6-2 Thirty-two/Sixty-four-point Basic I/O Units with Connectors

Units are available with either Fujitsu-compatible connectors (CJ1W- $\square$ D $\square$ 1) or MIL connectors (CJ1W- $\square$ D $\square$ 2/3/4).

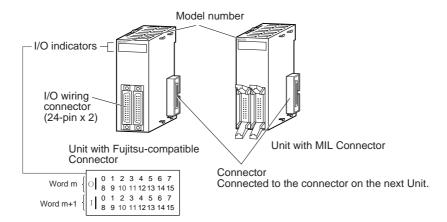
## **Part Names**

 Thirty-two-point Units (Models with 40-point Fujitsu Connector or MIL Connector)

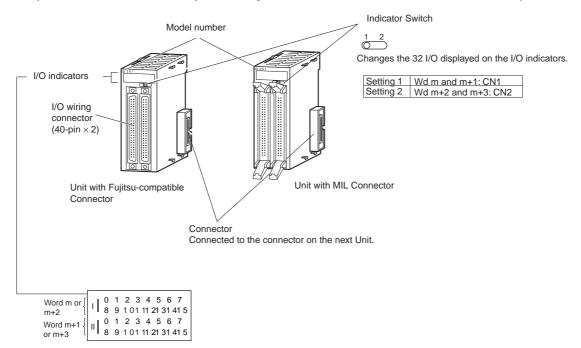


Note: Only the CJ1W-OD232 has an ERR indicator for the load short-circuit alarm.

 Thirty-two-point Units with 2 × 24-pin Fujitsu-compatible Connectors or 2 × 20-pin MIL Connectors



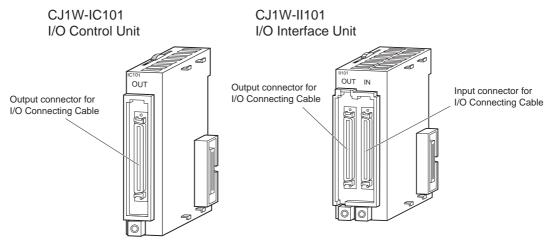
## • Sixty-four-point Units (Models with Two 40-point Fujitsu Connectors or MIL Connector)



# 3-7 I/O Control Units and I/O Interface Units

An I/O Control Unit and I/O Interface Units are used to connect Expansion Racks to expand the system.

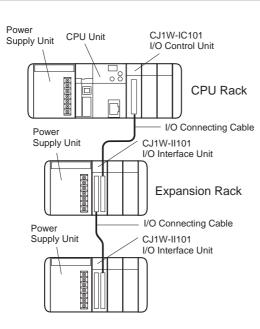
## 3-7-1 Component Names



## **Precautions for Correct Use**

Attached the enclosed cover to the I/O Connecting Cable connector on the I/O Interface Unit when it is not being used to protect it from dust.

# 3-7-2 System Configuration



The I/O Control Unit is connected directly to the CJ2 CPU Unit. If it is not immediately to the right of the CPU Unit, correct operation may not be possible.

The I/O Interface Unit is connected directly to the Power Supply Unit. If it is not immediately to the right of the Power Supply Unit, correct operation may not be possible.

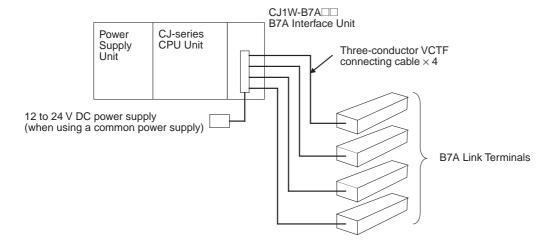
# **B7A Interface Unit**

### 3-8-1 **Overview**

The B7A is a 1:1 transmission path that does not require a master. A total of 16 signals are transmitted using a two-conductor or three-conductor VCTF cable (maximum length: 500 m). The CJ1W-B7A□□ B7A Interface Unit is a CJ-series Basic I/O Unit that exchanges up to 64 points of I/O data mainly with B7A Link Terminals using a B7A transmission path.

The B7A Interface Unit and B7A Link Terminal can be used in the same way as a standard Basic I/O Unit and I/O Terminal without any need to worry about communications. This characteristic reduces the wiring when using more than one relatively remote sensor or actuator.

### 3-8-2 **System Configuration**



### 3-8-3 **Models**

B7A Interface Unit	Specifications	I/O words allocated to Unit	Connectable B7A Link Terminals (See note 1.)
CJ1W-B7A14	64 inputs (four B7A ports)	4 input words	Inputs: Four 16-point Input Terminals, two 32-point Input Terminals, or two 16-point Input Terminals and one 32-point Input Terminal
CJ1W-B7A04	64 outputs (four B7A ports)	4 output words	Outputs: Four 16-point Output Terminals or two 32-point Output Terminals
CJ1W-B7A22	32 inputs, 32 outputs (four B7A ports)	2 input words and 2 output words	Inputs: Two 16-point Input Terminals or one 32-point Input Terminal Outputs: Two 16-point Output Terminals or one 32-point Output Terminal
			or Two Mixed I/O Terminals (16 inputs/16 outputs)

Note 1 A 10-point B7A Link Terminal cannot be connected to a B7A Interface Unit. B7A Interface Units can be connected together.

<sup>2</sup> Wireless transmissions are possible if B7AP Power Couplers are used on a B7A transmission path, reducing the wiring required for moving objects and rotating objects.

# 3-8-4 B7A Communications Specifications

Item	Specifications				
Transmission method	One-way time-sl	haring multiplex transmissions			
Transmission delay	High-speed	3 ms typical, 5 ms max.			
(communications delay on transmission path)	Standard	19.2 ms typical, 31 ms max.			
	CJ1W-B7A14	64 inputs (4 ports)			
Transmission points	CJ1W-B7A04	64 outputs (4 ports)			
	CJ1W-B7A22	32 inputs (2 ports), 32 outputs (	2 ports)		
External power supply voltage (See note 3.)	12 to 24 V DC (a	allowable voltage range: 10.8 to 26.4	ł V)		
<b>F</b> 41	CJ1W-B7A14	40 mA min.			
External supply current (See note 4.)	CJ1W-B7A04	150 mA min.			
	CJ1W-B7A22	80 mA min.	80 mA min.		
Minimum input time	High-speed	16 ms			
(See note 5.)	Standard	2.4 ms			
	High-speed	Power supply on one side	10 m max.		
		(common power supply)	50 m max. (with shielded cable)		
		Power supply on both sides	10 m max.		
		(separate power supplies)	100 m max. (with shielded cable)		
Transmission distance	Standard	Power supply on one side (common power supply)	100 m max.		
		Power supply on both sides (separate power supplies)	500 m max.		
	One-way time-sl	haring multiplex transmissions			
	High-speed	3 ms typical, 5 ms max.			
	VCTF, 0.75 mm <sup>2</sup> , 3 conductors (power supply on one side (common power supply))				
	VCTF, 0.75 mm <sup>2</sup>	<sup>2</sup> , 2 conductors (power supply on bo	th sides (separate power supplies))		
Cables	Shielded cable,	0.75 mm <sup>2</sup> , 3 conductors (power sup	ply on one side (common power supply))		
	Shielded cable, 0.75 mm <sup>2</sup> , 2 conductors (power supply on both sides (separate power supplies))				

- **Note 1** When separate power supplies are used, the B7A Interface Unit and B7A Link Terminal are supplied by separate external power supplies.
  - **2** When a common power supply is used, the B7A Interface Unit and B7A Link Terminal are supplied by the same external power supply.
  - **3** We recommend OMRON S8 series Power Supply Units for the external power supplies.
  - 4 The capacity of the external supply current does not include the capacity required by the B7A Link Terminal.
  - **5** The minimum input time is the minimum time required by the B7A Interface Unit to read the input signals from the CPU Unit.

### **Common Specifications** 3-8-5

Item	Specifications			
Applicable PLCs	CJ Series			
Unit classification	CJ-series Basic I/O Unit			
Transmission delay	Standard (19.2 ms typical) or high-speed (3 ms typical), switchable			
	(Switchable by using the setting switch on the front panel. Settings are read when power is turned ON or Unit is restarted.)			
	Factory setting: Standard (19.2 ms typical)			
	<b>Note</b> A transmission error will occur if B7A Link Terminals with different transmission delay times are connected to each other.			
Transmission error input status processing	HOLD (The bit status from immediately before the transmission error is held.)			
Settings	Front panel			
	Setting switch: Standard (19.2 ms typical) or high-speed (3 ms typical), switchable			
Indicators	5 LED indicators: RUN (B7A operating status), ERR1 (port 1 communications error), ERR2 (port 2 communications error), ERR3 (port 3 communications error), ERR4 (port 4 communications error)			
Front panel connection	Connector with clamps			
Current consumption	5 V DC: 70 mA max. (supplied from Power Supply Unit)			
Weight	80 g max.			

### 3-8-6 **I/O Memory Allocations**

The B7A Interface Unit is a Basic I/O Unit. Each Unit is allocated four words in the I/O Area (which starts at CIO 0000). The words are allocated according to the mounting position of the Unit as shown in the following table.

		Allocated word		
Port	CJ1W-B7A14	CJ1W-B7A04	CJ1W-B7A22	(n: First word allo- cated to Unit)
1	Input	Output	Output	Word n
2	Input	Output	Output	Word n+1
3	Input	Output	Input	Word n+2
4	Input	Output	Input	Word n+3

### **Transmission Error Processing** 3-8-7

# **Input Ports**

The B7A Interface Unit detects transmission errors at the input ports. When a transmission error is detected at an input port, the corresponding indicator and Transmission Error Flag turn ON.

## Indicators

When a transmission occurs at an input port, indicators ERR1 to ERR4 on the front panel will turn ON according to the port where the error occurred.

Port where error		LED error indicators		
occurred	CJ1W-B7A14	CJ1W-B7A04	CJ1W-B7A22	
Port 1	ERR1			
Port 2	ERR2			
Port 3	ERR3		ERR1	
Port 4	ERR4		ERR2	

## Transmission Error Flag

The corresponding Transmission Error Flag in the first word allocated to the Unit in the CPU Unit's Auxiliary Area will turn ON for each input port, as shown in the following table. Words A050 to A080 are allocated to Basic I/O Unit as information words.

## Example: Rack 0, Slot 0

Port where error	Transmission Error Flag			
occurred	CJ1W-B7A14	CJ1W-B7A04	CJ1W-B7A22	
Port 1	A05000			
Port 2	A05001			
Port 3	A05002		A05000	
Port 4	A05003		A05001	

## Example: Rack 0, Slot 1

Port where error	Т	Transmission Error Flag		
occurred	CJ1W-B7A14	CJ1W-B7A04	CJ1W-B7A22	
Port 1	A05008			
Port 2	A05009			
Port 3	A05010		A05008	
Port 4	A05011		A05009	

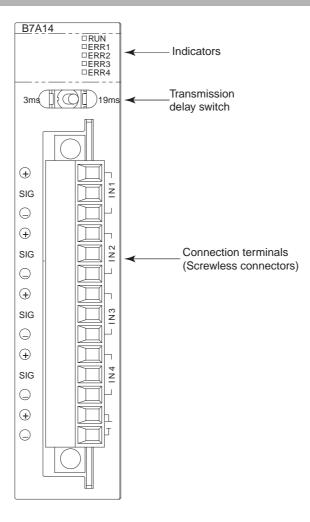
## Transmission Error Input Status Processing

If an error occurs at an input port, the Unit will hold the status of the input bit in the CPU Unit's I/O memory from immediately before the transmission error occurred. When transmission returns to normal, the signals that have been normally received will be input to the input bit.

## **Output Ports**

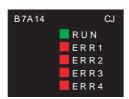
The B7A Interface Unit does not detect transmission errors at output ports. Detect output port transmission errors at the B7A Link Terminal that is connected to the B7A Interface Unit.

### **Parts and Names** 3-8-8



# Indicators

## • CJ1W-B7A14



Display	Name	Color	Status	Condition
RUN	B7A operat-	Green	ON	The B7A Unit is operating.
	ing status		OFF	The B7A Unit is stopped.
ERR1	Port 1 trans- mission error	Red	ON	A transmission error has occurred at port 1 of the B7A Unit.
			OFF	The Unit is operating normally.
ERR2	Port 2 trans- mission error	Red	ON	A transmission error has occurred at port 2 of the B7A Unit.
			OFF	The Unit is operating normally.

Display	Name	Color	Status	Condition
ERR3	Port 3 trans- mission error	Red	ON	A transmission error has occurred at port 3 of the B7A Unit.
			OFF	The Unit is operating normally.
ERR4	Port 4 trans- mission error	Red	ON	A transmission error has occurred at port 4 of the B7A Unit.
			OFF	The Unit is operating normally.

## • CJ1W-B7A04



Display	Name	Color	Status	Condition
RUN	B7A operat-	Green	ON	The B7A Unit is operating.
	ing status		OFF	The B7A Unit is stopped.

## CJ1W-B7A22



Display	Name	Color	Status	Condition
RUN	B7A operat-	Green	ON	The B7A Unit is operating.
	ing status		OFF	The B7A Unit is stopped.
ERR1	Port 3 trans- mission error	Red	ON	A transmission error has occurred at port 3 of the B7A Unit.
			OFF	The Unit is operating normally.
ERR2	Port 4 trans- mission error	Red	ON	A transmission error has occurred at port 4 of the B7A Unit.
			OFF	The Unit is operating normally.

# **Transmission Delay Switch**



Name	Function	Factory setting
Transmission delay switch	The same baud rate is set for all ports using this one switch.	Standard
	Right: Standard (19.2 ms typical)	
	Left: High-speed (3 ms typical)	

**Note** The switch setting is read when the power is turned ON or the Unit is restarted. If the switch setting is changed after turning ON the power or restarting the Unit, the setting will not be read.

#### **Terminal** Name **Function** Word **Appearance** Connect to the + terminal of the B7A Link Ter-Connector with clamps 1 Port 1 power supply: V1 minal to be connected to port 1 (only when using a common power supply) Connect to the SIG terminal of the B7A Link (2) Port 1 signal: SIG1 1 V 1 (+) Terminal to be connected to port 1. ≥ 2 SIG1 SIG (3) Port 1 ground: G1 Connect to the - terminal of the B7A Link Ter-」 ③ G 1 $\bigcirc$ minal to be connected to port 1. $\oplus$ ¬ (4) V 2 4 Port 2 power supply: V2 Connect to the + terminal of the B7A Link Ter-SIG n+1 minal to be connected to port 2 (only when $\bigcirc$ (6) G 2 using a common power supply). $\oplus$ ¬ (7) V 3 ∞ 8 SIG3 - 9 G 3 SIG **(5)** Port 2 signal: SIG2 Connect to the SIG terminal of the B7A Link $\bigcirc$ 9 G 3 Terminal to be connected to port 2. 10 V 4 $\oplus$ **(6)** Port 2 ground: G2 Connect to the - terminal of the B7A Link Ter-½ (1) SIG4 SIG minal to be connected to port 2. (12) G 4 (7) Port 3 power supply: V3 Connect to the + terminal of the B7A Link Tern+2 $\oplus$ (13) V minal to be connected to port 3 (only when (14) G using a common power supply). (8) Port 3 signal: SIG3 Connect to the SIG terminal of the B7A Link Terminal to be connected to port 3. 9 Port 3 ground: G3 Connect to the - terminal of the B7A Link Terminal to be connected to port 3. (10) Port 4 power supply: V4 Connect to the + terminal of the B7A Link Tern+3 minal to be connected to port 4 (only when using a common power supply). Port 4 signal: SIG4 Connect to the SIG terminal of the B7A Link (11) Terminal to be connected to port 4.

# Terminal Arrangement

Note Terminals V1, V2, V3, V4, and V are connected internally in the Unit, and terminals G1, G2, G3, G4, and G are connected internally in the Unit.

Connect to the + terminal of the external

Connect to the - terminal of the external

Connect to the - terminal of the B7A Link Ter-

minal to be connected to port 4.

### 3-8-9 **Preparing and Connecting Cables**

Use the following procedure to prepare and connect the cables.

power supply.

power supply.

Note Always turn OFF the Unit's power supply and communications power supply before attaching or removing connectors.

### 1) Preparing the Covering

Port 4 ground: G4

+ power supply: V

power supply: G

First, use the following procedure to prepare the cable.

Strip approximately 10 mm of the sheath covering the signal lines to match the crimp terminals. Next, twist together the wires of each signal line firmly.

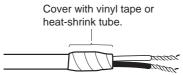


Use vinyl tape or a heat-shrink tube to cover the end of the VCTF cable sheath, as shown in the following diagram.

(12)

(13)

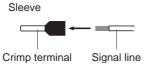
(14)



## 2) Preparing Cable Signal Lines

Attach the crimp terminals to the cable's signal lines.

1 Attaching Crimp Terminals
Insert the end of the cable into the terminal and crimp.



## **Recommended Crimp Terminals for Cables**

Model	Manufacturer
Al-series Al0.75-8GY	PHOENIX CONTACT
(Product code: 3200519)	
H0.75/14	Nihon Weidmuller Co., Ltd.
(Product code: 046290)	
TE-0.75	NICHIFU Co., Ltd.

**Note** Always use the specified crimp tool to attach the crimp terminals. If a crimp tool is not used, the cable will not be crimped properly, which may cause the cable to become detached from the terminal.

The following crimp tools are available.

Model	Manufacturer
UD6 (Product code: 1204436)	PHOENIX CONTACT
or ZA3 Series	
Crimper PZ1.5	Nihon Weidmuller Co., Ltd.
(Product code: 900599)	
NH77	NICHIFU Co., Ltd.

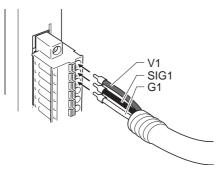
2 Insulate the stripped end of each signal line with vinyl tape or heat-shrink tubing.

## 3) Connecting Cables

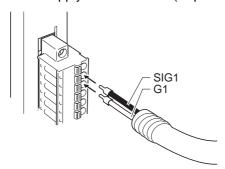
Use the following procedure to connect cables to the connection terminals.

Orient the connector properly, and then insert the signal lines fully into the back of each terminal hole in the connector, as shown in the following diagram. (The signal lines are secured in this way, without requiring the use of a tool.) If crimp terminals are not used on the signal lines, use a small flat-blade screwdriver to press down on the orange tab to insert the signal lines.

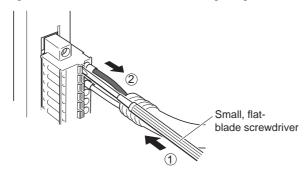
• Power Supply on One Side (Common Power Supply)



• Power Supply on Both Sides (Separate Power Supplies)



Note To remove the signal lines from the connector, press down on the orange tab while pulling out the signal line, as shown in the following diagram.



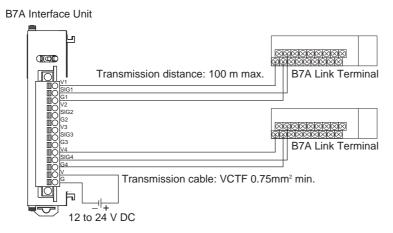
Note To remove the connector from the Unit, fully unscrew the set screws from both sides of the connector, and then remove the connector. Forcibly pulling the connector while the set screws are still attached may damage the connector.

# 3-8-10 Connection Diagrams

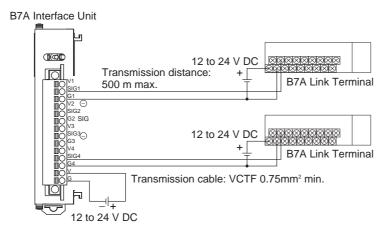
- Note 1 Confirm that terminals are connected correctly. If connections are incorrect, the internal components of the B7A Interface Unit and B7A Link Terminal may be damaged.
  - 2 Route the signal lines in separate ducts both inside and outside the control panel to isolate them from power lines.
  - 3 Connect cables at a distance that is within the range given in the specifications.
  - 4 Always turn OFF the power to the CPU Unit and all other Units before connecting the communications
  - 5 Always lay communications cables within ducts.

# **Standard Mode**

## Power Supply on One Side (Common Power Supply)



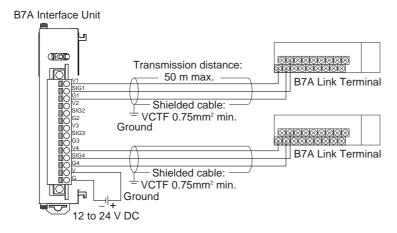
## Power Supply on Both Sides (Separate Power Supplies)



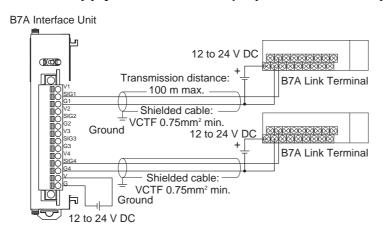
# **High-speed Mode**

**Note** If shielded cable is not used, the maximum transmission distance is 10 m regardless of whether a common or separate power supplies are used. (Use VCTF cable of 0.75 mm<sup>2</sup> or higher.)

## Power Supply on One Side (Common Power Supply)



## Power Supply on Both Sides (Separate Power Supplies)





# **Support Software**

This section describes the software that is used to program and debug a CJ2 PLC. It also describes how to connect the Programming Device and the PLC.

4-1	1 Support Software		
	4-1-1	CX-One FA Integrated Tool Package	4-2
4-2	2 Connection Methods		4-5
	4-2-1	Connecting by USB	4-5
	4-2-2	Connecting by RS-232C	4-7
	4-2-3	Connecting to Ethernet (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)	4-9

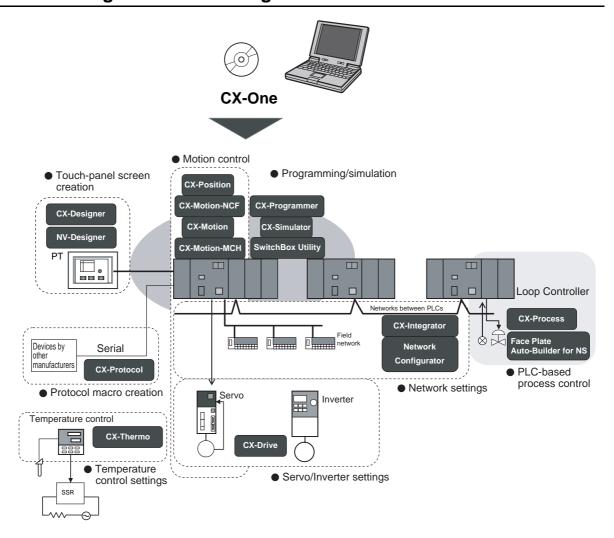
# **Support Software**

"Support Software" refers to software applications for programming and debugging OMRON Programmable Controllers.

### **CX-One FA Integrated Tool Package** 4-1-1

The CX-One provides an integrated package of Support Software for OMRON PLCs and components. It consists of software applications for PLC programming, network settings, touch-panel screen creation, servo control, inverters, temperature control, and other functions.

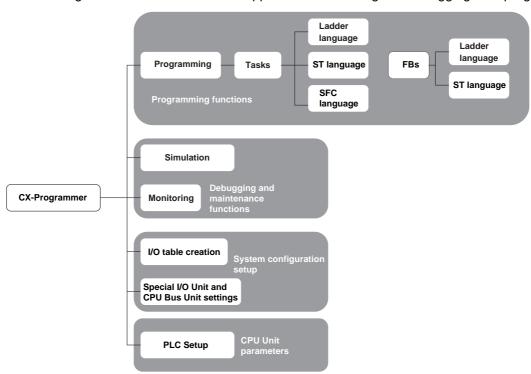
# **CX-One Integrated Tool Package Contents**



Application	CX-One Software	Description
Drogramming	CX-Programmer	Basic software for creating and debugging PLC programs.
Programming	SwitchBox Utility	Utility software to support PLC debugging operations.
Network settings	CX-Integrator	Software for starting and setting FA networks, such as Controller Link, DeviceNet, CompoWay/F, Ethernet, and CompoNet. Includes routing table components, data link components, and DeviceNet Configurator functions.
<b>3</b>	Network Configurator	Software for setting tag data links for the built-in EtherNet/IP port.
	CX-FLnet	Software for making FL-net Unit system settings and performing monitoring.
Touch-panel screen	CX-Designer	Software for creating screen data for touch panel NS-series PTs.
creation	NV-Designer	Software for creating screen data for touch panel NV-series PTs.
Protocol macro creation	CX-Protocol	Software for creating protocols (protocol macros) for exchanging data with general-purpose external devices connected to Serial Communications Boards/Units and Option Boards.
Simulation	CX-Simulator	Software for simulating PLC operations on a personal computer and debugging programs without requiring a CPU Unit.
	CX-Position	Software for creating and monitoring data for Position Control Units.
	CX-Motion-NCF	Software for creating and monitoring data for Position Control Units (MECHATROLINK communications models).
Motion Control	CX-Motion-MCH	Software for creating data for Motion Control Units (MECHATROLINK communications models), and for creating and monitoring motion programs.
	CX-Motion	Software for creating data for Motion Control Units, and for creating and monitoring motion programs.
Servo/Inverter settings	CX-Drive	Software for setting and adjusting Inverter and servo data.
PLC-based process control	CX-Process Tool	Software for creating and debugging function blocks for Loop Controllers (Loop Control Units/Boards, Process CPU Units, and Loop CPU Units).
	Face Plate Auto-Builder for NS	Software for automatic generation of screen data (project files) for touch panel NS-series PTs from Loop Controller function block tag information.
Temperature control settings	CX-Thermo	Software for setting and adjusting Temperature Controller parameters.

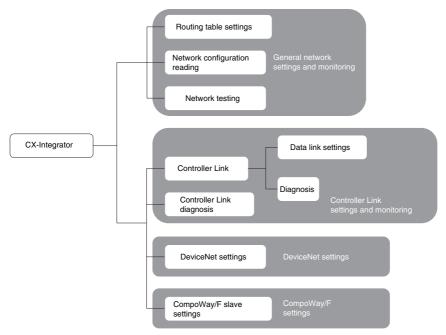
# CX-Programmer

The CX-Programmer is a basic software application for creating and debugging PLC programs.



# **CX-Integrator**

The CX-Integrator is a software application for setting up FA networks, such as Controller Link, DeviceNet, CompoWay/F, Ethernet, and CompoNet.



# Network Configurator

The Network Configurator is software for setting tag data links using the built-in EtherNet/IP port.



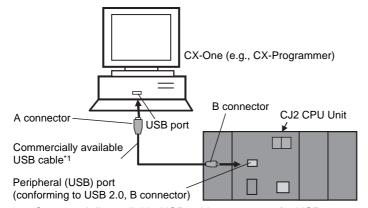
# 4-2 Connection Methods

A CJ2 CPU Unit can be directly connected to a personal computer running the CX-One Support Software (e.g., CX-Programmer) by using a USB cable or RS-232C cable. (The CP1W-CIF01 is required to use a RS-232C cable with the CJ2M-CPU3 $\square$ .) Also, an Ethernet twisted-pair cable can be used for the CJ2H-CPU6 $\square$ -EIP or CJ2M-CPU3 $\square$ .

# 4-2-1 Connecting by USB

# **Connection Method**

Using commercially available USB cable, connect CX-One Support Software via a standard peripheral (USB) port at the personal computer.



<sup>\*1</sup> Commercially available USB cable: 5 m max., for USB 1.1 or 2.0.

# **Connecting Cable**

Use the following cable to connect the CJ2 CPU Unit to the computer running the Support Software.

Port at Unit	Port at computer	Network type (communications mode)	Model	Length	Remarks
Peripheral (USB) port (Conforms to USB 2.0, B connector)	USB port	12 Mbps, USB 2.0	Commercially available USB cable (A connector - B connector)	5 m max.	

# **Before Connecting**

In order to connect the PLC to a personal computer by USB, a USB driver must be installed in the personal computer. When installing the CX-One, the installer automatically stores the USB driver for USB connections in the following directory on the OS disc drive:

C:\ProgramFiles\OMRON\CX-Server\USB

When the personal computer is connected to the PLC by USB cable, the personal computer automatically recognizes the device and the USB driver installation is started. For details on how to install the USB driver, refer to A-5 Installing the USB Driver.

# **CX-Programmer Settings**

The method for connecting the PLC to the personal computer is set using the CX-Programmer. For details on using the CX-Programmer to set the connection method, refer to the CJ2 CPU Unit Software User's Manual (Cat. No. W473).

# Restrictions on Connecting by USB

Based on USB specifications, the following restrictions apply when connecting a personal computer and components.

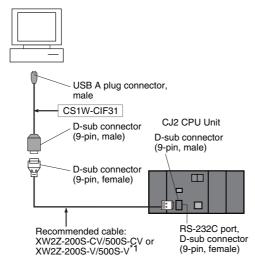
- Only one CJ2 CPU Unit can be connected by USB to a single personal computer. It is not possible to connect multiple CJ2 CPU Units simultaneously.
- Do not remove the USB cable while connected online. The application must be offline before the cable is removed. If the cable is removed while connected online, one of the following situations will occur depending on the operating system.
  - Windows 2000/XP The Support Software online status will not be restored by simply re-inserting the USB cable. Once the Support Software has gone offline, the cable must be re-inserted and the Support Software online connection operation must be repeated.
  - Windows 98/Me If the USB cable is removed while connected online, a blue error screen may be displayed. If that occurs, the personal computer must be restarted.



#### **Additional Information**

The USB port on a computer can be connected to the PLC serial port (RS-232C) by using CS1W-CIF31 USB-Serial Conversion Cable. (The USB driver for the CS1W-CIF31 must be installed.)

Refer to A-5 Installing the USB Driver for the installation procedure for the USB driver.



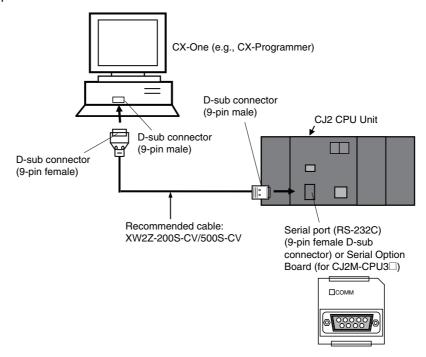
<sup>\*1</sup> Only a Host Link connection is possible.

# 4-2-2 Connecting by RS-232C

# **Connection Method**

Using commercially available RS-232C cable, directly connect the CX-One Support Software (e.g., CX-Programmer) via a standard serial port at the personal computer.

The network type must be set to the Toolbus. A Host Link connection cannot be used.

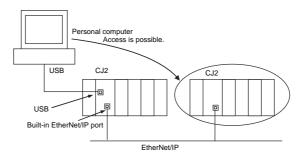




#### **Additional Information**

Connecting to the PLC by EtherNet/IP via USB or RS-232C

The Support Software can be directly connected by USB or RS-232C to one CJ2 CPU Unit and access other CPU Units on the EtherNet/IP network via the built-in EtherNet/IP ports on the CJ2 CPU Units. For details, refer to the CJ2 CPU Unit Software User's Manual (Cat. No. W473).



# **Connecting Cable**

Use the following cable to connect the CJ2 CPU Unit to the computer running the Support Software.

Port at Unit	Port at computer	Network type (communications mode)	Model	Length	Remarks
Serial port	D-sub,	Serial communications	XW2Z-200S-CV	2 m	Use a static-resis-
(RS-232C) (D-sub, 9-pin, female)	9-pin, male		XW2Z-500S-CV	5 m	tant connector.



#### **Precautions for Safe Use**

- · When the above cable connector is connected to the PLC serial port (RS-232C), be sure to discharge static electricity by touching grounded metal before touching the cable connector. The XW2Z-\|\| \| \| \| \| S-CV Cable is particularly resistant to static electricity because it uses a static-resistant connector hood (XM2S-0911-E). Even when this Cable is used, however, be sure to discharge static electricity before touching the connector.
- Use the specialized cable described above for connecting cable. Using ordinary commercially available RS-232C cable for personal computers may result in damage to external devices and the CPU Unit.



#### **Additional Information**

It is possible to create RS-232C cable for connecting to the serial port (RS-232C). For details on creating cables, refer to A-4 Connecting to a Serial Port on the CPU Unit.

Name	Model	Specifi	cations
Plug	XM3A-0921 or equivalent	9-pin, male	Use in combination.
Hood	XM2S-0911-E or equivalent	9-pin static-resistant connector with millimeter screws	

# **Setting the Communications Protocol**

Select the protocol for communications between the PLC and the CX-Programmer. For a SYSMAC WAY (Host Link) connection, turn OFF pin 5 of the DIP switch on the front panel. For a peripheral bus connection (faster than SYSMAC WAY), turn ON pin 5.

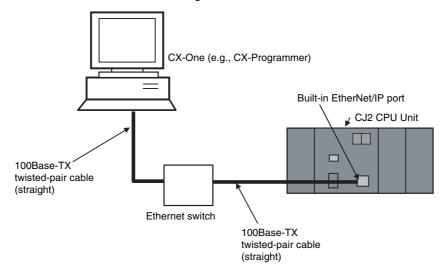
# **CX-Programmer Settings**

The method for connecting the PLC to the personal computer is set using the CX-Programmer. For details on using the CX-Programmer to set the connection method, refer to the CJ2 CPU Unit Software User's Manual (Cat. No. W473).

# 4-2-3 Connecting to Ethernet (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

# **Connection Method**

With the CJ2H-CPU6□-EIP or CJ2M-CPU3□, use a commercially available Ethernet 100Base-TX STP twisted-pair cable (straight) to connect the CX-One Support Software (e.g., CX-Programmer) to the built-in EtherNet/IP port through the Ethernet switch. With the CJ2H-CPU6□-EIP, Ethernet twisted-pair cable can also be used to connect to a personal computer. The same type of connection can be made with the CJ2H-CPU6□ or CJ2M-CPU1□ through an EtherNet/IP Unit.



# **Connecting Cable**

Use the following cable to connect the CJ2 CPU Unit to the computer running the Support Software.

Port at Unit	Port at computer	Network type (commu- nications mode)	Model	Length	Remarks
Built-in Ether- Net/IP port	Ethernet port	100Base-TX or 10Base- T*1	Commercially available twisted-pair cable*2	100 m (Recommended between Ethernet switch and nodes.)	
			Commercially available Ethernet switch*2, *3		

<sup>\*1</sup> Use 100Base-TX when using tag data links.

\*2 The following table shows the devices recommended for use with the built-in EtherNet/IP port.

Part	Manufacturer	Model number	Inquires
	OMRON	W4S1-03B W4S1-05B W4S1-05C	
	Cisco Systems, Inc.	Consult the manufacturer.	Cisco Systems, Inc. Main Corporate HQ
Ethernet switch	Contec USA, Inc.	Consult the manufacturer.	CONTEC USA Inc.
	Phoenix Contact	Consult the manufacturer.	Phoenix Contact USA Customer Service
	Hirschmann Automation and Control	Consult the manufacturer.	Hirschmann Automation and Control (US)
100Base-TX			
Twisted-pair cable	Fujikura	F-LINK-E 0.5mm × 4P	Fujikura America, Inc.
	EtherNet/IP compliant cable	e	

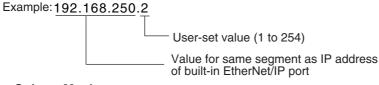
Part	Manufacturer	Model number	Inquires
Connectors	STP Plug		
(Modular plug)	Panduit Corporation	MPS588	Panduit Corporation US Headquarters
Boots	Tsuko Company	MK boot (IV) LV	Tsuko Company Japan Headquarters

<sup>\*3</sup> Always use an Ethernet switch when using tag data links in the network. If a repeater hub is used for Ether-Net/IP tag data links (cyclic communications), the network's communications load will increase, data collisions will occur frequently, and stable communications will be impossible.

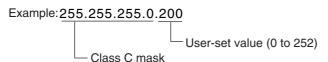
# **Before Connecting**

To connect using Ethernet, first set the IP address and subnet mask of the computer in advance as shown in the following example.

#### IP Addresses



#### Subnet Mask



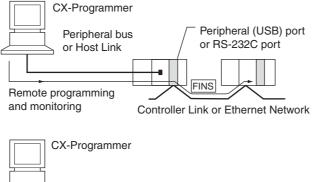
# CX-Programmer Settings

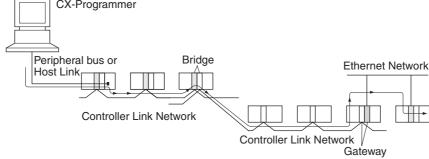
The method for connecting the PLC to the personal computer is set using the CX-Programmer. For details on using the CX-Programmer to set the connection method, refer to the CJ2 CPU Unit Software User's Manual (Cat. No. W473).



#### **Additional Information**

• The CX-Programmer can be used for remote programming and monitoring. It can be used to program and monitor not only the PLC to which it is directly connected, but also to program and monitor any PLC connected through a Controller Link or Ethernet network to which the PLC that the CX-Programmer is connected to is a part of. All programming and monitoring functionality for the directly connected PLC is supported for remote programming and monitoring. For details, refer to 11-2 Serial Communications and 11-3 Communications Networks in the CJ2 CPU Unit Software User's Manual (Cat. No. W473).







#### **Precautions for Correct Use**

Connecting to a Programming Device through the built-in EtherNet/IP port will not be possible if the following errors occur:

- I/O bus error
- Too many I/O points error
- · Unit number duplication error
- Rack number duplication error
- I/O setting error

If any of the above errors occurs and connecting to the Programming Device through the built-in EtherNet/IP port is not possible, connect through the USB port.

# Installation

This section describes how to install and wire a CJ2 PLC.

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	<b>500</b>	(CJ2M CPU Unit Only)	
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# **Fail-safe Circuits**

Be sure to set up safety circuits outside of the PLC to prevent dangerous conditions in the event of errors in the PLC or external power supply.

# Order of Powering Up the CPU Unit and Controlled System

Outputs from Units such as DC Output Units may malfunction momentarily when the power to the PLC is turned ON. This may cause problems in the system if the PLC's power supply is turned ON after the controlled system's power supply. To prevent possible malfunctions, add an external circuit that prevents the power supply to the controlled system from going ON before the power supply to the PLC itself.

# **Managing CPU Unit Errors**

When any of the following errors occurs, PLC operation will stop and all outputs from Output Units will be turned OFF.

- Operation of the Power Supply Unit's overcurrent protection circuit
- A CPU error (watchdog timer error) or CPU on standby
- A fatal error (memory error, Memory Card transfer error, I/O bus error, Unit/Rack number duplication error, too many I/O points error, I/O setting error, program error, cycle time exceeded error, or FALS(007) error)\*1

Be sure to add any circuits necessary outside of the PLC to ensure the safety of the system in the event of an error that stops PLC operation.

\*1 When a fatal error occurs, all outputs from Output Units will be turned OFF even if the IOM Hold Bit has been turned ON to protect the contents of I/O memory. (When the IOM Hold Bit is ON, the outputs will retain their previous status after the PLC has been switched from RUN/MONITOR mode to PROGRAM mode.)

# **Managing Output Malfunctions**

It is possible for an output to remain ON due to a malfunction in the internal circuitry of the Output Unit, such as a relay or transistor malfunction. Be sure to add any circuits necessary outside of the PLC to ensure the safety of the system in the event that an output fails to go OFF.

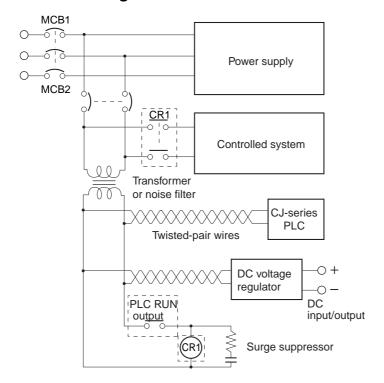
# **Emergency Stop Circuit**

The following emergency stop circuit controls the power supply to the controlled system so that power is supplied to the controlled system only when the PLC is operating and the RUN output is ON.

An external relay (CR1) is connected to the RUN output from the Power Supply Unit\*1 as shown in the following diagram.

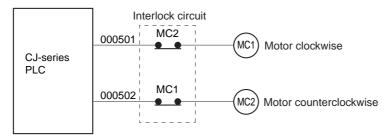
\*1 A RUN output is provided only on the CJ1W-PA205R Power Supply Unit. When a Power Supply Unit without a RUN output is used, program the Always ON Flag (A1) as the execution condition for an output point from an Output Unit.

### Electrical Diagram



# **Interlock Circuits**

When the PLC controls an operation such as the clockwise and counterclockwise operation of a motor, provide an external interlock such as the one shown in the following example to prevent both the forward and reverse outputs from turning ON at the same time.



This circuit prevents outputs MC1 and MC2 from both being ON at the same time even if both CIO 000501 and CIO 000502 are ON, so the motor is protected even if the PLC is programmed improperly or malfunctions.

# 5-2 Installation

#### 5-2-1 **Installation and Wiring Precautions**

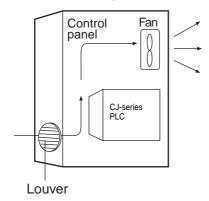
# **Installation in Cabinets or Control Panels**

When the PLC is being installed in a cabinet or control panel, be sure to provide proper ambient conditions as well as access for operation and maintenance.

# Temperature Control

The ambient temperature within the enclosure must be within the operating range of 0 to 55°C. When necessary, take the following steps to maintain the proper temperature.

- · Provide enough space for good air flow.
- Do not install the PLC above equipment that generates a large amount of heat such as heaters, transformers, or high-capacity resistors.
- If the ambient temperature exceeds 55°C, install a cooling fan or air conditioner.

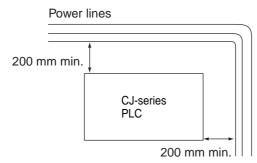


### Accessibility for Operation and Maintenance

- To ensure safe access for operation and maintenance, separate the PLC as much as possible from high-voltage equipment and power machinery.
- The PLC will be easiest to install and operate if it is mounted at a height of 1.0 to 1.6 m above the floor.

### Improving Noise Resistance

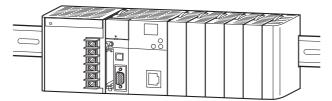
- Do not mount the PLC in a control panel containing high-voltage equipment.
- Install the PLC at least 200 mm from power lines.



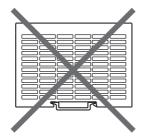
- Ground the mounting plate between the PLC and the mounting surface.
- When I/O Connecting Cables are 10 m or longer, connect the control panels in which Racks are mounted with heavier power wires (3 wires at least 2 mm<sup>2</sup> in cross-sectional area).

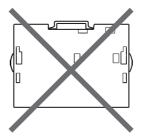
### PLC Orientation

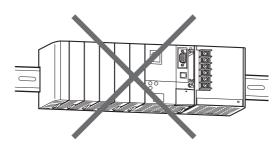
• Each Rack must be mounted in an upright position to provide proper cooling.

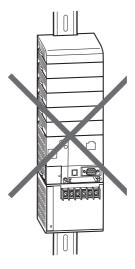


• Do not install a Rack in any of the following positions.











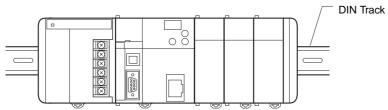
### **Precautions for Safe Use**

Always use the standard installation method. A nonstandard installation will decrease heat dissipation, and may delay the replacement notification signal (in particular for Power Supply Units with Replacement Notification (CJ1W-PA205C)), or degrade or damage the internal elements.

#### **Installation in a Control Panel** 5-2-2

# **Control Panel Installation Dimensions**

A CJ-series PLC must be mounted inside a control panel on DIN Track. Normally the CPU Rack is installed on top and the Expansion Racks under it.



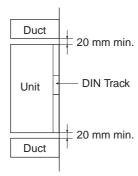
 Consider the width of wiring ducts, wiring, ventilation, and Unit replacement when determining the space between Racks. When you install Racks vertically, allow at least 66 mm between any two adjacent Racks.



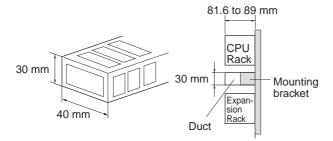
### **Additional Information**

A CJ-series PLC must be mounted on DIN Track. It cannot be mounted with screws.

• Whenever possible, route I/O wiring through wiring ducts or raceways. Install the duct so that it is easy to fish wire from the I/O Units through the duct. It is handy to have the duct at the same height as the Racks.



### Wiring Ducts



# 占

### **Precautions for Correct Use**

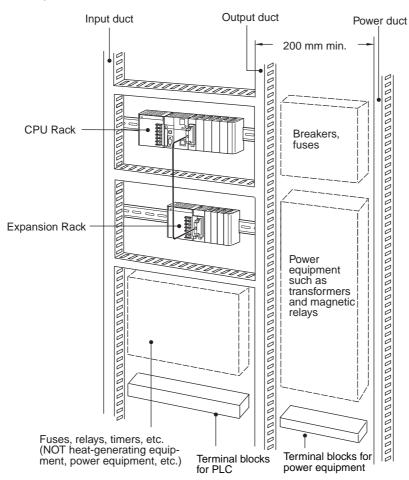
Tighten terminal block screws and cable screws to the following torques.

Terminal Screws M4: 1.2 N·m M3: 0.5 N·m

Cable Connector Screws M2.6: 0.2 N·m

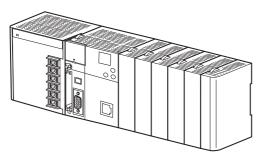
# Routing Wiring Ducts

Install the wiring ducts at least 20 mm between the tops of the Racks and any other objects, (e.g., ceiling, wiring ducts, structural supports, devices, etc.) to provide enough space for air circulation and replacement of Units.



#### **Assembled Appearance and Dimensions** 5-2-3

The CJ-series Units, including the Power Supply Unit, the CPU Unit, and I/O Units, are connected to each other and an End Cover is connected to the right end.



# Dimensions (Unit: mm)

### Power Supply Unit

Name	Model number	Specifications	Unit width
Power Supply Unit	CJ1W-PA205R	100 to 240 VAC, 25 W	80 mm
	CJ1W-PA205C	100 to 240 VAC, 25 W	80 mm
	CJ1W-PA202	100 to 240 VAC, 14 W	45 mm
	CJ1W-PD025	24 VDC, 25 W	60 mm
	CJ1W-PD022	24 VDC, 19.6 W	27 mm

### **CPU Unit**

Name	Model number	Specifications	Unit width
CPU Unit	CJ2H-CPU68-EIP	I/O points: 2,560 Program capacity: 400 Ksteps	79.8 mm
	CJ2H-CPU67-EIP	I/O points: 2,560 Program capacity: 250 Ksteps	
	CJ2H-CPU66-EIP	I/O points: 2,560 Program capacity: 150 Ksteps	
	CJ2H-CPU65-EIP	I/O points: 2,560 Program capacity: 100 Ksteps	
	CJ2H-CPU64-EIP	I/O points: 2,560 Program capacity: 50 Ksteps	
	CJ2H-CPU68	I/O points: 2,560 Program capacity: 400 Ksteps	48.8 mm
	CJ2H-CPU67	I/O points: 2,560 Program capacity: 250 Ksteps	
	CJ2H-CPU66	I/O points: 2,560 Program capacity: 150 Ksteps	
	CJ2H-CPU65	I/O points: 2,560 Program capacity: 100 Ksteps	
	CJ2H-CPU64	I/O points: 2,560 Program capacity: 50 Ksteps	

Name	Model number	Specifications	Unit width
CPU Unit	CJ2M-CPU35	I/O points: 2,560 Program capacity: 60 Ksteps	62 mm*
	CJ2M-CPU34	I/O points: 2,560 Program capacity: 30 Ksteps	
	CJ2M-CPU33	I/O points: 2,560 Program capacity: 20 Ksteps	
	CJ2M-CPU32	I/O points: 2,560 Program capacity: 10 Ksteps	
	CJ2M-CPU31	I/O points: 2,560 Program capacity: 5 Ksteps	
	CJ2M-CPU15	I/O points: 2,560 Program capacity: 60 Ksteps	31 mm*
	CJ2M-CPU14	I/O points: 2,560 Program capacity: 30 Ksteps	
	CJ2M-CPU13	I/O points: 2,560 Program capacity: 20 Ksteps	
	CJ2M-CPU12	I/O points: 2,560 Program capacity: 10 Ksteps	
	CJ2M-CPU11	I/O points: 2,560 Program capacity: 5 Ksteps	

<sup>\*</sup> The width of the CPU Rack will increase by 20 mm for each CJ2M-MD21□ Pulse I/O Module that is connected to the CJ2M CPU Unit.

Other than the CPU Units and Power Supply Units, CJ-series Units come in four widths: 20 mm, 31 mm, 51 mm, and 79.8 mm.

#### 20-mm-wide Units

Name	Model number	Unit width
I/O Control Unit	CJ1W-IC101	20 mm
32-point Basic I/O Units	CJ1W-ID231/ID232/ID233	
	CJ1W-OD231/OD232/OD233/OD234	
B7A Interface Units	CJ1W-B7A22 CJ1W-B7A14 CJ1W-B7A04	
CompoBus/S Master Unit	CJ1W-SRM21	
Space Unit	CJ1W-SP001	

### 31-mm-wide Units

Name	Model number	Unit width
I/O Interface Unit	CJ1W-II101	31 mm
8-point and 16-point Basic I/O Units	CJ1W-ID201 CJ1W-ID211/212 CJ1W-IA111/201 CJ1W-OD20□ CJ1W-OD211/212/213 CJ1W-OC201/211 CJ1W-OA201	
32-point Basic I/O Units	CJ1W-MD231/232/233	
64-point Basic I/O Units	CJ1W-ID261 CJ1W-OD261 CJ1W-MD261 CJ1W-ID262 CJ1W-OD262/263 CJ1W-MD263/563	
Interrupt Input Unit	CJ1W-INT01	
Quick-response Input Unit	CJ1W-IDP01	
Analog I/O Units	CJ1W-ADG41 CJ1W-ADD□□-V1 CJ1W-AD042 CJ1W-DA0□□ CJ1W-DA042V CJ1W-MAD42	
Process I/O Units	CJ1W-AD04U CJ1W-PH41U CJ1W-PTS51/52/15/16 CJ1W-PDC15	
Temperature Control Units	CJ1W-TC□□□	
Position Control Units (with pulse- string outputs)	CJ1W-NC113/133/213/233/413/433	
Position Control Units (with Ether-CAT communications)	CJ1W-NC281/481/881/NCF81 CJ1W-NC482/882	
MECHATROLINK-II Position Control Unit	CJ1W-NCF71(-MA)	
High-speed Counter Unit	CJ1W-CT021	
ID Sensor Units	CJ1W-V680C11 CJ1W-V680C12 CJ1W-V600C11 CJ1W-V600C12	
Controller Link Unit	CJ1W-CLK23	
Serial Communications Units	CJ1W-SCU41-V1 CJ1W-SCU21-V1 CJ1W-SCU31-V1 CJ1W-SCU22/32/42	
Ethernet Unit	CJ1W-ETN21	
EtherNet/IP Unit	CJ1W-EIP21	
DeviceNet Unit	CJ1W-DRM21	
CompoNet Master Unit	CJ1W-CRM21	
FL-net Unit	CJ1W-FLN22	

### 51-mm-wide Units

Name	Model number	Unit width
SYSMAC SPU Unit (High- speed Data Storage Unit)	CJ1W-SPU01-V2	51 mm
Position Control Units	CJ1W-NC214/234	

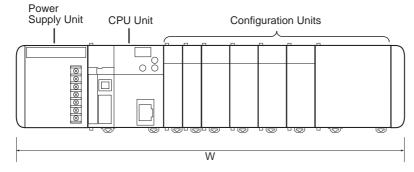
#### 62-mm-wide Units

Name	Model number	Unit width
Position Control Units	CJ1W-NC414/434	62 mm

#### 79.8-mm-wide Units

Name	Model number	Unit width
MECHATROLINK-II Motion Control Unit	CJ1W-MCH71	79.8 mm

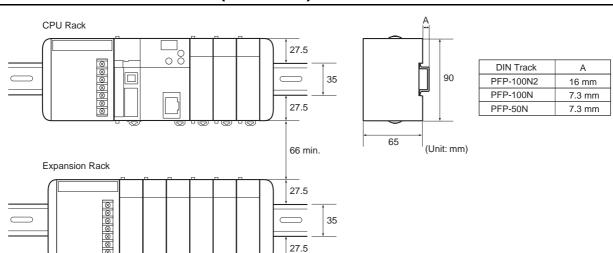
# • Design Example for Width W



Power Supply Unit: CJ1W-PA205R (80 mm) CPU Unit: CJ2H-CPU68-EIP (79.8 mm) Basic I/O Units: CJ1W-ID231 (20 mm)  $\times$  2 Special I/O Units: CJ1W-AD081-V1 (31 mm)  $\times$  4

CPU Bus Unit: CJ1W-MCH71 (79.8 mm)

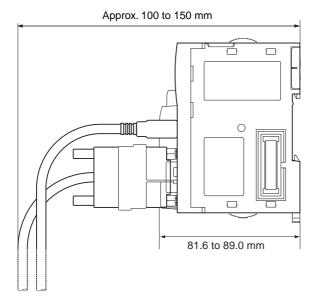
 $W = 80 + 79.8 + 20 \times 2 + 31 \times 4 + 79.8 \times 1 + 14.7$  (End Cover) = 418.3 mm



# Installation Dimensions (Unit: mm)

# Installation Height

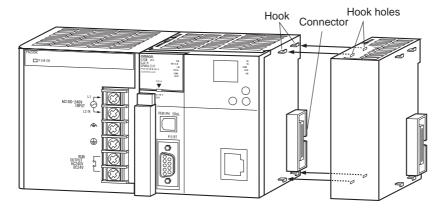
The installation height of the CJ-series CPU Rack and Expansion Racks varies from 81.6 to 89.0 mm, depending on the I/O Units that are mounted. When a Programming Device (e.g., CX-Programmer) is connected, however, even greater height is required. Allow sufficient depth in the control panel containing the PLC.



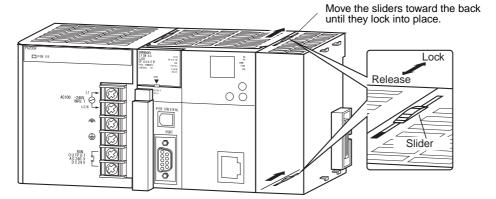
# 5-2-4 Connecting PLC Components

The Units that make up a CJ-series PLC can be connected simply by pressing the Units together and locking the sliders by moving them toward the back of the Units. The End Cover is connected in the same way to the Unit on the far right side of the PLC.

**1** Join the Units so that the connectors fit exactly.



2 The yellow sliders at the top and bottom of each Unit lock the Units together. Move the sliders toward the back of the Units as shown below until they click into place.



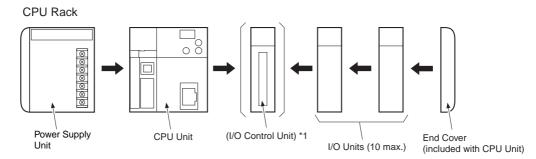


### **Precautions for Correct Use**

If the locking tabs are not secured properly, the connectors may become loose and not function properly. Be sure to slide the locking tabs until they are securely in place.

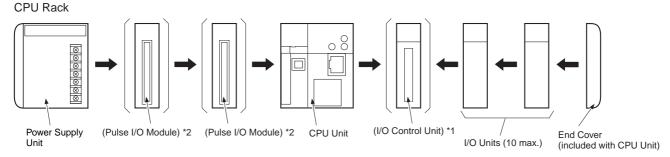
Attach the End Cover to the Unit on the far right side of the Rack.

#### 1 CJ2H CPU Unit



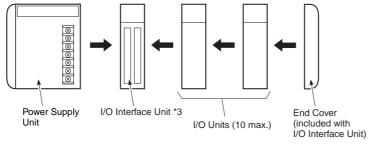
\*1: Connect the I/O Control Unit directly to the CPU Unit to enable connecting Expansion

#### **CJ2M CPU Unit**



- \*1: Connect the I/O Control Unit directly to the CPU Unit to enable connecting Expansion Racks.
  \*2: Up to two Pulse I/O Modules can be connected to the left of the CPU Unit.

#### **Expansion Rack**



\*3: Connect the I/O Interface Unit directly to the Power Supply Unit.



#### **Additional Information**

There is no Backplane for the CJ-series. The PLC is constructed by connecting Units together using the connectors on the sides.



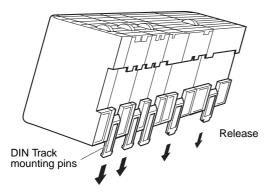
#### **Precautions for Correct Use**

- Always turn OFF the power supply before connecting Units to each other.
- · Always turn OFF the power supply to the entire system before replacing a Unit.
- A maximum of 10 Units can be connected in any one CPU or Expansion Rack. If more than the maximum number of Units are connected, a too many I/O points error (fatal error) will occur and the CJ2 CPU Unit will not operate in either RUN or MONITOR mode. If this occurs, the I/O Overflow Flag (A401.11) will turn ON and A407.13 to A407.15 (I/O Overflow Details 2) will turn ON.

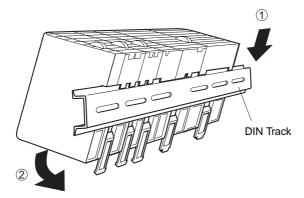
# 5-2-5 DIN Track Installation

Use the following procedure to install a CJ-series PLC on DIN Track.

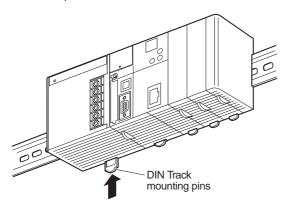
**1** Release the pins on the backs of the CJ-series Units.



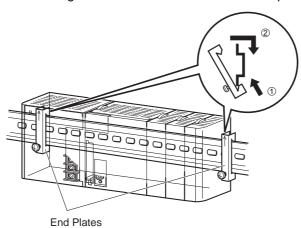
**2** Fit the back of the PLC onto the DIN Track by inserting the top of the track and then pressing in at the bottom of the PLC, as shown below.



**3** Lock the pins on the backs of the CJ-series Units.



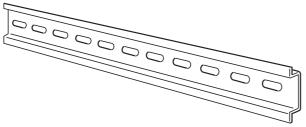
Install a DIN Track End Plate on each end of the PLC. To install an End Plate, hook the bottom on the bottom of the track, rotate the Plate to hook the top of the Plate on the top of the track, and then tighten the screw to lock the Plate in place.



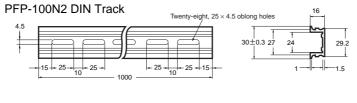
# **DIN Track and Accessories**

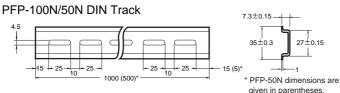
Use the DIN Track and DIN Track End Plates shown below. Secure each DIN Track inside a control panel with at least three screws.

• DIN Track Model numbers: PFP-50N (50 cm), PFP-100N (100 cm), PFP-100N2 (100 cm)



Secure the DIN Track to the control panel using M4 screws separated by 210 mm (6 holes) or less and using at least 3 screws. The tightening torque is 1.2 N·m.





• PFP-M DIN Track End Plates (2 required)



# 5-2-6 Connecting CJ-series Expansion Racks

CS/CJ-series I/O Connecting Cables are used to connect the CPU Rack and Expansion Racks.

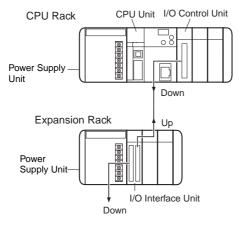
### CS/CJ-series I/O Connecting Cables



- These connectors are equipped with easy-lock connectors.
- Use them to connect the CPU Rack to an Expansion Rack or to connect two Expansion Racks.

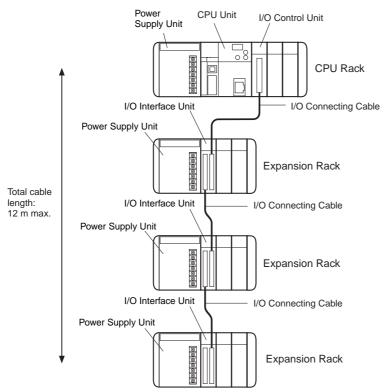
Model number	Cable length
CS1W-CN313	0.3 m
CS1W-CN713	0.7 m
CS1W-CN223	2 m
CS1W-CN323	3 m
CS1W-CN523	5 m
CS1W-CN133	10 m
CS1W-CN133B2	12 m

- The CJ-series I/O Connecting Cables are used to connect the I/O Control Unit on the CPU Rack to the I/O Interface Unit on an Expansion Rack or to connect the I/O Interface Units on two Expansion Racks.
- Install the Racks and select I/O Connecting Cables so that the total length of all I/O Connecting Cables does not exceed 12 m.
- The following diagram shows where each I/O Connecting Cable must be connected on each Rack. The Rack will not operate if the cables aren't connected properly. (The "up" direction is towards the CPU Unit and "down" is away from the CPU Unit.)



### Cable Connections

The following diagram shows examples of proper Rack connections. Connect the simple lock connectors to the I/O Control Unit on the CJ-series CPU Rack and the I/O Interface Unit on the CJseries Expansion Rack.

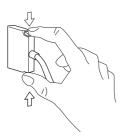


• The top and bottom of the connector are different. Be sure the connector is facing the correct direction before connecting it.

# Connecting the Simple Locking Connectors

Press the tabs on the end of the connector and insert the connector until it locks in place. The PLC will not operate properly if the connector isn't inserted completely.

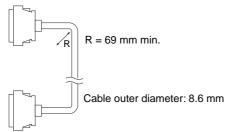
To remove the connector, press the tabs and pull on the connector.





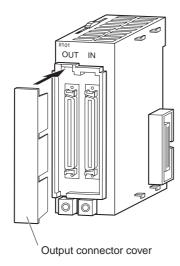
#### **Precautions for Correct Use**

- When using an I/O Connecting Cable with a locking connector, be sure that the connector is firmly locked in place before using it.
- Always turn OFF the power supply to the PLC before connecting a cable.
- An I/O bus error will occur and the PLC will stop if an I/O Connecting Cable's connector separates from the Rack. Be sure that the connectors are secure.
- A 63-mm hole will be required if the I/O Connecting Cable must pass through a hole when connecting an Expansion Rack.
- Do not bend the I/O Connecting cable past its natural bending radius or pull in it with excessive force.
- The cables can withstand a pulling force up to 49 N (11 lbs), so be sure that they are not pulled too forcefully.
- The I/O Connecting Cables mustn't be bent too severely. The minimum bending radii are shown in the following diagram.



• Always attach the cover to the output connector (left side) on the last I/O Interface Unit on the last Expansion Rack to protect it from dust.



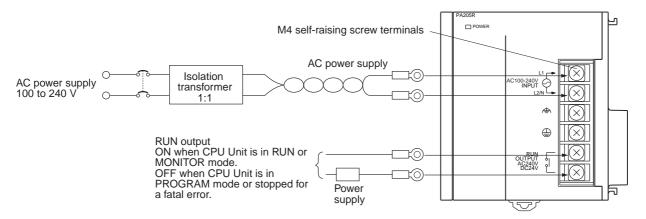


### Wiring **5-3**

#### 5-3-1 **Power Supply Wiring**

# **AC Power Supply Units**

### CJ1W-PA205R Power Supply Unit





#### **Additional Information**

The RUN output function is enabled only when mounted to a CPU Rack.

### AC Power Source

- Supply 100 to 240 VAC.
- Keep voltage fluctuations within the specified range:

Supply voltage	Allowable voltage fluctuations
100 to 240 VAC	85 to 264 VAC

 If one power supply phase of the equipment is grounded, connect the grounded phase side to the L2/N terminal.

### Isolation Transformer

The PLC's internal noise isolation circuits are sufficient to control typical noise in power supply lines, but noise between the PLC and ground can be significantly reduced by connecting a 1-to-1 isolation transformer. Do not ground the secondary coil of the transformer.

### Power Supply Capacity

The power consumption will be 100 VA max. per Rack for the CJ1W-PA205R/PA205C and 50 VA for the CJ1W-PA202, but there will be a surge current determined by power supply specifications when power is turned ON.

### RUN Output

The RUN output is provided only on the CJ1W-PA25R Power Supply Unit. This output is ON whenever the CPU Unit is operating in RUN or MONITOR mode; it is OFF when the CPU Unit is in PRO-GRAM mode or a fatal error has occurred (including execution of the FALS(007) instruction).

The RUN output can be used to control external systems, such as in an emergency stop circuit that turns off the power supply to external systems when the PLC is not operating. (Refer to *5-1 Fail-safe Circuits* for more details on the emergency stop circuit.)

Item	CJ1W-PA205R
Contact form	SPST-NO
Maximum switching	240 VAC: 2 A for resistive loads
capacity	120 VAC: 0.5 A for inductive loads
	24 VDC:2 A for resistive loads
	24 VDC:2 A for inductive loads

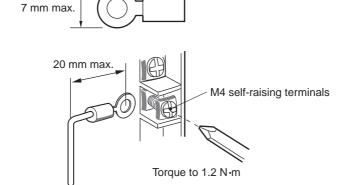
### Crimp Terminals

The terminals on the Power Supply Unit are M4, self-raising terminals with screws.



#### **Precautions for Correct Use**

- · Use crimp terminals for wiring.
- Do not connect bare stranded wires directly to terminals.
- Tighten the terminal block screws to the torque of 1.2 N·m.
- Use round-type crimp terminals (M4) having the dimensions shown below.
  - Crimp Terminals for AC Power Supplies





Tighten the AC power supply terminal screws to a torque of 1.2 N·m. Loose screws may result in short-circuit, malfunction, or fire.



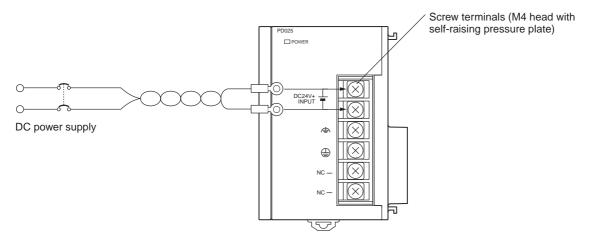


### **Precautions for Safe Use**

- Supply power to all of the Power Supply Units from the same source.
- Do not remove the protective label from the top of the Unit until wiring has been completed. This label prevents wire strands and other foreign matter from entering the Unit during wiring procedures.
- Do not forget to remove the label from the top of the Power Supply Unit after wiring the Unit. The label will block air circulation needed for cooling.

# **DC Power Supplies**

# CJ1W-PD025 Power Supply Unit



#### DC Power Source

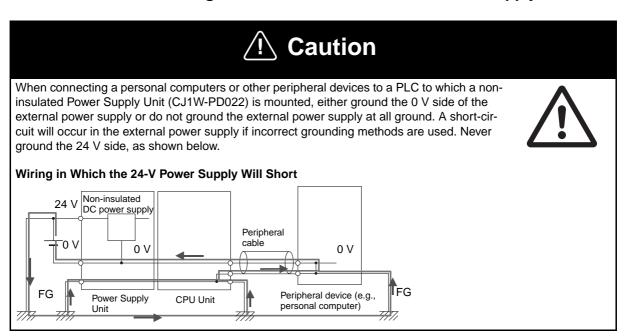
Supply 24 VDC. Keep voltage fluctuations within the specified range.

Model	Allowable voltage fluctuation range
CJ1W-PD025	19.2 to 28.8 VDC (±20%)
CJ1W-PD022	21.6 to 26.4 VDC (±10%)

# Power Supply Capacity

The maximum power consumption is 50 W (CJ1W-PD025)/35 W (CJ1W-PD022) per Rack, but there will be a surge current determined by power supply specifications when the power is turned ON.

# Precautions when Using CJ1W-PD022 Non-insulated Power Supply Units



### Crimp Terminals

The terminals on the Power Supply Unit are M4, self-raising terminals with screws.



#### **Precautions for Correct Use**

- · Use crimp terminals for wiring.
- Do not connect bare stranded wires directly to terminals.
- Tighten the terminal block screws to the torque of 1.2 N·m.
- Use crimp terminals (M4) having the dimensions shown below.
   Crimp Terminals for DC Power Supplies

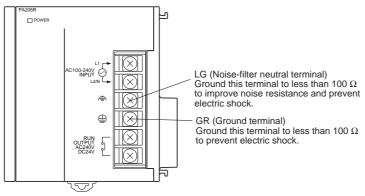




#### **Precautions for Safe Use**

- Be sure not to reverse the positive and negative leads when wiring the power supply terminals.
- Supply power to all of the Power Supply Units from the same source.
- Do not remove the protective label from the top of the Unit until wiring has been completed.
   This label prevents wire strands and other foreign matter from entering the Unit during wiring procedures.
- Do not forget to remove the label from the top of the Power Supply Unit after wiring the Unit.
   The label will block air circulation needed for cooling.

# Grounding



- To help prevent electrical shock, ground the ground terminal (GR:  $\oplus$ ) with a ground resistance of less than 100  $\Omega$  using a 14-gauge wire (minimum cross-sectional area of 2 mm<sup>2</sup>).
- The line ground terminal (LG:  $\oplus$ ) is a noise-filtered neutral terminal. If noise is a significant source of errors or electrical shocks are a problem, connect the line ground terminal to the ground terminal and ground both with a ground resistance of less than 100  $\Omega$ .
- If the LG and GR terminals are connected, ground to a resistance of 100  $\Omega$  or less to prevent electric shock.
- The ground wire should not be more than 20 m long.
- The CJ-series PLCs are designed to be mounted so that they are isolated (separated) from the mounting surface to protect them from the effects of noise in the installation environment (e.g., the control panel).
- Do not share the PLC's ground with other equipment or ground the PLC to the metal structure of a building. The configuration shown in the following diagram may worsen operation.

### Crimp Terminals

The terminals on the Power Supply Unit are M4, self-raising terminals with screws.



### **Precautions for Correct Use**

- · Use crimp terminals for wiring.
- Do not connect bare stranded wires directly to terminals.
- Tighten the terminal block screws to the torque of 1.2 N·m.
- Use crimp terminals (M4) having the dimensions shown below.

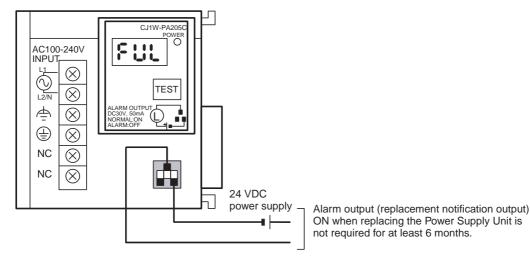
# Crimp Terminals for DC Power Supply



# **Alarm Output**

An alarm output is provided on Power Supply Units with a replacement notification function. Connect the alarm output to a PLC's Input Unit or external LED indicator to enable notification when Power Supply Unit replacement is required.

# CJ1W-PA205C Power Supply Unit



# Output Specifications

- ON (normal): Power Supply Unit replacement not required for at least 6 months.
- OFF: Power Supply Unit replacement required within 6 months.
- · Transistor open-collector outputs
- Maximum switching capacity: 30 VDC max., 50 mA max.
- ON: Residual voltage of 2 V max., OFF: Leakage current of 0.1 mA max.

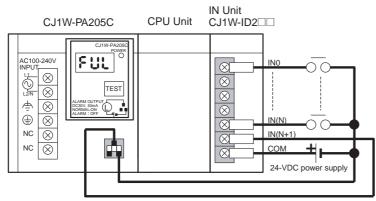
### Wiring

The following wire gauges are recommended.

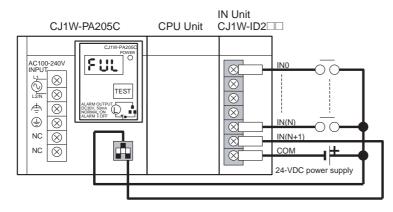
Recommended wire size	Use	Pushing strength (clamp- ing operation)	Pulling strength (holding force)	Length of stripped section
AWG 22 to 18 (0.32 to 0.82 mm <sup>2</sup> )	Connecting to PLC terminal block models	30 N max.	30 N min.	7 to 10 mm
AWG 28 to 24 (0.08 to 0.2 mm <sup>2</sup> )	Connecting to PLC connector models		10 N min.	

# • PLC Input Unit Wiring Example

Connect the positive terminals of the 24-VDC power supply to the Input Unit common (COM) terminals.

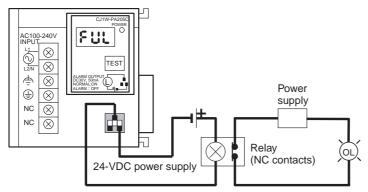


Connect the negative terminal of the 24-VDC power supply to the Input Unit common (COM) terminal.



### External Display Device Connection Example

The alarm output (replacement notification output) is an NC contact. Therefore, wire the alarm output using an NC contact or other means to turn ON an error indicator or LED display as shown in the following diagram.



Note The OL display will also light if the PLC's power supply fails.



### **Precautions for Safe Use**

- · Separate the alarm output cables from power lines and high-voltage lines.
- Do not apply a voltage or connect a load to the alarm output that exceeds the rated voltage or load.

# 5-3-2 Wiring CJ-series Basic I/O Units with Terminal Blocks

# Precautions for Wiring I/O Units

# I/O Unit Specifications

Double-check the specifications for the I/O Units. To avoid breakdown, damage or fire, observe the following instructions.

- Be sure not to apply a voltage that exceeds the input voltage for Input Units.
- Be sure not to apply a voltage and current that exceed the maximum switching capacity for Output Units.
- When the power supply has positive and negative terminals, be sure to wire them correctly.

### Electric Wires

• The following wire gauges are recommended.

Terminal Block Connector	Wire Size
18-terminal	AWG 22 to 18 (0.32 to 0.82 mm <sup>2</sup> )

• The current capacity of electric wire depends on factors such as the ambient temperature and insulation thickness as well as the gauge of the conductor.

# Crimp Terminals

The terminals on the I/O Unit are M3, self-raising terminals with screws.



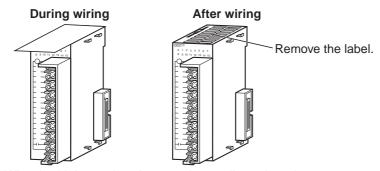
### **Precautions for Correct Use**

- · Use crimp terminals for wiring.
- Do not connect bare stranded wires directly to terminals.
- Tighten the terminal block screws to the torque of 0.5 N·m.
- Use crimp terminals (M3) having the dimensions shown below.

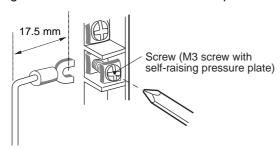


# Wiring

- · Make sure that all Units are connected properly.
- Do not remove the protective label from the top of the Unit until wiring has been completed.
- · This label prevents wire strands and other foreign matter from entering the Unit during wiring procedures.
- Remove the label after wiring has been completed to allow air circulation needed for cooling.

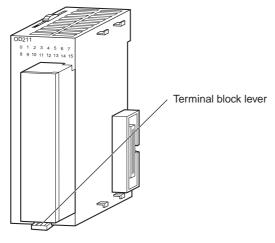


- · Wire the Units so that they can be easily replaced.
- Make sure that the I/O indicators are not covered by the wiring.
- Do not place the wiring for I/O Units in the same duct or raceway as power lines. Inductive noise can cause errors in operation.
- Tighten the terminal screws to the torque of 0.5 N·m.



# Terminal Blocks

- The I/O Units are equipped with removable terminal blocks. The lead wires do not have to be removed from the terminal block to remove it from an I/O Unit.
- After you complete wiring, check to see if the terminal block is securely locked.



CJ-series Basic I/O Unit

# 5-3-3 Wiring Basic I/O Units with Connectors

This section describes wiring for CJ-series Basic I/O Units with connectors (32- and 64-point Units). Depending on the connector, the following methods are used to connect these Units to external I/O devices.

- Use an OMRON Connecting Cable (equipped with a special connector) to connect to a Terminal Block or Relay Terminal.
- Use a special connector and user-provided cable.



#### **Precautions for Safe Use**

- Do not apply voltages to the Input Units in excess of the rated input voltage range.
- Do not apply voltages and currents to the Output Units in excess of the maximum switching capacity.
- When the power supply has positive and negative terminals, be sure to wire them correctly.
   Loads connected to Output Units may malfunction if the polarity is reversed.
- Use reinforced insulation or double insulation on the DC power supply connected to DC I/O Units when required by EC Directives (low voltage).
- When connecting the connector to the I/O Unit, tighten the connector screws to a torque of 0.2 N·m.
- Turn ON the power after checking the connector's wiring.
- Do not pull the cable. Doing so will damage the cable.
- Bending the cable too sharply can damage or break wiring in the cable.



#### **Additional Information**

CJ-series Basic I/O Units with 32 or 64 points and Fujitsu connectors have the same connector pin allocations as the C200H High-density I/O Units and CS-series I/O Units with connectors to make them compatible.

# Connecting to a Connector-Terminal Block Conversion Unit or I/O Relay Terminal

For details on using OMRON Connecting Cables equipped with special connectors to connect Basic I/O Units with connectors to OMRON Connector-Terminal Block Conversion Units or I/O Relay Terminals, refer to *A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals*.

# **Using User-made Cables with Connector**

#### Available Connectors

Use the following connectors when assembling a connector and cable.

# CJ-series 32- and 64-point Basic I/O Units with Fujitsu-compatible Connectors **Applicable Units**

Model	Specifications	Pins
CJ1W-ID231	Input Unit, 24 VDC, 32 inputs	40
CJ1W-ID261	Input Unit, 24 VDC, 64 inputs	
CJ1W-OD231	Transistor Output Unit with Sinking Outputs, 32 outputs	
CJ1W-OD261	Transistor Output Unit with Sinking Outputs, 64 outputs	
CJ1W-MD261	24-VDC Input/Transistor Output Units, 32 Inputs, 32 Outputs	
CJ1W-MD231	24-VDC Input/Transistor Output Units, 16 Inputs, 16 Outputs	24

#### **Applicable Cable-side Connectors**

Connection	Pins	OMRON set	Fujitsu parts
Solder-type 40 C500-CE404		C500-CE404	Socket: FCN-361J040-AU Connector cover: FCN-360C040-J2
	24	C500-CE241	Socket: FCN-361J024-AU Connector cover: FCN-360C024-J2
Crimped	nped 40 C500-CE405		Socket: FCN-363J040 Connector cover: FCN-360C040-J2 Contacts: FCN-363J-AU
	24	C500-CE242	Socket: FCN-363J024 Connector cover: FCN-360C024-J2 Contacts: FCN-363J-AU
Pressure-welded	40	C500-CE403	FCN-367J040-AU/F
	24	C500-CE243	FCN-367J024-AU/F

# CJ-series 32- and 64-point Basic I/O Units with MIL Connectors **Applicable Units**

Model	Specifications	Pins		
CJ1W-ID232	Input Unit, 24 VDC, 32 inputs	40		
CJ1W-ID233				
CJ1W-ID262	Input Unit, 24 VDC, 64 inputs			
CJ1W-OD232	Transistor Output Unit with sourcing outputs, 32 outputs			
CJ1W-OD262	Transistor Output Unit with sourcing outputs, 64 outputs			
CJ1W-OD233	Transistor Output Unit with sinking outputs, 32 outputs			
CJ1W-OD234				
CJ1W-OD263	Transistor Output Unit with sinking outputs, 64 outputs			
CJ1W-MD263	24-VDC Input/Transistor Output Units, 32 inputs, 32 outputs			
CJ1W-MD563	TTL Input/TTL Output Units, 32 inputs, 32 outputs			
CJ1W-MD232	24-VDC Input/Transistor Output Units, 16 inputs, 16 outputs	20		
CJ1W-MD233	24-VDC Input/Transistor Output Units, 16 inputs, 16 outputs			

#### **Applicable Cable-side Connectors**

Connection	Pins	OMRON set	DDK parts
Pressure-welded	40	XG4M-4030-T	FRC5-A040-3TOS
	20	XG4M-2030-T	FRC5-A020-3TOS

#### Wire Size

We recommend using cable with wire gauges of AWG 24 or AWG 28 (0.2 mm<sup>2</sup> to 0.08 mm<sup>2</sup>). Use cable with external wire diameters of 1.61 mm max.

#### Wiring Procedure

The following wiring procedure is an example for Fujitsu-compatible connectors.

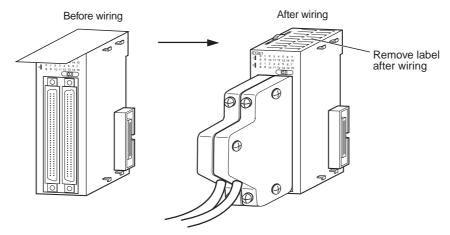
**1** Check that each Unit is installed securely.



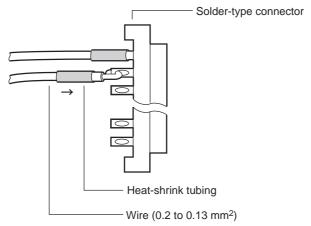
#### **Precautions for Correct Use**

Do not force the cables.

2 Do not remove the protective label from the top of the Unit until wiring has been completed. This label prevents wire strands and other foreign matter from entering the Unit during wiring. (Remove the label after wiring has been completed to allow air circulation needed for cooling.)



**3** When solder-type connectors are being used, be sure not to accidentally short adjacent terminals. Cover the solder joint with heat-shrink tubing.

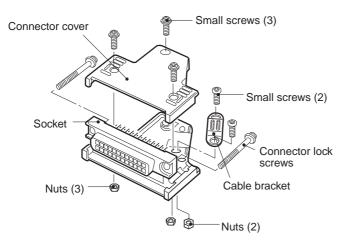




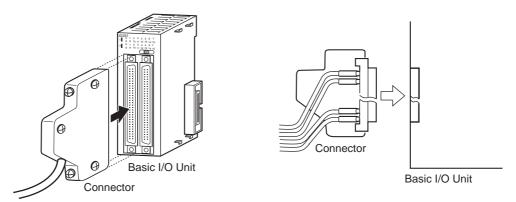
#### **Precautions for Safe Use**

Double-check to make sure that the Output Unit's power supply leads have not been reversed. If the leads are reversed, the Unit's internal fuse will blow and the Unit will not operate.

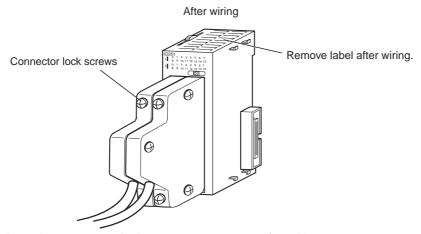
Assemble the connector (purchased separately).



Insert the wired connector.



Remove the protective label after wiring has been completed to allow air circulation needed for cooling.



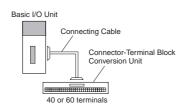
Tighten the connector lock screws to a torque of 0.2 N·m.

# 5-3-4 Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals

OMRON Connecting Cable can be used to connect Basic I/O Units with Connectors to OMRON Connector-Terminal Block Conversion Units or to OMRON I/O Relay Terminals. For details, refer to A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals.

#### Connection Examples

Connector-Terminal Block Conversion Unit





# 5-3-5 Connecting Pulse I/O Modules to External I/O Devices (CJ2M CPU Unit Only)

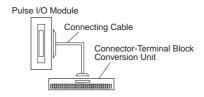
Depending on the connector, the following methods are used to connect these Pulse I/O Modules to external I/O devices.

- Use an OMRON Cable with Connectors to connect to a Connector-Terminal Block Conversion Unit or Servo Relay Unit.
- Make a cable with an MIL Connector (including using Servo General-purpose Control Cables).

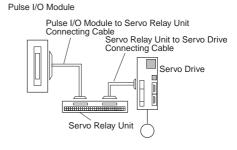
# Using OMRON Cables with Connectors to Connect to Connector-Terminal Block Conversion Units or Servo Relay Units

For details on using OMRON Cables with Connectors to connect Pulse I/O Modules to OMRON Connector-Terminal Block Conversion Units or Servo Relay Units, refer to the *CJ2M CPU Unit Pulse I/O Module User's Manual* (Cat. No. W486).

Connection Example for Connector-Terminal Block Conversion Unit



Connection Example for Servo Relay Unit



#### User-made Cables with Connectors

#### **Applicable Pulse I/O Modules**

Model	Specifications	Pins
CJ2M-MD211	Sinking outputs, MIL connector, 10 inputs, 6 outputs	40
CJ2M-MD212	Sourcing outputs, MIL connector, 10 inputs, 6 outputs	40

# Applicable Cable-side Connectors

Connection method	Pins	OMRON set	DDK Ltd.
Pressure-welded	40	XG4M-4030-T	FRC5-A040-3TOS

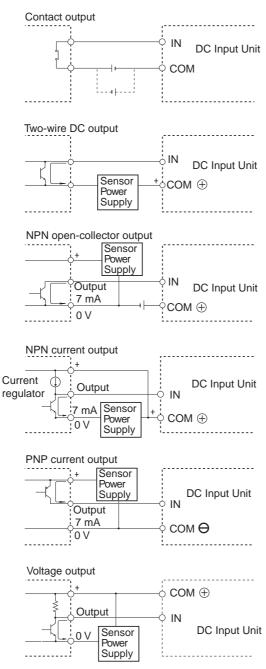
# 5-3-6 Connecting I/O Devices

# **Input Devices**

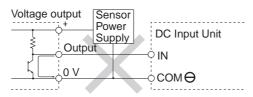
Use the following information for reference when selecting or connecting input devices.

#### DC Input Units

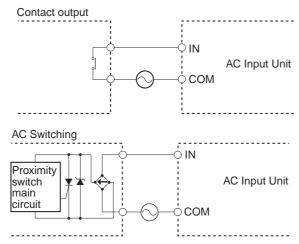
The following types of DC input devices can be connected.



The circuit below should NOT be used for I/O devices having a voltage output.



# AC Input Units





#### **Precautions for Safe Use**

When using a reed switch as the input contact for an AC Input Unit, use a switch with an allowable current of 1 A or greater. If reed switches with smaller allowable currents are used, the contacts may fuse due to surge currents.

#### Precautions when Connecting a Two-wire DC Sensor

When using a two-wire sensor with a 12-VDC or 24-VDC input device, check that the following conditions have been met. Failure to meet these conditions may result in operating errors.

Relation between voltage when the PLC is ON and the sensor residual voltage:  $Von \leq Vcc - Vr$ 

 Relation between voltage when the PLC is ON and sensor control output (load current):  $IOUT (min) \le ION \le IOUT (max.)$ 

ION = (VCC - VR - 1.5 [PLC internal residual voltage])/RIN

When ION is smaller than IOUT (min), connect a bleeder resistor R. The bleeder resistor constant can be calculated as follows:

 $R \leq (VCC - VR)/(IOUT (min.) - ION)$ 

Power W  $\geq$  (VCC – VR)<sup>2</sup>/R  $\times$  4 [allowable margin]

Vcc: Power voltage

VR: Sensor output residual current

ION: PLC ON current

IOUT: Sensor control current (load current)

RIN: PLC input impedance

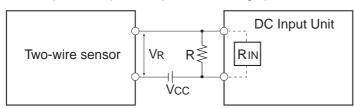
• Relation between current when the PLC is OFF and sensor leakage current:

IOFF ≥ Ileak

Connect a bleeder resistor if  $I_{leak}$  is greater than IOFF. Use the following equation to calculate the bleeder resistance constant.

 $R \le (RIN \times VOFF)/(Ileak \times RIN - VOFF)$ 

Power W  $\geq$  (VCC – VR) $^2/R \times 4$  [allowable margin]



VCC: Power voltage VON: PLC ON voltage VOFF: PLC OFF voltage

ION: PLC ON current IOFF: PLC OFF current

RIN: PLC input impedance

VR: Sensor output residual current IOUT: Sensor control current (load current)

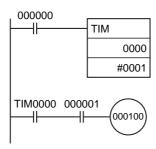
Ileak: Sensor leakage currentR: Bleeder resistance

### • Precautions on Sensor Surge Current

An incorrect input may occur if a sensor is turned ON after the PLC has started up to the point where inputs are possible. Determine the time required for sensor operation to stabilize after the sensor is turned ON and take appropriate measures, such as inserting into the program a timer delay after turning ON the sensor.

# Example

In this example, the sensor's power supply voltage is used as the input to CIO 000000 and a 100-ms timer delay (the time required for an OMRON Proximity Sensor to stabilize) is created in the program. After the Completion Flag for the timer turns ON, the sensor input on CIO 000001 will cause output bit CIO 000100 to turn ON.



# **Output Wiring Precautions**

### Output Short-circuit Protection

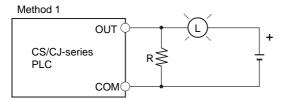
If a load connected to the output terminals is short-circuited, output components and the printed circuit boards may be damaged. To guard against this, incorporate a fuse in the external circuit. Use a fuse with a capacity of about twice the rated output.

# Transistor Output Residual Voltage

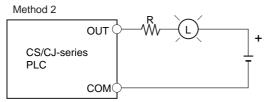
A TTL circuit cannot be connected directly to a transistor output because of the transistor's residual voltage. It is necessary to connect a pull-up resistor and a CMOS IC between the two.

# Output Surge Current

When connecting a transistor or triac output to an output device having a high surge current (such as an incandescent lamp), steps must be taken to avoid damage to the transistor or triac. Use either of the following methods to reduce the surge current.



Add a resistor that draws about 1/3 of the current consumed by the bulb.



Add a control resistor as shown in the following diagram.

# 5-3-7 Connecting through an Ethernet Cable (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

# **Precautions**

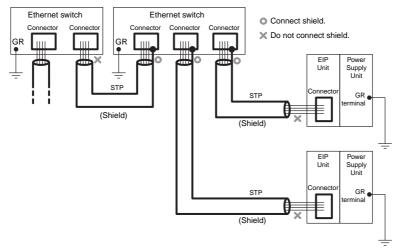
Observe the following precautions when using the built-in EtherNet/IP port on the CJ2H-CPU6□-EIP or CJ2M-CPU3□.

#### Basic Installation Precautions

- Take the greatest care when installing the Ethernet System, being sure to follow ISO 8802-3 specifications. You must obtain a copy of these specifications and be sure you understand them before attempting to install an Ethernet System.
- Unless you are already experienced in installing communications systems, we strongly recommend that you employ a professional to install your system.
- Do not install Ethernet equipment near sources of noise. If a noisy environment is unavoidable, take adequate measures against noise interference, such as installing network components in grounded metal cases or using optical cable in the system.
- When installing an EtherNet/IP network that combines an information system with the control system, and the communications load may be heavy due to tag data links, we recommend configuring the network so that the load does not affect communications. For example, install the tag data links in a segment that is separate from the information network.

# Precautions on Laying Twisted-pair Cable

- Noise resistance may be reduced by ground loops, which can occur due to improper shield connections and grounding. Ground the shield at one location, as shown in the following diagram.
- Do not connect the connector shield at the CPU Unit.
- If a cable connects two Ethernet switches, connect the shields at only one end.



- Press the cable connector in firmly until it locks into place at both the Ethernet switch and the CPU Unit.
- Do not lay the twisted-pair cable together with high-voltage lines.
- Do not lay the twisted-pair cable near devices that generate noise.
- Do not lay the twisted-pair cable in locations subject to high temperatures or high humidity.
- Do not lay the twisted-pair cable in locations subject to excessive dirt and dust or to oil mist or other contaminants.

# **Ethernet Connectors**

The following standards and specifications apply to the connectors for the Ethernet twisted-pair cable.

- Electrical specifications: Conform to IEEE802.3 standards.
- · Connector structure: RJ45 8-pin Modular Connector (Conforms to ISO 8877)



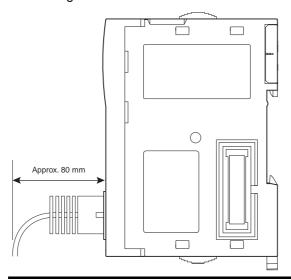
Connector pin	Signal name	Abbr.	Signal direction
1	Transmission data +	TD+	Output
2	Transmission data –	TD-	Output
3	Reception data +	RD+	Input
4	Not used.		
5	Not used.		
6	Reception data –	RD-	Input
7	Not used.		
8	Not used.		
Hood	Frame ground	FG	

# **Connecting the Cable**



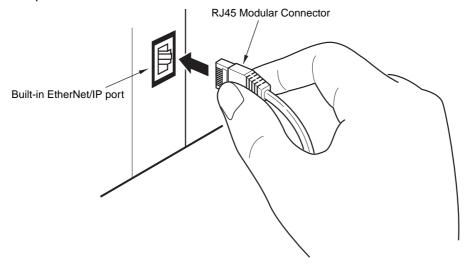
#### **Precautions for Correct Use**

- Turn OFF the PLC's power supply before connecting or disconnecting twisted-pair cable.
- Allow extra space for the bending radius of the twisted-pair cable. The required space depends on the communications cable and connector that are used. Consult with the manufacturer or sales agent.



- Lay the twisted-pair cable.
- Connect the cable to the Ethernet switch. Be sure to press in the cable until it locks into place.

3 Connect the twisted-pair cable to the connector on the built-in EtherNet/IP port at the CPU Unit. Be sure to press the connectors at both the Ethernet switch end and Ethernet end until they lock into place.



# **Control Panel Installation**

To ensure system reliability and safety, the system must be designed and configured according to the installation environment (temperature, humidity, vibration, shock, corrosive gases, overcurrent, noise, etc.).

#### 5-4-1 **Temperature**

Panels have been reduced in size due to space-saving and miniaturization in devices and systems, and the temperature inside the panel may be at least 10 to 15°C higher than outside the panel. Implement the following measures against overheating at the installation site and in the panel, and allow a sufficient margin for the temperature.

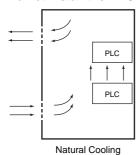
# **High Temperatures**

Use the following cooling methods as required, taking into account the ambient temperature and the amount of heating inside the panel.

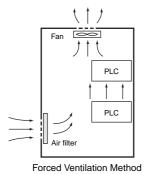
### Natural Cooling

Natural cooling relies on natural ventilation through slits in the panel, rather than using cooling devices such as fans or coolers. When using this method, observe the following points.

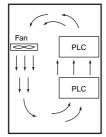
- Do not install the PLC at the top of the panel, where hot air tends to stagnate.
- To provide ventilation space above and below the PLC, leave sufficient distance from other devices, wiring ducts, etc.
- Do not mount the Units in the wrong direction (e.g., vertically or upside down). Doing so may cause abnormal heating in the PLC.
- Do not install heat-generating equipment, such as heaters, transformers, and devices with high resistance, directly above the panel.
- Do not install the PLC in a location exposed to direct sunlight.



#### Forced Ventilation (by Fan at Top of Panel)

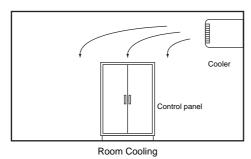


# • Forced Air Circulation (by Fan in Closed Panel)



Forced Air Circulation

# • Room Cooling (Cooling the Entire Room Where the Control Panel Is Located)

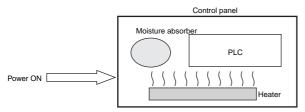


# Low Temperatures

The PLC will not start normally if the temperature is below 0°C when the power is turned ON. Maintain an air temperature of at least approximately 5°C inside the panel, by implementing measures such as installing a low-capacity space heater in the panel. Alternatively, leave the PLC power ON to keep the PLC warm.

# 5-4-2 Humidity

Rapid temperature changes can cause condensation to occur, resulting in malfunctioning due to short-circuiting. When there is a possibility of this occurring, take measures against condensation, such as leaving the PLC power ON at night or installing a heater in the control panel to keep it warmer.



**Examples of Measures against Condensation** 

#### 5-4-3 Vibration and Shock

The PLC is tested for conformity with the sine wave vibration test method (IEC 60068-2-6) and the shock test method (IEC 60068-2-27) of the Environmental Testing for Electrotechnical Products. It is designed so that malfunctioning will not occur within the specifications for vibration and shock. If, however, the PLC is to be used in a location in which it will be directly subjected to regular vibration or shock, then implement the following countermeasures:

- Either separate the control panel from the source of the vibration or shock, or secure the PLC and the panel with rubber padding to prevent vibration.
- Make the building or the floor vibration-resistant.
- To prevent shock during operation to devices in the panel, such as electromagnetic contactors, secure either the source of the shock or the PLC with rubber padding.

# 5-4-4 Atmosphere

Using the PLC in any of the following locations can cause defective contact with connectors and corrosion of components. Implement countermeasures such as purging the air as required.

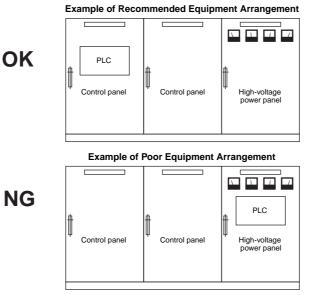
- In locations exposed to dust, dirt, salt, metal filings, soot, or organic solvents, use a panel with an airtight structure. Be careful of temperature increases inside the panel.
- In locations exposed to corrosive gas, purge the air inside the panel to clear the gas and then pressurize the inside of the panel to prevent gas from entering from outside.
- In locations where flammable gas is present, either use an explosion-protected construction or do not use the PLC.

# 5-4-5 Electrical Environment

When installing or wiring devices, make sure that there will be no danger to people and that noise will not interfere with electrical signals.

# **PLC Installation Location**

Install the PLC as far away as possible from high-voltage (600 V or higher) and power devices to ensure safe operation and maintenance.

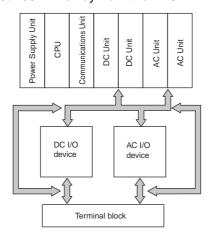


**Examples of Equipment Arrangement in Panel with High-voltage Devices** 

# **Arrangement of PLC and Units**

Observe the following points.

- Place a Unit that does not generate much noise next to the CPU Unit, such as an Input Unit or Communications Unit.
- The coils and contacts in electromagnetic contactors and relays in an external circuit are sources of noise. Locate them at least 100 mm away from the PLC.

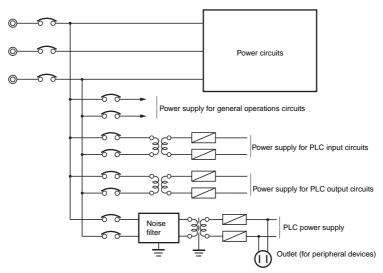


**Example of Arrangement in Panel** 

# Wire Layout for the Power Supply System

Observe the following points when wiring the power supply system.

- Separate the PLC power supply from the I/O device power supply and install a noise filter near the PLC power supply feed section.
- Use an isolating transformer to significantly reduce noise between the PLC and the ground. Install
  the isolating transformer between the PLC power supply and the noise filter, and do not ground the
  secondary coil of the transformer.
- Keep the wiring between the transformer and the PLC as short as possible, twist the wires well, and keep the wiring separate from high-voltage and power lines.

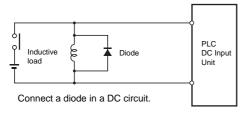


**Power Supply System Diagram** 

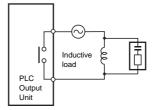
# Wiring External I/O Signal Lines

Observe the following points when wiring external I/O signal lines.

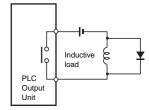
To absorb reverse electromotive force when an inductive load is connected to an output signal, connect a surge suppressor near the inductive load in an AC circuit, and connect a diode near the inductive load in a DC circuit.



**Input Signal Noise Countermeasures** 



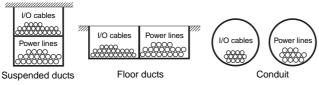




Connect a diode in a DC circuit.

**Output Signal Noise Countermeasures** 

Never bundle output signal lines with high-voltage or power lines, and do not route them in close
proximity or parallel to such lines. If output signal lines must be routed in close proximity to such lines,
place them in separate ducts or conduits and be sure to ground the ducts or conduits.



I/O Cable Arrangement

• If the signal lines and power lines cannot be routed in separate ducts, use shielded cable. Connect the shield to the ground terminal at the PLC, and leave it unconnected at the input device.

- Wire the lines so that common impedance does not occur. Such wiring will increase the number of wires, so use common return circuits. Use thick wires with sufficient allowance for the return circuits, and bundle them with lines of the same signal level.
- For long I/O lines, wire the input and output signal lines separately.
- Use twisted-pair wires for pilot lamps (and particularly lamps with filaments).
- Use countermeasures, such as CR surge absorbers and diodes, for input device and output load device noise sources, as required.

# **External Wiring**

Wiring, and noise countermeasures in particular, are based on experience, and it is necessary to closely manage wiring based on experience and information in the manuals.

# Wiring Routes

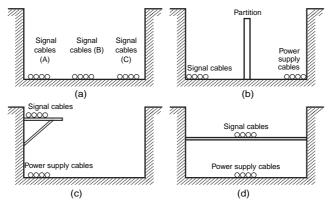
Each of the following combinations include different signal types, properties, or levels. They will cause the signal-to-noise ratio to drop due to factors such as electrical induction. As a general rule when wiring, either use separate cables or separate wiring routes for these items. Future maintenance operations and changes to the system will also be made easier by carefully organizing the wiring from the start.

- · Power lines and signal lines
- · Input signals and output signals
- · Analog signals and digital signals
- High-level signals and low-level signals
- · Communications lines and power lines
- DC signals and AC signals
- High-frequency devices (such as Inverters) and signal lines (communications)

# Wiring Methods

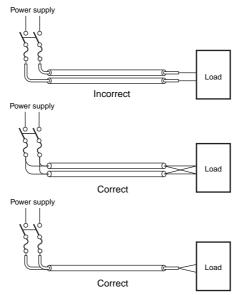
Observe the following points when wiring power supply and signal cables.

- When routing signal cables with differing characteristics through the same duct, always keep them separated.
- · As much as possible, avoid routing multiple power supply lines through the same duct. If it cannot be avoided, then construct a partition between them in the duct and ground the partition.



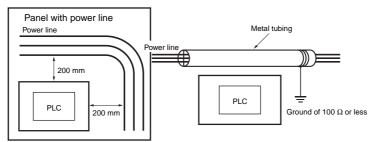
**Partitioning Methods for Signal and Power Supply Cables** 

• To avoid overheating the conduits when using conduits for wiring, do not place wires for a single circuit in separate conduits.



**Parallel Wiring (Single Phase)** 

- Power cables and signal cables adversely affect each other. Do not wire them in parallel.
- Noise induction may occur if the PLC is installed in a panel that includes high-voltage devices.
   Whenever possible, wire and install them separately. (Refer to PLC Installation Location on page 45.)
- Either install the PLC a minimum of 200 mm from high-voltage lines or power lines, or place the high-voltage lines or power lines in metal tubing and completely ground the metal tubing to 100  $\Omega$  or less.



**Example: Separating PLC from Power Lines** 

#### Other Precautions

- Basic I/O Units have both plus and minus commons, so pay attention to the polarity when wiring.
- Optical fiber cable looks like ordinary communications cable or power cable, but internally it consists of fibers, tension members, other protective materials. It must be handled with care. In particular, optical fiber cable must be installed according to prescribed methods and standards. Do not subject optical fiber cable to severe tensile shock, excessive bending, twisting, or excessive constriction. For details on wiring optical fiber cables, refer to the following manuals.
  - SYSMAC H-PCF Optical Fiber Cables Installation Guide (Cat. No. W156)
  - Optical Ring Controller Link Units Operation Manual (Cat. No. W370)

# 5-4-6 Grounding

Grounding has the following two purposes.

- · Protective Grounding
  - Protective grounding is done to ensure safety. It is intended to prevent electrical shock by grounding the electrical potential that is generated by factors such as leakage, induction, or failure.
- Functional Grounding

Functional grounding is done to protect device and system functions, including prevention of noise from external sources, or prevention of noise from devices or equipment that could have harmful effects on other devices or equipment.

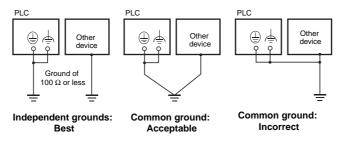
Grounding requirements sometimes depend on the situation, based on experimentation. It is important to sufficiently check the particular circumstances before grounding.

# **Grounding Methods and Precautions**

# Principles of One-point Grounding

For devices to operate properly, the reference potential between the devices must be stabilized. Use one-point grounding so that noise current does not flow to ground lines between the devices.

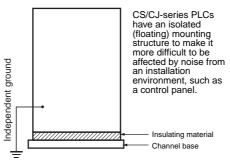
- Whenever possible, use an independent ground (with the ground pole separated by a minimum of 10 m from any other ground pole).
  - Ground to  $100 \Omega$  or less, and if possible use a separate ground from those of other devices. (Refer to figure (a) in the diagram below.)
  - If using an independent ground is not possible, then use a common ground as shown in figure (b). Connect to the ground pole of the other device.
  - Never connect to the same ground as a device that draws a large amount of power, such as a motor or inverter. Ground the devices separately to avoid mutually adverse influences.
  - To prevent electrical shock, do not connect to ground poles (especially steel frames) to which multiple devices are connected.
  - Use a ground pole as close to the PLC as possible and keep the ground line as short as possible.



**Grounding Methods** 

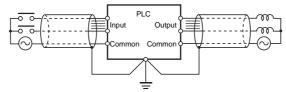
# Precautions when Grounding

• If the same ground is used for both the signal lines and the enclosure, isolate the channel base (a grounded metal plate inside a control panel) with an insulating material



**Example: Insulating and Grounding an Enclosure** 

- To prevent influence from leakage current from other electrical devices, electrically isolate the panel in which the PLC is housed from other devices.
- If high-frequency equipment is present, then ground not only the high-frequency equipment but also the panel itself in which the PLC is housed.
- As shown in the following diagram, when using shielded cable for I/O wiring, connect the shield near the PLC to the enclosure ground terminal. Follow the instructions in the Communications Unit manual for preparing shielded communications cable.



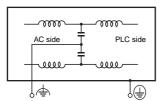
Shielded Cable Ground

#### PLC Ground Terminals

The PLC has the following two ground terminals.

- Protective ground terminal: Always connected to the PLC chassis to prevent electrical shock.
- Functional ground terminal: Connected to a neutral point in the noise filter to provide a ground when power supply noise causes malfunctioning.

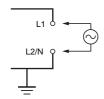
When the functional ground terminal is correctly grounded, it is generally effective in suppressing power supply common noise. Occasionally, however, grounding this terminal will result in picking up more noise, so be careful when using it.



**PLC Ground Terminals** 

# Grounding for AC Power Supply Units

When wiring to an AC Power Supply Unit, if one power supply phase of the equipment is grounded, always connect the grounded phase to the L2/N terminal.





# **Troubleshooting**

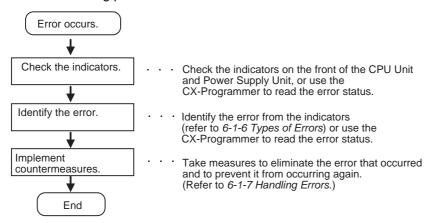
This section describes how to troubleshoot problems that may occur with a CJ2 PLC.

6-1	CPU L	Jnit Errors 6	<b>Տ-2</b>
	6-1-1	Errors and Remedies	3-2
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# **CPU Unit Errors**

#### 6-1-1 **Errors and Remedies**

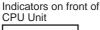
Use the following procedure when an error occurs.



#### 6-1-2 **Checking Errors**

The type of error that occurred can be determined by checking the indicators on the front of the CPU Unit or by using the CX-Programmer. For details on error types, refer to 6-1-6 Types of Errors.

# **Checking the Indicators**





RUN: Lit green when the PLC is in RUN or MONITOR mode.

ERR/ALM: Shows the results of self-diagnosis.

Flashing red: Non-fatal error

Lit red: Fatal error

INH: Lit yellow when Output OFF Bit has been turned ON.

PRPHL: Flashing yellow when the CPU Unit is communicating through

the peripheral (USB) port.

COMM\*: Flashing yellow when the CPU Unit is communicating through

the RS-232C (USB) port.

BKUP: Flashing yellow when data is being backed up from RAM to

built-in flash memory.

\* The CJ2M-CPU3□ does not have this indicator.

Power Supply Unit

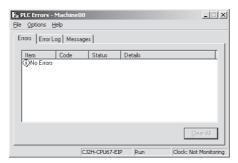


POWER: Lit when 5 V is output from the Power Supply Unit.

# **Checking Error Status with the CX-Programmer**

Use the following procedure to read the error status.

- **1** Connect the CX-Programmer online.
- **2** Double-click *Error Log* in the project tree in the main window. The PLC Error Window will be displayed.
- **3** Click the **Errors** Tab. The current errors will be displayed on the Errors Tab Page.



# 6-1-3 Checking Detailed Status

You can check detailed error status using information registered in the Auxiliary Area. The following error details are registered.

- Error Flags: The Auxiliary Area contains flags that indicate the type of error. There are error flags for various types of error.
- Error Information: The Auxiliary Area contains words that provide detailed information on current errors. Error information is provided for various types of error.
- Error Code: The error code assigned to the current error is stored in word A400 regardless of the type of error. If two or more errors occur at the same time, the highest (most serious) error code will be stored in A400.

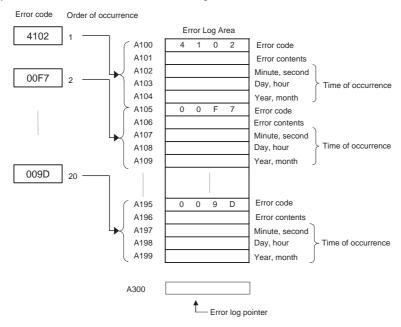
# 6-1-4 Reading Error Log Information

If the error status could not be checked when the error occurred, it can be checked by reading error log data. The following information is stored in the error log.

- Error code (This is the same error code as is stored in word A400.)
- · Error information
- · Time of occurrence

# **Error Log Information**

A maximum of 20 error records will be stored in the error log. If more than 20 errors occur, the oldest error record (in A100 to A104) will be deleted and the 19 records stored in A105 to A199 will be shifted by one, with the newest record being stored in A195 to A199.

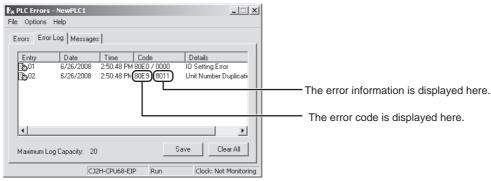


# **Checking Error Log Information**

The following methods can be used to check error log information with the CX-Programmer.

#### CX-Programmer PLC Error Window

Check the error log by clicking the Error Log Tab in the PLC Errors Window of the PLC.



The example above shows that unit number 17 has been duplicated for Special I/O Units.

- Error code 80E9: Unit number duplication error
- Error information: 80 "11": 11 hex = 17 decimal

For details on error codes and error information, refer to A-3 Fatal and Non-fatal Error Details.

# Directly Monitoring the Area where Error Log Information is Stored

- Connect the CX-Programmer online.
- Read words A100 to A199.

**3** Check the error status from the registered data.

# 6-1-5 I/O Table Verification

When an I/O verification error or a CPU standby error occurs, the following procedure can be used to verify the I/O tables to locate where the error occurred. With the CX-Programmer, use the following procedure.

- 1 Double-click I/O Tables in the project tree in the main window.

  The I/O Table Window will be displayed.
- **2** Select *Verify* from the Options Menu in the I/O Table Window.

The I/O table verification results will be displayed.

#### 6-1-6 **Types of Errors**

The type of error that has occurred can be identified by checking the indicators on the front of the CPU Unit and the Power Supply Unit, or by using the CX-Programmer to check the error status. The errors detected by the CPU Unit are listed in the following table.

For details on errors that are not detected by the CPU Unit, refer to 6-3 Non-CPU Unit Errors and Rem-

	Error name	POWER	RUN	ERR/ALM	INH	PRPHL	СОММ	Error code (stored in A400)	Operation status
Powe	er supply error	OFF	OFF	OFF	OFF	OFF	OFF		Operation stops.
CPU	Standby	ON	OFF	OFF					Operation stops.
CPU	reset								Operation stops.
CPU	error (WDT error)*1	ON	OFF	ON					Operation stops.
USB	port communications error	ON	ON	OFF		OFF			Operation continues.
	32C port communications	ON	ON	OFF			OFF		Operation continues.
error	Cycle time exceeded error	ON	OFF	ON				0x809F	0
	I/O bus error	ON	OFF	ON				0x80C9 to 0x80C0 to 0x80C7, 0x80CE, 0x80CF	Operation stops.
	I/O setting error							0x80E0	
	Too many I/O points error							0x80E1	
Fatal errors*1*2	Unit number duplication error							0x80E9	
atal err	Rack number duplication error							0x80EA	
щ	Program error							0x80F0	
	Memory error							0x80F1	
	Version error							0x80F2	
	Memory Card Transfer Error							0x80F4	
	FALS (007) error							0xC101 to 0xC2FF	
	Duplicated refreshing error	ON	ON	Flashing				0x008B	Operation continues.
	Basic I/O error							0x009A	
	PLC Setup error							0x009B	
	Option Board error							0x00D1	
	Backup memory error							0x00F1	
	Tag memory error*3							0x00F2	
.*2	System work errors							0x00F3	
al errors*2	Battery error							0x00F7	
Non-fatal e	CPU Bus Unit error							0x0200 to 0x020F	
	Special I/O Unit error							0x0300 to 0x035F, 0x03FF	
	CPU Bus Unit setting error							0x0400 to 0x040F	
	FAL (006) error							0x4101 to 0x42FF	
	Special I/O Unit setting error							0x0500 to 0x055F	

The indicator status is the same for CPU errors and fatal errors, but they can be distinguished because a Programming Device can be connected when a fatal error occurs, but not when a CPU error occurs.

Note The indicator status shows the status of the errors that have occurred in RUN or MONITOR mode.

<sup>\*2</sup> For details on fatal errors and non-fatal errors, refer to A-3 Fatal and Non-fatal Error Details.

<sup>\*3</sup> CJ2H-CPU6□-EIP only.

# 6-1-7 Handling Errors

This section describes the measures to take for the errors that most commonly occur. First check the error status. Then, make a preliminary determination of the cause of the error, confirm the cause, correct the error, and take measures to ensure that it will not occur again. For all other errors, refer to A-3 Fatal and Non-fatal Error Details.

# **Power Supply Errors**

A power supply error occurs when a voltage of 5 V is not output from the Power Supply Unit.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Not lit.	Not lit.	Not lit.	None	None	None

Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
Power is not being input.	Use a tester to measure the voltage at the input terminals of the Power Supply Unit.*1	Turn the power ON again.	Investigate the reason that the power was turned OFF.
Connection status of power supply selector terminals	100 VAC:     Use a tester check for short-circuits.     200 VAC:     Check for disconnections.	Reconnect and secure the terminal connections.	Periodically (approximately once a year) tighten the terminal connections.
The voltage is out of the allowable range for the power supply.	Use a tester to measure the voltage at the input terminals to the Power Supply Unit.*1	Correct the power supply system for the PLC.	Same as at the left.
Power Supply Unit failure  Replace the Power Supply Unit and check operation. (Check whether the POWER indicator is lit.)		Replace the Power Supply Unit.	Depends on the type of error.
Failure at another Unit	Remove in order the Units mounted in the Rack and check the POWER indicator.	Replace the failed Unit.	Depends on the type of error.

<sup>\*1</sup> The following table shows the allowable power supply ranges for each Power Supply Unit model.

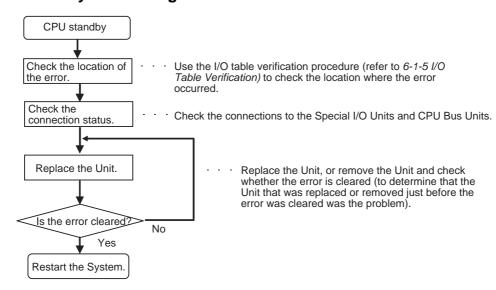
Model	Power supply voltage	Allowable power supply voltage fluctuation
CJ1W-PA205R/PA202	100 to 240 VAC	85 to 264 VAC
CJ1W-PD025	24 VDC	19.2 to 28.8 VDC

# CPU Standby Errors

When a CJ-series PLC is turned ON, the CPU starts cyclic servicing and enters RUN mode only after all Special I/O Units and CPU Bus Units have been detected. If the startup mode is RUN or MONITOR mode, the CPU will remain on standby until all Units have been detected.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Not lit.	Not lit.	None	None	None

# Recovery Processing Flow



#### **Error Causes and Remedies**

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Faulty connection at Unit (at a connector)	Check the insertion at the connector. Restart the Unit and check whether the error is cleared.	Tighten the screws.	Same as at the left.
Unit failure	Replace the Unit that is causing the standby (the undetected Unit). If the error is not cleared, remove the Units in order until the status returns to normal.	Replace the Special I/O Unit or Interrupt Unit for which "\$" is displayed when the I/O tables are read.     Replace the failed Unit.	(Determined by the cause of the failure.)
The remote I/O power supply is OFF or there is no terminator for SYSMAC BUS.	Check whether the power is turned ON. Check the terminator settings.	Turn ON the power or set the terminators. If the error is not cleared, replace the Unit.	



#### **Additional Information**

The CJ2 CPU Units support the following function.

#### Startup Condition Setting

After the power supply is turned ON, it is possible to start operation of the CPU Unit in RUN mode or MONITOR mode even if there is one or more Units that has not completed startup. Select the *Start running program when initializing Unit/Inner board recognition* Check Box in the PLC Setup. For details, refer to the *CJ-series CJ2 CPU Unit Software User's Manual* (Cat. No. W473).

# **CPU Reset**

The CPU Unit is being reset, and Programming Devices cannot be connected.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Not lit.	Not lit.	None	None	None

#### Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Power to an Expansion Rack is OFF.	Use a tester to measure the voltage at the input terminals of the Power Supply Unit.*1	Turn ON the power.	Investigate the reason that the power was OFF.
<ul> <li>The I/O Connecting Cable is incorrectly installed.</li> <li>The IN-OUT connectors are reversed.</li> <li>The cable does not have good contact at the connectors.</li> <li>Two or more I/O Control Units are mounted on the CPU Rack, or an I/O Control Unit is</li> </ul>	Check the connections.	Reconnect the cable.	If the Cable is disconnected, check for vibration and shock.

\*1 The following table shows the allowable power supply ranges for each Power Supply Unit.

Model	Power supply voltage	Allowable power supply voltage fluctuation
CJ1W-PA205R/PA202	100 to 240 VAC	85 to 264 VAC
CJ1W-PD025	24 VDC	19.2 to 28.8 VDC



#### **Precautions for Correct Use**

Observe the following points when using Expansion Racks.

- Always confirm the safety of any related equipment before turning the power supply ON or OFF.
- When the power supply is interrupted to an Expansion Rack, the CPU Unit will stop program
  execution and the same operations as are performed when the power supply to the CPU Unit
  is interrupted will be performed. For example, if the power OFF interrupt task is enabled, it will
  be executed. If power is then restored to the Expansion Rack, the CPU Unit will perform startup processing. The same operational status as existed before the power interrupt will not necessarily be continued.

# **CPU Errors**

CPU errors are error that occur in the CPU Unit itself. A CPU error occurs when the WDT (watchdog timer) times out. Programming Devices cannot be connected when a CPU error occurs.

POWER	RUN	ERR/ALM	Error flag	Error code	Error information
Lit.	Not lit.	Lit.	None	None	None

#### Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
Unit failure	A CPU error has possibly occurred in the following cases.	Replace the CPU Unit.	Same as at the left.
	If the error is not cleared when the CPU Unit is restarted after the recovery measures.		
	If the error occurs frequently     If the condition improves when the Unit is replaced.		
A conductive object has gotten inside.	Check for conductive objects.	Clean the inside of the Unit with an air blower or replace the CPU Unit.	Do not do any metal working in the vicinity of the control panel. Close the control panel.
Noise  The microcomputer inside the CPU Unit is malfunctioning.	When the CPU Unit is restarted after the recovery measures, the error will either be cleared or will continue to occur. Check whether errors become less frequent after the Unit is replaced.	Take measures against noise. (Investigate the path of entry.)  • FG  • Power lines	Same as at the left.



#### **Precautions for Correct Use**

- · Always confirm the safety of any related equipment before turning the power supply ON or OFF.
- When power supply is interrupted to an Expansion Rack, the CPU Unit will stop program execution and the same operations as are performed when the power supply to the CPU Unit is interrupted will be performed. For example, if the power OFF interrupt task is enabled, it will be executed. If power is then restored to the Expansion Rack, the CPU Unit will perform startup processing. The same operational status as existed before the power interrupt will not necessarily be continued.

# **Communications Error (Peripheral (USB) Port)**

A communications error will occur if there is an error in communications between the peripheral (USB) Port and a connected device.

POWER	RUN	ERR/ALM	PRPHL	COMM	Error flag	Error code	Error information
Lit.	Lit.	Not lit.	Not lit.	Not lit.	None	None	None

#### Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
The communications cable is disconnected.	Perform a visual inspection and pull on the cables.	Reconnect the cables.	During operation, confirm that the connections are secure. Check for vibration or shock.

# Communications Error (Serial Port (RS-232C))

A communications error will occur if there is an error in communications between the serial (RS-232C) port and a connected device.

POWER	RUN	ERR/ALM	PRPHL	COMM	Error flag	Error code	Error information
Lit.	Lit.	Not lit.	Not lit.	Not lit.	None	None	None

#### Error Causes and Remedies

Suspected cause of error	Confirmation method   Re		Prevention of recur- rence
Communications settings are incorrect.	<ul> <li>Check whether the DIP switch pin 5 setting and and the serial port settings in the PLC Setup are correct.</li> <li>If a host computer is connected, check the host computer serial port settings and the program.</li> </ul>	Correctly set DIP switch pin 5 and the serial port settings in the PLC Setup. Correct the host computer serial port settings and the program.	Same as at the left.
A communications cable is incorrectly connected.	Check the cable connections.	Correct the cable connections.	Same as at the left.
A communications cable is disconnected.	Perform a visual inspection and pull on the cables.	Reconnect the cables.	During operation, confirm that the connections are secure. Check for effects of vibration or shock.

# Cycle Time Exceeded Error (Fatal Error)

# • Cycle Time Exceeded Error

A cycle time exceeded error will occur if the PLC cycle time exceeds the setting for Watch Cycle Time in the PLC Setup.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Not lit.	Lit.	A401.08	809F	None

### Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
An interrupt task with a long processing time was executed.	Check the Max. Interrupt Task Processing Time (A440)*	Divide the interrupt task into sections.	Same as at the left.
An incorrect value (an extremely large number) was set for the number of repeats of FOR(512).	Set up a trap in the ladder program to monitor the number of repeats.	Correct the ladder program.	Same as at the left.

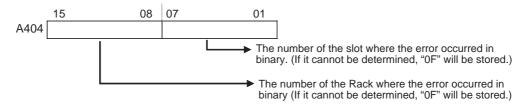
<sup>\*</sup> The maximum processing time for an interrupt task will not be stored in A440 if High-speed interrupt function is enabled in the PLC Setup.

### I/O Bus Error (Fatal Error)

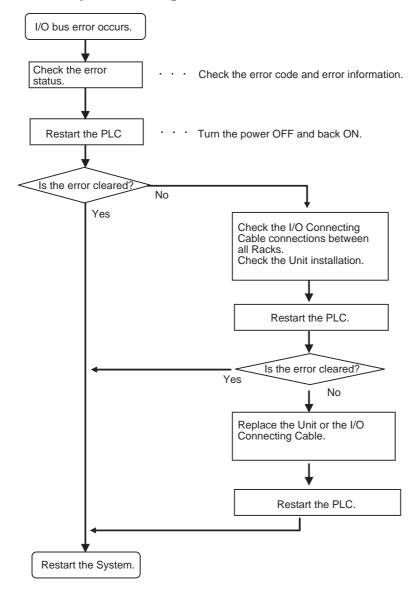
An I/O bus error will occur if there is an error in a data transfer between the CPU Unit and a Unit connected in the Rack.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Not lit.	Lit.	A401.10	80C0 to 80C7 or 80CF	A404*1

\*1 The numbers of the slot and Rack where the I/O bus error was detected are stored in word A404.



#### Recovery Processing Flow



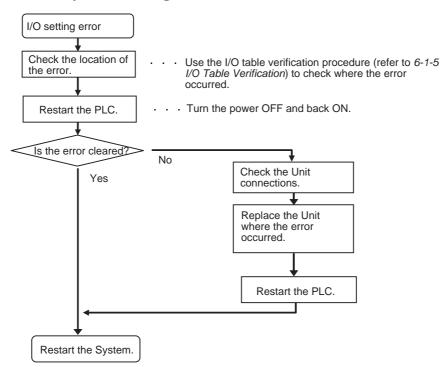
Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
The I/O Connecting Cable is disconnected.	Perform a visual inspection and pull on the Cables.	Reconnect the cables.	During operation, confirm that the connections are secure. Check for vibration or shock.
Equipment failure     CPU Unit     I/O Connecting Cable (damage to bus interface circuit)	An I/O bus error has possibly occurred in the following cases.  If the error is not cleared when the CPU Unit is restarted  If the error occurs frequently  If the condition improves when the Unit is replaced.	Replace the equipment.  CPU Unit  I/O Connecting Cable	
A conductive object has gotten inside.	Check for conductive objects.	Clean the inside of the Unit with an air blower or replace the CPU Unit.	Do not do any metal working in the vicinity of the control panel. Close the control panel.
Faulty connector contact (A foreign object has gotten inside.)	Check for foreign objects in the connector.	Replace the Unit or take off the connector and remove the foreign object.	Make sure that the operating environment is free of dirt and dust.
Noise     Data corruption in bus signals     Malfunctioning in bus interface circuit	When the CPU Unit is restarted after the recovery measures, the error will either be cleared or will continue to occur. Check whether errors become less frequent after the Unit is replaced.	Take measures against noise. (Investigate the path of entry.)  • FG  • Power lines  • I/O connecting cable (inductive noise)	Same as at the left.

### I/O Setting Error (Fatal Error)

An I/O setting error will occur if the Units that are actually connected do not match the Unit in the registered I/O tables.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Not lit.	Flashing.	A401.10	80E0	

#### Recovery Processing Flow



Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
Faulty connection at Unit (at a connector)	Check the insertion at the connector. Restart the Unit and check whether the error is cleared.	Tighten the screws.	Same as at the left.
Unit failure	If restarting the Unit does not clear the error, check whether the error is cleared by replacing the Unit.	Replace the applicable Unit.	Same as at the left.
Noise  • Data corruption in bus signals	Restart the CPU Unit and check whether the error continues to occur.	Take measures against noise. (Investigate the path of entry.)  • FG  • Power lines	Same as at the left.

### **Memory Error (Fatal Error)**

A memory error will occur if there is a memory error in the CPU Unit or if a checksum error is detected (checksum checked by the PLC with each cycle). The details of the cause of the error will be stored in the error information in the Auxiliary Area.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Not lit.	Lit.	A401.15	80F1	A403*1

<sup>\*1</sup> Individual bits in A403 indicate where the memory error occurred.

#### Recovery Measures

Check the detailed error contents in the error information in the Auxiliary Area, and then implement the following recovery measures. If these measures cannot solve the problem, there is a strong probability that the Unit has failed, so replace the Unit.

Error information	Error contents	Recovery measures
A403.00: ON	A checksum error has occurred in the user program memory.	Transfer the user program to the CPU Unit again.
A403.04: ON	A checksum error has occurred in the PLC Setup.	Transfer the PLC Setup to the CPU Unit again.
A403.05: ON	A checksum error has occurred in the registered I/O table.	Transfer the I/O tables to the CPU Unit again.
A403.07: ON	A checksum error has occurred in the routing tables.	Transfer the routing tables to the CPU Unit again.
A403.08: ON	A checksum error has occurred in the CPU Bus Unit setup.	Transfer the CPU Bus Unit setup again.



#### **Additional Information**

Checksums are used to detect illegal rewriting in a specific area of memory by calculating and comparing sums written to memory in advance to sums during operation. When a checksum error is detected by the CJ2H CPU Unit during operation, memory is automatically recovered by automatically reading data from flash memory. If recovery is not possible, an error occurs and operation stops.

The automatic recovery is valid only for the following areas where the checksum error detection can be employed.

- · User program memory
- PLC Setup
- Registered I/O table
- · Routing tables
- · CPU Bus Unit setup

The following areas cannot automatically be recovered:

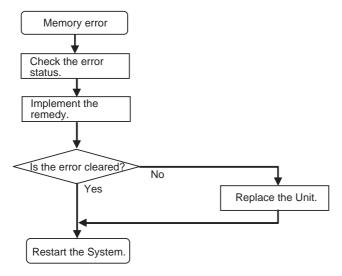
- I/O memory areas
- Source/Comment Memory
- Network variables (tags)

Use any of the following methods to transfer the data again.

- Use the CX-Programmer to download data.
- Use the automatic transfer at startup function to download data saved on a Memory Card. For details, refer to the CJ-series CJ2 CPU Unit Software User's Manual (Cat. No. W473).
- Use the simple backup function to download data saved on a Memory Card. For details, refer to 8-3 Simple Backup.

The CJ2 CPU Unit has built-in flash memory for backup. When the CPU Unit is restarted, data is transferred to memory for calculation and this sometimes enables an error to be cleared.

#### Recovery Processing Flow



#### • Error Causes and Remedies

If the measures described above do not clear the error, take the measures shown in the following table.

Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
Unit failure  • Memory element failure  • Memory peripheral circuit failure	A memory error has probably occurred in the following cases.  If the error is not cleared when the CPU Unit is restarted after the recovery measures  If the error occurs frequently  If the condition improves when the Unit is replaced.	Replace the CPU Unit.	Determined by the cause of the failure.
A conductive object has gotten inside.	Check for conductive objects.	Clean the inside of the Unit with an air blower or replace the CPU Unit.	Do not do any metal working in the vicinity of the control panel. Close the control panel.
Noise     Data corruption in memory     Microcomputer malfunctioning     Memory write circuit malfunctioning	When the CPU Unit is restarted after the recovery measures, the error will either be cleared or will continue to occur. Check whether errors become less frequent after the Unit is replaced.	Take measures against noise. (Investigate the path of entry.)  • FG  • Power lines	Same as at the left.
Software error*1	None	None	None

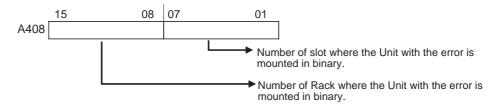
<sup>\*1</sup> This refers to errors caused by data corruption. SRAM is used for the CPU Unit user memory. SRAM is affected by cosmic rays (neutrons) and naturally occurring radiation, so data can become corrupted.

### Basic I/O Error (Non-fatal Error)

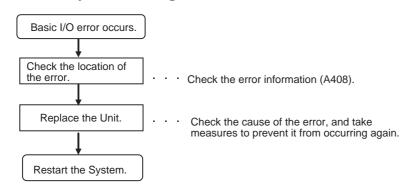
A basic I/O error occurs when there is an error at a Basic I/O Unit.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Lit.	Flashing.	A402.12	009A	A408*1

#### \*1 Error Information



### Recovery Processing Flow



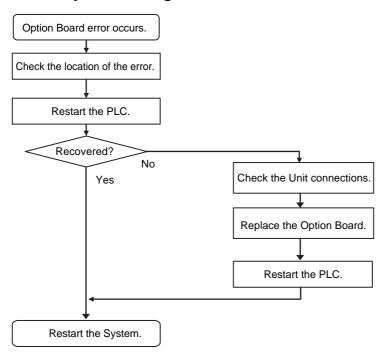
Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
A fuse is burned out.	Measure the voltage at the power supply terminals. Check whether 24 V is being supplied. (Check whether the problem is solved by replacing the fuse.)	Replace the fuse.	Check the maximum switching current.
The external power supply is OFF (disconnected).	Measure the voltage at the power supply terminals. Check whether 24 V is being supplied.	Turn ON the power supply.	Investigate the reason that the power was turned OFF.
Other errors specific to Units	Refer to the manual for the particular Unit.	Same as at the left.	Same as at the left.

### **Option Board Errors**

An Option Board error will occur if the Option Board is removed while the power is being supplied.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Lit.	Flashing.	A315.13	00D1	
			A402.00		

#### Recovery Processing Flow



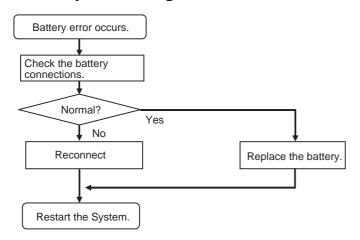
Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
The Option Board was removed while the system was operating.	Check the mating of the Option Board connector.	Reconnect.	Check for vibration and shock.
Option Board failure	If restarting does not clear the error, check whether the error is cleared by replacing the Option Board.	Replace the Option Board.	Same as at the left.

### Battery Error (Non-fatal Error)

A battery error occurs when the battery voltage drops.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Lit.	Flashing.	A402.04	00F7	

### Recovery Processing Flow



Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
A connector is disconnected.	Check the connection at the connector.	Reconnect the connector.	Check for vibration and shock.
Battery voltage is low.	Check whether the error is cleared by replacing the battery.	Replace the battery. For details, refer to 7-2 Replacing the Battery.	Periodically replace the battery.

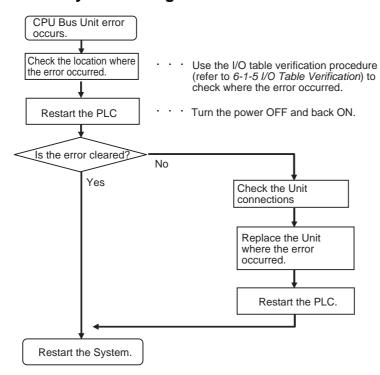
### **CPU Bus Unit Error (Non-fatal Error)**

A CPU Bus Unit error occurs when there is an error in the data conversion between the CPU Unit and a CPU Bus Unit.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Lit.	Flashing.	A402.07	0200 to 020F	A417*

<sup>\*</sup> The bit corresponding to the unit number where the error occurred turns ON. (Bits 00 to 15 correspond to unit numbers 0 to F.)

#### Recovery Processing Flow



Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
An error specific to the Unit	Refer to the manual for the particular Unit.	Same as at the left.	Same as at the left.
Faulty connection at Unit (at a connector)	Check the insertion at the connector. Restart the Unit and check whether the error is cleared.	Tighten the screws.	Check for vibration and shock.
Unit failure	If restarting the Unit does not clear the error, check whether the error is cleared by replacing the Unit.	Replace the applicable Unit.	Same as at the left.
Noise	Restart the CPU Unit and	Take measures against	Same as at the left.
<ul> <li>Data corruption in bus signals</li> </ul>	check whether the error occurs again.	noise. (Investigate the path of entry.)	
		• FG	
		Power lines	

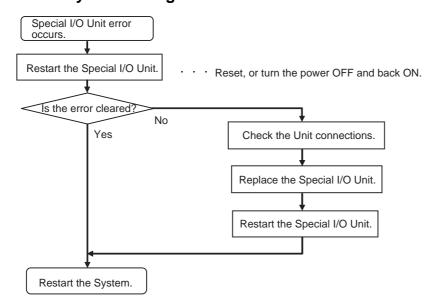
### Special I/O Unit Error (Non-fatal Error)

A Special I/O Unit error occurs when there is an error in the data conversion between the CPU Unit and a Special I/O Unit.

POWER	RUN	ERR/ALM	Error flag	Error code	Error information
Lit.	Lit.	Flashing.	A402.06	0300 to 035F or 03FF	A418 to A423 *

<sup>\*</sup> The bit corresponding to the unit number where the error occurred turns ON.

#### Recovery Processing Flow



Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
An error specific to the Unit	Refer to the manual for the particular Unit.	Same as at the left.	Same as at the left.
Faulty connection at Unit (at a connector)	Check the insertion at the connector. Restart the Unit and check whether the error is cleared.	Tighten the screws.	Check for vibration and shock.
Unit failure	If restarting the Unit does not clear the error, check whether the error is cleared by replacing the Unit.	Replace the applicable Unit.	Same as at the left.
Noise  • Data corruption in bus signals	Restart the CPU Unit and check whether the error occurs again after this.	Take measures against noise. (Investigate the path of entry.)  • FG  • Power lines	Same as at the left.

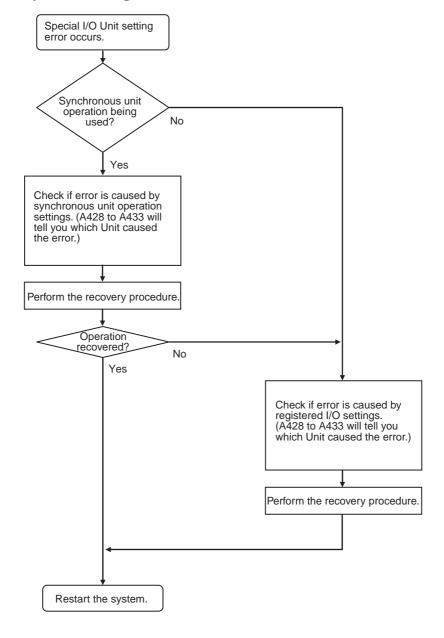
### Special I/O Unit Setting Error (Non-fatal Error)

A Special I/O Unit setting error will occur if a Unit registered in the registered I/O tables does not agree with the Unit actually connected in the PLC. A Special I/O Unit setting error will also occur if a Unit set as a Synchronous Unit in the synchronous operation parameter settings is not actually connected in the PLC or does not support synchronous unit operation.

POWER	RUN	ERR/ALM	Error flag	Error code	Error infor- mation
Lit.	Lit.	Flashing.	A402.02	0500 to 055F	A428 to A433*

<sup>\*</sup> The bit corresponding to the Unit for which the error occurred will turn ON.

### Recovery Processing Flow



### • Error Causes and Remedies for Synchronous Unit Operation Settings

Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
A Unit set in the synchro- nous unit operation set- tings does not support synchronous unit opera- tion.	Check the operation manual for the Unit.	Transfer the settings again.	Same as at the left.
A Unit set in the synchro- nous unit operation set- tings does not exist in the PLC.	Check the Units in the PLC.	Transfer the settings again.	Same as at the left.
A Unit set in the synchro- nous unit operation set-	Check the Units in the PLC.	Move the Synchronous Unit to the CPU Rack.	Same as at the left.
tings does not exist on the CPU Rack (i.e., it is on an Expansion Rack).		If I/O tables have been registered, change the registered I/O tables.	

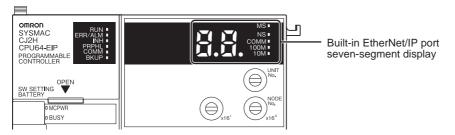
### • Error Causes and Remedies for Registered I/O Table Settings

Suspected cause of error	Confirmation method	Remedy	Prevention of recur- rence
The model of a CPU Bus Unit in the registered I/O tables is different from the model the Unit actually mounted in the PLC.	Check the Units in the PLC.	Correct the I/O table settings.	Same as at the left.

# 6-2 Troubleshooting Built-in EtherNet/IP Port Errors (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

### 6-2-1 Checking Built-in EtherNet/IP Port Error Status

Built-in EtherNet/IP port errors can be checked on the built-in EtherNet/IP port seven-segment display on the front of the CJ2H-CPU6□-EIP or CJ2M-CPU3□ CPU Unit.





#### **Precautions for Correct Use**

For details on the types of errors related to the built-in EtherNet/IP port, and measures for handling them, refer to the CS/CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465).

#### Checking Error Status at the EtherNet/IP Port Seven-segment 6-2-2 **Display**

Built-in EtherNet/IP port seven-segment display

The seven-segment display alternately displays the built-in EtherNet/IP port node address and the following error codes.



#### Normal Operation

Indications			Error
MS	NS	7-segment	EIIOI
Lit green	Lit or flashing green	Built-in Ether- Net/IP port node address	Normal

### • Errors Related to CPU Unit Data Exchange

	Indications		Error
MS	NS	7-segment	Ellor
Flashing red	Not lit	H1	Duplicate unit number
Flashing red	Not lit	H2	CPU Unit faulty
Lit red	Not lit	H3	Built-in EtherNet/IP port faulty
Flashing red	Not lit	H4	Node address setting error
Flashing red	Not lit	H6	CPU Unit faulty
Flashing red	Not lit	H7	I/O table not registered
Flashing red		H8	Simple backup function restore error
Flashing red		H9	I/O bus error
Flashing red		НА	CPU Unit memory error
Flashing red	Not lit	Hb	CPU Unit event servicing timeout
Flashing red		HC	Routing table error
Flashing red		Hd	I/O refresh error
Flashing red		HE	CPU Unit service monitoring error
Flashing red		HF	CPU Unit watchdog timer error

#### Errors Related to the CPU Unit

	Indications		Error	
MS	NS	7-segment	EIIOI	
Flashing red		НН	CPU Unit Fatal Error	
			Output OFF Error	

#### • Errors Related to the Control Bits

Indications			Error
MS	NS	7-segment	LIIOI
		C6	Multiple Switches ON

### • Errors Related to the Tag Data Links

Indications			Error	
MS	NS	7-segment	EIIOI	
		d5	Verification Error (target non-existent)	
		d6	Connection Failed	
		d9	Tag Data Link Error	

### • Errors Related to Memory Access

Indications			Error	
MS	NS	7-segment	EIIOI	
Flashing red		E9	Memory Access Error	
Flashing red		E8	Device Parameters Error	
Flashing red		EA	IP Advanced Settings Error	
Flashing red		F2	Ethernet Basic Settings Error	

#### Errors Related to the Network

Indications			Error	
MS	NS	7-segment	Elloi	
		E1	Ethernet Link Not Detected	
		E3	Server Connection Error	
	Lit red	F0	IP Address Duplication	
Flashing red		F3	Address mismatch	
Flashing red	Not lit	F4	Communications Controller Error	
Flashing red		C8	Node Address Setting Changed During Operation	

#### • Errors Related to Units

Indicator			Error
MS	NS	7-segment	Liloi
Lit red	Not lit		CPU Bus Unit Error

#### 6-3 **Non-CPU Unit Errors and Remedies**

#### 6-3-1 **Error Causes and Remedies**

### Input Units

No.	Symptom	Cause	Remedy
1	Not all inputs turn ON or indicators are not lit.	Power is not supplied to Input Unit.	Supply the appropriate external input power.
		Supply voltage is low.	Adjust supply voltage to within rated range.
		Terminal block mounting screws are loose.	Tighten screws.
		Faulty contact of terminal block connector.	Replace terminal block connector.
2	Not all inputs turn ON (indicator lit).	Input circuit is faulty.	Replace Unit.
3	Not all inputs turn OFF.	Input circuit is faulty.	Replace Unit.
4	Specific bit does not turn ON.	Input device is faulty.	Replace input devices.
		Input wiring disconnected.	Check input wiring
		Terminal block screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
		Too short ON time of external input.	Adjust input device.
		Faulty input circuit	Replace Unit.
		Input bit number is used for output instruction.	Correct program.
5	Specific bit does not turn OFF.	Input circuit is faulty.	Replace Unit.
		Input bit number is used for output instruction.	Correct program.
6	Input irregularly turns ON/OFF.	External input voltage is low or unstable.	Adjust external input voltage to within rated range.
		Malfunction due to noise.	Take protective measures against noise, such as:
			Install surge suppressor.
			Install insulation transformer.
			Install shielded cables between the Input Unit and the loads.
		Terminal block screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.

No.	Symptom	Cause	Remedy
7	Error occurs in units of 8 points or 16 points, i.e., for the same	Common terminal screws are loose.	Tighten screws.
	common.	Faulty terminal block connector contact.	Replace terminal block connector.
		Faulty data bus	Replace Unit.
		Faulty CPU	Replace CPU.
8	Input indicator is not lit in normal operation.	Faulty indicator or indicator circuit.	Replace Unit.

### **Output Units**

No.	Symptom	Cause	Remedy
1	Not all outputs turn ON.	Load is not supplied with power.	Supply power.
		Load voltage is low.	Adjust voltage to within rated range.
		Terminal block screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
		An overcurrent (possibly caused by a short at the load) resulted in a blown fuse in the Output Unit. (Some Output Units provide an indicator for blown fuses.)	Replace fuse.
		Faulty I/O bus connector contact.	Replace Unit.
		Output circuit is faulty.	Replace Unit.
		If the INH indicator is lit, the Output OFF Bit (A500.15) is ON.	Turn A500.15 OFF.
2	Not all outputs turn OFF.	Output circuit is faulty.	Replace Unit.
3	Output of a specific bit number does not turn ON or indicator is not lit.	Output ON time too short because of a mistake in programming.	Correct program to increase the time that the output is ON.
		Bit status controlled by multiple instructions.	Correct program so that each output bit is controlled by only one instruction.
		Faulty output circuit.	Replace Unit.
4	Output of a specific bit number does not turn ON (indicator lit).	Faulty output device.	Replace output device.
		Break in output wiring.	Check output wiring.
		Loose terminal block screws.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
		Faulty output bit on a Relay Output Unit.	Replace relay.
		Faulty output circuit.	Replace Unit.
5	Output of a specific bit number does not turn OFF (indicator is	Faulty output bit (Relay Output Units only)	Replace relay.
	not lit).	Bit does not turn OFF due to leakage current or residual voltage.	Replace external load or add dummy resistor.
6	Output of a specific bit number does not turn OFF (indicator lit).	Bit status controlled by multiple instructions.	Correct program.
		Faulty output circuit.	Replace Unit.

No.	Symptom	Cause	Remedy
7	Output irregularly turns ON/OFF.	Low or unstable load voltage.	Adjust load voltage to within rated range.
		Bit status controlled by multiple instructions.	Correct program so that each output bit is controlled by only one instruction.
		Malfunction due to noise.	Protective measures against noise:
			<ul> <li>Install surge suppressor.</li> <li>Install insulation transformer.</li> <li>Use shielded cables between the Output Unit and the loads.</li> </ul>
		Terminal block screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
8	Error occurs in units of 8 points	Loose common terminal screw.	Tighten screws.
	or 16 points, i.e., for the same common.	Faulty terminal block connector contact.	Replace terminal block connector.
		An overcurrent (possibly caused by a short at the load) resulted in a blown fuse in the Output Unit.	Replace fuse.
		Faulty data bus.	Replace Unit.
		Faulty CPU.	Replace CPU.
9	Output indicator is not lit (operation is normal).	Faulty indicator.	Replace Unit.
10	ERR indicator (load short-circuit alarm) lights and outputs turn OFF.	An external short-circuit or disconnection occurred.	Refer to A-6-1 Load Short-circuit Protection and Line Disconnec- tion Detection for CJ1W-OD202.

### Special I/O Units

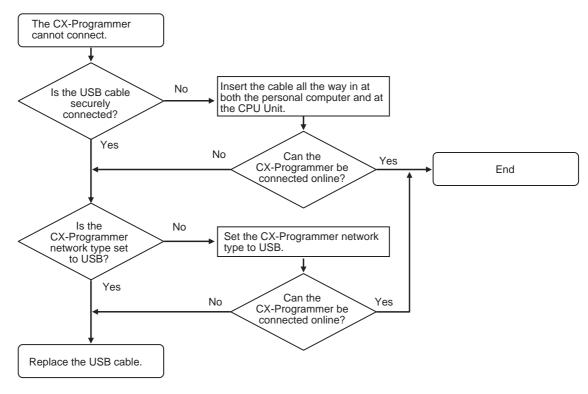
Refer to the Operation Manual for the Special I/O Unit to troubleshoot any other errors.

No.	Symptom	Cause	Remedy
1	The ERH and RUN indicators on the Special I/O Unit are lit.	Special I/O refreshing is not being performed for the Unit from the CPU Unit (CPU Unit monitoring error).	Change the bit corresponding to the unit number to 0 to enable cyclic refreshing, or make sure that the Unit is refreshed from the program using IORF or FIORF at least once every 11 s.

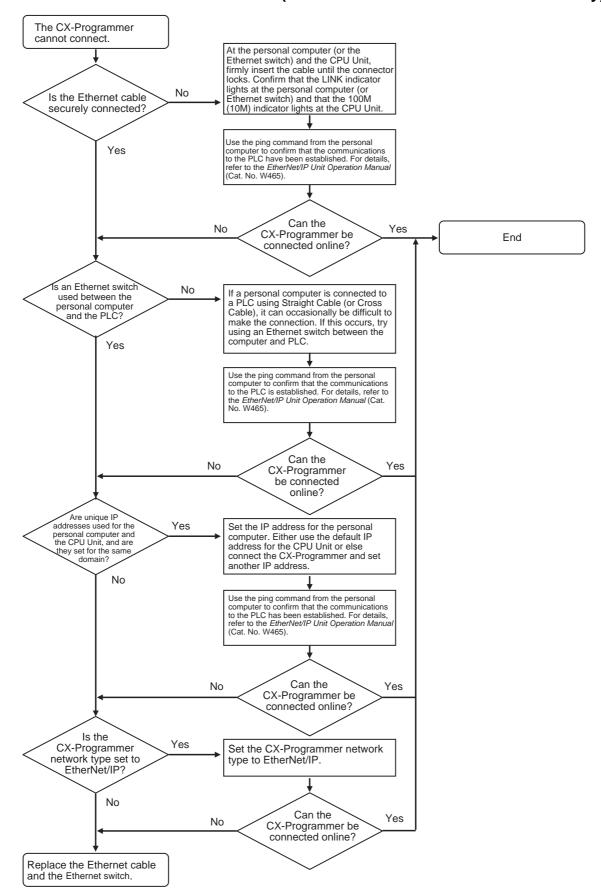
### **CX-Programmer Connections**

Use the following procedure if the CX-Programmer cannot be connected.

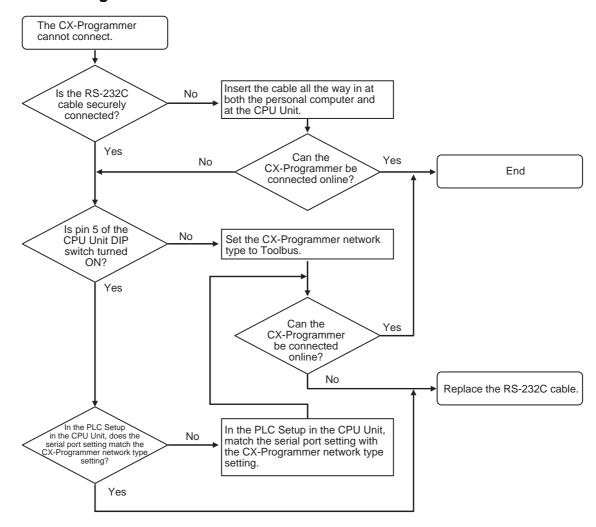
### Connecting via the Peripheral (USB) Port



#### ● Connection to the EtherNet/IP Port (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)



### Connecting via the Serial Port





## **Inspection and Maintenance**

This section describes the inspection and maintenance that is required for CJ2 PLCs.

7-1	Insped	ctions	
	7-1-1	Inspection Points	
	7-1-2	Unit Replacement Precautions 7-4	
7-2	Replacing the Battery		
	7-2-1	Battery Replacement	
	7-2-2	Operation When Battery Is Exhausted or Not Installed	
7-3	Power	Supply Unit Replacement Time	

#### 7-1 **Inspections**

Daily or periodic inspections are required in order to maintain the PLC's functions in peak operating condition.

#### 7-1-1 **Inspection Points**

Although the major components in CJ-series PLCs have an extremely long life time, they can deteriorate under improper environmental conditions. Periodic inspections are thus required to ensure that the required conditions are being kept.

Inspection is recommended at least once every six months to a year, but more frequent inspections will be necessary in adverse environments.

Take immediate steps to correct the situation if any of the conditions in the following table are not met.

### **Periodic Inspection Points**

No.	Item	Inspection	Criteria	Action
1	Source Power Supply	Check for voltage fluctuations at the power supply terminals.	The voltage must be within the allowable voltage fluctuation range.	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring voltage fluctuations within limits.
2	I/O Power Supply	Check for voltage fluctuations at the I/O terminals.	Voltages must be within specifications for each Unit.	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring voltage fluctuations within limits.
3	Ambient environment	Check the ambient tempera- ture. (Inside the control panel if the PLC is in a control panel.)	0 to 55°C	Use a thermometer to check the temperature and ensure that the ambient temperature remains within the allowed range of 0 to 55°C.
		Check the ambient humidity. (Inside the control panel if the PLC is in a control panel.)	Relative humidity must be 10% to 90% with no condensation.	Use a hygrometer to check the humidity and ensure that the ambient humidity remains between 10% and 90%. Make sure that condensation does not occur due to rapid changes in temperature.
		Check that the PLC is not in direct sunlight.	Not in direct sunlight	Protect the PLC if necessary.
		Check for accumulation of dirt, dust, salt, metal filings, etc.	No accumulation	Clean and protect the PLC if necessary.
		Check for water, oil, or chemical sprays hitting the PLC.	No spray on the PLC	Clean and protect the PLC if necessary.
		Check for corrosive or flam- mable gases in the area of the PLC.	No corrosive or flammable gases	Check by smell or use a sensor.
		Check the level of vibration or shock.	Vibration and shock must be within specifications.	Install cushioning or shock absorbing equipment if necessary.
		Check for noise sources near the PLC.	No significant noise sources	Either separate the PLC and noise source or protect the PLC.

No.	Item	Inspection	Criteria	Action
4	Installation and wiring	Check that each Unit is connected and locked to the next Unit securely.	No looseness	Press the connectors together completely and lock them with the sliders.
		Check that cable connectors are fully inserted and locked.	No looseness	Correct any improperly installed connectors.
		Check for loose screws in external wiring.	No looseness	Tighten loose screws with a Phillips-head screwdriver.
		Check crimp connectors in external wiring.	Adequate spacing between connectors	Check visually and adjust if necessary.
		Check for damaged external wiring cables.	No damage	Check visually and replace cables if necessary.
5	User-serviceable parts	Check whether the battery has reached its service life.  CJ1W-BAT01	Service life expectancy is 5 years at 25°C, less at higher temperatures.	Replace the battery when its service life has passed even if a battery error has not occurred.
			(From 0.75 to 5 years depending on model, power supply rate, and ambient temperature.)	(Battery life depends upon the model, the percentage of time in service, and ambient conditions.)

### Tools Required for Inspections

#### Required Tools

- Slotted and Phillips-head screwdrivers
- Voltage tester or digital voltmeter
- Industrial alcohol and clean cotton cloth

### • Tools Required Occasionally

- Oscilloscope
- Thermometer and hygrometer (humidity meter)

#### 7-1-2 **Unit Replacement Precautions**

Check the following after replacing any faulty Unit.

- Do not replace a Unit until the power is turned OFF.
- Check the new Unit to make sure that there are no errors.
- If a faulty Unit is being returned for repair, describe the problem in as much detail as possible, enclose this description with the Unit, and return the Unit to your OMRON representative.
- For poor contact, take a clean cotton cloth, soak the cloth in industrial alcohol, and carefully wipe the contacts clean. Be sure to remove any lint prior to remounting the Unit.



#### **Precautions for Correct Use**

- · When replacing a CPU Unit, be sure that not only the user program but also all other data required for operation is transferred to or set in the new CPU Unit before starting operation, including DM Area and HR Area settings. If data area and other data are not correct for the user program, unexpected accidents may occur.
- Be sure to include the routing tables, Controller Link Unit data link tables, network parameters, and other CPU Bus Unit data, which are stored as parameters in the CPU Unit. Be sure to set this data again after replacing the CPU Unit.
- Refer to the CPU Bus Unit and Special I/O Unit operation manuals for details on the data required by each Unit.



#### **Additional Information**

The simple backup operation can be used to store the user program and all parameters for the CJ2 CPU Unit, DeviceNet Units, Serial Communications Units, and other specific Units in a Memory Card as backup files. A Memory Card and the simple backup operation can be used to easily restore data after replacing any of these Units.

Refer to 8-3-6 Data Backed Up Using Simple Backup for details.

### 7-2 Replacing the Battery

The Battery in the CJ-series CPU Unit must be replaced periodically as preventative maintenance. (The Battery is a backup power supply for the CPU Unit's internal clock and RAM). This section describes how to replace the Battery.

### 7-2-1 Battery Replacement

### **Purpose of the Battery**

The Battery maintains the CPU Unit internal clock and the I/O memory data held in RAM while the main power supply is OFF. If the Battery is not installed or Battery voltage drops too low, the internal clock will stop and the I/O memory data that is held will be lost when the main power supply goes OFF.

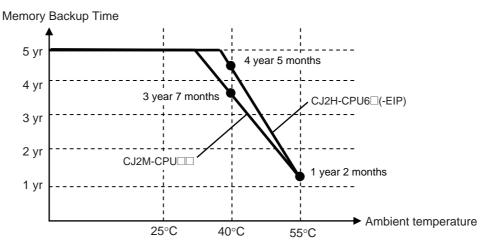
### **Battery Service Life and Replacement Period**

At 25°C, the maximum service life for batteries is five years whether or not power is supplied to the CPU Unit while the battery is installed. The battery's lifetime will be shorter when it is used at higher temperatures and when power is not supplied to the CPU Unit for long periods.

The following table shows the approximate minimum lifetimes and typical lifetimes for the backup battery (total time with power not supplied).

Model	Approx. maximum lifetime	Approx. minimum lifetime*1	Typical lifetime*1
CJ2H-CPU6□(-EIP) CJ2M-CPU□□	5 years	1 year 2 months	5 years

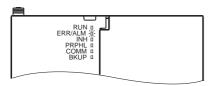
<sup>1</sup> The minimum lifetime is the memory backup time at an ambient temperature of 55°C. The typical lifetime is the memory backup time at an ambient temperature of 25°C.



7-5

### Low Battery Indicators

If the PLC Setup has been set to detect a low-battery error, the ERR/ALM indicator on the front of the CPU Unit will flash when the battery is nearly discharged.



If the Battery Error Flag (A402.04) is ON\*1, first check whether the Battery is properly connected to the CPU Unit. If the battery is properly connected, replace the battery as soon as possible.

Once a low-battery error has been detected, it will take 5 days (at an ambient temperature of 25°C\*2) before the battery fails assuming that power has been supplied at least once a day. Battery failure and the resulting loss of data in RAM can be delayed by ensuring that the CPU Unit power is not turned OFF until the battery has been replaced.

- The Battery Error Flag (A402.04) will turn ON only if the Detect Low Battery parameter in the PLC Setup has been set to detect a low-battery error. If this setting has not been made, battery errors will not be detected.
- \*2 The battery will discharge faster at higher temperatures, e.g., 4 days at 40°C and 2 days at 55°C.

#### Replacement Battery

Use the CJ1W-BAT01 Battery Set.



#### **Precautions for Correct Use**

Be sure to install a replacement battery within two years of the production date shown on the battery's label.

**Production Date** 



Manufactured in June 2008

### **Replacement Procedure**

Use the following procedure to replace the battery when the previous battery has become completely discharged.



#### **Precautions for Safe Use**

We recommend replacing the battery with the power OFF to prevent the CPU Unit's sensitive internal components from being damaged by static electricity. The battery can be replaced without turning OFF the power supply. To do so, always touch a grounded piece of metal to discharge static electricity from your body before starting the procedure.

After replacing the battery, connect a Programming Device and clear the battery error.

Turn OFF the power to the CPU Unit.

If the CPU Unit has not been ON, turn it ON for at least five minutes and then turn it OFF.

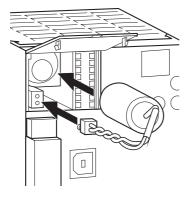


#### **Additional Information**

If power is not turned ON for at least five minutes before replacing the battery, the capacitor that backs up memory when the battery is removed will not be fully charged and memory may be lost before the new battery is inserted.

2

Open the compartment on the upper left of the CPU Unit and carefully draw out the battery.



- When inserting the battery, be sure to align the protrusion on the battery to the groove in the battery compartment.
   The groove position varies depending on the CPU Unit model.
  - CJ2H-CPU: upper rightCJ2M-CPU: lower right



#### **Precautions for Safe Use**

- You must complete this procedure within five minutes at 25°C after turning OFF the power to the CPU Unit to ensure memory backup. Data may be lost if more than five minutes is required.
- Never short-circuit the battery terminals; never charge the battery; never disassemble the battery; and never heat or incinerate the battery. Doing any of these may cause the battery to leak, burn, or rupturing resulting in injury, fire, and possible loss of life or property. Also, never use a battery that has been dropped on the floor or otherwise subject to shock. It may leak.
- UL standards require that batteries be replaced by experienced technicians. Always place an experienced technician in charge or battery replacement.
- Turn ON the power after replacing the battery for a CPU Unit that has been unused for a long time. Leaving the CPU Unit unused again without turning ON the power even once after the battery is replaced may result in a shorter battery life.



#### **Additional Information**

The battery error will be cleared automatically the next time the CPU Unit is turned ON after replacing the Battery.

#### 7-2-2 Operation When Battery Is Exhausted or Not Installed

The CJ-series PLCs can operate even when the Battery is exhausted or not installed.

### **Continuing Operation**

To have operation continue when the Battery is exhausted or not installed, set the parameter in the PLC Setup so that Battery errors are not detected.

### **Saving Data**

The user program and parameter area data are saved in flash memory even when the Battery is exhausted or not installed. I/O memory (such as the CIO Area), however, cannot be saved.

### Conditions for Operation

Operation is possible when the Battery is exhausted or not installed if the following two conditions both

- There is no need to save data in I/O memory.
- There is no need to use initial settings in the DM/EM Area, or the initial settings are made by the user program.



#### **Additional Information**

You can use the function for automatic transfer from the Memory Card at startup to store data in I/O memory and the DM/EM Area even when the Battery is exhausted or not installed.

The following table shows when the Battery is required according to the purpose of CPU Unit operation.

Saving I/O memory is required.			The Battery is required.
Saving to I/O memory is not required.	DM/EM Area ini- tial values are required at star- tup.	DM/EM Area initial values are set from the Memory Card.	Automatic transfer from the Memory Card at startup is set. (Pin 2 is set to ON.)
		DM/EM Area initial values are set from the user program.	Normal operation from flash memory or operation using the
	DM/EM Area initial values are not required at startup.		Memory Card is possible.

#### Restrictions

- The clock function cannot be used, so the values for the Calendar/Clock Area (A351 to A354) and the Startup Time (A510 to A511) in the Auxiliary Area will be unstable. In addition, the times at which the CPU Unit created files on the Memory Card will be unstable.
- The Total Power ON Time (A523), Power Interruption Time (A512 to A513), and Number of Power Interruptions (A514) in the Auxiliary Area will all be all zeros at startup.
- Error log data will not be held in the Error Log Area (A100 to A199) in the Auxiliary Area at startup.
- Correct values may not be held in I/O memory (including the HR, DM, and EM Areas) at startup. In the PLC Setup, set the IOM Hold Bit (A500.12) and the Forced Status Hold Bit (A500.13) to not be held at startup.

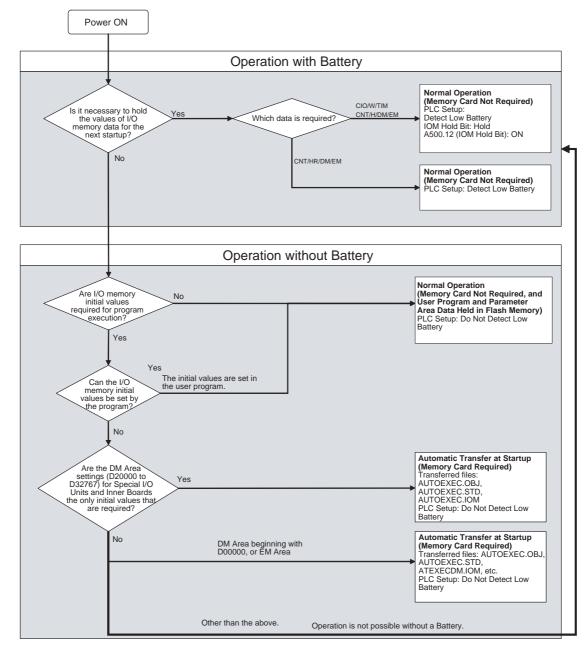
The value for the Output OFF Bit (A500.15) will become unstable. Moreover, when the Output OFF
Bit turns ON, the outputs of all Output Units will turn OFF. To prevent the outputs of all Output Units
from turning OFF at startup, take countermeasures such as writing the following program section into
the ladder program.



- Bank 0 will be the EM current bank at startup.
- Files will not be held in the EM file memory (EM data converted to flash memory) and the file memory function cannot be used. Make the EM file memory setting again in the PLC Setup, and format the EM file memory.

### **Setup Method**

The following flowchart shows the flow of setup operations for the CPU Unit.



### **Power Supply Unit Replacement** 7-3 Time

### Principle of Replacement Notification

The Power Supply Unit has a built-in electrolytic capacitor. The electrolytic capacitor is impregnated with electrolytic solution that starts to penetrate the sealing rubber from the time of manufacture. As time elapses, the internal electrolytic solution continues to evaporate, resulting in decreased electrostatic capacity and deterioration in other characteristics. Over time, the characteristic deterioration of the electrolytic capacitor prevents the Power Supply Unit from being utilized to its full capacity. In particular, the speed at which the electrolytic capacitor deteriorates fluctuates greatly with the ambient temperature (generally, a temperature rise of 10°C will double the rate of a reaction, as stated by Arrhenius' law).

The CJ1W-PA205C Power Supply Unit with Replacement Notification monitors the internal temperature of the Power Supply Unit while the power is turned ON, and calculates the level of deterioration of the electrolytic capacitor from the operating time and internal temperature. The replacement notification function displays the approximate time until the Power Supply Unit will stop functioning at its full capacity due to the characteristic deterioration of the electrolytic capacitor, based on the calculated level of deterioration. When 6 months are remaining until replacement is required, the alarm output will turn OFF.

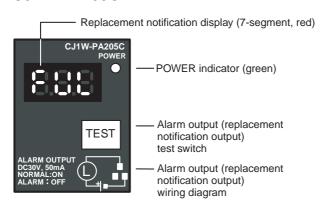
Note The replacement notification function provides an indication of when the deterioration of the electrolytic capacitor will prevent the power supply functioning at its full capacity. It does not provide information on failures occurring due to other causes.

### **Power Supply Unit with Replacement Notification**

Model	Specifications		
CJ1W-PA205C	100 to 240 VAC, Output capacity: 5 A at 5 VDC, 0.8 A at 24 VDC, total of 30 W		
	With replacement notification		

### **Power Supply Unit Replacement Notification Module**

#### CJ1W-PA205C

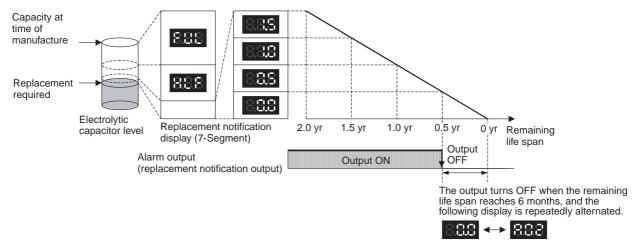


#### **Function**

#### Replacement Notification Function Displays

The replacement notification of the Power Supply Unit is shown using three 7-segment display characters.

- At time of purchase "FUL" is displayed. The display changes to "HLF" as the electrolytic capacitor deteriorates ("HLF" may not be displayed, depending on the operating environment).
- When the time until replacement is required drops below 2 years, the display will change corresponding to the operating time from "1.5" to "1.0" to "0.5" to "0.0"/"A02." When the remaining service life reaches 6 months or less, the display will alternate between "0.0" and "A02" in 2-second intervals.



Note 1 The time remaining until replacement does not include periods when the power is turned OFF.

- 2 Until approximately one month of operating time has accumulated, the display will always be "FUL" and the alarm output will remain ON (conducting) due to the estimated deterioration speed.
- **3** The time remaining until replacement will vary the operating and storage conditions, so periodically check the display.
- 4 Fluctuation in the time remaining until replacement may result in the alarm output repeatedly turning ON and OFF.
- **5** The precision of the replacement notification function will be adversely affected by applications in which the power is frequently turned ON and OFF.
- **6** Due to the service life of the electronic components, replace the Power Supply Unit approximately 15 years after purchase, even if the replacement notification display or output has not indicated that replacement is required.

#### Alarm Output (Replacement Notification Output)

The output remains ON until the remaining service life drops below 6 months and then turns OFF.

Note The alarm output will also turn OFF under the following conditions.

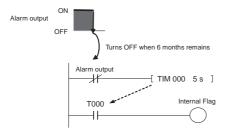
- The AC input to the Power Supply Unit is turned OFF.
- An error is detected by the self-diagnostic function.
- The TEST switch is pressed for at least 3 seconds.



#### **Additional Information**

Example of Using the Alarm Output:

Monitoring Power Supply Replacement Notification in the System (6 Months or Less Until Replacement Is Required)



The Flag is programmed to allow for the delay in the alarm output at system startup. The Flag does not turn ON when the alarm output is ON (normal operation). When the alarm output turns OFF (replacement required), the Flag turns ON, and the replacement notification can be monitored from the system.

#### Maintenance Function Using the TEST Switch

- Press the TEST switch for at least 3 seconds to display "A02" and force the alarm output OFF. Release the switch to return to normal operating status.
  - The TEST switch is used initially or periodically to check the connection status between the alarm output and external devices.
- Press the TEST switch for less than 3 seconds to display the unit version information for the Power Supply Unit.



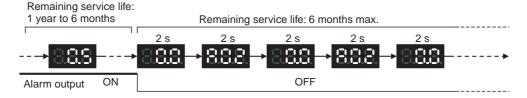
#### **Precautions for Correct Use**

- Replace the Power Supply Unit within 6 months when the display on the front panel of the Power Supply Unit alternates between 0.0 and A02 or the alarm output automatically turns
- Maintain an ambient storage temperature of -20 to 30°C and humidity of 25% to 70% when storing the product (with the power turned OFF) for longer than 3 months to keep the replacement notification function in optimum working condition. The replacement time is calculated from when the power is turned ON only. The precision of the replacement period will decline if the electrolytic capacitor deteriorates during storage.

### **Display and Alarm Output Operation**

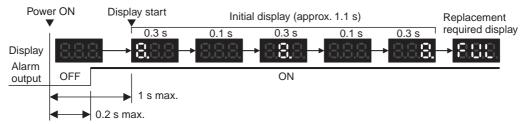
#### Normal Display: Replacement Notification Display

When 6 months or less are remaining until replacement is required, the display will alternate between "0.0" and "A02" (in 2 second intervals), and the alarm output will turn OFF.

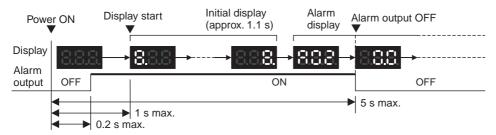


#### Operation When Turning ON the Power

The following initial display is shown when the power is turned ON, after which the replacement notification is displayed. The alarm output turns ON approximately 0.2 seconds after the power is turned ON.

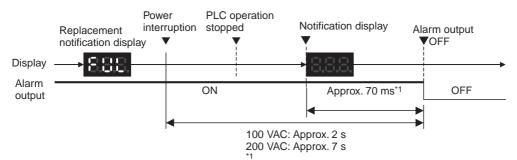


When replacement is already required, the alarm display will follow the initial display. The alarm output will turn ON approximately 0.2 seconds after the power is turned ON, and then turn OFF after approximately 5 seconds.



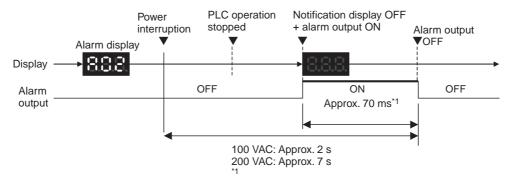
### Operation at Power OFF

When the power is turned OFF, the display will turn OFF after the PLC operation stops. The alarm output will turn OFF after the display turns OFF.



\*1 The values shown are reference values (calculated for a no-load status on the Power Supply Unit's output).

If replacement is already required, the display will turn OFF after the PLC operation stops. When the display turns OFF, the alarm output will turn ON momentarily and then turn OFF again.



\*1 The values shown are reference values (calculated for a no-load status on the Power Supply Unit's output).

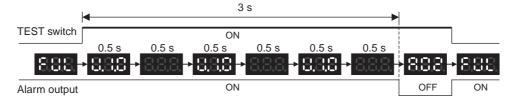
#### Operation When TEST Switch Is Pressed

The following operation will be performed when the TEST switch on the replacement notification function module is pressed. When the switch is pressed for less than 3 seconds, the unit version will be displayed 3 times at 0.5-second intervals. When the switch is pressed for at least 3 seconds, the alarm output will momentarily turn OFF, and the alarm display A02 will be shown. The operation will return to the normal display and output when the switch is released. Use the TEST switch to check the connection between the replacement notification output and devices.

Operation when TEST switch is pressed for less than 3 seconds.



Operation when TEST switch is pressed for less than 3 seconds.





#### **Precautions for Correct Use**

Under normal application conditions, the replacement notification function will operate after several years or even tens of years. When using a Power Supply Unit for an extended period of time, periodically check operation with the TEST switch as described above and be sure the alarm output functions properly.

#### Self-diagnostic Function

Error name	Display	Alarm out- put status	Error details (cause)	Recovery method
Unit overheated error	8.8.8	OFF	Internal overheating has occurred in the Power Supply Unit as a result of usage under conditions that exceed the specified values, insufficient venti- lation, or incorrect installation.*1	Remove the cause of the over-heating error.
Unit error	8.8.8	OFF	System error from external noise or hardware malfunction.	Turn ON the input's power supply again. If the Unit does not recover, the error may be caused by a Unit malfunction. Consult with your OMRON representative.

If the error continues for 3 hours or longer, the replacement notification function will be disabled. Even if the cause of the overheating is removed, the display will continue as "Hot," and the notification output will remain OFF. In this state, the internal parts may deteriorate even if the PLC operation is normal, so replace the Power Supply Unit.

### Comparison between the CJ1W-PA205C and CJ1W-PA205R

Item	CJ1W-PA205C	CJ1W-PA205R (for comparison)		
RUN contact output	Not supported	Supported		
Terminal block arrangement	CJ1W-PA205C  100 to 240 VAC INPUT  AC input  B  C  GR  NC -	CJ1W-PA205R  100 to 240 VAC		
Terminal block position	Located on the left side of the Unit.  CJ1W-PA205C POWER  AC100-240V NPPUT LL2N  AC100-240V NC — Workson Off	Located on the right side of the Unit.  PAZOGR  AC100-240V  AC240V  AC240V  AC240V  AC240V  Terminal block		
POWER indicator	On replacement notification module	On hood of Power Supply Unit		
Replacement notification	Supported (7-segment display + transistor outputs)	Not supported		



# **Backup Operations**

This section describes operations used to back up and restore data.

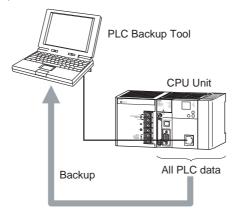
8-1	Backin	g Up Data	8-2
8-2	Using a	a Computer to Back Up Data	8-3
	8-2-1	PLC Backup Tool	8-3
	8-2-2	PLC Backup Tool Operations	8-4
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#### **Backing Up Data** 8-1

There are two methods for backing up PLC data.

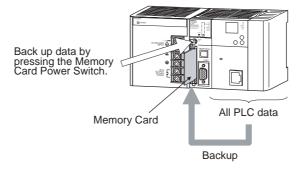
### Using a Computer to Back Up Data to the Computer

- Operation: PLC Backup Tool running on the personal computer
- · Backup destination: Computer hard disk



### Using Front-panel Switches on the CPU Unit to Back Up Data to a **Memory Card**

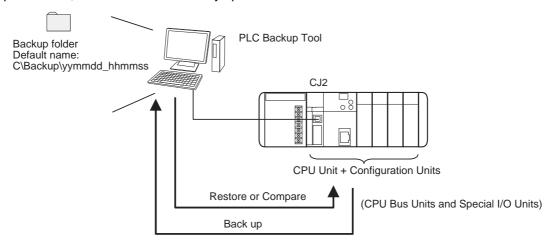
- Operation: DIP switch and Memory Card Power Switch
- · Backup destination: A Memory Card inserted in the CPU Unit



## 8-2 Using a Computer to Back Up Data

### 8-2-1 PLC Backup Tool

The PLC Backup Tool can be used to back up, compare, and restore data, such as programs and unit parameters, of all the Units or of only specified Units in a PLC that is connected online.



#### Applications

The PLC Backup Tool can be used for the following applications.

- · Backing up all of the data from the PLC
- Comparing all of the data in the PLC with the data backed up in the computer
- Transferring all of the data to a PLC that has the same system configuration as another PLC
- Transferring data to a Unit that has been replaced, e.g., when the Unit has failed

#### Applicable Units

Applicable Unit	Description
CPU Unit	CS/CJ/CP-series PLCs, all models and all versions
	Data in the following Units is not backed up:
	Screen data for an NSJ Controller
	SYSMAC SPU Unit data
	Customizable Counter Unit data
Special I/O Units and CPU Bus Units	Refer to the list of backup Units in the help files for the PLC Backup Tool.

#### Applicable Data

Applicable Unit	Description
CPU Unit	User program, symbols tables, rung comments, program index, parameters (PLC Setup, registered I/O tables, routing tables, Ethernet settings, and all other data in the initial setting areas), I/O memory, forced status (backup and comparison only), and EM file memory data (backup only)
Special I/O Units and CPU Bus Units	Parameter settings and data stored inside the Unit (e.g., programming created with Support Software)

#### Restrictions

The following restrictions apply.

- Forced Status
  - Forced status cannot be restored. If you attempt to restore forced status, the address of the forceset/reset bits will be displayed in the log display area. Use the CX-Programmer or Switch Box to manually force-set/reset the displayed bits.
- Data Stored in EM File Memory (Part of the EM Area Converted to File Memory) EM file memory cannot be compared or resorted. EM file memory backups are saved in the CPU\EM\_FILES Folder that will be created within the backup file destination folder. Restore EM file memory manually by using the PLC Memory Card Window in the CX-Programmer to write the data to memory.
- Restrictions in Comparing and Restoring I/O Memory The CIO Area and Auxiliary Area data in the I/O memory cannot be compared or restored.

#### 8-2-2 **PLC Backup Tool Operations**

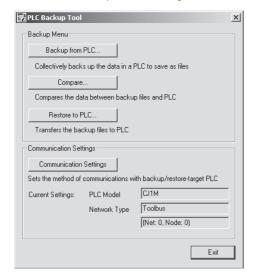
An overview of the PLC Backup Tool is provided below. For details on specific procedures and functions, refer to the CX-Programmer Operation Manual (Cat. No. W446).

#### Starting the PLC Backup Tool

Either of the following methods can be used to start the PLC Backup Tool.

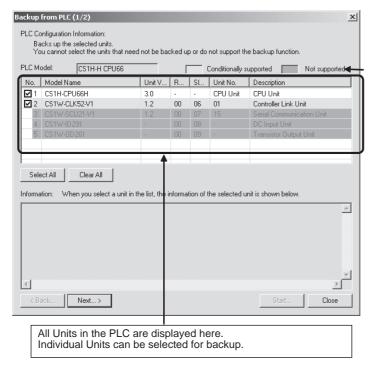
- Select PLC Backup Tool from the CX-Programmer Tools Menu.
- Select Programs OMRON- CX-One CX Programmer PLC Backup Tool from the Windows Start Menu.

The PLC Backup Tool Dialog Box will be displayed.



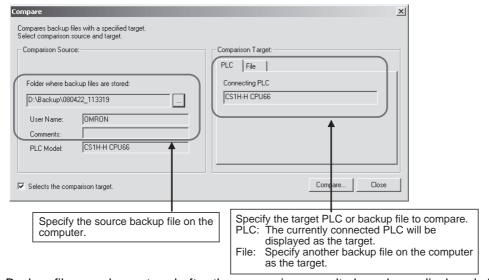
#### Backing Up Data

The data in the connected PLC can be backed up to the computer as a batch. A folder named with the date and time will be automatically created under the user-specified folder, and the backup files will be created in that folder.



#### Comparing Data

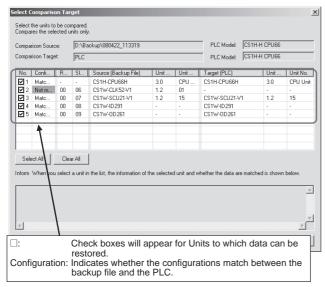
Data in backup files can be compared with data from other backup files or data from connected PLC. The comparison results will be displayed.



Backup files can be restored after the comparison results have been displayed. Also, the comparison results can be saved in a CSV file.

#### Restoring Data

PLC data can be restored to a previous state by transferring backup file data to a connected PLC. Before the data is restored, a comparison will be made automatically with the applicable PLC and the results will be displayed.



Before the data is restored, the contents of the data can be checked by starting the Support Software for that Unit.



#### **Precautions for Correct Use**

The CPU Unit will be changed to PROGRAM mode before restoring the data. This will stop operation. Be sure it is safe to stop CPU Unit operation before restoring the data.



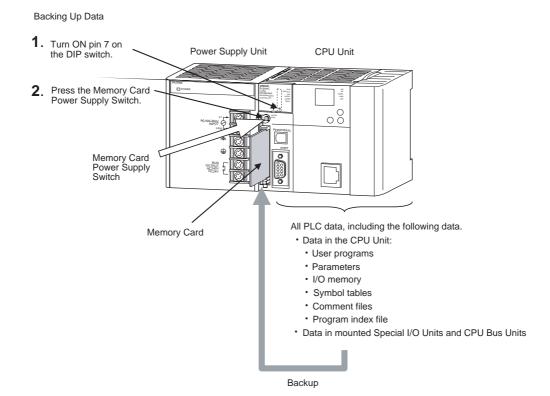
#### **Precautions for Safe Use**

- Sufficiently check the data that is selected for restoring before performing the next step. If the correct data is not restored, unexpected operation may occur in the controlled system after the
- Some Special I/O Units and CPU Bus Units operate with parameters that are stored in the CPU Unit. If one of these Units is selected for backup, restrictions will be displayed in the Comments Area of the Backup from PLC Dialog Box. Confirm the restrictions, and always select the Special I/O Unit or CPU Bus Unit together with the CPU Unit when backing up or restoring data. If the data from both Units is not backed up or restored together, unexpected operation may occur in the controlled system.
- If there are any backup restrictions for the Units to which data is being restored, the restrictions will be displayed in the Comments Area of the Backup from PLC Dialog Box. Confirm the restrictions, and always take the required measures. If required measures are not taken, unexpected operation may occur in the controlled system after the data is restored.
- Confirm that stopping PLC operation will not create any problems before restoring data during PLC operation. If the PLC stops at an unanticipated time, unexpected operation may occur in the controlled system.
- Always turn the power supply to the PLC OFF and then ON after restoring data. If the power supply is not turned OFF and then ON, memory in the PLC may not be updated to the restored data, which may cause unexpected operation of the controlled system.
- · Forced status can be backed up, but it cannot be restored. If you restored data that contained forced status, use the CX-Programmer after restoring the data to force-set or force-reset bits as required. If required bits are not force-set or force-reset, differences in the forced status in memory may cause unexpected operation of the controlled system.

## 8-3 Simple Backup

#### 8-3-1 Overview

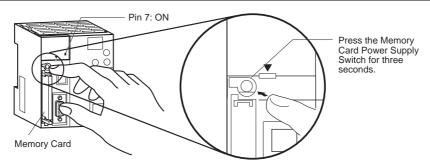
The simple backup operation can be used to back up all PLC data to a Memory Card, or to restore or compare the data, by using a simple DIP switch setting and the Memory Card Power Supply Switch. No Support Software is required.



Backup operation	DIP switch on front of CPU Unit	Procedure			
	Pin 7				
Backing up data to the Memory Card	ON	Press the Memory Card Power Supply Switch for three seconds.	The data can be backed up regardless of the CPU Unit operating mode.		
Restoring data from the Memory Card		Turn the PLC OFF and ON again. (Data restoration is given priority over the automatic transfer at startup.)	After the data has been restored, the operating mode will remain in PROGRAM mode until the PLC power is turned OFF.		
Comparing data to the Memory Card	OFF	Press the Memory Card Power Supply Switch for three seconds.	The data can be compared regardless of the CPU Unit operating mode.		

#### 8-3-2 **Operating Procedures**

### **Backing Up Data from the CPU Unit to the Memory Card**



- 1 Insert the Memory Card into the CPU Unit. The MCPWR indicator will light and the BUSY indicator will flash (meaning the Memory Card is being accessed) and then turn OFF.
- **2** Turn ON pin 7 on the CPU Unit's DIP switch.
- 3 Press the Memory Card Power Supply Switch for three seconds until the BUSY indicator lights, and then release the switch.
- **4** The PLC will start backing up data to the Memory Card. The MCPWR indicator will flash once and then light while the data is being written. At the same time the BUSY indicator will flash.
- The MCPWR and BUSY indicators will both turn OFF when the operation is completed normally.
- **6** Turn OFF pin 7 on the CPU Unit's DIP switch.

### Restoring Data from the Memory Card to the CPU Unit

- Turn OFF the PLC power supply.
- Insert the Memory Card containing the backup files into the CPU Unit.
- **3** Turn ON pin 7 on the CPU Unit's DIP switch.
- **4** Turn ON the PLC power supply.

The PLC will start restoring the data from the Memory Card. The MCPWR indicator will flash once and then light while the data is being read. At the same time the BUSY indicator will flash.

- **5** The MCPWR and BUSY indicators will both turn OFF when the operation is completed normally. If the MCPWR indicator flashes five times, or if only the BUSY signal turns OFF, it means that an error has occurred. (Refer to 8-3-3 Verifying Backup Operations with Indicators.)
- **6** Turn OFF pin 7 on the CPU Unit's DIP switch.

- **Note 1** The backup function will override the automatic transfer at startup function, so the backup files will be read to the CPU Unit when the PLC is turned ON even if pin 2 of the DIP switch is ON.
  - 2 Data will not be read from the Memory Card to the CPU Unit if pin 1 of the DIP switch is ON (write-protecting program memory).



#### **Additional Information**

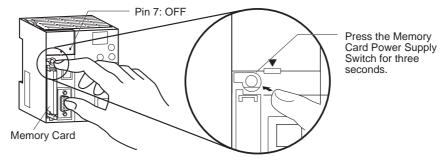
- When the backup files are read from the Memory Card by the backup function, the status of I/O memory and force-set/force-reset bits will be cleared unless the necessary settings are made in the Auxiliary Area and PLC Setup.
  - If the IOM Hold Bit (A500.12) is ON and the PLC Setup is set to maintain the IOM Hold Bit Status at Startup when the backup files are written, the status of I/O memory data will be maintained when data is read from the Memory Card.
  - If the Forced Status Hold Bit (A500.13) is ON and the PLC Setup is set to maintain the Forced Status Hold Bit Status at Startup when the backup files are written, the status of force-set and force-reset bits will be maintained when data is read from the Memory Card.
- After the simple backup operation has been used to restore data from the Memory Card to the PLC, the operating mode will remain in PROGRAM mode and cannot be changed to MONI-TOR or RUN mode until the PLC power is turned OFF. After restoring the data, turn OFF the power, change the setting of DIP switch pin 7, and then turn the power back ON.
- File backups may take from several seconds to several minutes. For information on execution times refer to 8-3-5 Time Required for Simple Backup.
- The simple backup is designed for transferring data between two systems with the same unit configuration. If a CPU Unit of a different model is used, there are cases where data cannot be transferred with the simple backup.

### **Comparing Data in the Memory Card and CPU Unit**

- 1 Insert the Memory Card containing the backup files into the CPU Unit.
  The MCPWR indicator will light and the BUSY indicator will flash and then turn OFF.
- **2** Turn OFF pin 7 on the CPU Unit's DIP switch.
- **3** Press the Memory Card Power Supply Switch for three seconds until the BUSY indicator lights, and then release the switch.

The PLC will start comparing the data in the PLC and the data in the backup file on the Memory Card. The MCPWR indicator will flash once and then light while the data is being written. At the same time the BUSY indicator will flash.

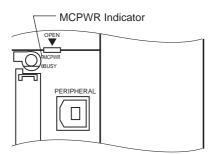
The MCPWR and BUSY indicators will both turn OFF if the data matches. If the MCPWR and BUSY indicators both flash, it means that the data does not match or that an error has occurred. (Refer to 8-3-3 Verifying Backup Operations with Indicators.)



**Note** If an error occurs during writing or comparison, the MCPWR indicator will flash. Press the power supply switch to stop the flashing and to turn ON the MCPWR indicator.

#### 8-3-3 **Verifying Backup Operations with Indicators**

The status of the Memory Card Power (MCPWR) indicator shows whether a simple backup operation has been completed normally or not.



Backup operation	Normal completion*1	Error occurred				
васкир орегалоп	MCPWR status	MCPWR status	Error			
Backing up data from the CPU Unit to the Memory Card	■ MCPWR Lit      ↓      Remains lit while the Memory Card Power Switch is pressed.      ↓      MCPWR Flashes once.      ↓      MCPWR Lit while writing.      ↓      MCPWR OFF after data is written.	Remains lit while the Memory Card Power Switch is pressed.  MCPWR Remains flashing.	The data was not backed up due to one of the following errors, and no backup file was created.  Insufficient Memory Card capacity  Memory error in CPU Unit  I/O bus error  Data was not read from the Unit to be backed up.			

5	Normal completion*1	Error occurred			
Backup operation	MCPWR status	MCPWR status	Error		
Restoring data from the Memory Card to the CPU Unit			The data was not restored due to one of the following causes.  Program in Memory Card exceeds CPU Unit capacity Required backup files do not exist in Memory Card. Program can't be written because it is write-protected (Pin 1 of the DIP switch is ON.) The EM file was not complete, i.e., a portion was missing. There are fewer CPU Unit EM banks than backup EM files.		
	read.		The I/O tables are not correct (e.g., the same unit number was set twice).		
		MCPWR Same as for normal completion. + Special I/O or CPU Bus Unit ERR indicator  HB 7-segment LED indicator Displayed as "H8"	A Unit was added to the configuration since the data was backed up.     The unit number settings for Special I/O Units or CPU Bus Units are not correct.		
		MCPWR Same as for normal completion.  HINEE Board READY indicator  Flashing	A Unit was added to the configuration since the data was backed up.		
Comparing data between the CPU Unit and the Memory Card	MCPWR Lit  ↓  Remains lit while the Memory Card Power Switch is pressed.  ↓  MCPWR Flashes once.  ↓  MCPWR Lit while comparing.  ↓  MCPWR OFF after data is compared.	MCPWR Lit  Remains lit while the Memory Card Power Switch is pressed.  MCPWR  Remains flashing.	The following comparison errors can occur:  • Memory error in CPU Unit*2  • Incorrect I/O tables (e.g., the same unit number set twice)  • Comparison results (of backup files on Memory Card and data in PLC) do not match.  • Required backup files do not exist in Memory Card.*2  • I/O bus error		

<sup>\*1</sup> When the backup operation is completed normally, power to the Memory Card will go OFF when the MCPWR indicator goes OFF. If the Memory Card will be used again, press the Memory Card Power Switch to supply power and execute the desired operation.

<sup>\*2</sup> The backup files for Units and Boards are also compared.

#### **Related Auxiliary Bits/Words** 8-3-4

Name	Address	Description
File Memory Operation Flag	A343.13	ON when any of the following are being performed. OFF when execution has been completed.
		Memory Card detection
		CMND instruction executed for local CPU Unit
		FREAD/FWRIT instructions
		Program replacement via special control bits
		Simple backup operation
		Wiring data to or verifying the contents of the Memory Card is not possible while this flag is ON.
EM File Memory Starting Bank	A344	When the CPU Unit starts reading from the Memory Card, it references this value. If the maximum EM bank number of the BKUPEM□.IOM files (maximum consecutive bank number counting from 0) matches the maximum bank number of the CPU Unit, the EM area will be formatted based on the value in this word. If the maximum EM bank numbers do not match, the EM Area will revert to its unformatted condition.

#### **Time Required for Simple Backup** 8-3-5

The following tables list the benchmark execution times for the simple backup operation. The execution time will depend on the Unit configuration, cycle time, and Memory Card. These times were measured under the following conditions:

CPU Unit Model: CJ2H-CPU6□-EIP

Configuration: CPU Unit only Operating mode: PROGRAM

Operating mode	Writing to Memory Card	Reading from Memory Card
User program: 120K steps, No network symbols (tags)	Approx. 7 s	Approx. 20 s
User program: 120K steps, 20,000 network symbols (tags)	Approx. 19 s	Approx. 68 s



#### **Additional Information**

The Units that are backed up for the simple backup operation are predetermined. You cannot specify which Units are backed up and which are not.

#### 8-3-6 Data Backed Up Using Simple Backup

The files and applicable data transferred between the Memory Card and CPU Unit using the simple backup operation are listed below. The file name is fixed as BACKUP ......

The files in the following tables with "Yes" in the "Required" column must be stored in the memory card when using the simple backup to restore the data from the memory card to the CPU Unit.

### **Program Files**

Contents	Backup	Restore	Compare	File name	Extension	Required
User program	Yes	Yes	Yes	BACKUP	.OBJ	Yes
<ul> <li>Network symbols*</li> </ul>						

CJ2H-CPU6□-EIP or CJ2M-CPU3□ only. Program files that include network symbols cannot be transferred to the CJ2H-CPU6□ or CJ2M-CPU1□. A Memory Card transfer error (fatal) will occur if an attempt is made to transfer such a file.

### Symbol Tables, Comments, and Program Index Files

Contents	Backup	Restore	Compare	File name	Extension	Required
Symbol table files	Yes	Yes	Yes	BKUPSYM	.SYM	No
Comment files				BKUPCMT	.CMT	No
Program index file				BKUPPRG	.IDX	No

### **Parameter Files**

Contents	Backup	Restore	Compare	File name	Extension	Required
PLC Setup	Yes	Yes	Yes	BACKUP	.STD	Yes
<ul> <li>PLC name</li> </ul>						
<ul> <li>Registered I/O tables</li> </ul>						
<ul> <li>Routing tables</li> </ul>						
<ul> <li>CPU Bus Unit setup</li> </ul>						
• Etc.						

### **Data**

There are five types of data files, as shown below, when the simple backup operation is used for backing up data (creating files) on the Memory Card or for restoring or comparing data from the Memory Card.

- BACKUP.IOM
- BKUPIOR.IOR
- BACKUPDM.IOM
- BKUPEM□.IOM
- BKUPEF□.IOM

These files are used exclusively for the simple backup operation. With the exception of BKUPIOR.IOR, they can all be manipulated from the CX-Programmer. (BKUPIOR.IOR files cannot be manipulated.)

1/0	I/O memory			Compara	File name	Evtonoion	Doguirod
Area	Addresses	Backup	Restore	Compare	riie name	Extension	Required
DM Area	D20000 to D32767	Yes	Yes	No	BACKUP	.IOM	Yes
CIO Area	CIO 0000 to CIO 6143	Yes		No	BAUPIOR	.IOR	Yes
	(Includes forced status.)		(See note 3.)				
Work Area	W000 to W511	Yes		No			
	(Includes forced status.)		(See note 3.)				
Holding Area	H000 to H511	Yes	Yes	No			
Auxiliary Area	A000 to A447, A10000 to A11135	Yes					
	A448 to A1472	Yes	Yes	No			
Timer Completion Flags and Timer PVs	T0000 to T4095	Yes	(See note 3.)	No			
Counter Completion Flags and Counter PVs	C0000 to C4095	Yes	Yes	No			

I/O r	Backup	Restore	Compare	File name	Extension	Required	
Area	Addresses	Баскир	Restore	Compare	File Hairie	Extension	Required
DM Area	D00000 to D19999	Yes	Yes	No	BACK- UPDM	.IOM	Yes
EM Area (See notes 1 and 2.)	E□_0 to E□_32767 (□: Bank No. 0 to 18 hex. The maximum bank number depends on the CPU Unit model.)	Yes	Yes	No	BKUPEM□	.IOM	No
EM Area (forced status) (See note 4.)	When bits are force- set/reset	Yes	Yes	No	BKUPEF□	.IOM	No

- Note 1 If the number of banks in the EM data on the Memory Card is less than the number of EM banks in the CPU Unit where the data is to be restored (e.g., if data backed up by the CJ2H-CPU64-EIP is to be restored at the CJ2H-CPU68-EIP), the amount of EM data on the Memory Card will be restored. On the other hand, if the number of banks in the EM data on the Memory Card is greater than the number of EM banks in the CPU Unit where the data is to be restored (e.g., if data backed up by the CJ2H-CPU68-EIP is to be restored at the CJ2H-CPU64-EIP), it will not be possible to restore the data.
  - 2 When the EM file memory function is used, the EM file memory will be restored only if the backup data is restored to a CPU Unit of the same model. If it is restored to a CPU Unit of a different model, the data will not function as EM file memory.
  - 3 The BKUPIOR.IOR file will be cleared when data is restored from the Memory Card at startup. If, however, the IOM Hold Bit (A500.12) is ON and the IOM Hold Bit Startup Hold Setting in the PLC Setup is set to hold the setting of the IOM Hold Bit, the CIO and Work Area data and Timer Completion Flags and PVs will be held without being cleared from the Memory Card at startup.
  - 4 If the Forced Status Hold Bit (A500.13) is ON and the Forced Status Hold Bit Startup Hold Setting in the PLC Setup is set to hold the setting of the Forced Status Hold Bit, the forced status will be held without being cleared when restored from the Memory Card at startup, to a CPU Unit of the same model. If the data is restored to a CPU Unit of a different model, the status will not be held.

### | Unit Backup Data

When CPU Bus or Special I/O Units that support the simple backup function are connected to the CPU Unit, the data in the CPU Bus or Special I/O Units will also be backed up by the simple backup operation. Data in the CPU Bus and Special I/O Units is backed up separately for each Unit.

Contents	Backup	Restore	Compare	File name	Extension	Required
Data in Unit with unit address □□ (The contents depend on the Unit.)	Yes	Yes	Yes	BACKUP	.PRM	Yes

Note If the file does not exist when restoring data from the Memory Card to I/O memory, an error will not occur at the CPU Unit but the data will not be restored to the CPU Bus or Special I/O Unit and an error will occur at the CPU Bus or Special I/O Unit. For details on errors that occur at a CPU Bus or Special I/O Unit, refer to the operation manual for the specific Unit.

Data in individual Units is saved to the Memory Card under the following file names.



Note The unit address is determined as follows:

- Built-in EtherNet/IP (CJ2H-CPU6□-EIP or CJ2M-CPU3□) or CPU Bus Unit: Unit number + 10 hex
- Special I/O Unit: Unit number + 20 hex

In order for data in a Unit to be backed up, that Unit must support the simple backup function. Refer to the operation manual for the specific Unit to check whether this function is supported.

Applicable Units	Model numbers	Data backed up for simple backup	Data capacity used in Memory Card
Serial Communications Units	CJ1W- SCU21/22/32/41/42 CJ1W- SCU21/31/41-V1	Protocol macro data (Including both standard system protocols and user-defined protocols from the flash memory in the Unit or Board)	129 Kbytes
FL-net Units	CJ1W-FLN22	Data link tables	1.3 Kbytes
DeviceNet Units	CJ1W-DRM21	Device parameters (all data in EEPROM in the Unit)  (Although this is the same data as is backed up from the Memory Card backup function supported by the Unit or the DeviceNet Configuration (Ver. 2.□), there is no file compatibility.)	7 Kbytes
CompoNet Units	CJ1W-CRM21	Registration tables     Software settings     Network parameters     Slave parameters	3.5 Kbytes
Motion Control Units	CJ1W-MCH71	<ul><li>Positioning data</li><li>System parameters</li><li>G-language programming</li></ul>	8,192 Kbytes
Position Control Units	CJ1W-NCF71(-MA)	Common parameters     Individual axis parameters	64 Kbytes
	CJ1W- NC113/133/213/233/ 413/433	<ul> <li>Axis parameters</li> <li>Sequence data</li> <li>Speed data</li> <li>Acceleration/deceleration time data</li> <li>Dual timer data</li> <li>Zone data</li> </ul>	7 Kbytes
	CJ1W- NC214/234/414/434	Common parameters     Axis parameters     Memory operation parameters     Memory operation data     Memory operation conditions data	220 Kbytes
	CJ1W- NC281/481/881/F81/ 482/882	<ul> <li>Common parameters</li> <li>Axis parameters</li> <li>Memory operation parameters</li> <li>Memory operation data</li> <li>Memory operation conditions data</li> <li>Communications parameters</li> </ul>	2,560 Kbytes
EtherNet/IP Unit	CJ1W-EIP21	Unit settings     Tag data link settings	459 Kbytes



#### **Precautions for Correct Use**

When using a simple backup file to restore data, use a CPU Unit of the same model as the backup source. If a CPU Unit of a different model is used, the following operations will result.

- If the number of EM banks for the simple backup file is greater than that of the CPU Unit where the data is to be restored, the data will not be restored.
- If the number of EM banks for the simple backup file is less than that of the CPU Unit where the data is to be restored, the data in the EM bank areas in the simple backup file will be restored, but forced status will not be restored. In addition, EM banks that are not in the simple backup file will retain their values from before the restoration.



# **Appendices**

The appendices provide Unit specifications, Unit dimensions, details on fatal and non-fatal errors, information on connecting to serial ports on the CPU Unit, the procedure for installing the USB driver on a personal computer, and information on load short-circuit protection and line disconnection detection.

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#### A-1-1 **Overview of Units**

### **Basic I/O Units**

### Basic Input Units

Type of Unit	Name	Specifications		Model	Page
Basic Input	DC Input Units	Terminal block, 12 to 24 VDC	8 inputs	CJ1W-ID201*1	A-5
Units		Terminal block, 24 VDC,	16 inputs	CJ1W-ID211	A-7
				CJ1W-ID212	A-8
		Fujitsu-compatible connector, 24 VDC	32 inputs	CJ1W-ID231	A-9
		MIL connector, 24 VDC	32 inputs	CJ1W-ID232	A-11
				CJ1W-ID233	A-13
		Fujitsu-compatible connector, 24 VDC	64 inputs	CJ1W-ID261	A-15
		MIL connector, 24 VDC	64 inputs	CJ1W-ID262	A-17
	AC Input Units	Terminal block, 200 to 240 VAC	8 inputs	CJ1W-IA201*1	A-19
		Terminal block, 100 to 120 VAC	16 inputs	CJ1W-IA111	A-20
	Interrupt Input Unit	Terminal block, 24 VDC	16 inputs	CJ1W-INT01	A-21
	Quick-response Input Unit	Terminal block, 24 VDC	16 inputs	CJ1W-IDP01	A-23

<sup>\*1</sup> Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O.

#### Basic Output Units

Type of Unit	Name		Specifications		Model	Page
Basic Out- put Units	Relay Output Units		Terminal block, 250 VAC/24 VDC, 2 A, 8 independent contacts	8 outputs	CJ1W-OC201*1	A-25
			Terminal block, 250 VAC/24 VDC, 2 A	16 outputs	CJ1W-OC211	A-26
	Triac Outp	out Unit	Terminal block, 250 VAC/24 VDC, 0.6 A	8 outputs	CJ1W-OA201*1	A-27
	Transis-	Sinking	Terminal block, 12 to 24 VDC, 2 A	8 outputs	CJ1W-OD201*1	A-28
	tor Out- put Units	outputs	Terminal block, 12 to 24 VDC, 0.5 A	8 outputs	CJ1W-OD203*1	A-29
			Terminal block, 12 to 24 VDC, 0.5 A	16 outputs	CJ1W-OD211	A-30
			Terminal block, 24 VDC, 0.5 A	16 outputs	CJ1W-OD213	A-31
			Fujitsu-compatible connector, 12 to 24 VDC, 0.5 A	32 outputs	CJ1W-OD231	A-32
			MIL connector, 12 to 24 VDC, 0.5 A	32 outputs	CJ1W-OD233	A-34
			MIL connector, 24 VDC, 0.5 A	32 outputs	CJ1W-OD234	A-36
			Fujitsu-compatible connector, 12 to 24 VDC, 0.3 A	64 outputs	CJ1W-OD261	A-38
			MIL connector, 12 to 24 VDC, 0.3 A	64 outputs	CJ1W-OD263	A-40
		Sourc- ing out-	Terminal block, 24 VDC, 2 A, load short-circuit protection, line disconnection detection	8 outputs	CJ1W-OD202*1	A-42
		puts	Terminal block, 24 VDC, 0.5 A, load short-circuit protection	8 outputs	CJ1W-OD204*1	A-44
			Terminal block, 24 VDC, 0.5 A, load short-circuit protection	16 outputs	CJ1W-OD212	A-45
			MIL connector, 24 VDC, 0.5 A, load short-circuit protection	32 outputs	CJ1W-OD232	A-46
			MIL connector, 12 to 24 VDC, 0.3 A	64 outputs	CJ1W-OD262	A-48

<sup>\*1</sup> Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O.

#### Basic Mixed I/O Units

Type of Unit	Name		Specifications		Model	Page
Mixed I/O	24-VDC	Sinking	Fujitsu-compatible connector	16 inputs	CJ1W-MD231	A-50
Units	Inputs/Transis-	output	Inputs: 24 VDC	16 outputs		
	tor Output Units		Outputs: 12 to 24 VDC, 0.5 A			
			MIL connector		CJ1W-MD233	A-52
			Inputs: 24 VDC			
			Outputs: 12 to 24 VDC, 0.5 A			
			Fujitsu-compatible connector	32 inputs	CJ1W-MD261	A-54
			Inputs: 24 VDC	32 outputs		
			Outputs: 12 to 24 VDC, 0.3 A			
			MIL connector		CJ1W-MD263	A-56
			Inputs: 24 VDC			
			Outputs: 12 to 24 VDC, 0.3 A			
		Sourcing	MIL connector	16 inputs	CJ1W-MD232	A-58
		output	Input: 24 VDC	16 outputs		
			Outputs: 24 VDC, 0.5 A, load short-circuit protection			
	TTL I/O Units	•	Inputs: 5 VDC	32 inputs	CJ1W-MD563	A-60
			Outputs: 5 VDC, 35 mA	32 outputs		
	Precautions on Contact Output Units					A-62
	Load short-circuit protection and line disconnection detection for CJ1W-OD202					A-159
	Load short-circuit	t protection f	or CJ1W-OD204/OD212/OD232/MD232			A-161

**Note** For details on the connectors included with the Unit, refer to the information provided under Accessories in the tables for *Basic I/O Units* in the following pages.

### **Reading Terminal Connection Diagrams**

- I/O terminals in terminal connection diagrams are shown as viewed from the front panel of the Unit.
- Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on all Units.
- A0 to A20 and B0 to B20 are printed on the Units.

### **Terminology**

#### External Power Supply

The "external power supply" refers to the power supply connected between the +V and COM terminals.

The "voltage" for the external power supplies refers to the operating load voltage ranges for the external power supplies.

The "current" for the external power supplies refers to the required current for the photocouplers and other components connected to the +V terminals in the drive circuits of the output transistors (OUT terminals) to operate.

The external power supply connected between the +V and COM terminals requires the current capacity calculated from the following equation:

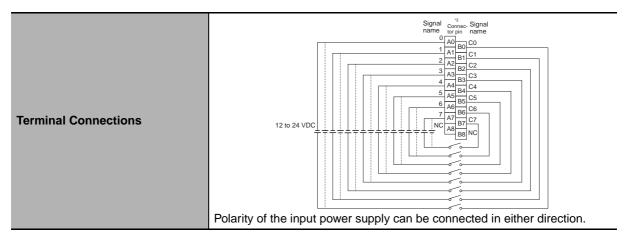
Current capacity = (Maximum load current) + (Consumption current in the drive circuit)

### A-1-2 Basic I/O Units

### **Basic Input Units with Terminal Blocks**

### • CJ1W-ID201 DC Input Unit (12 to 24-VDC, 8 Points)

Name	8-point DC Input Unit with Terminal Block			
Model	CJ1W-ID201			
Rated Input Voltage	12 to 24 VDC			
Rated Input Voltage Range	10.2 to 26.4 VDC			
Input Impedance	2.4 kΩ			
Input Current	10 mA typical (at 24 VDC)			
ON Voltage/ON Current	8.8 VDC min./3 mA min.			
OFF Voltage/OFF Current	3 VDC max./1 mA max.			
ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2			
OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2			
Number of Circuits	8 independent circuits			
Number of Simultaneously ON Points	100% simultaneously ON			
Insulation Resistance	$20~\text{M}\Omega$ between external terminals and the GR terminal (100 VDC)			
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.			
Internal Current Consumption	80 mA max.			
Weight	110 g max.			
Circuit Configuration	Signal name  2.4 kΩ  COM0 o  to  Input indicator  COM7 o  Lagrange A RQ  Input indicator  Input indicator			



- \*1 The ON response time will be 20  $\mu$ s maximum and OFF response time will be 400  $\mu$ s maximum even if the response time are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.
- \*3 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O.

#### • CJ1W-ID211 DC Input Unit (24 VDC, 16 Points)

Name	16-point DC Input Unit with Terminal Block
Model	CJ1W-ID211
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 VDC) 14.4 VDC min./3 mA min.
ON Voltage/ON Current	
OFF Voltage/OFF Current	5 VDC max./1 mA max.  8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input
ON Response Time	Response Time Settings under the PLC Setup)*1,*2
OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1,*2
Number of Circuits	16 (16 points/common, 1 circuit)
Number of Simultaneously ON Points	100% simultaneously ON (at 24 VDC) (Refer to the following illustration.)
Insulation Resistance	20 M $\Omega$ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	80 mA max.
Weight	110 g max.
Circuit Configuration	Signal name 3.3 kΩ 470 Ω  IN0 to 1000 pF 1000
Terminal Connections	Signal name torpin name  Signal name torpin name  Signal name torpin name    No

- \*1 The ON response time will be 20  $\mu s$  maximum and OFF response time will be 400  $\mu s$  maximum even if the response time are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.
- \*3 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

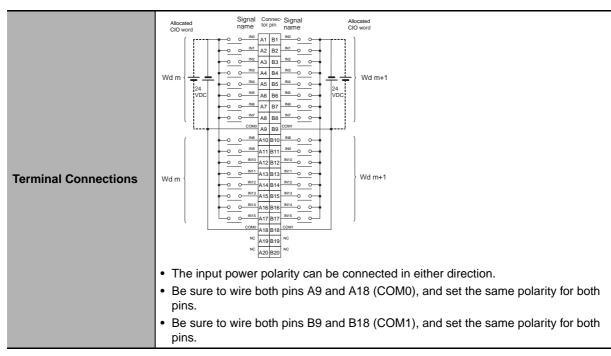
### • CJ1W-ID212 DC Input Unit (24 VDC, 16 Points)

Name	16-point DC Input Unit with Terminal Block				
Model	CJ1W-ID212				
Rated Input Voltage	24 VDC				
Rated Input Voltage Range	20.4 to 26.4 VDC				
Input Impedance	3.3 kΩ				
Input Current	7 mA typical (at 24 VDC)				
ON Voltage/ON Current	14.4 VDC min./3 mA min.				
OFF Voltage/OFF Current	5 VDC max./1 mA max.				
ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2				
OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2				
Number of Circuits	16 (16 points/common, 1 circuit)				
Number of Simultaneously ON Points	100% simultaneously ON (at 24 VDC) (Refer to the following illustration.)				
Insulation Resistance	20 $\text{M}\Omega$ between external terminals and the GR terminal (100 VDC)				
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.				
Internal Current Consumption	130 mA max.				
Weight	110 g max.				
Circuit Configuration	Signal name 3.3 kΩ 470 Ω  INO  INO  INO  INO  INO  IND  IND  IND				
Terminal Connections	Signal Connected in either direction.				

- \*1 The ON response time will be 15  $\mu$ s maximum and OFF response time will be 90  $\mu$ s maximum even if the response time are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.
- \*3 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

### • CJ1W-ID231 DC Input Unit (24 VDC, 32 Points)

Name	32-point DC Input Unit with Fujitsu Connector
Model	CJ1W-ID231
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1,*2
OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1,*2
Number of Circuits	32 (16 points/common, 2 circuits)
Number of Simulta- neously ON Points	75% (12 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustration.)
Insulation Resistance	$20~\text{M}\Omega$ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	70 g max.
Accessories	None
Circuit Configuration	Allocated CIO word name  Signal



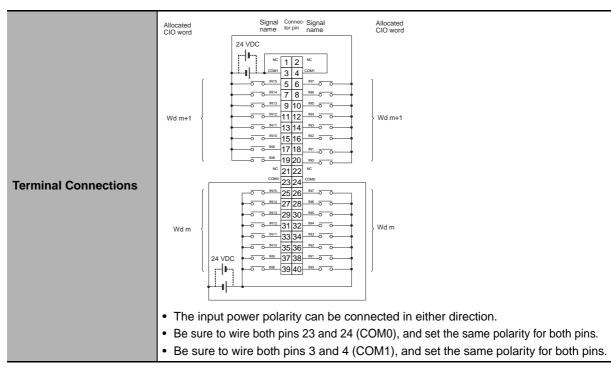
- \*1 The ON response time will be 20  $\mu$ s maximum and OFF response time will be 400  $\mu$ s maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

**Note** Observe the following restrictions when connecting to a 2-wire sensor.

- Make sure the input power supply voltage is larger than the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

### • CJ1W-ID232 DC Input Unit (24 VDC, 32 Points)

Name	32-point DC Input Unit with MIL Connector
Model	CJ1W-ID232
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1,*2
OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1,*2
Number of Circuits	32 (16 points/common, 2 circuits)
Number of Simulta- neously ON Points	75% (12 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustration.)
Insulation Resistance	20 M $\Omega$ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	70 g max.
Accessories	None
Circuit Configuration	Allocated CIO word name  Connect or row A  Connect or row B  Allocated Signal CIO word name  Signal CIO word n



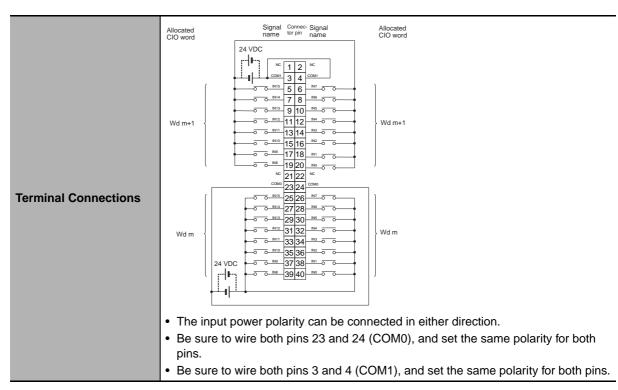
- \*1 The ON response time will be 20  $\mu$ s maximum and OFF response time will be 400  $\mu$ s maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

**Note** Observe the following restrictions when connecting to a 2-wire sensor.

- Make sure the input power supply voltage is larger than the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- · Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

### • CJ1W-ID233 DC Input Unit (24 VDC, 32 Points)

Name	32-point DC Input Unit with MIL Connector
Model	CJ1W-ID233
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1,*2
OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1,*2
Number of Circuits	32 (16 points/common, 2 circuits)
Number of Simulta- neously ON Points	75% (12 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustration.)
Insulation Resistance	20 M $\Omega$ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	200 mA max.
Weight	70 g max.
Accessories	None
Circuit Configuration	Allocated CIO word name  Connect or row A  Connect or row B  Allocated Signal CIO word name  Signal CIO word n



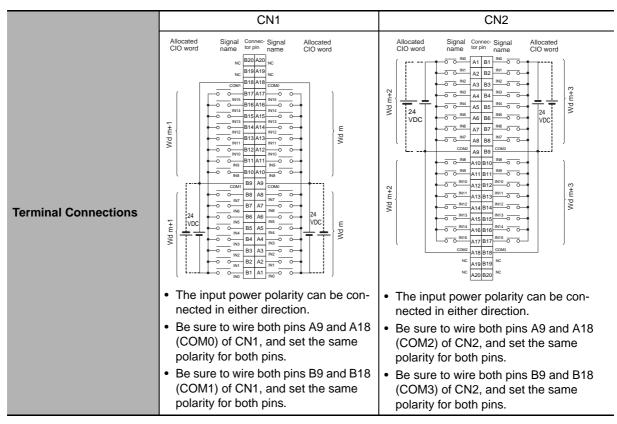
- \*1 The ON response time will be 15  $\mu$ s maximum and OFF response time will be 90  $\mu$ s maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

**Note** Observe the following restrictions when connecting to a 2-wire sensor.

- Make sure the input power supply voltage is larger than the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

### • CJ1W-ID261 DC Input Unit (24 VDC, 64 Points)

Name	64-point DC Input Unit with Fujitsu Connector
Model	CJ1W-ID261
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2
OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2
Number of Circuits	64 (16 points/common, 4 circuits)
Number of Simulta- neously ON Points	50% (16 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustrations.)
Insulation Resistance	$20~\text{M}\Omega$ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	110 g max.
Accessories	None
Circuit Configuration	Allocated Signal CIO word name CIO word name COMMO CONNECT Or row B  CONNECT Or row B  CONNECT



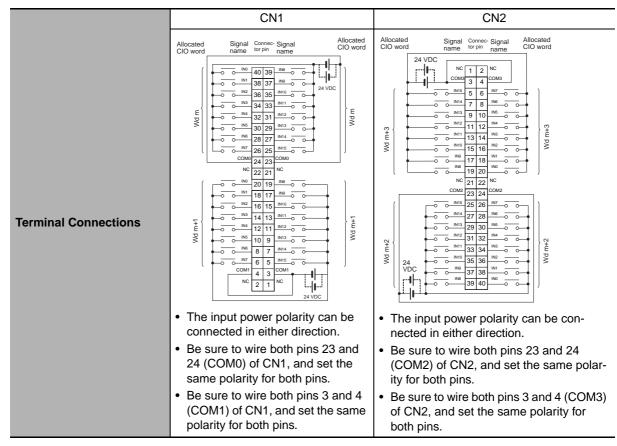
- \*1 The ON response time will be 120 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

**Note** Observe the following restrictions when connecting to a 2-wire sensor.

- Make sure the input power supply voltage is larger than the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

### • CJ1W-ID262 DC Input Unit (24 VDC, 64 Points)

Name	64-point DC Input Unit with MIL Connector
Model	CJ1W-ID262
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2
OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2
Number of Circuits	64 (16 points/common, 4 circuits)
Number of Simulta- neously ON Points	50% (8 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustrations.)
Insulation Resistance	20 $M\Omega$ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	110 g max.
Accessories	None
Circuit Configuration	Allocated CIO word Indicator Signal and INO Wd m 1 No



<sup>\*1</sup> The ON response time will be 120 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

**Note** Observe the following restrictions when connecting to a 2-wire sensor.

- Make sure the input power supply voltage is larger than the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- · Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

<sup>\*2</sup> The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

#### • CJ1W-IA201 AC Input Unit (200 VAC, 8 Points)

Name	8-point AC Input Unit with Terminal Block
Model	CJ1W-IA201
Rated Input Voltage	200 to 240 VAC 50/60 Hz
Rated Input Voltage Range	170 to 264 VAC
Input Impedance	21 kΩ (50 Hz), 18 kΩ (60 Hz)
Input Current	9 mA typical (at 200 VAC, 50 Hz),
input Current	11 mA typical (at 200 VAC, 60 Hz)
ON Voltage/ON Current	120 VAC min./4 mA min.
OFF Voltage/OFF Current	40 VAC max./2 mA max.
ON Response Time	18.0 ms max. (PLC Setup default setting: 8 ms)*1
OFF Response Time	48.0 ms max. (PLC Setup default setting: 8 ms)*1
Number of Circuits	8 (8 points/common, 1 circuit)
<b>Number of Simultaneously ON Points</b>	100% (8 points/common) simultaneously ON
Insulation Resistance	20 $M\Omega$ between external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	80 mA max.
Weight	130 g max.
Accessories	None
Circuit Configuration	Signal name  820 Ω 1 MΩ  INO  INO  O  O  O  O  O  O  O  O  O  O  O  O
Terminal Connections	Connector pin Signal name  NC A0 B0 IN0 O O O O O O O O O O O O O O O O O O O

<sup>\*1</sup> The Input ON and OFF response times for Basic I/O Units can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup. When the response times have been set to 0 ms, the ON response time will be 10 ms maximum and the OFF response time will be 40 ms maximum due to internal element delays.

<sup>\*2</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

#### • CJ1W-IA111 AC Input Unit (100 VAC, 16 points)

Name	16-point AC Input Unit with Terminal Block
Model	CJ1W-IA111
Rated input voltage	100 to 120 VAC 50/60 Hz <sup>*2</sup>
Rated Input Voltage Range	85 to 132 VAC
Input Impedance	14.5 kΩ (50 Hz), 12 kΩ (60 Hz)
Input Current	7 mA typical (at 100 VAC, 50 Hz),
input current	8 mA typical (at 100 VAC, 60 Hz)
ON Voltage/ON Current	70 VAC min./4 mA min
OFF Voltage/OFF Current	20 VAC max./2 mA max
ON Response Time	18 ms max. (PLC Setup default setting: 8 ms)*1
OFF Response Time	48 ms max. (PLC Setup default setting: 8 ms) <sup>*1</sup>
Number of Circuits	16 (16 points/common, 1 circuit)
Number of Inputs ON Simultaneously	100% simultaneously ON (16 points/common)
Insulation Resistance	20 M $Ω$ between external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	130 g max.
Accessories	None
Circuit Layout	Signal name Input indicator In
Terminal Connections	Signal connectorpin Signal name Signal nam

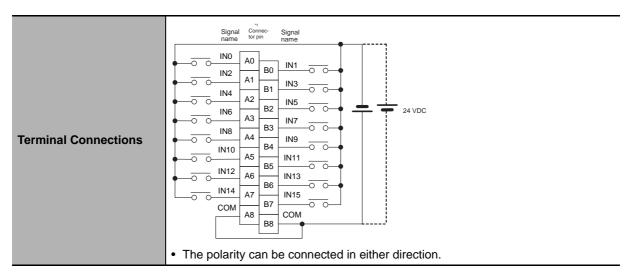
<sup>\*1</sup> The Input ON and OFF response times for Basic I/O Units can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup. When the response times have been set to 0 ms, the ON response time will be 10 ms maximum and the OFF response time will be 40 ms maximum due to internal element delays.

<sup>\*2</sup> Use an input voltage of 90 VAC or higher when connecting 2-wire sensors.

<sup>\*3</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

## • CJ1W-INT01 Interrupt Input Unit (16 Points)

Name	AC a sint later must be set their with Towning I Dist	
Name	16-point Interrupt Input Unit with Terminal Block	
Model	CJ1W-INT01	
Rated Input Voltage	24 VDC	
Rated Input Voltage Range	20.4 to 26.4 VDC	
Input Impedance	3.3 kΩ	
Input Current	7 mA typical (at 24 VDC)	
ON Voltage/ON Current	14.4 VDC min./3 mA min.	
OFF Voltage/OFF Current	5 VDC max./1 mA max.	
ON Response Time	0.05 ms max.	
OFF Response Time	0.5 ms max.	
Number of Circuits	16 (16 points/common, 1 circuit)	
Number of Simulta- neously ON Points	100% (16 points/common) simultaneously ON (24 VDC)	
Insulation Resistance	20 $M\Omega$ between external terminals and GR terminal (at 100 VDC)	
Dielectric Strength	1,000 VAC between external terminals and GR terminal for 1 minute at a leakage current of 10 mA max.	
Internal Current Consumption	80 mA max.	
Weight	110 g max.	
Accessories	None	
Circuit Configuration	<ul> <li>Up to two Interrupt Input Units can be mounted to the CPU Rack, but they must be connected as one the five Unit. If an Interrupt Input Unit is connected in any other position, an I/O setting error will occur.</li> <li>Set the pulse width of signals input to the Interrupt Input Unit so they satisfy the following conditions.</li> </ul> <li>*1 With the CJ2JH-CPU6□-EIP CPU Units, the Unit must be mounted as one of the four Units immediately next to the CPU Unit.</li>	



<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

# • CJ1W-IDP01 Quick-response Input Unit (16 Points)

Name	16-point Quick-response Input Unit with Terminal Block
Model	CJ1W-IDP01
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 VDC)
ON Voltage/ON Current	14.4 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	0.05 ms max.
OFF Response Time	0.5 ms max.
Number of Circuits	16 (16 points/common, 1 circuit)
Number of Simultaneously ON Points	100% (16 points/common) simultaneously ON (24 VDC)
Insulation Resistance	20 MΩ between external terminals and GR terminal (at 100 VDC)
Dielectric Strength	1,000 VAC between external terminals and GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	80 mA max.
Weight	110 g max.
Accessories	None
Circuit Configuration	Number of simultaneously ON points Ambient temperature characteristics  Number of simultaneously ON points Ambient temperature characteristics  18 9 10 10 11 12 12 15 18 18 18 18 18 19 10 10 10 10 10 10 10 10 10 10 10 10 10
Terminal Connections	Signal Connected in either direction.  Signal Connected in either direction.

- With quick-response inputs, pulse inputs shorter than the CPU Unit's cycle time can be read by the CPU Unit.
- The pulse width (ON time) that can be read by the Quick-response Input Unit is 0.05 ms.
- Inputs read by the internal circuits are cleared when inputs are refreshed.
- \*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

# **Basic Output Units**

### • CJ1W-OC201 Contact Output Unit (Independent Relays, 8 Points)

Name	8-point Contact Output Unit with Terminal Block (Independent Relays)
Model	CJ1W-OC201
Max. Switching Capacity	2 A 250 VAC (cosφ = 1), 2 A 250 VAC (cosφ = 0.4), 2 A 24 VDC (16 A/Unit)
Min. Switching Capacity	1 mA 5 VDC
Relays	NY-24W-K-IE (Fujitsu Takamizawa Components, Ltd.), Cannot be replaced.
Service Life of Relay	Electrical: 150,000 operations (24 VDC, resistive load)/100,000 operations (240 VAC, $\cos\phi = 0.4$ , inductive load)  Mechanical: 20,000,000 operations  Service life will vary depending on the connected load. Refer to page
	A-62 for information on service life according to the load.
ON Response Time	15 ms max.
OFF Response Time	15 ms max.
Number of Circuits	8 independent contacts
Insulation Resistance	20 $\mathrm{M}\Omega$ between external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA 5 VDC max. 48 mA 24 VDC max. (6 mA × No. of ON points)
Weight	140 g max.
Circuit Configuration	Signal name OUT OUTC Output indicator
Terminal Connections	Signal Connected in either direction.  Signal Connected in either direction.

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

### • CJ1W-OC211 Contact Output Unit (16 Points)

Name	16-point Contact Output Unit with Terminal Block
Model	CJ1W-OC211
Max. Switching Capacity	$2 A 250 VAC (\cos \phi = 1), 2 A 250 VAC (\cos \phi = 0.4), 2 A 24 VDC (8 A/Unit)$
Min. Switching Capacity	1 mA 5 VDC
Relays	NY-24W-K-IE (Fujitsu Takamizawa Components, Ltd.), Cannot be replaced.
	Electrical: 150,000 operations (24 VDC, resistive load)/ 100,000 operations (240 VAC, $\cos\phi$ = 0.4, inductive load)
Service Life of Relay	Mechanical: 20,000,000 operations
	Service life will vary depending on the connected load. Refer to page A-62 for information on service life according to the load.
ON Response Time	15 ms max.
OFF Response Time	15 ms max.
Number of Circuits	16 points/common, 1 circuit
Insulation Resistance	20 ${\rm M}\Omega$ between external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	110 mA 5 VDC max. 96 mA 24 VDC max. (6 mA × No. of ON points)
Weight	170 g max.
Circuit Configuration	Signal name OUTO to OUT15  COM COM
Terminal Connections	Signal name   Connector pin   Signal name   Signal name

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

### • CJ1W-OA201 Triac Output Unit (8 Points)

Name	8-point Triac Output Unit with Terminal Block
Model	CJ1W-OA201
Max. Switching Capacity	0.6 A 250 VAC, 50/60 Hz (2.4 A/Unit)
Max. Inrush Current	15 A (pulse width: 10 ms max.)
Min. Switching Capacity	50 mA 75 VAC
Leakage Current	1.5 mA (200 VAC) max.
Residual Voltage	1.6 VAC max.
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency + 1 ms or less.
Number of Circuits	8 (8 points/common, 1 circuit)
Surge Protector	C.R Absorber + Surge Absorber
Fuses	5 A (1/common, 1 used) The fuse cannot be replaced by the user.
Insulation Resistance	20 M $\Omega$ between the external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	220 mA max.
Weight	150 g max.
Circuit Configuration	Signal name OUTO to OUTO to COM Fuse
Terminal Connections	Connector pin Signal name  NC A0 B0 OUT0 L  NC A1 B1 OUT1 L  NC A2 B2 OUT2 L  NC A3 B3 OUT4 L  NC A5 B5 OUT6 L  NC A7 B7 OUT7 L  NC A8 B8

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

#### • CJ1W-OD201 Transistor Output Unit (8 Points)

Name	8-point Transistor Output Unit with Terminal Block (Sinking Outputs)
Model	CJ1W-OD201
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	2.0 A/point, 8.0 A/Unit
Maximum Inrush Current	10 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (4 points/common, 2 circuits)
Internal Current Consumption	90 mA max.
Fuse	6.3 A (1/common, 2 used)
ruse	The fuse cannot be replaced by the user.
External Power Supply	12 to 24 VDC, 10 mA min.
Weight	110 g max.
Circuit Configuration	Signal name  +V  OUT0 to OUT3  Fuse  OUT4 to OUT7  Fuse COM1
Terminal Connections	Signal conec Signal name to pin name  OUTO AO BO OUT1 L OUT2 A1 B1 NC  A2 B2 +V  NC A4 B4 OUT5 L OUT4 A5 B5 OUT7 L  NC COM1 A8 B8 +V  • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

#### • CJ1W-OD203 Transistor Output Unit (8 Points)

Name	8-point Transistor Output Unit with Terminal Block (Sinking Outputs)
Model	CJ1W-OD203
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.5 A/point, 4.0 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (8 points/common, 1 circuit)
Internal Current Consumption	100 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 VDC, 20 mA min.
Weight	110 g max.
Circuit Configuration	Signal name Output indicator Output indicator Output indicator OUTO to OUT7
Terminal Connections	• When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

### • CJ1W-OD211 Transistor Output Unit (16 Points)

Name	16-point Transistor Output Unit with Terminal Block (Sinking Outputs)	
Model	CJ1W-OD211	
Rated Voltage	12 to 24 VDC	
Operating Load Voltage Range	10.2 to 26.4 VDC	
Maximum Load Current	0.5 A/point, 5.0 A/Unit	
Maximum Inrush Current	4.0 A/point, 10 ms max.	
Leakage Current	0.1 mA max.	
Residual Voltage	1.5 V max.	
ON Response Time	0.1 ms max.	
OFF Response Time	0.8 ms max.	
Insulation Resistance	20 $M\Omega$ between the external terminals and the GR terminal (100 VDC)	
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.	
Number of Circuits	16 (16 points/common, 1 circuit)	
Internal Current Consumption	5 VDC 100 mA max.	
Fuse	None	
External Power Supply	10.2 to 26.4 VDC, 20 mA min.	
Weight	110 g max.	
Circuit Configuration	Signal name  Output indicator  +V  OUT0 to  OUT15  COM	
Terminal Connections	Signal Connect Signal Iname  L OUTO AD BO OUT1 L OUT4 A2 B2 OUT5 L OUT6 A3 B3 OUT7 L OUT10 A5 B5 OUT11 L OUT14 A7 B6 OUT13 L L OUT14 A7 B7 OUT15 L  When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.	

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

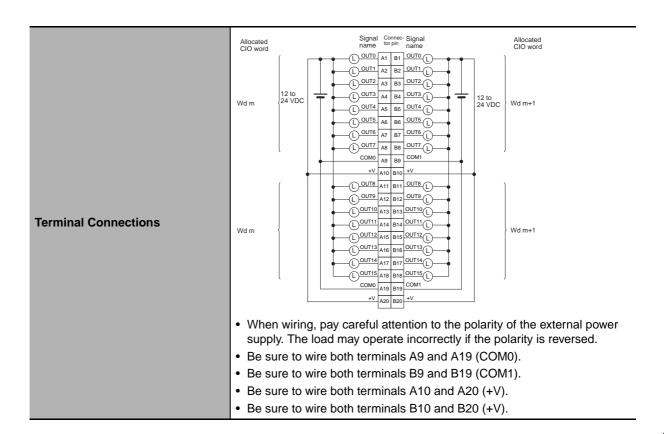
#### • CJ1W-OD213 Transistor Output Unit (16 Points)

Name	16-point Transistor Output Unit with Terminal Block (Sinking Outputs)	
Model	CJ1W-OD213	
Rated Voltage	24 VDC	
Operating Load Voltage Range	20.4 to 26.4 VDC	
Maximum Load Current	0.5 A/point, 5.0 A/Unit	
Maximum Inrush Current	4.0 A/point, 10 ms max.	
Leakage Current	0.1 mA max.	
Residual Voltage	1.5 V max.	
ON Response Time	15 μs max.	
OFF Response Time	80 μs max.	
Insulation Resistance	20 $M\Omega$ between the external terminals and the GR terminal (100 VDC)	
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.	
Number of Circuits	16 (16 points/common, 1 circuit)	
Internal Current Consumption	5 VDC 150 mA max.	
Fuse	None	
External Power Supply	20.4 to 26.4 VDC, 55 mA min.	
Weight	110 g max.	
Circuit Configuration	Signal name  OUT0  OUT0  to  OUT15  COM	
Terminal Connections	Signal Connect Signal Name	

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

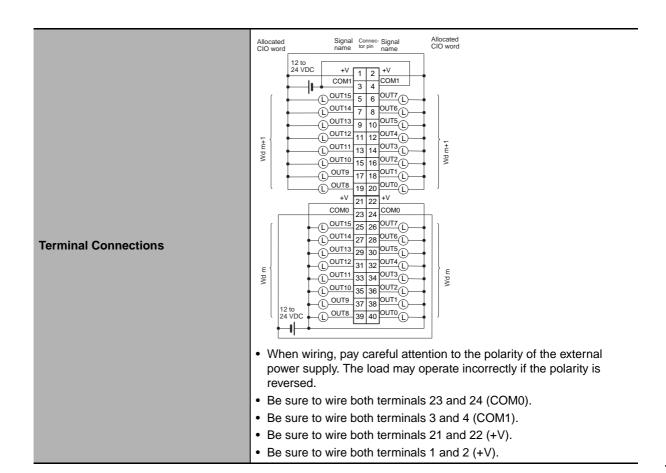
## • CJ1W-OD231 Transistor Output Unit (32 Points)

Name	32-point Transistor Output Unit with Fujitsu Connector (Sinking Outputs)
Model	CJ1W-OD231
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.5 A/point, 2.0 A/common, 4.0 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	32 (16 points/common, 2 circuits)
Internal Current Consumption	5 VDC 140 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 VDC, 30 mA min.
Weight	70 g max.
Accessories	None
Circuit Configuration	Signal Allocated CIO word  +V  OUTO OUTO TO Wd m  OUTO TO Wd m  OUTO TO Wd m+1  OUTO TO Wd m+1  OUTO TO Wd m+1  Connect or row A  Connect or row B



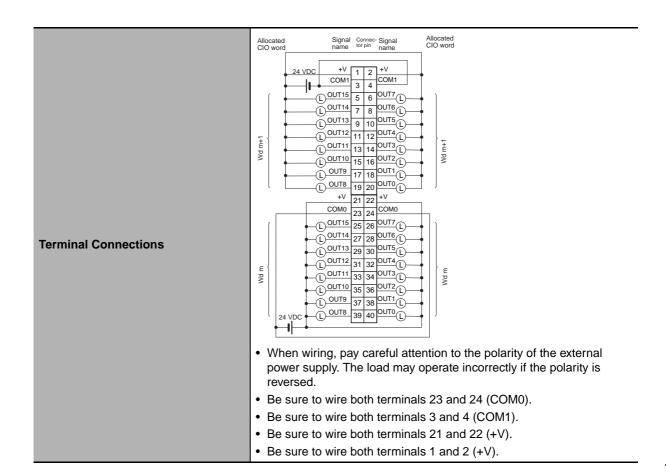
# • CJ1W-OD233 Transistor Output Unit (32 Points)

Name	32-point Transistor Output Unit with MIL Connector (Sinking Outputs)			
Model	CJ1W-OD233			
Rated Voltage	12 to 24 VDC			
Operating Load Voltage Range	10.2 to 26.4 VDC			
Maximum Load Current	0.5 A/point, 2 A/common, 4 A/Unit			
Maximum Inrush Current	4.0 A/point, 10 ms max.			
Leakage Current	0.1 mA max.			
Residual Voltage	1.5 V max.			
ON Response Time	0.1 ms max.			
OFF Response Time	0.8 ms max.			
Insulation Resistance	20 ${\rm M}\Omega$ between the external terminals and the GR terminal (100 VDC)			
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.			
Number of Circuits	32 (16 points/common, 2 circuits)			
Internal Current Consumption	140 mA max.			
Fuse	None			
External Power Supply	12 to 24 VDC, 30 mA min.			
Weight	70 g max.			
Circuit Configuration	Signal Allocated name CIO word  +V OUTO to OUT15 Wd m Output indicator  OUT0 SW OUT15 Wd m+1 OUT15 COM1 COM1			



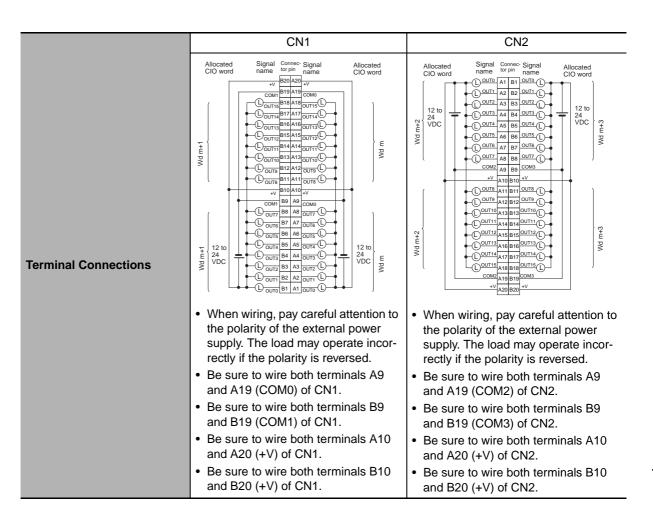
# • CJ1W-OD234 Transistor Output Unit (32 Points)

Name	32-point Transistor Output Unit with MIL Connector (Sinking Outputs)		
Model	CJ1W-OD234		
Rated Voltage	24 VDC		
Operating Load Voltage Range	20.4 to 26.4 VDC		
Maximum Load Current	0.5 A/point, 2 A/common, 4 A/Unit		
Maximum Inrush Current	4.0 A/point, 10 ms max.		
Leakage Current	0.1 mA max.		
Residual Voltage	1.5 V max.		
ON Response Time	15 μs max.		
OFF Response Time	80 μs max.		
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals and the GR terminal (100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Number of Circuits	32 (16 points/common, 2 circuits)		
Internal Current Consumption	220 mA max.		
Fuse	None		
External Power Supply	20.4 to 26.4 VDC, 110 mA min.		
Weight	70 g max.		
Circuit Configuration	Signal Allocated CIO word CIO		



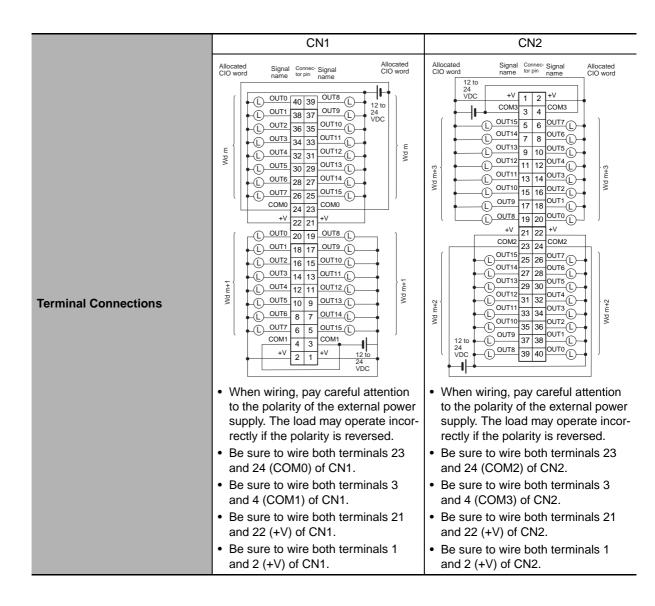
# • CJ1W-OD261 Transistor Output Unit (64 Points)

Name	64-point Transistor Output Unit with Fujitsu Connectors (Sinking Outputs)			
Model	CJ1W-OD261			
Rated Voltage	12 to 24 VDC			
Operating Load Voltage Range	10.2 to 26.4 VDC			
Maximum Load Current	0.3 A/point, 1.6 A/common, 6.4 A/Unit			
Maximum Inrush Current	3.0 A/point, 10 ms max.			
Leakage Current	0.1 mA max.			
Residual Voltage	1.5 V max.			
ON Response Time	0.5 ms max.			
OFF Response Time	1.0 ms max.			
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals and the GR terminal (100 VDC)			
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.			
Number of Circuits	64 (16 points/common, 4 circuits)			
Internal Current Consumption	5 VDC, 170 mA max.			
Fuse	None			
External Power Supply	10.2 to 26.4 VDC, 50 mA min.			
Weight	110 g max.			
Accessories	None			
Circuit Configuration	Signal name CIO word  +V  OUTO to to to COM0 COM0 COM0 COM1  +V  OUTO OUTO To			



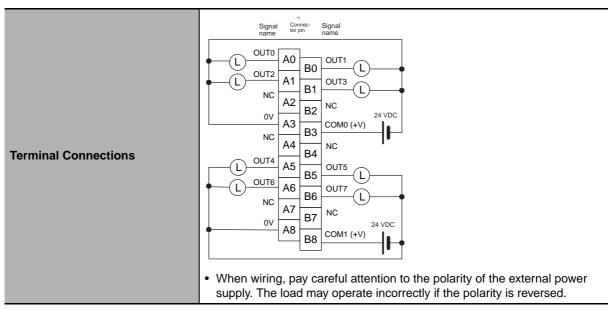
## • CJ1W-OD263 Transistor Output Unit (64 Points)

Name	64-point Transistor Output Unit with MIL Connectors (Sinking Outputs)		
Model	CJ1W-OD263		
Rated Voltage	12 to 24 VDC		
Operating Load Voltage Range	10.2 to 26.4 VDC		
Maximum Load Current	0.3 A/point, 1.6 A/common, 6.4 A/Unit		
Maximum Inrush Current	3.0 A/point, 10 ms max.		
Leakage Current	0.1 mA max.		
Residual Voltage	1.5 V max.		
ON Response Time	0.5 ms max.		
OFF Response Time	1.0 ms max.		
Insulation Resistance	20 $M\Omega$ between the external terminals and the GR terminal (100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Number of Circuits	64 (16 points/common, 4 circuits)		
Internal Current Consumption	170 mA max.		
Fuse	None		
External Power Supply	12 to 24 VDC, 50 mA min.		
Weight	110 g max.		
Circuit Configuration	Signal name CIO word  V OUTO OUT 15 O		



## • CJ1W-OD202 Transistor Output Unit (8 Points)

Name	8-point Transistor Output Unit with Terminal Block (Sourcing Outputs)		
Model	CJ1W-OD202		
Rated Voltage	24 VDC		
Operating Load Voltage Range	20.4 to 26.4 VDC		
Maximum Load Current	2 A/point, 8 A/Unit		
Leakage Current	0.1 mA max.		
Residual Voltage	1.5 V max.		
ON Response Time	0.5 ms max.		
OFF Response Time	1.0 ms max.		
Load Short-circuit Protection	Detection current: 6 A min.		
Load Short-circuit Protection	Automatic restart after error clearance. (Refer to page A-159.)		
Line Disconnection Detection	Detection current: 200 mA (Refer to page A-159.)		
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals and the GR terminal (100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Number of Circuits	8 (4 points/common, 2 circuits)		
Internal Current Consumption	110 mA max.		
Fuse	None		
External Power Supply	24 VDC, 50 mA min.		
Weight	120 g max.		
Circuit Configuration	• The ERR indicator will light and the corresponding bit in A050 to A069 (Basic I/O Unit Information, two points per bit) will turn ON if an overcurrent or line disconnection is detected.		



<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

### • CJ1W-OD204 Transistor Output Unit (8 Points)

Name	8-point Transistor Output Unit with Terminal Block (Sourcing Outputs)			
Model	CJ1W-OD204			
Rated Voltage	24 VDC			
Operating Load Voltage Range	20.4 to 26.4 VDC			
Maximum Load Current	0.5 A/point, 4.0 A/Unit			
Leakage Current	0.1 mA max.			
Residual Voltage	1.5 V max.			
ON Response Time	0.5 ms max.			
OFF Response Time	1.0 ms max.			
Land Object almost Destantion	Detection current: 0.7 to 2.5 A			
Load Short-circuit Protection	Automatic restart after error clearance. (Refer to page A-159.)			
Insulation Resistance	20 M $\Omega$ between the external terminals and the GR terminal (100 VDC)			
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.			
Number of Circuits	8 (8 points/common, 1 circuit)			
Internal Current Consumption	100 mA max.			
Fuse	None			
External Power Supply	20.4 to 26.4 VDC, 40 mA min.			
Weight	120 g max.			
Circuit Configuration	Signal name COM (+V) Outro Outro Outro Outro Fere indicator  • When an overcurrent is detected, the ERR indicator will light, and the corresponding flag in the Basic I/O Unit Information Area will turn ON.			
Terminal Connections	Signal Cornec Signal name to pin name  OUTO AO BO OUT1 A D OUT3 AO BO OUT1 C OUT4 AD BO OUT5 AD BO			

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

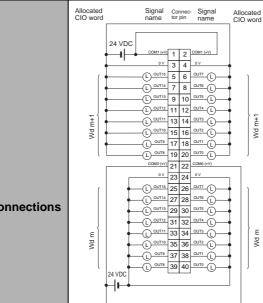
#### • CJ1W-OD212 Transistor Output Unit (16 Points)

Name	16-point Transistor Output Unit with Terminal Block (Sourcing Outputs)		
Model	CJ1W-OD212		
Rated Voltage	24 VDC		
Operating Load Voltage Range	20.4 to 26.4 VDC		
Maximum Load Current	0.5 A/point, 5.0 A/Unit		
Maximum Inrush Current	0.1 mA max.		
Leakage Current	1.5 V max.		
ON Response Time	0.5 ms max.		
OFF Response Time	1.0 ms max.		
Load Short-circuit Protection	Detection current: 0.7 to 2.5 A		
Load Short-circuit Protection	Automatic restart after error clearance. (Refer to page A-159.)		
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals and the GR terminal (100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Number of Circuits	16 (16 points/common, 1 circuit)		
Internal Current Consumption	5 VDC, 100 mA max.		
External Power Supply	20.4 to 26.4 VDC, 40 mA min.		
Weight	120 g max.		
Circuit Configuration	• When overcurrent is detected, the ERR indicator will light, and the corresponding flag in the Basic I/O Unit Information Area (A050 to A069) will turn ON.		
Terminal Connections	Signal Connector pin Name    Course   Signal name		

<sup>\*1</sup> Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

## • CJ1W-OD232 Transistor Output Unit (32 Points)

Name	32-point Transistor Output Unit with MIL Connector (Sourcing Outputs)		
Model	CJ1W-OD232		
Rated Voltage	24 VDC		
Operating Load Voltage Range	20.4 to 26.4 VDC		
Maximum Load Cur- rent	0.5 A/point, 2.0 A/common, 4.0 A/Unit		
Leakage Current	0.1 mA max.		
Residual Voltage	1.5 V max.		
ON Response Time	0.5 ms max.		
OFF Response Time	1.0 ms max.		
Load Short-circuit	Detection current: 0.7 to 2.5 A		
Protection	Automatic restart after error clearance. (Refer to page A-159.)		
Insulation Resistance	20 $M\Omega$ between the external terminals and the GR terminal (100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Number of Circuits	32 (16 points/common, 2 circuits)		
Internal Current Consumption	5 VDC 150 mA max.		
External Power Supply	20.4 to 26.4 VDC, 70 mA min.		
Weight	80 g max.		
Accessories	None		
Circuit Configuration	Signal Allocated CIO word COM0 (+V) COM0 (+V) OUT		



- **Terminal Connections**
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.
- Be sure to wire both terminals 21 and 22 (COM0 (+V)).
- Be sure to wire both terminals 1 and 2 (COM1 (+V)).
- Be sure to wire both terminals 3 and 4 (0 V).
- Be sure to wire both terminals 23 and 24 (0 V).

## • CJ1W-OD262 Transistor Output Unit (64 Points)

Name	64-point Transistor Output Unit with MIL Connectors (Sourcing Outputs)		
Model	CJ1W-OD262		
Rated Voltage	12 to 24 VDC		
Operating Load Voltage Range	10.2 to 26.4 VDC		
Maximum Load Cur- rent	0.3 A/point, 1.6 A/common, 6.4 A/Unit		
Maximum Inrush Cur- rent	3.0 A/point, 10 ms max.		
Leakage Current	0.1 mA max.		
Residual Voltage	1.5 V max.		
ON Response Time	0.5 ms max.		
OFF Response Time	1.0 ms max.		
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals and the GR terminal (100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Number of Circuits	64 (16 points/common, 4 circuits)		
Internal Current Consumption	170 mA max. (5 VDC)		
Fuse	None		
External Power Supply	10.2 to 26.4 VDC, 50 mA min.		
Weight	110 g max.		
Accessories	None		
Circuit Configuration	Signal Allocated name COM0 COM0 COM0 COM0 OUT0 OUT0 OUT0 OUT0 OUT0 OUT15 OUT15 OUT0 OUT15 OUT15 OUT0 OUT15 OUT15 OUT0 OUT15 OU		

• Be sure to wire both terminals 1 and 2

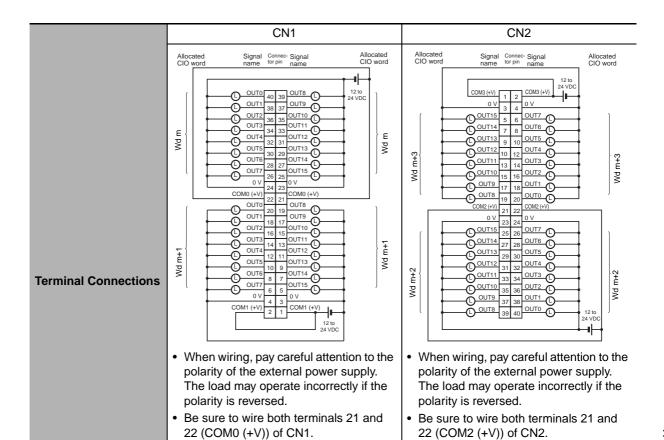
· Be sure to wire both terminals 23 and

• Be sure to wire both terminals 3 and 4

(COM3 (+V)) of CN2.

24 (0 V) of CN2.

(0 V) of CN2.



• Be sure to wire both terminals 1 and 2

Be sure to wire both terminals 23 and

• Be sure to wire both terminals 3 and 4

(COM1 (+V)) of CN1.

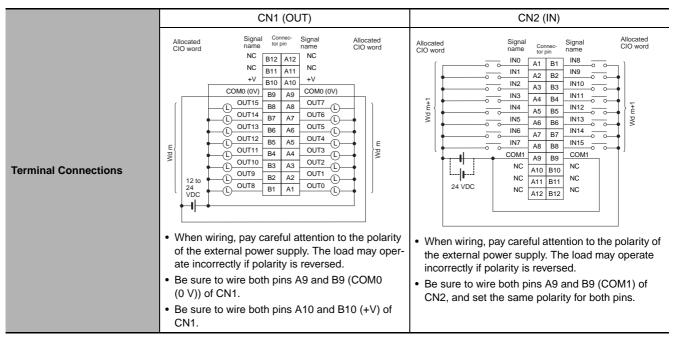
24 (0 V) of CN1.

(0 V) of CN1.

# Mixed I/O Units

# • CJ1W-MD231 DC Input/Transistor Output Unit (24 VDC, 16 Inputs/16 Outputs)

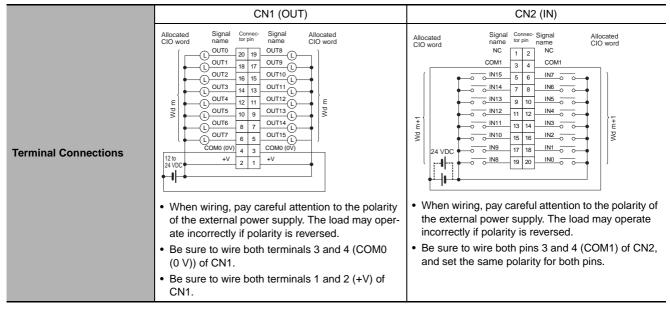
Name	16-point DC Input/16-point Transistor Output Unit with Fujitsu Connectors (Sinking Outputs)			
Model				
Output section (CN1)		Input section (CN2)		
Rated Voltage	12 to 24 VDC	Rated Input Voltage	24 VDC	
Operating Load Voltage Range	10.2 to 26.4 VDC	Operating Input Voltage	20.4 to 26.4 VDC	
Maximum Load Current	0.5 A/point, 2.0 A/Unit	Input Impedance	3.3 kΩ	
Maximum Inrush Current	4.0 A/point, 10 ms max.	Input Current	7 mA typical (at 24 VDC)	
Leakage Current	0.1 mA max.	ON Voltage/ON Current	14.4 VDC min./3 mA min.	
Residual Voltage	1.5 V max.	OFF Voltage/OFF Current	5 VDC max./1 mA max.	
ON Response Time	0.1 ms max.		8.0 ms (default) max. (Can be set to between 0 and	
OFF Response Time	0.8 ms max.	ON Response Time	32 ms in the Input Response Time Settings under the PLC Setup)*1, *2	
No. of Circuits	16 (16 points/common, 1 circuit)	OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under	
Fuse	None		the PLC Setup)*1, *2	
Futamal Barras Crossler	12 to 24 VDC, 20 mA min.	No. of Circuits	16 (16 points/common, 1 circuit)	
External Power Supply	111111.	Number of Simulta- neously ON Points	75% (at 24 VDC)	
Insulation Resistance	20 M $\Omega$ between the extern	20 $M\Omega$ between the external terminals and the GR terminal (at 100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.			
Internal Current Consumption	5 VDC 130 mA max.			
Weight	90 g max.	90 g max.		
Accessories	None			
	CN1 (	OUT)	CN2 (IN)	
Circuit Configuration	Signal Allocated name CIO word  OUTO OUTO To O		Allocated CIO word name 3.3 kΩ  Connect or row A  Connect or row B  Wd m+1 INS  3.3 kΩ  INS  3.3 kΩ  Input indicator Input Inp	
			Number of Simultaneously ON Points vs. Ambient Temperature Characteristic  16 points at 33°C 16 points at 45°C  18 points at 33°C 16 points at 45°C  Input voltage: 24 VDC  Input voltage: 26.4 VDC  12 points at 55°C  9 points at 55°C  9 points at 55°C  Ambient Temperature	



- The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.
- The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

# • CJ1W-MD233 DC Input/Transistor Output Unit (24 VDC, 16 Inputs/16 Outputs)

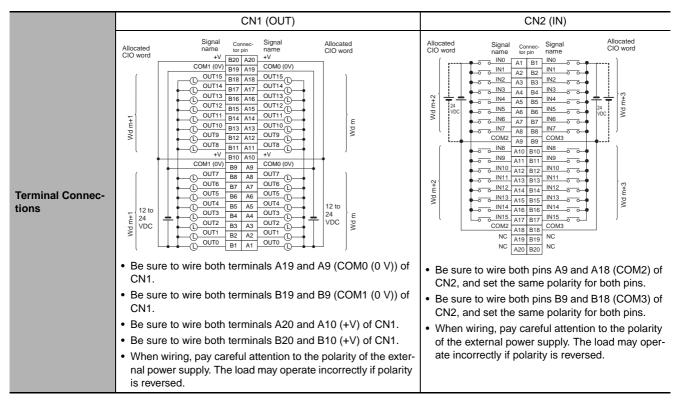
Name	16-point DC Input/16-point Transistor Output Unit with MIL Connectors (Sinking Outputs)			
Model	CJ1W-MD233			
Output section (CN1)	Input section (CN2)			
Rated Voltage	12 to 24 VDC	Rated Input Voltage	24 VDC	
Operating Load Voltage Range	10.2 to 26.4 VDC	Operating Input Voltage	20.4 to 26.4 VDC	
Maximum Load Current	0.5 A/point, 2.0 A/Unit	Input Impedance	3.3 kΩ	
Maximum Inrush Current	4.0 A/point, 10 ms max.	Input Current	7 mA typical (at 24 VDC)	
Leakage Current	0.1 mA max.	ON Voltage/ON Current	14.4 VDC min./3 mA min.	
Residual Voltage	1.5 V max.	OFF Voltage/OFF Current	5 VDC max./1 mA max.	
ON Response Time	0.1 ms max.	ON Response	8.0 ms (default) max. (Can be set to between 0 and	
OFF Response Time	0.8 ms max.	Time	32 ms in the Input Response Time Settings under the PLC Setup)*1, *2	
No. of Circuits	16 (16 points/common, 1 circuit)	OFF Response	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under	
Fuse	None		the PLC Setup)*1, *2	
	12 to 24 VDC, 20 mA min.	No. of Circuits	16 (16 points/common, 1 circuit)	
External Power Supply		Number of Simultaneously ON Points	75% (at 24 VDC)	
Insulation Resistance	$20~\text{M}\Omega$ between the external t	terminals and the GR t	erminal (at 100 VDC)	
Dielectric Strength	1,000 VAC between the externmax.	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 VDC 130 mA max.			
Weight	90 g max.			
Accessories	None			
	CN1 (OU	T)	CN2 (IN)	
Circuit Configuration	Si indicator indicator	Signal Allocated CIO word +V OUTO to OUT7 COM0 +V OUT8 to OUT15 Wd m CCOM0	Allocated CIO word Number 1 Signal name 3.3 kΩ  Wd m+1 INS 3.3 kΩ  Input indicator Input indic	
			Number of Simultaneously ON Points vs. Ambient Temperature Characteristic  16 points at 33°C 16 points at 45°C  16 points at 33°C 16 points at 45°C  17 points at 55°C  18 points at 55°C  19 points at 55°C  4 points at 55°C  Ambient Temperature	



- The ON response time will be 20 µs maximum and OFF response time will be 400 µs maximum even if the response times are set to 0 ms due to internal element delays.
- The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

# • CJ1W-MD261 DC Input/Transistor Output Unit (24 VDC 32 Inputs/32 Outputs)

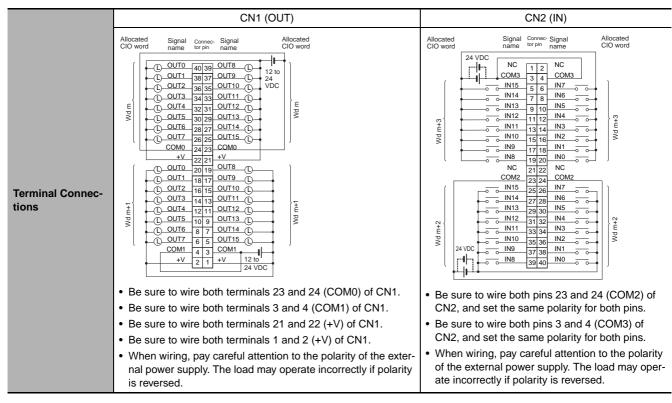
Name	32-point DC Input/32-point Transistor Output Unit with Fujitsu Connectors (Sinking Outputs)			
Model CJ1W-MD261				
Output section (CN	1)	Input section (CN2)		
Rated Voltage	12 to 24 VDC	Rated Input Voltage	24 VDC	
Operating Load Voltage Range	10.2 to 26.4 VDC	Operating Input Voltage	20.4 to 26.4 VDC	
Maximum Load Current	0.3 A/point, 1.6 A/common, 3.2 A/Unit	Input Impedance	5.6 kΩ	
Maximum Inrush Current	3.0 A/point, 10 ms max.	Input Current	4.1 mA typical (at 24 VDC)	
Leakage Current	0.1 mA max.	ON Voltage/ON Current	19.0 VDC min./3 mA min. *3	
Residual Voltage	1.5 V max.	OFF Voltage/OFF Current	5 VDC max./1 mA max.	
ON Response Time	0.5 ms max.	ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings	
OFF Response Time	1.0 ms max.	ON Response Time	under the PLC Setup)*1, *2	
No. of Circuits	32 (16 points/common, 2 circuits)	OFF Response	8.0 ms (default) max. (Can be set to between 0	
Fuse	None	Time	and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2	
External Power	12 to 24 VDC, 30 mA min.	No. of Circuits	32 (16 points/common, 2 circuits)	
Supply		Number of Simulta- neously ON Points	75% (24 points) (at 24 VDC)	
Insulation Resistance	20 M $\Omega$ between the external terminals and the GR terminal (at 100 VDC)			
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.			
Internal Current Consumption	5 VDC 140 mA max.			
Weight	110 g max.			
Accessories	sories None			
	CN1 (OUT) CN2 (IN)			
Circuit Configura- tion	Signal Allocated name CIO word +V OUTO to OUT15 Wd m Connect or row A COM0 COM0 To OUT0 Wd OUT0 Wd Or row B COM1 COM1		Ambient Temperature Characteristic 24 VDC 25 September 15 September 26 September 26 September 27 September 27 September 28 September 28 September 29	



- \*1 The ON response time will be 120  $\mu$ s maximum and OFF response time will be 400  $\mu$ s maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.
- 3 Observe the following restrictions when connecting to a 2-wire sensor.
  - Make sure the input power supply voltage is larger than the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
  - Use a sensor with a minimum load current of 3 mA min.
  - Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

# ● CJ1W-MD263 DC Input/Transistor Output Unit (24 VDC 32 Inputs/32 Outputs)

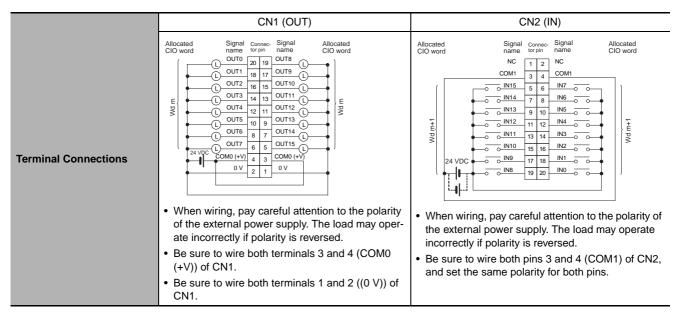
Name	32-point DC Input/32-point Transistor Output Unit with MIL Connectors (Sinking Outputs)							
Model	CJ1W-MD263							
Output section (CN	1)	Input section (CN2)						
Rated Voltage	12 to 24 VDC	Rated Input Voltage	24 VDC					
Operating Load Voltage Range	10.2 to 26.4 VDC	Operating Input Voltage	20.4 to 26.4 VDC					
Maximum Load Current	0.3 A/point, 1.6 A/common, 3.2 A/Unit	Input Impedance	5.6 kΩ					
Maximum Inrush Current	3.0 A/point, 10 ms max.	Input Current	4.1 mA typical (at 24 VDC)					
Leakage Current	0.1 mA max.	ON Voltage/ON Cur- rent	19.0 VDC min./3 mA min.*3					
Residual Voltage	1.5 V max.	OFF Voltage/OFF Current	5 VDC max./1 mA max.					
ON Response Time	0.5 ms max.	ON Pagnance Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under					
OFF Response Time	1.0 ms max.	ON Response Time	the PLC Setup)*1, *2					
No. of Circuits	32 (16 points/common, 2 circuits)		8.0 ms (default) max. (Can be set to between 0 and					
Fuse	None	OFF Response Time	32 ms in the Input Response Time Settings under the PLC Setup)*1, *2					
External Power	12 to 24 VDC, 30 mA min.	No. of Circuits	32 (16 points/common, 2 circuits)					
Supply		Number of Simulta- neously ON Points	75% (24 points) (at 24 VDC)					
Insulation Resistance	$20~\text{M}\Omega$ between the external terminals a	and the GR terminal (at	100 VDC)					
Dielectric Strength	1,000 VAC between the external termin	als and the GR terminal	for 1 minute at a leakage current of 10 mA max.					
Internal Current Consumption	5 VDC 140 mA max.							
Weight	110 g max.							
Accessories	None							
	CN1 (OUT)	CN2 (IN)						
Circuit Configura- tion	Signal Allocated name CIO word  OUTO to OUTO OUTO OUTO TO OUTO OUTO TO OUTO OU		32 points at 38°C 32 points at 44°C Input voltage: 24 VDC 24 VDC 24 VDC 24 VDC 26 VDC 27 VDC					



- \*1 The ON response time will be 120 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.
- \*3 Observe the following restrictions when connecting to a 2-wire sensor.
  - Make sure the input power supply voltage is larger than the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
  - Use a sensor with a minimum load current of 3 mA min.
  - · Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

# • CJ1W-MD232 DC Input/Transistor Output Unit (24 VDC, 16 inputs/16 Outputs)

Name	16-point DC Input/16-point Transistor Output Unit with MIL Connectors (Sourcing Outputs)					
Model	CJ1W-MD232					
Output section (CN1)		Input section (CN2)				
Rated Voltage	24 VDC	Rated Input Voltage	24 VDC			
Operating Load Voltage Range	20.4 to 26.4 VDC	Operating Input Voltage	20.4 to 26.4 VDC			
Maximum Load Current	0.5 A/point, 2.0 A/Unit	Input Impedance	3.3 kΩ			
Leakage Current	0.1 mA max.	Input Current	7 mA typical (at 24 VDC)			
Residual Voltage	1.5 V max.	ON Voltage/ON Current	14.4 VDC min./3 mA min.			
ON Response Time	0.5 ms max.	OFF Voltage/OFF Current	5 VDC max./1 mA max.			
OFF Response Time	1.0 ms max.	ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1,*2			
Load Short-circuit Protection	Detection current: 0.7 to 2.5 A min. Automatic restart after error clearance. (Refer to page A- 161.)	OFF Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2			
No. of Circuits	16 (16 points/common, 1 circuit)	No. of Circuits	16 (16 points/common, 1 circuit)			
External Power Supply	20.4 to 26.4 VDC, 40 mA min.	Number of Simultaneously ON Points	75% (at 24 VDC)			
Insulation Resistance	$20~\text{M}\Omega$ between the external t	erminal (at 100 VDC)				
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 m max.					
Internal Current Consumption	5 VDC 130 mA max.					
Weight	100 g max.					
Accessories	None					
Circuit Configuration	Signal Allocated CIO word OCOMO (+V)  Signal Allocated CIO word OCOMO (+V)  OUT7  OU		CN2 (IN)  Allocated Signal CIO word name  3.3 kΩ  INO  INO  INO  INO  INO  INO  INO  IN			

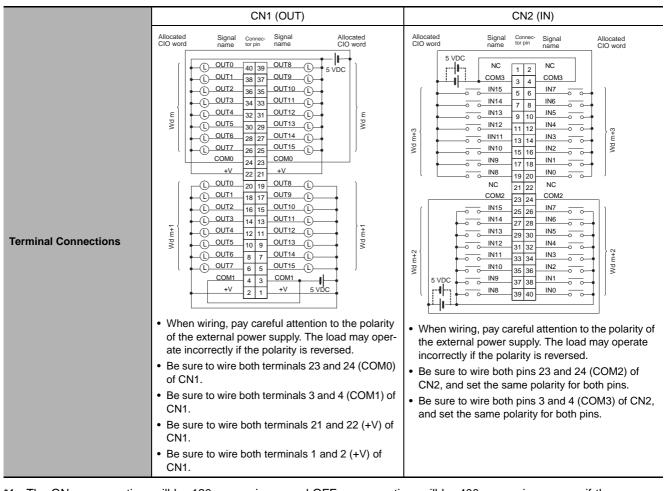


<sup>\*1</sup> The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

# • CJ1W-MD563 TTL I/O Unit (32 Inputs/32 Outputs)

Name	32-point Input /32-point Outpu	ut TTL I/O Unit with MII	Connectors		
Model	CJ1W-MD563				
Output section (CN1)		Input section (CN2)			
Rated Voltage	5 VDC±10%	Rated Input Voltage	5 VDC±10%		
Operating Load Voltage Range	4.5 to 5.5 VDC	Input Impedance	1.1 kΩ		
Maximum Load Current	35 mA/point, 560 mA/com- mon, 1.12 A/Unit	Input Current	Approx. 3.5 mA (at 5 VDC)		
Leakage Current	0.1 mA max.	ON Voltage	3.0 VDC min.		
Residual Voltage	0.4 V max.	OFF Voltage	1.0 VDC max.		
ON Response Time	0.2 ms max.	ON Response Time	8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)*1, *2		
OFF Response Time	0.3 ms max.	OFF Beamanas	8.0 ms (default) max. (Can be set to between 0 and		
No. of Circuits	32 points (16 points/common, 2 circuits)	OFF Response Time	32 ms in the Input Response Time Settings under the PLC Setup)*1, *2		
Fuse	None	No. of Circuits	32 points (16 points/common, 2 circuits)		
External Power Supply	5 VDC±10%, 40 mA min. (1.2 mA × No. of ON points)	Number of Simultaneously ON Points	100% (16 points/common)		
Insulation Resistance	20 M $\Omega$ between the external t	erminals and the GR t	erminal (at 100 VDC)		
Dielectric Strength	1,000 VAC between the extern max.	nal terminals and the C	GR terminal for 1 minute at a leakage current of 10 mA		
Internal Current Consumption	5 VDC 190 mA max.				
Weight	110 g max.				
Accessories	None				
	CN1 (OU	T)	CN2 (IN)		
Circuit Configuration	Signal Allocated CIO word +V OUTO OUTO OUTO OUTO Indicator switch +V OUTO OUTO OUTO OUTO OUTO OUTO OUTO OUT		Allocated CIO word name 1.1 kΩ  Wd m+2 liN0		



 $<sup>^{*}</sup>$ 1 The ON response time will be 120  $\mu$ s maximum and OFF response time will be 400  $\mu$ s maximum even if the response times are set to 0 ms due to internal element delays.

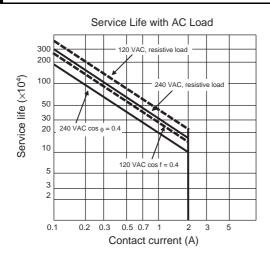
<sup>\*2</sup> The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

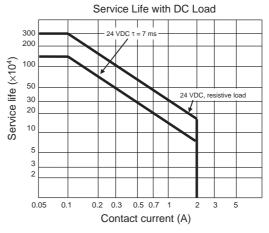
### A-1-3 Precautions on Contact Output Units

# Service Life Expectancy of CJ1W-OC201/211 Relays

The service life expectancy of the relays (NY-24W-K-IE) in the CJ1W-OC201/211 Contact Output Units is shown in the following diagrams. Use the diagrams to calculate the relay service life based on the operating conditions, and replace the relay before the end of its service life.

## **Contact Current vs. Service Life Characteristic**





Switching frequency: 1,800 operations/hour max.



#### **Precautions for Correct Use**

The diagrams show the life expectancy of the relay itself. Do not use a contact current, therefore, that exceeds the maximum switching capacity specified in the specifications for each Contact Output Unit. If a switching capacity exceeding the specifications is used, the reliability and life expectancy of other parts will be reduced and the Unit may malfunction.

# **Inductive Load**

The life of the Relay varies with the load inductance. If any inductive load is connected to the Contact Output Unit, use an arc killer with the Contact Output Unit using an inductive load. (See next page.)

Be sure to connect a diode in parallel with every DC inductive load that is connected to the Contact Output Unit.

#### **Contact Protection Circuit**

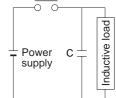
Arc killers are used with the Contact Output Unit in order to prolong the life of each Relay mounted to the Contact Output Unit, prevent noise, and reduce the generation of carbide and nitrate deposits. However, if arc killers are used incorrectly, they can reduce relay life. Using an arc killer can also cause a delay in the resetting time (shut-off time). Arc killer circuit examples are listed in the following table.

	Circuit	Cur	rent	Characteristic	Poguired element
	Circuit	AC	DC	Characteristic	Required element
CR method	Power c T W R	Yes	Yes	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.  If the supply voltage is 24 or 48 V, insert the arc killer in parallel with the load. If the supply voltage is 100 to 200 V, insert the arc killer between the contacts.	The capacitance of the capacitor must be 1 to $0.5~\mu F$ per contact current of 1 A and resistance of the resistor must be $0.5$ to $1~\Omega$ 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. 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.
Diode method	Power supply	No	Yes	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. 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.	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.  The reversed dielectric strength value of the diode may be two to three times larger than the supply voltage if the arc killer is applied to electronic circuits with low circuit voltages.
Varistor method	Power supply	Yes	Yes	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.  If the supply voltage is 24 or 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.	



#### **Precautions for Correct Use**

Do not connect a capacitor as an arc killer in parallel with an inductive load as shown in the following diagram. This arc killer is very effective for preventing spark discharge at the moment when the circuit is opened. However, when the contacts are closed, the contacts may be welded due to the current charged in the capacitor.



DC inductive loads can be more difficult to switch than resistive loads. If appropriate arc killers are used, however, DC inductive loads will be as easy to switch as resistive loads.

# A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals

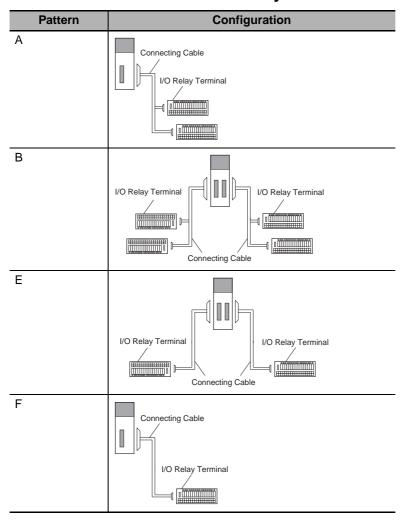
# Patterns for Combining Connector-Terminal Block Conversion Units and I/O Relay Terminals

The following patterns can be used to connect Basic I/O Units with Connectors to OMRON Connector-Terminal Block Conversion Units and I/O Relay Terminals using OMRON Connecting Cables.

#### Connection Patterns for Connector-Terminal Block Conversion Units

Pattern	Configuration	Number of connectors	Branching
Α	Connecting Cable  Connector-Terminal Block Conversion Unit  40 or 60 terminals	1	None
В	Connecting Cable with two branches  Connector-Terminal Block Conversion Unit  20 terminals 20 terminals		2 branches
С	Connecting Cable  Connector-Terminal Block Conversion Unit  20 terminals  Connector-Terminal Block Conversion Unit	2	None
D	Connecting Cable  Connector-Terminal Block Conversion Unit  40 or 60 terminals  40 or 60 terminals		
F	Connector Cable with two branches  Connector-Terminal Block Conversion Unit  20 terminals 20 terminals 20 terminals		2 branches

## Connection Patterns for I/O Relay Terminals



# **Combinations of Connections**

Combinations of OMRON Connecting Cables with Connector-Terminal Block Conversion Units and I/O Relay Terminals are shown below.

#### Connections to Connector-Terminal Block Conversion Units

Refer to the pages given in the right columns for connection diagrams and details on the Connector-Terminal Block Conversion Units and Connecting Cables.

Unit	I/O capac- ity	Number of con- nectors	Polarity	Connection pat-	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connec- tion dia- gram
CJ1W-	32 inputs	1 Fujitsu	NPN/PNP	Α	None	XW2Z-□□□B	XW2D-40G6	None	A-75
ID231		connector		Α	None	XW2Z-□□□B	XW2D-40G6-RF <sup>*3</sup>	None	
				А	None	XW2Z-□□□B	XW2B-40G5	None	
				Α	None	XW2Z-□□□B	XW2B-40G4	None	
				Α	None	XW2Z-□□□BU	XW2D-40C6	None	
				В	2	XW2Z-□□□D	XW2D-20G6 (2 Units)	None	
				В	2	XW2Z-□□□D	XW2B-20G5 (2 Units)	None	
				В	2	XW2Z-□□□D	XW2B-20G4 (2 Units)	None	
				В	2	XW2Z-□□□D	XW2C-20G6-IO16 (2 Units)	Yes	A-75
				В	2	XW2Z-□□□D	XW2C-20G5-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□D	XW2E-20G5-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□D	XW2F-20G7-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□D	XW2N-20G8-IN16 (2 Units)*2	Yes	
CJ1W-	32 inputs	1 MIL con-	NPN/PNP	Α	None	XW2Z-□□□K	XW2D-40G6	None	A-76
ID232		nector		Α	None	XW2Z-□□□K	XW2D-40G6-RM*3	None	
				Α	None	XW2Z-□□□K	XW2B-40G5	None	
				Α	None	XW2Z-□□□K	XW2B-40G4	None	
				В	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-76
				В	2	XW2Z-□□□N	XW2C-20G5-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□N	XW2E-20G5-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□N	XW2F-20G7-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□N	XW2N-20G8-IN16 (2 Units)*2	Yes	
CJ1W-	32 inputs	1 MIL con-	NPN/PNP	Α	None	XW2Z-□□□K	XW2D-40G6	None	A-77
ID233		nector		Α	None	XW2Z-□□□K	XW2D-40G6-RM*3	None	
				Α	None	XW2Z-□□□K	XW2B-40G5	None	
				A	None	XW2Z-□□□K	XW2B-40G4	None	
				В	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-77
				В	2	XW2Z-□□□N	XW2C-20G5-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□N	XW2E-20G5-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□N	XW2F-20G7-IN16 (2 Units)*2	Yes	
				В	2	XW2Z-□□□N	XW2N-20G8-IN16 (2 Units)*2	Yes	

<sup>\*1</sup> For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

<sup>\*2</sup> The inputs are NPN. For PNP inputs, reverse the polarity of the external power supply connections to the power supply terminals on the Connector-Terminal Block Conversion Unit.

<sup>\*3</sup> Bleeder resistance (5.6 k $\Omega$ ) is built in.

Unit	I/O capac- ity	Number of con- nectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connection diagram	
CJ1W-	64 inputs	2 Fujitsu	NPN/PNP	D	None	XW2Z-□□□B	XW2D-40G6	None	A-78	
ID261		connectors		D	None	XW2Z-□□□B	XW2D-40G6-RF*3	None		
				D	None	XW2Z-□□□B	XW2B-40G5	None		
				D	None	XW2Z-□□□B	XW2B-40G4	None		
				D	None	XW2Z-□□□BU	XW2D-40C6	None		
				F	2	XW2Z-□□□D	XW2D-20G6 (2 Units)	None		
				F	2	XW2Z-□□□D	XW2B-20G5 (2 Units)	None		
				F	2	XW2Z-□□□D	XW2B-20G4 (2 Units)	None		
				F	2	XW2Z-□□□D	XW2C-20G6-IO16 (2 Units)	Yes	A-78	
				F	2	XW2Z-□□□D	XW2C-20G5-IN16 (2 Units)*2	Yes		
				F	2	XW2Z-□□□D	XW2E-20G5-IN16 (2 Units)*2	Yes		
				F	2	XW2Z-□□□D	XW2F-20G7-IN16 (2 Units)*2	Yes		
				F	2	XW2Z-□□□D	XW2N-20G8-IN16 (2 Units)*2	Yes		
CJ1W-	64 inputs	2 MIL con-	NPN/PNP	D	None	XW2Z-□□□K	XW2D-40G6	None	A-79	
ID262		nectors		D	None	XW2Z-□□□K	XW2D-40G6-RM*3	None		
				D	None	XW2Z-□□□K	XW2B-40G5	None		
				D	None	XW2Z-□□□K	XW2B-40G4	None		
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None		
					F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
					F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-79	
				F	2	XW2Z-□□□N	XW2C-20G5-IN16 (2 Units)*2	Yes		
				F	2	XW2Z-□□□N	XW2E-20G5-IN16 (2 Units)*2	Yes		
				F	2	XW2Z-□□□N	XW2F-20G7-IN16 (2 Units)*2	Yes		
				F	2	XW2Z-□□□N	XW2N-20G8-IN16 (2 Units)*2	Yes		
CJ1W-	32 outputs	1 Fujitsu	NPN	А	None	XW2Z-□□□B	XW2D-40G6	None	A-80	
OD231		connector		Α	None	XW2Z-□□□B	XW2B-40G5	None		
				Α	None	XW2Z-□□□B	XW2B-40G4	None		
				A	None	XW2Z-□□□BU	XW2D-40C6	None	A-80	
				В	2	XW2Z-□□□L	XW2D-20G6 (2 Units)	None		
				В	2	XW2Z-□□□L	XW2B-20G5 (2 Units)	None		
				В	2	XW2Z-□□□L	XW2B-20G4 (2 Units)	None		
				В	2	XW2Z-□□□L	XW2C-20G6-IO16 (2 Units)	Yes	A-80	
				В	2	XW2Z-□□□L	XW2F-20G7-OUT16 (2 Units)	Yes		
CJ1W-	32 outputs	1 MIL con-	PNP	А	None	XW2Z-□□□K	XW2D-40G6	None	A-81	
OD232		nector		Α	None	XW2Z-□□□K	XW2B-40G5	None		
				А	None	XW2Z-□□□K	XW2B-40G4	None		
				В	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None		
				В	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None		
				В	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None		
				В	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-81	
				В	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes		

<sup>\*1</sup> For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

<sup>\*2</sup> The inputs are NPN. For PNP inputs, reverse the polarity of the external power supply connections to the power supply terminals on the Connector-Terminal Block Conversion Unit.

<sup>\*3</sup> Bleeder resistance (5.6  $k\Omega$ ) is built in.

Unit	I/O capac- ity	Number of con- nectors	Polarity	Connection pat-	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connec- tion dia- gram
CJ1W-	32 outputs	1 MIL con-	NPN	А	None	XW2Z-□□□K	XW2D-40G6	None	A-82
OD233		nector		Α	None	XW2Z-□□□K	XW2B-40G5	None	
				А	None	XW2Z-□□□K	XW2B-40G4	None	
				В	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-82
				В	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	
CJ1W-	32 outputs	1 MIL con-	NPN	А	None	XW2Z-□□□K	XW2D-40G6	None	A-83
OD234		nector		А	None	XW2Z-□□□K	XW2B-40G5	None	
				А	None	XW2Z-□□□K	XW2B-40G4	None	
				В	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
				В	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-83
				В	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	
CJ1W-	64 outputs	2 Fujitsu	NPN	D	None	XW2Z-□□□B	XW2D-40G6	None	A-84
OD261		connectors		D	None	XW2Z-□□□B	XW2B-40G5	None	
				D	None	XW2Z-□□□B	XW2B-40G4	None	
				D	None	XW2Z-□□□BU	XW2D-40C6	None	A-84
				F	2	XW2Z-□□□L	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2B-20G4 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2C-20G6-IO16 (2 Units)	Yes	A-84
				F	2	XW2Z-□□□L	XW2F-20G7-OUT16 (2 Units)	Yes	
CJ1W-	64 outputs	2 MIL con-	PNP	D	None	XW2Z-□□□K	XW2D-40G6	None	A-85
OD262		nectors		D	None	XW2Z-□□□K	XW2B-40G5	None	
				D	None	XW2Z-□□□K	XW2B-40G4	None	
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-85
				F	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	
CJ1W-	64 outputs	2 MIL con-	NPN	D	None	XW2Z-□□□K	XW2D-40G6	None	A-86
OD263		nectors		D	None	XW2Z-□□□K	XW2B-40G5	None	
				D	None	XW2Z-□□□K	XW2B-40G4	None	
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-86
				F	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	

<sup>\*1</sup> For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

Unit	I/O capac- ity	Number of con- nectors	Polarity	Connection pat-	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connec- tion dia- gram
CJ1W-	16 inputs	1 Fujitsu	NPN/PNP	С	None	XW2Z-□□□A	XW2D-20G6	None	A-87
MD231		connector		С	None	XW2Z-□□□A	XW2B-20G5	None	
				С	None	XW2Z-□□□A	XW2B-20G4	None	
				С	None	XW2Z-□□□A	XW2C-20G6-IO16	Yes	A-88
				С	None	XW2Z-□□□A	XW2C-20G5-IN16*2	Yes	
				С	None	XW2Z-□□□A	XW2E-20G5-IN16*2	Yes	
				С	None	XW2Z-□□□A	XW2F-20G7-IN16*2	Yes	
				С	None	XW2Z-□□□A	XW2N-20G8-IN16*2	Yes	
	16 outputs	1 Fujitsu	NPN	С	None	XW2Z-□□□A	XW2D-20G6	None	A-87
		connector		С	None	XW2Z-□□□A	XW2B-20G5	None	
				С	None	XW2Z-□□□A	XW2B-20G4	None	
				С	None	XW2Z-□□□A	XW2C-20G6-IO16	Yes	A-88
				С	None	XW2Z-□□□A	XW2F-20G7-OUT16	Yes	
CJ1W-	16 inputs	1 MIL con-	NPN/PNP	С	None	XW2Z-□□□X	XW2D-20G6	None	A-89
MD232		nector		С	None	XW2Z-□□□X	XW2B-20G5	None	
				С	None	XW2Z-□□□X	XW2B-20G4	None	
	16 outputs	1 MIL con-	PNP	С	None	XW2Z-□□□X	XW2D-20G6	None	A-89
		nector	or	С	None	XW2Z-□□□X	XW2B-20G5	None	
				С	None	XW2Z-□□□X	XW2B-20G4	None	
CJ1W-	16 inputs		NPN/PNP	С	None	XW2Z-□□□X	XW2D-20G6	None	A-89
MD233	16 outputs 1 MIL con-		С	None	XW2Z-□□□X	XW2B-20G5	None		
				С	None	XW2Z-□□□X	XW2B-20G4	None	
			con- NPN	С	None	XW2Z-□□□X	XW2D-20G6	None	A-89
		nector		С	None	XW2Z-□□□X	XW2B-20G5	None	
				С	None	XW2Z-□□□X	XW2B-20G4	None	
CJ1W-	32 outputs	1 Fujitsu	NPN/PNP	D	None	XW2Z-□□□B	XW2D-40G6	None	A-90
MD261		connector		D	None	XW2Z-□□□B	XW2D-40G6-RF*3	None	
				D	None	XW2Z-□□□B	XW2B-40G5	None	
				D	None	XW2Z-□□□B	XW2B-40G4	None	
				D	None	XW2Z-□□□BU	XW2D-40C6	None	
				F	2	XW2Z-□□□D	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□D	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□D	XW2B-20G4 (2 Units)	None	
				F	2	XW2Z-□□□D	XW2C-20G6-IO16 (2 Units)	Yes	A-91
				F	2	XW2Z-□□□D	XW2C-20G5-IN16 (2 Units)*2	Yes	
				F	2	XW2Z-□□□D	XW2E-20G5-IN16 (2 Units)*2	Yes	
				F	2	XW2Z-□□□D	XW2F-20G7-IN16 (2 Units)*2	Yes	
				F	2	XW2Z-□□□D	XW2N-20G8-IN16 (2 Units)*2	Yes	
	32 outputs	1 Fujitsu	NPN	D	None	XW2Z-□□□B	XW2D-40G6	None	A-90
	2 - 2 2 1 P 0 1 0	connector		D	None	XW2Z-□□□B	XW2B-40G5	None	
				D	None	XW2Z-□□□B	XW2B-40G4	None	
				D	None	XW2Z-□□□BU	XW2D-40C6	None	
				F	2	XW2Z-□□□L	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2B-20G4 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2C-20G6-IO16 (2 Units)	Yes	A-91
				F	2	XW2Z-□□□L	XW2F-20G7-OUT16 (2 Units)	Yes	

For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

The inputs are NPN. For PNP inputs, reverse the polarity of the external power supply connections to the power supply terminals on the Connector-Terminal Block Conversion Unit.

Bleeder resistance (5.6 k $\Omega$ ) is built in.

Unit	I/O capac- ity	Number of con- nectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connec- tion dia- gram
CJ1W-	32 inputs	1 MIL con-	NPN/PNP	D	None	XW2Z-□□□K	XW2D-40G6	None	A-92
MD263		nector		D	None	XW2Z-□□□K	XW2D-40G6-RM*3	None	
				D	None	XW2Z-□□□K	XW2B-40G5	None	
				D	None	XW2Z-□□□K	XW2B-40G4	None	
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	None	A-93
				F	2	XW2Z-□□□N	XW2C-20G5-IN16 (2 Units)*2	Yes	
				F	2	XW2Z-□□□N	XW2E-20G5-IN16 (2 Units)*2	Yes	
				F	2	XW2Z-□□□N	XW2F-20G7-IN16 (2 Units)*2	Yes	
				F	2	XW2Z-□□□N	XW2N-20G8-IN16 (2 Units)*2	` '	
		1 MIL con-	NPN	D	None	XW2Z-□□□B	XW2D-40G6	None	A-92
	necto	nector		D	None	XW2Z-□□□B	XW2B-40G5	None	
				D	None	XW2Z-□□□B	XW2B-40G4	None	
				F	2	XW2Z-□□□L	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2B-20G4 (2 Units)	None	
				F	2	XW2Z-□□□L	XW2C-20G6-IO16 (2 Units)	Yes	A-93
				F	2	XW2Z-□□□L	XW2F-20G7-OUT16 (2 Units)	Yes	
CJ1W-	32 inputs	1 MIL con-	NPN/PNP	D	None	XW2Z-□□□K	XW2D-40G6	None	A-94
MD563		nector		D	None	XW2Z-□□□K	XW2D-40G6-RM*3	None	
				D	None	XW2Z-□□□K	XW2B-40G5	None	
				D	None	XW2Z-□□□K	XW2B-40G4	None	
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	
	32 outputs	1 MIL con-	NPN	D	None	XW2Z-□□□K	XW2D-40G6	None	A-94
		nector		D	None	XW2Z-□□□K	XW2B-40G5	None	
				D	None	XW2Z-□□□K	XW2B-40G4	None	
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	

<sup>\*1</sup> For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

<sup>\*2</sup> The inputs are NPN. For PNP inputs, reverse the polarity of the external power supply connections to the power supply terminals on the Connector-Terminal Block Conversion Unit.

<sup>\*3</sup> Bleeder resistance (5.6 k $\Omega$ ) is built in.

## Connecting Cables

Length	XW2Z-□□A	XW2Z-□□B	XW2Z-□□BU	XW2Z-□□D	XW2Z-□□L	XW2Z-□□X	XW2Z-□□K
0.25 m							XW2Z-C25K
0.5 m	XW2Z-050A	XW2Z-050B	XW2Z-050BU			XW2Z-C50X	XW2Z-C50K
1.0 m	XW2Z-100A	XW2Z-100B	XW2Z-100BU	XW2Z-100D	XW2Z-100L	XW2Z-100X	XW2Z-100K
1.5 m	XW2Z-150A	XW2Z-150B	XW2Z-150BU	XW2Z-150D	XW2Z-150L		XW2Z-150K
2.0 m	XW2Z-200A	XW2Z-200B	XW2Z-200BU	XW2Z-200D	XW2Z-200L	XW2Z-200X	XW2Z-200K
3.0 m	XW2Z-300A	XW2Z-300B	XW2Z-300BU	XW2Z-300D	XW2Z-300L	XW2Z-300X	XW2Z-300K
5.0 m	XW2Z-500A	XW2Z-500B	XW2Z-500BU	XW2Z-500D	XW2Z-500L	XW2Z-500X	XW2Z-500K
10.0 m	XW2Z-010A	XW2Z-010B		XW2Z-010D	XW2Z-010L	XW2Z-010X	
15.0 m	XW2Z-15MA	XW2Z-15MB		XW2Z-15MD	XW2Z-15ML		
20.0 m	XW2Z-20MA	XW2Z-20MB		XW2Z-20MD	XW2Z-20ML		

Len	Length						
Α	В	XW2Z-□□N					
1.0 m	0.75 m	XW2Z-100N					
1.5 m	1.25 m	XW2Z-150N					
2.0 m	1.75 m	XW2Z-200N					
3.0 m	2.75 m	XW2Z-300N					
5.0 m	4.75 m	XW2Z-500N					
10.0 m	9.75 m	XW2Z-010N					
15.0 m	14.75 m	XW2Z-15MN					
20.0 m	19.75 m	XW2Z-20MN					

For details on Connecting Cables and Connector-Terminal Block Conversion Units, refer to "Reduced-wiring/Man-hour Reduction Device" in "FA System Device General Catalog" (Cat. No. SAOO-211).

### Connections to I/O Relay Terminals

Refer to the pages given in the right columns for connection diagrams and details on the I/O Relay Terminals and Connecting Cables.

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	I/O Relay Terminal	Connection diagram
CJ1W-ID231	32 inputs	1 Fujitsu con-	NPN	Α	2	G79-I□C-□	G7TC-ID16	A-95
		nector		A	2	G79-I□C-□	G7TC-IA16	
CJ1W-ID232	32 inputs	1 MIL con-	NPN	Α	2	G79-O□-□-D1	G7TC-ID16	
		nector		Α	2	G79-O□-□-D1	G7TC-IA16	
CJ1W-ID233	32 inputs	1 MIL con-	NPN	Α	2	G79-O□-□-D1	G7TC-ID16	
		nector		Α	2	G79-O□-□-D1	G7TC-IA16	
CJ1W-ID261	64 inputs	2 Fujitsu con- nectors	NPN	В	2	G79-I□C-□	G7TC-ID16	
				В	2	G79-I□C-□	G7TC-IA16	
CJ1W-ID262	64 inputs	2 MIL con- nectors	NPN	В	2	G79-O□-□-D1	G7TC-ID16	
				В	2	G79-O□-□-D1	G7TC-IA16	
CJ1W-OD231	32 outputs	1 Fujitsu con-	NPN	Α	2	G79-O□C-□	G7TC-OC16	A-98
		nector		Α	2	G79-O□C-□	G7TC-OC08	
				Α	2	G79-O□C-□	G70D-SOC16	A-97
				Α	2	G79-O□C-□	G70D-FOM16	
				Α	2	G79-O□C-□	G70D-VSOC16	A-96
				A	2	G79-O□C-□	G70D-VFOM16	
				А	2	G79-O□C-□	G70A-ZOC16-3 and Relay	A-99
				Α	2	G79-O□C-□	G70R-SOC08	A-98
				Α	2	G79-O□C-□	G70D-SOC08	A-97
CJ1W-OD232	32 outputs	1 MIL con-	PNP	А	2	G79-I□-□-D1	G7TC-OC16-1	A-99
		nector		Α	2	G79-O□-□-D1	G70D-SOC16-1	
				А	2	G79-O□-□-D1	G70D-FOM16-1	
				Α	2	G79-O□-□-D1	G70A-ZOC16-4 and Relay	
CJ1W-OD233	32 outputs	1 MIL con-	NPN	Α	2	G79-O□-□-D1	G7TC-OC16	A-98
		nector		Α	2	G79-O□-□-D1	G7TC-OC08	
				Α	2	G79-O□-□-D1	G70D-SOC16	A-97
				Α	2	G79-O□-□-D1	G70D-FOM16	
				Α	2	G79-O□-□-D1	G70D-VSOC16	A-96
				Α	2	G79-O□-□-D1	G70D-VFOM16	
				Α	2	G79-O□-□-D1	G70A-ZOC16-3 and Relay	A-99
				Α	2	G79-O□-□-D1	G70R-SOC08	A-98
				Α	2	G79-O□-□-D1	G70D-SOC08	A-97
CJ1W-OD234	32 outputs	1 MIL con-	NPN	Α	2	G79-O□-□-D1	G7TC-OC16	A-98
		nector		A	2	G79-O□-□-D1	G7TC-OC08	1
				Α	2	G79-O□-□-D1	G70D-SOC16	A-97
				Α	2	G79-O□-□-D1	G70D-FOM16	
				Α	2	G79-O□-□-D1	G70D-VSOC16	A-96
				A	2	G79-O□-□-D1	G70D-VFOM16	
				Α	2	G79-O□-□-D1	G70A-ZOC16-3 and Relay	A-99
				A	2	G79-O□-□-D1	G70R-SOC08	A-98
				A	2	G79-O□-□-D1	G70D-SOC08	A-90 A-97

<sup>\*1</sup> For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	I/O Relay Terminal	Connection diagram
CJ1W-OD261	64 outputs	2 Fujitsu con-	NPN	В	2	G79-O□C-□	G7TC-OC16	A-98
		nectors		В	2	G79-O□C-□	G7TC-OC08	
				В	2	G79-O□C-□	G70D-SOC16	A-97
				В	2	G79-O□C-□	G70D-FOM16	
				В	2	G79-O□C-□	G70D-VSOC16	A-96
				В	2	G79-O□C-□	G70D-VFOM16	
				В	2	G79-O□C-□	G70A-ZOC16-3 and Relay	A-99
				В	2	G79-O□C-□	G70R-SOC08	A-98
				В	2	G79-O□C-□	G70D-SOC08	A-97
CJ1W-OD262	64 outputs	2 MIL con-	PNP	В	2	G79-I□-□-D1	G7TC-OC16-1	A-99
		nectors		В	2	G79-O□-□-D1	G70D-SOC16-1	
				В	2	G79-O□-□-D1	G70D-FOM16-1	
				В	2	G79-O□-□-D1	G70A-ZOC16-4 and Relay	
CJ1W-OD263	64 outputs	2 MIL con-	NPN	В	2	G79-O□-□-D1	G7TC-OC16	A-98
	,	nectors		В	2	G79-O□-□-D1	G7TC-OC08	
				В	2	G79-O□-□-D1	G70D-SOC16	A-97
				В	2	G79-O□-□-D1	G70D-FOM16	
				В	2	G79-O□-□-D1	G70D-VSOC16	A-96
				В	2	G79-O□-□-D1	G70D-VFOM16	
				В	2	G79-O□-□-D1	G70A-ZOC16-3 and Relay	A-99
				В	2	G79-O□-□-D1	G70R-SOC08	A-98
				В	2	G79-O□-□-D1	G70D-SOC08	A-97
CJ1W-MD231	16 inputs	1 Fujitsu con- nector	NPN	F	None	G79-□C	G7TC-ID16	A-95
GTW-MD231				F	None	G79-□C	G7TC-IA16	
	16 outputs	1 Fujitsu con-	NPN	F	None	G79-□C	G7TC-OC16	A-98
	. o outputo	nector		F	None	G79-□C	G7TC-OC08	-
				F	None	G79-□C	G70D-SOC16	A-97
				F	None	G79-□C	G70D-FOM16	
				F	None	G79-□C	G70D-VSOC16	A-96
				F	None	G79-□C	G70D-VFOM16	
				F	None	G79-□C		A-99
				F	None	G79-□C G79-□C	G70A-ZOC16-3 and Relay G70R-SOC08	A-99 A-98
				F	None	G79-□C	G70D-SOC08	A-96 A-97
CJ1W-MD232	16 inputs	1 MIL con-	PNP	E	None	G79-□C	G7TC-ID16	A-97 A-95
CJ I W-WIDZ3Z	16 inputs	nector	FINE	E	None	G79-O□C	G7TC-IA16	A-95
	16 outputs	1 MIL con-	PNP	F	None	G79-O□C	G7TC-OC16-1	A-99
	10 outputs	nector	FINE	F	None	G79-I□C	G70D-SOC16-1	A-99
				F				-
					None	G79-I□C	G70D-FOM16-1	
				F	None	G79-I□C	G70A-ZOC16-4 and Relay	
CJ1W-MD233	16 inputs	1 MIL con- nector	NPN	E	None	G79-O□C	G7TC-ID16	A-95
	16 outputs	1 MIL con- nector	NPN	E	None	G79-O□C	G7TC-IA16	
				E	None	G79-O□C	G7TC-OC16	A-98
				E	None	G79-O□C	G7TC-OC08	
				E	None	G79-O□C	G70D-SOC16	A-97
				E	None	G79-O□C	G70D-FOM16	
				E	None	G79-O□C	G70D-VSOC16	A-96
				Е	None	G79-O□C	G70D-VFOM16	
				Е	None	G79-O□C	G70A-ZOC16-3 and Relay	A-99
				Е	None	G79-O□C	G70R-SOC08	A-98
		1		E	None	G79-O□C	G70D-SOC08	A-97

<sup>\*1</sup> For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

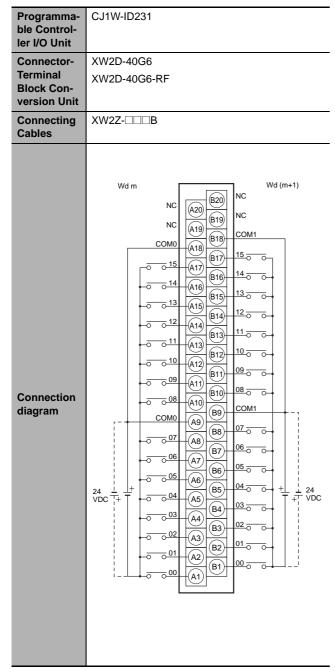
Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	I/O Relay Terminal	Connection diagram
CJ1W-MD261	32 inputs	1 Fujitsu con- nector	NPN	В	2	G79-I□C-□	G7TC-ID16	A-95
				В	2	G79-I□C-□	G7TC-IA16	
	32 outputs	1 Fujitsu con- nector	NPN	В	2	G79-O□C-□	G7TC-OC16	A-98
				В	2	G790□C-□	G7TC-OC08	
				В	2	G79-O□C-□	G70D-SOC16	A-97
				В	2	G79-O□C-□	G70D-FOM16	
				В	2	G79-O□C-□	G70D-VSOC16	A-96
				В	2	G79-O□C-□	G70D-VFOM16	
				В	2	G790□C-□	G70A-ZOC16-3 and Relay	A-99
				В	2	G79-O□C-□	G70R-SOC08	A-98
				В	2	G79-O□C-□	G70D-SOC08	A-97
CJ1W-MD263	32 inputs	1 MIL con- nector	NPN	В	2	G79-O□-□-D1	G7TC-ID16	A-95
				В	2	G79-O□-□-D1	G7TC-IA16	
	32 outputs	1 MIL con- nector	NPN	В	2	G79-O□-□-D1	G7TC-OC16	A-98
				В	2	G79-O□-□-D1	G7TC-OC08	
				В	2	G79-O□-□-D1	G70D-SOC16	A-97
				В	2	G79-O□-□-D1	G70D-FOM16	
				В	2	G79-O□-□-D1	G70D-VSOC16	A-96
				В	2	G79-O□-□-D1	G70D-VFOM16	
				В	2	G79-O□-□-D1	G70A-ZOC16-3 and Relay	A-99
				В	2	G79-O□-□-D1	G70R-SOC08	A-98
				В	2	G79-O□-□-D1	G70D-SOC08	A-97

<sup>\*1</sup> For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

# **Connector-Terminal Block Conversion Unit Connection Diagrams**

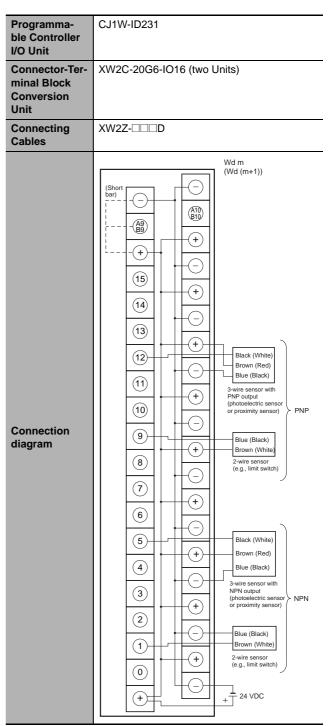
The applicable terminals on the Connector-Terminal Block Conversion Unit and external connection diagrams are provided below for Basic I/O Unit connections to Connector-Terminal Block Conversion Units.

#### Inputs



Note 1 The polarity for input power supply connections indicated with dotted lines (----) can be connected in either direction provided that the same polarity is used for the commons for rows A and B.

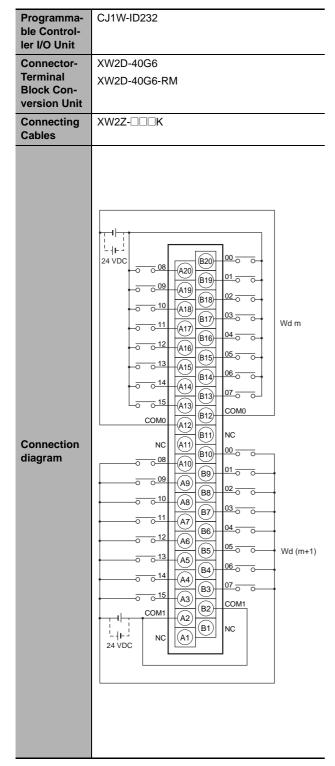
2 Both COM0 and COM1 have two pins each. They are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the  $_{\oplus}$  terminal for NPN.

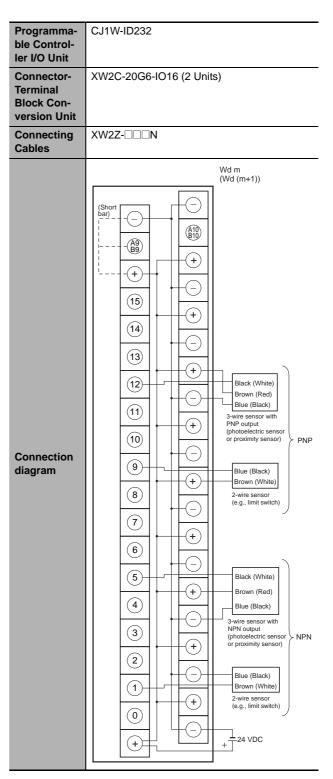
Connect the A9/B9 terminal and the  $_{\mbox{\scriptsize $\ominus$}}$  terminal for PNP.

(Use the enclosed short bar.)



Note 1 The polarity for input power supply connections indicated with dotted lines (----) can be connected in either direction provided that the same polarity is used for the commons.

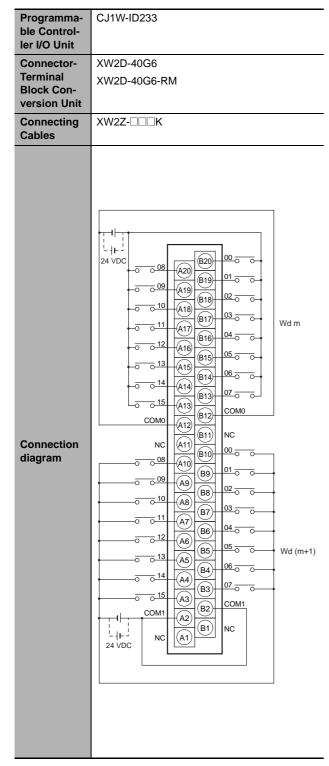
2 Both COM0 and COM1 have two pins each. They are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the ⊕ terminal for

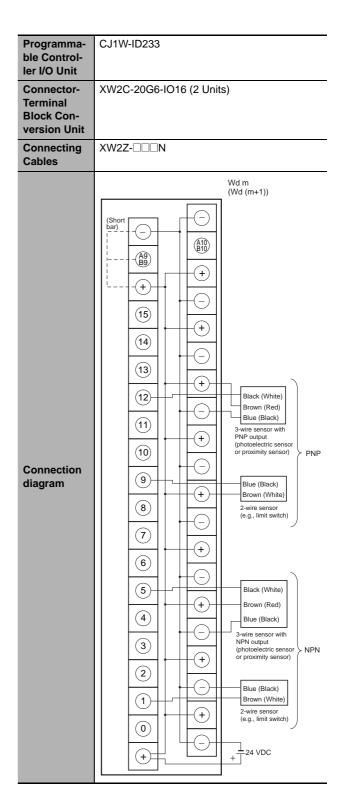
Connect the A9/B9 terminal and the  $\ominus$  terminal for PNP.

(Use the enclosed short bar.)



Note 1 The polarity for input power supply connections indicated with dotted lines (----) can be connected in either direction provided that the same polarity is used for the commons.

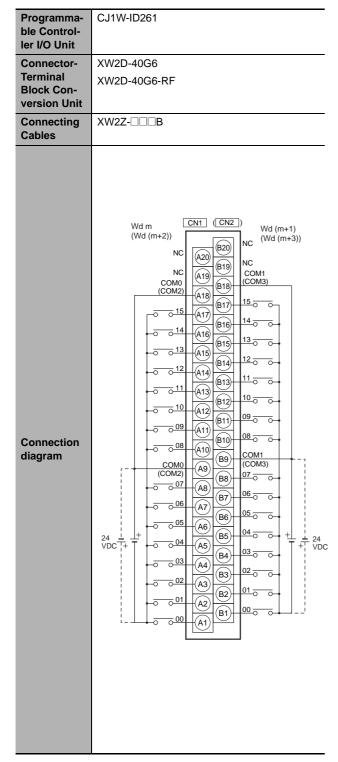
2 Both COM0 and COM1 have two pins each. They are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the ⊕ terminal for NPN

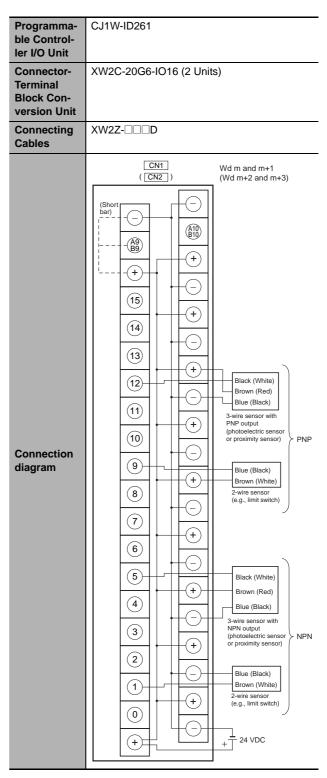
Connect the A9/B9 terminal and the  $\ominus$  terminal for PNP.

(Use the enclosed short bar.)



Note 1 The polarity for input power supply connections indicated with dotted lines (-----) can be connected in either direction provided that the same polarity is used for the commons for rows A and B.

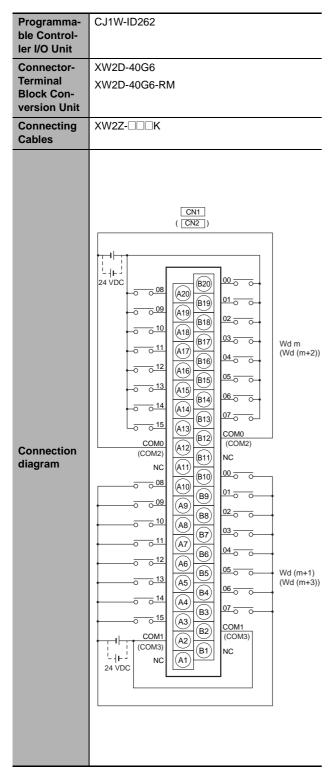
**2** COM0, COM1, COM2, and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the ⊕ terminal for NPN

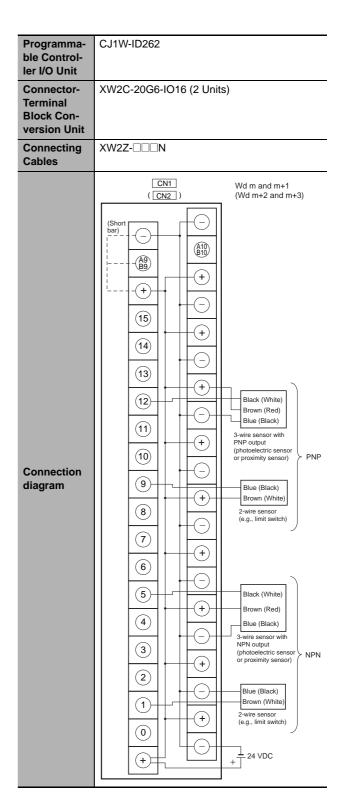
Connect the A9/B9 terminal and the  $\ominus$  terminal for PNP.

(Use the enclosed short bar.)



**Note 1** The polarity for input power supply connections indicated with dotted lines (----) can be connected in either direction provided that the same polarity is used for the commons.

**2** COM0, COM1, COM2, and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.

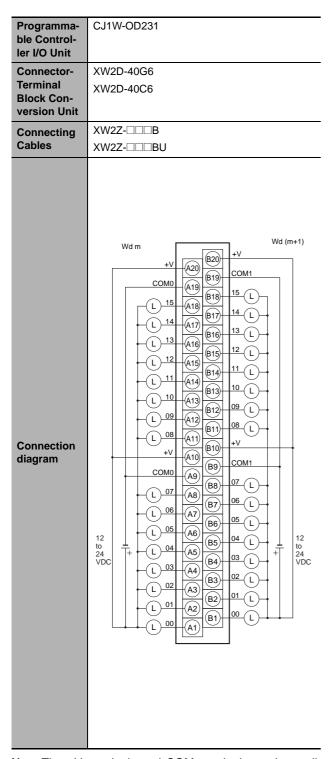


Note 1 Connect the A9/B9 terminal and the  $\oplus$  terminal for NPN

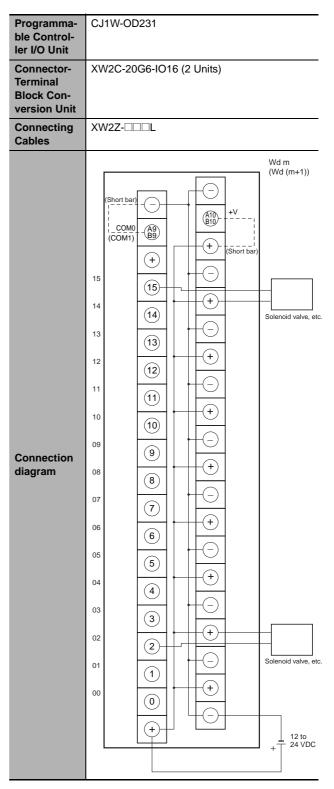
Connect the A9/B9 terminal and the  $\ominus$  terminal for PNP.

(Use the enclosed short bar.)

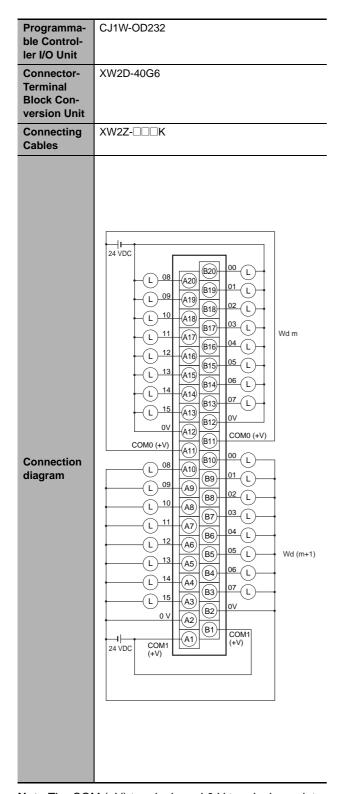
#### Outputs



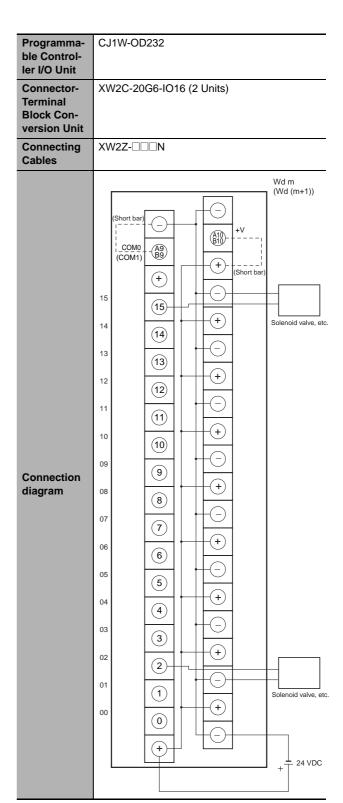
Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the  $\ominus$  terminal. Connect the A10/B10 terminal and the  $\oplus$  terminal. (Use the enclosed short bar.)



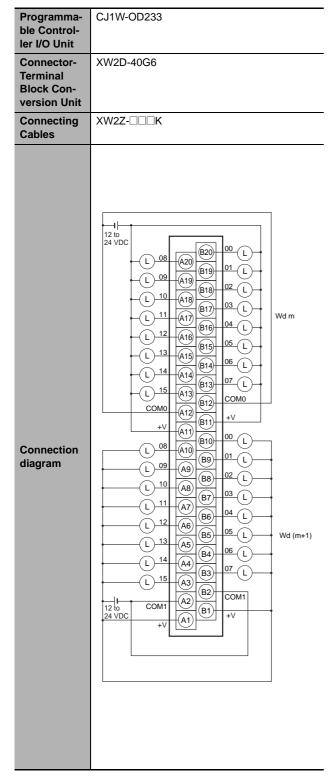
Note The COM (+V) terminals and 0 V terminals are internally connected inside the PLC, but they must all be wired.



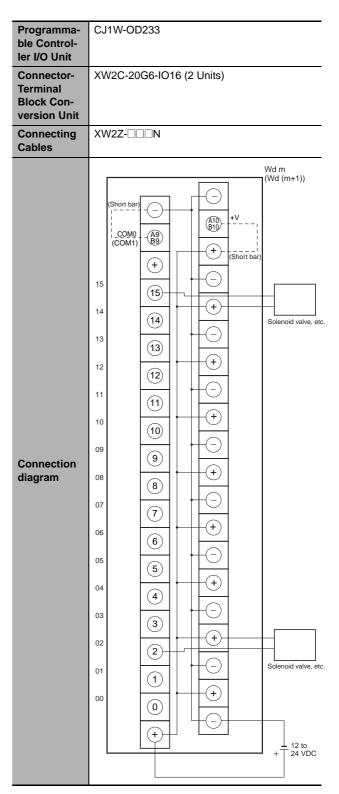
Note 1 Connect the A9/B9 terminal and the ⊖ terminal.

Connect the A10/B10 terminal and the ⊕ terminal.

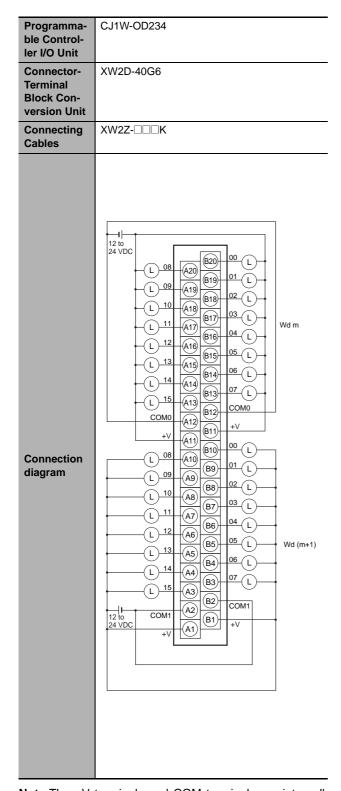
(Use the enclosed short bar.)



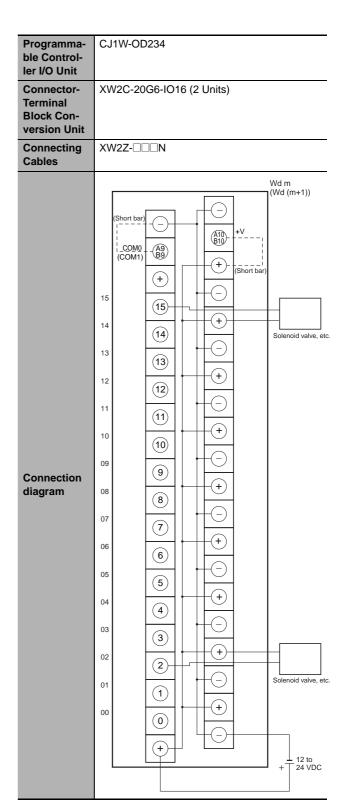
Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the  $\ominus$  terminal. Connect the A10/B10 terminal and the  $\oplus$  terminal. (Use the enclosed short bar.)



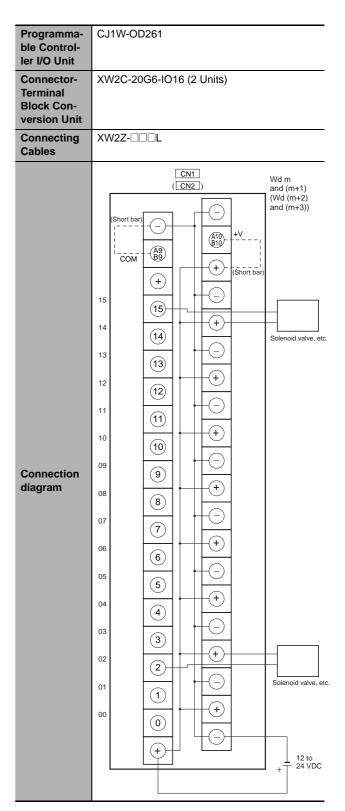
Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the  $\ominus$  terminal. Connect the A10/B10 terminal and the  $\oplus$  terminal. (Use the enclosed short bar.)

Programma- ble Control-	CJ1W-OD261						
ler I/O Unit	\(\text{\tint{\text{\tint{\text{\tin}\text{\text{\text{\text{\text{\text{\text{\text{\text{\ti}\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\tex{\tex						
Connector- Terminal	XW2D-40G6						
Block Con- version Unit	XW2D-40C6						
Connecting	XW2Z-□□□B						
Cables	XW2Z-□□BU						
Connection diagram	Wd m (Wd (m+2))						

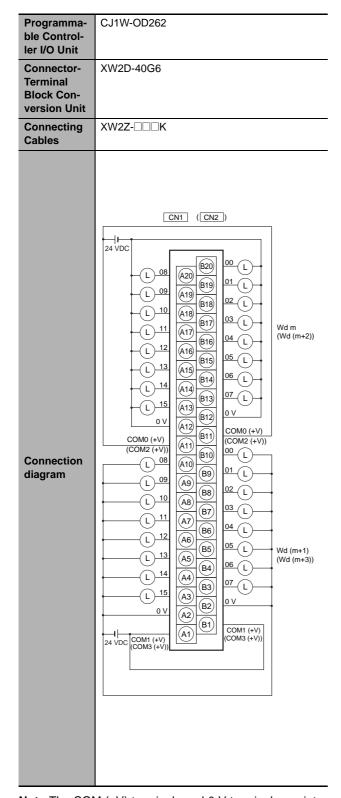
Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.



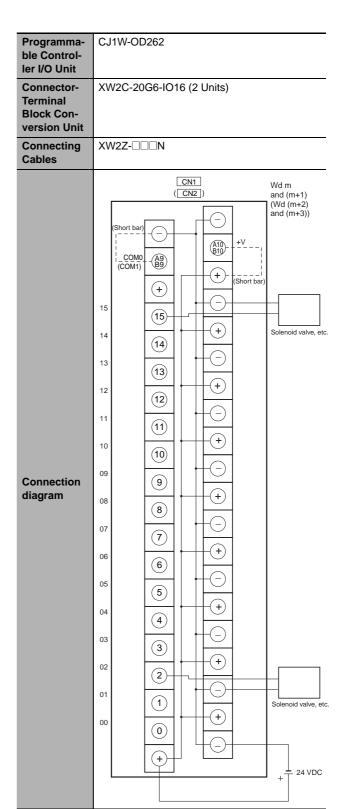
Note 1 Connect the A9/B9 terminal and the ⊝ terminal.

Connect the A10/B10 terminal and the ⊕ terminal.

(Use the enclosed short bar.)



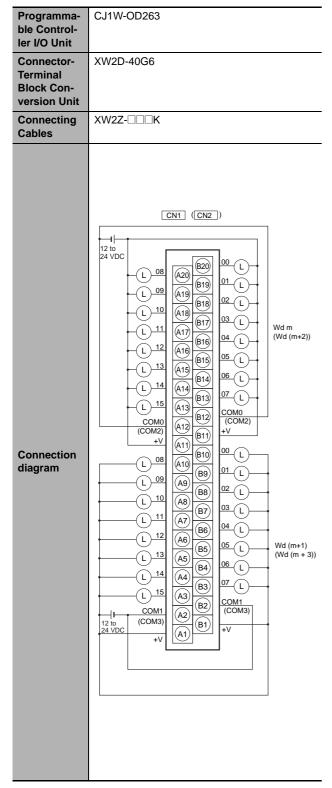
Note The COM (+V) terminals and 0 V terminals are internally connected inside the PLC, but they must all be wired.



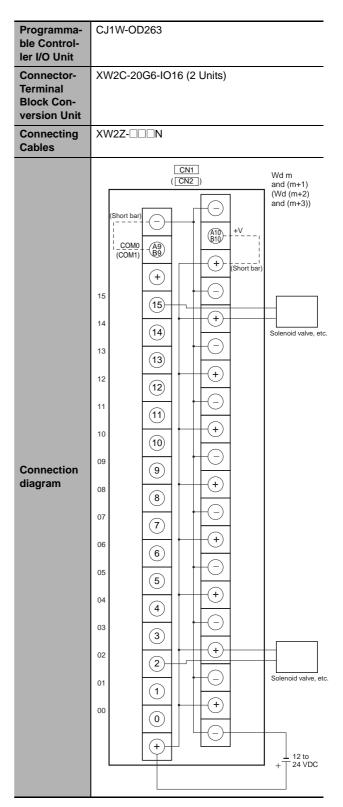
Note 1 Connect the A9/B9 terminal and the ⊝ terminal.

Connect the A10/B10 terminal and the ⊕ terminal.

(Use the enclosed short bar.)

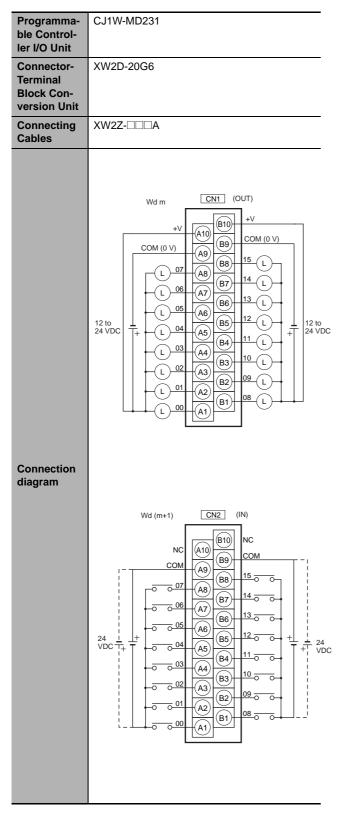


Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.



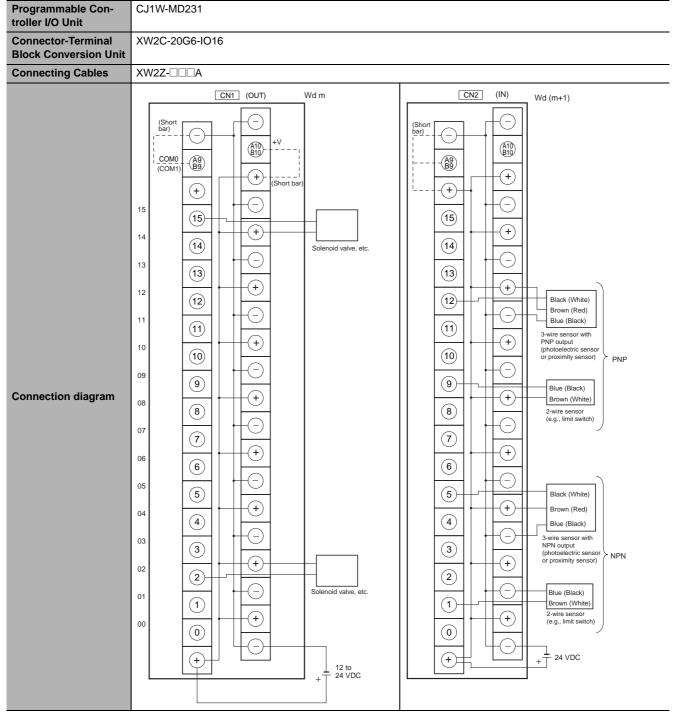
Note 1 Connect the A9/B9 terminal and the  $\ominus$  terminal. Connect the A10/B10 terminal and the  $\oplus$  terminal. (Use the enclosed short bar.)

#### Inputs and Outputs



Note 1 The polarity for input power supply connections indicated with dotted lines (----) can be connected in either direction.

2 The COM terminals are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the ⊝

Connect the A10/B10 terminal and the  $\oplus$  terminal.

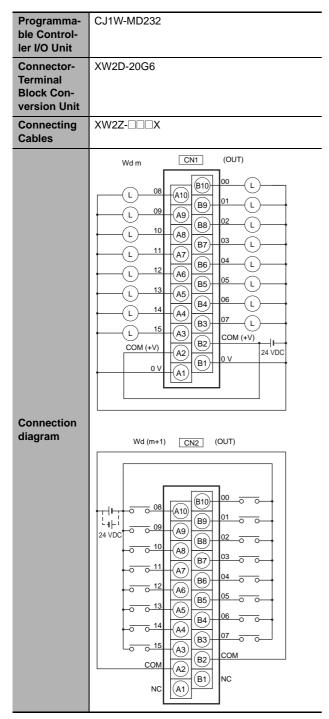
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion

Note 1 Connect the A9/B9 terminal and the  $\oplus$  terminal for NPN.

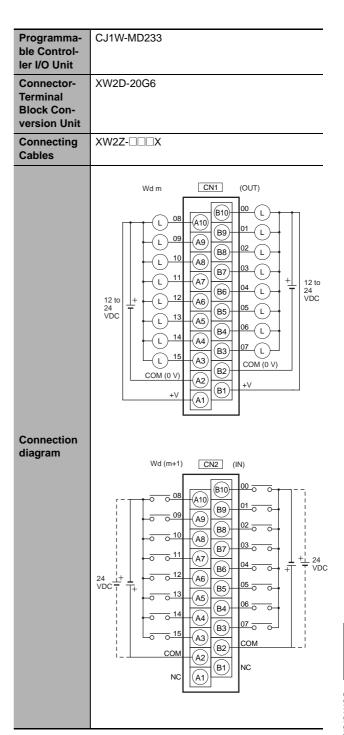
Connect the A9/B9 terminal and the  $\ominus$  terminal for PNP.

(Use the enclosed short bar.)



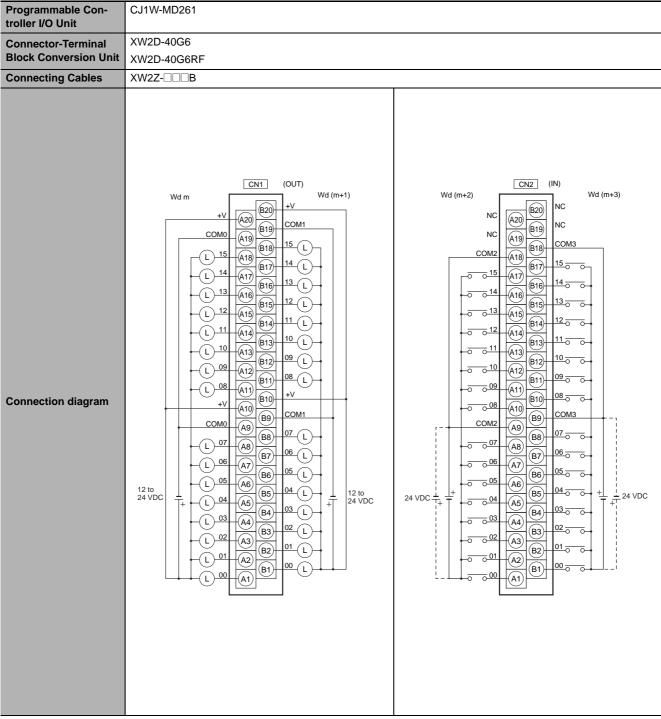
**Note 1** The polarity for input power supply connections indicated with dotted lines (\_\_\_\_\_) can be connected in either direction.

2 The COM terminals and 0V terminal are internally connected inside the PLC, but they must all be wired.



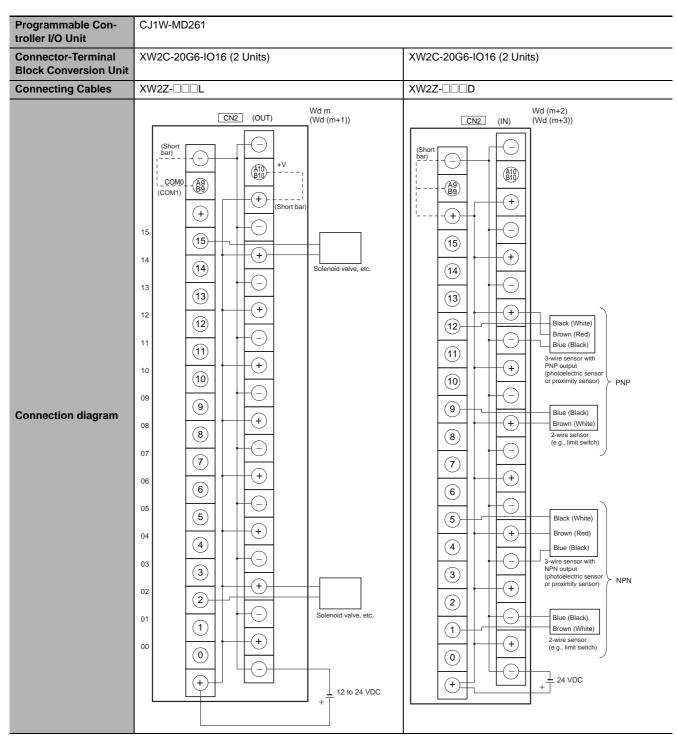
Note 1 The polarity for input power supply connections indicated with dotted lines (\_\_\_\_) can be connected in either direction.

2 The COM terminals and +V terminals are internally connected inside the PLC, but they must all be wired.



Note The +V terminals and COM terminals are Note 1 internally connected inside the PLC, but they must all be wired.

- 1 The polarity for input power supply connections indicated with dotted lines (\_\_\_\_\_) can be connected in either direction provided that the same polarity is used for the commons for rows A and B
- **2** Both COM2 and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the ⊝ terminal.

Connect the A10/B10 terminal and the ⊕ terminal.

(Use the enclosed short bar.)

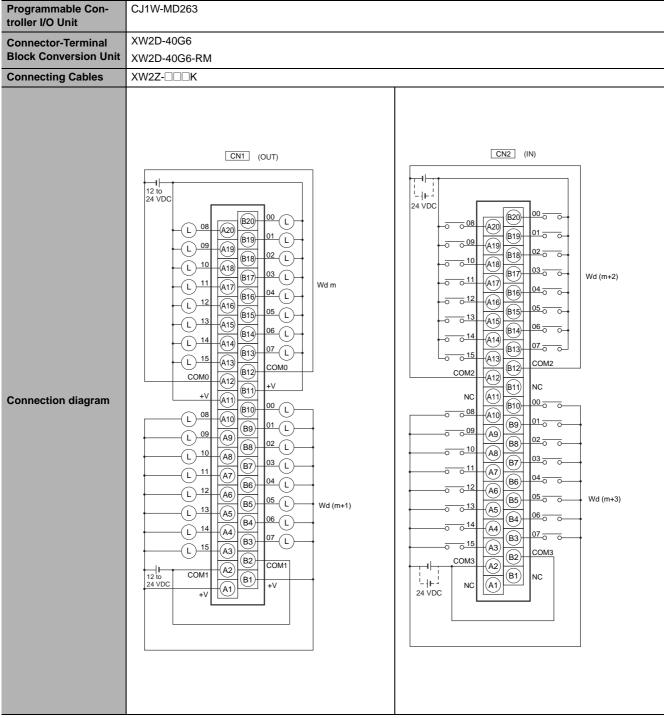
2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Connect the A9/B9 terminal and the  $\oplus$ Note 1 terminal for NPN.

Connect the A9/B9 terminal and the ⊝ terminal for PNP.

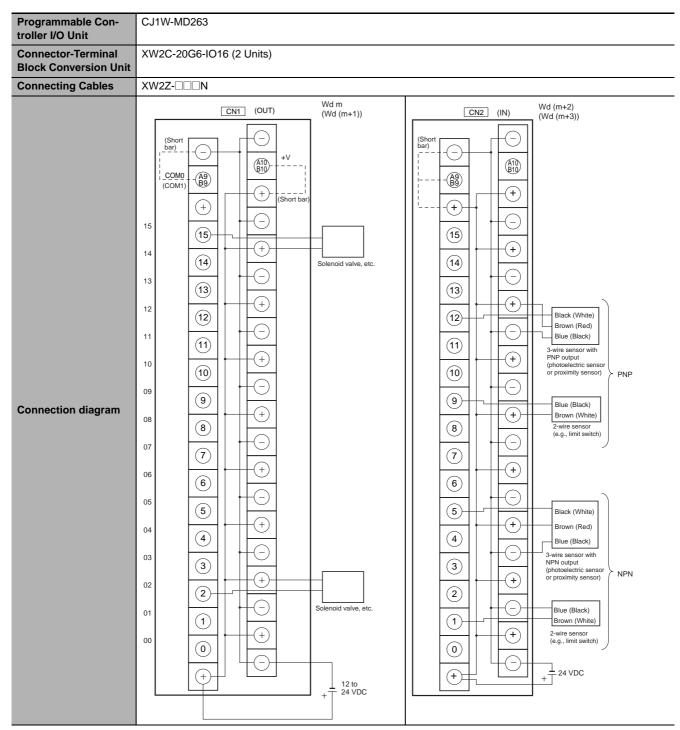
(Use the enclosed short bar.)

The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.



Note The +V terminals and COM terminals are Note 1 internally connected inside the PLC, but they must all be wired.

- ote 1 The polarity for input power supply connections indicated with dotted lines (\_\_\_\_\_) can be connected in either direction.
  - 2 Both COM2 and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.



Note 1 Connect the A9/B9 terminal and the ⊝ terminal.

Connect the A10/B10 terminal and the  $\oplus$  terminal.

(Use the enclosed short bar.)

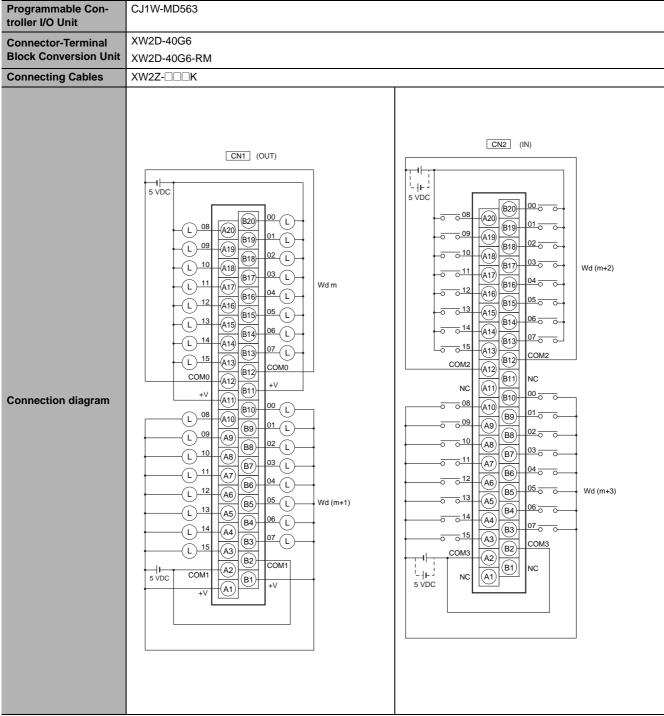
2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Note 1 Connect the A9/B9 terminal and the  $\oplus$  terminal for NPN.

Connect the A9/B9 terminal and the  $\ominus$  terminal for PNP.

(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.



Note 1 The +V terminals and COM terminals Note 1 are internally connected inside the PLC, but they must all be wired.

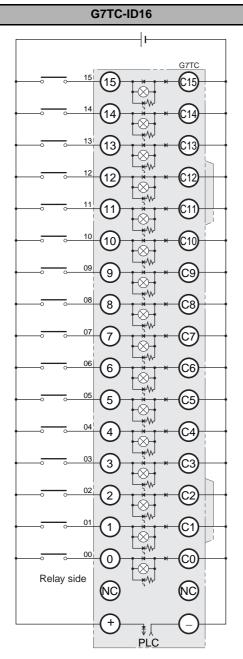
- 2 The power supply voltage for the CJ1W-MD563 is 5 V.
- ote 1 The COM terminals are internally connected inside the PLC, but they must all be wired.
  - 2 The power supply voltage for the CJ1W-MD563 is 5 V.

#### **Connection Diagrams for I/O Relay Terminals**

Connection examples and internal connection diagrams for I/O Relay Terminals connected to Basic I/O Units are shown below.

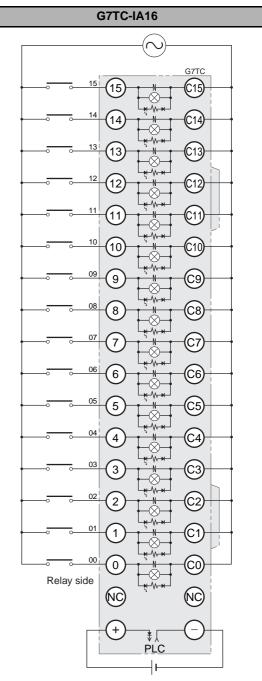
#### Inputs

**G7TC I/O Relay Terminals** 



#### TOP VIEW

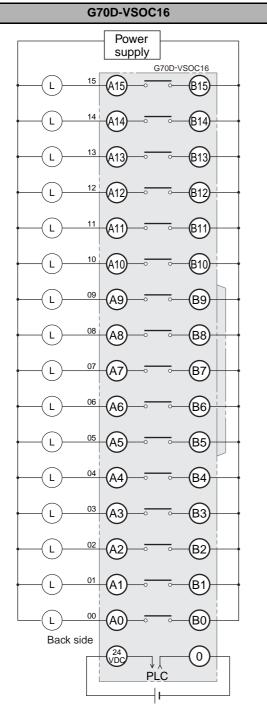
- Note 1 Inputs to the PLC Input Units and I/O Relay Terminals use isolated contacts. "00" to "15" are the input bit numbers for the PLC Input Unit and the input numbers for the I/O Relay Terminal.
  - 2 Use the G78-04 short bar to short to the common terminal.



- Note 1 Inputs to the PLC Input Units and I/O Relay Terminals use isolated contacts. "00" to "15" are the input bit numbers for the PLC Input Unit and the input numbers for the I/O Relay Terminal.
  - 2 Use the G78-04 short bar to short to the common terminal.

#### Outputs

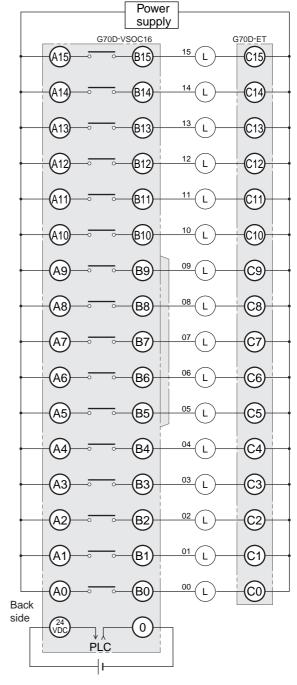
#### **G70D-V Relay Terminals**



TOP VIEW

- Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "15" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.
  - 2 Use the G6D-4-SB short bar to short to the common terminal

#### G70D-VSOC16+G70D-ET



- Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "15" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.
  - 2 Use the G6D-4-SB short bar to short to the common terminal.

#### **G70D Relay Terminals**

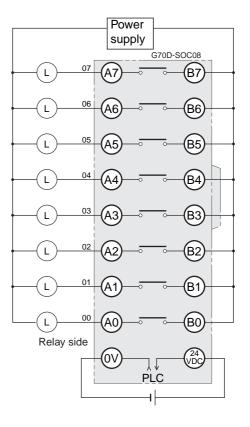
#### **G70D-SOC16**

# Power supply G70D-SOC16 B6 (B2 <u>06</u>(L (B2 Relay side 0 (NC (NC)

#### TOP VIEW

Note Every two outputs share a common. The current supplied is 3 A per common. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "15" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

#### **G70D-SOC08**



- Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "07" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.
  - 2 Use the G6D-4-SB short bar to short to the common terminal.

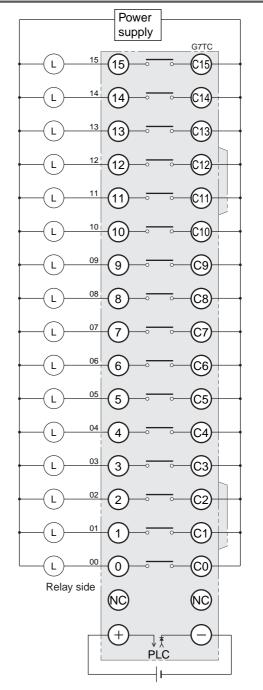
#### **G70R Relay Terminals**

#### G70R-SOC08

# Power supply G70R-SOC08 L 07 A7 B7 L 06 A6 B6 L 05 A5 B5 L 04 A4 B4 L 03 A3 B3 L 02 A2 B2 L 01 A1 B1 L 00 A0 B0 PLC

#### **G7TC I/O Relay Terminals**

#### G7TC-OC16/OC08



TOP VIEW

- Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "07" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.
  - 2 Use the G6D-4-SB short bar to short to the common terminal.

- Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "15" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.
  - 2 The G7TC-OC08 has only 8 outputs and therefore does not have 8 to 15 and C8 to C15.
  - **3** Use the G78-04 short bar to short to the common terminal.

#### **G7TC I/O Relay Terminals**

# G7TC-OC16-1 Power supply G7TC 0 Relay side (NC

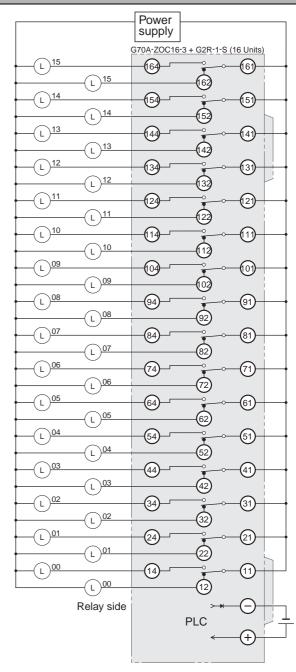
TOP VIEW

- Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "15" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.
  - **2** Use the G78-04 short bar to short to the common terminal.

₹ PLC

#### G70A-ZOC16 Relay Terminal Socket

#### G70A-ZOC16-3+G2R-1-S (16 Units)

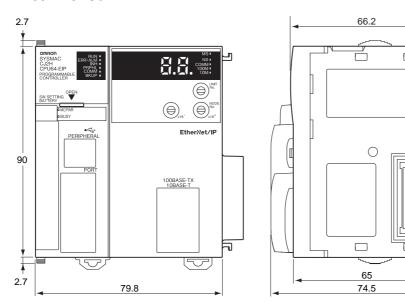


- Note 1 The above diagram is an example with the G2R-1-S(N) mounted to the G70A-ZOC16-3.
  - 2 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "15" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

#### **A-2** Dimensions

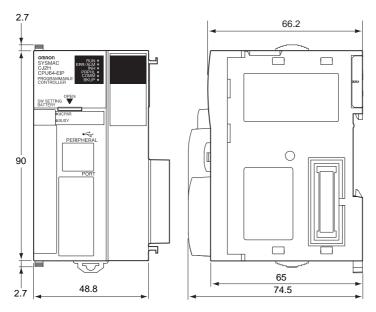
#### A-2-1 CJ2H CPU Units

#### CJ2H-CPU6□-EIP



Unit: mm

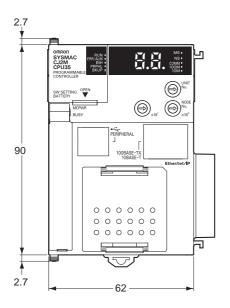
#### CJ2H-CPU6□

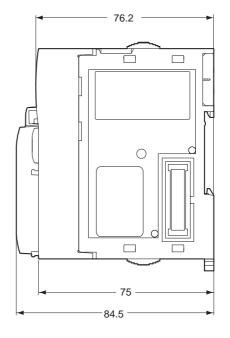


# **A-2 Dimensions** App A-2-2 CJ2M CPU Units

#### **CJ2M CPU Units** A-2-2

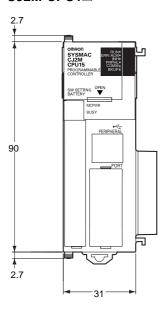
#### CJ2M-CPU3□

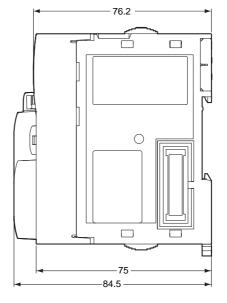




Unit: mm

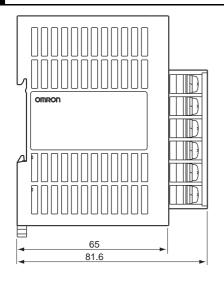
#### CJ2M-CPU1□

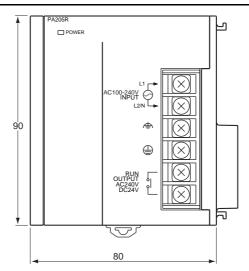




#### A-2-3 Power Supply Units

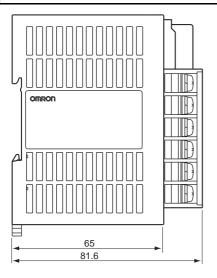
#### CJ1W-PA205R

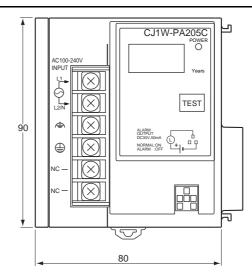




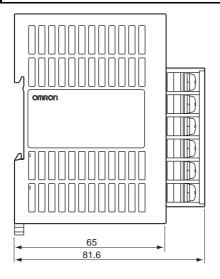
Unit: mm

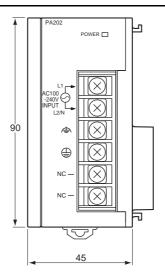
#### CJ1W-PA205C





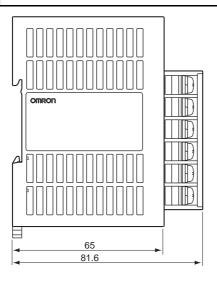
#### CJ1W-PA202

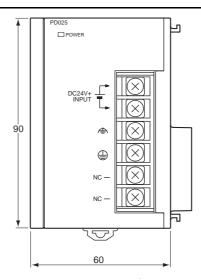




Unit: mm

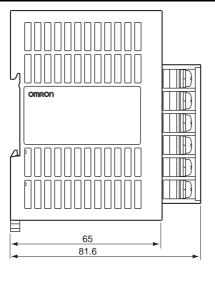
#### CJ1W-PD025

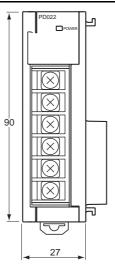




Unit: mm

#### CJ1W-PD022

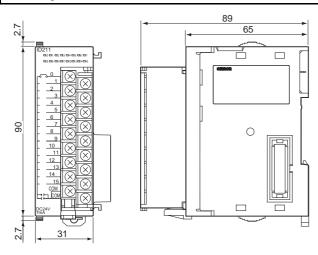




#### A-2-4 Basic I/O Units

#### 8/16-point Units with 18-terminal Terminal Blocks

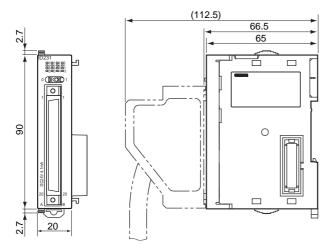
Unit: mm



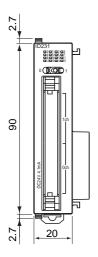
#### 32-point Units (Input Units and Output Units)

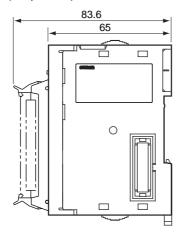
Units with Fujitsu-compatible Connector (40-pin  $\times$  1)

Unit: mm



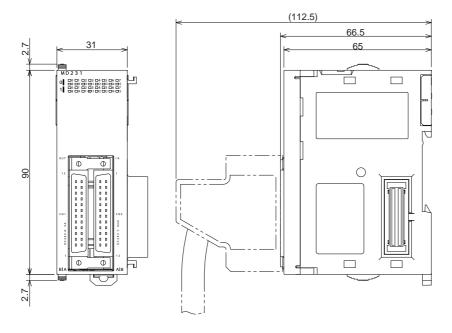
Units with MIL Connector (40-pin × 1)



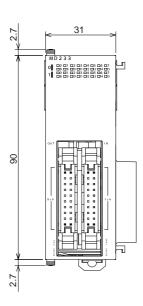


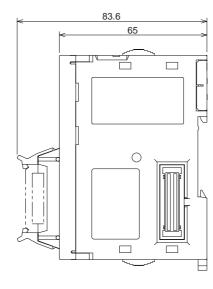
#### 32-point Units (24-VDC Input/Transistor Output Units)

Units with Fujitsu-compatible Connector (24-pin  $\times$  2)



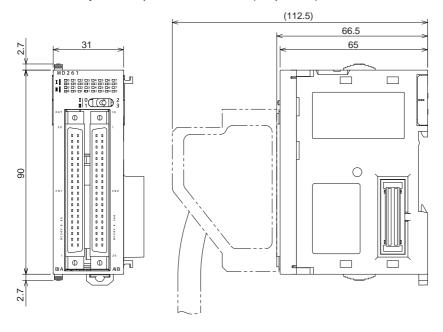
Units with MIL Connector (20-pin  $\times$  2)



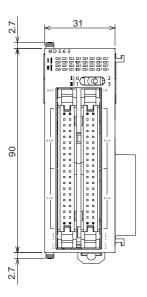


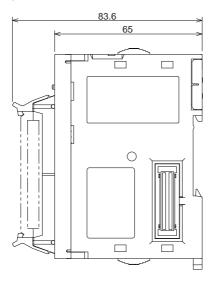
### 64-point Units (Input Units, Output Units, 24-VDC Input/Transistor Output Units, TTL I/O Units)

Units with Fujitsu-compatible Connector (40-pin  $\times$  2)

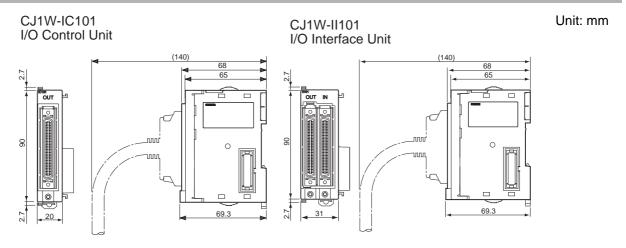


Units with MIL Connector (40-pin  $\times$  2)

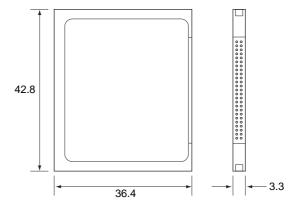




#### A-2-5 I/O Control Unit and I/O Interface Unit

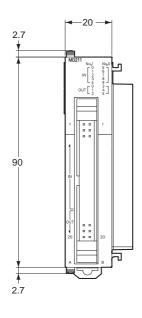


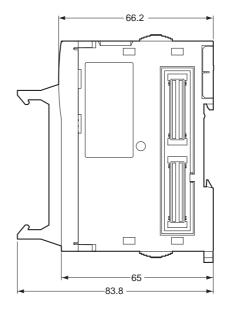
#### A-2-6 I/O Memory Card



#### Unit: mm

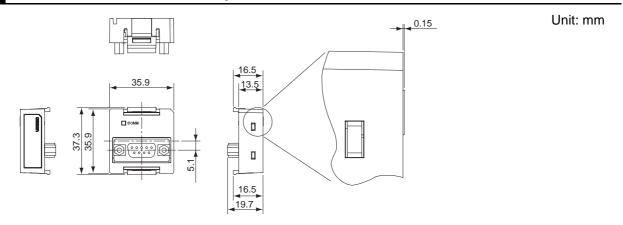
#### A-2-7 Pulse I/O Modules (CJ2M CPU Unit Only)



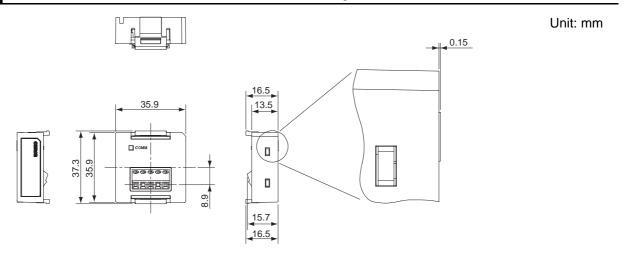


#### A-2-8 Serial Option Boards (CJ2M-CPU3 Only)

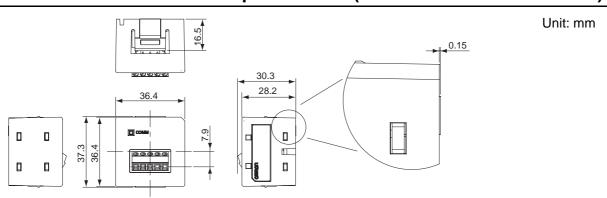
#### CP1W-CIF01 RS-232C Option Board



#### CP1W-CIF11/CIF12-V1 RS-422A/485 Option Board

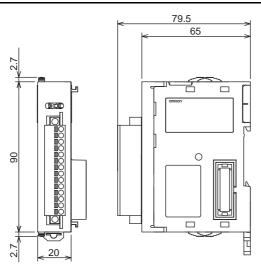


#### CP1W-CIF12 RS-422A/485 Option Board (Not include CP1W-CIF12-V1)



#### **B7A Interface Unit** A-2-9

#### CJ1W-B7A□□ Interface Unit

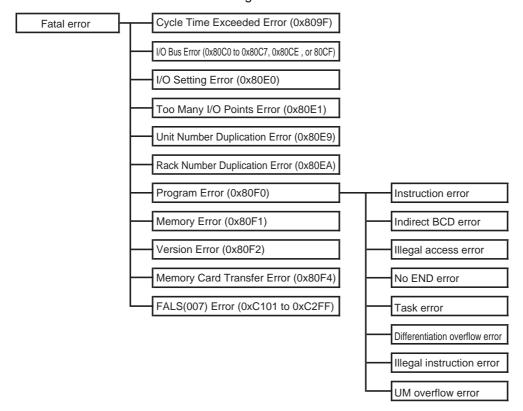


#### A-3 Fatal and Non-fatal Error Details

This appendix describes the fatal and non-fatal errors that can occur in the CPU Unit.

#### A-3-1 Fatal Errors

Operation will stop if a fatal error occurs. Information on the fatal error is displayed on the Error Tab Page opened from the CX-Programmer's PLC Error Window. Check the details on the error based on the message that is displayed, and the error flags and error information in the Auxiliary Area, and take suitable countermeasures. The following list shows the fatal errors.



#### **Table of Fatal Errors**

- The table of fatal errors is arranged in ascending order of error codes.
- When two or more errors occur at the same time, the error code of the more serious error will be recorded in A400.
- If the IOM Hold Bit hasn't been turned ON to protect I/O memory, all nonretained areas of I/O memory will be cleared when a fatal error other than FALS(007) occurs.
- If the IOM Hold Bit is ON, the contents of I/O memory will be retained but all outputs will be turned OFF.

Error	Error code (in A400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Cycle Time Exceeded Error	0x809F	A401.08: Cycle Time Exceeded Flag		The cycle time has exceeded the maximum cycle time (watch cycle time) set in the PLC Setup.	Change the program to reduce the cycle time or change the maximum cycle time setting. Check the Maximum Interrupt Task Processing Time in A440 and see if the Cycle Time Watch Time can be changed.*2 The cycle time can be reduced by dividing unused parts of the program into tasks, jumping unused instructions in tasks, and disabling cyclic refreshing of Special I/O Units that don't require frequent refreshing.
I/O Bus Error	0x80C0 to 0x80C7, 0x80CE, or 0x80CF	A401.14: I/O Bus Error Flag	A404: I/O Bus Error Slot and Rack Num- bers	Error has occurred in the bus line between the CPU and I/O Units or the End Cover is not connected to the CPU Rack or an Expansion Rack.*1  A404.08 to A404.15 contain the error rack number (00 to 03) in binary. 0F hex indicates that the rack cannot be determined.0E hex indicates the End Cover is not connected to the CPU Rack or an Expansion Rack.	Try turning the power OFF and ON again. If the error isn't corrected, turn the power OFF and check cable connections between the I/O Units and Racks and the End Covers. Check for damage to the cable or Units. Turn the Rack's power supply OFF and then ON again.

<sup>\*1</sup> A404.00 to A404.07 contain the error slot number (00 to 09) in binary. "0F hex" indicates that the slot cannot be determined.

<sup>&</sup>quot;0B hex" indicates a bus error occurred for the built-in EtherNet/IP port.

<sup>&</sup>quot;0E hex" indicates the End Cover is not connected to the CPU Rack or an Expansion Rack.

<sup>\*2</sup> The maximum processing time for an interrupt task will not be stored in A440 if High-speed interrupt function is enabled in the PLC Setup.

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
I/O Setting Error	0x80E0	A401.10: I/O Setting Error Flag	A405.08	The Units that are connected do not agree with the registered I/O tables or the number of Units that are connected does not agree with the number in the registered I/O table.	If the number of Units is not correct, turn OFF the power supply and correctly connect the proper Units.  With the CJ2 CPU Unit, if the I/O verification operation*¹ is performed when the number of Units is incorrect, mismatch errors will be detected for all Units registered in the I/O tables. If this occurs even when the number of Units is correct, it is possible that a Unit has failed and is not being correctly recognized. Generate new I/O tables, and then read the I/O tables and check for Units that are not being recognized.  If the number of Units is correct, confirm the Unit in discrepancy, turn OFF the power supply, and then correct the Unit connections.  If there is a mistake in the I/O tables, generate new I/O tables or edit the tables to correct the mistake.
				An Interrupt Input Unit has been mounted in the wrong slot, i.e., not in one of the following slots on the CPU Rack, or has been registered in the registered I/O tables in any slots other than the following slots.  • CJ2H-CPU6□-EIP: CPU Rack slots 0 to 3  • CJ2H-CPU6□ or CJ2M-CPU3□: Slots 0 to 4 in CPU Rack	When an Interrupt Input Unit is used, A405.08 will turn ON if the Interrupt Input Unit is in the wrong position or is registered in the wrong position.  If the Unit is connected in a slot on the CPU Rack that is not in the specified range, move the Unit to one of the specified CPU Rack slots.  If the Unit is mounted in a slot on the CPU Rack that is not in the specified range, correct the I/O tables so that the Interrupt Input Unit is correctly registered to one of the specified slots.
				Registered I/O tables for the CJ2H-CPU6□-EIP or CJ2M-CPU3□ were downloaded to the CJ2M-CPU6□ or CJ2M-CPU1□. Or, registered I/O tables for the CJ2H-CPU6□ or CJ2M-CPU1□ were downloaded to the CJ2M-CPU6□-EIP or CJ2M-CPU3□.	Delete or correct the I/O tables using the CX-Programmer.
Too Many I/O Points Error	0x80E1	A401.11: Too Many I/O Points Flag	A407.13 to A407.15: Too Many I/O Points, Details 2	One of the following values exceeds the maximum or is allocated to more than one Unit.  1. The total number of I/O points set in the I/O tables exceeds the maximum allowed for the CPU Unit (bits: 000)  2. There are more than 32 interrupt inputs (bits: 001).  3. Three or more Pulse I/O Modules were connected to a CJ2M CPU Unit (bits: 100).  4. The number of Expansion Racks exceeds the maximum (bits: 101).  5. More than 10 I/O Units are connected to one Rack (bits: 111). 12	Correct the problem and then turn the power supply OFF and back ON.

<sup>\*1</sup> Execute the I/O verification operation by selecting *Options – Compare with Project* from the I/O Table Menu of the CX-Programmer.

<sup>\*2</sup> Regardless of the error that occurred, the three bits in parentheses will be stored in A407.13 to A407.15. The value will simultaneously be stored in A407.00 to A407.12.

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy									
Unit/Rack Number Duplication Error	0x80E9	A401.13: Duplication Error	A410: CPU Bus Unit Duplicated Number Flags	The same number has been allocated to more than one CPU Bus Unit.*1	Check the unit numbers, eliminate the duplications, and turn the Rack's power supply OFF and then ON again.									
			A411 to A416: Special I/O Unit Dupli- cated Num- ber Flags	The same number has been allocated to more than one Special I/O Unit. *2	Check the unit numbers, eliminate the duplications, and turn the Rack's power supply OFF and then ON again.									
Expansion Rack Dupli- cated Rack Number	0x80EA	A401.13: Duplication Error	A409: Expansion Rack Duplicated Rack Number	The same I/O word has been allocated to more than one Basic I/O Unit.	Check allocations to Units on the rack number whose bit is ON in A409.00 to A409.03. Correct the allocations so that no words are allocated more than once, including to Units on other Racks, and turn the Rack's power supply OFF and then ON again.									
				An Expansion Rack's starting word address exceeds CIO 0901.The corresponding bit in A409.00 to A409.03 (Racks 0 to 3) will be turned ON.	Check the first word setting for the Rack indicated in A409.00 to A409.03 and change the setting to a valid word address below CIO 0900 with a Programming Device (such as a CX-Programmer).									
Program Error	0x80F0	A401.09: Program Error Flag	A294 to A299: Program Error Information	The program is incorrect. See the following rows of this table for details. The address at which the program stopped will be output to A298 and A299.	Check the program using A298/A299 and the error flags to find the mistake, and correct the program. Correct the program and then clear the error.									
				A295.11: No END error	Be sure that there is an END(001) instruction at the end of the task specified in A294 (program stop task number).									
				A295.15: UM overflow error The last address in UM (user pro- gram memory) has been exceeded.	Transfer the program again.									
				A295.13: Differentiation overflow error Too many differentiated instruc- tions have been inserted or deleted during online editing.	Return to PROGRAM mode and transfer the program again.									
				A295.12: Task error A task error has occurred. The follow- ing conditions will generate a task	Check the startup cyclic task attributes.     Check the execution status of each task as controlled by TKON(820) and TKOF(821).									
									Ī				There is no executable cyclic task.     There is no task that corresponds to the interrupt that was	Make sure that all of the task numbers specified in TKON(820), TKOF(821), and MSKS(690) instruc- tions have corresponding tasks. Use MSKS(690) to mask any I/O or scheduled interrupt tasks that are not being used and that do not have programs
								input. (Only when the Stop CPU on Instruction Error parameter in the PLC Setup is set to Stop.)	set for them.     If the power OFF interrupt task is enabled in the PLC Setup, make sure that the power OFF interrupt task has been created.					
				A295.10: Illegal access error An illegal access error has occurred and the PLC Setup has been set to stop operation for an instruction error. The following are illegal access errors:	Find the program address where the error occurred (A298/A299) and correct the instruction.									
				Reading/writing a parameter area.     Writing memory that is not										
				installed.  3. Writing an EM bank that is EM file memory.										
				Writing to a read-only area.     Indirect DM/EM address that is not in BCD when BCD mode is specified.										

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Program Error	ogram Error 0x80F0 A401.0 gram Er		A294 to A299: Program Error Information	Indirect DM/EM BCD Error Flag (A295.09) turned ON: An indirect DM/EM BCD error has occurred, causing the AER Flag to turn ON. Also, the PLC Setup has been set to stop operation for an instruction error.	Find the program address where the error occurred using A298/A299 and correct the indirect addressing (the indirect address or the word holding the indirect address) or change to binary mode.
				Instruction Error Flag (A295.08) turned ON: Incorrect data values were provided in an operand when an attempt was made to execute an instruction, causing the ER Flag to turn ON, and the PLC Setup has been set to stop operation for an instruction error.	Check the Program Error Position (A298/A299) to find the reason that the ER Flag turned ON and correct the operand data according to the descriptions of the instructions in the <i>Instructions Reference Manual</i> (Cat. No. W474).
				A295.14: Illegal instruction error The program contains an instruction that cannot be executed.	Retransfer the program to the CPU Unit.
Memory Error	0x80F1	A401.15: Memory Error Flag	A403: Memory Error Location	An error has occurred in memory. A bit in A403 will turn ON to show the location of the error as listed below.	See below.
				A403.00 ON: A checksum error has occurred in the user program memory. The power was turned OFF while storing data to the flash memory (backup memory).	Transfer the program again.
				A403.04 ON: A checksum error has occurred in the PLC Setup.	Clear the entire PLC Setup to 0000 and reenter the settings.
				A403.05 ON: A checksum error has occurred in the registered I/O tables.	Initialize the registered I/O table and generate a new I/O table.
				A403.07 ON: A checksum error has occurred in the routing tables.	Initialize the routing tables and reenter the tables.
				A403.08 ON: A checksum error has occurred in the CPU Bus Unit Setup.	Initialize the CPU Bus Unit setup and reenter the settings.
Version Error	0x80F2	A401.05: Version Error Flag	A293	The user program that was transferred includes functions that are not supported by the unit version of the CPU Unit.	Check whether the unit version supports the user program.     Replace the CPU Unit with a CPU Unit with a supported unit version.
Memory Card Transfer Error	0x80F4	A401.03: Memory Card Error Flag		When A401.03 is ON: The contents of the Memory Card cannot be correctly read to the CPU Unit when the power is ON.	Check whether the files required for executing the automatic transfer function are available.
				An attempt was made to transfer a user program (OBJ file) that includes network symbols when the power supply was turned ON (CJ2H-CPU6□ only).	Transfer a user program (OBJ file) that does not include network symbols.
FALS(007) Error	0xC101 to 0xC2FF	A401.06: FALS Error Flag		FALS(007) has been executed in the program. The error code in A400 will indicate the FAL number. The leftmost digit of the code will be C and the rightmost 3 digits of the code will be from100 to 2FF hex and will correspond to FAL numbers 001 to 511.	Correct according to cause indicated by the FAL number (set by user).

<sup>\*1</sup> Bits A410.00 to A410.15 correspond to unit numbers 0 to F.

<sup>\*2</sup> Bits A411.00 to A416.15 correspond to unit numbers 0 to 95.

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
I/O Setting Error	0x80E0	A401.10: I/O Setting Error Flag	A405.08	The Units that are connected do not agree with the registered I/O tables or the number of Units that are connected does not agree with the number in the registered I/O table.	If the number of Units is not correct, turn OFF the power supply and correctly connect the proper Units.  With the CJ2 CPU Unit, if the I/O verification operation*¹ is performed when the number of Units is incorrect, mismatch errors will be detected for all Units registered in the I/O tables. If this occurs even when the number of Units is correct, it is possible that a Unit has failed and is not being correctly recognized. Generate new I/O tables, and then read the I/O tables and check for Units that are not being recognized.  If the number of Units is correct, confirm the Unit in discrepancy, turn OFF the power supply, and then correct the Unit connections.  If there is a mistake in the I/O tables, generate new I/O tables or edit the tables to correct the mistake.
				An Interrupt Input Unit has been mounted in the wrong slot, i.e., not in one of the following slots on the CPU Rack, or has been registered in the registered I/O tables in any slots other than the following slots.  • CJ2H-CPU6□-EIP: CPU Rack slots 0 to 3  • CJ2H-CPU6□ or CJ2M-CPU3□: Slots 0 to 4 in CPU Rack	When an Interrupt Input Unit is used, A405.08 will turn ON if the Interrupt Input Unit is in the wrong position or is registered in the wrong position.  If the Unit is connected in a slot on the CPU Rack that is not in the specified range, move the Unit to one of the specified CPU Rack slots.  If the Unit is mounted in a slot on the CPU Rack that is not in the specified range, correct the I/O tables so that the Interrupt Input Unit is correctly registered to one of the specified slots.
				Registered I/O tables for the CJ2H-CPU6□-EIP or CJ2M-CPU3□ were downloaded to the CJ2M-CPU6□ or CJ2M-CPU1□. Or, registered I/O tables for the CJ2H-CPU6□ or CJ2M-CPU1□ were downloaded to the CJ2M-CPU6□-EIP or CJ2M-CPU3□.	Delete or correct the I/O tables using the CX-Programmer.
Too Many I/O Points Error	0x80E1	A401.11: Too Many I/O Points Flag	A407.13 to A407.15: Too Many I/O Points, Details 2	One of the following values exceeds the maximum or is allocated to more than one Unit.  1. The total number of I/O points set in the I/O tables exceeds the maximum allowed for the CPU Unit (bits: 000)  2. There are more than 32 interrupt inputs (bits: 001).  3. Three or more Pulse I/O Modules were connected to a CJ2M CPU Unit (bits: 100).  4. The number of Expansion Racks exceeds the maximum (bits: 101).  5. More than 10 I/O Units are connected to one Rack (bits: 111). *2	Correct the problem and then turn the power supply OFF and back ON.
Unit/Rack Number Duplication Error	0x80E9	A401.13: Duplication Error	A410: CPU Bus Unit Duplicated Number Flags	The same number has been allocated to more than one CPU Bus Unit.*4	Check the unit numbers, eliminate the duplications, and turn the Rack's power supply OFF and then ON again.
			A411 to A416: Special I/O Unit Dupli- cated Num- ber Flags	The same number has been allocated to more than one Special I/O Unit. 15	Check the unit numbers, eliminate the duplications, and turn the Rack's power supply OFF and then ON again.

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy	
Expansion Rack Dupli- cated Rack Number	0x80EA	A401.13: Duplication Error	A409: Expansion Rack Duplicated Rack Number	The same I/O word has been allocated to more than one Basic I/O Unit.	Check allocations to Units on the rack number whose bit is ON in A409.00 to A409.03. Correct the allocations so that no words are allocated more than once, including to Units on other Racks, and turn the Rack's power supply OFF and then ON again.	
				An Expansion Rack's starting word address exceeds CIO 0901.The corresponding bit in A409.00 to A409.03 (Racks 0 to 3) will be turned ON.	Check the first word setting for the Rack indicated in A409.00 to A409.03 and change the setting to a valid word address below CIO 0900 with a Programming Device (such as a CX-Programmer).	
Program Error	0x80F0	A401.09: Pro- gram Error Flag	A294 to A299: Program Error Information	The program is incorrect. See the following rows of this table for details. The address at which the program stopped will be output to A298 and A299.	Check the program using A298/A299 and the error flags to find the mistake, and correct the program. Correct the program and then clear the error.	
				A295.11: No END error	Be sure that there is an END(001) instruction at the end of the task specified in A294 (program stop task number).	
				A295.15: UM overflow error The last address in UM (user pro- gram memory) has been exceeded.	Transfer the program again.	
				A295.13: Differentiation overflow error Too many differentiated instructions have been inserted or deleted during online editing.	Return to PROGRAM mode and transfer the program again.	
				<ul> <li>A295.12: Task error</li> <li>A task error has occurred. The following conditions will generate a task error.</li> <li>There is no executable cyclic task.</li> <li>There is no task that corresponds to the interrupt that was input. (Only when the <i>Stop CPU on Instruction Error</i> parameter in the PLC Setup is set to <i>Stop.</i>)</li> </ul>	Check the startup cyclic task attributes. Check the execution status of each task as controlled by TKON(820) and TKOF(821). Make sure that all of the task numbers specified in TKON(820), TKOF(821), and MSKS(690) instructions have corresponding tasks. Use MSKS(690) to mask any I/O or scheduled interrupt tasks that are not being used and that do not have programs set for them.  If the power OFF interrupt task is enabled in the PLC Setup, make sure that the power OFF interrupt task has been created.	
				A295.10: Illegal access error An illegal access error has occurred and the PLC Setup has been set to stop operation for an instruction error. The following are illegal access errors:  1. Reading/writing a parameter area.  2. Writing memory that is not installed.  3. Writing an EM bank that is EM file memory.  4. Writing to a read-only area.  5. Indirect DM/EM address that is not in BCD when BCD mode is specified.	Find the program address where the error occurred (A298/A299) and correct the instruction.	
					Indirect DM/EM BCD Error Flag (A295.09) turned ON: An indirect DM/EM BCD error has occurred, causing the AER Flag to turn ON. Also, the PLC Setup has been set to stop operation for an instruction error.	Find the program address where the error occurred using A298/A299 and correct the indirect addressing (the indirect address or the word holding the indirect address) or change to binary mode.
				Instruction Error Flag (A295.08) turned ON: Incorrect data values were provided in an operand when an attempt was made to execute an instruction, causing the ER Flag to turn ON, and the PLC Setup has been set to stop operation for an instruction error.	Check the Program Error Position (A298/A299) to find the reason that the ER Flag turned ON and correct the operand data according to the descriptions of the instructions in the <i>Instructions Reference Manual</i> (Cat. No. W474).	
				A295.14: Illegal instruction error The program contains an instruction that cannot be executed.	Retransfer the program to the CPU Unit.	

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Memory Error	0x80F1	A401.15: Memory Error Flag	A403: Memory Error	An error has occurred in memory. A bit in A403 will turn ON to show the location of the error as listed below.	See below.
				A403.00 ON: A checksum error has occurred in the user program memory. The power was turned OFF while storing data to the flash memory (backup memory).	Transfer the program again.
				A403.04 ON: A checksum error has occurred in the PLC Setup.	Clear the entire PLC Setup to 0000 and reenter the settings.
				A403.05 ON: A checksum error has occurred in the registered I/O tables.	Initialize the registered I/O table and generate a new I/O table.
				A403.07 ON: A checksum error has occurred in the routing tables.	Initialize the routing tables and reenter the tables.
				A403.08 ON: A checksum error has occurred in the CPU Bus Unit Setup.	Initialize the CPU Bus Unit setup and reenter the settings.
Version Error	0x80F2	A401.05: Version Error Flag	A293	The user program that was trans- ferred includes functions that are not supported by the unit version of the CPU Unit.	Check whether the unit version supports the user program.     Replace the CPU Unit with a CPU Unit with a supported unit version.
Memory Card Transfer Error	0x80F4	A401.03: Memory Card Error Flag		When A401.03 is ON: The contents of the Memory Card cannot be correctly read to the CPU Unit when the power is ON.	Check whether the files required for executing the automatic transfer function are available.
				An attempt was made to transfer a user program (OBJ file) that includes network symbols when the power supply was turned ON (CJ2H-CPU6□ only).	Transfer a user program (OBJ file) that does not include network symbols.
FALS(007) Error	0xC101 to 0xC2FF	A401.06: FALS Error Flag		FALS(007) has been executed in the program. The error code in A400 will indicate the FAL number. The leftmost digit of the code will be C and the rightmost 3 digits of the code will be from100 to 2FF hex and will correspond to FAL numbers 001 to 511.	Correct according to cause indicated by the FAL number (set by user).

<sup>\*1</sup> Execute the I/O verification operation by selecting Options - Compare with Project from the I/O Table Menu of the CX-Programmer.

<sup>\*2</sup> Regardless of the error that occurred, the three bits in parentheses will be stored in A407.13 to A407.15. The value will simultaneously be stored in A407.00 to A407.12.

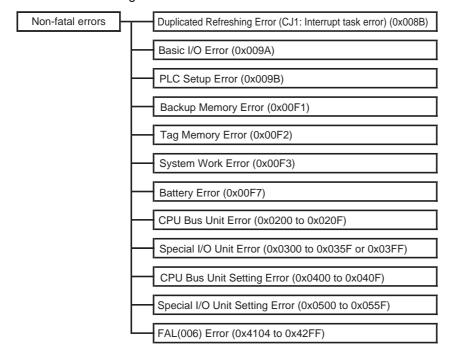
<sup>\*3</sup> Bits A410.00 to A410.15 correspond to unit numbers 0 to F.

<sup>\*4</sup> Bits A411.00 to A416.15 correspond to unit numbers 0 to 95.

#### A-3-2 Non-fatal Errors

Operation continues when a non-fatal error occurs. Connect the CX-Programmer to display the error message in the Error Log Dialog Box on the CX-Programmer.

The cause of the error can be determined from the error message and related Auxiliary Area flags and words. The following list shows the non-fatal errors.



#### **Table of Non-fatal Errors**

- The table of non-fatal errors is arranged in ascending order of error codes.
- When two or more errors occur at the same time, the error code of the more serious error will be recorded in A400.
- When the IOM Hold Bit is set to ON, I/O memory will be retained and outputs to the Output Unit will

Error	Error code (in A400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Duplicated Refreshing Error (CJ1: Interrupt task error)	0x008B	A402.13: Duplicated Refresh Error Flag	A426: Unit number where duplicated refresh error occurred	ON when the Detect Duplicated Refresh Errors setting in the PLC Setup is set to <i>Detect</i> and one of the following occurs for the same Special I/O Unit.  • IORF(097), FIORF(225), IORD(222) or IOWR(223) in a cyclic task are competing with FIORF(225), IORF(097), IORD(222) or IOWR(223) in an interrupt task.  • IORF(097), FIORF(225), IORD(222) or IOWR(223) was executed in an interrupt task when I/O was being refreshed.*1	Check the program. Either disable detection of duplicated refresh errors in the PLC Setup or correct the problem in the program.
Basic I/O Error	0x009A	A402.12: CJ- series Basic I/O Unit Error Flag	A408: Basic I/O Unit Error, Slot Number	An error has occurred in a Basic I/O Unit.*2	Check the Basic I/O Unit to see whether a fuse needs to be replaced.
PLC Setup Error	0x009B	A402.10: PLC Setup Error Flag		There is a setting error in the PLC Setup.	Change the indicated setting to a valid setting.
Option Board Error	0x00D1	A315.13 Option Board Error Flag A402.00 Other Non-fatal Error Flag		The Option Board was removed while the system was operating. Option Board failure	Check the mating of the Option Board connector and reconnect the connector. If the Option Board still fails, replace it.
Backup Mem- ory Error	0x00F1	A315.15: Backup Mem- ory Error Flag		Writing to the built-in flash memory failed.	Operation may not be possible the next time power is restored after a power interruption. Replace the CPU Unit.
Tag Memory Error <sup>*3</sup>	0x00F2	A315.12: Tag Memory Error Flag		An error occurred in memory where network tags are stored.	Transfer the program again.
System Work Error	0x00F3	A315.04: System Work Error Flag A402.00: Other Non-fatal Error Flag		An error occurred in the memory for online editing.	Operation may not be possible the next time power is restored after a power interruption. Trans- fer the program again.
Battery Error	0x00F7	A402.04: Bat- tery Error Flag		This error occurs when the PLC Setup has been set to detect battery errors and the CPU Unit's backup battery is missing or its voltage has dropped.	Check battery and replace if nec- essary. Change the PLC Setup setting if battery-free operation is being used.
CPU Bus Unit Error	0x0200 to 0x020F	A402.07: CPU Bus Unit Error Flag	A417: CPU Bus Unit Error, Unit Number Flags	An error occurred in a data exchange between the CPU Unit and a CPU Bus Unit.*4	Check the Unit indicated in A417. Refer to the Unit's operation manual to find and correct the cause of the error. Restart the Unit by toggling its Restart Bit or turn the power OFF and ON again. Replace the Unit if it won't restart.
Special I/O Unit Error	0x0300 to 0x035F or 0x03FF	A402.06: Special I/O Unit Error Flag	A418 to A423: Special I/O Unit Error, Unit Number Flags	An error occurred in a data exchange between the CPU Unit and a Special I/O Unit.*5	Check the Unit indicated in A418 to A423. Refer to the Unit's operation manual to find and correct the cause of the error. Restart the Unit by toggling its Restart Bit or turn the power OFF and ON again. Replace the Unit if it won't restart.

Error	Error code (in A400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
CPU Bus Unit Setting Error	0x0400 to 0x040F	A402.03: CPU Bus Unit Set- ting Error Flag	A427: CPU Bus Unit Setting Error, Unit Number Flags	An installed CPU Bus Unit does not match the CPU Bus Unit registered in the I/O tables.*6	Change the registered I/O table.
Special I/O Unit Setting Error	or 0x055F cial I/O Ur	A402.02: Spe- cial I/O Unit Special I/O Unit		An installed Special I/O Unit does not match the Special I/O Unit registered in the I/O tables.*7	Change the registered I/O table.
		Setting Error Flag	Setting Error, Unit Number Flags	A Unit that is specified for synchronous unit operation does not support synchronous unit operation. *7  A Unit that is specified for synchronous unit operation does not exist.*7	Correct the settings for synchro- nous unit operation in the PLC Setup and transfer the PLC Setup again.
				A Synchronous Unit that is specified for synchronous unit operation is not on the CPU Rack (the Synchronous Unit is on an Expansion Rack).*7	Move the Synchronous Unit to the CPU Rack. If I/O tables have been registered, correct the settings in the registered I/O tables.
FAL(006) Error	0x4101 to 0x42FF	A402.15: FAL Error Flag	A360 to A391: Executed FAL Number Flags	FAL(006) has been executed in program.*8	Correct according to cause indicated by FAL number (set by user).

<sup>\*1</sup> If cyclic refreshing is not disabled in the PLC Setup for a Special I/O Unit and IORF(097), FIORF(225), IORD(222) or IOWR(223) is executed for the same Special I/O Unit in an interrupt task, a duplicate refreshing status will occur and an duplicated refreshing error will occur.

- \*2 A408 contains the errant rack/slot number.
- \*3 CJ2H-CPU6 -EIP or CJ2M-CPU3 only.
- \*4 The corresponding flag in A417 is turned ON to indicate the problem Unit.
- \*5 The corresponding flag in A418 to A423 is turned ON to indicate the problem Unit.
- \*6 The corresponding flag in A427 will be ON.
- \*7 The corresponding flag in A428 to A433 will be ON.
- \*8 Executed FAL Number Flags in consecutive bits in A360 to A391 correspond to FAL numbers 001 to 511.

  The error code in A400 will indicate the FAL number.

  The leftmost digit of the code will be 4 and the rightmost 3 digits of the code will be from 101 to 2FF hex and will corre-

spond to FAL numbers 001 to 511.

## A-4 Connecting to a Serial Port on the CPU Unit

This appendix provides information on configurations and wiring methods when connecting various functionality to a serial port on a CPU Unit.

#### A-4-1 Serial Port Interface Types and Specifications

With the following configurations, the serial port on a CJ2 CPU Unit can be used with an RS-232C or RS-422A/485 interface. In this appendix, serial ports on CPU Units with these interfaces are called RS-232C ports and RS-422A/485 ports.

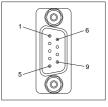
Interface	RS-232C	RS-422A/485			
Model	N3-232C	Not isolated	Isolated		
CJ2H-CPU6□(-EIP)	Built into the CPU Unit as	A CJ1W-CIF11 RS-422A	The built-in RS-232C inter-		
CJ2M-CPU1□	a standard feature.	Converter is mounted directly to the built-in RS-232C interface.	face and an NT-AL001 RS- 232C/RS-422A Link Adapter are connected with a cable.		
CJ2M-CPU3□	A CP1W-CIF01 RS-232C Option Board is mounted.	A CP1W-CIF11 RS- 422A/485 Option Board is mounted.	A CP1W-CIF12 RS- 422A/485 Option Board is mounted.		

#### **RS-232C Interface Specifications**

#### CPU Unit Built-in RS-232C Interface Specifications

Connector Pin Arrangement

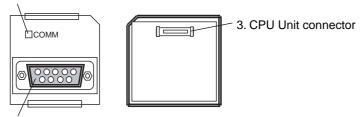
Pin No.	Signal	Name	Direction
1	FG	Protection earth	
2	SD (TXD)	Send data	Output
3	RD (RXD)	Receive data	Input
4	RS (RTS)	Request to send	Output
5	CS (CTS)	Clear to send	Input
6	5 V	Power supply	
7	DR (DSR)	Data set ready	Input
8	ER (DTR)	Data terminal ready	Output
9	SG (0 V)	Signal ground	
Connector hood	FG	Protection earth	



#### ● CP1W-CIF01 RS-232C Option Board Specifications

Front Back

1. Communications status indicators



#### 2. RS-232C connector

• Connector Pin Arrangement



Pin No.	Signal	Name	Direction
1	FG	Protection earth	
2	SD (TXD)	Send data	Output
3	RD (RXD)	Receive data	Input
4	RS (RTS)	Request to send	Output
5	CS (CTS)	Clear to send	Input
6	5 V	Power supply	
7	DR (DSR)	Data set ready	Input
8	ER (DTR)	Data terminal ready	Output
9	SG (0 V)	Signal ground	
Connector hood	FG	Protection earth	



#### **Precautions for Safe Use**

Do not use the 5-V power from pin 6 of the RS-232C port on the CPU Unit for anything but the NT-AL001 Link Adapter, CJ1W-CIF11 RS-422A Converter, or NV3W-M□20L Programmable Terminal. The external device or the CPU Unit may be damaged.

#### Communications Specifications

Item	Specification
Communications method	Half duplex
Synchronization	Start-stop
Baud rate	0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4/57.6/115.2 kbps <sup>*1</sup>
Transmission distance	15 m max.
Interface	EIA RS-232C
Protocol	Host Link, NT Link, 1:N, No-protocol, or Peripheral Bus

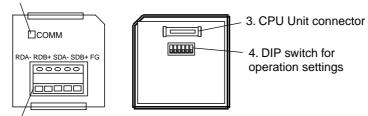
<sup>\*1</sup> Baud rates for the RS-232C are specified only up to 19.2 kbps. The CJ Series supports serial communications from 38.4 kbps to 115.2 kbps, but some computers cannot support these speeds. Lower the baud rate if necessary.

#### **RS-422A/485 Interface Specifications**

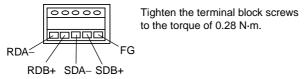
#### CP1W-CIF11 and CP1W-CIF12 RS-422A/485 Option Board Specifications

Front Back

1. Communications status indicators



- 2. RS-422A/485 connector
  - RS-422A/485 Terminal Block



DIP Switch for Operation Settings

CP1W-CIF11/12 CP1W-CIF12-V1		Setting				
	Pin		Pin			
SW	1	SW1	1	ON	ON (both ends)	Terminating resistance setting
ΟZ		OZ		OFF	OFF	
	2		2	ON	2-wire	2-wire or 4-wire setting*1
				OFF	4-wire	
	3		3	ON	2-wire	2-wire or 4-wire setting*1
				OFF	4-wire	Ç
	4		4			Not used.
	5	SW2	1	ON	RS control enabled	RS control selection for RD*2
				OFF	RS control disabled (Data always received.)	
	6		2	ON	RS control enabled	RS control selection for SD*3
		1 (7)		OFF	RS control disabled (Data always sent.)	

- \*1 Set both pins 2 and 3 to either ON (2-wire) or OFF (4-wire).
- \*2 To disable the echo-back function, set pin 5 to ON (RS control enabled).
- \*3 When connecting to a device on the N side in a 1: N connection with the 4-wire method, set pin 6 to ON (RS control enabled).

Also, when connecting by the 2-wire method, set pin 6 to ON (RS control enabled).

#### Converting Built-in RS-232C to RS-422A/485

When converting the RS-232C port on a CJ2 CPU Unit to RS-422A, using one of the following Link Adapters and Conversion Units.

- CJ1W-CIF11 RS-422A Converter The maximum distance is 50 m.
   Either RS-422A or RS-485 can be used.
- NT-AL001 RS-232C/RS-422A Link Adapter The maximum distance is 500 m.
   Only RS-422A can be used.

#### CJ1W-CIF11 RS-422A Converter

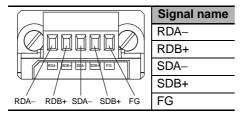
The CJ1W-CIF11 RS-422A Converter is used to convert RS-232C to RS-422A/485. It is connected directly to the RS-232C port on a CJ2 CPU Unit. It is not isolated, so the maximum distance for RS-422A/485 is 50 m.

#### **Appearance**

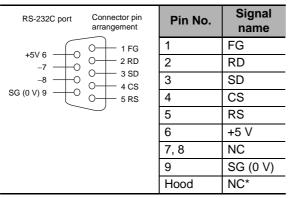


#### **Electric Specifications**

• RS-422A/485 Terminal Block



#### RS-232C Connector



<sup>\*</sup> The hood will have the same electric potential as the connector hood where it is connected.

#### **DIP Switch Settings**

Pin No.	Setting	ON	OFF
1	Terminating resistance set- ting	Connects terminating resistance on both ends of the transmission path.	Disconnects terminating resistance.
2	2-wire/4-wire setting*1	2-wire	4-wire
3	2-wire/4-wire setting*1	2-wire	4-wire
4	Not used.		
5	RS control selection for RD*2	RS control enabled	RS control disabled (Data always received.)
6	RS control selection for SD*3	RS control enabled	RS control disabled (Data always sent.)

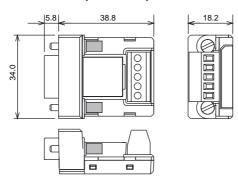
<sup>\*1</sup> Set both pins 2 and 3 to either ON (2-wire) or OFF (4-wire).

<sup>\*2</sup> To disable the echo-back function, set pin 5 to ON (RS control enabled).

<sup>\*3</sup> When connecting to a device on the N side in a 1: N connection with the 4-wire method, set pin 6 to ON (RS control enabled).

Also, when connecting by the 2-wire method, set pin 6 to ON (RS control enabled).

#### **Dimensions (Unit: mm)**



#### NT-AL001 RS-232C/RS-422A Link Adapter

The NT-AL001 RS-232C/RS-422A Link Adapter is used to connect to devices that have RS-232C or RS-422A terminals. It is connected with a cable to the RS-232C port on a CJ2 CPU Unit. It is isolated, so the maximum distance for RS-422A is 500 m.

#### **Appearance**



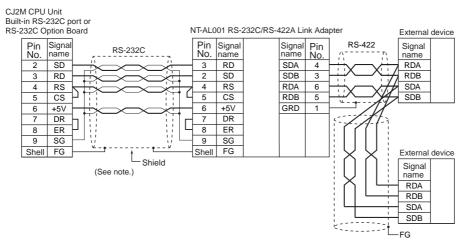
#### **DIP Switch Settings**

There is a DIP switch on the NT-AL001 RS-232C/RS-422A Link Adapter that is used to set RS-422A/485 communications parameters. Set the DIP switch as required for the serial communications mode according to the following table.

Pin	Function	Default setting
1	Not used. (Leave set to ON.)	ON
2	Internal terminating resistance setting.	ON
	ON: Terminating resistance connected.	
	OFF: Terminating resistance not connected.	
3	2-wire/4-wire setting OFF	
4	Both pins ON: 2-wire communications	OFF
	Both pins OFF: 4-wire communications	
5	Communications mode*	ON
6	Both pins OFF: Always send.	OFF
	5 OFF/6 ON: Send when RS-232C's CS is high.	
	5 ON/6 OFF: Send when RS-232C's CS is low.	

<sup>\*</sup> When connecting to a CJ-series CPU Unit, turn OFF pin 5 and turn ON pin 6.

#### Application Example

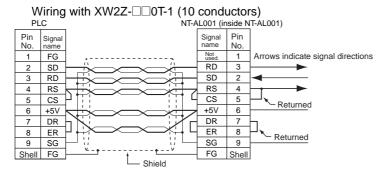


Note Use the special cables for the above cables.

Use the following Cables to connect the RS-232C port on an Option Board to an NT-AL001 RS-232C/RS-422A Link Adapter.

Length	Model
70 cm	XW2Z-070T-1
2 m	XW2Z-200T-1

#### Wiring the Recommended Cable (XW2Z-070T-1/XW2Z-200T-1)



**Note** The shell (FG) is internally connected to the protective earth (GR) terminal on the CPU Unit. FG can thus be connected by connecting the protective earth (GR) terminal on the Power Supply Unit.



#### **Precautions for Correct Use**

- The XW2Z-□□0T-1 Cable is designed to connect the NT-AL001 and contains special wiring for the DS and RS signals. Do not use this cable for any other application. Connecting this cable to other devices can damage them.
- Always turn ON the terminating resistance on the ends of the RS-422A/485 line.

## A-4-2 Connection Examples

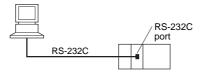
This section provides connection examples and corresponding connection diagrams.

Refer to A-4-3 Applicable Connectors and Recommended Cables for actual wiring methods.

# **Host Computer (Host Link or Tool Bus)**

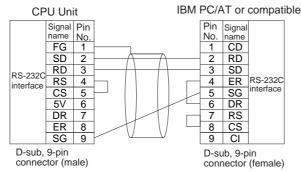
Note Connections to a computer running the CX-Programmer are the same as those shown here.

#### 1:1 Connections via RS-232C Port

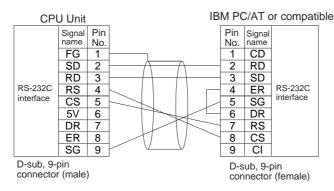


**Note** The maximum cable length for an RS-232C connection is 15 m. RS-232C communications specifications, however, do not cover transmissions at 19.2 Kbps. Refer to documentation of the device being connected when using this baud rate.

#### **Connection Example for the Host Link Serial Communications Mode**

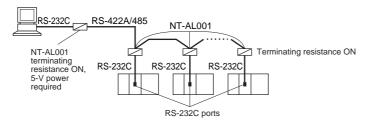


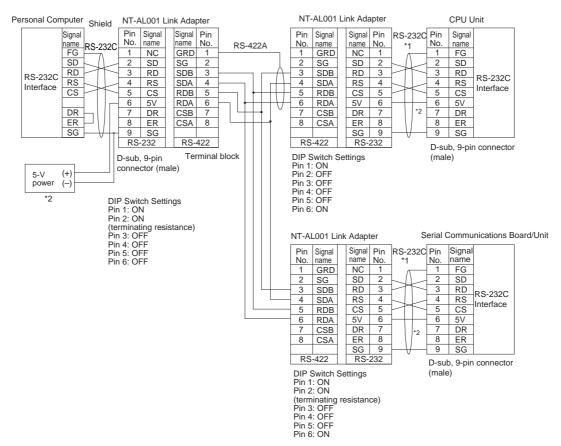
#### Connection Example for the Peripheral Bus (Toolbus) Serial Communications Mode



#### 1:N Connections via RS-232C Port

A connection example for converting between RS-232C and RS-422A/485 to use 1:N connections is shown below.





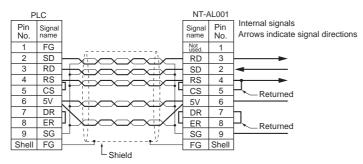
\*1 We recommend using the following NT-AL001 RS-232C/RS-422A Link Adapter Connecting Cables to connect to NT-AL001 Link Adapters.

XW2Z-070T-1: 0.7 m XW2Z-200T-1: 2 m

• Wiring the Recommended Cable (XW2Z-070/200T-1)

The recommended cables should be wired as shown below. For an RS-232C cable, each signal wire should be twisted with the SG (signal ground) wire and placed in a shielded cable to prevent the effects of noise in noise-prone environments. The 5-V wires can also be twisted with the SG wire to increase noise immunity. Although this wiring is different from that shown in the example above, it can be used to increase noise immunity if required.

#### Wiring with XW2Z-□□0T-1 (10 conductors)



\*2 When the NT-AL001 Link Adapter is connected to the RS-232C port on the CPU Unit, 5 V is supplied from pin 6, eliminating the need for a 5-V power supply.



#### **Precautions for Correct Use**

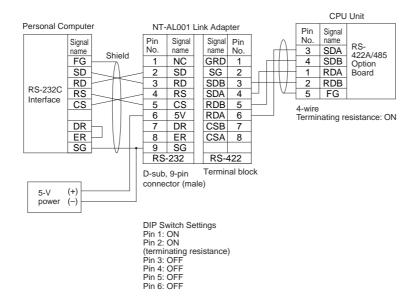
- Do not use the 5-V power from pin 6 of the RS-232C port for anything but the NT-AL001 Link Adapter, CJ1W-CIF11 RS-422A Converter, or NV3W-M□20L Programmable Terminals. Using this power supply for any other external device may damage the CPU Unit or the external device.
- The XW1Z-\(\subseteq\) OT-1 Cable is designed to connect the NT-AL001 and contains special wiring for the CS and RS signals. Do not use this cable for any other application. Connecting this cable to other devices can damage them.

#### DIP Switch Settings on the NT-AL001 Link Adapter

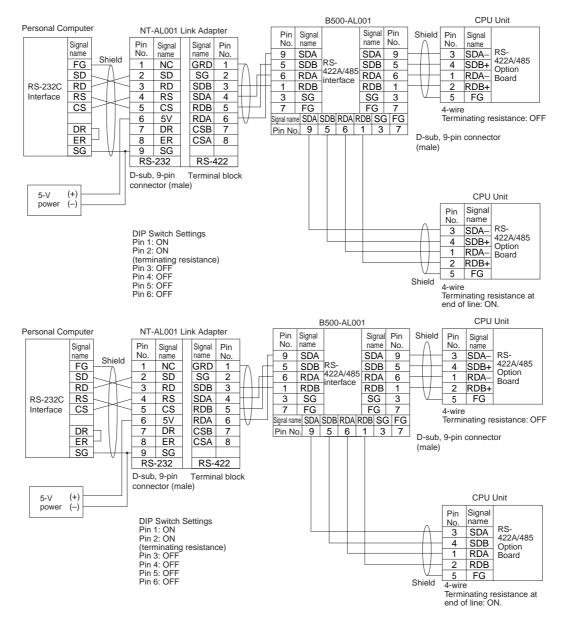
There is a DIP switch on the NT-AL001 Link Adapter that is used to set RS-422A/485 communications parameters. Set the DIP switch as required for the serial communications mode according to the following table.

Pin	Function	Default setting
1	Not used. (Leave set to ON.)	ON
2	Internal terminating resistance setting.	ON
	ON: Terminating resistance connected.	
	OFF: Terminating resistance not connected.	
3	2-wire/4-wire setting	OFF
4	Both pins ON: 2-wire communications	OFF
	Both pins OFF: 4-wire communications	
5	Communications mode	ON
6	Both pins OFF: Always send.	OFF
	5 OFF/6 ON: Send when RS-232C's CS is high.	
	5 ON/6 OFF: Send when RS-232C's CS is low.	

#### • RS-422A/485 Ports with 1:1 Connection

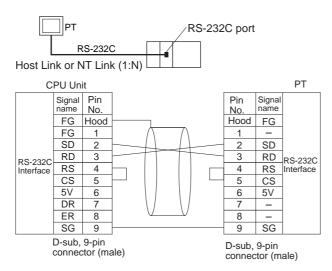


#### RS-422A/485 Ports with 1:N Connections



# OMRON PT (Host Link or 1:N NT Link)

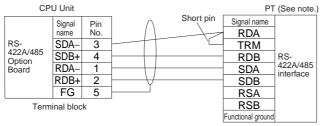
#### Direct Connection from RS-232C to RS-232C



- Communications Mode: Host Link (unit number 0 only for Host Link)
   NT Link (1:N, N = 1 Unit only)
- · OMRON Cables with Connectors:

XW2Z-200T-1: 2 m XW2Z-500T-1: 5 m

#### RS-422A/485 Ports with 1:1 Connection



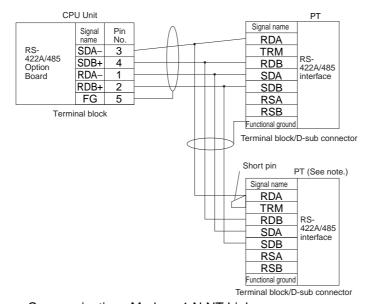
Terminal block/D-sub connector

- Communications Mode: Host Link (Host Link unit number 0 only)
   NT Link (1:N, N = 1 Unit only)
- \* Switch Settings on RS-422A/485 Option Board
  - · Terminating resistance: ON
  - 2-wire/4-wire setting: 4-wire

**Note** The terminating resistance setting example is for the NT631/NT631C.

The setting method depends on the PT model. Refer to the manual for your PT.

#### ● RS-422A/485 Ports with 1:N, 4-wire Connections



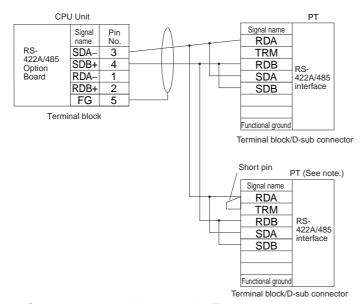
Communications Mode: 1:N NT Link
 \* Switch Settings on RS-422A/485 Option Board

Terminating resistance: ON2-wire/4-wire setting: 4-wire

**Note** The terminating resistance setting example is for the NT631/NT631C.

The setting method depends on the PT model. Refer to the manual for your PT.

#### • RS-422A/485 Ports with 1:N, 2-wire Connections



Communications Mode: 1:N NT Link
 \* Switch Settings on RS-422A/485 Option Board

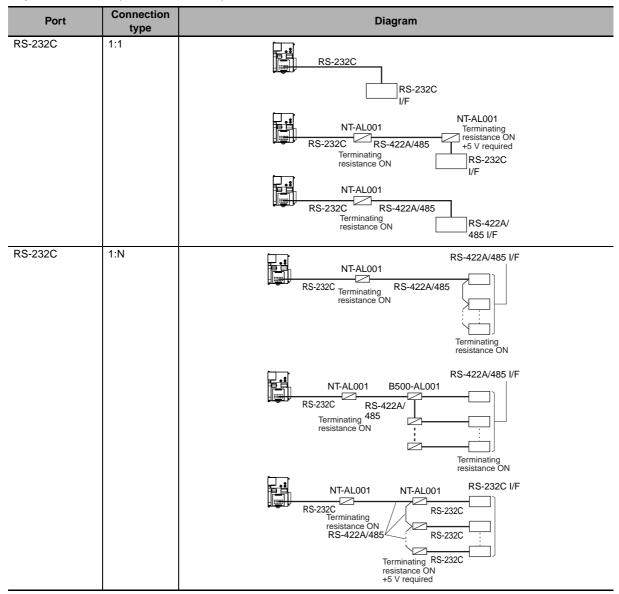
Terminating resistance: ON2-wire/4-wire setting: 2-wire

**Note** The terminating resistance setting example is for the NT631/NT631C.

The setting method depends on the PT model. Refer to the manual for your PT.

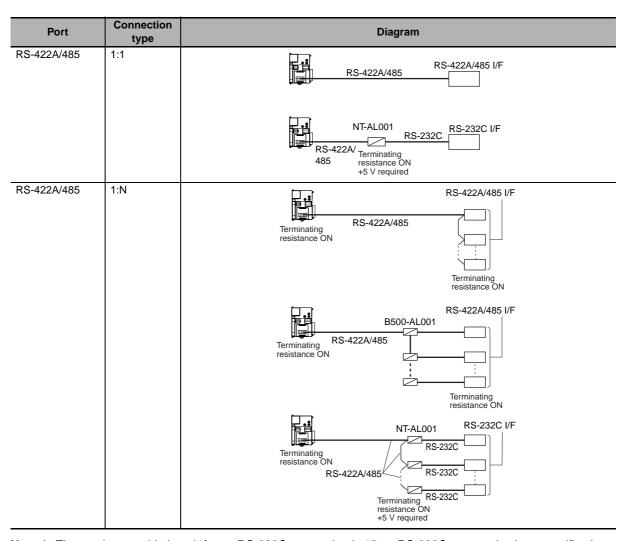
# General-purpose External Devices (No-protocol or Serial Gateway)

This section describes the connection patterns and connections for using different ports in Serial Gateway Mode and No-protocol Mode. Up to 32 nodes can be connected for 1:N communications.



**Note 1** The maximum cable length for an RS-232C connection is 15 m. RS-232C communications specifications, however, do not cover transmissions at 19.2 Kbps. Refer to documentation of the device being connected when using this baud rate.

- 2 The maximum total cable length including branch lines is 500 m for RS-422A/485.
- 3 The maximum cable length for connecting to the NT-AL001 is 2 m.
- 4 The maximum branch cable length is 10 m.

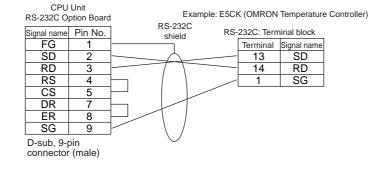


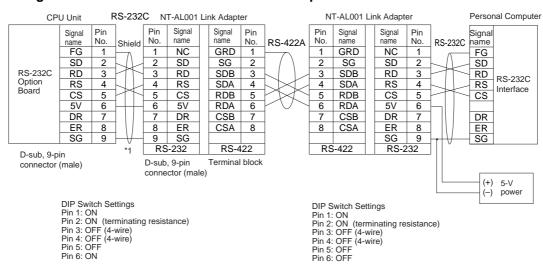
**Note 1** The maximum cable length for an RS-232C connection is 15 m. RS-232C communications specifications, however, do not cover transmissions at 19.2 Kbps. Refer to documentation of the device being connected when using this baud rate.

- 2 The CP1W-CIF11 RS-422A/485 Option Board is not isolated. The maximum transmission distance is therefore 50 m. If the distance exceeds 50 m, use the isolated CP1W-CIF12, or connect the isolated NT-AL001 RS-422A Link Adapter to the RS-232C port on the CP1W-CIF01 RS-232C Option Board. If you use one of these methods, the maximum total transmission distance will be 500 m.
- 3 The maximum cable length for connecting to the NT-AL001 is 2 m.
- 4 The maximum branch cable length is 10 m.

#### Examples of 1:1 Connections to RS-232C Ports

#### **Connecting to E5CK Temperature Controllers**



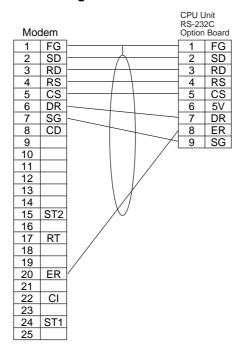


#### Using an NT-AL-001 RS-232C/RS-422A Link Adapter

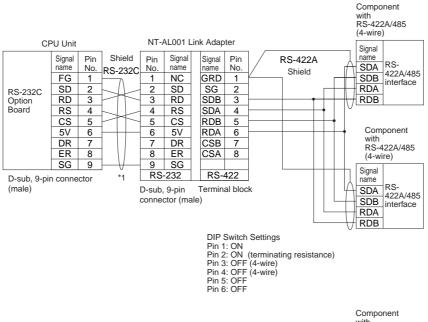
\*1 We recommend using the following NT-AL001 Link Adapter Connecting Cables to connect to NT-AL001 Link Adapters.

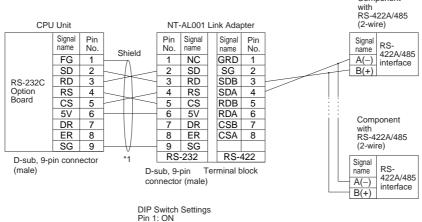
NT-AL001 Connecting Cables: XW2Z-070T-1 (0.7 m) XW2Z-200T-1 (2 m)

#### **Connecting to Modems**



#### Examples of 1:N Connections to RS-232C Ports





Pin 2: ON (terminating resistance) Pin 3: ON (2-wire) Pin 4: ON (2-wire)

Pin 5: OFF Pin 6: ON

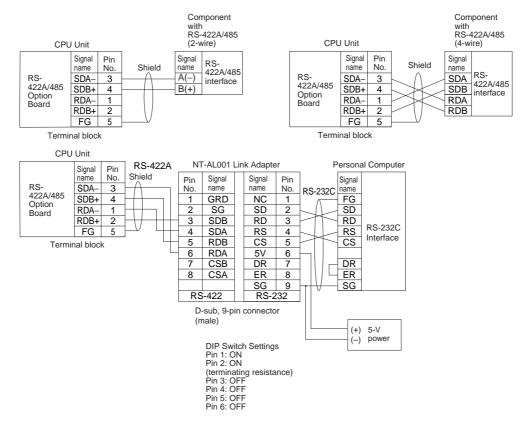
Adapters.

NT-AL001 Connecting Cables: XW2Z-070T-1 (0.7 m)

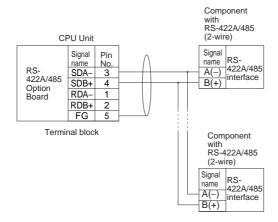
XW2Z-200T-1 (2 m)

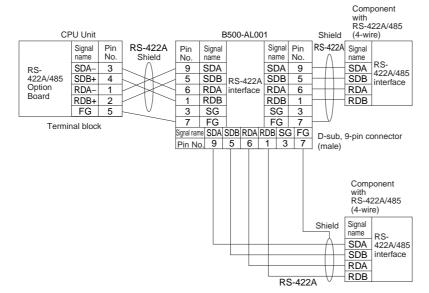
We recommend using the following NT-AL001 Link Adapter Connecting Cables to connect to NT-AL001 Link

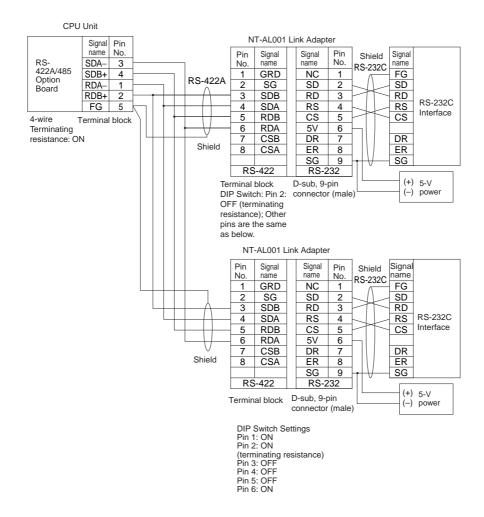
## • Examples of 1:1 Connections to RS-422A/485 Ports



#### • Examples of 1:N Connections to RS-422A/485 Ports



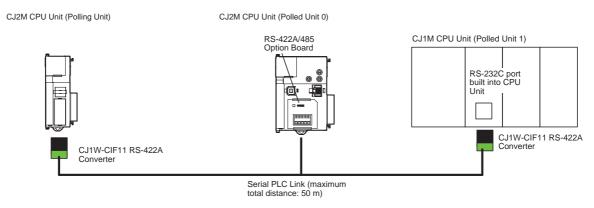




# Serial PLC Links for OMRON CJ2M, CJ1M, CP1H, CP1L, and CP1E PLCs

Examples of connections to use Serial PLC Links are provided below. The Serial PLC Link communications mode is used.

#### Connecting with RS-422A Converters

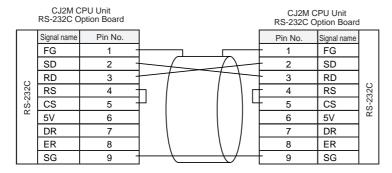


Note The CJ1W-CIF11/CP1W-CIF11 is not isolated. The maximum transmission distance is therefore 50 m. If the distance exceeds 50 m, use the isolated CP1W-CIF12, or the NT-AL001.

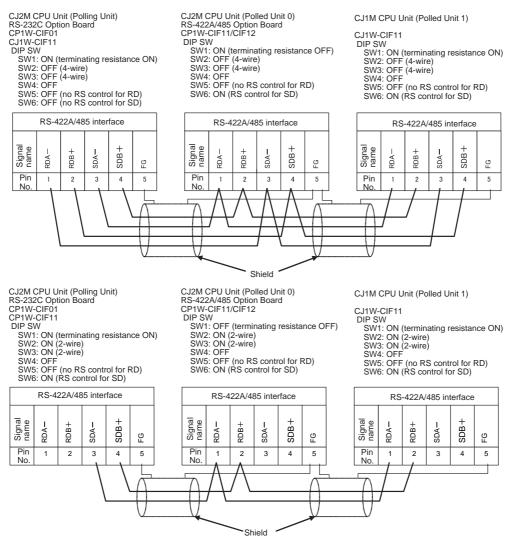
Do not use the CJ1W-CIF11/CP1W-CIF11 in the transmission path. If you use the NT-AL001 and CP1W-CIF12, the maximum total transmission distance will be 500 m.

#### Connections to RS-232C Ports

RS-232C can also be used to connect two CJ2M CPU Units with a Serial PLC Link.



## Connection Example



#### Connections for Echoback Test

Use the following connections.

RS-232C port				
Pin No.	Signal name			
2	SD			
3	RD			
4	RS			
5	CS			
1	FG			
8	ER	$\neg$		
7	DR	$\Box$		

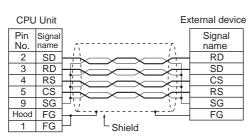
RS-422A/485 port					
Pin No.					
3	SDA-				
4	SDB+				
1	RDA-				
2	RDB+				
5	FG				

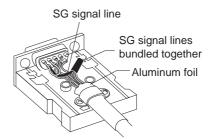
# A-4-3 Applicable Connectors and Recommended Cables

# Examples of Recommended RS-232C Wiring

We recommend the following wiring methods for RS-232C, especially in environment prone to noise.

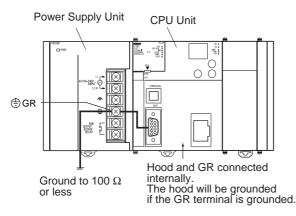
- · Use shielded twisted-pair cable for communications cables.
- Use a twisted-pair cable for each signal line and SG (signal ground) to connect the CPU Unit to a
  communications partner. Also, bundle all the SG lines at the Unit and at the other device and connect
  them together.
- Connect the shield line of the communications cable to the hood (FG) of the RS-232C connector at the Unit. Also, ground the protective earth (GR) terminal of the Power Supply Units on the CPU Rack and the CJ-series Expansion Racks to a resistance of 100  $\Omega$  or less. The following example shows connecting SD-SG, RD-SG, RS-SG, and CS-SG for Serial Communications Mode using a twisted-pair cable using the peripheral bus.



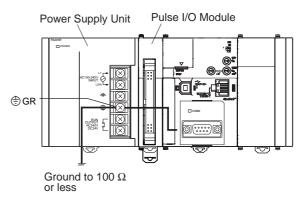


Note The hood (FG) is internally connected to the protective earth (GR) terminal on the Power Supply Unit through the CPU Rack. FG can thus be connected by connecting the protective earth (GR) terminal on the Power Supply Unit. The hood (FG) is also electrically connected to pin 1 (FG), but the connection resistance between the shield and the FG is smaller for the hood. To reduce contact resistance between the hood (FG) and the FG, connect the shield both to the hood (FG) and to pin 1 (FG).

#### Example for CJ2H CPU Unit

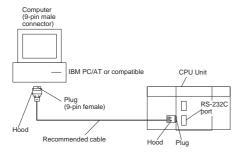


#### Example for CJ2M CPU Unit



#### Applicable Connector and Recommended Cables

Use the following connectors and cables when making an RS-232C cable to connect to the RS-232C port.



#### **Applicable Connectors**

#### **CPU Unit Connector**

Item	Model	Specifications		
Plug	XM3A-0921 or equivalent	9-pin male	Used together	
Hood	XM2S-0911-E or equivalent	9-pin, millimeter screws, static-resistant		

#### Personal Computer Connector for IBM PC/AT Computer (9-pin Male Connector)

Item	Model	Specifications		
Plug	XM3D-0921 or equivalent	9-pin female	Used together	
Hood	XM2S-0913 or equivalent	9-pin, inch screws, static- resistant		

#### **Recommended Cables**

We recommend using the following shielded twisted-pair cables to provide noise resistance.

Fujikura Ltd.: UL2464 AWG28 × 5P IFS-RVV-SB (UL product)

AWG 28 × 5P IFVV-SB (non-UL product)

Hitachi Cable, Ltd.: UL2464-SB(MA)  $5P \times 28AWG$  (7/0.127) (UL product) CO-MA-VV-SB  $5P \times 28AWG$  (7/0.127) (non-UL product)



#### **Precautions for Correct Use**

Use the special cables provided from OMRON for all connections whenever possible. If cables are produced in-house, be sure they are wired correctly. External devices and the CPU Unit may be damaged if general purpose (e.g., computer to modem) cables are used or if wiring is not correct.

#### Wiring Connectors

Use the following procedures to wire connectors.

#### **Preparing the Cable**

Lengths for steps in the procedure are provided in the diagrams.

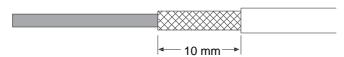
#### Connecting the Shield Line to the Hood (FG)

1	Cut the cable to	the required	length,	leaving	leeway fo	or wiring	and laying	the cables.
---	------------------	--------------	---------	---------	-----------	-----------	------------	-------------

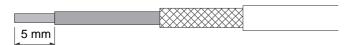
**2** Use a razor blade to cut away the sheath, being careful not to damage the braiding.



**3** Use scissors to cut away all but 10 mm of the exposed braiding.



**4** Use wire strippers to remove the insulation from the end of each wire.



**5** Fold the braiding back over the end of the sheath.



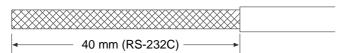
**6** Wrap aluminum foil tape over the top of the braiding for one and a half turns.



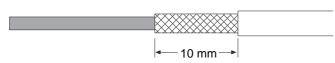
# Not Connecting the Shield to the Hood (FG)

1 Cut the cable to the required length, leaving leeway for wiring and laying the cables.

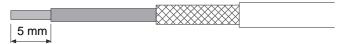
**2** Use a razor blade to cut away the sheath, being careful not to damage the braiding.



**3** Use scissors to cut away the exposed braiding.



**4** Use wire strippers to remove the insulation from the end of each wire.

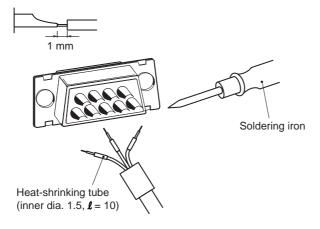


Wrap electrician's tape over the top and end of the cut sheath.

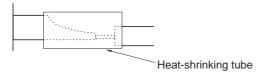


## Soldering

- Place heat-shrinking tubes over all wires.
- Pre-solder all wires and connector terminals.
- Solder the wires.

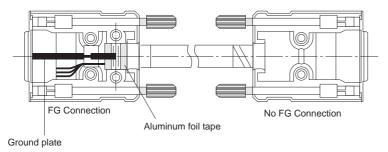


Move the heat-shrinking tubes onto the soldered area and shrink them into place.



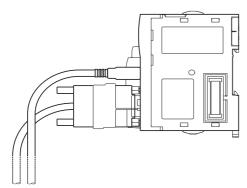
## Assembling the Hood

Assemble the connector hood as shown.



#### Connections to the CPU Unit

- Always turn OFF the power supply to the PLC before connecting or disconnecting communications cables.
- Tighten the communications connector attachment screws to 0.4 N·m.



# **Example of Recommended RS-422A/485 Wiring**

We recommend using the following wiring for RS-422A/485 to ensure transmission quality.

- 1 Use shielded twisted-pair cable for communications cables.
- Recommended RS-422A/485 Cable

Model	Manufacturer	
CO-HC-ESV-3P × 7/0.2	Hirakawa Hewtech Corp.	

**2** Connect the shield on the communications cable to the FG terminal on the RS-422A/485 Option Board. Also, ground the protective earth (GR) terminal on the CPU Unit to a resistance of 100  $\Omega$  or less.



#### **Precautions for Correct Use**

Using the CP1W-CIF11 RS-422A/485 Option Board (Not Isolated)

Use the CP1W-CIF11 only when there is no difference in electrical potential between devices. Connect the shield on the communications cable at both ends to the FG terminals on the RS-422A/485 terminal blocks to ground it. Do not allow the communications distance to exceed 50 m.

Using the CP1W-CIF12 RS-422A/485 Option Board (Isolated)

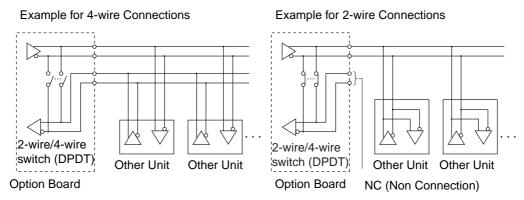
Use the CP1W-CIF12 if there is a difference in electrical potential between devices or for long-distance communications (500 m max.).

Connect the shield on the communications cable only at the Option Board to ground it. If the shield is connected at both ends of the cable when there is a difference in electrical potential, the devices may be damaged.

#### Connection Examples

#### **Examples for 2-wire and 4-wire Transmission Paths**

The transmission path for 2-wire and 4-wire connections are different, as shown below.



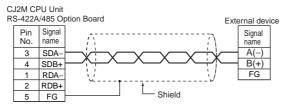


#### **Precautions for Correct Use**

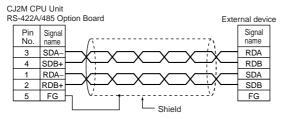
- All nodes must use either 2-wire connections or 4-wire connections.
- Do not use 4-wire connections with the switch on the Board set for 2-wire connections.

#### Wiring Example for 1:1 Connections

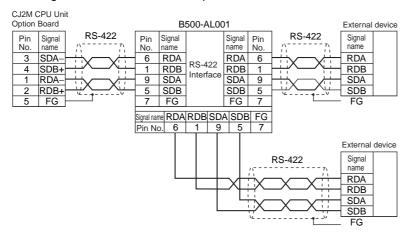
• Example for 2-wire Connections



· Example for 4-wire Connections



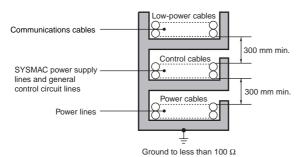
Using a B500-AL001 Link Adapter



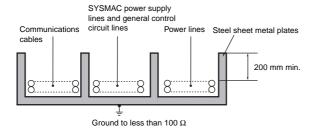
# Noise Countermeasures for External Wiring

Take the following points into account when externally wiring communications cables.

- When multi-conductor signal cable is being used, do not combine I/O wires and other control wires in the same cable.
- If wiring racks are parallel, allow at least 300 mm between them.



• If the I/O wiring and power cables must be placed in the same duct, they must be shielded from each other using grounded steel sheet metal plates.



# A-5 Installing the USB Driver

The USB driver must be installed in the computer to connect the PLC to the computer using the USB port.

# **Procedure for Installing the USB Driver**

This section describes the procedure for connecting a computer to the peripheral (USB) port on the CJ2 CPU Unit for the first time. This example assumes that the Support Software is already installed.

The installation procedure given here is for CX-One version 4.0 (CX-Programmer version 9.1).

#### Windows 2000, Vista, or Windows 7

1 Turn ON the power supply to the PLC and connect the peripheral USB port on the PLC to the personal computer using a USB cable. The USB driver will be automatically installed when the cable is connected.



Note If the software is not automatically installed, refer to Installing a Specified USB Driver later in this section.

#### Windows XP

1 Turn ON the power supply to the CJ2 PLC, and connect a USB cable between the USB port on the computer and the peripheral (USB) port on the CJ2 CPU Unit.

After the cable has been connected, the computer will automatically recognize the device and the following message will be displayed.



**2** The following dialog box will be displayed. Select one of the options and click the **Next** Button.



**3** The following dialog box will be displayed. Select the *Install the software automatically (Recommended)* Option and click the **Next** Button.



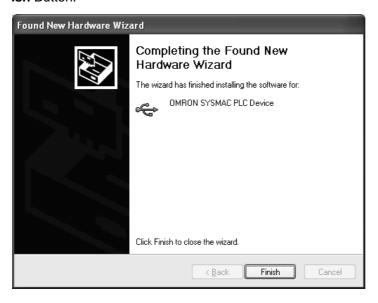
- Note 1 If the software cannot be installed automatically, refer to *Installing a Specified USB Driver* later in this section.
  - 2 If the installation media is not inserted or the USB device driver is installed for another port, a Driver List Dialog Box will be displayed. Make sure that the newest driver is selected and click the **Next** Button.



4 Ignore the following dialog box if it is displayed and click the Continue Anyway Button.



5 The following dialog box will be displayed if the installation is completed normally. Click the Finish Button.



# **Installing a Specified USB Driver**

If the USB driver cannot be installed automatically, use the following procedure to install it.

#### Windows Vista/Windows 7

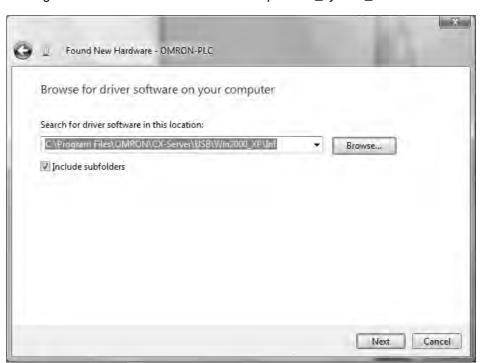
- **1** Turn ON the power supply to the PLC and connect the peripheral USB port on the PLC to the personal computer using a USB cable.
- The following dialog box will be displayed. Select Locate and install driver software (Recommended).



**3** The following dialog box will be displayed. Select *I* don't have the disc. Show me other options.



- **4** The following dialog box will be displayed. Click the **Browse** Button, specify the following location, and then click the **Next** Button.
  - C:\Program Files\OMRON\CX-Server\USB\operation\_system\_name\inf



Ignore the following dialog box if it is displayed and select Install this driver software anyway.

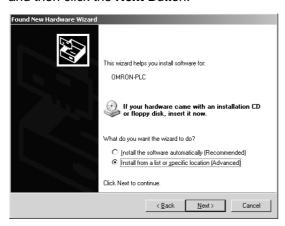


6 The following dialog box will be displayed when the driver software has been installed successfully.



#### Windows XP

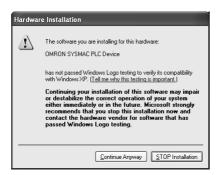
The following window will be displayed. Select the Install from a list of specific location Option and then click the Next Button.



**2** The following window will be displayed. Click the **Browse** Button for the *Include this location in the search* Field, specify C:\Program Files\OMRON\CX-Server\USB\win2000\_XP\Inf, and then click the **Next** Button. The driver will be installed. ("C:\" indicates the installation drive and may be different on your computer.)



**3** Ignore the following window if it is displayed and click the **Continue Anyway** Button.



**4** The following window will be displayed if the installation is completed normally. Click the **Finish** Button.



#### Windows 2000

1 Turn ON the power supply to the CJ2 PLC, and connect a USB cable between the USB port on the computer and the peripheral (USB) port on the CJ2 CPU Unit.

After the cable has been connected, the computer will automatically recognize the device and the following message will be displayed.



**2** The following message will be displayed. Click the **Next** Button.

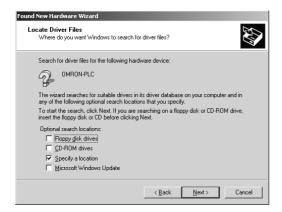


**3** The following window will be displayed.

Select the Search for a suitable driver for the device (recommended) Option and then click the **Next** Button.



**4** The following window will be displayed. From the list in the window, select the *Specify location* Check Box and then click the **Next** Button.



Click the Browse Button, specify the following location, and then click the Next Button.
C:\Program Files\OMRON\CX-Server\USB\operation\_system\_name\inf
("C:\" indicates the installation drive and may be different on your computer.)



**6** A search will be made for the driver and the following window will be displayed. Click the **Next** Button. The driver will be installed.

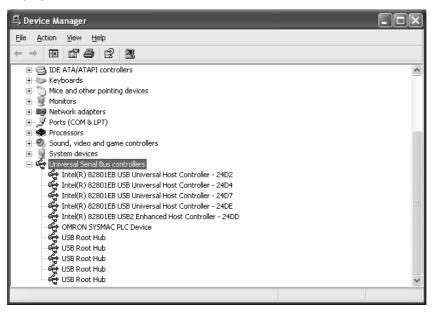


7 After the driver has been successfully installed, the following window will be displayed. Click the Finish Button.



# Checking after Installation

- **1** Display the Device Manager at the computer.
- **2** Click USB (Universal Serial Bus) Controllers, and confirm that OMRON SYSMAC PLC Device is displayed.

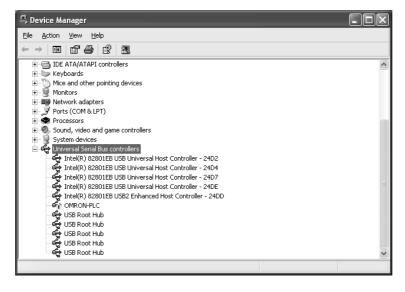


# Re-installing the USB Driver

If the USB driver installation fails for some reason or is cancelled in progress, the USB driver must be reinstalled.

## Checking USB Driver Status

- **1** Display the Device Manager on the computer.
- **2** If the *OMRON-PLC* is displayed under *Universal Serial Bus controllers*, installation of the USB driver software failed.



#### Reinstalling the USB Driver

**1** Right-click *OMRON-PLC* under *Universal Serial Bus controllers* and select **Properties**. The properties will be displayed.



**2** Click the **Reinstall Driver** Button. The Hardware Update Wizard Dialog Box will be displayed. Install the driver software using the procedure described in *Installing the USB Driver*.



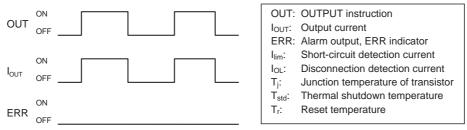
# A-6 Load Short-circuit Protection and Line Disconnection Detection for Basic I/O Units

# A-6-1 Load Short-circuit Protection and Line Disconnection Detection for CJ1W-OD202

This section describes the load short-circuit protection of the CJ1W-OD202 Output Units.

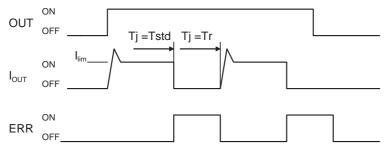
As shown below, normally when the output bit turns ON (OUT), the transistor will turn ON and then output current (lout) will flow.

#### **Normal Operation**



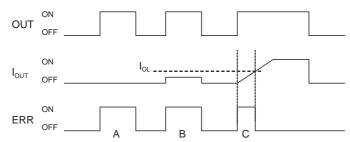
If the output (lout) is overloaded or short-circuited exceeding the detection current (Ilim), the output current (lout) will be limited as shown in figure below. When the junction temperature (Tj) of the output transistor reaches the thermal shutdown temperature (Tstd), the output will turn OFF to protect the transistor from being damaged, and the alarm output bit will turn ON to light the ERR indicator. When the junction temperature (Tj) of the transistor drops down to the reset temperature (Tr), the ERR indicator will be automatically reset and the output current will start flowing.

#### Operation for Overload or Short Circuit



If the line is disconnected and the output current (lout) drops below the line disconnection detection current (IOL), the ERR indicator will light as shown in the following figure.

Operation for Disconnected Line with Output Current below the Line Disconnection Detection Current



- A: Load not connected or load line broken.
- B: Current to load at or below line disconnection detection current.
- C: Rise of current to load too slow and error detected before the disconnection detection current was reached.

When load L is connected, the ERR indicator may light and the Alarm Output Bit may turn ON for approximately 100 ms. The programming example given later in this section can be used so that an error is not detected in this case.

#### Operating Restrictions

Although the CJ1W-OD202 is provided with short-circuit protection, these are for protecting internal circuits against momentary short-circuiting in the load. As shown in Figure 2, the short-circuit protection is automatically released when the Tj equals to Tr. Therefore, unless the cause of short-circuit is removed, ON/OFF operations will be repeated in the output. Leaving short-circuits for any length of time will cause internal temperature rise, deterioration of elements, discoloration of the case or PCBs, etc. Therefore, observe the following restrictions.

#### Restrictions

If a short-circuit occurs in an external load, immediately turn OFF the corresponding output and remove the cause. The CJ1W-OD202 turns ON an alarm output bit that corresponds to the external load output number. There is an alarm output bit for every common.

When an alarm output bit turns ON, use a self-holding bit for the alarm in the user program and turn OFF the corresponding output.

The alarm output bit is allocated in the Basic I/O Unit Information Area (A050 to A069) for every Unit mounting slot.

The following table shows the correspondence between output bits and bits in the Basic I/O Unit Information Area.

	Output bit	0 to 1	2 to 3	4 to 5	6 to 7
CJ1W-OD202	Mounted in even slot	0	1	2	3
	Mounted in odd slot	8	9	10	11

For example, when the CJ1W-OD202 is mounted in slot 0 on Rack 0, A50.00 will turn ON if the output 0 is short-circuited. When the CJ1W-OD202 is mounted in slot 1 of Rack 0, A50.11 will turn ON if the output 7 is short-circuited.

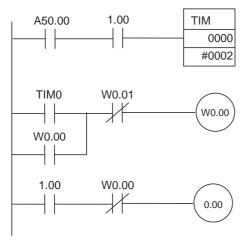
#### Programming Example

In this example, CJ1W-OD202 is mounted in slot 0 of the Rack 0.

This example shows how to turn OFF output bits CIO 0.00 immediately if the alarm output bit A50.00 turns ON and how to keep the output bits OFF until the cause is removed and the bit is reset using work bit W0.01.

Change to CIO 0.00, CIO 1.00, 0 (under TIM and at bottom right of diagram), A50.00, and W0.01.

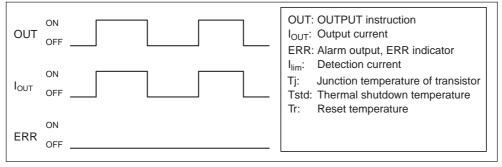
To prevent the alarm output bit from turning ON momentarily when the load turns ON, the alarm output is not turned ON for 200 ms after the input (CIO 1.00) turns ON.



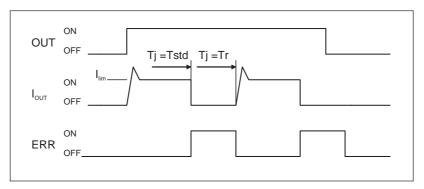
# A-6-2 Load Short-circuit Protection for CJ1W-OD204/OD212/OD232/MD232

As shown below, normally when the output bit turns ON (OUT), the transistor will turn ON and then output current (lout) will flow. If the output (lout) is overloaded or short-circuited exceeding the detection current (llim), the output current (lout) will be limited as shown in second figure below. When the junction temperature (Tj) of the output transistor reaches the thermal shutdown temperature (Tstd), the output will turn OFF to protect the transistor from being damaged, and the alarm output bit will turn ON to light the ERR indicator. When the junction temperature (Tj) of the transistor drops down to the reset temperature (Tr), the ERR indicator will be automatically reset and the output current will start flowing.

#### Normal Operation



#### Operation for Overload or Short Circuit



# Operating Restrictions for the CJ1W-OD204/OD212/OD232/MD232

These Units are provided with short-circuit protection, these are for protecting internal circuits against momentary short-circuiting in the load. As shown in Figure 2, the short-circuit protection is automatically released when the Tj equals to Tr. Therefore, unless the cause of short-circuit is removed, ON/OFF operations will be repeated in the output. Leaving short-circuits for any length of time will cause internal temperature rise, deterioration of elements, discoloration of the case or PCBs, etc. Therefore, observe the following restrictions.

#### Restrictions

If a short-circuit occurs in an external load, immediately turn OFF the corresponding output and remove the cause. An alarm output bit that corresponds to the external load output number is turned ON. There is an alarm output bit for every common.

When an alarm output bit turns ON, use a self-holding bit for the alarm in the user program and turn OFF the corresponding output.

The alarm output bit is allocated in the Basic I/O Unit Information Area (A050 to A069) for every Unit mounting slot.

The following table shows the correspondence between output bits and bits in the Basic I/O Unit Information Area.

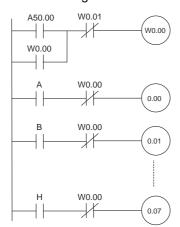
Output hit		m		m+1	m+2	m+3
	Output bit	0 to 7	8 to 15	0 to 15	0 to 15	0 to 15
CJ1W-OD204	Mounted in even slot	0				
	Mounted in odd slot	8				
CJ1W-OD212	Mounted in even slot		0			
	Mounted in odd slot		8			
CJ1W-MD232	Mounted in even slot		0			
	Mounted in odd slot		8			
CJ1W-OD232	Mounted in even slot		0	1		
	Mounted in odd slot		8	9		

For example, when the CJ1W-OD212 is mounted in slot 0 on Rack 0, A50.00 will turn ON if the output 8 is short-circuited. When the CJ1W-OD232 is mounted in slot 1 of Rack 0, A50.09 will turn ON if the output m+1 is short-circuited.

#### Programming Example

In this example, CJ1W-OD212 is mounted in slot 0 of the Rack 0.

This example shows how to turn OFF output bits CIO 0.00 to CIO 0.07 immediately if the alarm output bit A50.00 turns ON and how to keep the output bits OFF until the cause is removed and the bit is reset using work bit W0.01.



# A-7 Relay Output Noise Reduction Methods

The CJ-series PLCs conforms to the Common Emission Standards (EN61000-6-4) 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 PLC.

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 EN61000-6-4 for more details.)

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

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

# **Countermeasure Examples**

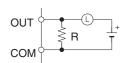
When switching an inductive load, connect an surge protector, diodes, etc., in parallel with the load or contact as shown below.

Circuit	Cur	rent	Characteristic	Required element
Circuit	AC	DC	Cital acteristic	Required element
CR method  C existing proper supply proper supply	Yes	Yes	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.  If the supply voltage is 24 or 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.	The capacitance of the capacitor must be 1 to 0.5 $\mu$ F per contact current of 1 A and resistance of the resistor must be 0.5 to 1 $\Omega$ 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. 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.

Circuit	Cur	rent	Characteristic	Required element
Circuit	AC DC		Citaracteristic	Required element
Diode method  Power supply  Power supply	No	Yes	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.  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.	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.  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.
Varistor method  Power supply  Power supply	Yes	Yes	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.  If the supply voltage is 24 or 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.	

When switching a load with a high inrush current such as an incandescent lamp, suppress the inrush current as shown below.

#### Countermeasure 1



Providing a dark current of approx. one-third of the rated value through an incandescent lamp.

#### Countermeasure 2

Providing a limiting resistor

# **Functions Supported for Unit A-8 Versions**

#### A-8-1 **CJ2H CPU Units**

# **Unit Version 1.4 or Later**

CX-Programmer version 9.3 or higher must be used to enable using the functions added for unit version 1.4.

Units	CJ2H CPU Units		
Models	CJ2H-CPU6□-EIP CJ2H-CPU6□		
Unit version	Unit version 1.4 or later	Unit version 1.3 or earlier	
Synchronous unit operation function	Supported.	Not supported.	
Position Control Units with EtherCAT interface CJ1W-NC□82 work for synchronous unit operation.			

# **Functions Supported for Unit Version 1.3 or Later**

CX-Programmer version 9.1 or higher must be used to enable using the functions added for unit version 1.3.

Units		CJ2H CPU Units			
Models		CJ2H-CPU6□-EIP CJ2H-CPU6□			
Function	Unit version	Unit version 1.3 or later	Unit version 1.2	Unit version 1.1	Unit version 1.0
Special instructions for certain Special I/O Units	CJ1W-NC281/NC481/NC881 Position Control Units: PCU HIGH-SPEED POSITIONING (NCDMV(218))	Supported.	Not supported.	Not supported.	Not supported.
	CJ1W-NC281/NC481/NC881 Position Control Units: PCU POSITIONING TRIGGER (NCDTR(219))	Supported.	Not supported.	Not supported.	Not supported.
New special instructions	SIGNED AREA RANGE COM- PARE: ZCPS(088)	Supported.	Not supported.	Not supported.	Not supported.
	DOUBLE SIGNED AREA RANGE COMPARE: ZCPSL(116)	Supported.	Not supported.	Not supported.	Not supported.

## Unit Version 1.2 or Later

CX-Programmer version 8.3 or higher must be used to enable using the functions added for unit version 1.2.

Units	CJ2H CPU Units		
Models	CJ2H-CPU6□-EIP CJ2H-CPU6□		
Unit version	Unit version 1.2 or later	Unit versions earlier than 1.2	
EM Area Force-setting/resetting	Supported.	Not supported.	

**Note** User programs that use functions of CJ2H CPU Units with unit version 1.2 or later cannot be used with CJ2H CPU Units with unit version 1.1 or earlier. If an attempt is made to transfer a program that uses any of these functions from the CX-Programmer to a CPU Unit with unit version 1.1 or earlier, an error will be displayed and it will not be possible to download to the CPU Unit.

# Functions Supported for Unit Version 1.1 or Later

CX-Programmer version 8.1\* or higher must be used to enable using the functions added for unit version 1.1.

Units	CJ2H CPU Units	
Models	CJ2H-CPU6□-EIP CJ2H-CPU6□	
Function Unit version	Unit version 1.1	Unit version 1.0
High-speed interrupt function	Supported.	Not supported.
Reduced overhead time for interrupt tasks  Minimum interval for scheduled interrupt task execution: 0.1 ms		
Changing the minimum cycle time setting during operation	Supported.	Not supported.
Synchronous unit operation	Supported.	Not supported.
Addition of immediate refreshing instructions for certain Special I/O Units	Supported.	Not supported.
CJ1W-AD042 High-speed Analog Input Unit: ANALOG INPUT DIRECT CONVERSION (AIDC(216)) CJ1W-DA042V High-speed Analog Output Unit: ANALOG OUTPUT DIRECT CONVERSION (AODC(217))		
High-speed Serial Communications Units	Supported.	Not supported.
CJ1W-SCU22/SCU32/SCU42 High-speed Serial Communications Units: DIRECT RECEIVE VIA SERIAL COMMUNICATIONS UNIT (DRXDU(261)) and DIRECT TRANSMIT VIA SERIAL COMMUNICATIONS UNIT (DTXDU(262)		

<sup>\*</sup> CX-Programmer version 8.02 or higher is required to use the high-speed interrupt function and the function to change the minimum cycle time setting during operation.

Note User programs that use functions of CJ2H CPU Units with unit version 1.1 or later cannot be used with CJ2H CPU Units with unit version 1.0 or earlier. If an attempt is made to transfer a program that uses any of these functions from the CX-Programmer to a CPU Unit with unit version 1.0, an error will be displayed and it will not be possible to download to the CPU Unit. If a program file (extension: .OBJ) that uses any of these functions is transferred to a CPU Unit with unit version 1.0, a program error will occur when operation starts or when the function starts and operation of the CPU Unit will stop.

#### A-8-2 CJ2M CPU Units

# **Functions Supported for Unit Version 2.0 or Later**

CX-Programmer version 9.12 or higher must be used to enable using the functions added for unit version 2.0.

Units	CJ2M CPU Units		
Models CJ2M-CPU		CPU 🗆	
Unit version Function	Unit version 2.0 or later	Unit versions earlier than 2.0	
Pulse I/O	Supported.	Not supported.	

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# **Revision History**

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
01	July 2008	Original production
02	December 2008	Added the CJ2H-CPU6□.
		Added information on unit version 1.1 of the CJ2 CPU Units.
		Added the following Basic I/O Units: CJ1W-ID212, CJ1W-ID233, CJ1W-OD213, and CJ1W-OD234.
03	February 2009	Added information on the synchronous unit operation function.
		Added the CJ1W-NC214/234/414/434 Position Control Units.
04	July 2009	Added the CJ1W-AD042 Analog Input Unit.
		Added the CJ1W-DA042V Analog Output Unit.
05	November 2009	Added the CJ1W-SCU22/32/42 Serial Communications Units.
		Added information on the EM Area force-setting/resetting function.
		Corrected mistakes.
06	February 2010	Added the CJ2M-CPU□□.
07	July 2010	Added information on CJ2M-MD21□ Pulse I/O Modules.
		Corrected mistakes.
08	October 2010	Added information on unit version 2.1 of the built-in EtherNet/IP section on CJ2M-CPU3 CPU Units.
		Corrected mistakes.
09	March 2011	Added CJ2H CPU Units with unit version 1.4.
		Added information on synchronous unit operation (for the CJ1W-NC□82).
		Added information on B7A Interface Units.
		Corrected mistakes.
10	October 2014	Corrected mistakes.
		Added descriptions.
11	October 2015	Added CJ2H CPU Units with unit version 1.5.
		Added CJ2M CPU Units with unit version 2.1.
		Corrected mistakes.
12	June 2016	Updated the EtherNet/IP logo.
		Corrected mistakes.
13	September 2016	Changed accessories.
		Corrected mistakes.
14	July 2017	Added the CP1W-CIF12-V1 Serial Communications Option Board.



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Cat. No. W472-E1-14