

# **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 2023*



# 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

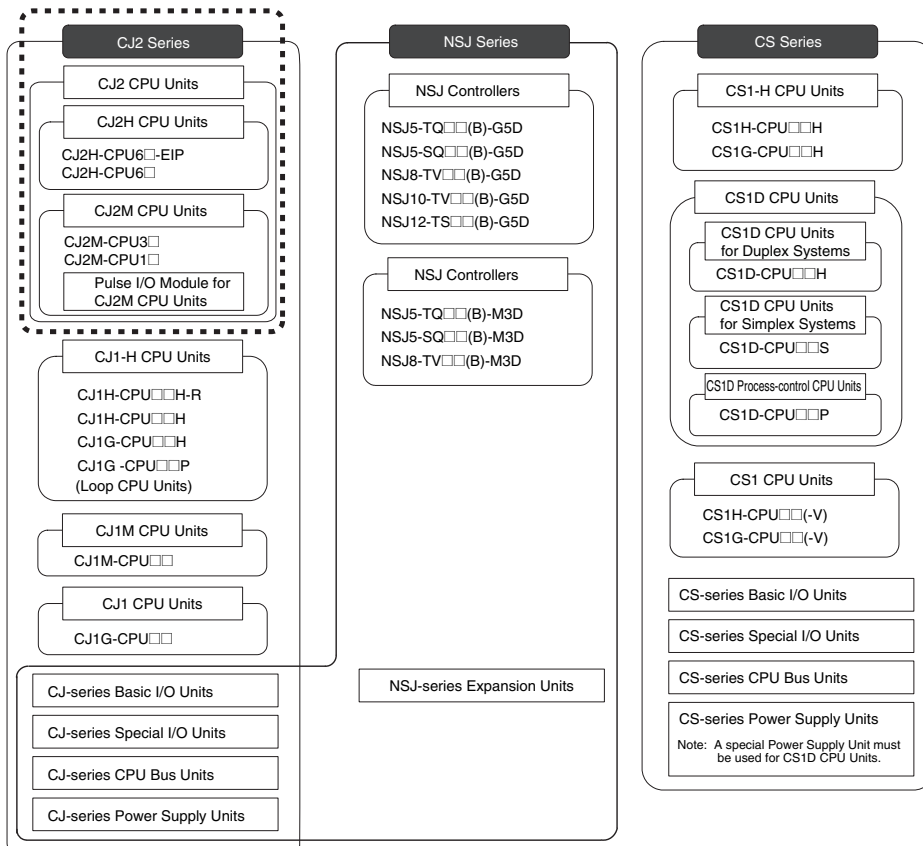
CJ-series CJ2 CPU Units

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

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

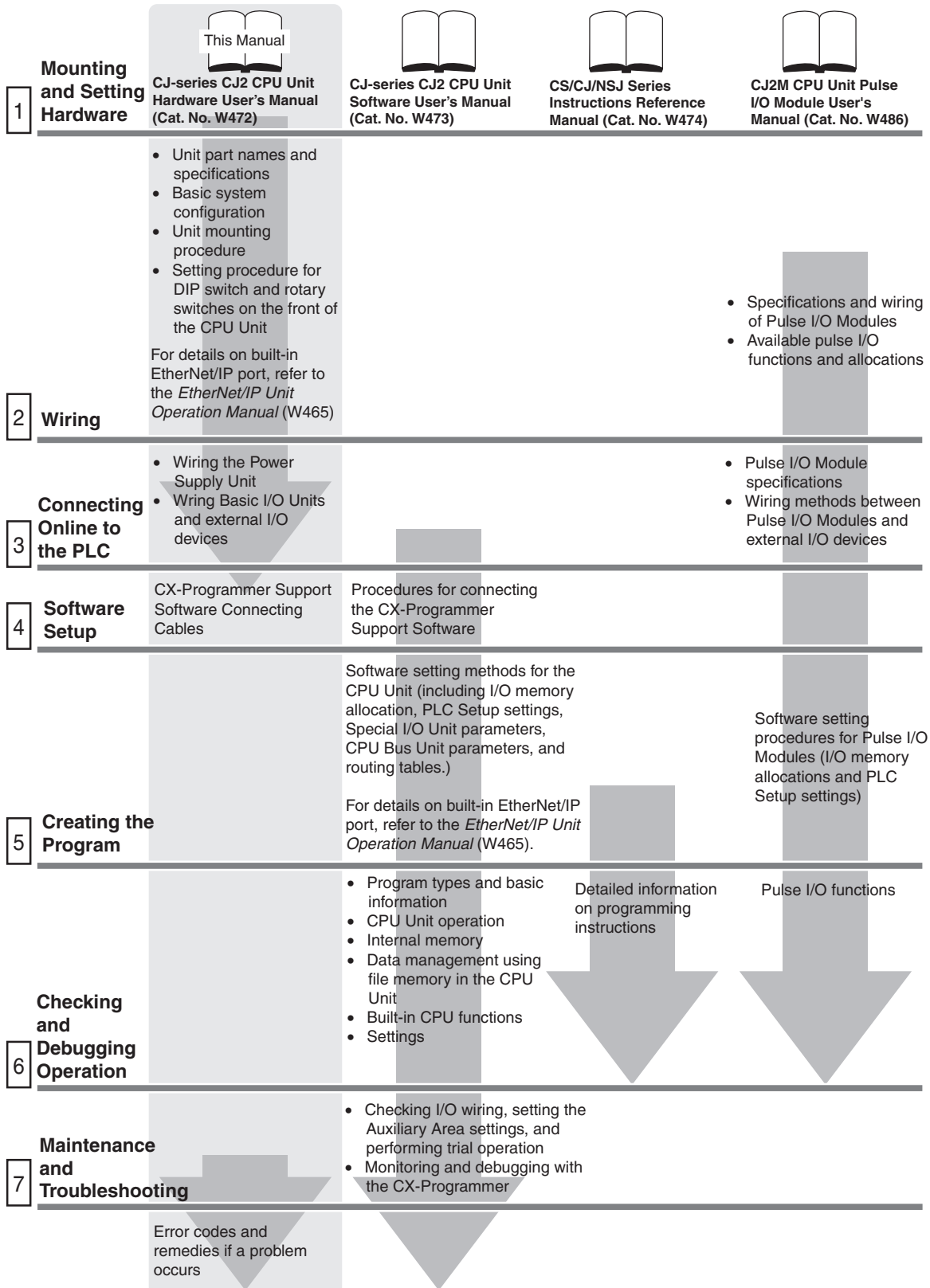
- CJ2H-CPU6□(-EIP): Indicates the CJ2H-CPU6□-EIP and CJ2H-CPU6□ CPU Units.
- CJ2M-CPU□□: Indicates the CJ2M-CPU3□ and CJ2M-CPU1□ CPU Units.

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.



## 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   |
|---|---|
| <b>Section 1 Overview</b>                               | This section gives an overview of the CJ2 CPU Units and describes the features and specifications.  |
| <b>Section 2 Basic System Configuration and Devices</b> | This section describes the system configuration for the CJ2 CPU Unit.   |
| <b>Section 3 Nomenclature and Functions</b>             | This section describes the part names and functions of the CPU Unit and Configuration Units.  |
| <b>Section 4 Support Software</b>                       | 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.  |
| <b>Section 5 Installation</b>                           | This section describes the installation locations and how to wire CPU Units and Configuration Units.  |
| <b>Section 6 Troubleshooting</b>                        | This section describes how to check the status for errors that occur during system operation and the remedies for those errors.   |
| <b>Section 7 Inspection and Maintenance</b>             | This section describes periodic inspection, the service life of the Battery and Power Supply Unit, and how to replace the Battery.  |
| <b>Section 8 Backup Operations</b>                      | This section describes the procedure to back up PLC data.   |
| <b>Appendices</b>                                       | 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   |
|--|---|
| <b>Section 1 Overview</b>                                | This section gives an overview of the CJ2 CPU Units and describes the features and specifications.  |
| <b>Section 2 Internal Memory in the CPU Unit</b>         | This section describes the types of memory in the CPU Unit and the data that is stored.   |
| <b>Section 3 CPU Unit Operation</b>                      | This section describes the internal operation of the CPU Unit.  |
| <b>Section 4 CPU Unit Initialization</b>                 | This section describes the initial setup of the CPU Unit.   |
| <b>Section 5 Understanding Programming</b>               | This section describes program types and programming details, such as symbols and programming instructions.   |
| <b>Section 6 I/O Memory Areas</b>                        | This section describes the I/O memory areas in the CPU Unit.  |
| <b>Section 7 File Operations</b>                         | This section describes the files that can be stored in the CPU Unit, the storage destination for those files, and file operations.  |
| <b>Section 8 I/O Allocations and Unit Settings</b>       | This section describes the I/O allocations used to exchange data between the CPU Unit and other Units.  |
| <b>Section 9 PLC Setup</b>                               | This section describes details on the PLC Setup settings, which are used to perform basic settings for the CPU Unit.  |
| <b>Section 10 CPU Unit Functions</b>                     | This section describes functions that are built into the CPU Unit.  |
| <b>Section 11 Programming Devices and Communications</b> | This section describes the procedure for connecting the CJ2 CPU Unit to the CX-Programmer or other Support Software and to other devices.   |
| <b>Section 12 CPU Unit Cycle Time</b>                    | This section describes how to monitor and calculate the cycle time.   |
| <b>Appendices</b>  | 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   |
|--|---|
| <b>Section 1 Basic Understanding of Instructions</b>             | This section provides basic information on designing ladder programs for a CS/CJ/NSJ-series CPU Unit.                                     |
| <b>Section 2 Summary of Instructions</b>                         | This section provides a summary of instructions used with a CS/CJ/NSJ-series CPU Unit.  |
| <b>Section 3 Instructions</b>                                    | This section describes the functions, operands and sample programs of the instructions that are supported by a CS/CJ/NSJ-series CPU Unit. |
| <b>Section 4 Instruction Execution Times and Number of Steps</b> | This section provides the instruction execution times for each CS/CJ/NSJ-series CPU Unit instruction.                                     |
| <b>Appendices</b>  | 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)

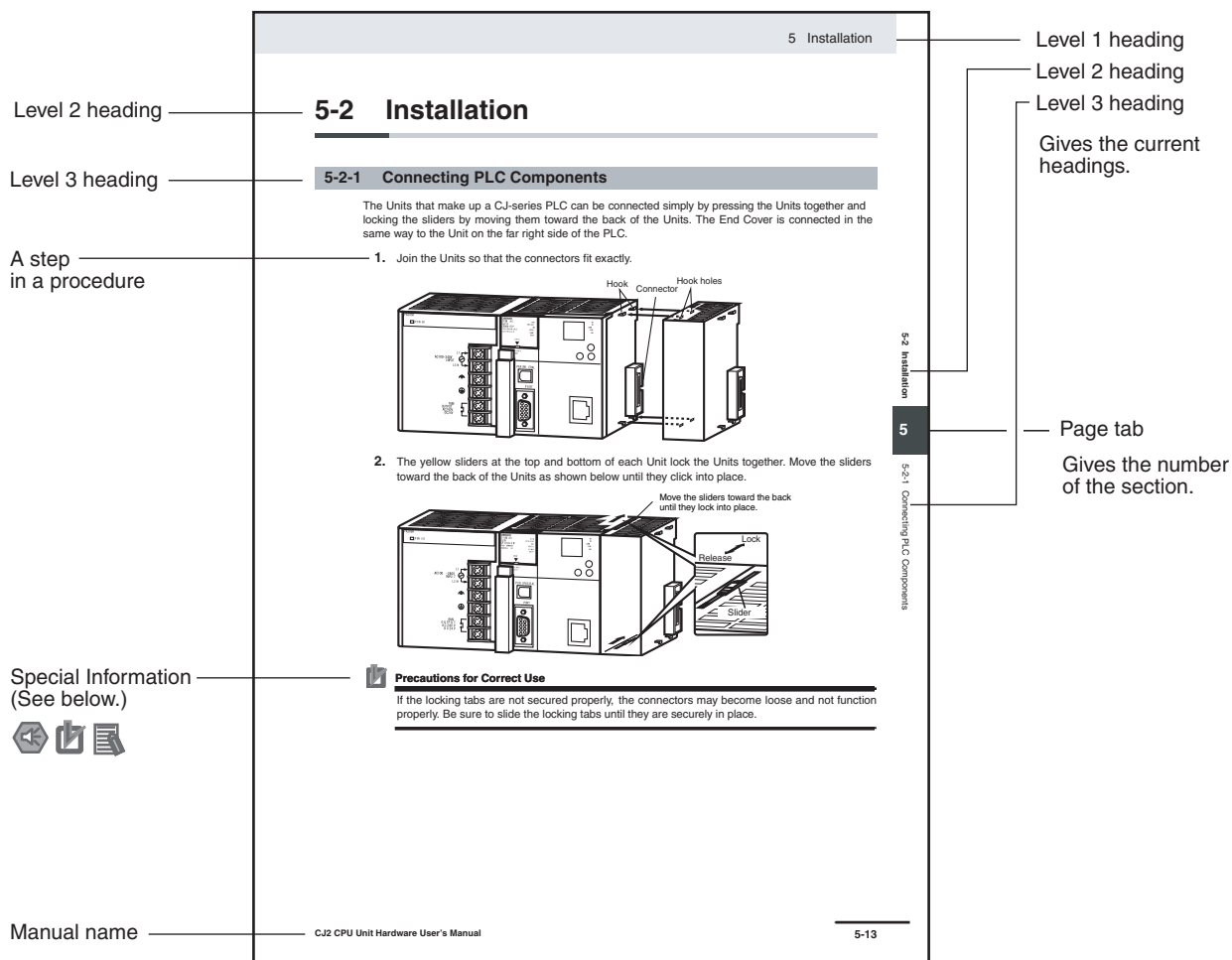
| Section  | Content  |
|--|--|
| <b>Section 1 Overview</b>  | This section gives an overview of the Pulse I/O Modules and the pulse I/O functions of the CJ2M.   |
| <b>Section 2 I/O Application Procedures and Function Allocations</b> | This section lists the pulse functions of the CJ2M CPU Units and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



# Sections in this Manual

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|          |   |          |
|----------|---|----------|
| <b>1</b> | <b>Overview</b>                               | <b>1</b> |
| <b>2</b> | <b>Basic System Configuration and Devices</b> | <b>2</b> |
| <b>3</b> | <b>Nomenclature and Functions</b>             | <b>3</b> |
| <b>4</b> | <b>Support Software</b>                       | <b>4</b> |
| <b>5</b> | <b>Installation</b>                           | <b>5</b> |
| <b>6</b> | <b>Troubleshooting</b>                        | <b>6</b> |
| <b>7</b> | <b>Inspection and Maintenance</b>             | <b>7</b> |
| <b>8</b> | <b>Backup Operations</b>                      | <b>8</b> |
| <b>A</b> | <b>Appendices</b>                             | <b>A</b> |



# CONTENTS

---

|   |    |
|---|----|
| Introduction.....                       | 1  |
| CJ2 CPU Unit Manuals .....              | 2  |
| Manual Structure .....                  | 5  |
| Sections in this Manual.....            | 7  |
| Terms and Conditions Agreement .....    | 13 |
| Safety Precautions .....                | 15 |
| Application Precautions.....            | 21 |
| Operating Environment Precautions ..... | 26 |
| Regulations and Standards .....         | 27 |
| Unit Versions of CJ2 CPU Units .....    | 29 |
| Related Manuals .....                   | 36 |

## Section 1 Overview

---

|  |             |
|--|-------------|
| <b>1-1 Overview of CJ2 CPU Units .....</b> | <b>1-2</b>  |
| 1-1-1 Overview.....                        | 1-2         |
| 1-1-2 CJ2 CPU Unit Features .....          | 1-4         |
| <b>1-2 Basic Operating Procedure .....</b> | <b>1-12</b> |
| <b>1-3 Specifications .....</b>            | <b>1-13</b> |
| 1-3-1 General Specifications.....          | 1-13        |
| 1-3-2 Performance Specifications .....     | 1-14        |
| 1-3-3 Function Specifications.....         | 1-21        |

## Section 2 Basic System Configuration and Devices

---

|  |             |
|--|-------------|
| <b>2-1 Basic System Configuration.....</b>       | <b>2-2</b>  |
| 2-1-1 Basic System Configuration.....            | 2-2         |
| 2-1-2 CPU Rack .....                             | 2-3         |
| 2-1-3 Expansion Racks .....                      | 2-11        |
| 2-1-4 Configuration Units .....                  | 2-14        |
| 2-1-5 Calculating Unit Current Consumption ..... | 2-23        |
| 2-1-6 Calculating Power Consumption.....         | 2-25        |
| <b>2-2 Expanded System Configuration .....</b>   | <b>2-27</b> |
| 2-2-1 Serial Communications.....                 | 2-27        |
| 2-2-2 Communications Networks.....               | 2-29        |

## Section 3 Nomenclature and Functions

---

|            |   |             |
|------------|---|-------------|
| <b>3-1</b> | <b>CPU Units</b> .....  | <b>3-3</b>  |
| 3-1-1      | CPU Section.....  | 3-3         |
| 3-1-2      | Built-in EtherNet/IP Section (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only) ..... | 3-9         |
| <b>3-2</b> | <b>Memory Card</b> .....  | <b>3-14</b> |
| 3-2-1      | Models and Specifications .....   | 3-14        |
| 3-2-2      | Operating Procedures .....  | 3-14        |
| 3-2-3      | Installing and Removing.....  | 3-15        |
| <b>3-3</b> | <b>Pulse I/O Modules (CJ2M CPU Unit Only)</b> .....                     | <b>3-18</b> |
| 3-3-1      | Models and Specifications .....   | 3-18        |
| 3-3-2      | Part Names and Functions.....   | 3-18        |
| <b>3-4</b> | <b>Serial Option Boards (CJ2M-CPU3□ Only)</b> .....                     | <b>3-21</b> |
| 3-4-1      | Overview .....  | 3-21        |
| <b>3-5</b> | <b>Power Supply Units</b> .....   | <b>3-22</b> |
| 3-5-1      | Models and Specifications .....   | 3-22        |
| 3-5-2      | Components .....  | 3-25        |
| 3-5-3      | Selecting a Power Supply Unit.....                                      | 3-28        |
| <b>3-6</b> | <b>CJ-series Basic I/O Units</b> .....                                  | <b>3-29</b> |
| 3-6-1      | Basic I/O Units with Terminal Blocks.....                               | 3-29        |
| 3-6-2      | Thirty-two/Sixty-four-point Basic I/O Units with Connectors.....        | 3-31        |
| <b>3-7</b> | <b>I/O Control Units and I/O Interface Units</b> .....                  | <b>3-33</b> |
| 3-7-1      | Component Names .....   | 3-33        |
| 3-7-2      | System Configuration.....   | 3-33        |
| <b>3-8</b> | <b>B7A Interface Unit</b> .....   | <b>3-34</b> |
| 3-8-1      | Overview .....  | 3-34        |
| 3-8-2      | System Configuration.....   | 3-34        |
| 3-8-3      | Models.....   | 3-34        |
| 3-8-4      | B7A Communications Specifications.....                                  | 3-35        |
| 3-8-5      | Common Specifications .....   | 3-36        |
| 3-8-6      | I/O Memory Allocations .....  | 3-36        |
| 3-8-7      | Transmission Error Processing.....                                      | 3-36        |
| 3-8-8      | Parts and Names .....   | 3-38        |
| 3-8-9      | Preparing and Connecting Cables .....                                   | 3-40        |
| 3-8-10     | Connection Diagrams.....  | 3-42        |

## Section 4 Support Software

---

|            |   |            |
|------------|---|------------|
| <b>4-1</b> | <b>Support Software</b> .....                                     | <b>4-2</b> |
| 4-1-1      | CX-One FA Integrated Tool Package .....                           | 4-2        |
| <b>4-2</b> | <b>Connection Methods</b> .....                                   | <b>4-5</b> |
| 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        |

## Section 5 Installation

---

|            |  |            |
|------------|--|------------|
| <b>5-1</b> | <b>Fail-safe Circuits</b> .....            | <b>5-2</b> |
| <b>5-2</b> | <b>Installation</b> .....                  | <b>5-4</b> |
| 5-2-1      | Installation and Wiring Precautions.....   | 5-4        |
| 5-2-2      | Installation in a Control Panel .....      | 5-6        |
| 5-2-3      | Assembled Appearance and Dimensions .....  | 5-8        |
| 5-2-4      | Connecting PLC Components.....             | 5-13       |
| 5-2-5      | DIN Track Installation .....               | 5-15       |
| 5-2-6      | Connecting CJ-series Expansion Racks ..... | 5-17       |

|            |  |             |
|------------|--|-------------|
| <b>5-3</b> | <b>Wiring</b> .....  | <b>5-20</b> |
| 5-3-1      | Power Supply Wiring .....  | 5-20        |
| 5-3-2      | Wiring CJ-series Basic I/O Units with Terminal Blocks .....                          | 5-27        |
| 5-3-3      | Wiring Basic I/O Units with Connectors .....   | 5-29        |
| 5-3-4      | Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals ..... | 5-33        |
| 5-3-5      | Connecting Pulse I/O Modules to External I/O Devices (CJ2M CPU Unit Only) .....      | 5-33        |
| 5-3-6      | Connecting I/O Devices .....   | 5-35        |
| 5-3-7      | Connecting through an Ethernet Cable (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only) .....      | 5-39        |
| <b>5-4</b> | <b>Control Panel Installation</b> .....  | <b>5-42</b> |
| 5-4-1      | Temperature .....  | 5-42        |
| 5-4-2      | Humidity .....   | 5-44        |
| 5-4-3      | Vibration and Shock .....  | 5-44        |
| 5-4-4      | Atmosphere .....   | 5-44        |
| 5-4-5      | Electrical Environment .....   | 5-45        |
| 5-4-6      | Grounding .....  | 5-50        |

## Section 6 Troubleshooting

---

|            |  |             |
|------------|--|-------------|
| <b>6-1</b> | <b>CPU Unit Errors</b> .....   | <b>6-2</b>  |
| 6-1-1      | Errors and Remedies .....  | 6-2         |
| 6-1-2      | Checking Errors .....  | 6-2         |
| 6-1-3      | Checking Detailed Status .....   | 6-3         |
| 6-1-4      | Reading Error Log Information .....  | 6-3         |
| 6-1-5      | I/O Table Verification .....   | 6-5         |
| 6-1-6      | Types of Errors .....  | 6-6         |
| 6-1-7      | Handling Errors .....  | 6-7         |
| <b>6-2</b> | <b>Troubleshooting Built-in EtherNet/IP Port Errors (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)</b> ..... | <b>6-25</b> |
| 6-2-1      | Checking Built-in EtherNet/IP Port Error Status .....  | 6-25        |
| 6-2-2      | Checking Error Status at the EtherNet/IP Port Seven-segment Display .....                          | 6-26        |
| <b>6-3</b> | <b>Non-CPU Unit Errors and Remedies</b> .....  | <b>6-28</b> |
| 6-3-1      | Error Causes and Remedies .....  | 6-28        |

## Section 7 Inspection and Maintenance

---

|            |  |             |
|------------|--|-------------|
| <b>7-1</b> | <b>Inspections</b> .....                                   | <b>7-2</b>  |
| 7-1-1      | Inspection Points .....                                    | 7-2         |
| 7-1-2      | Unit Replacement Precautions .....                         | 7-4         |
| <b>7-2</b> | <b>Replacing the Battery</b> .....                         | <b>7-5</b>  |
| 7-2-1      | Battery Replacement .....                                  | 7-5         |
| 7-2-2      | Operation When Battery Is Exhausted or Not Installed ..... | 7-8         |
| <b>7-3</b> | <b>Power Supply Unit Replacement Time</b> .....            | <b>7-10</b> |

## Section 8 Backup Operations

---

|            |   |            |
|------------|---|------------|
| <b>8-1</b> | <b>Backing Up Data</b> .....                      | <b>8-2</b> |
| <b>8-2</b> | <b>Using a Computer to Back Up Data</b> .....     | <b>8-3</b> |
| 8-2-1      | PLC Backup Tool .....                             | 8-3        |
| 8-2-2      | PLC Backup Tool Operations .....                  | 8-4        |
| <b>8-3</b> | <b>Simple Backup</b> .....                        | <b>8-7</b> |
| 8-3-1      | Overview .....                                    | 8-7        |
| 8-3-2      | Operating Procedures .....                        | 8-8        |
| 8-3-3      | Verifying Backup Operations with Indicators ..... | 8-10       |
| 8-3-4      | Related Auxiliary Bits/Words .....                | 8-12       |
| 8-3-5      | Time Required for Simple Backup .....             | 8-12       |
| 8-3-6      | Data Backed Up Using Simple Backup .....          | 8-13       |

# Appendices

---

|                               |  |              |
|-------------------------------|--|--------------|
| <b>A-1</b>                    | <b>Specifications of Basic I/O Units .....</b>   | <b>A-3</b>   |
| A-1-1                         | Overview of Units .....  | A-3          |
| A-1-2                         | Basic I/O Units .....  | A-5          |
| A-1-3                         | Precautions on Contact Output Units .....  | A-62         |
| A-1-4                         | Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals .....           | A-64         |
| <b>A-2</b>                    | <b>Dimensions .....</b>  | <b>A-101</b> |
| A-2-1                         | CJ2H CPU Units .....   | A-101        |
| A-2-2                         | CJ2M CPU Units .....   | A-102        |
| A-2-3                         | Power Supply Units .....   | A-103        |
| A-2-4                         | Basic I/O Units .....  | A-105        |
| A-2-5                         | I/O Control Unit and I/O Interface Unit .....  | A-108        |
| A-2-6                         | I/O Memory Card .....  | A-108        |
| A-2-7                         | Pulse I/O Modules (CJ2M CPU Unit Only) .....   | A-108        |
| A-2-8                         | Serial Option Boards (CJ2M-CPU3□ Only) .....   | A-109        |
| A-2-9                         | B7A Interface Unit .....   | A-110        |
| <b>A-3</b>                    | <b>Fatal and Non-fatal Error Details .....</b>   | <b>A-111</b> |
| A-3-1                         | Fatal Errors .....   | A-111        |
| A-3-2                         | Non-fatal Errors .....   | A-119        |
| <b>A-4</b>                    | <b>Connecting to a Serial Port on the CPU Unit .....</b>                                     | <b>A-122</b> |
| A-4-1                         | Serial Port Interface Types and Specifications .....   | A-122        |
| A-4-2                         | Connection Examples .....  | A-128        |
| A-4-3                         | Applicable Connectors and Recommended Cables .....   | A-143        |
| <b>A-5</b>                    | <b>Installing the USB Driver .....</b>   | <b>A-150</b> |
| <b>A-6</b>                    | <b>Load Short-circuit Protection and Line Disconnection Detection for Basic I/O Units ..</b> | <b>A-160</b> |
| A-6-1                         | Load Short-circuit Protection and Line Disconnection Detection for CJ1W-OD202 .....          | A-160        |
| A-6-2                         | Load Short-circuit Protection for CJ1W-OD204/OD212/OD232/MD232 .....                         | A-162        |
| <b>A-7</b>                    | <b>Relay Output Noise Reduction Methods .....</b>  | <b>A-164</b> |
| <b>A-8</b>                    | <b>Functions Supported for Unit Versions .....</b>   | <b>A-166</b> |
| A-8-1                         | CJ2H CPU Units .....   | A-166        |
| A-8-2                         | CJ2M CPU Units .....   | A-169        |
| <b>Index .....</b>            | <b>Index-1</b>   |              |
| <b>Revision History .....</b> | <b>Revision-1</b>  |              |



# Terms and Conditions Agreement

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## Warranty, Limitations of Liability

### Warranties

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Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com/global/> or contact your Omron representative for published information.

### Limitation on Liability; Etc

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OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

## Application Considerations

### Suitability of Use

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Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

### Programmable Products

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Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

## Disclaimers

### Performance Data

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Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

### Change in Specifications

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Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

### Errors and Omissions

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Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

# Safety Precautions

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## 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.



### **WARNING**

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.



### **Caution**

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



### **Precautions for Safe Use**

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.

---

## **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.



## **WARNING**

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### **Anti-virus protection**

Install the latest commercial-quality antivirus software on the computer connected to the control system and maintain to keep the software up-to-date.



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### **Security measures to prevent unauthorized access**

Take the following measures to prevent unauthorized access to our products.

- Install physical controls so that only authorized personnel can access control systems and equipment.
- Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.
- Install firewalls to shut down unused communications ports and limit communications hosts and isolate control systems and equipment from the IT network.
- Use a virtual private network (VPN) for remote access to control systems and equipment.
- Adopt multifactor authentication to devices with remote access to control systems and equipment.
- Set strong passwords and change them frequently.
- Scan virus to ensure safety of USB drives or other external storages before connecting them to control systems and equipment.



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### **Data input and output protection**

Validate backups and ranges to cope with unintentional modification of input/output data to control systems and equipment.

- Checking the scope of data
- Checking validity of backups and preparing data for restore in case of falsification and abnormalities
- Safety design, such as emergency shutdown and fail-soft operation in case of data tampering and abnormalities



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### **Data recovery**

Backup data and keep the data up-to-date periodically to prepare for data loss.



---

When using an intranet environment through a global address, connecting to an unauthorized terminal such as a SCADA, HMI or to an unauthorized server may result in network security issues such as spoofing and tampering.

You must take sufficient measures such as restricting access to the terminal, using a terminal equipped with a secure function, and locking the installation area by yourself.



## **WARNING**

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When constructing an intranet, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment. Take adequate measures, such as restricting physical access to network devices, by means such as locking the installation area.

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When using a device equipped with the SD Memory Card function, there is a security risk that a third party may acquire, alter, or replace the files and data in the removable media by removing the removable media or unmounting the removable media.

Please take sufficient measures, such as restricting physical access to the Controller or taking appropriate management measures for removable media, by means of locking the installation area, entrance management, etc., by yourself.

---



## 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.



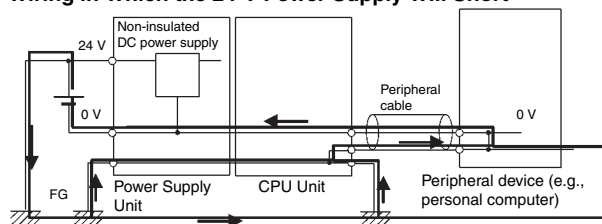
Do not touch the Power Supply Unit when power is being supplied or immediately after the power supply is turned OFF. The Power Supply Unit will be hot and you may be burned.



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

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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  $30^{\circ}\text{C}$  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  $\Omega$  or less when installing the Units. Not connecting to a ground of 100  $\Omega$  or less may result in electric shock.  
A ground of 100  $\Omega$  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 force-set 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 operation.
- 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.

## ● 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

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- 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 EMC and Electrical Safety Regulations

### Concepts

OMRON products are industrial electrical devices that are incorporated into various types of machines and manufacturing equipment. The products conform to the relevant standards so that the machines and equipment incorporating the OMRON products can comply with EMC and Electrical Safety Regulations more easily.

Refer to the OMRON website ([www.ia.omron.com](http://www.ia.omron.com)) or ask your OMRON representative for the most recent standards to which our products conform.

#### ● Conformance to EMC regulations

This product complies with EMC regulations when assembled in a PLC system or Machine Automation Controller.

To ensure that your machine or equipment complies with EMC regulations, please observe the following precautions.

- This product is defined as an in-panel device and must be installed within a control panel.
- This product complies with the emission standards. For the radiated emission requirements, in particular, please note that the actual emission varies depending on the configuration of the control panel to be used, the connected devices, and wiring methods. Therefore, customers themselves must confirm that the entire machine or equipment conforms to EMC regulations, even you are using a device that conforms to EMC regulations.
- You must use reinforced insulation or double insulation for the DC power supplies connected to DC Power Supply Units and I/O Units.

Caution:

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

#### ● Conformance to Electrical Safety regulations

This product complies with Electrical Safety regulations required by specific laws and regulations such as the EU Directives and UKCA.

For precautions for each product, see the instruction manual included with the product.

## 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

|                     |                        |
|---------------------|------------------------|
| <b>Manufacturer</b> | <b>Cosel Co., Ltd.</b> |
| Model               | TAH-06-683             |



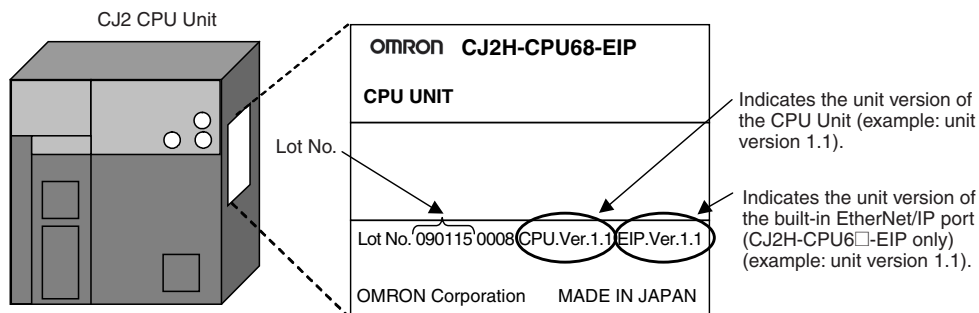
# Unit Versions of CJ2 CPU Units

## 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

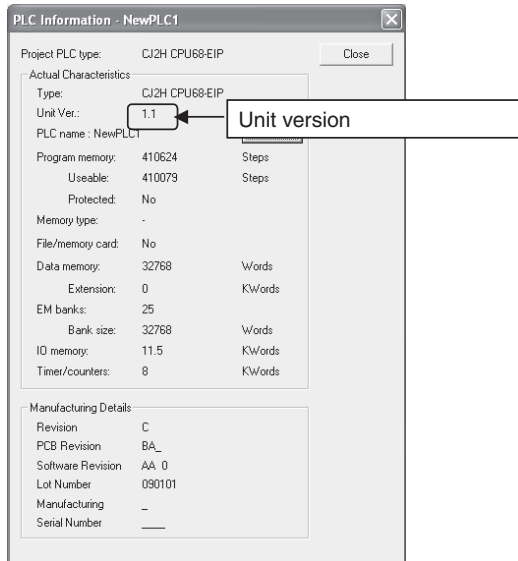
CX-Programmer can be used to confirm the unit version using one of the following two methods.

- 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.

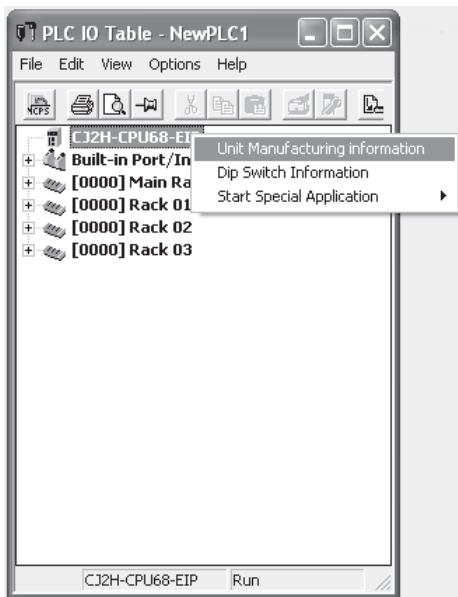
**2** In either case, the following *PLC Information* Dialog Box will be displayed.



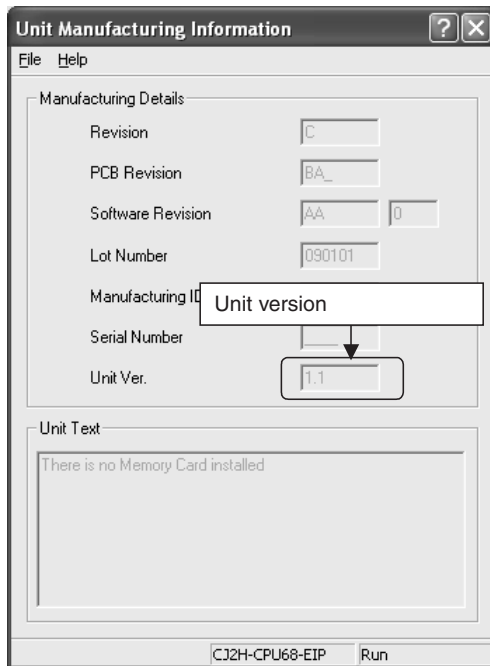
Use the above display to confirm the unit version of the CPU Unit.

## ● Unit Manufacturing Information

**1** In the I/O 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

The unit versions of CJ2 CPU Units are as follows:

Refer to *A-8 Functions Supported for Unit Versions* for the functions supported by each unit version.

| 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) |
|   |                | Unit version 1.6 (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  |
|   |                | Unit version 1.6  |
|   | CJ2M CPU Unit  | CJ2M-CPU3□  |
| 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) |                |   |
| Unit version 2.2 (Built-in EtherNet/IP section: Unit version 2.1) |                |   |
| CJ2M-CPU1□  |                | Unit version 1.0  |
|   |                | Unit version 2.0  |
|   |                | Unit version 2.1  |
|   |                | Unit version 2.2  |
|   |                |   |

## 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

- For CJ2H

| CPU Unit                           | Functions                            |                         | Required Programming Device |                  |                          |             |             |             |             |                          |                           | Program-<br>ming<br>Console |
|------------------------------------|--------------------------------------|-------------------------|-----------------------------|------------------|--------------------------|-------------|-------------|-------------|-------------|--------------------------|---------------------------|-----------------------------|
|                                    |                                      |                         | CX-Programmer               |                  |                          |             |             |             |             |                          |                           |                             |
|                                    |                                      |                         | Ver.<br>7.1 or<br>lower     | Ver.<br>8.0      | Ver.<br>8.2 or<br>higher | Ver.<br>9.0 | Ver.<br>9.1 | Ver.<br>9.2 | Ver.<br>9.3 | Ver.<br>9.6 or<br>higher | Ver.<br>9.81 or<br>higher |                             |
| CJ2H-CPU6□-EIP<br>Unit version 1.0 | Functions for unit version 1.0       |                         | ---                         | OK               | OK                       | OK          | OK          | OK          | OK          | OK                       | OK                        | ---                         |
| CJ2H-CPU6□-EIP<br>Unit version 1.1 | Functions added for unit version 1.1 | Using new functions     | ---                         | ---              | OK <sup>*2</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | OK <sup>*1</sup> | OK                       | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□<br>Unit version 1.1     | Functions added for unit version 1.1 | Using new functions     | ---                         | ---              | OK <sup>*2</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | ---              | OK                       | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□-EIP<br>Unit version 1.2 | Functions added for unit version 1.2 | Using new functions     | ---                         | ---              | ---                      | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | OK <sup>*1</sup> | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□<br>Unit version 1.2     | Functions added for unit version 1.2 | Using new functions     | ---                         | ---              | ---                      | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | ---              | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□-EIP<br>Unit version 1.3 | Functions added for unit version 1.3 | Using new functions     | ---                         | ---              | ---                      | ---         | OK          | OK          | OK          | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | OK <sup>*1</sup> | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□<br>Unit version 1.3     | Functions added for unit version 1.3 | Using new functions     | ---                         | ---              | ---                      | ---         | OK          | OK          | OK          | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | ---              | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□-EIP<br>Unit version 1.4 | Functions added for unit version 1.4 | Using new functions     | ---                         | ---              | ---                      | ---         | ---         | ---         | OK          | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | OK <sup>*1</sup> | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□<br>Unit version 1.4     | Functions added for unit version 1.4 | Using new functions     | ---                         | ---              | ---                      | ---         | ---         | ---         | OK          | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | ---              | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□-EIP<br>Unit version 1.5 | Functions added for unit version 1.5 | Using new functions     | ---                         | ---              | ---                      | ---         | ---         | ---         | ---         | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | OK <sup>*1</sup> | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□<br>Unit version 1.5     | Functions added for unit version 1.5 | Using new functions     | ---                         | ---              | ---                      | ---         | ---         | ---         | ---         | OK                       | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | ---              | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |
| CJ2H-CPU6□-EIP<br>Unit version 1.6 | ---                                  | ---                     | ---                         | ---              | ---                      | ---         | ---         | ---         | ---         | ---                      | ---                       |                             |
| CJ2H-CPU6□<br>Unit version 1.6     | Functions added for unit version 1.6 | Using new functions     | ---                         | ---              | ---                      | ---         | ---         | ---         | ---         | ---                      | OK                        | OK                          |
|                                    |                                      | Not using new functions | ---                         | ---              | OK <sup>*1</sup>         | OK          | OK          | OK          | OK          | OK                       | OK                        | OK                          |

- \*1 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.
- \*2 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.
- \*3 A Programming Console cannot be used with a CJ2 CPU Unit.
- \*4 The CJ2H-CPU6□-EIP with unit version 1.6 does not have any functions added to that with unit version 1.5. Therefore, the versions of required programming devices are the same as those for that with unit version 1.5.

• For CJ2M

| CPU Unit                       | Functions                                  |                            | Required Programming Device |             |                          |             |                  |             |             |                          |                           |     | Program-<br>ming<br>Console |
|--------------------------------|--|----------------------------|-----------------------------|-------------|--------------------------|-------------|------------------|-------------|-------------|--------------------------|---------------------------|-----|-----------------------------|
|                                |  |                            | CX-Programmer               |             |                          |             |                  |             |             |                          |                           |     |                             |
|                                |  |                            | Ver.<br>7.1 or<br>lower     | Ver.<br>8.0 | Ver.<br>8.2 or<br>higher | Ver.<br>9.0 | Ver.<br>9.1      | Ver.<br>9.2 | Ver.<br>9.3 | Ver.<br>9.6 or<br>higher | Ver.<br>9.81 or<br>higher |     |                             |
| CJ2M-CPU□□<br>Unit version 1.0 | Functions for unit version 1.0             |                            | ---                         | ---         | ---                      | ---         | OK               | OK          | OK          | OK                       | OK                        | OK  | ---                         |
| CJ2M-CPU□□<br>Unit version 2.0 | Functions<br>added for unit<br>version 2.0 | Using new<br>functions     | ---                         | ---         | ---                      | ---         | ---              | OK          | OK          | OK                       | OK                        | OK  | ---                         |
|                                |  | Not using<br>new functions | ---                         | ---         | ---                      | ---         | OK <sup>*1</sup> | OK          | OK          | OK                       | OK                        | OK  |                             |
| CJ2M-CPU□□<br>Unit version 2.1 | Functions<br>added for unit<br>version 2.1 | Using new<br>functions     | ---                         | ---         | ---                      | ---         | ---              | ---         | ---         | ---                      | OK                        | OK  | ---                         |
|                                |  | Not using<br>new functions | ---                         | ---         | ---                      | ---         | OK <sup>*1</sup> | OK          | OK          | OK                       | OK                        | OK  |                             |
| CJ2M-CPU3□<br>Unit version 2.2 | --- <sup>*4</sup>                          |                            | ---                         | ---         | ---                      | ---         | ---              | ---         | ---         | ---                      | ---                       | --- | ---                         |
| CJ2M-CPU1□<br>Unit version 2.2 | Functions<br>added for unit<br>version 2.2 | Using new<br>functions     | ---                         | ---         | ---                      | ---         | ---              | ---         | ---         | ---                      | ---                       | OK  | ---                         |
|                                |  | Not using<br>new functions | ---                         | ---         | ---                      | ---         | OK <sup>*1</sup> | OK          | OK          | OK                       | OK                        | OK  |                             |


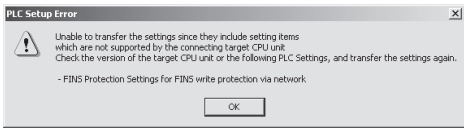
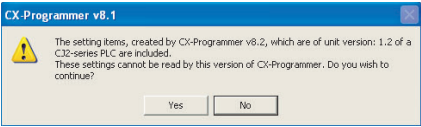
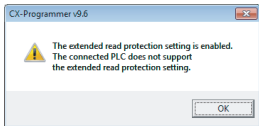
- \*1 It is not necessary to upgrade the version of the CX-Programmer if functionality that was enhanced for the upgrade of the CPU Unit will not be used.
- \*2 CX-Programmer version 8.2 or higher is required to use the functions added for unit version 1.1. The high-speed interrupt function and changing the minimum cycle time setting in MONITOR mode, however, are also supported by CX-Programmer version 8.02.
- \*3 A Programming Console cannot be used with a CJ2 CPU Unit.
- \*4 The CJ2M-CPU3□ with unit version 2.2 does not have any functions added to that with unit version 2.1. Therefore, the versions of required programming devices are the same as those for that with unit version 2.1.

## ● 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 ver-<br>sion 9.0 or higher |
|-----------|---------------|------------------------------|--|
| CJ Series | CJ2H CPU Unit | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□ | CJ2H   |
|           | CJ2M CPU Unit | CJ2M-CPU3□<br>CJ2M-CPU1□     | CJ2M   |

## Troubleshooting Problems with Unit Versions on the CX-Programmer

| Problem   | Cause   | Solution  |
|---|---|---|
|  <p>After the above message is displayed, a compiling error will be displayed on the <i>Compile</i> Tab Page in the Output Window.</p> | <p>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.</p>  | <p>Check the program or change to a CPU Unit with a later unit version.</p>   |
|    | <p>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.</p>   | <p>Check the settings in the PLC Setup or change to a CPU Unit with a later unit version.</p>   |
| <p>“????” is displayed in a program transferred from the PLC to the CX-Programmer.</p>  | <p>An attempt was made to upload a program containing instructions supported only by higher versions of CX-Programmer to a lower version.</p>   | <p>New instructions cannot be uploaded to lower versions of CX-Programmer. Use a higher version of CX-Programmer.</p>   |
|  <p>The above error is displayed when a project file is read.</p>   | <p>An attempt was made to read a project file for an unsupported unit version.</p>  | <p>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.</p>             |
|  <p>The above warning is displayed when going online.</p>  | <p>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.</p> | <p>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.</p> |

# 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<br>CJ2H-CPU6□<br>CJ2M-CPU□□  | Hardware specifications for CJ2 CPU Units               | Describes the following for CJ2 CPU Units: <ul style="list-style-type: none"> <li>• Overview and features</li> <li>• Basic system configuration</li> <li>• Part nomenclature and functions</li> <li>• Mounting and setting procedure</li> <li>• Remedies for errors</li> </ul> Also refer to the <i>Software User's Manual (W473)</i> .  |
| CJ-series CJ2 CPU Unit Software User's Manual               | W473     | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□<br>CJ2M-CPU□□  | Software specifications for CJ2 CPU Units               | Describes the following for CJ2 CPU Units: <ul style="list-style-type: none"> <li>• CPU Unit operation</li> <li>• Internal memory</li> <li>• Programming</li> <li>• Settings</li> <li>• Functions built into the CPU Unit</li> </ul> Also refer to the <i>Hardware User's Manual (W472)</i>  |
| CS/CJ-series EtherNet/IP™ Units Operation Manual            | W465     | CJ2H-CPU6□-EIP<br>CJ2M-CPU3□<br>CS1W-EIP21/EIP21S<br>CJ1W-EIP21/EIP21S  | Using the built-in EtherNet/IP port of the CJ2 CPU Unit | Describes the built-in EtherNet/IP port and EtherNet/IP Units.<br>Describes basic settings, tag data links, FINS communications, and other functions.  |
| CJ-series CJ2M CPU Unit Pulse I/O Module User's Manual      | W486     | CJ2M-CPU□□<br>+<br>CJ2M-MD21□   | Information on using pulse I/O on CJ2M CPU Units        | Provides the following information on the CJ2M CPU Units: <ul style="list-style-type: none"> <li>• Specifications and wiring methods</li> <li>• I/O functions</li> <li>• Quick-response inputs</li> <li>• Interrupt functions</li> <li>• High-speed counters</li> <li>• Pulse outputs</li> <li>• PWM outputs</li> </ul> When programming, use this manual together with the <i>Instructions Reference Manual (Cat. No. W474)</i> . |
| CS/CJ/NSJ-series Instructions Reference Manual              | W474     | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□<br>CJ2M-CPU□□<br>CS1G/H-CPU□□H<br>CS1G/H-CPU□□-V1<br>CS1D-CPU□□H<br>CS1D-CPU□□S<br>CJ1H-CPU□□H-R<br>CJ1G/H-CPU□□H<br>CJ1G-CPU□□P<br>CJ1G-CPU□□<br>CJ1M-CPU□□<br>NSJ□-□□□□(B)-G5D<br>NSJ□-□□□□(B)-M3D | Information on instructions                             | Describes each programming instruction in detail.<br>Also refer to the <i>Software User's Manual (W473)</i> when you do programming.   |



| Manual  | Cat. No. | Model  | Application   | Description  |
|---|----------|--|---|--|
| CS/CJ/CP/NSJ-series Communications Command Reference Manual                       | W342     | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□<br>CJ2M-CPU□□<br>CS1G/H-CPU□□H<br>CS1G/H-CPU□□-V1<br>CS1D-CPU□□H<br>CS1D-CPU□□S<br>CS1W-SCU□□-V1<br>CS1W-SCB□□-V1<br>CJ1H-CPU□□H-R<br>CJ1G/H-CPU□□H<br>CJ1G-CPU□□P<br>CJ1M-CPU□□<br>CJ1G-CPU□□<br>CJ1W-SCU□□-V1<br>CP1H-X□□□□-□<br>CP1H-XA□□□□-□<br>CP1H-Y□□□□-□<br>CP1L-M/L□□□□-□□<br>CP1E-E/N□□□□-□ | Information on communications for CS/CJ/CP-series CPU Units and NSJ-series Controllers  | Describes C-mode commands and FINS commands<br><br>Refer to this manual for a detailed description of commands for communications with the CPU Unit using C mode commands or FINS commands.<br><br><b>Note</b> 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/<br>LT□□□-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.<br><br>Also refer to the <i>Software User's Manual (W473)</i> and <i>CS/CJ/NSJ-series Instructions Reference Manual (W474)</i> when you do programming.  |
| CX-Programmer Operation Manual Functions Blocks/Structured Text                   | W447     |  | CX-Programmer operating procedure   |  |
| 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<br><br>Using simulation in the CX-Programmer with CX-Programmer version 6.1 or higher |  |
| CS/CJ/CP/NSJ-series CX-Integrator Network Configuration Software Operation Manual | W464     |  | Network setup and monitoring  | Describes the operating procedures for the CX-Integrator.  |



# 1

## Overview

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This section provides an overview of the CJ2 CPU Units.

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|            |  |             |
|------------|--|-------------|
| <b>1-1</b> | <b>Overview of CJ2 CPU Units</b> ..... | <b>1-2</b>  |
| 1-1-1      | Overview .....                         | 1-2         |
| 1-1-2      | CJ2 CPU Unit Features .....            | 1-4         |
| <b>1-2</b> | <b>Basic Operating Procedure</b> ..... | <b>1-12</b> |
| <b>1-3</b> | <b>Specifications</b> .....            | <b>1-13</b> |
| 1-3-1      | General Specifications .....           | 1-13        |
| 1-3-2      | Performance Specifications .....       | 1-14        |
| 1-3-3      | Function Specifications .....          | 1-21        |

# 1-1 Overview of CJ2 CPU Units

## 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**

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.

Tag access is supported by the CJ2 CPU Units of CJ2H-CPU6□-EIP/CJ2M-CPU3□, CJ2H-CPU6□ with unit version 1.6 or later, and CJ2M-CPU1□ with unit version 2.2 or later.

- **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.

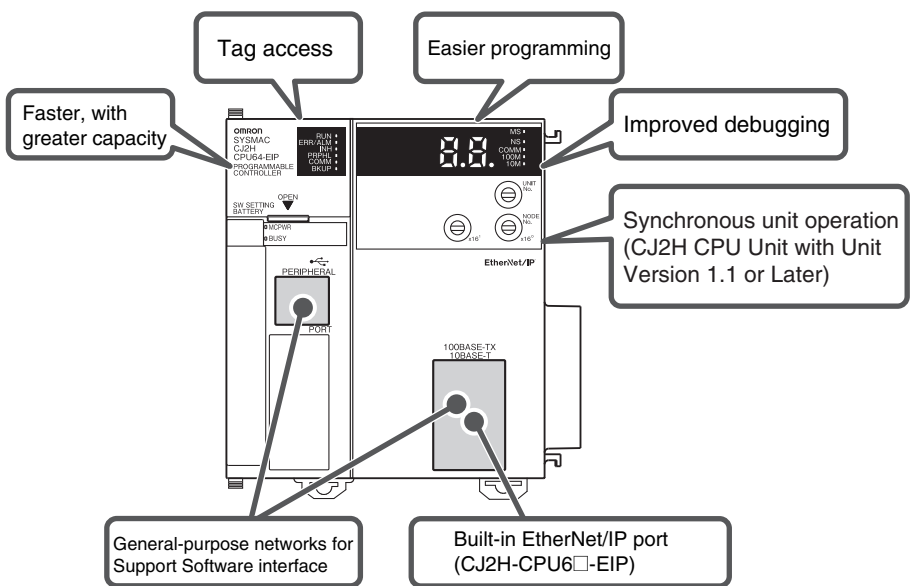
- **Increased Pulse I/O Capacity (CJ2M CPU Unit with Unit Version 2.0 or Later)**

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.

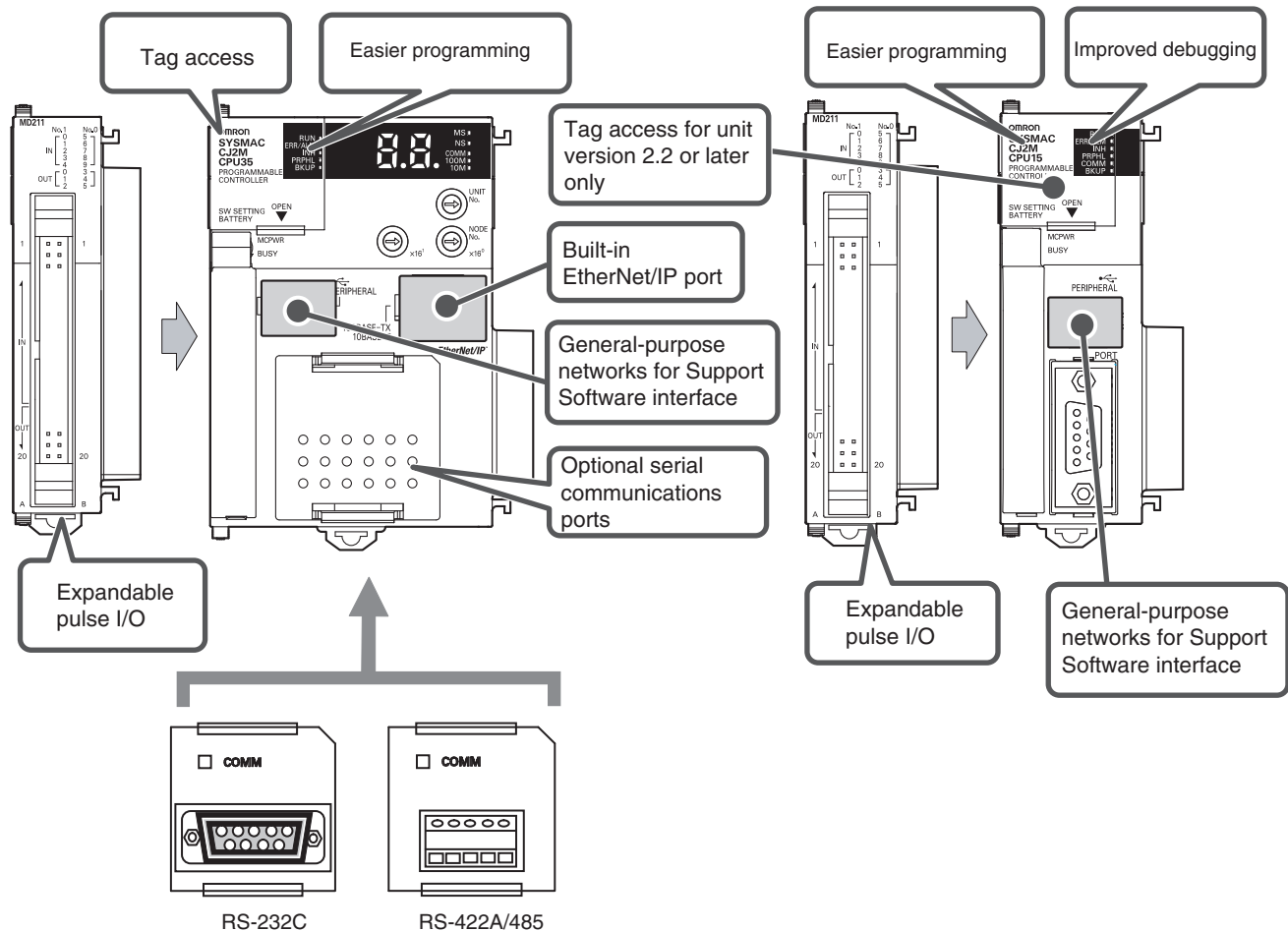
### CJ2H CPU Units



### CJ2M CPU Units

Standard CPU Unit (CJ2M-CPU3□)

Simple CPU Unit (CJ2M-CPU1□)



## 1-1-2 CJ2 CPU Unit Features

### Fast, with Large Memory Capacity

- **High-speed Processing**

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

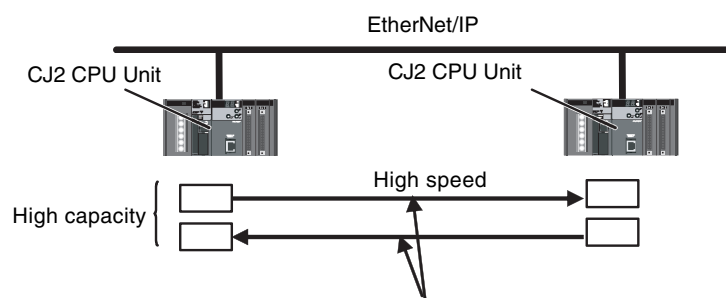
- Minimum interval setting of 0.1 ms for one of Scheduled Interrupt Tasks (For unit version 1.0, the minimum interval is 0.2 ms.)

## 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 EtherNet/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

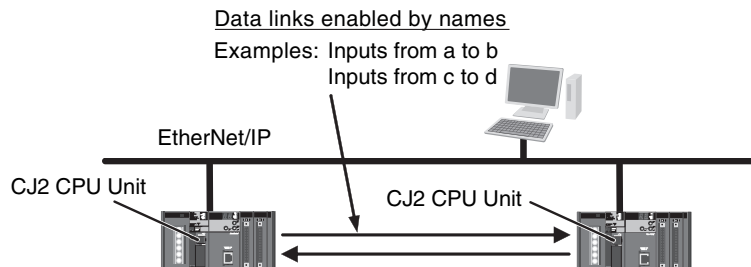
Tag access is supported by the CJ2 CPU Units of CJ2H-CPU6□-EIP/CJ2M-CPU3□, CJ2H-CPU6□ with unit version 1.6 or later, and CJ2M-CPU1□ with unit version 2.2 or later.

### ● 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.

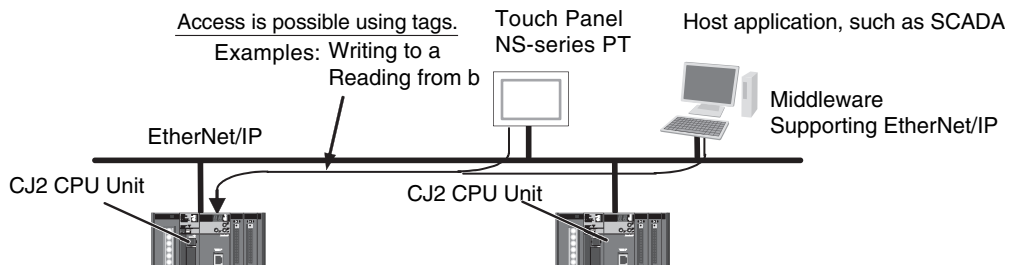
#### Data links can be set using tags.

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.



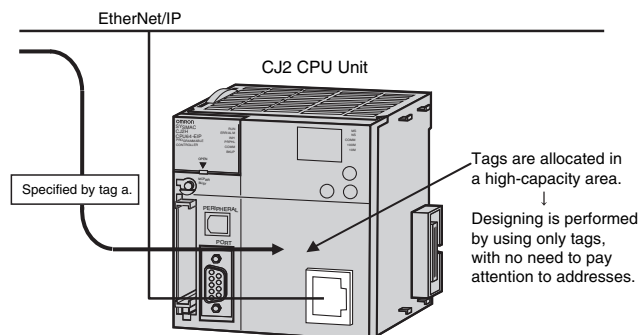
#### Access from host devices is enabled using tags.

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.



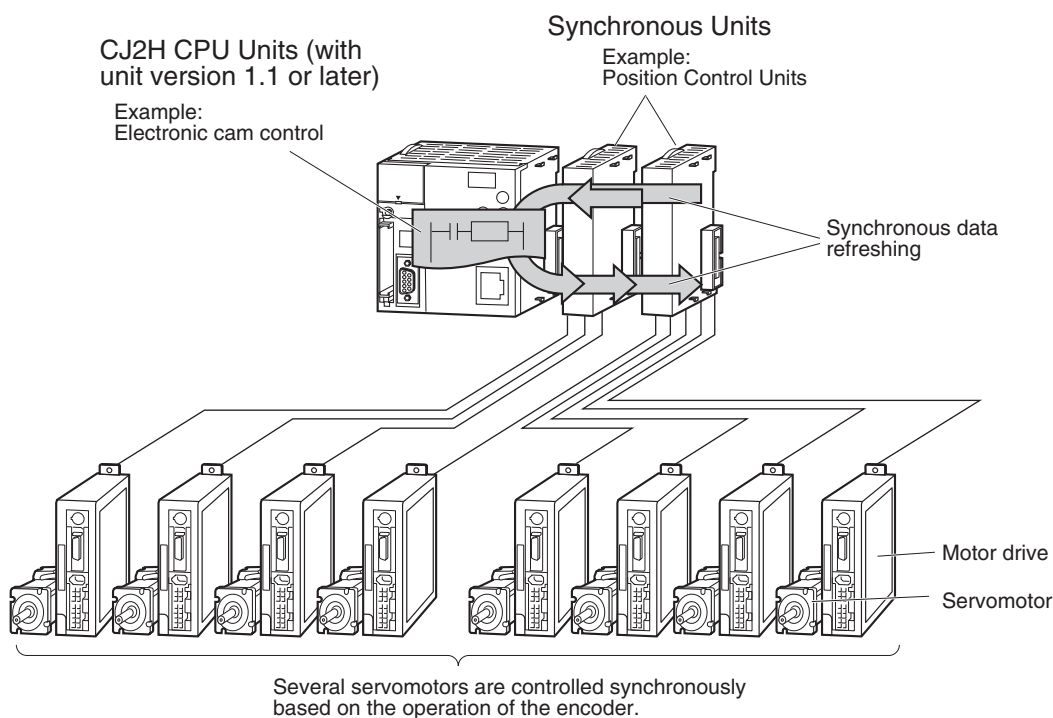


## Synchronous Unit Operation (CJ2H CPU Units with Unit Version 1.1 or Later)

- 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 multi-axis 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.

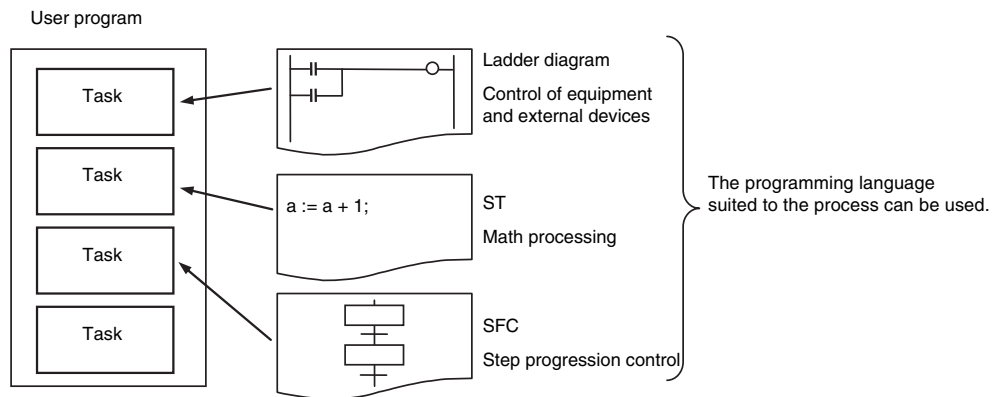
For example, D10.00 specifies bit 00 of D10.

● **The format for timer/counter PV refreshing can be selected individually for each instruction.**

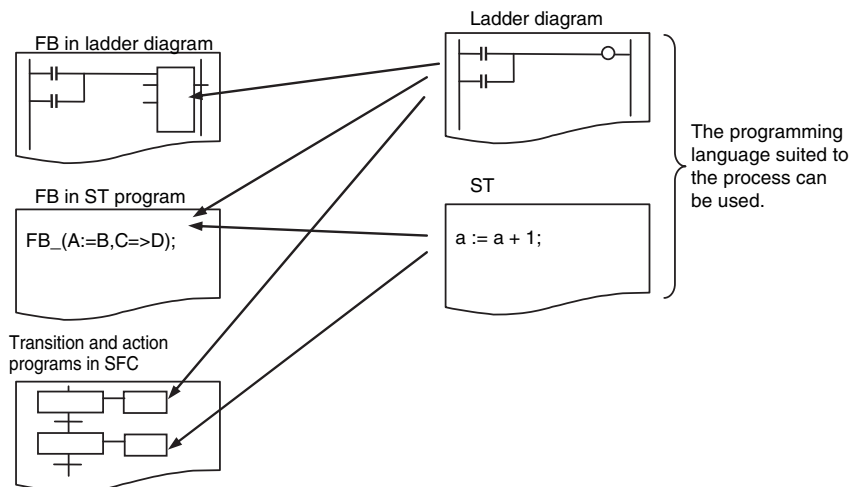
Either BCD or binary can be selected individually for each instruction as the format for timer/counter PV refreshing. For example, the TIM (BCD) and TIMX (binary) instructions can be used together.

● **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

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- **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**

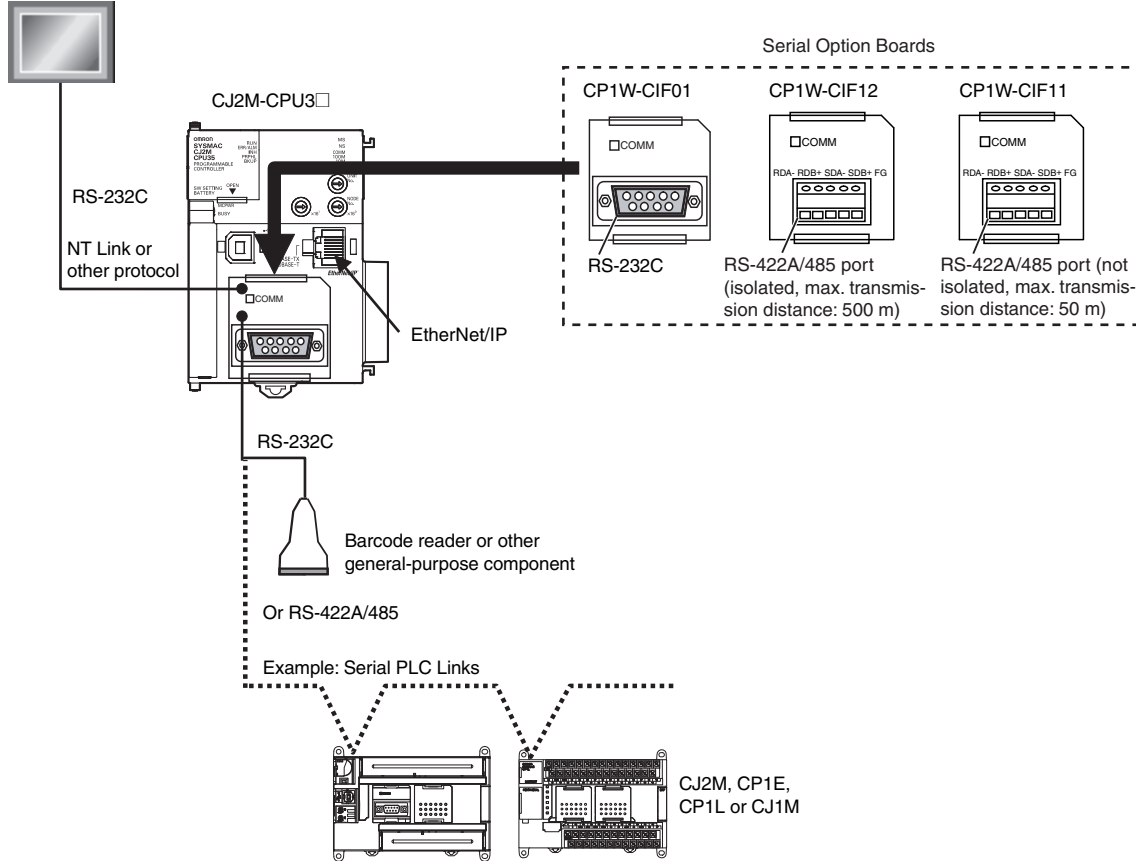
With CX-Programmer version 8.3 or higher, a parameter can be set to enable force-setting/resetting bits in specified EM Area banks. (This function is supported only by CJ2H CPU Units with unit version 1.2 or later and CJ2M CPU Units.)

## 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.

Example: NS-series PT

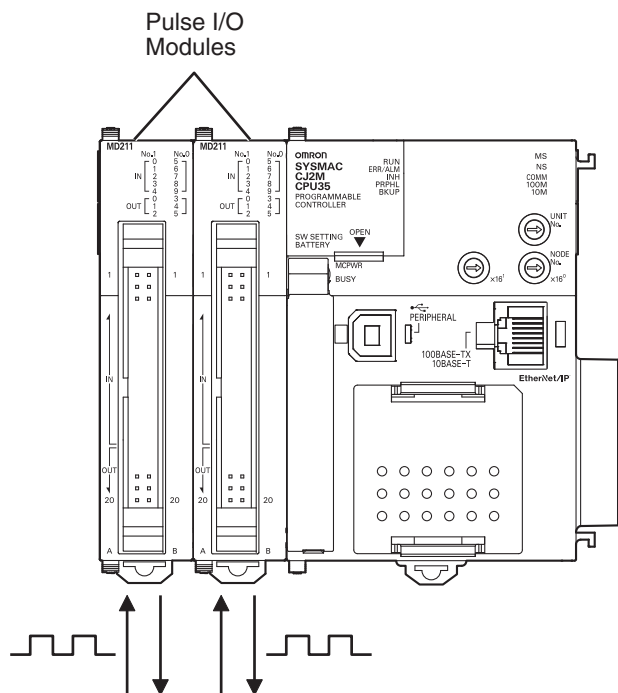


**Note** In this manual, unless otherwise specified, “CP1W-CIF12” refers to the CP1W-CIF12 and CP1W-CIF12-V1 Option Boards.

## 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.



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Normal inputs: 20 (10 per Pulse I/O Module)</li> <li>• Interrupt inputs: 8 (4 per Pulse I/O Module)</li> <li>• High-speed counter inputs: 4 (2 per Pulse I/O Module)</li> <li>• Quick-response inputs: 8 (4 per Pulse I/O Module)</li> </ul> | <ul style="list-style-type: none"> <li>• Normal outputs: 12 (6 per Pulse I/O Module)</li> <li>• Pulse outputs: 4 (2 per Pulse I/O Module)</li> <li>• Variable duty factor pulse outputs: 4 (2 per Pulse I/O Module)</li> </ul> |
|---|--|

# 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).

## 6. 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

| Item                 | CJ2H-  |  |             |             |             | CJ2M-                                      |  |
|----------------------|--|--|-------------|-------------|-------------|--|--|
|                      | CPU64(-EIP)  | CPU65(-EIP)  | CPU66(-EIP) | CPU67(-EIP) | CPU68(-EIP) | CPU1□                                      | CPU3□                                      |
| Enclosure            | Mounted in a panel   |  |             |             |             |  |  |
| Grounding            | Less than 100 Ω  |  |             |             |             |  |  |
| CPU Unit Dimensions  | CJ2H-CPU6□-EIP: 90 mm × 65 mm × 80 mm (H × D × W)<br>CJ2H-CPU6□: 90 mm × 65 mm × 49 mm (H × D × W) |  |             |             |             | 90 mm ×<br>75 mm ×<br>31 mm (H<br>× D × W) | 90 mm ×<br>75 mm ×<br>62 mm (H<br>× D × W) |
| Weight*1             | CJ2H-CPU6□-EIP: 280 g or less<br>CJ2H-CPU6□: 190 g or less   |  |             |             |             | 130 g or<br>less                           | 190 g or<br>less*2                         |
| Current Consumption  | CJ2H-CPU6□-EIP: 5 VDC, 0.82 A<br>CJ2H-CPU6□: 5 VDC, 0.42 A   |  |             |             |             | 5 VDC,<br>0.5 A                            | 5 VDC,<br>0.7 A                            |
| Use Environment      | Ambient Operating Temperature  | 0 to 55°C  |             |             |             |  |  |
|                      | Ambient Operating Humidity   | 10% to 90% (with no condensation)  |             |             |             |  |  |
|                      | 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 IEC 61010-2-201.  |             |             |             |  |  |
|                      | Noise Immunity   | 2 kV on power supply line (Conforms to IEC 61000-4-4.)   |             |             |             |  |  |
|                      | Overvoltage Category   | Category II: Conforms to IEC 61010-2-201.  |             |             |             |  |  |
|                      | EMC Immunity Level   | Zone B   |             |             |             |  |  |
|                      | Vibration Resistance   | Conforms to IEC60068-2-6.<br>5 to 8.4 Hz with 3.5-mm amplitude, 8.4 to 150 Hz<br>Acceleration of 9.8 m/s <sup>2</sup> for 100 min in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total) |             |             |             |  |  |
| Battery              | Life   | 5 years at 25°C  |             |             |             |  |  |
|                      | Weight   | Approx. 10 g   |             |             |             |  |  |
|                      | Model  | CJ1W-BAT01   |             |             |             |  |  |
| Applicable Standards | *3   |  |             |             |             |  |  |

\*1 Includes the weights of the End Cover and the battery.

\*2 Without a Serial Option Board

\*3 Refer to the OMRON website (<http://www.ia.omron.com/>) or consult your OMRON representative for the most recent applicable standards for each model.

## 1-3-2 Performance Specifications

| Items                                     |                                  | CJ2H-   |  |                 |                 |                 | CJ2M-  |   |              |              |              |  |
|---|----------------------------------|---|--|-----------------|-----------------|-----------------|--|---|--------------|--------------|--------------|--|
|   |                                  | CPU64<br>(-EIP)   | CPU65<br>(-EIP)  | CPU66<br>(-EIP) | CPU67<br>(-EIP) | CPU68<br>(-EIP) | CPU<br>11/31   | CPU<br>12/32  | CPU<br>13/33 | CPU<br>14/34 | CPU<br>15/35 |  |
| User Memory                               |                                  | 50K<br>steps  | 100K<br>steps  | 150K<br>steps   | 250K<br>steps   | 400K<br>steps   | 5K steps   | 10K<br>steps  | 20K<br>steps | 30K<br>steps | 60K<br>steps |  |
| I/O Bits                                  |                                  | 2,560 bits  |  |                 |                 |                 |  |   |              |              |              |  |
| Process-<br>ing Speed                     | Overhead Processing<br>Time*1    | Normal Mode: CJ2H-CPU□□-EIP:200 μs<br>CJ2H-CPU□□: 100 μs  |  |                 |                 |                 | Normal Mode: CJ2M-CPU3□: 270 μs<br>CJ2M-CPU1□: 160 μs  |   |              |              |              |  |
|   | Execution Time                   |   | Basic Instructions: 0.016 μs min.;<br>Special Instructions: 0.048 μs min.  |                 |                 |                 |  | Basic Instructions: 0.04 μs min.;<br>Special Instructions: 0.06 μs min.   |              |              |              |  |
|   | Interrupts                       | I/O Inter-<br>rupts and<br>External<br>Interrupts   | Interrupt task startup time: 26 μs or 17 μs*2 (30 μs for<br>unit version 1.0)<br>Return times to cyclic tasks: 11 μs or 8 μs*2 (15 μs for<br>unit version 1.0)   |                 |                 |                 |  | Interrupt task startup time: 31 μs<br>Return times to cyclic tasks: 10 μs   |              |              |              |  |
|   |                                  | Scheduled<br>Interrupts   | Minimum time interval: 0.2 ms or 0.1 ms*2<br>(set in 0.1-ms increments)<br>Interrupt task startup time: 22 μs or 13 μs*2 (27 μs for<br>unit version 1.0)<br>Return time to cyclic task: 11 μs or 8 μs*2 (15 μs for unit<br>version 1.0)  |                 |                 |                 |  | Minimum time interval: 0.4 ms (set in 0.1-ms increments)<br>Interrupt task startup time: 30 μs<br>Return time to cyclic task: 11 μs |              |              |              |  |
| Maximum Number of Connectable Units       |                                  | Total per CPU Rack or Expansion Rack: 10 Units max.;<br>Total per PLC: 40 Units max.  |  |                 |                 |                 |  |   |              |              |              |  |
| Basic I/O Units                           |                                  | No limit<br>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 and 8 unit numbers.)  |  |                 |                 |                 |  |   |              |              |              |  |
| CPU Bus Units                             |                                  | CJ2H-CPU6□-EIP: 15 Units max.<br>CJ2H-CPU6□: 16 Units max.  |  |                 |                 |                 | CJ2M-CPU3□: 15 Units max.<br>CJ2M-CPU1□: 16 Units max. |   |              |              |              |  |
| Pulse I/O Modules                         |                                  | ---   |  |                 |                 |                 | 2 max.*3   |   |              |              |              |  |
| Slots for which interrupts<br>can be used |                                  | CJ2H-CPU6□-EIP: Slots 0 to 3 on CPU Rack<br>CJ2H-CPU6□: Slots 0 to 4 on CPU Rack  |  |                 |                 |                 | Slots 0 to 4 on CPU Rack                               |   |              |              |              |  |
| Maximum Number of Expansion Racks         |                                  | 3 max.  |  |                 |                 |                 |  |   |              |              |              |  |
| CIO Area                                  | I/O Area                         | 2,560 bits (160 words): Words CIO 0000 to CIO 0159  |  |                 |                 |                 |  |   |              |              |              |  |
|   | Link Area                        | 3,200 bits (200 words): Words CIO 1000 to CIO 1199  |  |                 |                 |                 |  |   |              |              |              |  |
|   | Synchronous Data Refresh<br>Area | 1,536 bits (96 words): Words CIO 1200 to CIO 1295   |  |                 |                 |                 | ---  |   |              |              |              |  |
|   | CPU Bus Unit Area                | 6,400 bits (400 words): Words CIO 1500 to CIO 1899  |  |                 |                 |                 |  |   |              |              |              |  |
|   | Special I/O Unit Area            | 15,360 bits (960 words): Words CIO 2000 to CIO 2959   |  |                 |                 |                 |  |   |              |              |              |  |
|   | Pulse I/O Area                   | ---   |  |                 |                 |                 | 20 inputs, 12 outputs (CIO 2960 to CIO 2963)           |   |              |              |              |  |
|   | Serial PLC Link Words            | ---   |  |                 |                 |                 | 1,440 bits (90 words): Words CIO 3100 to CIO 3189      |   |              |              |              |  |
|   | DeviceNet Area                   | 9,600 bits (600 words): Words CIO 3200 to CIO 3799  |  |                 |                 |                 |  |   |              |              |              |  |
| Work Area                                 | Internal I/O Area                | 3,200 bits (200 words): Words CIO 1300 to CIO 1499 (Cannot be used for external I/O.)<br>37,504 bits (2,344 words): Words CIO 3800 to CIO 6143 (Cannot be used for external I/O.) |  |                 |                 |                 |  |   |              |              |              |  |
|   | Holding Area                     |   | 8,192 bits (512 words): Words W000 to W511 (Cannot be used for external I/O.)<br>Bits in this area maintain their ON/OFF status when PLC is turned OFF or operating mode is changed.<br>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). |                 |                 |                 |  |   |              |              |              |  |

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

Normal operation:  $100 \mu\text{s} + \text{Number of transfer words} \times 0.33 \mu\text{s}$

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

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

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

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

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

\*2 This applies when high-speed interrupts are used.

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



| Items                 | CJ2H-   |                                       |                      |                      |                      | CJ2M-   |                   |              |                     |                  |
|-----------------------|---|---------------------------------------|----------------------|----------------------|----------------------|---|-------------------|--------------|---------------------|------------------|
|                       | CPU64<br>(-EIP)   | CPU65<br>(-EIP)                       | CPU66<br>(-EIP)      | CPU67<br>(-EIP)      | CPU68<br>(-EIP)      | CPU<br>11/31  | CPU<br>12/32      | CPU<br>13/33 | CPU<br>14/34        | CPU<br>15/35     |
| Auxiliary Area        | Read-only: 31,744 bits (1,984 words)<br><ul style="list-style-type: none"> <li>7,168 bits (448 words): Words A0 to A447</li> <li>24,576 bits (1,536 words): Words A10000 to A11535*4</li> </ul> Read/write: 16,384 bits (1,024 words) in words A448 to A1471*4  |                                       |                      |                      |                      |   |                   |              |                     |                  |
| Temporary Area        | 16 bits: TR0 to TR15  |                                       |                      |                      |                      |   |                   |              |                     |                  |
| Timer Area            | 4,096 timer numbers (T0000 to T4095 (separate from counters))   |                                       |                      |                      |                      |   |                   |              |                     |                  |
| Counter Area          | 4,096 counter numbers (C0000 to C4095 (separate from timers))   |                                       |                      |                      |                      |   |                   |              |                     |                  |
| DM Area               | 32k words*5<br><ul style="list-style-type: none"> <li>DM Area words for Special I/O Units: D20000 to D29599 (100 words × 96 Units)</li> <li>DM Area words for CPU Bus Units: D30000 to D31599 (100 words × 16 Units)</li> </ul>   |                                       |                      |                      |                      |   |                   |              |                     |                  |
| EM Area               | 32k words/bank × 25 banks max.: E00_00000 to E18_32767 max.*5, *6   |                                       |                      |                      |                      | 32k words/bank × 4 banks max.: E00_00000 to 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 × 1 bank  |                   |              | 32K words × 4 banks |                  |
|                       | Banks for which bits can be force-set/reset*7   | Using EM Area force-setting/resetting | 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 hex   |                     | Banks 0 to 3 hex |
|                       | Using automatic address allocation specifications   | Bank 3 hex                            | Bank 3 hex           | Banks 6 to 9 hex     | Banks 7 to E hex     | Banks 11 to 18 hex  | ---               |              |                     |                  |
| Index Registers       | IR0 to IR15<br>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 Card           | 128 MB, 256 MB, or 512 MB   |                                       |                      |                      |                      |   |                   |              |                     |                  |
| Operating Modes       | PROGRAM Mode: Programs are not executed. Preparations can be executed prior to program execution in this mode.<br>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.<br>RUN Mode: Programs are executed. This is the normal operating mode. |                                       |                      |                      |                      |   |                   |              |                     |                  |
| Execution Mode        | Normal Mode   |                                       |                      |                      |                      |   |                   |              |                     |                  |
| Programming Languages | Ladder Logic (LD)<br>Sequential Function Charts (SFC)<br>Structured Text (ST)<br>Instruction Lists (IL)   |                                       |                      |                      |                      |   |                   |              |                     |                  |
| Function Blocks       | Maximum number of definitions   | 2,048                                 |                      |                      |                      | 256   |                   | 2,048        |                     |                  |
|                       | Maximum number of instances   | 2,048                                 |                      |                      |                      | 256   |                   | 2,048        |                     |                  |
| FB Program Area       | ---   |                                       |                      |                      | 20K steps            |   |                   |              |                     |                  |

\*4 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.

\*5 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.

\*6 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.

\*7 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.

| Items               |  | CJ2H-   |                 |                 |                 |                 | CJ2M-        |              |              |              |              |
|---------------------|--|---|-----------------|-----------------|-----------------|-----------------|--------------|--------------|--------------|--------------|--------------|
|                     |  | CPU64<br>(-EIP)   | CPU65<br>(-EIP) | CPU66<br>(-EIP) | CPU67<br>(-EIP) | CPU68<br>(-EIP) | CPU<br>11/31 | CPU<br>12/32 | CPU<br>13/33 | CPU<br>14/34 | CPU<br>15/35 |
| Tasks               | Type of Tasks  | Cyclic tasks<br>Interrupt tasks (Power OFF interrupt tasks, scheduled interrupt tasks, I/O interrupt tasks, external interrupt tasks, and input interrupt tasks* <sup>3</sup> )   |                 |                 |                 |                 |              |              |              |              |              |
|                     | Number of Tasks  | Cyclic tasks: 128<br>Interrupt tasks: 256<br>(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  | Local symbols: Can be used only within a single task in the PLC.<br>Global symbols: Can be used in all tasks in the PLC.<br>Network symbols (tags)* <sup>8</sup> : I/O memory in the CPU Unit can be externally accessed using symbols, depending on parameter settings.  |                 |                 |                 |                 |              |              |              |              |              |
|                     | Data Type of Symbols                                       | BOOL (bit)<br>UINT (one-word unsigned binary)<br>UDINT (two-word unsigned binary)<br>ULINT (four-word unsigned binary)<br>INT (one-word signed binary)<br>DINT (two-word signed binary)<br>LINT (four-word signed binary)<br>UINT BCD (one-word unsigned BCD)* <sup>9</sup><br>UDINT BCD (two-word unsigned BCD)* <sup>9</sup><br>ULINT BCD (four-word unsigned BCD)* <sup>9</sup><br>REAL (two-word floating-point)<br>LREAL (four-word floating-point)<br>CHANNEL (word)<br>NUMBER (constant or number)<br>WORD (one-word hexadecimal)<br>DWORD (two-word hexadecimal)<br>LWORD (four-word hexadecimal)<br>STRING (1 to 255 ASCII characters)<br>TIMER (timer)* <sup>10</sup><br>COUNTER (counter)* <sup>10</sup><br>User-defined data types (data structures)* <sup>11</sup> |                 |                 |                 |                 |              |              |              |              |              |
|                     | Maximum Size of Symbol                                     | 32k words   |                 |                 |                 |                 |              |              |              |              |              |
|                     | Array Symbols (Array Variables)                            | One-dimensional arrays  |                 |                 |                 |                 |              |              |              |              |              |
|                     | Number of Array Elements                                   | 32,000 elements max.  |                 |                 |                 |                 |              |              |              |              |              |
|                     | Number of Registrable Network Symbols (Tags)* <sup>8</sup> | 20,000 max.   |                 |                 |                 |                 | 2,000 max.   |              |              |              |              |
|                     | Length of Network Symbol (Tag) Name* <sup>8</sup>          | 255 bytes max.  |                 |                 |                 |                 |              |              |              |              |              |
|                     | Encoding of Network Symbols (Tags)* <sup>8</sup>           | UTF-8   |                 |                 |                 |                 |              |              |              |              |              |

\*<sup>8</sup> Supported only by the CJ2H-CPU6□-EIP/CJ2M-CPU3□, CJ2H-CPU6□ with unit version 1.6 or later, and CJ2M-CPU1□ with unit version 2.2 or later.

\*<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.

| Items                 |   | CJ2H-  |                 |                 |                 |                 | CJ2M-              |              |              |              |              |
|-----------------------|---|--|-----------------|-----------------|-----------------|-----------------|--------------------|--------------|--------------|--------------|--------------|
|                       |   | CPU64<br>(-EIP)  | CPU65<br>(-EIP) | CPU66<br>(-EIP) | CPU67<br>(-EIP) | CPU68<br>(-EIP) | CPU<br>11/31       | CPU<br>12/32 | CPU<br>13/33 | CPU<br>14/34 | CPU<br>15/35 |
| Data Tracing          | Memory Capacity   | 8,000 words  |                 | 16,000 words    | 32,000 words    |                 | 8,000 words        |              |              |              |              |
|                       |   | (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-word data = 16, two-word data = 8, four-word data = 4   |                 |                 |                 |                 |                    |              |              |              |              |
|                       | Sampling Cycle  | 1 to 2,550 ms (Unit: 1 ms)   |                 |                 |                 |                 |                    |              |              |              |              |
|                       | Trigger Conditions  | ON/OFF of specified bit<br>Data comparison of specified word<br>Data size: 1 word, 2 words, 4 words<br>Comparison Method: Equals (=), Greater Than (>), Greater Than or Equals ( $\geq$ ), Less Than (<), Less Than or Equals ( $\leq$ ), Not Equal ( $\neq$ ) |                 |                 |                 |                 |                    |              |              |              |              |
|                       | Delay Value   | -32,768 to +32,767 ms  |                 |                 |                 |                 |                    |              |              |              |              |
| File Memory           |   | Memory Card (128, 256, or 512 Mbytes) (Use the Memory Cards provided by OMRON.)<br>EM file memory (Part of the EM Area can be converted for use as file memory.)   |                 |                 |                 |                 |                    |              |              |              |              |
| Source/Comment Memory | Program source, comments, program index, and symbol table | Capacity: 3.5 Mbytes   |                 |                 |                 |                 | Capacity: 1 Mbytes |              |              |              |              |

| Item                          |                                    |  | CJ2H-   |  |              |              |              | CJ2M-  |           |           |           |           |  |
|-------------------------------|------------------------------------|--|---|--|--------------|--------------|--------------|--|-----------|-----------|-----------|-----------|--|
|                               |                                    |  | 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 |  |
| Communications                | Logical Ports for Communications   | Logical Ports  | 8 ports (Used for SEND, RECV, CMND, PMCR, TXDU, and RXDU instructions.)   |  |              |              |              |  |           |           |           |           |  |
|                               |                                    | Extended Logical Ports                                   | 64 ports (Used for SEND2, RECV2, CMND2, and PMCR2 instructions.)  |  |              |              |              |  |           |           |           |           |  |
|                               | CIP Communications Specification   | Class 3 (Number of Connections)                          | Number of connections: 128  |  |              |              |              |  |           |           |           |           |  |
|                               |                                    | UCMM (Non-connection Type)                               | Maximum number of clients that can communicate at the same time: 32<br>Maximum number of servers that can communicate at the same time: 32          |  |              |              |              | Maximum number of clients that can communicate at the same time: 16<br>Maximum number of servers that can communicate at the same time: 16   |           |           |           |           |  |
|                               | Peripheral (USB) Port              |  | USB 2.0-compliant B-type connector  |  |              |              |              |  |           |           |           |           |  |
|                               | Baud Rate                          |  | 12 Mbps max.  |  |              |              |              |  |           |           |           |           |  |
|                               | Transmission Distance              |  | 5 m max.  |  |              |              |              |  |           |           |           |           |  |
|                               | Serial Port                        |  | Interface: Conforms to EIA RS-232C.   |  |              |              |              | <ul style="list-style-type: none"> <li>CJ2M-CPU1□ interface: Conforms to EIA RS-232C.</li> <li>CJ2M-CPU3□: No serial ports with default system</li> </ul> One of the following Serial Option Boards can be mounted. <ul style="list-style-type: none"> <li>CP1W-CIF01 RS-232C Option Board</li> <li>CP1W-CIF11 RS-422A/485 Option Board (not isolated, max. transmission distance: 50 m)</li> <li>CP1W-CIF12 RS-422A/485 Option Board (isolated, max. transmission distance: 500 m)</li> </ul> |           |           |           |           |  |
|                               | Communications Method              |  | Half-duplex   |  |              |              |              |  |           |           |           |           |  |
|                               | Synchronization Method             |  | Start-stop  |  |              |              |              |  |           |           |           |           |  |
|                               | Baud Rate                          |  | 0.3, 0.6, 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, or 115.2 (kbps)   |  |              |              |              |  |           |           |           |           |  |
|                               | Transmission Distance              |  | 15 m max.   |  |              |              |              |  |           |           |           |           |  |
|                               | EtherNet/IP Port* <sup>12</sup>    |  | ---   |  |              |              |              |  |           |           |           |           |  |
|                               | Transmission Specifications        | Media Access Method                                      |   | CSMA/CD  |              |              |              |  |           |           |           |           |  |
|                               |                                    | Modulation   |   | Baseband   |              |              |              |  |           |           |           |           |  |
|                               |                                    | Transmission Paths                                       |   | Star   |              |              |              |  |           |           |           |           |  |
|                               |                                    | Baud Rate  |   | 100 Mbps (100Base-TX)                                |              |              |              |  |           |           |           |           |  |
|                               |                                    | Transmission Media                                       |   | Shielded twisted-pair (STP) cable; Categories: 5, 5e |              |              |              |  |           |           |           |           |  |
|                               |                                    | Transmission Distance                                    |   | 100 m (between Ethernet switch and node)             |              |              |              |  |           |           |           |           |  |
|                               |                                    | Number of Cascade Connections                            |   | No restrictions if Ethernet switch is used.          |              |              |              |  |           |           |           |           |  |
| Communications Specifications | CIP Communications: Tag Data Links |  | ---   |  |              |              |              |  |           |           |           |           |  |
|                               | Number of Connections              |  | 256   |  |              |              |              | 32   |           |           |           |           |  |
|                               | Packet Interval (Refresh period)   |  | 0.5 to 10,000 ms (Unit: 0.5 ms)<br>Can be set for each connection. (Data will be refreshed at the set interval, regardless of the number of nodes.) |  |              |              |              | 1 to 10,000 ms (in 0.5-ms increments)<br>Can be set for each connection. (Data will be refreshed at the set interval, regardless of the number of nodes.)  |           |           |           |           |  |
|                               | Permissible Communications Band    |  | 6,000 packets per second* <sup>13</sup>   |  |              |              |              | 3,000 packets per second* <sup>13</sup>  |           |           |           |           |  |
|                               | Number of Registrable Tags         |  | 256   |  |              |              |              | 32   |           |           |           |           |  |
|                               | 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.) |   |  |              |              |              |  |           |           |           |           |  |

\*12 The EtherNet/IP port is built into the CJ2H-CPU6□-EIP and CJ2M-CPU3□ only.

\*13 "Packets per second" is the number of communications packets that can be processed per second.

| Item           | CJ2H-                         |   |  |                 |                 | CJ2M-        |              |  |              |              |  |  |
|----------------|-------------------------------|---|--|-----------------|-----------------|--------------|--------------|--|--------------|--------------|--|--|
|                | CPU64<br>(-EIP)               | CPU65<br>(-EIP)   | CPU66<br>(-EIP)  | CPU67<br>(-EIP) | CPU68<br>(-EIP) | CPU<br>11/31 | CPU<br>12/32 | CPU<br>13/33   | CPU<br>14/34 | CPU<br>15/35 |  |  |
| Communications | Communications Specifications | Maximum Link Data Size per Node   | 184,832 words  |                 |                 |              |              | 640 words  |              |              |  |  |
|                |                               | Maximum Data Size per Connection  | 252 or 722 words* <sup>14</sup><br>(Data is synchronized within each connection.)  |                 |                 |              |              | 640 words (Data is synchronized within each connection.)* <sup>15</sup>  |              |              |  |  |
|                |                               | Number of Registrable Tag Set   | 256 (1 connection = 1 segment)   |                 |                 |              |              | 32 (1 connection = 1 segment)  |              |              |  |  |
|                |                               | Maximum Tag Set Size  | 722 words (One word is used when PLC status is included in the segment.)   |                 |                 |              |              | 640 words (One word is used when PLC status is included in the segment.)* <sup>15</sup>  |              |              |  |  |
|                |                               | Maximum Number of Tags Refreshable in a Single Cycle of CPU Unit* <sup>16</sup> | Output/send (CPU Unit to EtherNet/IP): 256<br>Input/receive (EtherNet/IP to CPU Unit): 256   |                 |                 |              |              | Output/send (CPU Unit to EtherNet/IP): 32<br>Input/receive (EtherNet/IP to CPU Unit): 32   |              |              |  |  |
|                |                               | Data Size Refreshable in a Single Cycle of CPU Unit* <sup>16</sup>              | Output/send (CPU to EtherNet/IP): 6,432 words<br>Input/receive (EtherNet/IP to CPU): 6,432 words   |                 |                 |              |              | Output/send (CPU Unit to EtherNet/IP): 640 words<br>Input/receive (EtherNet/IP to CPU Unit): 640 words                                     |              |              |  |  |
|                |                               | Change of Tag Data Link Parameter Settings during Operation                     | OK* <sup>17</sup>  |                 |                 |              |              |  |              |              |  |  |
|                |                               | Multi-cast Packet Filter* <sup>18</sup>   | OK   |                 |                 |              |              |  |              |              |  |  |
|                |                               | CIP Communications: Explicit Messages   | ---  |                 |                 |              |              |  |              |              |  |  |
|                |                               | Class 3 (Number of Connections)   | Number of connections: 128   |                 |                 |              |              |  |              |              |  |  |
|                |                               | UCMM (Non-connection Type)  | Maximum number of clients that can communicate at the same time: 32<br>Maximum number of servers that can communicate at the same time: 32 |                 |                 |              |              | Maximum number of clients that can communicate at the same time: 16<br>Maximum number of servers that can communicate at the same time: 16 |              |              |  |  |
|                |                               | CIP Routing   | OK<br>(CIP routing is enabled for the following remote Units: CJ1W-EIP21/EIP21S, CJ2H-CPU6□-EIP, CJ2M-CPU3□, and CS1W-EIP21/EIP21S.)       |                 |                 |              |              |  |              |              |  |  |
|                |                               | FINS Communications   | ---  |                 |                 |              |              |  |              |              |  |  |
|                |                               | FINS/UDP  | OK   |                 |                 |              |              |  |              |              |  |  |
|                |                               | FINS/TCP  | 16 connections max.  |                 |                 |              |              |  |              |              |  |  |
|                |                               | EtherNet/IP Conformance Test  | Conforms to A5.  |                 |                 |              |              |  |              |              |  |  |
|                |                               | EtherNet/IP Interface   | 10Base-T/100Base-TX<br>Auto Negotiation/Fixed Setting  |                 |                 |              |              |  |              |              |  |  |

\*14 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.

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

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

\*17 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.

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

| Item        |  | CJ2H-           |                 |                 |                 |                 | CJ2M-   |              |              |              |              |
|-------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|---|--------------|--------------|--------------|--------------|
|             |  | CPU64<br>(-EIP) | CPU65<br>(-EIP) | CPU66<br>(-EIP) | CPU67<br>(-EIP) | CPU68<br>(-EIP) | CPU<br>11/31  | CPU<br>12/32 | CPU<br>13/33 | CPU<br>14/34 | CPU<br>15/35 |
| Pulse I/O*3 | External interface                         | ---             |                 |                 |                 |                 | CJ2M-MD211 or CJ2M-MD212 Pulse I/O Module with 40-pin MIL connector   |              |              |              |              |
|             | Pulse Inputs                               |                 |                 |                 |                 |                 | Can be used as normal inputs, interrupt inputs, quick-response inputs, or high-speed counter inputs. (Functions of each input must be selected in the PLC Setup.)<br>Input method: Line-driver input or 24-VDC input (selected by wiring)   |              |              |              |              |
|             | Normal inputs                              |                 |                 |                 |                 |                 | 20 max. (10 per Pulse I/O Module)<br>Input constants: Set in the PLC Setup (0, 0.5, 1, 2, 4, 8, 16, or 32 ms). Default: 8 ms  |              |              |              |              |
|             | Interrupt inputs and quick-response inputs |                 |                 |                 |                 |                 | 8 max. (4 per Pulse I/O Module)<br>Input signal minimum ON pulse width: 30 μs   |              |              |              |              |
|             | High-speed counter inputs                  |                 |                 |                 |                 |                 | 4 max. (2 per Pulse I/O Module)<br>Input method: Differential-phase (×4) pulses, pulse + direction, up/down pulses, or increment pulse<br>Maximum response frequency: 50 kHz for differential phases or 100 kHz for single phase<br>Counting mode: Linear mode or circular (ring) mode<br>Count value: 32 bits<br>Counter reset: Phase Z + software reset or software reset<br>Control method: Target-value comparison or range comparison<br>Gate function: Supported  |              |              |              |              |
|             | Pulse Outputs                              |                 |                 |                 |                 |                 | Can be used as normal outputs, pulse outputs, or PWM outputs. (Functions of each output must be selected in the PLC Setup.)<br>Output method: Sinking or sourcing transistor outputs (The method is determined by Pulse I/O Module model.)  |              |              |              |              |
|             | Normal outputs                             | ---             |                 |                 |                 |                 | 12 max. (6 per Pulse I/O Module)  |              |              |              |              |
|             | Pulse outputs                              |                 |                 |                 |                 |                 | 4 max. (2 per Pulse I/O Module)<br>Output method: CW/CCW or pulse + direction (The method is determined by the I/O wiring and the instructions used in the ladder program.)<br>Output frequency: 1 pps to 100 kpps (in increments of 1 pps)<br>Output Mode: Continuous mode (for speed control) or independent mode (for position control)<br>Output pulses: Relative coordinates: 0000 0000 to 7FFF FFFF hex (0 to 2,147,483,647 pulses)<br>Absolute coordinates: 8000 0000 to 7FFF FFFF hex (-2,147,483,648 to 2,147,483,647)<br>Acceleration/deceleration curves: Linear or S-curve<br>Origin search function: Supported |              |              |              |              |
|             | PWM outputs                                |                 |                 |                 |                 |                 | 4 max. (2 per Pulse I/O Module)<br>Output frequency: 0.1 to 6,553.5 Hz (in 0.1-Hz increments) or 1 to 32,800 Hz (in 1-Hz increments)<br>Duty ratio: 0.0% to 100.0% (in 0.1% increments)   |              |              |              |              |

### 1-3-3 Function Specifications

| Functions             |   |  | Description   |  |
|-----------------------|---|--|---|--|
| Cycle Time Management | Minimum Cycle Time                                    |  | A minimum cycle time can be set.<br>(0.2 to 32,000 ms; Unit: 0.1 ms)<br><br>The minimum cycle time setting can be changed in MONITOR mode*1 |  |
|                       | Cycle Time Monitoring                                 |  | The cycle time is monitored.<br>(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) Management | Basic I/O Units, Special I/O Units, and CPU Bus Units | I/O Refreshing   | Cyclic Refreshing   | Cyclic refreshing of Basic I/O Units, Special I/O Units, and CPU Bus Units   |
|                       |   |  | Immediate Refreshing  | I/O refreshing by immediate refreshing instructions  |
|                       |   |  | Refreshing by IORF  | I/O refreshing by IORF instruction   |
|                       |   | Unit Recognition at Startup                                  |   | The number of units recognized when the power is turned ON is displayed.   |
|                       | Basic I/O Units                                       | Input Response 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 Unit Status Monitoring                             |   | Alarm information can be read from Basic I/O Units and the number of Units recognized can be read.   |
|                       |   | Reading/writing data using instructions for specific Units*1 |   | Special instructions can be used to read/write required data for specific Units at high speed.   |
|                       | Special I/O Units and CPU Bus Units                   | Unit Restart Bits to Restart Units                           |   | A Special I/O Unit or CPU Bus Unit can be restarted.   |
|                       |   | Synchronous Unit Operation*2                                 |   | The start of processing for all the specified Units can be synchronized at a fixed interval.<br>Maximum number of Units: 10 Units (Only Units that support Synchronous Operation Mode can be used.)<br>Synchronous operation cycle: 0.5 to 10 ms (default: 2 ms)<br>Maximum number of words for synchronous data refreshing: 96 words (total of all Units) |
|                       | Configuration Management                              | 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 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.  |

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

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

| Functions             |   | Description  |   |
|-----------------------|---|--|---|
| Pulse I/O Functions*3 | Pulse Input Functions   | Normal Inputs  | Input signals are read during I/O refreshing and stored in I/O memory.                                  |
|                       |   | 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 Output Functions  | Normal Outputs   | The status of I/O memory is output during I/O refreshing.   |
|                       |   | 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 Searches       | 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 Management     | Holding I/O Memory when Changing Operating Modes  | 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 Function  | Parts of the EM Area can be treated as file memory.  |   |
|                       | Storing Comments  | I/O comments can be stored as symbol table files in a Memory Card, EM file memory, or comment memory.  |   |
|                       | EM Configuration  | EM Area can be set as trace memory or EM file memory.  |   |
| Memory Cards          | Automatic File Transfer at Startup  | A program file and parameter files can be read from a Memory Card when the power is turned ON.   |   |
|                       | Program Replacement during PLC Operation  | User programs can be transferred from a Memory Card to CPU Unit during operation.  |   |
|                       | Function for Reading and Writing Data from a Memory Card  | 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.                       |   |

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



| Function                          |                        | Description  |
|-----------------------------------|------------------------|--|
| Communications                    |                        | ---  |
| 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* <sup>4</sup>         |                        | ---  |
| Host Link (SYSWAY) 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 Communications            |                        | 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 Bus                    |                        | 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 Links                  |                        | 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* <sup>5</sup>    |                        | 100Base-TX/10Base-T<br>Protocols: TCP/IP, UDP, ARP, ICMP (ping only), BOOTP<br>Applications: FINS, CIP, SNTP, DNS (Client), FTP (Server)   |
| CIP Communications Service        | Tag Data Links         | Programless cyclic data exchanges with the devices on the EtherNet/IP network.   |
|                                   | Message Communications | Any CIP commands can be received from the devices on the EtherNet/IP network.  |
| FINS Communications Service       | Message Communications | Any FINS commands can be transferred with the devices on the EtherNet/IP network.  |

\*4 A Serial Option Board is required to use a serial port for the CJ2M-CPU3□ CPU Unit.

\*5 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.<br>Direct Mode: An interrupt task is executed each time an input signal changes.<br>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.<br>Target-value comparison: The interrupt task is executed when the count matches a specified value.<br>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.<br>Accuracy (Accuracy depends on the temperature.)<br>Ambient temperature of 55°C: -3.5 to +0.5 min error per month<br>Ambient temperature of 25°C: -1.5 to +1.5 min error per month<br>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 MONITOR 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.  |

\*6 Supported only by the CJ2M CPU Units.

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

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

| Function                       |   | Description  |
|--------------------------------|---|--|
| Power Supply Management        | 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.<br>AC power supply: 10 to 25 ms (variable)<br>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 Blocks                |   | Standard programming can be encapsulated as function blocks.   |
|                                | Languages in Function Block Definitions   | Ladder programming or structured text  |
| Debugging                      | 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.<br><br>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-diagnosis and Restoration | Error Log   | A function is provided to store predefined error codes in CPU Unit, error information, and time at which the error occurred.   |
|                                | CPU Error Detection   | CPU Unit WDT errors are detected.  |
|                                | User-defined Failure Diagnosis  | Errors can be generated for user-specified conditions: Non-fatal errors (FAL) and fatal errors (FALS).<br><br>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 analyzed 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. |  |

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

| Function  |  | Description   |  |   |
|---|--|---|--|---|
| Self-diagnosis and Restoration (Continued from previous page) | 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.   |   |
|   |  | 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.                  |   |
|   |  | 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 Detection                                     | Memory Error Detection   | This function detects errors that occur in memory of the CPU Unit.  |
|   |  |   | 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 Overflow 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.  |   |  |   |

\*10 Supported only by the CJ2H-CPU6□-EIP/CJ2M-CPU3□, CJ2H-CPU6□ with unit version 1.6 or later, and CJ2M-CPU1□ with unit version 2.2 or later.

\*11 Supported only by the CJ2M-CPU3□.

| Function  |   | Description  |
|---|---|--|
| Self-diagnosis and Restoration (Continued from previous page) | Fatal Error Detection                   | User Program Area Overflow Error Detection   |
|   |   | Cycle Time Exceeded Error Detection  |
|   |   | System FALS Error Detection (User-defined Fatal Error)                                       |
|   |   | Version Error Detection  |
|   |   | Memory Card Transfer Error Detection   |
|   | Memory Self-restoration Function        | This function performs a parity check on the user program area and self-restoration data.*12 |
| Maintenance   | Simple Backup Function                  |  |
|   | Unsolicited Communications              |  |
|   | Remote Programming and Monitoring       |  |
|   | Automatic Online Connection via Network | Direct Serial Connection   |
|   | Via Networks                            |  |
| Security  | Read Protection using Password          |  |
|   | FINS Write Protection                   |  |
|   | Unit Name Function                      |  |
|   | Hardware ID Using Lot Numbers           |  |

\*12 This function can be used only with CJ2H CPU Units.



# 2

## 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.

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|  |             |
|--|-------------|
| <b>2-1 Basic System Configuration</b> .....      | <b>2-2</b>  |
| 2-1-1 Basic System Configuration .....           | 2-2         |
| 2-1-2 CPU Rack .....                             | 2-3         |
| 2-1-3 Expansion Racks .....                      | 2-11        |
| 2-1-4 Configuration Units .....                  | 2-14        |
| 2-1-5 Calculating Unit Current Consumption ..... | 2-23        |
| 2-1-6 Calculating Power Consumption .....        | 2-25        |
| <b>2-2 Expanded System Configuration</b> .....   | <b>2-27</b> |
| 2-2-1 Serial Communications .....                | 2-27        |
| 2-2-2 Communications Networks .....              | 2-29        |

# 2-1 Basic System Configuration

## 2-1-1 Basic System Configuration

### ● CPU Rack

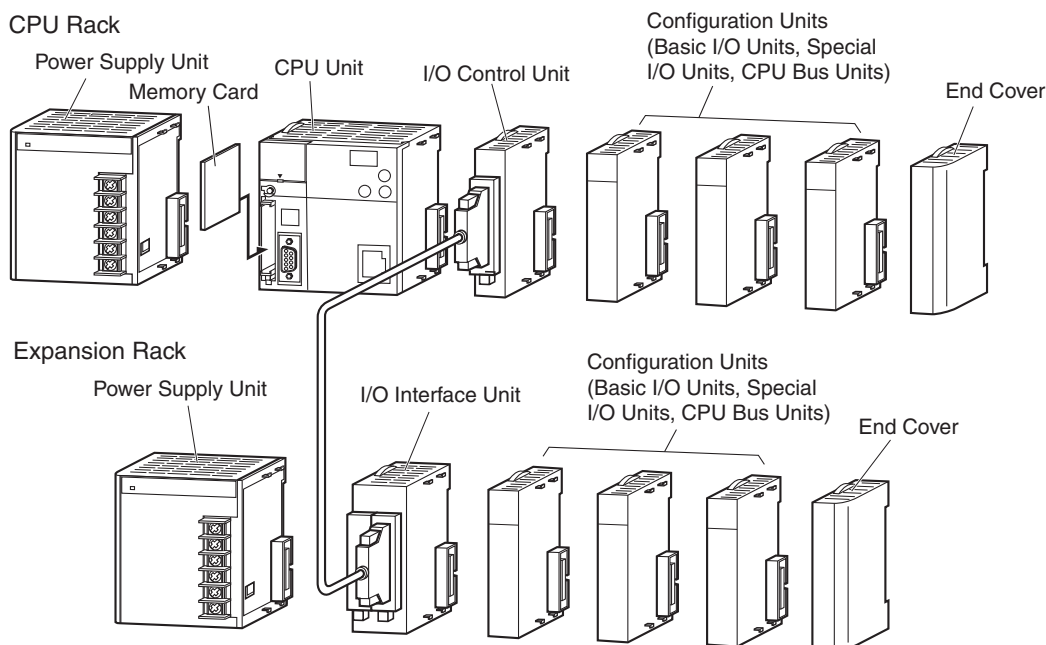
A CPU Rack can consist of a CJ2 CPU Unit, a CJ-series Power Supply Unit, CJ-series Configuration Units (Basic I/O Units, Special I/O Units, CPU Bus Units), and a CJ-series End Cover. The same CJ-series Power Supply Units and CJ-series Configuration Units that are used with CJ1 CPU Units are used with 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/EIP21S
- Position Control Units: CJ1W-NC214, CJ1W-NC234, CJ1W-NC281, CJ1W-NC414, CJ1W-NC434, CJ1W-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.

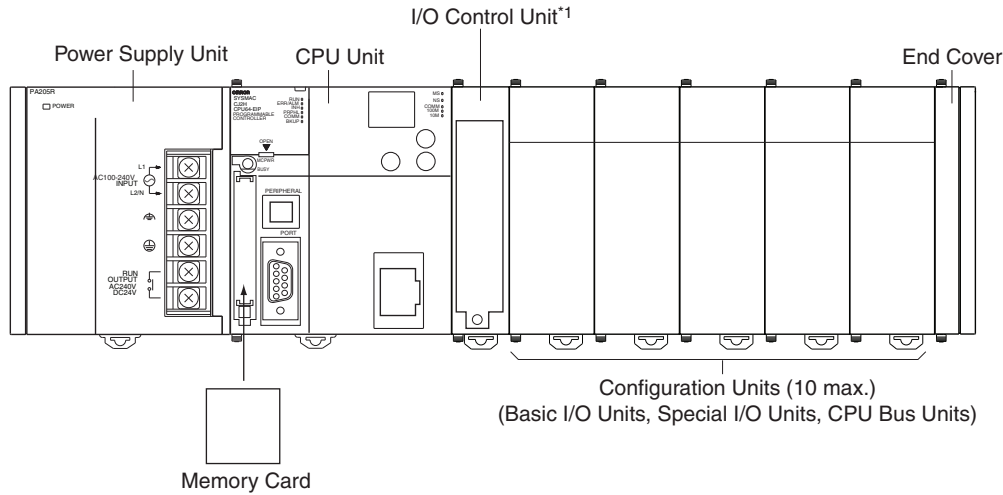




## 2-1-2 CPU Rack

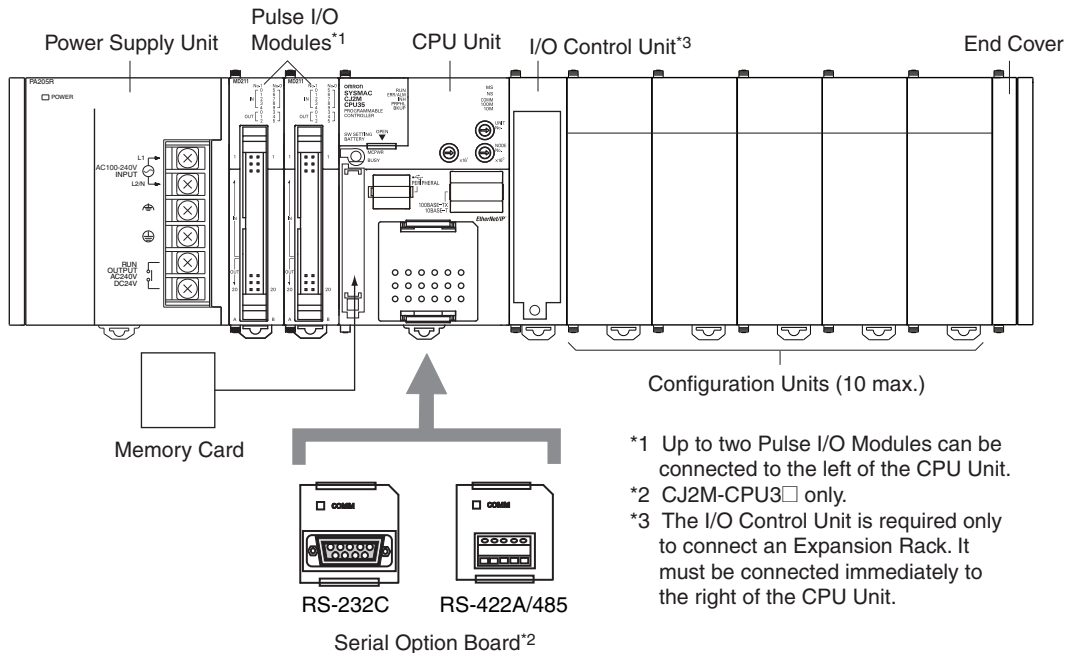
The CPU Rack consists of a CJ2 CPU Unit, a CJ-series Power Supply Unit, CJ-series Configuration Units, and a CJ-series End Cover. Up to 10 Configuration Units can be connected.

### ● 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



\*1 Up to two Pulse I/O Modules can be connected to the left of the CPU Unit.

\*2 CJ2M-CPU3□ only.

\*3 The I/O Control Unit is required only to connect an Expansion Rack. It must be connected immediately to the right of the CPU Unit.

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                | Configuration  | Remarks  |
|---------------------|--|--|
| CJ-series CPU Rack  | CPU Unit   |  |
|                     | CJ2H CPU Units   | One required for every CPU Rack.   |
|                     | CJ2M CPU Units   | One required for every CPU Rack.   |
|                     | Pulse I/O Module (Can be connected only with a CJ2M CPU Unit.) | Connected to use pulse I/O.<br>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.   |
| Configuration Units | 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 are connected.)  |
|                     | CJ-series Special I/O Units                                    |  |
|                     | 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.<br><br>A fatal error will occur if the End Cover is not connected.  |

## Units

### ● CJ2H CPU Units

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

\*1 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.

\*2 Includes the weights of the End Cover and the battery.

### ● CJ2M CPU Units

| Model      | I/O capacity | Program capacity | DM Area capacity  | Current consumption (A) |        | Weight              |
|------------|--------------|------------------|---|-------------------------|--------|---------------------|
|            |              |                  |   | 5 VDC                   | 24 VDC |                     |
| CJ2M-CPU35 | 2,560 points | 60 Ksteps        | 160 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 4 banks) | 0.7*1                   | ---    | 190 g<br>max.*2, *3 |
| CJ2M-CPU34 |              | 30 Ksteps        | 160 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 4 banks) |                         |        |                     |
| CJ2M-CPU33 |              | 20 Ksteps        | 64 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 1 bank)   |                         |        |                     |
| CJ2M-CPU32 |              | 10 Ksteps        | 64 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 1 bank)   |                         |        |                     |
| CJ2M-CPU31 |              | 5 Ksteps         | 64 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 1 bank)   |                         |        |                     |
| CJ2M-CPU15 | 2,560 points | 60 Ksteps        | 160 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 4 banks) | 0.5*1                   | ---    | 130 g<br>max.*2     |
| CJ2M-CPU14 |              | 30 Ksteps        | 160 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 4 banks) |                         |        |                     |
| CJ2M-CPU13 |              | 20 Ksteps        | 64 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 1 bank)   |                         |        |                     |
| CJ2M-CPU12 |              | 10 Ksteps        | 64 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 1 bank)   |                         |        |                     |
| CJ2M-CPU11 |              | 5 Ksteps         | 64 Kwords<br>(DM: 32 Kwords, EM:<br>32 Kwords × 1 bank)   |                         |        |                     |

\*1 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.

\*2 Includes the weights of the End Cover and the battery.

\*3 The weight of a Serial Option Board is not included.

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

| Model      | Specifications   | Current consumption (A) |        | Weight |
|------------|--|-------------------------|--------|--------|
|            |  | 5 VDC                   | 24 VDC |        |
| CJ2M-MD211 | Sinking outputs, MIL connector<br>10 inputs (including four interrupt/quick-response inputs and two high-speed counter inputs)<br>6 outputs (including two pulse outputs and two PWM outputs)  | 0.08                    | ---    | 70 g   |
| CJ2M-MD212 | Sourcing outputs, MIL connector<br>10 inputs (including four interrupt/quick-response inputs and two high-speed counter inputs)<br>6 outputs (including two pulse outputs and two PWM outputs) | 0.08                    | ---    | 70 g   |

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

| Name                              | Model      | Specifications  | Serial communications mode  | Current consumption (A) |        | Weight |
|-----------------------------------|------------|---|---|-------------------------|--------|--------|
|                                   |            |   |   | 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.<br>Maximum transmission distance: 15 m      | Host Link, 1:N NT Link, No-protocol, Serial PLC Link Slave, Serial PLC Link Master, Serial Gateway converted to CompoWay/F, and Tool Bus* | 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.<br>Maximum transmission distance: 50 m  |   | 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.<br>Maximum transmission distance: 500 m |   | 0.075 A                 | ---    | 30 g   |

\* 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 voltage        | Output capacity |        | Additional functions     | Weight     |
|-------------|-----------------------------|-----------------|--------|--------------------------|------------|
|             |                             | 5 VDC           | 24 VDC |                          |            |
| 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 consumption (A) |        | Weight    |
|------------|--|-------------------------|--------|-----------|
|            |  | 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 consumption (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.)*1 | Included with CPU Unit and I/O Interface Unit. | ---    |

\*1 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.<br>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 Cables for serial port          | XW2Z-200S-CV   | Connects to IBM PC/AT computer<br>D-Sub 9-pin connector (Cable length: 2.0 m).<br>Uses static-resistant connector.  |
|   | XW2Z-500S-CV   | Connects to IBM PC/AT computer<br>D-Sub 9-pin connector (Cable length: 5.0 m).<br>Uses static-resistant connector.  |
|   | XW2Z-200S-V  | Connects to IBM PC/AT computer<br>D-Sub 9-pin connector. (Cable length: 2.0 m)  |
|   | XW2Z-500S-V  | Connects to IBM PC/AT computer<br>D-Sub 9-pin connector. (Cable length: 5.0 m)  |
| Connecting Cable for EtherNet/IP port*                        | Commercially available 100Base-TX twisted-pair cable | Recommended: Fujikura F-LINK-E 0.5 mm × 4P Twisted-pair cable with RJ45 Modular Connectors on both ends. Connect between EtherNet/IP Unit or built-in EtherNet/IP port and Ethernet switch.<br>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.<br>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 Conversion Units                     | XW2D-40G6  | Slim model (M3 screw terminals), 40 terminals   |
|   | XW2B-40G5  | Through model (M3 screw terminals), 40 terminals  |
|   | XW2B-40G4  | Through model (M3.5 screw terminals), 40 terminals  |
| Connector-Terminal Block Conversion Cables                    | XW2Z-C25K  | Cable length: 0.25 m  |
|   | 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   |
|   | XW2B-20J6-9A   | To connect two axes   |

\* CJ2H-CPU6□-EIP or CJ2M-CPU3□ only.

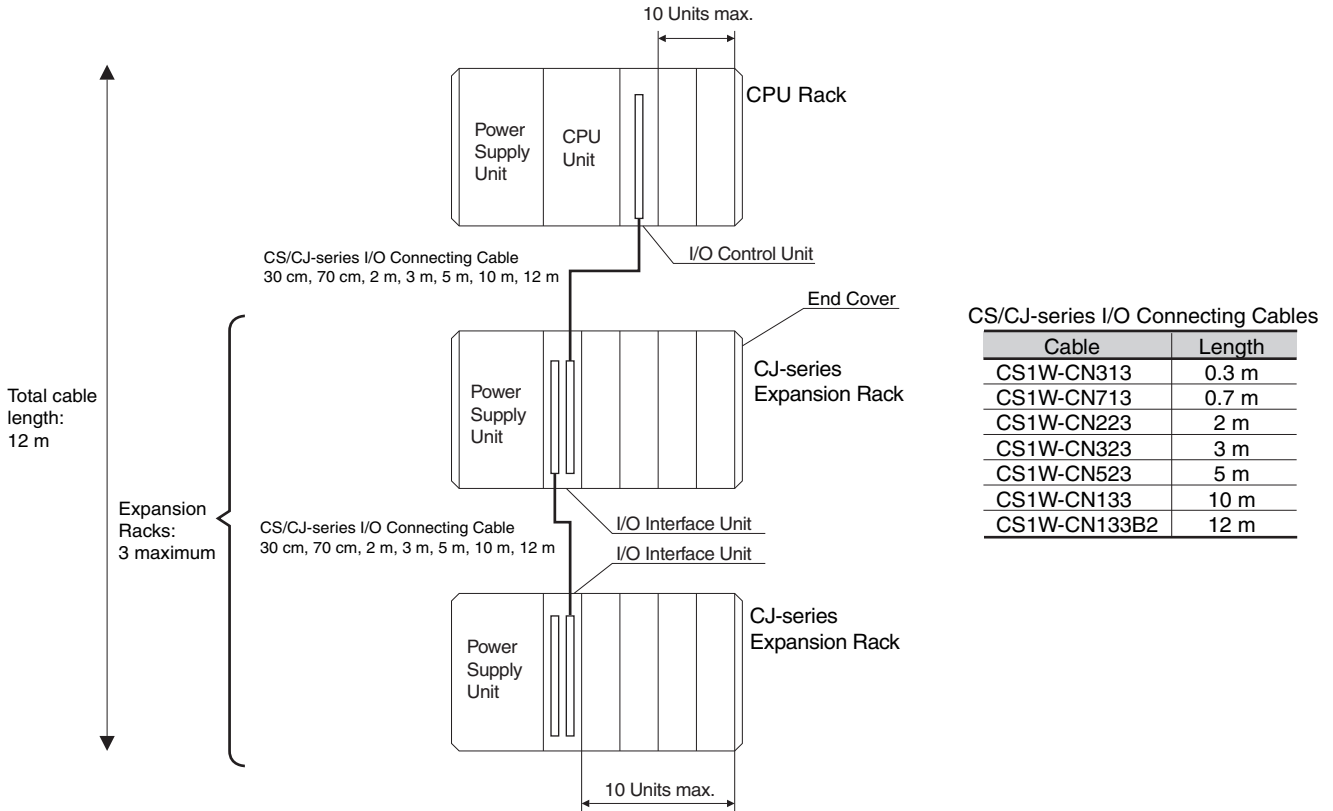
| Name                               |                            | Model                      | Specifications  |                     |
|------------------------------------|----------------------------|----------------------------|---|---------------------|
| Servo Relay Unit Connection Cables | OMNUC G Series             | CJ2M Pulse I/O Module side | XW2Z-050J-A33   | Cable length: 0.5 m |
|                                    |                            |                            | XW2Z-100J-A33   | Cable length: 1 m   |
|                                    |                            | Servo Drive side           | XW2Z-100J-B31   | Cable length: 1 m   |
|                                    |                            |                            | XW2Z-200J-B31   | Cable length: 2 m   |
|                                    | OMNUC G5 Series            | CJ2M Pulse I/O Module side | XW2Z-050J-A33   | Cable length: 0.5 m |
|                                    |                            |                            | XW2Z-100J-A33   | Cable length: 1 m   |
|                                    |                            | Servo Drive side           | XW2Z-100J-B31   | Cable length: 1 m   |
|                                    |                            |                            | XW2Z-200J-B31   | Cable length: 2 m   |
|                                    | SMART-STEP 2 Series        | CJ2M Pulse I/O Module side | XW2Z-050J-A33   | Cable length: 0.5 m |
|                                    |                            |                            | XW2Z-100J-A33   | Cable length: 1 m   |
|                                    |                            | Servo Drive side           | XW2Z-100J-B32   | Cable length: 1 m   |
|                                    |                            |                            | XW2Z-200J-B32   | Cable length: 2 m   |
|                                    | SMART-STEP A Series        | CJ2M Pulse I/O Module side | XW2Z-100J-A26   | Cable length: 1 m   |
|                                    |                            |                            | XW2Z-100J-B5  | Cable length: 1 m   |
|                                    |                            | Servo Drive side           | XW2Z-100J-B5  | Cable length: 1 m   |
|                                    |                            |                            | XW2Z-200J-B5  | Cable length: 2 m   |
|                                    | SMART-STEP Junior          | CJ2M Pulse I/O Module side | XW2Z-100J-A26   | Cable length: 1 m   |
|                                    |                            |                            | XW2Z-100J-B17   | Cable length: 1 m   |
| Servo Drive side                   |                            | XW2Z-100J-B17              | Cable length: 1 m   |                     |
|                                    |                            | XW2Z-200J-B17              | Cable length: 2 m   |                     |
| OMNUC W Series                     | CJ2M Pulse I/O Module side | XW2Z-050J-A27              | Cable length: 0.5 m   |                     |
|                                    |                            | XW2Z-100J-A27              | Cable length: 1 m   |                     |
|                                    | Servo Drive side           | XW2Z-100J-B4               | Cable length: 1 m   |                     |
|                                    |                            | XW2Z-200J-B4               | Cable length: 2 m   |                     |
| Battery Set                        |                            | CJ1W-BAT01                 | For CJ2 CPU Unit  |                     |
| Support Software                   | CX-One                     | CXONE-AL□□D-V□             | <p>CX-One is an FA Integrated Tool Package that integrates the PLC, network, HMI, components, motion control, and PLC-based process control.</p> <ul style="list-style-type: none"> <li>• CX-Programmer</li> <li>• CX-Integrator</li> <li>• SwitchBox Utility</li> <li>• CX-Simulator</li> <li>• CX-Protocol</li> <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.



### 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 Expansion Racks         | CJ-series Power Supply Unit  | One required for each Expansion Rack. (An I/O Control Unit is required on the CJ-series CPU Rack.)   |
|                                   | I/O Interface Unit (one End Cover included.)   |  |
|                                   | 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 are connected.)                        |
|                                   | CJ-series Special I/O Units  |  |
|                                   | CJ-series CPU Bus Units  |  |
|                                   | 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 voltage           | Output capacity |        | Functions                |
|-------------|--------------------------------|-----------------|--------|--------------------------|
|             |                                | 5 VDC           | 24 VDC |                          |
| 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<br>(non-insulated type) | 2.0 A           | 0.4 A  | ---                      |

### ● I/O Interface Unit

| Model      | Specifications  | Current consumption (A) |        | 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 |

\*1 Includes the weight of the End Cover.

### ● End Cover

| Model      | Specifications  | Current consumption (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.)<br>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 I/O Interface Unit (CJ1W-II101), or connects an I/O Interface Unit to another I/O Interface Unit. | 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         |

## 2-1-4 Configuration Units

### 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 identification 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.<br>Examples:<br>Analog I/O Units and High-speed Counter Units<br>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.<br>(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.<br>Examples:<br>Network Communications Units and Serial Communications Units<br>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 allocated | Current consumption (A) |            | Weight     |
|------------------------------------|---|----------------|--------------------------|-------------------------|------------|------------|
|                                    |   |                |                          | 5 VDC                   | 24 VDC     |            |
| DC Input Units                     | Terminal block<br>12 to 24 VDC, 8 inputs    | CJ1W-ID201     | 16*1                     | 0.08                    | ---        | 110 g max. |
|                                    | Terminal block<br>24 VDC, 16 inputs         | CJ1W-ID211*2   | 16                       | 0.08                    | ---        | 110 g max. |
|                                    |   | CJ1W-ID212*2   | 16                       | 0.13                    | ---        | 110 g max. |
|                                    | Fujitsu/OTAX connector<br>24 VDC, 32 inputs | CJ1W-ID231*3   | 32                       | 0.09                    | ---        | 70 g max.  |
|                                    | MIL connector<br>24 VDC, 32 inputs          | CJ1W-ID232*2*3 | 32                       | 0.09                    | ---        | 70 g max.  |
|                                    |   | CJ1W-ID233*2*3 | 32                       | 0.20                    | ---        | 70 g max.  |
|                                    | Fujitsu/OTAX connector<br>24 VDC, 64 inputs | CJ1W-ID261*3   | 64                       | 0.09                    | ---        | 110 g max. |
| MIL connector<br>24 VDC, 64 inputs | CJ1W-ID262*3                                | 64             | 0.09                     | ---                     | 110 g max. |            |
| AC Input Units                     | 200 to 240 VAC,<br>8 inputs                 | CJ1W-IA201     | 16*1                     | 0.08                    | ---        | 130 g max. |
|                                    | 100 to 120 VAC,<br>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                       | 0.07                    | ---        | 80 g max.  |

\*1 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.

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

- ON response time: 20  $\mu$ s improved to 15  $\mu$ s
- OFF response time: 400  $\mu$ s improved to 90  $\mu$ s

\*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

## Output Units

| Name                    | Specifications  | Model   | Number of bits allocated | Current consumption (A) |   | Weight     |            |
|-------------------------|---|---|--------------------------|-------------------------|---|------------|------------|
|                         |   |   |                          | 5 VDC                   | 24 VDC                                  |            |            |
| Relay Output Units      | Terminal block, 250 VAC/24 VDC, 2 A; 8 points, independent contacts | CJ1W-OC201  | 16*1                     | 0.09                    | 0.048<br>(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<br>(0.006 × Number of ON outputs) | 170 g max. |            |
| Triac Output Unit       | Terminal block, 250 VAC, 0.6 A; 8 points                            | CJ1W-OA201  | 16*1                     | 0.22                    | ---                                     | 150 g max. |            |
| Transistor Output Units | Sinking outputs   | Terminal block, 12 to 24 VDC, 2 A; 8 outputs  | CJ1W-OD201               | 16*1                    | 0.09                                    | ---        | 110 g max. |
|                         |   | Terminal block, 12 to 24 VDC, 0.5 A; 8 outputs  | CJ1W-OD203               | 16*1                    | 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/OTAX 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/OTAX 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. |
|                         | Sourcing outputs  | Terminal block, 24 VDC, 2 A; 8 outputs, load short-circuit protection and disconnected line detection | CJ1W-OD202               | 16*1                    | 0.11                                    | ---        | 120 g max. |
|                         |   | Terminal block, 24 VDC, 0.5 A; 8 outputs, load short-circuit protection                               | CJ1W-OD204               | 16*1                    | 0.10                                    | ---        | 120 g max. |
|                         |   | Terminal block, 24 VDC, 0.5 A; 16 outputs, load short-circuit protection                              | CJ1W-OD212               | 16                      | 0.10                                    | ---        | 120 g max. |
|                         |   | MIL connector, 24 VDC, 0.5 A; 32 outputs, load short-circuit protection                               | 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 Interface Units     | 64 outputs  | CJ1W-B7A04  | 64                       | 0.07                    | ---                                     | 80 g max.  |            |

\*1 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.

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

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

\*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.*).

## Mixed I/O Units

| Name                                 | Specifications   | Model   | Number of bits allocated | Current consumption (A) |        | Weight     |            |
|--------------------------------------|--|---|--------------------------|-------------------------|--------|------------|------------|
|                                      |  |   |                          | 5 VDC                   | 24 VDC |            |            |
| 24-VDC Input/Transistor Output Units | Sinking  | Fujitsu/OTAX connector<br>Inputs: 24 VDC, 16 inputs<br>Outputs: 12 to 24 VDC, 0.5 A; 16 outputs                   | CJ1W-MD231*1             | 32                      | 0.13   | ---        | 90 g max.  |
|                                      |  | Fujitsu/OTAX connector<br>Inputs: 24 VDC, 32 inputs<br>Outputs: 12 to 24 VDC, 0.3 A; 32 outputs                   | CJ1W-MD261*1             | 64                      | 0.14   | ---        | 110 g max. |
|                                      |  | MIL connector<br>Inputs: 24 VDC, 16 inputs<br>Outputs: 12 to 24 VDC, 0.5 A; 16 outputs                            | CJ1W-MD233*1             | 32                      | 0.13   | ---        | 90 g max.  |
|                                      |  | MIL connector<br>Inputs: 24 VDC, 32 inputs<br>Outputs: 12 to 24 VDC, 0.3 A; 32 outputs                            | CJ1W-MD263*1             | 64                      | 0.14   | ---        | 110 g max. |
|                                      | Sourcing   | MIL connector<br>Inputs: 24 VDC, 16 inputs<br>Outputs: 24 VDC, 0.5 A; 16 outputs<br>Load-short circuit protection | CJ1W-MD232*1             | 32                      | 0.13   | ---        | 80 g max.  |
| TTL I/O Units                        | MIL connector<br>Inputs: TTL (5 VDC), 32 inputs<br>Outputs: TTL (5 VDC, 35 mA), 32 outputs | CJ1W-MD563*1  | 64                       | 0.19                    | ---    | 110 g max. |            |
| B7A Interface Units                  | 32 inputs, 32 outputs  | CJ1W-B7A22  | 64                       | 0.07                    | ---    | 80 g max.  |            |

\*1 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

| Type              | Name   | Specifications  | Model         | Number of words allocated (CIO 2000 to CIO 2959) | Number of words allocated (D20000 to D29599) | Unit No.                                | Number of mountable Units | Current consumption (A) |        | Weight     |
|-------------------|--|---|---------------|--|--|---|---------------------------|-------------------------|--------|------------|
|                   |  |   |               |  |  |   |                           | 5 VDC                   | 24 VDC |            |
| Special I/O Units | General-purpose Universal 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 Output 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.)<br>2 outputs (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. |
|                   | Isolated-type High-resolution Universal Input Unit | 4 inputs, fully universal<br>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 Thermocouple 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 Thermometer Input Units   | 4 resistance thermometer inputs   | CJ1W-PTS52    | 10 words   | 100 words                                    | 0 to 95                                 | 40 Units                  | 0.25                    | ---    | 150 g max. |
|                   |  | 2 resistance thermometer inputs   | CJ1W-PTS16    | 10 words   | 100 words                                    | 0 to 95                                 | 40 Units                  | 0.18                    | ---    | 150 g max. |
|                   | Direct Current 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, thermocouple 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, thermocouple 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, thermocouple 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, thermocouple 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. |



| Type              | Name                      | Specifications  | Model   | Number of words allocated (CIO 2000 to CIO 2959) | Number of words allocated (D20000 to D29599) | Unit No.                                | Number of mountable Units | Current consumption (A) |        | Weight     |
|-------------------|---------------------------|---|---|--|--|---|---------------------------|-------------------------|--------|------------|
|                   |                           |   |   |  |  |   |                           | 5 VDC                   | 24 VDC |            |
| Special I/O Units | Temperature Control Units | 4 control loops, temperature-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, temperature-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, temperature-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, temperature-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 Control 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   | ---        |
|                   |                           | 4 axes, pulse outputs; open collector outputs   | 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. |
|                   |                           |   | CJ1W-NC413                                    | 20 words   | 200 words                                    | 0 to 94 (uses words for 2 unit numbers) | 40 Units                  | 0.36                    | ---    | 150 g max. |
|                   |                           | 4 axes, pulse outputs; open collector outputs   | 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   | ---        |
|                   |                           | 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*3                                       | 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.  |

| Type                     | Name  | Specifications  | Model                | Number of words allocated (CIO 2000 to CIO 2959) | Number of words allocated (D20000 to D29599) | Unit No.                                | Number of mountable Units | Current consumption (A) |             | Weight     |
|--------------------------|---|---|----------------------|--|--|---|---------------------------|-------------------------|-------------|------------|
|                          |   |   |                      |  |  |   |                           | 5 VDC                   | 24 VDC      |            |
| 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                                    | 0 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  | 0 to 92 (uses words for 4 unit numbers)      | 24 Units                                | 0.28                      | ---                     | 100 g max.  |            |
| Compo-Bus/S Master 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 Master Unit     | CompoNet remote I/O   | Communications mode No. 0: 128 inputs/ 128 outputs for Word Slaves  | CJ1W-CRM21           | 20 words   | None   | 0 to 94 (uses words for 2 unit numbers) | 40 Units                  | 0.40                    | ---         | 130 g max. |
|                          |   | Communications mode No. 1: 256 inputs/ 256 outputs for Word Slaves  |                      | 40 words   | None   | 0 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   | 0 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                    | ---         |            |

\*1 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.

$$\text{Number of CJ1W-NC}\square\square 4 \text{ Units} \times 2 + \text{Number of other Units} \leq 10$$

For example, if five CJ1W-NC□□4 Units are connected to one Rack, no other Units can be connected.

\*2 The Units must be mounted on the CPU Rack to use synchronous unit operation.

\*3 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.

\*4 The Space Unit is for Position Control Units.

\*5 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

\*6 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.

\*7 Includes the weight of accessory connectors.

### ● CJ-series CPU Bus Units

| Type                           | Name   | Specifications  | Model         | Number of words allocated (CIO 1500 to CIO 1899) | Unit No. | Maximum number of Units*1 | Current consumption (A) |        | Weight       |            |
|--------------------------------|--|---|---------------|--|----------|---------------------------|-------------------------|--------|--------------|------------|
|                                |  |   |               |  |          |                           | 5 VDC                   | 24 VDC |              |            |
| CPU Bus Units*1                | High-speed Analog Input Unit                 | 4 inputs: 80 $\mu$ s/2 inputs, 160 $\mu$ s/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 Communications 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 communications  | 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.    |            |
|                                |  | Tag data links, FINS communications, CIP message communications, FTP server, socket communications, security functions etc. | CJ1W-EIP21S   | 25 words   | 0 to F   | *5                        | 0.65                    | ---    | 91 g max.    |            |
|                                | FL-net Unit                                  | 100Base-TX cyclic transmissions and message 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 Master and Slave functions, Automatic allocation possible without Configurator     | CJ1W-DRM21    | 25 words*6                                       | 0 to F   | 16 Units*3                | 0.29                    | ---    | 118 g max.*7 |            |
|                                | EtherCAT-compatible Position Control Units*8 | 2 servo axes  | CJ1W-NC281    | 25 words   | 0 to F   | 16 Units*3                | 0.46                    | ---    | 110 g max.   |            |
| 4 servo axes                   |  | CJ1W-NC481  |               |  |          |                           |                         |        |              |            |
| 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  |               |  |          |                           |                         |        |              |            |

| Type            | Name   | Specifications   | Model            | Number of words allocated (CIO 1500 to CIO 1899) | Unit No. | Maximum number of Units*1 | Current consumption (A) |        | Weight     |
|-----------------|--|--|------------------|--|----------|---------------------------|-------------------------|--------|------------|
|                 |  |  |                  |  |          |                           | 5 VDC                   | 24 VDC |            |
| CPU Bus Units*1 | Position Control Units supporting MECHATROLINK-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 supporting MECHATROLINK-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.

\*4 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 used.

\*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).

\*7 Includes the weight of accessory connectors.

\*8 Only OMNUC G5-series Servo Drives with Built-in EtherCAT can be connected.

\*9 When mounting to a CJ-series CPU Rack or a CJ-series Expansion Rack, one of these Units uses the space of three Units.

\*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 Unit.

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.

| Power Supply Unit | Max. current consumption   |                     |                      | Max. total power consumption |
|-------------------|----------------------------|---------------------|----------------------|------------------------------|
|                   | 5-V group (internal logic) | 24-V group (relays) | 24-V group (service) |                              |
| 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          | Quantity | Voltage group  |                          |
|---------------------|----------------|----------|--|--------------------------|
|                     |                |          | 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 +<br>0.080 A × 2 + 0.090 A × 2 +<br>0.090 A × 2 + 0.120 A +<br>0.350 A | 0.048 A × 2              |
|                     | Result         |          | 1.83 A (≤5.0 A)  | 0.096 A (≤0.8 A)         |
| Power consumption   | Calculation    |          | 1.83 A × 5 V = 9.15 W  | 0.096 A × 24 V = 2.304 W |
|                     | 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                | Model       | Quantity | Voltage group  |      |
|---------------------|-------------|----------|--|------|
|                     |             |          | 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 |          | $0.130\text{ A} + 0.080\text{ A} \times 2 + 0.140\text{ A} \times 8$ | ---  |
|                     | Result      |          | 1.41 A ( $\leq 5.0\text{ A}$ )                                       | ---  |
| Power consumption   | Calculation |          | $1.41\text{ A} \times 5\text{ V} = 7.05\text{ W}$                    | ---  |
|                     | Result      |          | 7.05 W ( $\leq 25\text{ W}$ )  | ---  |



**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.

The screenshot shows the 'Consumption and Width [CJ2M-CPU35]' window. It features a table with the following columns: Rack, Power Supply Unit, I/O module, Option board, Expansion unit, Consumption (mA) at 5V, Consumption (mA) at 26V/24V, Total power consumption (W), and Width (mm). The 'CPU Rack' row is highlighted, showing a consumption of 720 mA at 5V, 4 W total power consumption, and a width of 141.7 mm. An arrow points to the 'Expansion unit' checkbox for the CPU Rack, with the text 'Indicates long-distance expansion' below it. A 'Close' button is visible at the bottom right of the 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.

$$W = \underbrace{W\_PLC}_{\text{Basic PLC power consumption}} + \underbrace{W\_IO\_ONOFF}_{\text{Basic I/O Unit power consumption}}$$

#### ● 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*.
- $\eta$ :  
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

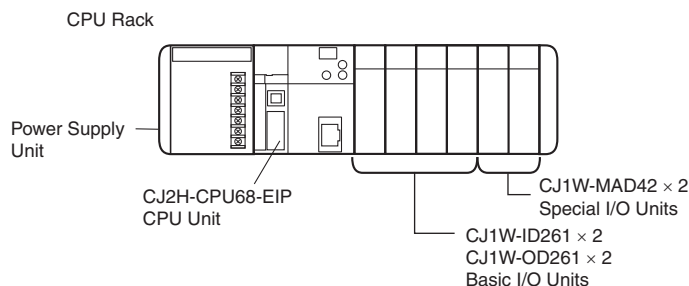
- Output Units

Residual voltage × Maximum load current × 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<br>Input current: 4.1 mA<br>Number of input points: 64                                  |
| Output Unit       | CJ1W-OD261     | 2 Units  | 0.17 A | Residual voltage: 0.1 V<br>Maximum load current: 0.3 A per point<br>6.4 A per Unit<br>Number of output points: 64 |
| Special I/O Units | CJ1W-MAD42     | 2 Units  | 0.58 A | ---   |

### ● Basic PLC Power Consumption (W<sub>PLC</sub>)

$$W_{PLC} = (0.82 + 0.09 \times 2 + 0.17 \times 2 + 0.58 \times 2) A \times 5 V \div 0.7 = 17.86 W$$

### ● Basic I/O Unit Power Consumption (W<sub>IO\_ONOFF</sub>)

$$W_{IO\_ONOFF} = 24 V \times 0.0041 A \times 64 \text{ points} \times 2 \text{ Units} + 0.1 V \times 6.4 A \times 2 \text{ Units} = 13.88 W^*$$

\* The maximum load current of an Output Unit is limited for each Unit.

### ● Average Power Consumption (W)

$$W = W_{PLC} + W_{IO\_ONOFF} = 31.74 W$$



## 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.

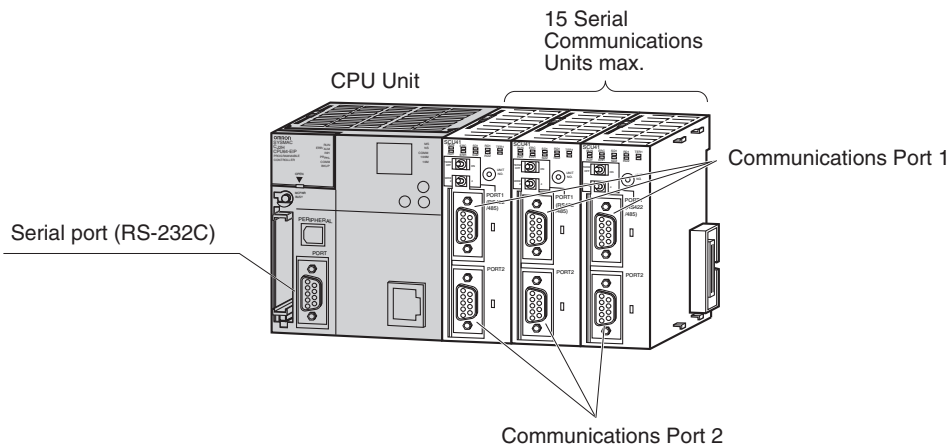
### 2-2-1 Serial Communications

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.

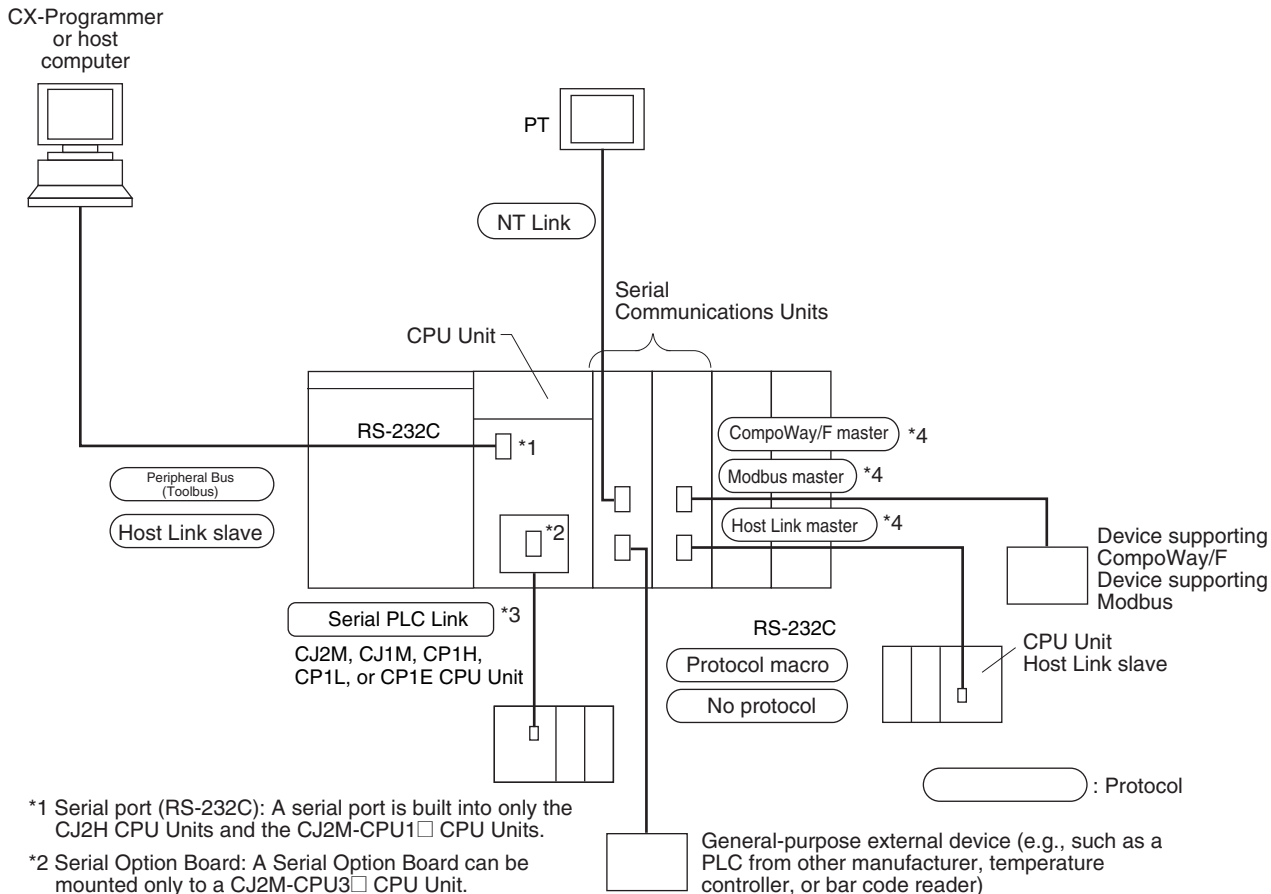


#### Precautions for Correct Use

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).



\*1 Serial port (RS-232C): A serial port is built into only the CJ2H CPU Units and the CJ2M-CPU1□ CPU Units.

\*2 Serial Option Board: A Serial Option Board can be mounted only to a CJ2M-CPU3□ CPU Unit.

\*3 Serial PLC Links are supported only by CJ2M CPU Units.

\*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).



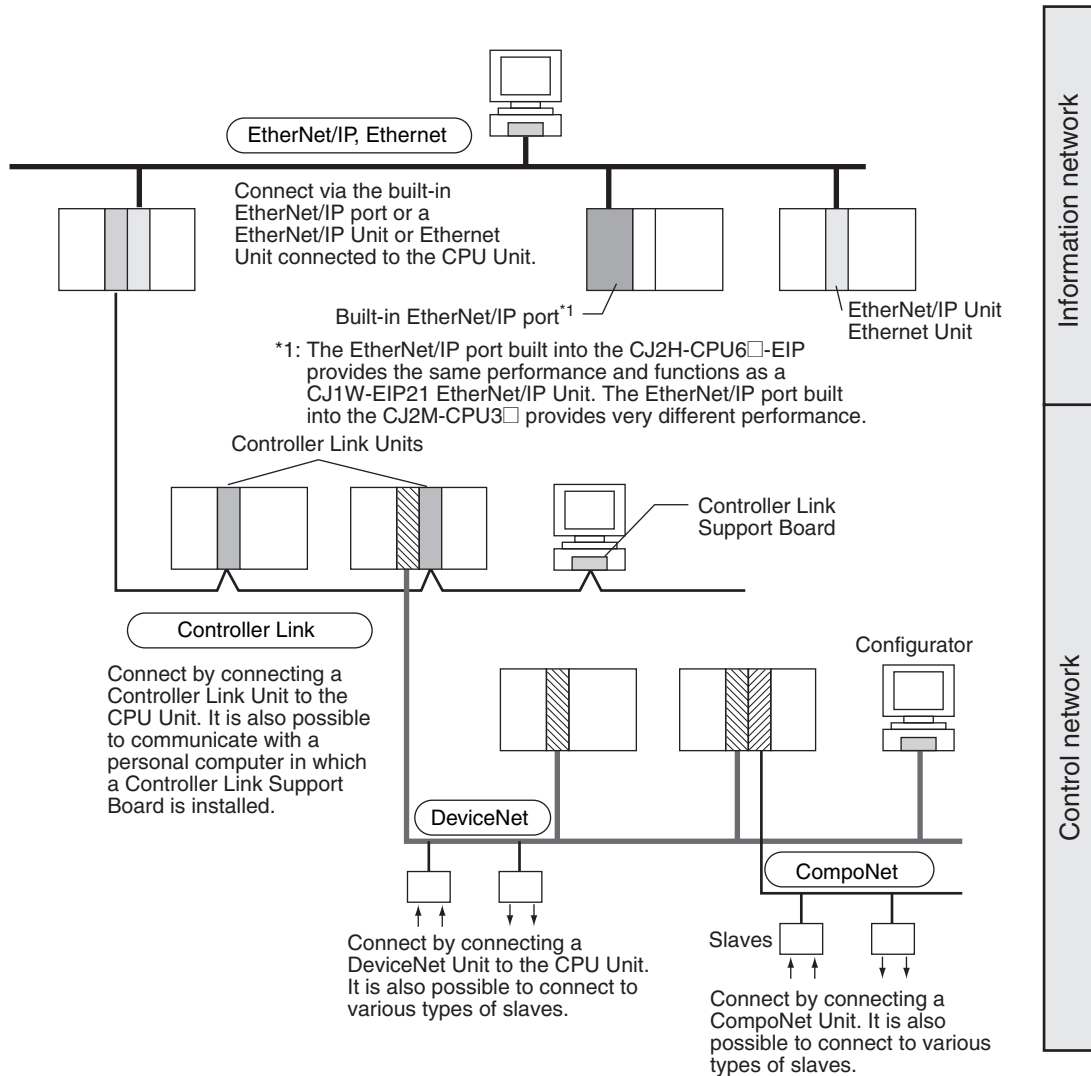
### Additional Information

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  |
|---------------------------|---|--|---|--|
| Information networks      | EtherNet/IP   | Between Host computer and PLC.                                       | FINS message communications   | Built-in EtherNet/IP port on CJ2H-CPU6□-EIP or CJ2M-CPU3□, or EtherNet/IP Unit |
|                           |   | Between PLCs.  |   |  |
|                           |   | Between Host computer and Memory Card installed in CPU Unit.         | FTP server  |  |
|                           | Controller Link   | Between PLC and personal computer directly connected to the Network. | FINS message communications   | Controller Link Support Board or Controller Link Unit                          |
|                           |   |  | Data link (offset, simple settings)                                     |  |
| 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                                 |  |
| Control networks          | 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)                                     |  |
|                           | DeviceNet   | Between PLC and Network devices (Slaves).                            | FINS message communications in an open network.                         | DeviceNet Master Unit and Configurator   |
|                           | DeviceNet   |  | 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 network |  | CompoNet Master Unit  |  |

# 3

## Nomenclature and Functions

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

---

|  |             |
|--|-------------|
| <b>3-1 CPU Units</b> .....   | <b>3-3</b>  |
| 3-1-1 CPU Section .....  | 3-3         |
| 3-1-2 Built-in EtherNet/IP Section (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only) .. | 3-9         |
| <b>3-2 Memory Card</b> .....   | <b>3-14</b> |
| 3-2-1 Models and Specifications .....                                      | 3-14        |
| 3-2-2 Operating Procedures .....   | 3-14        |
| 3-2-3 Installing and Removing .....  | 3-15        |
| <b>3-3 Pulse I/O Modules (CJ2M CPU Unit Only)</b> .....                    | <b>3-18</b> |
| 3-3-1 Models and Specifications .....                                      | 3-18        |
| 3-3-2 Part Names and Functions .....                                       | 3-18        |
| <b>3-4 Serial Option Boards (CJ2M-CPU3□ Only)</b> .....                    | <b>3-21</b> |
| 3-4-1 Overview .....   | 3-21        |
| <b>3-5 Power Supply Units</b> .....  | <b>3-22</b> |
| 3-5-1 Models and Specifications .....                                      | 3-22        |
| 3-5-2 Components .....   | 3-25        |
| 3-5-3 Selecting a Power Supply Unit .....                                  | 3-28        |
| <b>3-6 CJ-series Basic I/O Units</b> .....                                 | <b>3-29</b> |
| 3-6-1 Basic I/O Units with Terminal Blocks .....                           | 3-29        |
| 3-6-2 Thirty-two/Sixty-four-point Basic I/O Units with Connectors .....    | 3-31        |
| <b>3-7 I/O Control Units and I/O Interface Units</b> .....                 | <b>3-33</b> |
| 3-7-1 Component Names .....  | 3-33        |
| 3-7-2 System Configuration .....   | 3-33        |

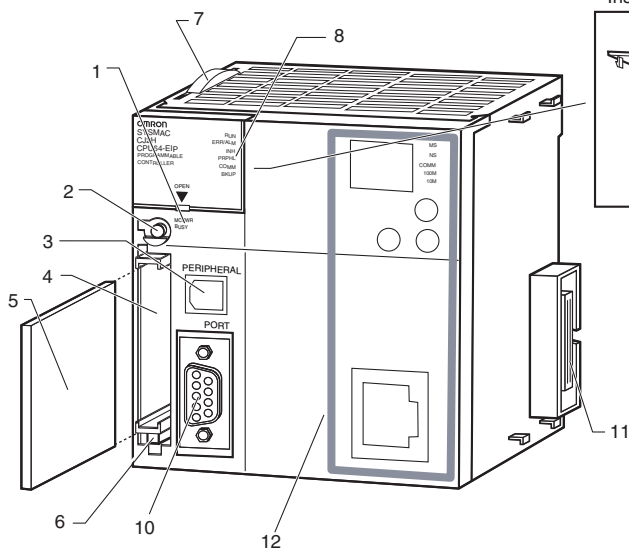
|            |                                   |             |
|------------|-----------------------------------|-------------|
| <b>3-8</b> | <b>B7A Interface Unit</b>         | <b>3-34</b> |
| 3-8-1      | Overview                          | 3-34        |
| 3-8-2      | System Configuration              | 3-34        |
| 3-8-3      | Models                            | 3-34        |
| 3-8-4      | B7A Communications Specifications | 3-35        |
| 3-8-5      | Common Specifications             | 3-36        |
| 3-8-6      | I/O Memory Allocations            | 3-36        |
| 3-8-7      | Transmission Error Processing     | 3-36        |
| 3-8-8      | Parts and Names                   | 3-38        |
| 3-8-9      | Preparing and Connecting Cables   | 3-40        |
| 3-8-10     | Connection Diagrams               | 3-42        |

# 3-1 CPU Units

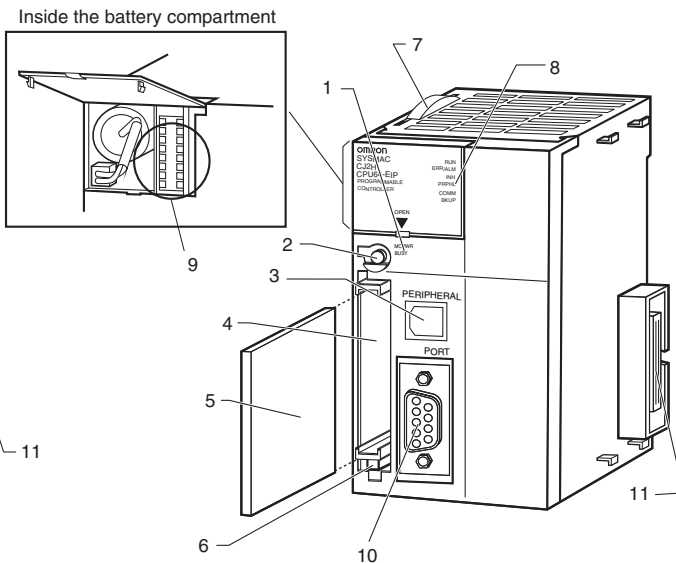
## 3-1-1 CPU Section

### Components and Functions

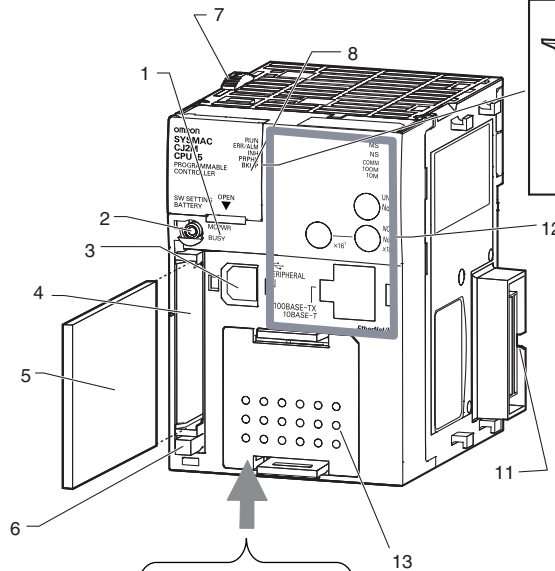
CJ2H-CPU6□-EIP



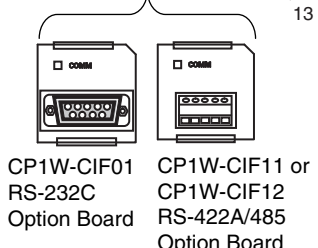
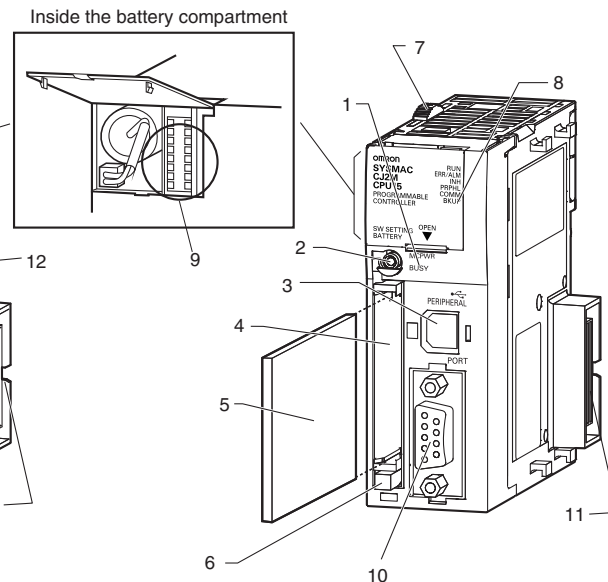
CJ2H-CPU6□



CJ2M-CPU3□



CJ2M-CPU1□

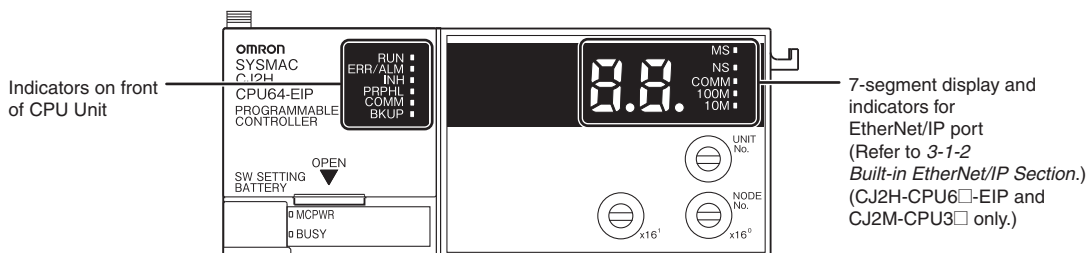


3-1 CPU Units  
3  
3-1-1 CPU Section

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 EtherNet/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.   |

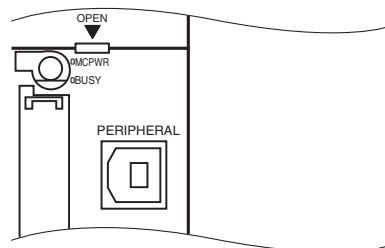
\*1 The CJ2M-CPU3□ does not have this indicator.

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

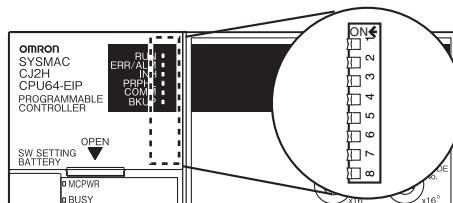
## Memory Card Indicators

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<br>Flashes five times: Simple backup read malfunction<br>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 accidentally overwritten from Programming Devices (including the CX-Programmer).  | ON          | Writing disabled for user program memory.*1  | OFF     |
|         |   | OFF         | 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 Memory Card to the CPU Unit when power is turned ON.*2<br>Used to store the programs in the Memory Card to switch operations, or to automatically transfer programs at startup (Memory Card ROM operation).*3 | ON          | The user program is automatically transferred from the Memory Card when power is turned ON.  | OFF     |
|         |   | OFF         | The user program is not automatically transferred from the Memory Card when power is turned ON.                                      |         |
| SW3     | Not used.   | ---         | ---  | OFF     |
| SW4     | Not used.   | ---         | ---  | OFF     |
| SW5     | Set to ON to automatically detect the baud rate of the CX-Programmer (peripheral bus only) when using the serial port (RS-232C).*4, *5  | ON          | Serial port (RS-232C) communications condition: Automatically detect CX-Programmer (peripheral bus only) baud rate.                  | OFF     |
|         |   | OFF         | Serial port (RS-232C) communications condition: According to CX-Programmer communications settings in PLC Setup. (Refer to Table 1.) |         |
| SW6     | Set pin 6 to ON or OFF and use A395.12 in the program to create a user-defined condition without using an Input Unit.   | ON          | User-defined pin. Turns ON the User DIP Switch Pin Flag (A395.12).   | OFF     |
|         |   | 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.

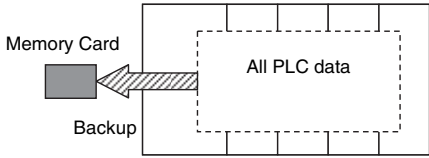
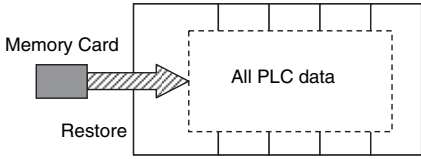
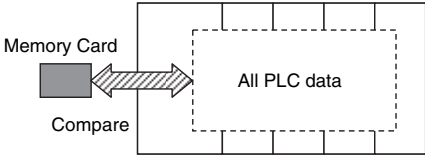
**Table 1**

| Connection                              | Setting | Pin 5 of DIP switch on front panel | PLC Setup (Serial port (RS-232C))*1 |
|---|---------|------------------------------------|-------------------------------------|
| 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                      |

\*1 Set using the CX-Programmer.

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

**Table 2**

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

\*1 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.

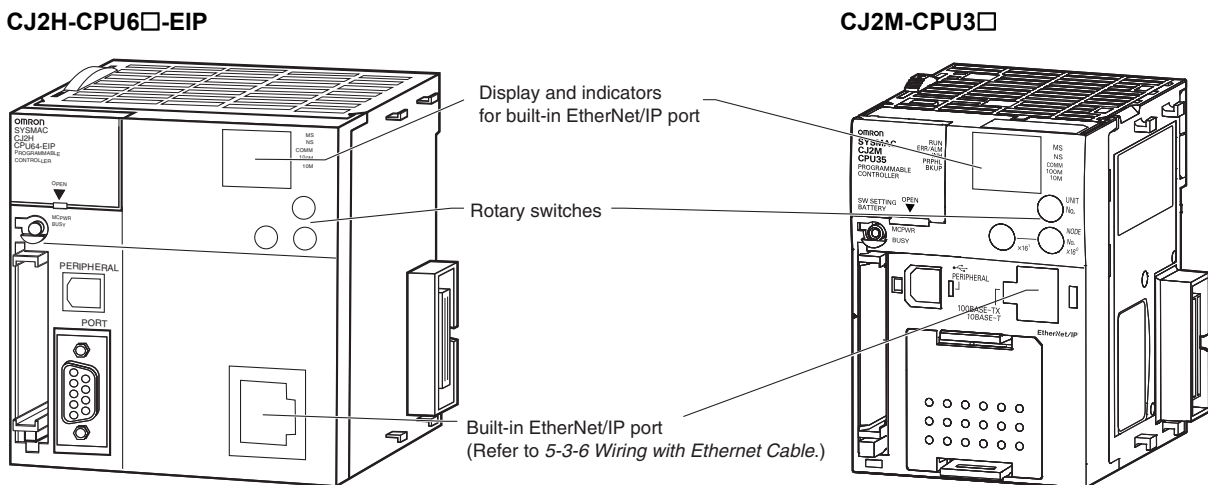
### 3-1-2 Built-in EtherNet/IP Section (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)

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**

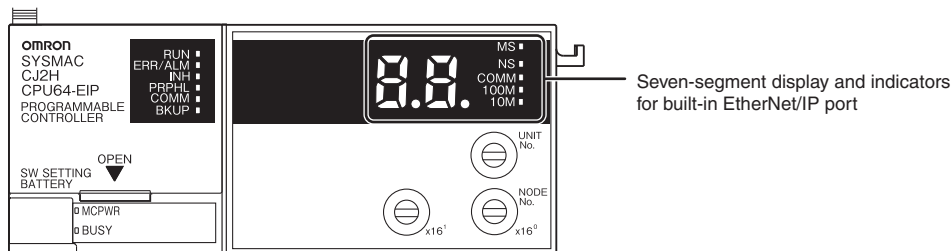
The built-in EtherNet/IP port on the CJ2H-CPU6□-EIP provides the same performance and functions as a CJ1W-EIP21 EtherNet/IP Unit. (The performance of the built-in EtherNet/IP port on the CJ2M-CPU3□ is very different.) Set the unit number and node address with the rotary switches on the front panel of 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.

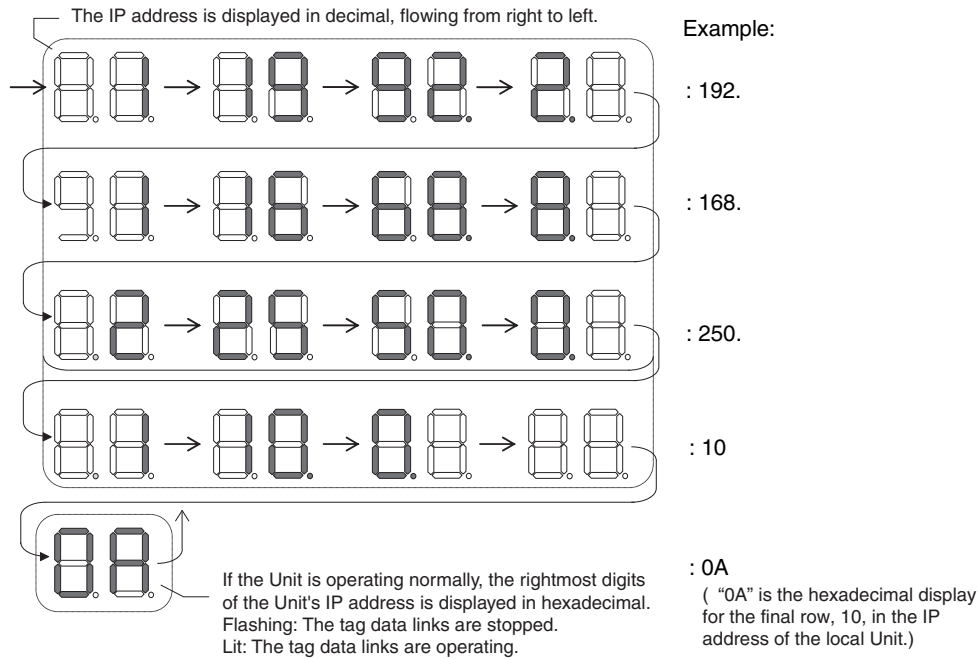
| Indicator | Name           | Color                       | Status   | Meaning   |
|-----------|----------------|-----------------------------|----------|---|
| MS        | Module Status  | Red                         | Lit      | Fatal error   |
|           |                |                             | 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 7-segment 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.

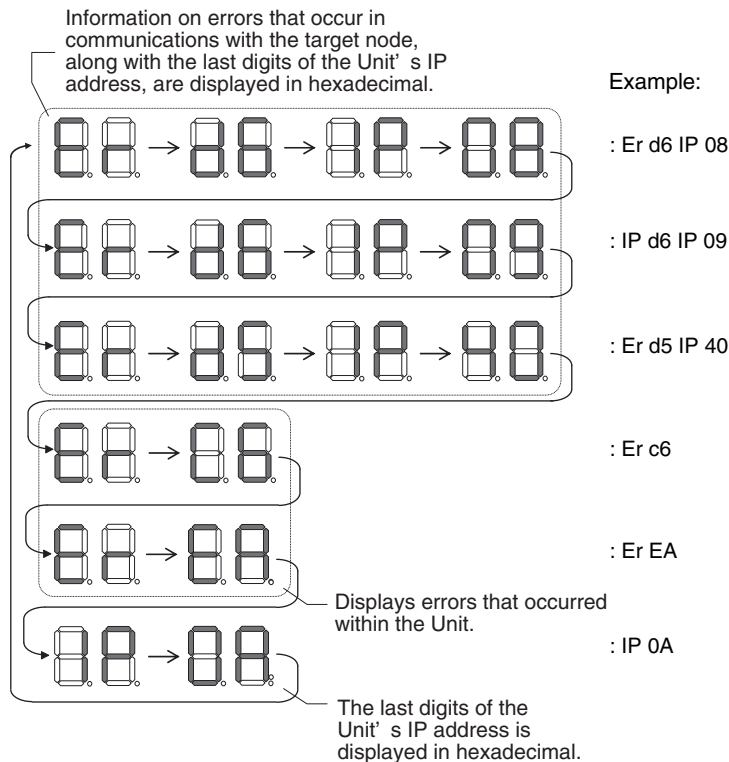
For example, the display will change as follows if the IP address is 192.168.250.10:



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 EtherNet/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).



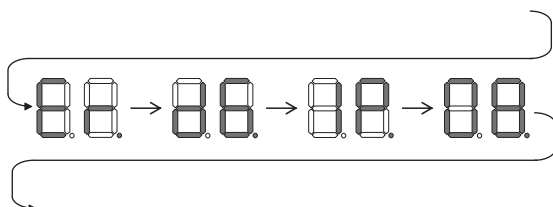
- There is no priority to the order in which the errors are displayed. All of the errors are displayed repeatedly in sequence.

#### 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.



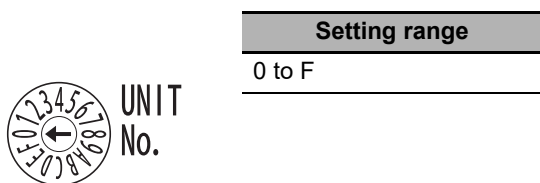
## Rotary Switches

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

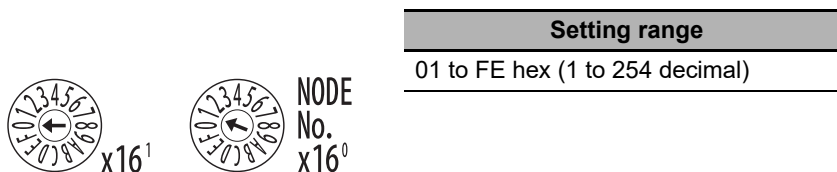
- Always turn OFF the PLC's power supply before setting the unit number.
- When setting the unit number for the first time or when changing the setting, create the PLC's I/O tables.



## ● 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).

## 3-2 Memory Card

### 3-2-1 Models and Specifications

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 |
| Common specifications  | Dimensions                              | 42.8 × 36.4 × 3.3 mm (W × H × T)      |            |
|                        | Weight                                  | 15 g max.                             |            |
|                        | 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 | 511                                   |            |
|                        | File system                             | FAT16                                 |            |

### 3-2-2 Operating Procedures

#### Memory Card Indicators

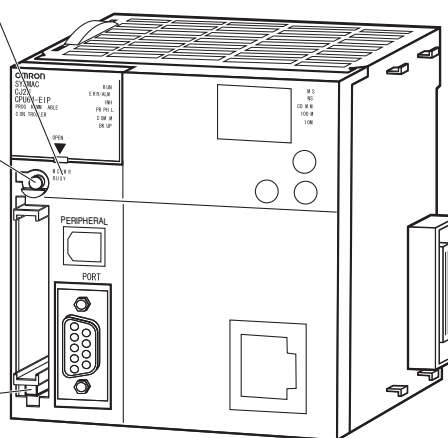
- MCPWR (green): Lit when power is being provided to the Memory Card.
- BUSY (orange): Flashes while the Memory Card is being accessed.

#### Simple Backup/Memory Card Power Supply Switch

This switch has the following two functions.

- Simple Backup  
To back up all CPU Unit data to the Memory Card, press this switch for 3 s when DIP switch pin 7 is set to ON.
- Turning OFF Power to the Memory Card  
Press this switch to turn OFF the power before removing the Memory Card.

#### Memory Card Eject Button



#### 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*.

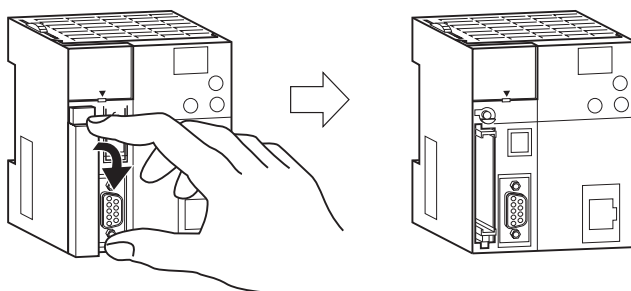
### 3-2-3 Installing and Removing

#### Before Using a Memory Card

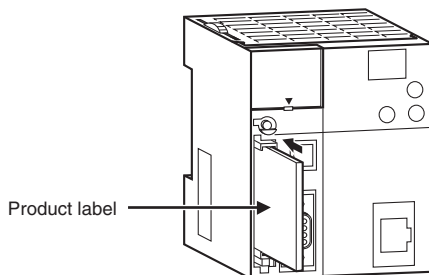
- Observe the following precautions while the Memory Card is being accessed. The Memory Card may become unusable if these precautions are not followed.
  - Never turn OFF the PLC while the CPU is accessing the Memory Card.
  - Never remove the Memory Card while the CPU is accessing the Memory Card. Press 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.

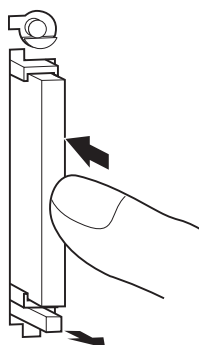


- 2 Insert the Memory Card with the label facing to the left. (Insert with the  $\Delta$  on the Memory Card label and the  $\Delta$  on the CPU Unit facing each other.)



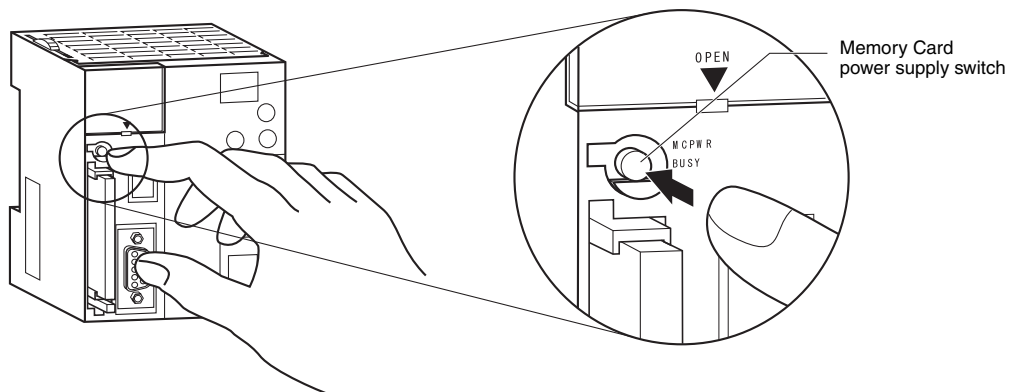
- 3 Push the Memory Card securely into the compartment.

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

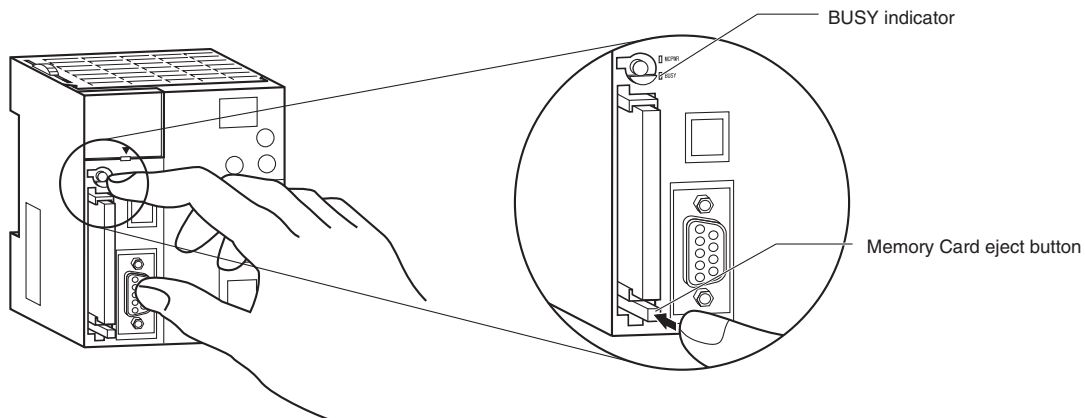


## Removing the Memory Card

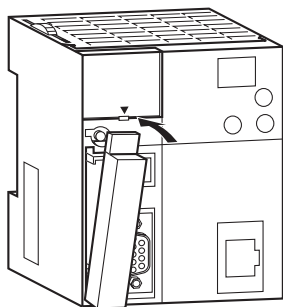
- 1 Press the Memory Card power supply switch.



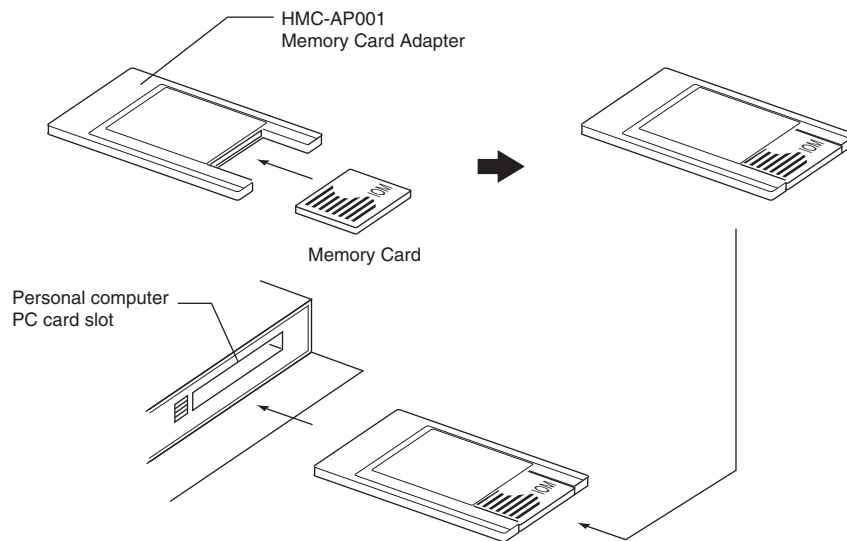
- 2 Press the Memory Card eject button after the BUSY indicator is no longer lit. The Memory Card will be ejected from the compartment.



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



## Installing the Memory Card into a Personal Computer



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

### 3-3-1 Models and Specifications

| Model      | Type of transistor outputs | Specifications  |
|------------|----------------------------|---|
| CJ2M-MD211 | Sinking outputs            | 1 MIL connector   |
| CJ2M-MD212 | Sourcing outputs           | <ul style="list-style-type: none"> <li>• 10 inputs (four interrupt/quick-response inputs or two high-speed counter inputs)</li> <li>• 6 outputs (two pulse outputs or two PWM outputs)</li> </ul> |

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

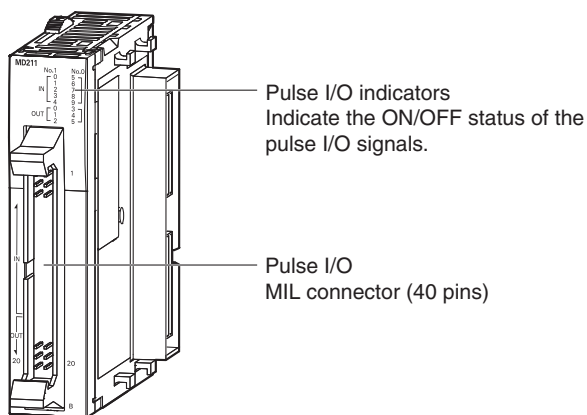
Purchase the following Connector, an OMRON Cable with Connectors for Connector-Terminal Block Conversion Units, or an OMRON Cable with Connectors for Servo Relay Units.

| 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.)

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

#### Part Names

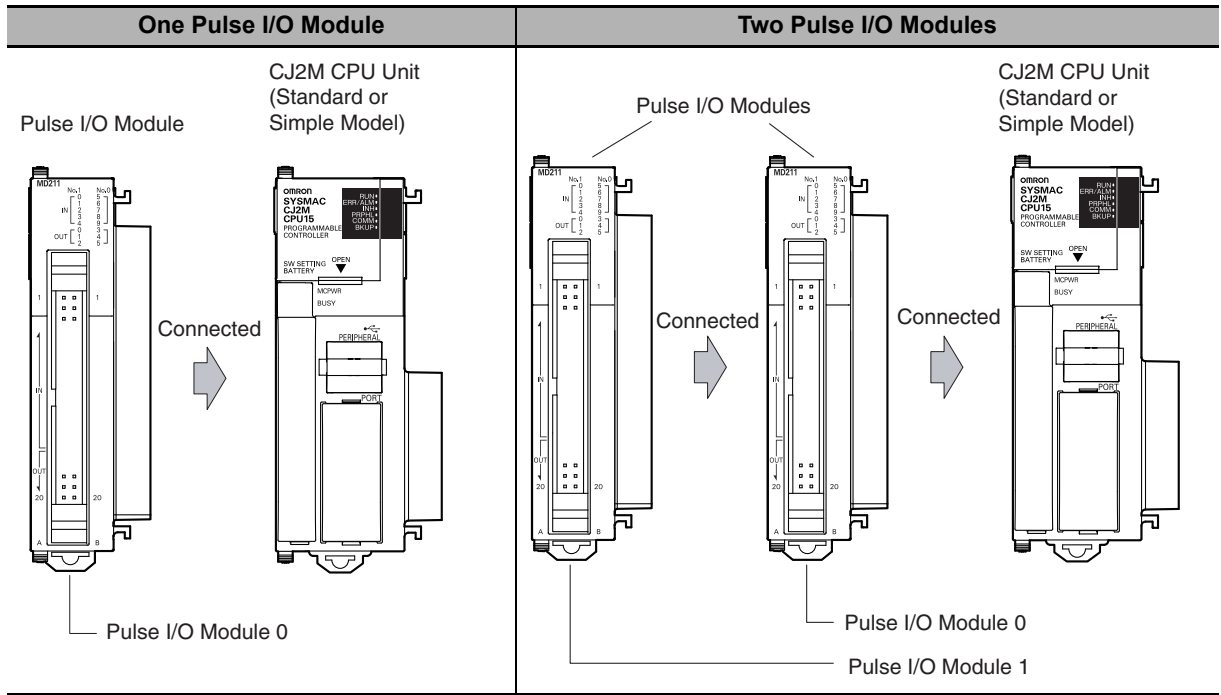


## Connecting Pulse I/O Modules to the CPU Unit

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.

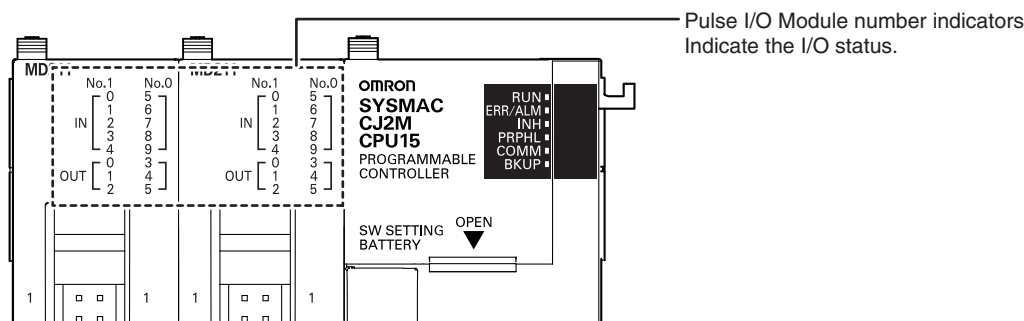


## Pulse I/O Module Detection

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.

○: Lit, ● :Not lit

| Indicator    | Color  | Status | Meaning   |
|--------------|--------|--------|---|
| No. 0        | Green  | ○      | This is the Pulse I/O Module that is connected directly to the CPU Unit. It is Pulse I/O Module number 0.   |
|              |        | ●      | Not connected.  |
| No. 1        | Green  | ○      | 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. |
|              |        | ●      | Not connected.  |
| IN0 to IN9   | Yellow | ○      | The allocated input is ON.  |
|              |        | ●      | The allocated input is OFF.   |
| OUT0 to OUT5 | Yellow | ○      | The allocated output is ON.   |
|              |        | ●      | The allocated output is OFF.  |



### Precautions for Correct Use

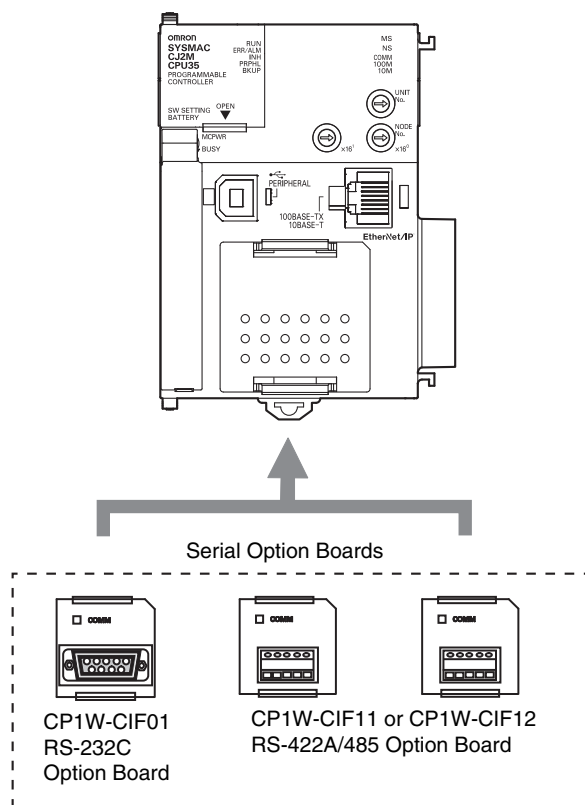
A maximum of two Pulse I/O Modules can be connected. Do not connect more than this. If three or more Pulse I/O Modules are connected, a too many I/O points error (fatal error) will occur. If this error occurs, turn OFF the power supply to the PLC and remove all but two Pulse I/O Modules.



# 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

### 3-5-1 Models and Specifications

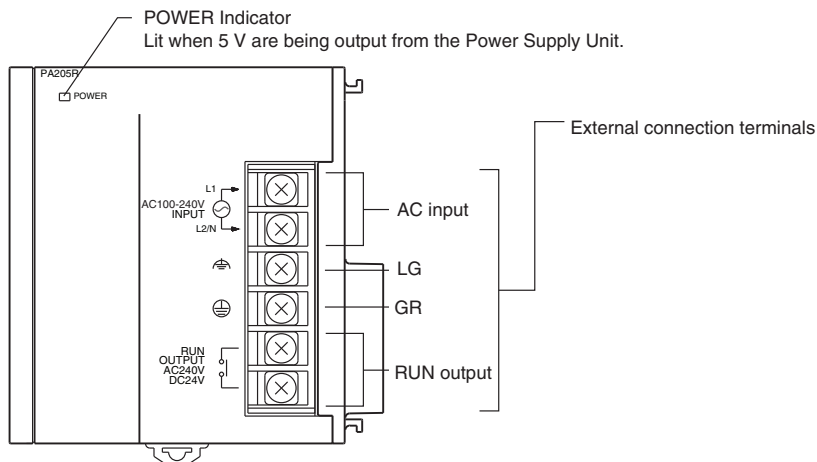
| Item                                   | Specifications   |   |  |  |   |
|--|--|---|--|--|---|
|  | CJ1W-PA205R  | CJ1W-PA205C   | CJ1W-PA202   | CJ1W-PD025   | CJ1W-PD022                                  |
| Power Supply Unit                      | CJ1W-PA205R  | CJ1W-PA205C   | CJ1W-PA202   | CJ1W-PD025   | 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:<br>15 A/8 ms max. for cold start at room temperature<br>At 200 to 240 VAC:<br>30 A/8 ms max. for cold start at room temperature                                     |   | At 100 to 120 VAC:<br>20 A/8 ms max. for cold start at room temperature<br>At 200 to 240 VAC:<br>40 A/8 ms max. for cold start at room temperature | At 24 VDC:<br>30 A/20 ms max. for cold start at room temperature |   |
| Output capacity*7                      | 5.0 A, 5 VDC (including supply to CPU Unit)  |   | 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) |
|  | 0.8 A, 24 VDC  |   | 0.4 A, 24 VDC  | 0.8 A, 24 VDC  | 0.4 A, 24 VDC                               |
|  | Total: 25 W max.   |   | Total: 14 W max.   | Total: 25 W max.   | Total: 19.6 W max.                          |
| Output terminal (service supply)       | Not provided   |   |  |  |   |
| RUN output*2                           | Contact configuration: SPST-NO<br>Switch capacity:<br>250 VAC, 2 A (resistive load)<br>120 VAC, 0.5 A (inductive load),<br>24 VDC, 2A (resistive load)<br>24 VDC, 2 A (inductive load) | Not provided.   | Not provided.  | Not provided.  | Not provided.                               |
| Replacement notification function      | Not provided.  | With Alarm output (open collector output)<br>30 VDC max.,<br>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 style="list-style-type: none"> <li>• 20 MΩ min. (at 500 VDC) between all external terminals and GR terminal*3, and between all alarm output terminals.</li> <li>• 20 MΩ min. (at 250 VDC) between all alarm output terminals and GR terminal*3.</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<br>Leakage current: 10 mA max.  | <ul style="list-style-type: none"> <li>• 2,300 VAC, 50/60 Hz for 1 min between all external terminals and GR terminal*3 and between all alarm output terminals with a leakage current of 10 mA max.</li> <li>• 1,000 VAC, 50/60 Hz for 1 min between all alarm output terminals and GR terminal*3 with a leakage current of 10 mA max.</li> </ul> | 2,300 VAC 50/60 Hz for 1 min between AC external and GR terminals*3<br>Leakage current: 10 mA max. | 1,000 VAC 50/60 Hz for 1 min between DC external and GR terminals*3<br>Leakage current: 10 mA max. | ---*6 |
| Noise immunity                | 2 kV on power supply line (Conforms to IEC61000-4-4.)   |   |  |  |       |
| Vibration resistance          | 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)   |   |  |  |       |
| Ambient operating temperature | 0 to 55°C   |   |  |  |       |
| Ambient operating humidity    | 10% to 90% (with no condensation)   | 10% to 90% (with no condensation)*5   | 10% to 90% (with no condensation)  |  |       |
| Atmosphere                    | Must be free from corrosive gases.  |   |  |  |       |
| Ambient storage temperature   | -20 to 75°C (excluding battery)   | -20 to 75°C*5   | -20 to 75°C (excluding battery)  |  |       |

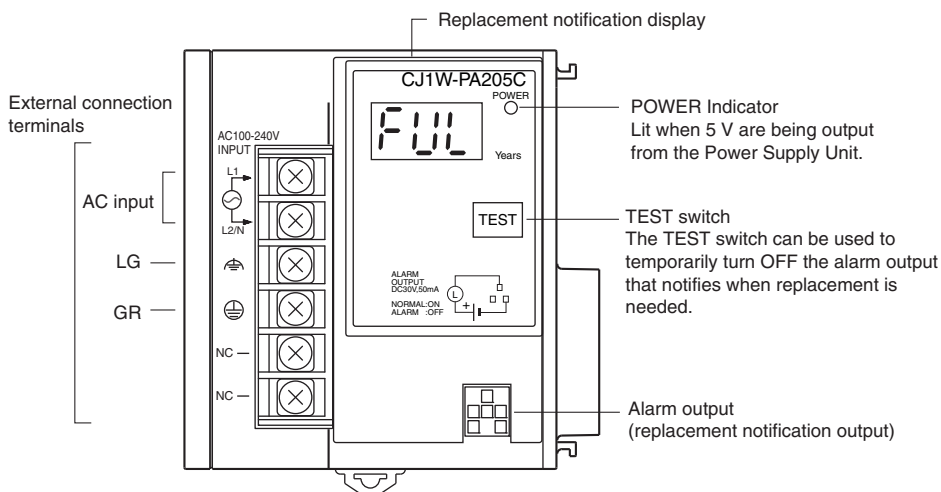
- \*1 The AC and DC values above are given for a cold start, and the AC values are at room temperature. The AC inrush control circuit uses a thermistor element with a low-temperature current control characteristic. If the ambient temperature is high or the PLC is hot-started, the thermistor will not 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.
- \*4 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.
- \*5 Maintain an ambient storage temperature of  $-25$  to  $30^{\circ}\text{C}$  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.
- \*7 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

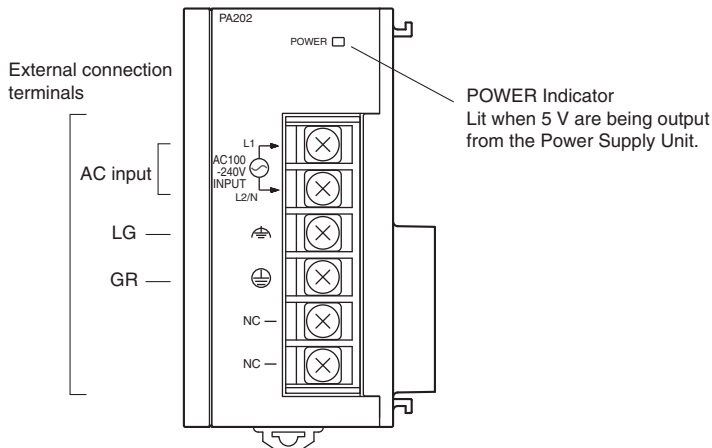
● Example: CJ1W-PA205R



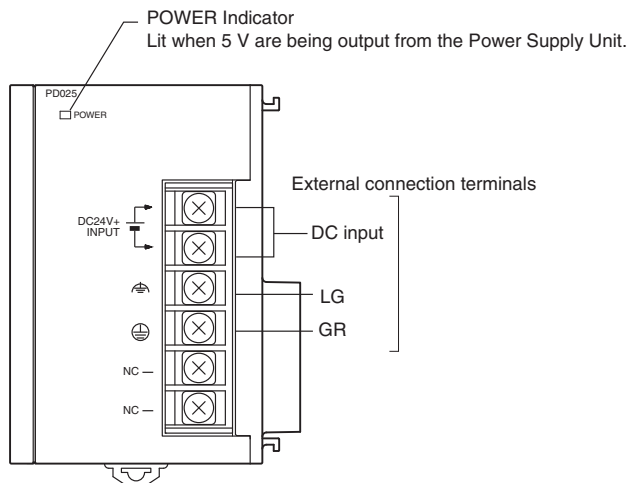
● Example: CJ1W-PA205C



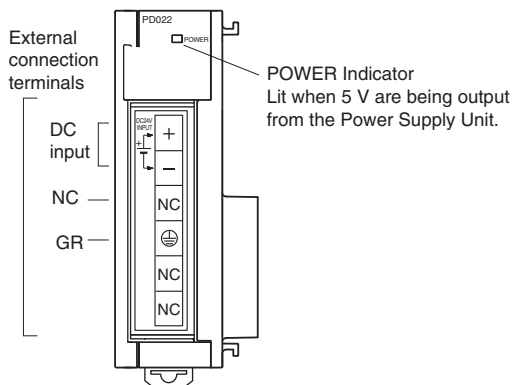
● Example: CJ1W-PA202



● **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 Ω or less to increase noise resistance and avoid electric shock.

## GR

Ground to a resistance of 100 Ω 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.

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

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.

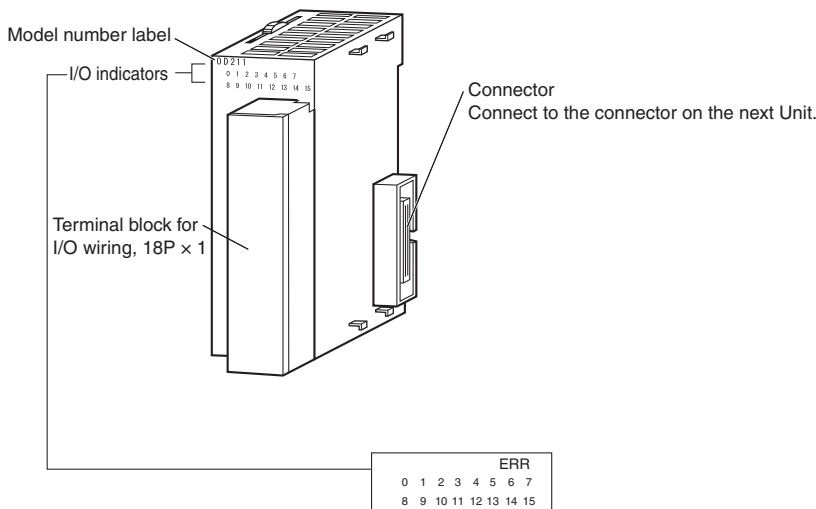


# 3-6 CJ-series Basic I/O Units

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

### Part Names and Functions

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

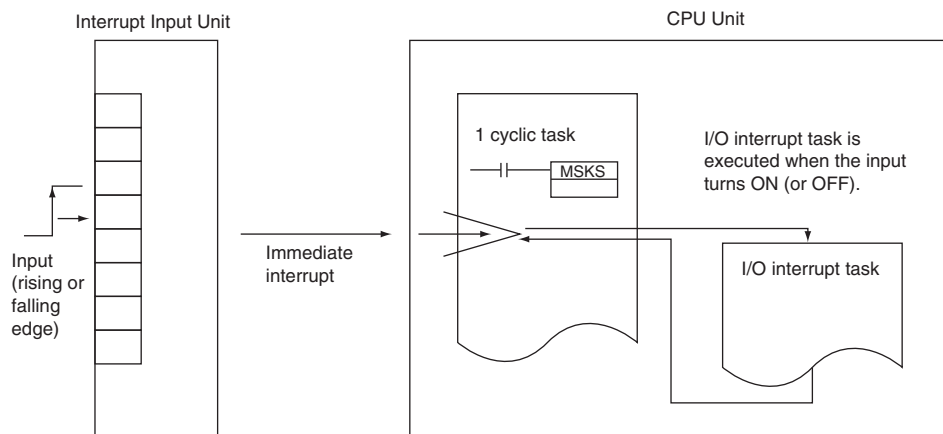


**Note** The CJ1W-OD202, CJ1W-OD204, and CJ1W-OD212 also have an ERR indicator for the load short-circuit alarm.

### 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.

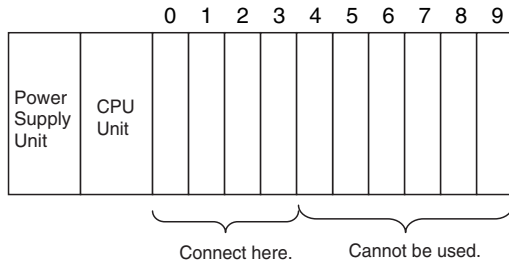


● **Application Precautions**

- 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



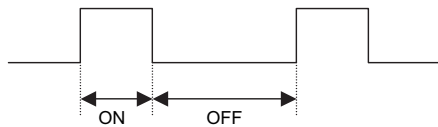
- The Interrupt Input Units must be connected in the slot ranges specified above even when the I/O tables are edited using the CX-Programmer. If the Interrupt Input Units are not connected in the correct positions, an error will occur when the I/O tables are generated from the CX-Programmer. A401.10 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.



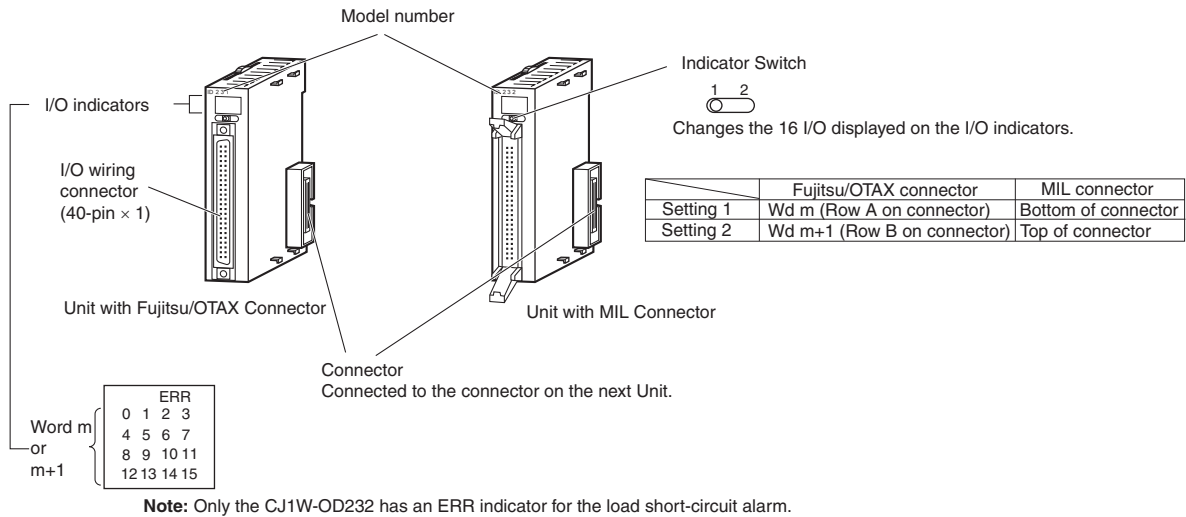
| Unit       | ON time      | OFF time    |
|------------|--------------|-------------|
| CJ1W-INT01 | 0.05 ms min. | 0.5 ms min. |

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

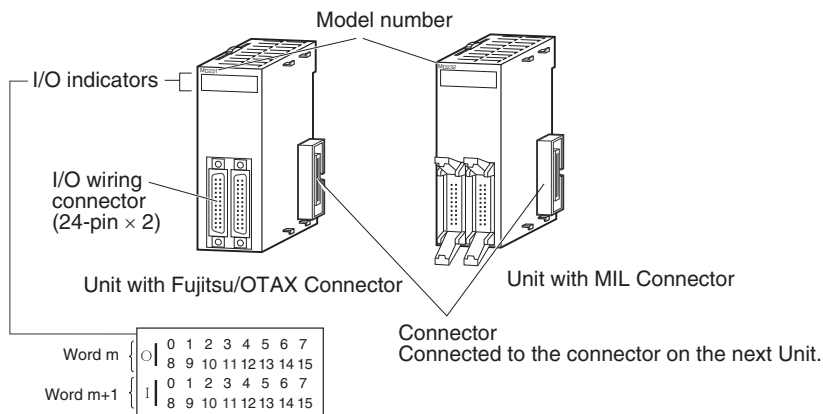
Units are available with either Fujitsu/OTAX connectors (CJ1W-□D□□1) or MIL connectors (CJ1W-□D□□2/3/4).

#### Part Names

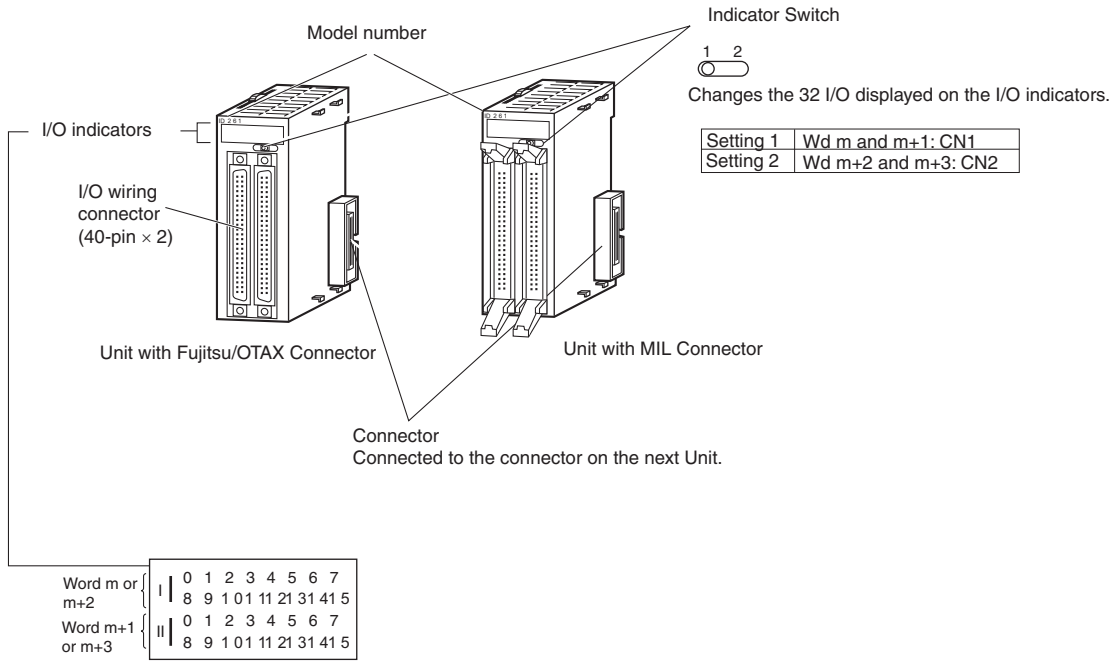
##### ● Thirty-two-point Units (Models with 40-point Fujitsu/OTAX Connector or MIL Connector)



##### ● Thirty-two-point Units (Models with 2 × 24-pin Fujitsu/OTAX Connectors or 2 × 20-pin MIL Connectors)



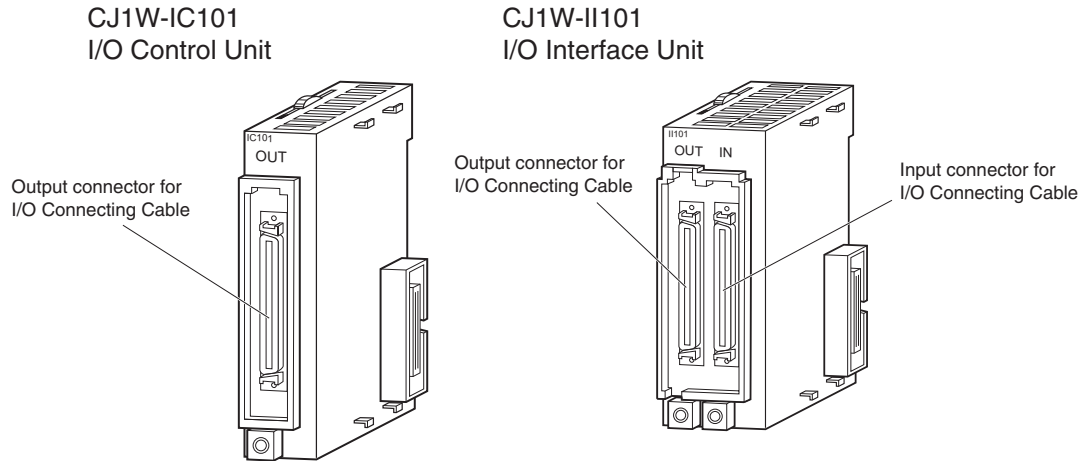
● **Sixty-four-point Units**  
**(Models with 2 × 40-point Fujitsu/OTAX Connectors or MIL Connector)**



# 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.

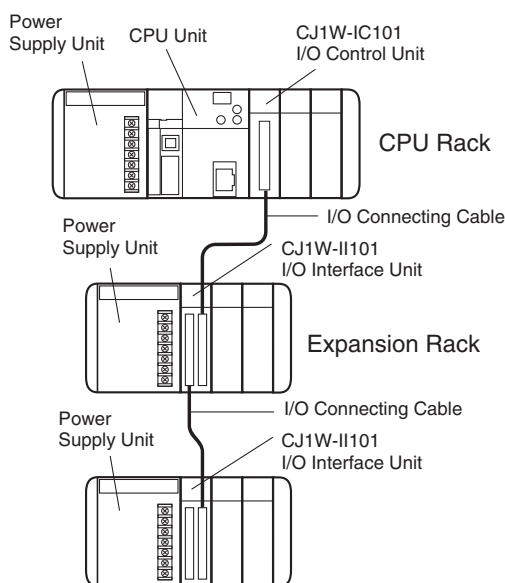
## 3-7-1 Component Names



### 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.

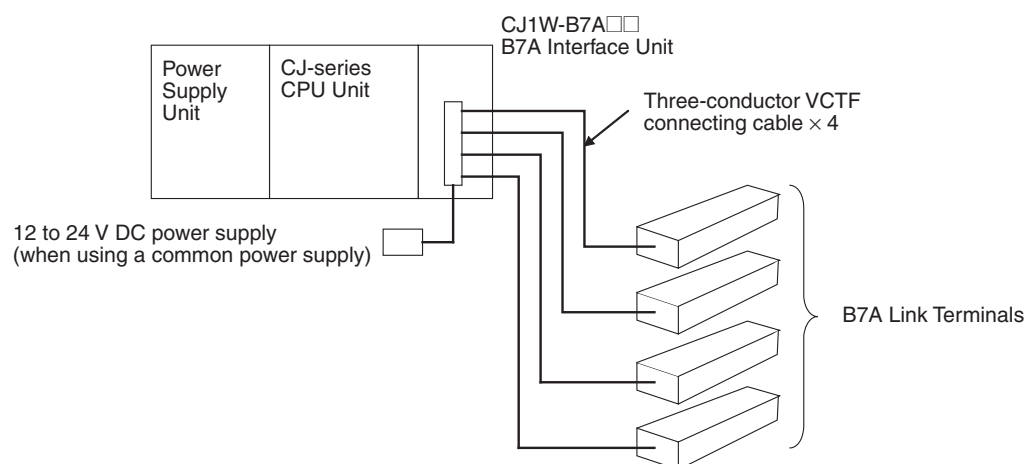
## 3-8 B7A Interface Unit

### 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<br>(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<br>(four B7A ports) | 2 input words and<br>2 output words | Inputs: Two 16-point Input Terminals or one 32-point Input Terminal<br>Outputs: Two 16-point Output Terminals or one 32-point Output Terminal<br>or<br>Two Mixed I/O Terminals<br>(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.

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

### 3-8-5 Common Specifications

| 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<br>(Switchable by using the setting switch on the front panel. Settings are read when power is turned ON or Unit is restarted.)<br>Factory setting: Standard (19.2 ms typical)<br><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<br>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.

| Port | Input/output |            |            | Allocated word (n: First word allocated to Unit) |
|------|--------------|------------|------------|--|
|      | CJ1W-B7A14   | CJ1W-B7A04 | CJ1W-B7A22 |  |
| 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   |

### 3-8-7 Transmission Error Processing

#### 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 occurred | LED error indicators |            |            |
|---------------------------|----------------------|------------|------------|
|                           | 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 occurred | Transmission Error Flag |            |            |
|---------------------------|-------------------------|------------|------------|
|                           | 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 occurred | Transmission Error Flag |            |            |
|---------------------------|-------------------------|------------|------------|
|                           | CJ1W-B7A14              | CJ1W-B7A04 | CJ1W-B7A22 |
| Port 1                    | A05008                  | ---        | ---        |
| Port 2                    | A05009                  | ---        | ---        |
| Port 3                    | A05010                  | ---        | A05008     |
| Port 4                    | A05011                  | ---        | A05009     |

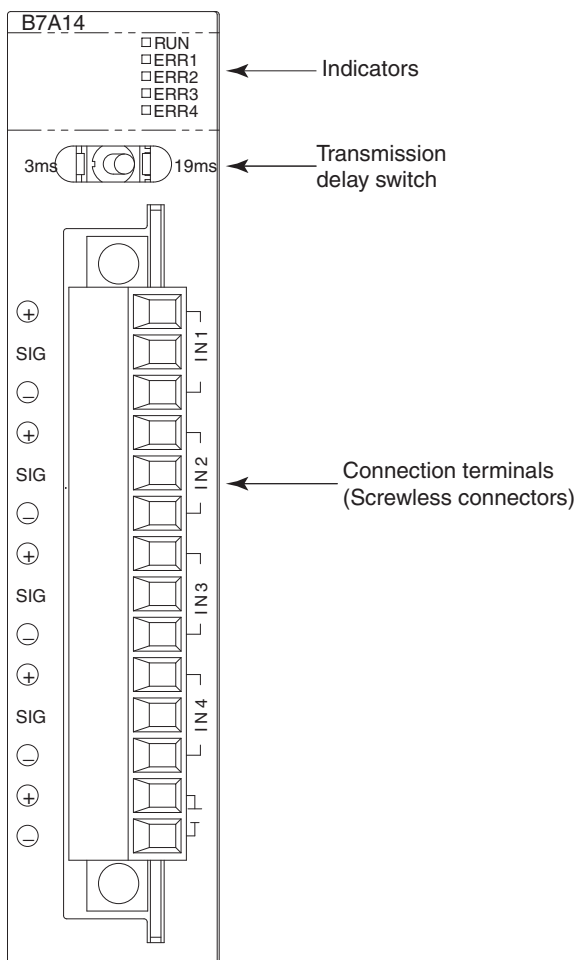
### ● Transmission Error Input Status Processing

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.

### 3-8-8 Parts and Names



## Indicators

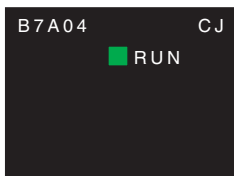
### ● CJ1W-B7A14



| Display | Name                      | Color | Status | Condition  |
|---------|---------------------------|-------|--------|--|
| RUN     | B7A operating status      | Green | ON     | The B7A Unit is operating.                                   |
|         |                           |       | OFF    | The B7A Unit is stopped.                                     |
| ERR1    | Port 1 transmission error | Red   | ON     | A transmission error has occurred at port 1 of the B7A Unit. |
|         |                           |       | OFF    | The Unit is operating normally.                              |
| ERR2    | Port 2 transmission 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 transmission error | Red   | ON     | A transmission error has occurred at port 3 of the B7A Unit. |
|         |                           |       | OFF    | The Unit is operating normally.                              |
| ERR4    | Port 4 transmission 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 operating status | Green | ON     | The B7A Unit is operating. |
|         |                      |       | OFF    | The B7A Unit is stopped.   |

● CJ1W-B7A22



| Display | Name                      | Color | Status | Condition  |
|---------|---------------------------|-------|--------|--|
| RUN     | B7A operating status      | Green | ON     | The B7A Unit is operating.                                   |
|         |                           |       | OFF    | The B7A Unit is stopped.                                     |
| ERR1    | Port 3 transmission error | Red   | ON     | A transmission error has occurred at port 3 of the B7A Unit. |
|         |                           |       | OFF    | The Unit is operating normally.                              |
| ERR2    | Port 4 transmission 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.<br>Right: Standard (19.2 ms typical)<br>Left: High-speed (3 ms typical) | Standard        |

**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 Arrangement

| Terminal | Name                    | Function  | Word | Appearance |
|----------|-------------------------|---|------|------------|
| ①        | Port 1 power supply: V1 | Connect to the + terminal of the B7A Link Terminal to be connected to port 1 (only when using a common power supply). | n    |            |
| ②        | Port 1 signal: SIG1     | Connect to the SIG terminal of the B7A Link Terminal to be connected to port 1.                                       |      |            |
| ③        | Port 1 ground: G1       | Connect to the – terminal of the B7A Link Terminal to be connected to port 1.   |      |            |
| ④        | Port 2 power supply: V2 | Connect to the + terminal of the B7A Link Terminal to be connected to port 2 (only when using a common power supply). | n+1  |            |
| ⑤        | Port 2 signal: SIG2     | Connect to the SIG terminal of the B7A Link Terminal to be connected to port 2.                                       |      |            |
| ⑥        | Port 2 ground: G2       | Connect to the – terminal of the B7A Link Terminal to be connected to port 2.   |      |            |
| ⑦        | Port 3 power supply: V3 | Connect to the + terminal of the B7A Link Terminal to be connected to port 3 (only when using a common power supply). | n+2  |            |
| 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 Terminal to be connected to port 4 (only when using a common power supply). | n+3  |            |
| ⑪        | Port 4 signal: SIG4     | Connect to the SIG terminal of the B7A Link Terminal to be connected to port 4.                                       |      |            |
| ⑫        | Port 4 ground: G4       | Connect to the – terminal of the B7A Link Terminal to be connected to port 4.   |      |            |
| ⑬        | + power supply: V       | Connect to the + terminal of the external power supply.   | ---  |            |
| ⑭        | – power supply: G       | Connect to the – terminal of the external power supply.   |      |            |

**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.

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

Use the following procedure to prepare and connect the cables.

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

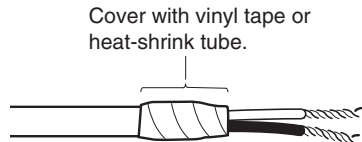
#### 1) Preparing the Covering

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.

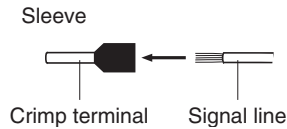


**2) Preparing Cable Signal Lines**

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 AI0.75-8GY<br>(Product code: 3200519) | PHOENIX CONTACT            |
| H0.75/14<br>(Product code: 046290)              | Nihon Weidmuller Co., Ltd. |
| 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)<br>or ZA3 Series | PHOENIX CONTACT            |
| Crimper PZ1.5<br>(Product code: 900599)      | Nihon Weidmuller Co., Ltd. |
| NH77   | NICHIFU Co., Ltd.          |

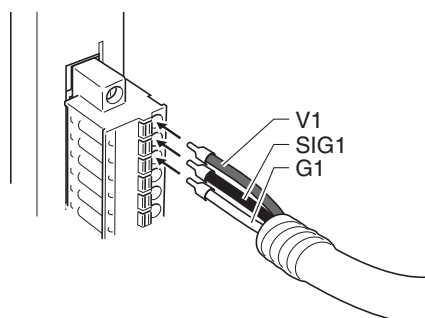
**2 Insulate the stripped end of each signal line with vinyl tape or heat-shrink tubing.**

**3) Connecting Cables**

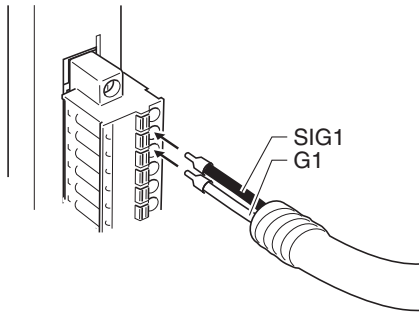
Use the following procedure to connect cables to the connection terminals.

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.

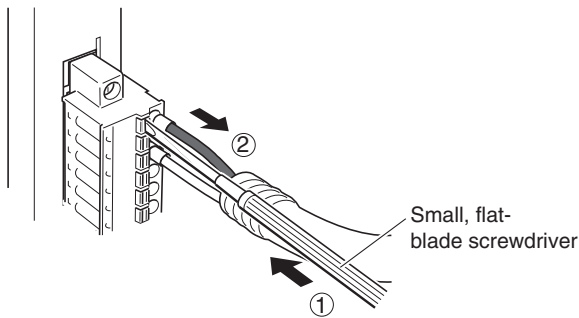
- Power Supply on One Side (Common Power Supply)



- 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.



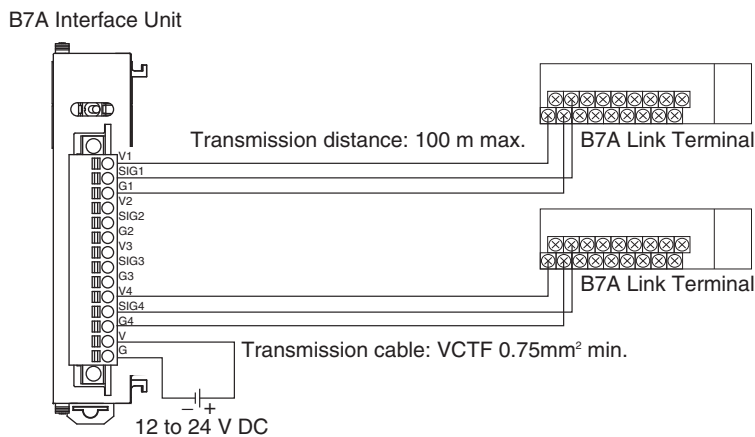
**Note** To remove the connector from the Unit, fully unscrew the set screws from both sides of the connector, and then remove the connector. Forcibly pulling the connector while the set screws are still attached may damage the connector.

### 3-8-10 Connection Diagrams

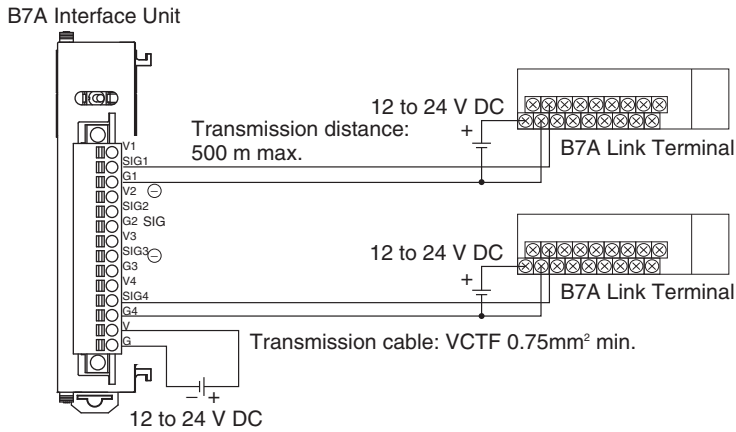
- Note 1** Confirm that terminals are connected correctly. If connections are incorrect, the internal components of the B7A Interface Unit and B7A Link Terminal may be damaged.
- 2 Route the signal lines in separate ducts both inside and outside the control panel to isolate them from power lines.
  - 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 cables.
  - 5 Always lay communications cables within ducts.

## Standard Mode

- Power Supply on One Side (Common Power Supply)



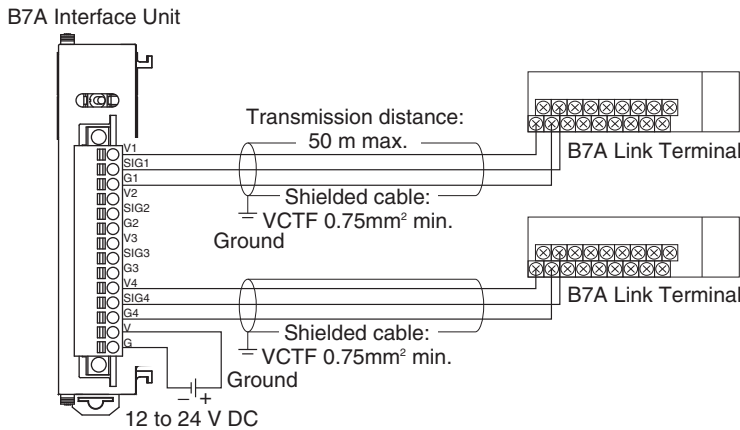
● Power Supply on Both Sides (Separate Power Supplies)



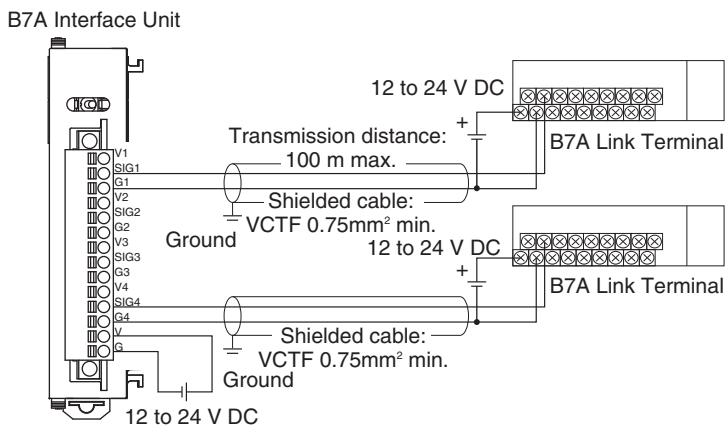
## High-speed Mode

**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)







# 4

## 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

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|            |   |            |
|------------|---|------------|
| <b>4-1</b> | <b>Support Software</b> .....                                     | <b>4-2</b> |
| 4-1-1      | CX-One FA Integrated Tool Package .....                           | 4-2        |
| <b>4-2</b> | <b>Connection Methods</b> .....                                   | <b>4-5</b> |
| 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        |

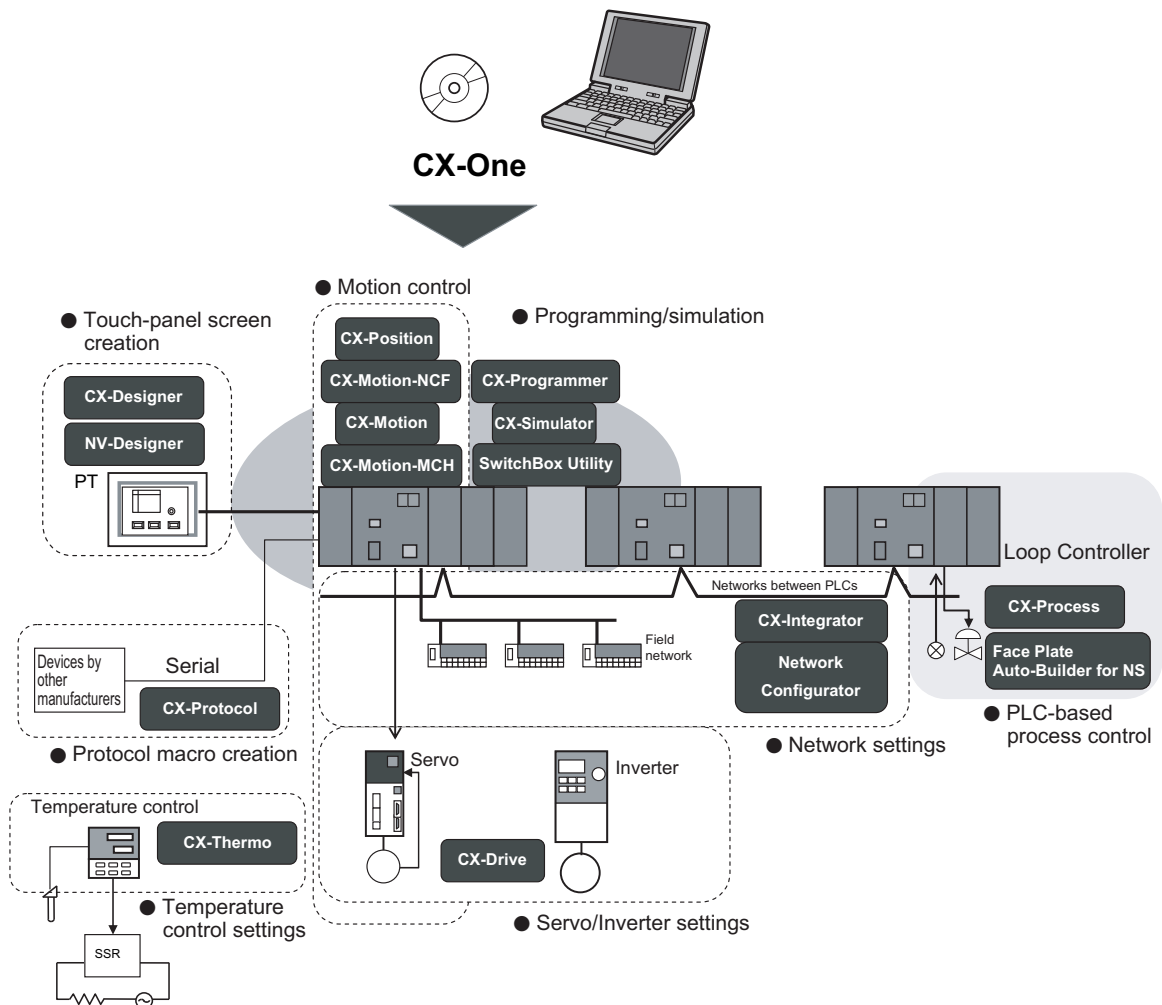
# 4-1 Support Software

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

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

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.

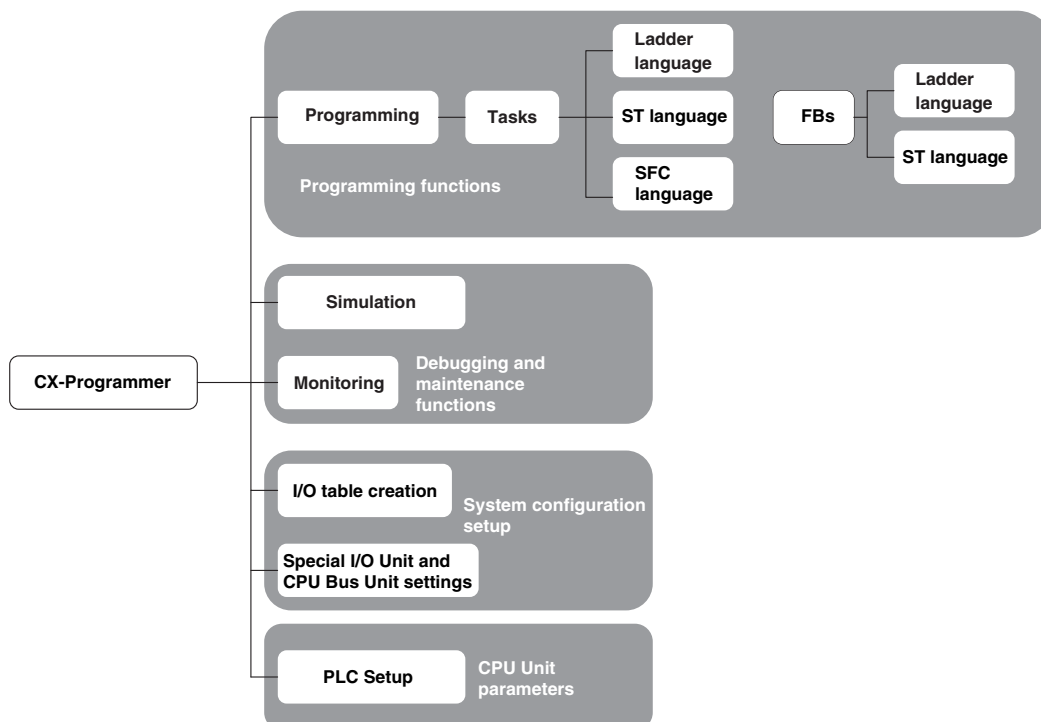
### CX-One Integrated Tool Package Contents



| Application                  | CX-One Software                | Description   |
|------------------------------|--------------------------------|---|
| Programming                  | CX-Programmer                  | Basic software for creating and debugging PLC programs.   |
|                              | 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. |
|                              | 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 creation  | CX-Designer                    | Software for creating screen data for touch panel NS-series PTs.  |
|                              | 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.  |
| Motion Control               | 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).  |
|                              | 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.   |

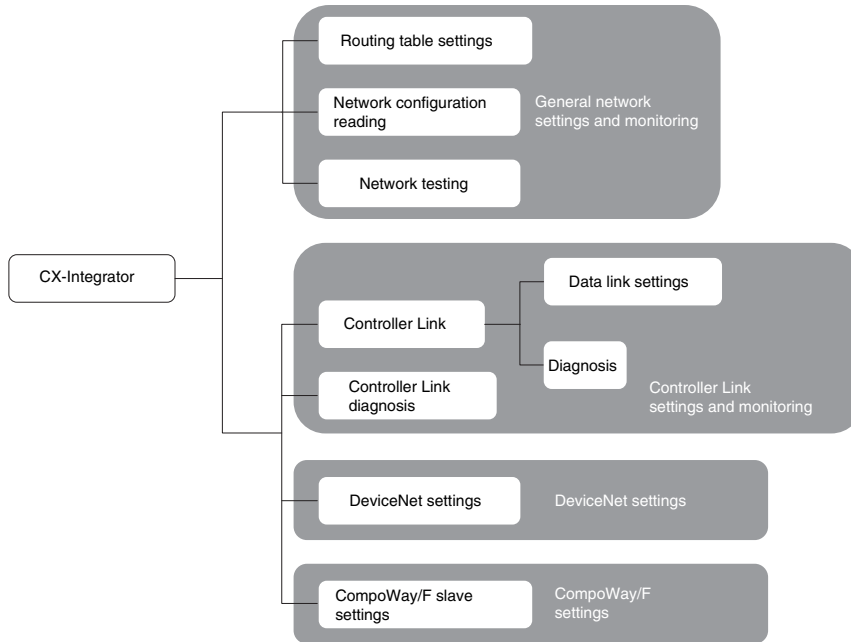
## CX-Programmer

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



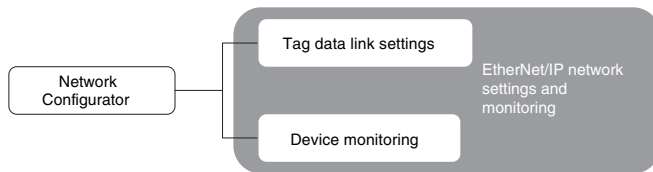
## CX-Integrator

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

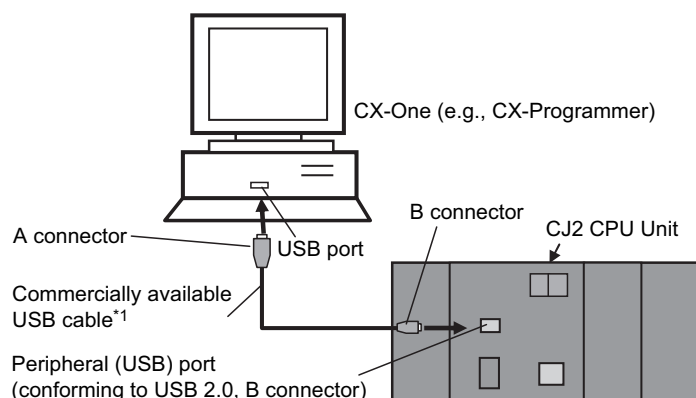
A CJ2 CPU Unit can be directly connected to a personal computer running the CX-One Support Software (e.g., CX-Programmer) by using a USB cable or RS-232C cable. (The CP1W-CIF01 is required to use a RS-232C cable with the CJ2M-CPU3□.) Also, an Ethernet twisted-pair cable can be used for the CJ2H-CPU6□-EIP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

Refer to the *SYSMAC CX-Programmer Ver.9.□ Operation Manual* (Cat. No. W446) for information on the connection methods that are not described here.

### 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.



\*1 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:

- For 32-bit Windows  
C:\Program Files\OMRON\CX-Server\USB
- For 64-bit Windows  
C:\Program Files(x86)\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.

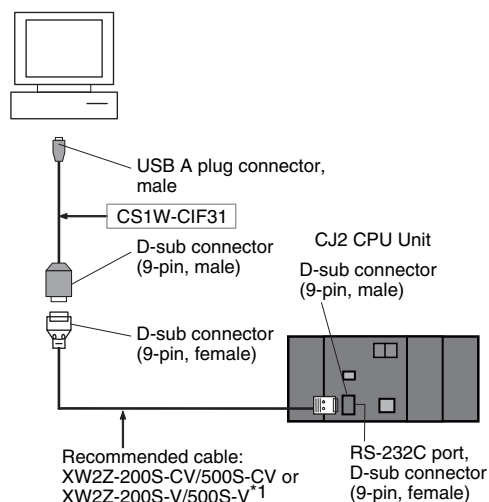
- Only one CJ2 CPU Unit can be connected by USB to a single personal computer. It is not possible to connect multiple CJ2 CPU Units simultaneously.
- Do not remove the USB cable while connected online. The application must be offline before the cable is removed. If the cable is removed while connected 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.



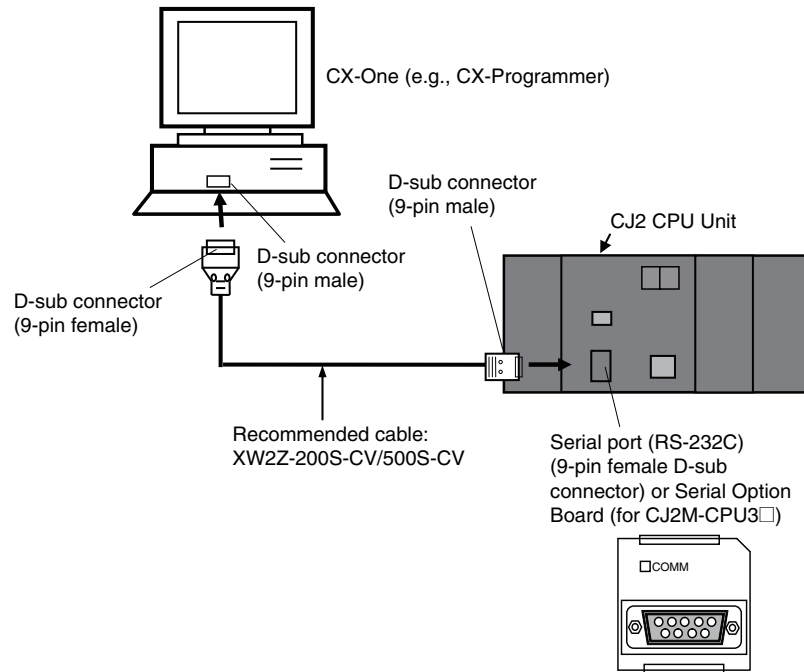
\*1 Only a Host Link connection is possible.

## 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.

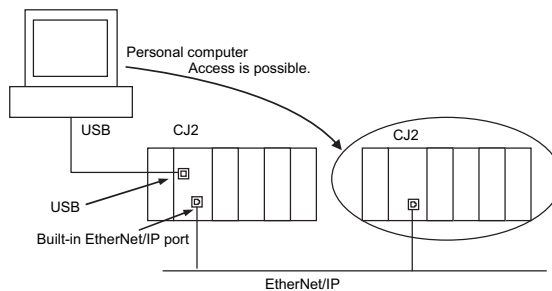
The network type must be set to the Toolbus. A Host Link connection cannot be used.



### 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 (RS-232C)<br>(D-sub, 9-pin, female) | D-sub, 9-pin, male | Serial communications              | XW2Z-200S-CV | 2 m    | Use a static-resistant connector. |
|   |                    |                                    | XW2Z-500S-CV | 5 m    |                                   |



### 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*.

Examples of applicable connectors

| Name | Model                     | Specifications  |                     |
|------|---------------------------|---|---------------------|
| 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

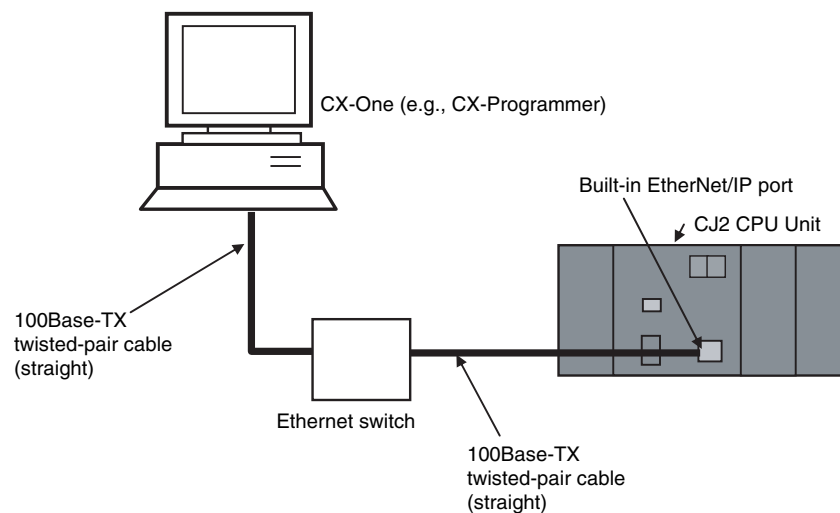
The method for connecting the PLC to the personal computer is set using the CX-Programmer. For details on using the CX-Programmer to set the connection method, refer to the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).



## 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 (communications mode) | Model  | Length   | Remarks |
|---------------------------|------------------|------------------------------------|--|--|---------|
| Built-in EtherNet/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 | ---  |         |

\*1 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                               |
|--------------------|-----------------------------------|----------------------------------|--|
| Ethernet switch    | OMRON                             | W4S1-03B<br>W4S1-05B<br>W4S1-05C | ---                                    |
|                    | Cisco Systems, Inc.               | Consult the manufacturer.        | Cisco Systems, Inc. Main Corporate HQ  |
|                    | 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) |
| Twisted-pair cable | <b>100Base-TX</b>                 |                                  |  |
|                    | Fujikura                          | F-LINK-E 0.5mm × 4P              | Fujikura America, Inc.                 |
|                    | EtherNet/IP compliant cable       |                                  | ---                                    |

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

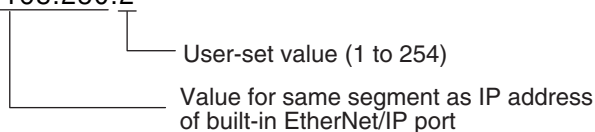
\*3 Always use an Ethernet switch when using tag data links in the network. If a repeater hub is used for EtherNet/IP tag data links (cyclic communications), the network's communications load will increase, data collisions will occur frequently, and stable communications will be impossible.

## 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.

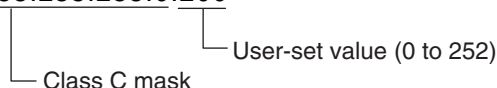
- **IP Addresses**

Example: 192.168.250.2



- **Subnet Mask**

Example: 255.255.255.0.200



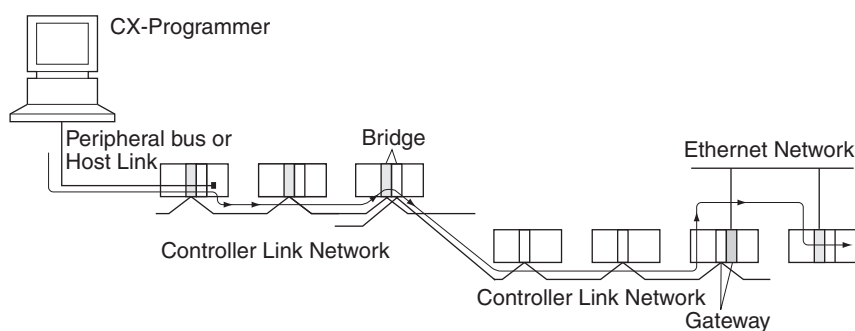
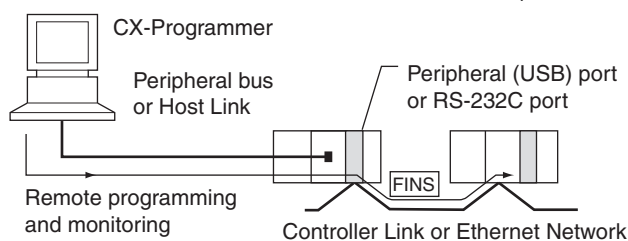
## CX-Programmer Settings

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.



# 5

## Installation

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

|            |  |             |
|------------|--|-------------|
| <b>5-1</b> | <b>Fail-safe Circuits</b>  | <b>5-2</b>  |
| <b>5-2</b> | <b>Installation</b>  | <b>5-4</b>  |
| 5-2-1      | Installation and Wiring Precautions  | 5-4         |
| 5-2-2      | Installation in a Control Panel  | 5-6         |
| 5-2-3      | Assembled Appearance and Dimensions  | 5-8         |
| 5-2-4      | Connecting PLC Components  | 5-13        |
| 5-2-5      | DIN Track Installation   | 5-15        |
| 5-2-6      | Connecting CJ-series Expansion Racks   | 5-17        |
| <b>5-3</b> | <b>Wiring</b>  | <b>5-20</b> |
| 5-3-1      | Power Supply Wiring  | 5-20        |
| 5-3-2      | Wiring CJ-series Basic I/O Units with Terminal Blocks                          | 5-27        |
| 5-3-3      | Wiring Basic I/O Units with Connectors   | 5-29        |
| 5-3-4      | Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals | 5-33        |
| 5-3-5      | Connecting Pulse I/O Modules to External I/O Devices (CJ2M CPU Unit Only)      | 5-33        |
| 5-3-6      | Connecting I/O Devices   | 5-35        |
| 5-3-7      | Connecting through an Ethernet Cable (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)      | 5-39        |
| <b>5-4</b> | <b>Control Panel Installation</b>  | <b>5-42</b> |
| 5-4-1      | Temperature  | 5-42        |
| 5-4-2      | Humidity   | 5-44        |
| 5-4-3      | Vibration and Shock  | 5-44        |
| 5-4-4      | Atmosphere   | 5-44        |
| 5-4-5      | Electrical Environment   | 5-45        |
| 5-4-6      | Grounding  | 5-50        |

## 5-1 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.

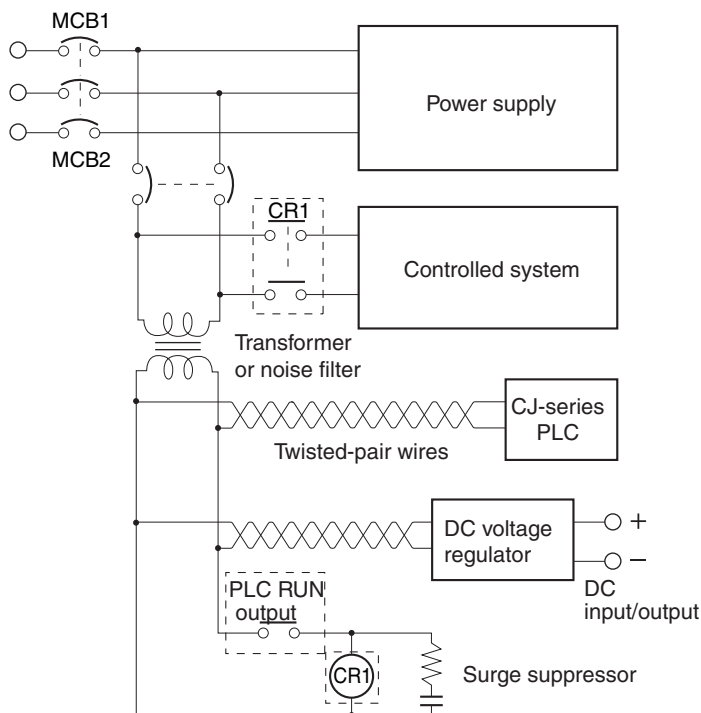
## Emergency Stop Circuit

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.

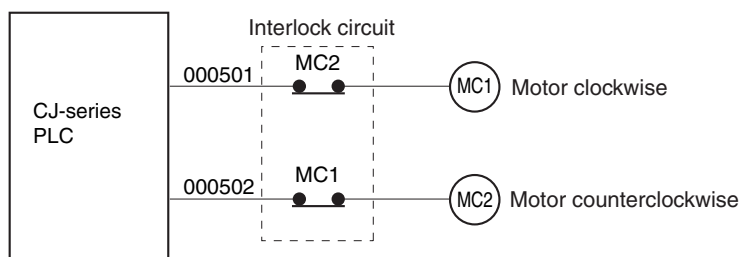
\*1 A RUN output is provided only on the CJ1W-PA205R Power Supply Unit. When a Power Supply Unit without a RUN output is used, program the Always ON Flag (A1) as the execution condition for an output point from an Output Unit.

### ● 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

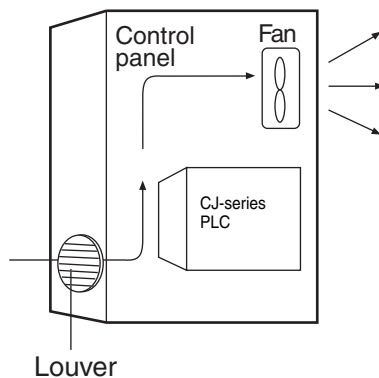
#### Installation in Cabinets or Control Panels

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.

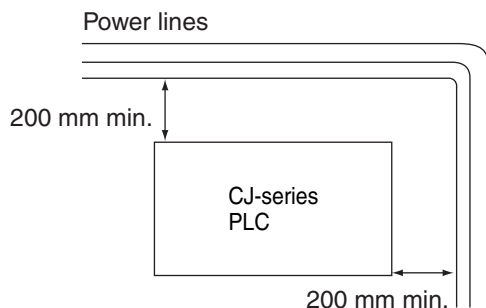


##### ● Accessibility for Operation and Maintenance

- 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.

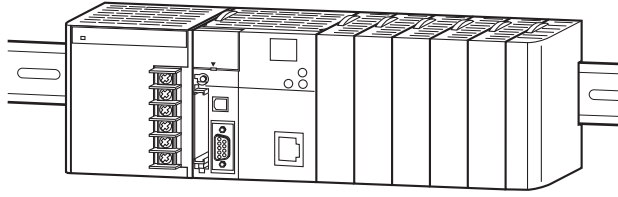


- Ground the mounting plate between the PLC and the mounting surface.
- When I/O Connecting Cables are 10 m or longer, connect the control panels in which Racks are mounted with heavier power wires (3 wires at least 2 mm<sup>2</sup> in cross-sectional area).

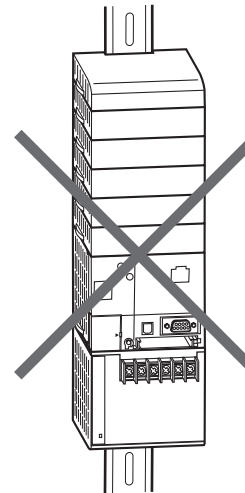
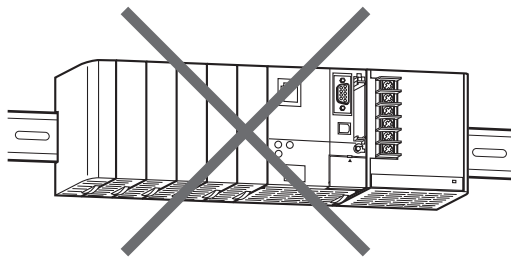
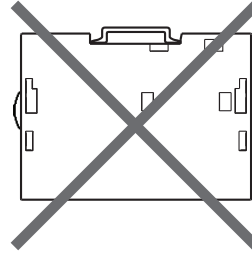
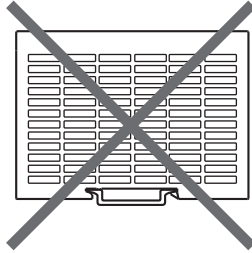


### ● PLC Orientation

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



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



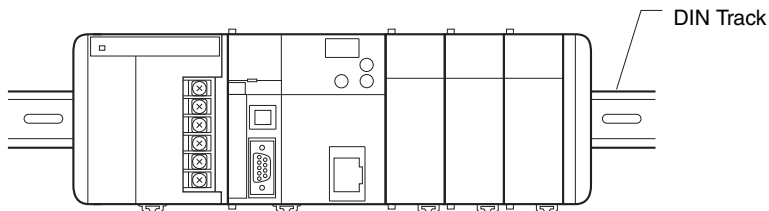
### Precautions for Safe Use

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.

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

### 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.



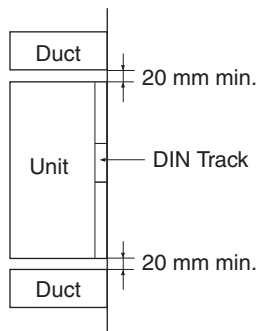
- Consider the width of wiring ducts, wiring, ventilation, and Unit replacement when determining the space between Racks. When you install Racks vertically, allow at least 66 mm between any two adjacent Racks.



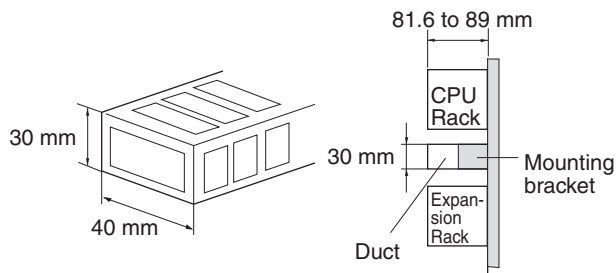
#### Additional Information

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



### Precautions for Correct Use

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

#### Terminal Screws

M4: 1.2 N·m

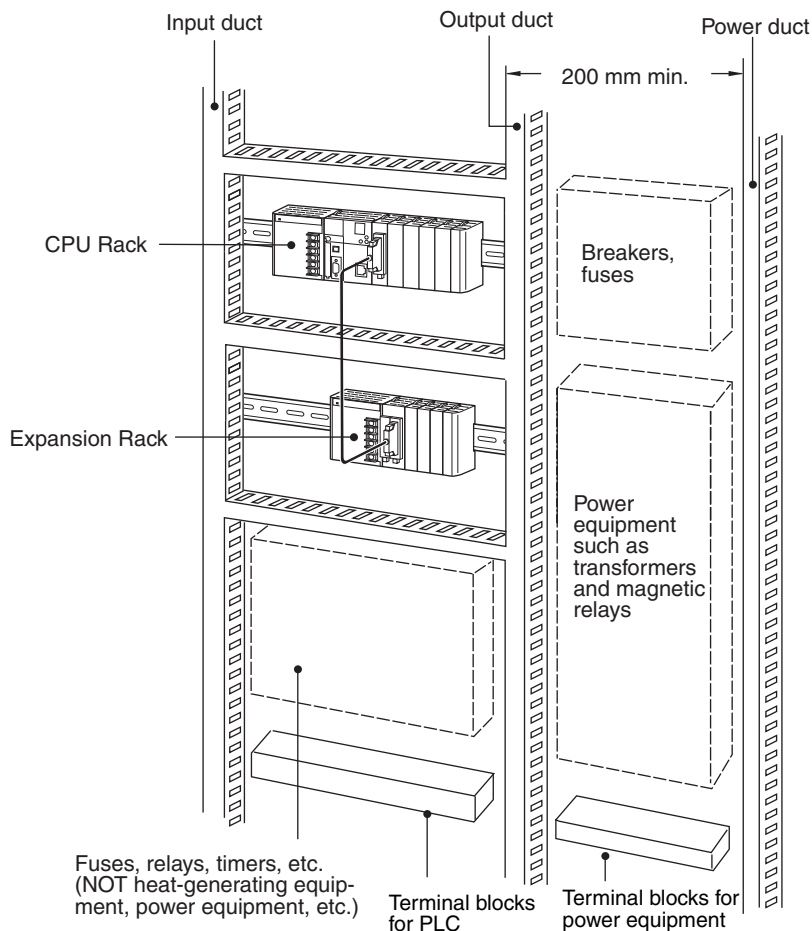
M3: 0.5 N·m

#### Cable Connector Screws

M2.6: 0.2 N·m

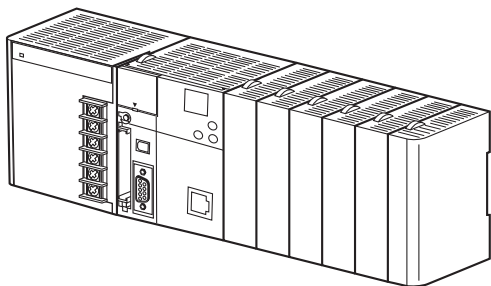
## ● Routing Wiring Ducts

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.



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

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<br>Program capacity: 400 Ksteps | 79.8 mm    |
|          | CJ2H-CPU67-EIP | I/O points: 2,560<br>Program capacity: 250 Ksteps |            |
|          | CJ2H-CPU66-EIP | I/O points: 2,560<br>Program capacity: 150 Ksteps |            |
|          | CJ2H-CPU65-EIP | I/O points: 2,560<br>Program capacity: 100 Ksteps |            |
|          | CJ2H-CPU64-EIP | I/O points: 2,560<br>Program capacity: 50 Ksteps  |            |
| CPU Unit | CJ2H-CPU68     | I/O points: 2,560<br>Program capacity: 400 Ksteps | 48.8 mm    |
|          | CJ2H-CPU67     | I/O points: 2,560<br>Program capacity: 250 Ksteps |            |
|          | CJ2H-CPU66     | I/O points: 2,560<br>Program capacity: 150 Ksteps |            |
|          | CJ2H-CPU65     | I/O points: 2,560<br>Program capacity: 100 Ksteps |            |
|          | CJ2H-CPU64     | I/O points: 2,560<br>Program capacity: 50 Ksteps  |            |

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

\* 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<br>CJ1W-ID211/212<br>CJ1W-IA111/201<br>CJ1W-OD20□<br>CJ1W-OD211/212/213<br>CJ1W-OC201/211<br>CJ1W-OA201 |            |
| 32-point Basic I/O Units                               | CJ1W-MD231/232/233   |            |
| 64-point Basic I/O Units                               | CJ1W-ID261<br>CJ1W-OD261<br>CJ1W-MD261   |            |
|  | CJ1W-ID262<br>CJ1W-OD262/263<br>CJ1W-MD263/563   |            |
| Interrupt Input Unit                                   | CJ1W-INT01   |            |
| Quick-response Input Unit                              | CJ1W-IDP01   |            |
| Analog I/O Units                                       | CJ1W-ADG41<br>CJ1W-AD□□□-V1<br>CJ1W-AD042<br>CJ1W-DA□□□<br>CJ1W-DA042V<br>CJ1W-MAD42                               |            |
| Process I/O Units                                      | CJ1W-AD04U<br>CJ1W-PH41U<br>CJ1W-PTS51/52/15/16<br>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<br>CJ1W-NC482/882   |            |
| MECHATROLINK-II Position Control Unit                  | CJ1W-NCF71(-MA)  |            |
| High-speed Counter Unit                                | CJ1W-CT021   |            |
| ID Sensor Units  | CJ1W-V680C11<br>CJ1W-V680C12<br>CJ1W-V600C11<br>CJ1W-V600C12   |            |
| Controller Link Unit                                   | CJ1W-CLK23   |            |
| Serial Communications Units                            | CJ1W-SCU41-V1<br>CJ1W-SCU21-V1<br>CJ1W-SCU31-V1<br>CJ1W-SCU22/32/42  |            |
| Ethernet Unit  | CJ1W-ETN21   |            |
| EtherNet/IP Unit                                       | CJ1W-EIP21/EIP21S  |            |
| 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 |            |

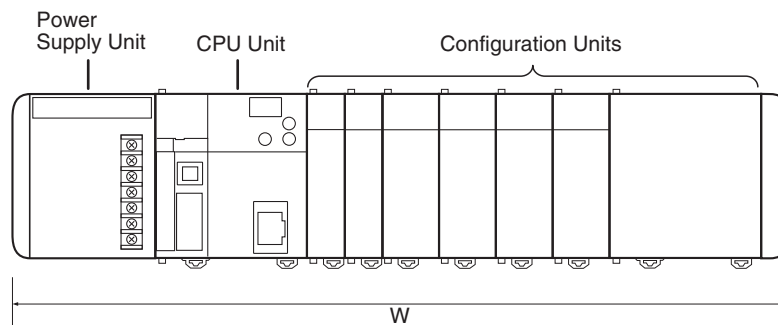
## 62-mm-wide Units

| 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)

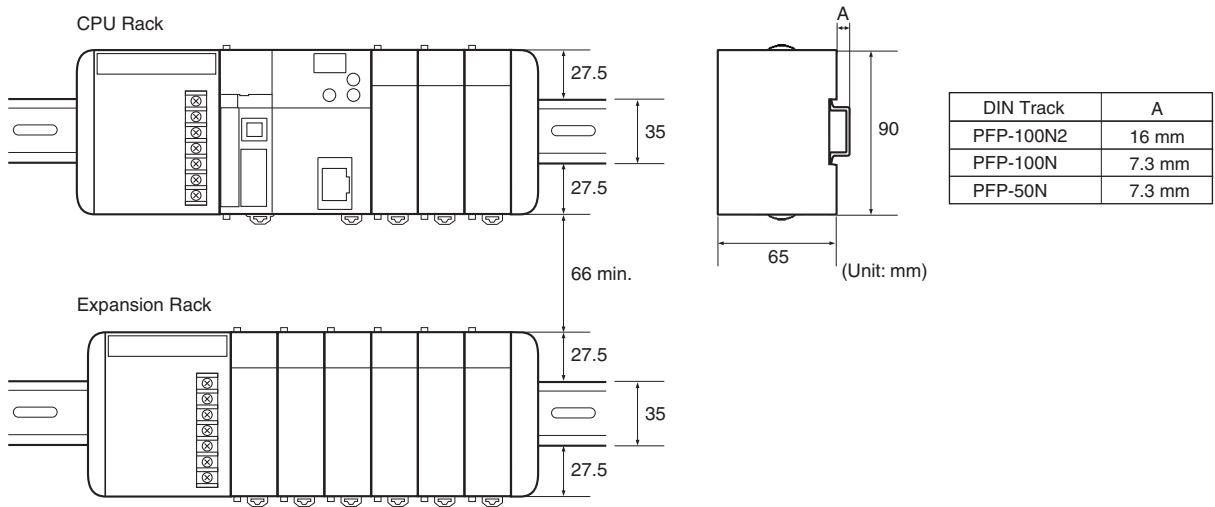
Basic I/O Units: CJ1W-ID231 (20 mm) × 2

Special I/O Units: CJ1W-AD081-V1 (31 mm) × 4

CPU Bus Unit: CJ1W-MCH71 (79.8 mm)

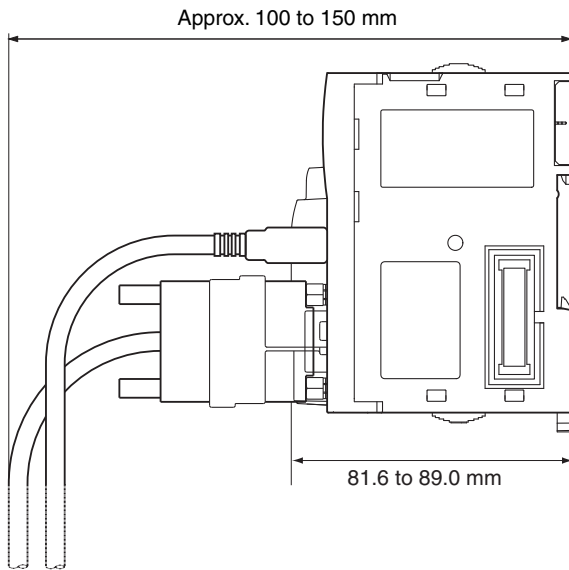
$$W = 80 + 79.8 + 20 \times 2 + 31 \times 4 + 79.8 \times 1 + 14.7 \text{ (End Cover)} = 418.3 \text{ mm}$$

## 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.

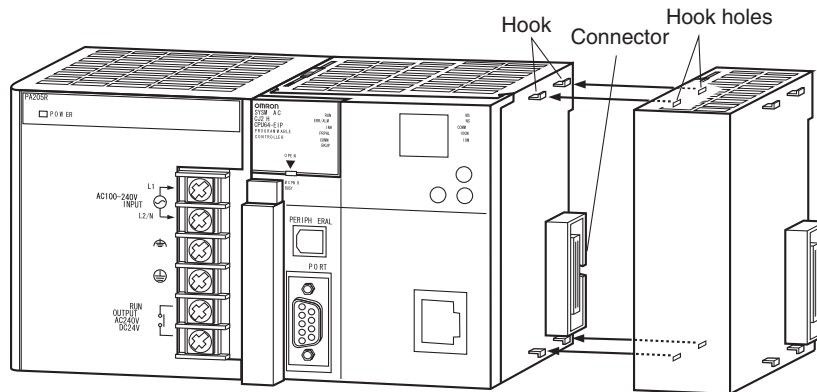




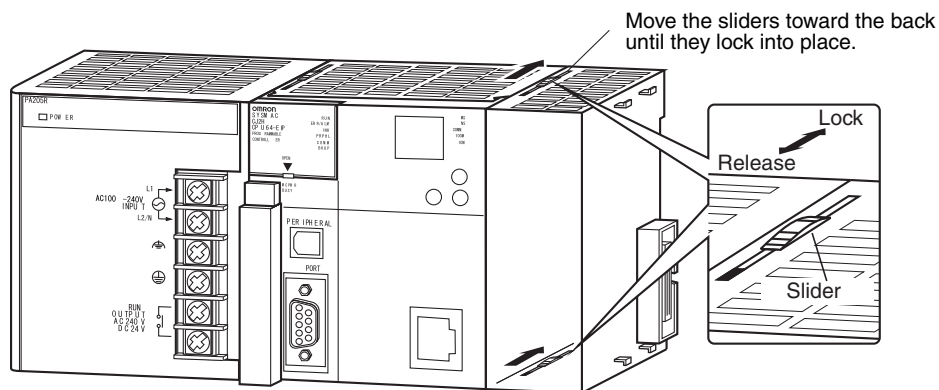
## 5-2-4 Connecting PLC Components

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.



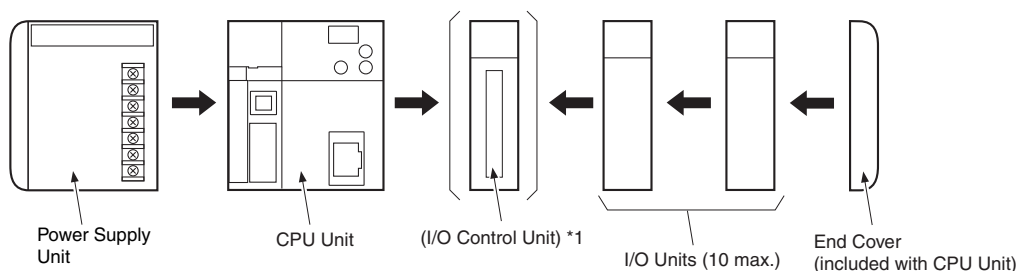
### Precautions for Correct Use

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.

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

#### ● CJ2H CPU Unit

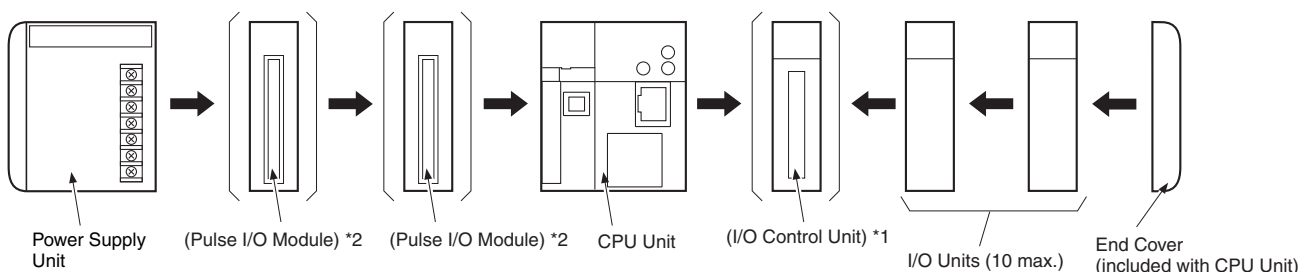
CPU Rack



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

#### ● CJ2M CPU Unit

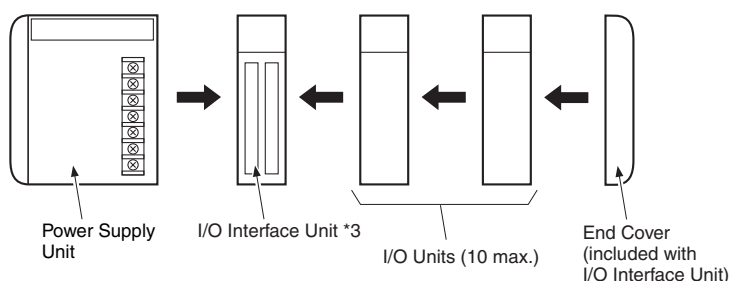
CPU Rack



\*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.



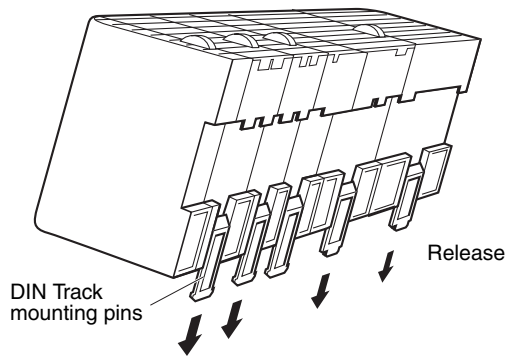
#### Precautions for Correct Use

- 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.

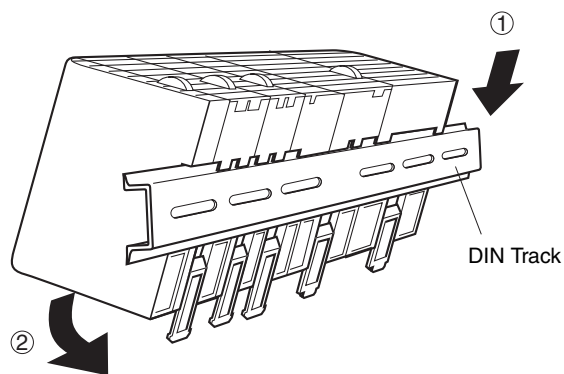
### 5-2-5 DIN Track Installation

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

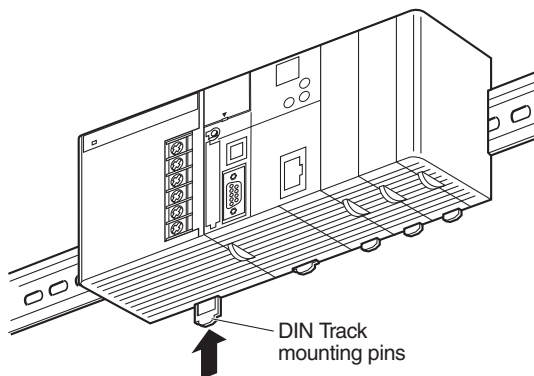
- 1 Release the pins on the backs of the CJ-series Units.



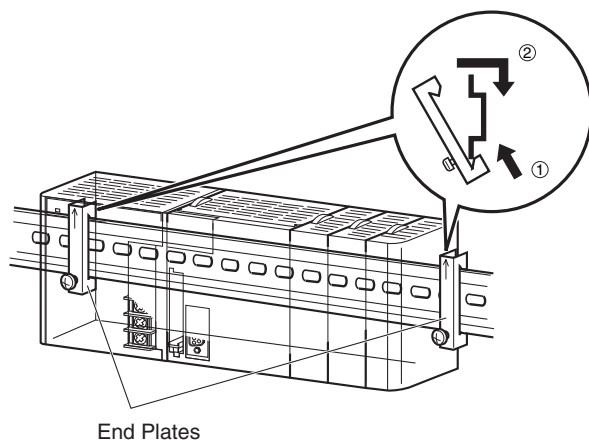
- 2 Fit the back of the PLC onto the DIN Track by inserting the top of the track and then pressing in at the bottom of the PLC, as shown below.



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



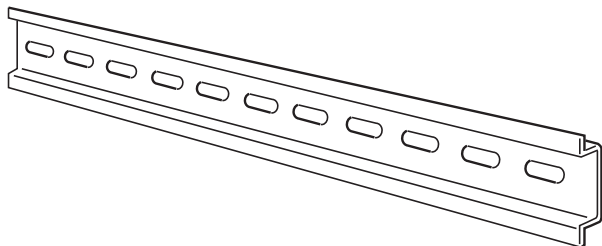
- 4 Install a DIN Track End Plate on each end of the PLC. To install an End Plate, hook the bottom on the bottom of the track, rotate the Plate to hook the top of the Plate on the top of the track, and then tighten the screw to lock the Plate in place.



## DIN Track and Accessories

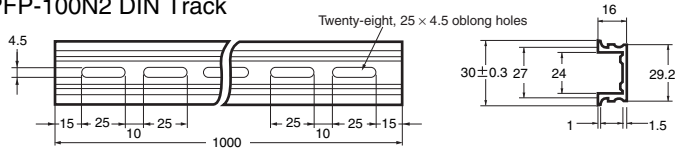
Use the DIN Track and DIN Track End Plates shown below. Secure each DIN Track inside a control panel with at least three screws.

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

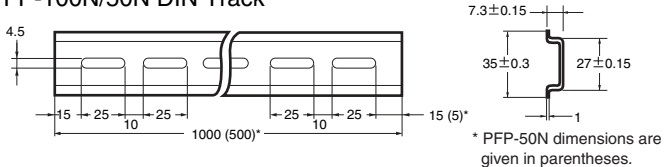


Secure the DIN Track to the control panel using M4 screws separated by 210 mm (6 holes) or less and using at least 3 screws. The tightening torque is 1.2 N·m.

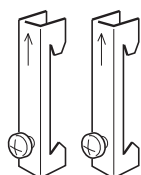
PFP-100N2 DIN Track



PFP-100N/50N DIN Track



- 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.

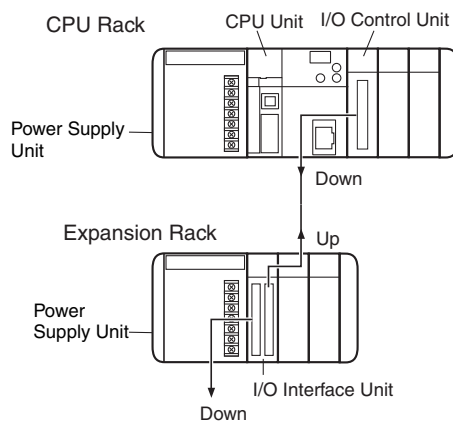
### ● CS/CJ-series I/O Connecting Cables



- 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.

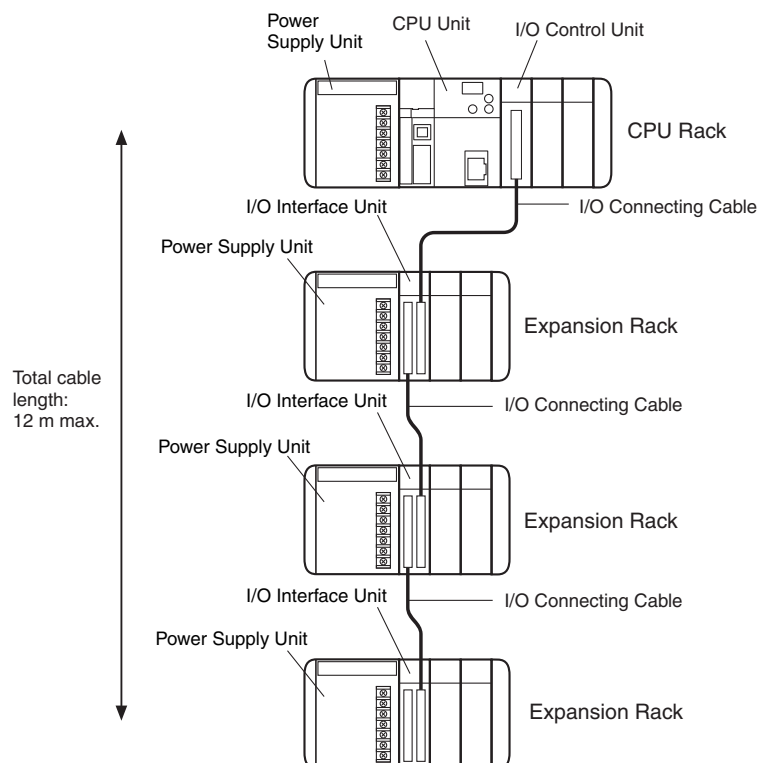
| Model number | Cable length |
|--------------|--------------|
| CS1W-CN313   | 0.3 m        |
| CS1W-CN713   | 0.7 m        |
| CS1W-CN223   | 2 m          |
| CS1W-CN323   | 3 m          |
| CS1W-CN523   | 5 m          |
| CS1W-CN133   | 10 m         |
| CS1W-CN133B2 | 12 m         |

- 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 CJ-series Expansion Rack.

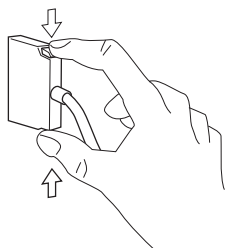


- The top and bottom of the connector are different. Be sure the connector is facing the correct direction before connecting it.

## ● 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.

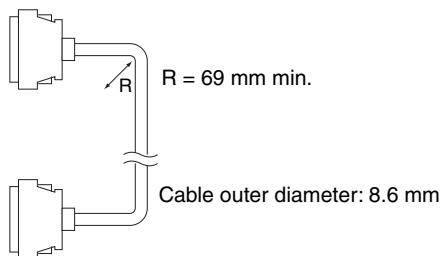
To remove the connector, press the tabs and pull on the connector.



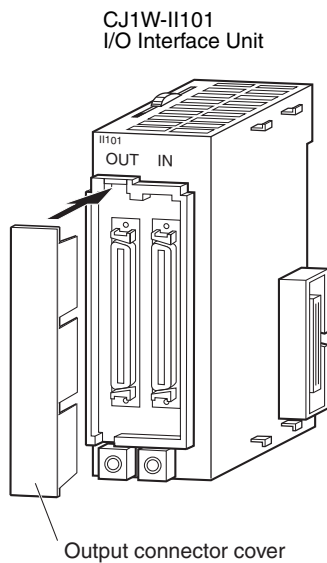


### Precautions for Correct Use

- 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.

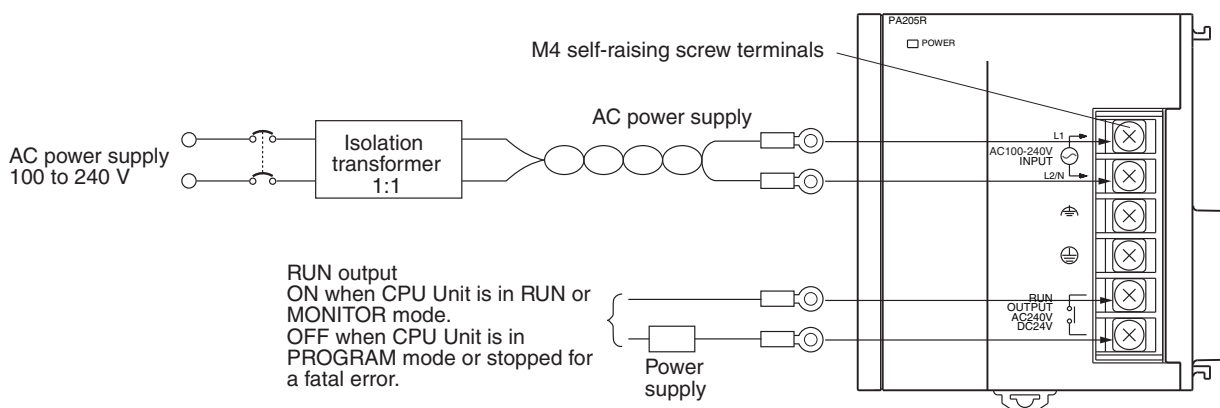


## 5-3 Wiring

### 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 when-ever 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 capacity | 240 VAC: 2 A for resistive loads<br>120 VAC: 0.5 A for inductive loads<br>24 VDC: 2 A for resistive loads<br>24 VDC: 2 A for inductive loads |

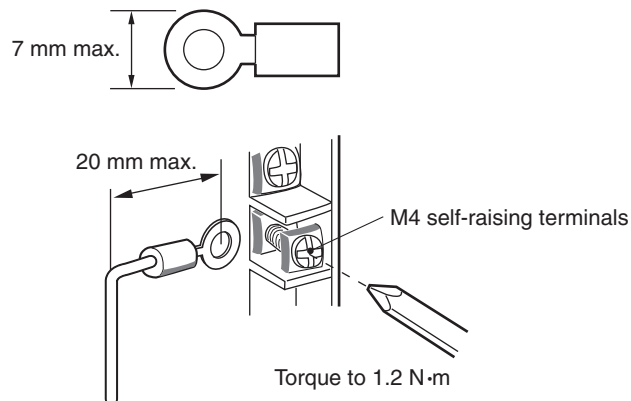
### ● Crimp Terminals

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



## Caution

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.

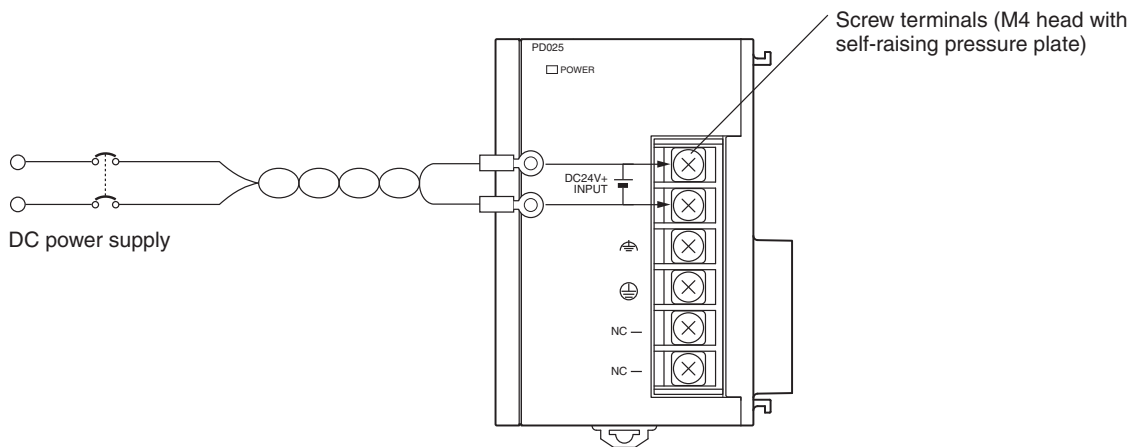


#### Precautions for Safe Use

- 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 ( $\pm 20\%$ )     |
| CJ1W-PD022 | 21.6 to 26.4 VDC ( $\pm 10\%$ )     |

### ● 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

**Caution**

When connecting a personal computers or other peripheral devices 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**

## ● 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.

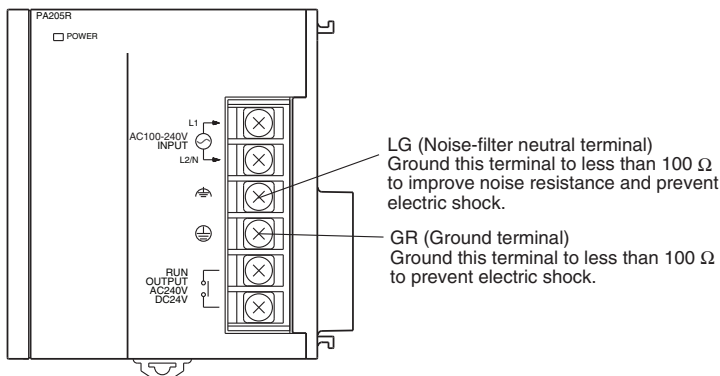
Crimp Terminals for DC Power Supplies



### 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: ⊕) 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: ⊕) 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.

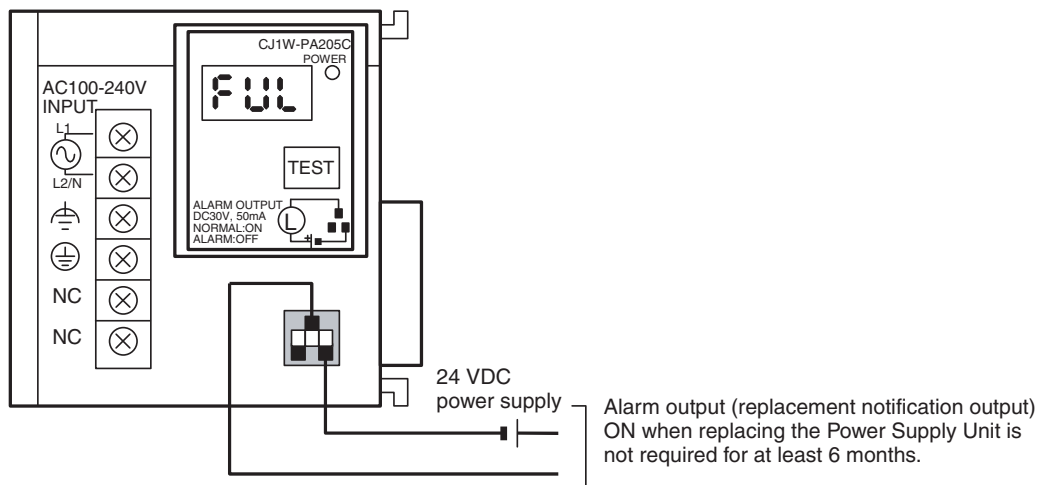
## ● Crimp Terminals for DC Power Supply



## 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.

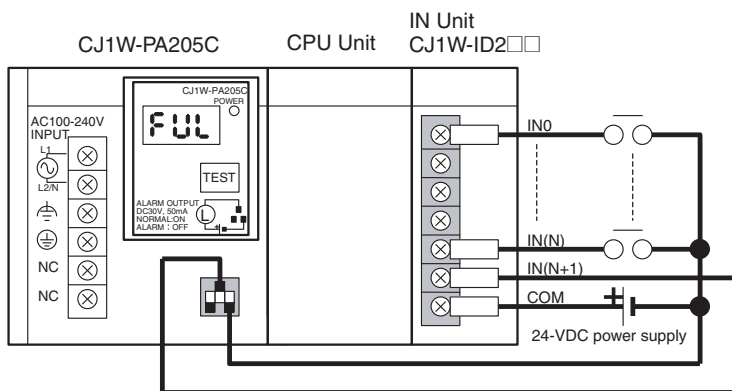
## ● Wiring

The following wire gauges are recommended.

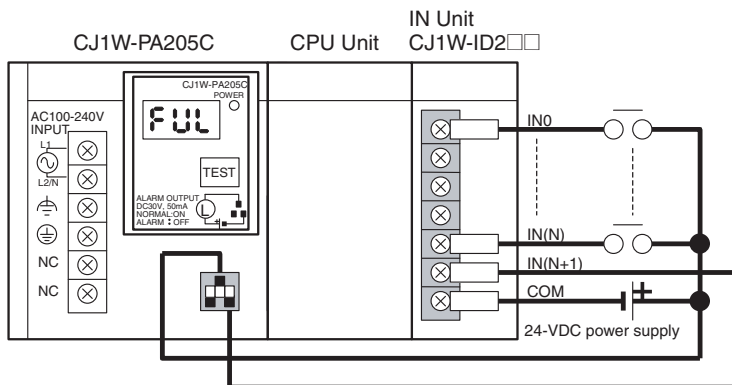
| Recommended wire size                           | Use                                     | Pushing strength (clamping operation) | Pulling strength (holding force) | Length of stripped section |
|---|---|---------------------------------------|----------------------------------|----------------------------|
| AWG 22 to 18<br>(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<br>(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 terminal of the 24-VDC power supply to the Input Unit common (COM) terminals.

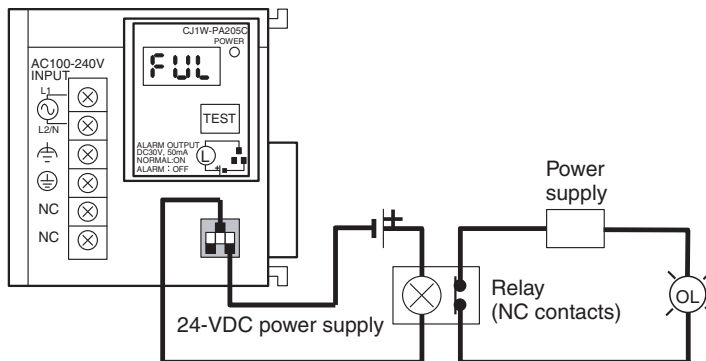


Connect the negative terminal of the 24-VDC power supply to the Input Unit common (COM) terminal.



### ● 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.



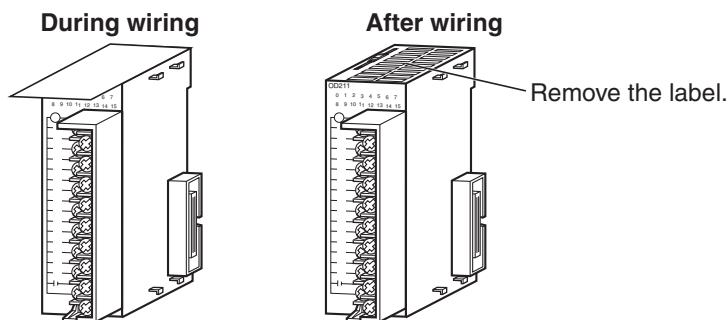
#### Precautions for Correct Use

- 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.

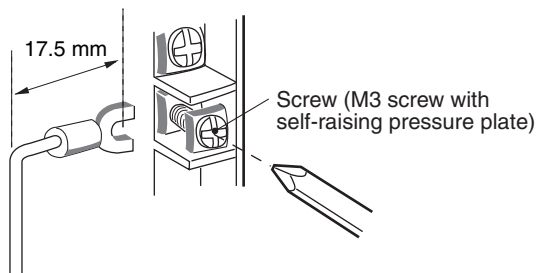


## ● Wiring

- 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.

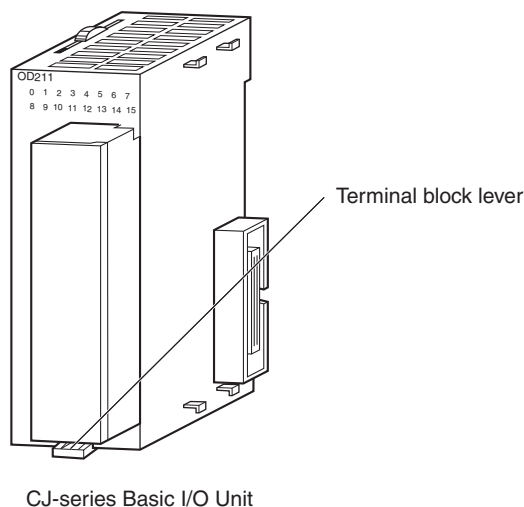


- Wire the Units so that they can be easily replaced.
- Make sure that the I/O indicators are not covered by the wiring.
- Do not place the wiring for I/O Units in the same duct or raceway as power lines. Inductive noise can cause errors in operation.
- Tighten the terminal screws to the torque of 0.5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





### 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/OTAX 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/OTAX 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  | OTAX parts  |
|-----------------|------|------------|--|---|
| Solder-type     | 40   | C500-CE404 | Socket: FCN-361J040-AU<br>Connector cover:<br>FCN-360C040-J2                       | Socket: N361J040AU<br>Connector cover:<br>N360C040J2                    |
|                 | 24   | C500-CE241 | Socket: FCN-361J024-AU<br>Connector cover:<br>FCN-360C024-J2                       | Socket: N361J024AU<br>Connector cover:<br>N360C024J2                    |
| Crimped         | 40   | C500-CE405 | Socket: FCN-363J040<br>Connector cover:<br>FCN-360C040-J2<br>Contacts: FCN-363J-AU | Socket: N363J040<br>Connector cover:<br>N360C040J2<br>Contacts: N363JAU |
|                 | 24   | C500-CE242 | Socket: FCN-363J024<br>Connector cover:<br>FCN-360C024-J2<br>Contacts: FCN-363J-AU | Socket: N363J024<br>Connector cover:<br>N360C024J2<br>Contacts: N363JAU |
| Pressure-welded | 40   | C500-CE403 | FCN-367J040-AU/F   | N367J040AUF   |
|                 | 24   | C500-CE243 | FCN-367J024-AU/F   | N367J024AUF   |

#### **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/OTAX connectors.

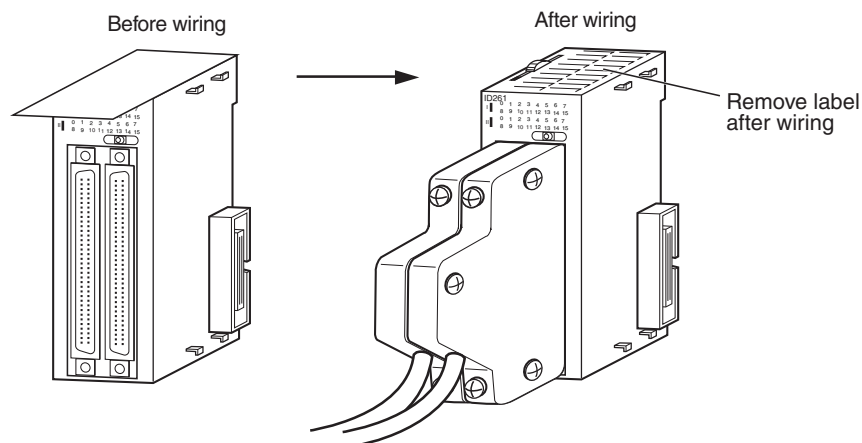
- 1 Check that each Unit is installed securely.



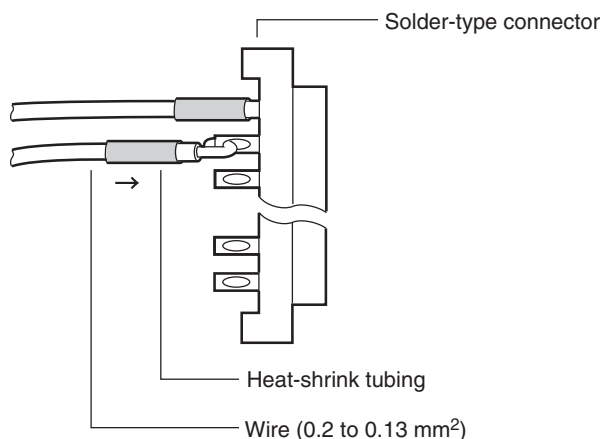
### Precautions for Correct Use

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.

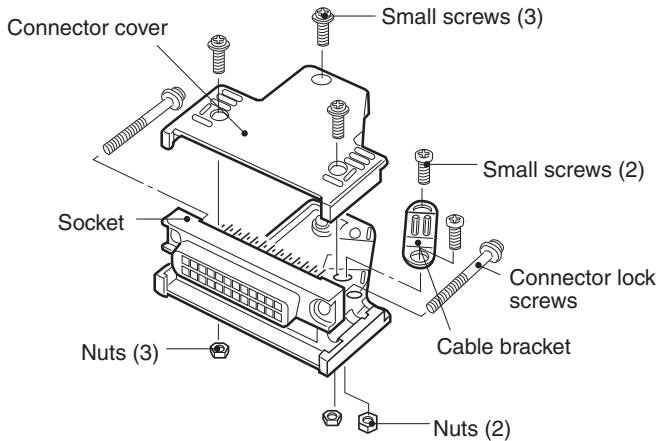




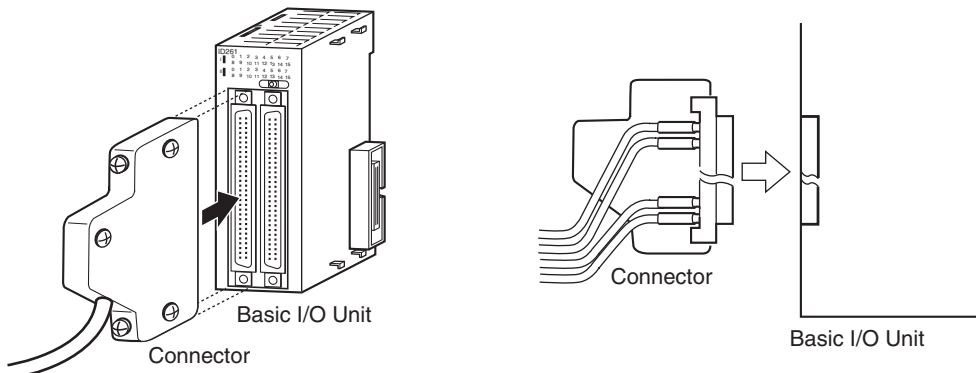
**Precautions for Safe Use**

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.

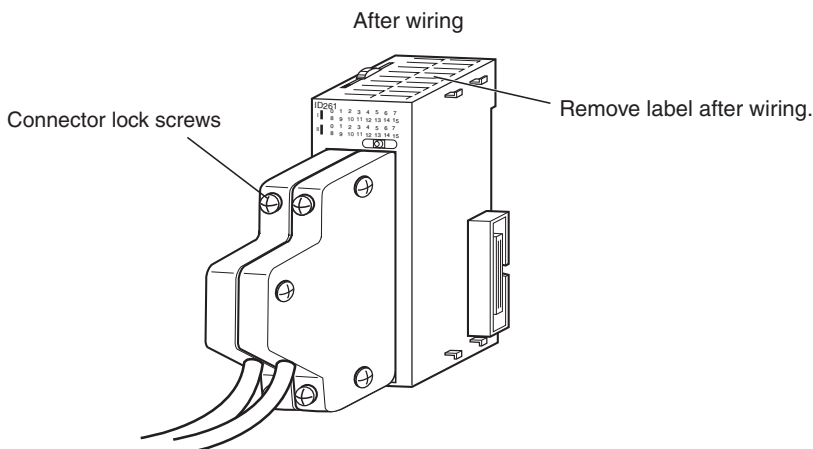
**4** Assemble the connector (purchased separately).



**5** Insert the wired connector.



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



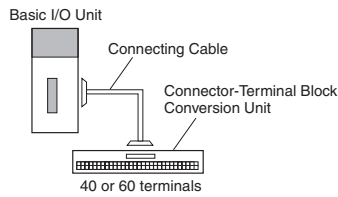
Tighten the connector lock screws to a torque of 0.2 N·m.

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

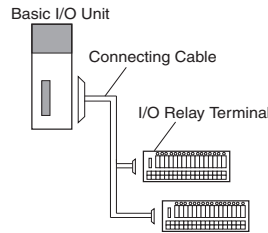
OMRON Connecting Cable can be used to connect Basic I/O Units with Connectors to OMRON Connector-Terminal Block Conversion Units or to OMRON I/O Relay Terminals. For details, refer to A-1-4 *Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals*.

#### ● Connection Examples

Connector-Terminal Block Conversion Unit



I/O Relay Terminals



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

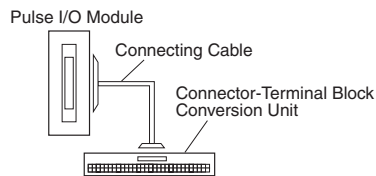
Depending on the connector, the following methods are used to connect these Pulse I/O Modules to external I/O devices.

- 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).

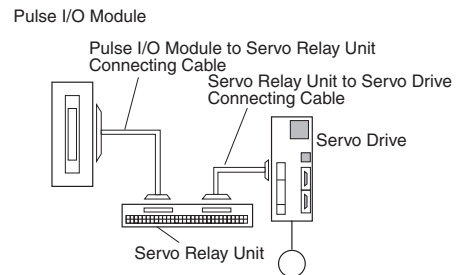
#### ● Using OMRON Cables with Connectors to Connect to Connector-Terminal Block Conversion Units or Servo Relay Units

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 |

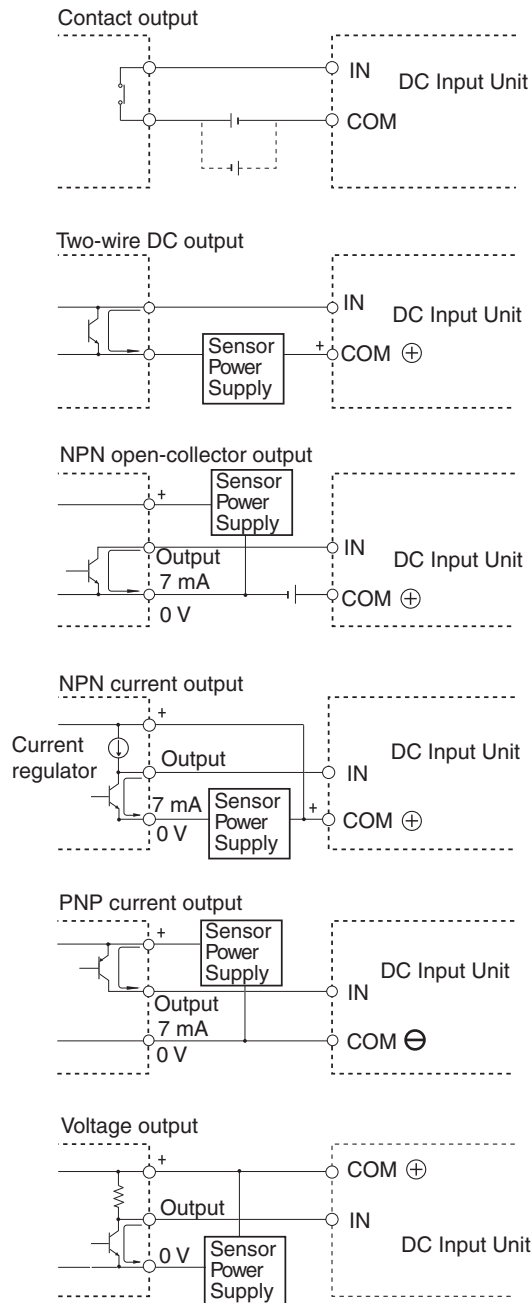
## 5-3-6 Connecting I/O Devices

### Input Devices

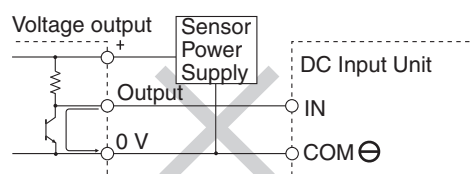
Use the following information for reference when selecting or connecting input devices.

#### ● DC Input Units

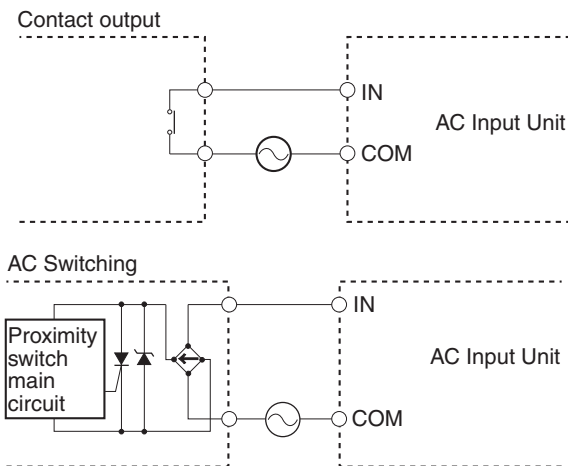
The following types of DC input devices can be connected.



- 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:  
 $V_{ON} \leq V_{CC} - V_R$
- Relation between voltage when the PLC is ON and sensor control output (load current):  
 $I_{OUT} (\text{min.}) \leq I_{ON} \leq I_{OUT} (\text{max.})$   
 $I_{ON} = (V_{CC} - V_R - 1.5 [\text{PLC internal residual voltage}]) / R_{IN}$

When  $I_{ON}$  is smaller than  $I_{OUT} (\text{min.})$ , connect a bleeder resistor  $R$ . The bleeder resistor constant can be calculated as follows:

$$R \leq (V_{CC} - V_R) / (I_{OUT} (\text{min.}) - I_{ON})$$

$$\text{Power } W \geq (V_{CC} - V_R)^2 / R \times 4 \text{ [allowable margin]}$$

$V_{CC}$ : Power voltage

$V_R$ : Sensor output residual current

$I_{ON}$ : PLC ON current

$I_{OUT}$ : Sensor control current (load current)

$R_{IN}$ : PLC input impedance



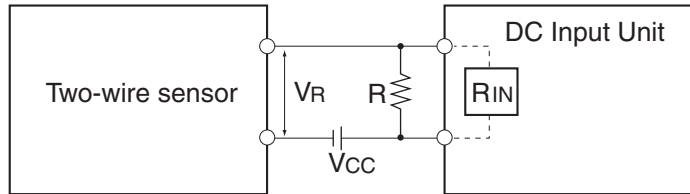
- Relation between current when the PLC is OFF and sensor leakage current:

$$I_{OFF} \geq I_{leak}$$

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

$$R \leq (R_{IN} \times V_{OFF}) / (I_{leak} \times R_{IN} - V_{OFF})$$

$$\text{Power } W \geq (V_{CC} - V_R)^2 / R \times 4 \text{ [allowable margin]}$$



VCC: Power voltage

VON: PLC ON voltage

VOFF: PLC OFF voltage

ION: PLC ON current

I<sub>OFF</sub>: PLC OFF current

R<sub>IN</sub>: PLC input impedance

V<sub>R</sub>: Sensor output residual current

I<sub>OUT</sub>: Sensor control current (load current)

I<sub>leak</sub>: Sensor leakage current

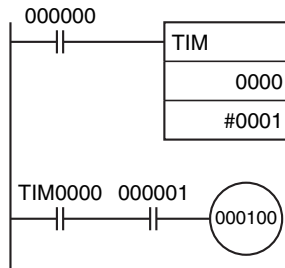
R: Bleeder resistance

- 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.

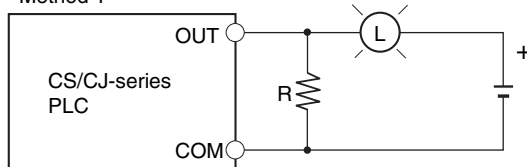
### ● Transistor Output Residual Voltage

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

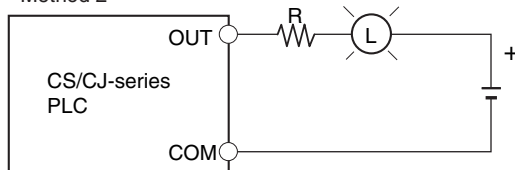
When connecting a transistor or triac output to an output device having a high surge current (such as an incandescent lamp), steps must be taken to avoid damage to the transistor or triac. Use either of the following methods to reduce the surge current.

Method 1



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

Method 2



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

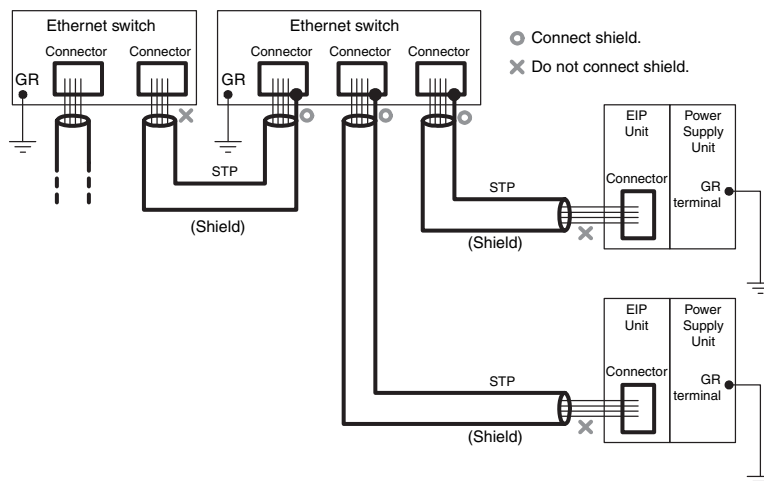
Observe the following precautions when using the built-in EtherNet/IP port on the CJ2H-CPU6□-EIP or CJ2M-CPU3□.

#### ● 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.

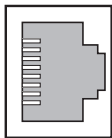


- Press the cable connector in firmly until it locks into place at both the Ethernet switch and the CPU Unit.
- Do not lay the twisted-pair cable together with high-voltage lines.
- Do not lay the twisted-pair cable near devices that generate noise.
- Do not lay the twisted-pair cable in locations subject 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)



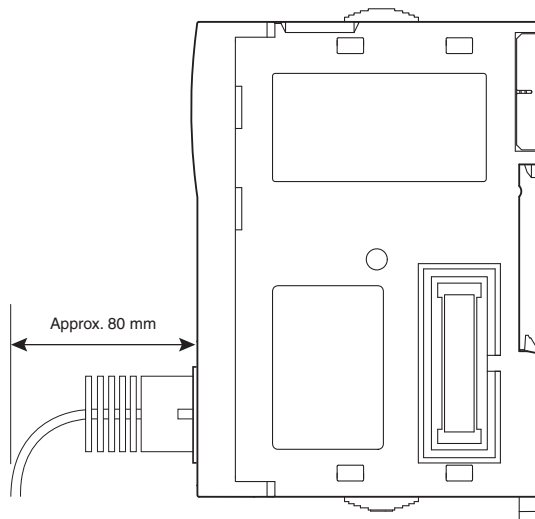
| Connector pin | Signal name         | Abbr. | Signal direction |
|---------------|---------------------|-------|------------------|
| 1             | Transmission data + | TD+   | Output           |
| 2             | Transmission data – | TD–   | Output           |
| 3             | Reception data +    | 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



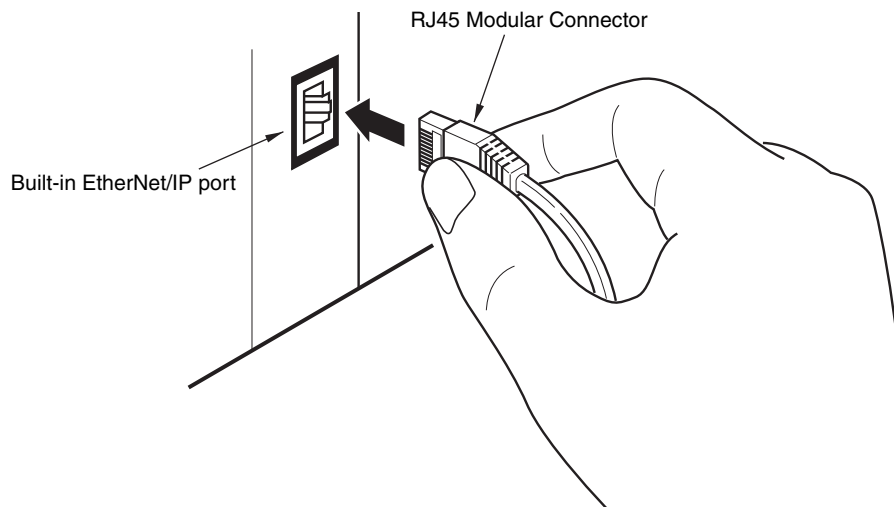
### Precautions for Correct Use

- 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.



- 1** Lay the twisted-pair cable.
- 2** 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.



## 5-4 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.

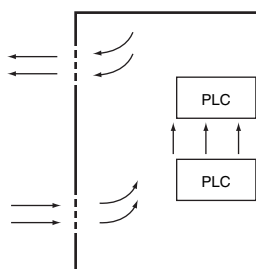
#### High Temperatures

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

##### ● Natural Cooling

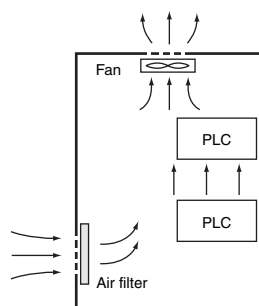
Natural cooling relies on natural ventilation through slits in the panel, rather than using cooling devices such as fans or coolers. When using this method, observe the following points.

- 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.



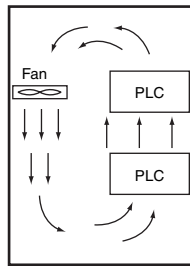
Natural Cooling

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



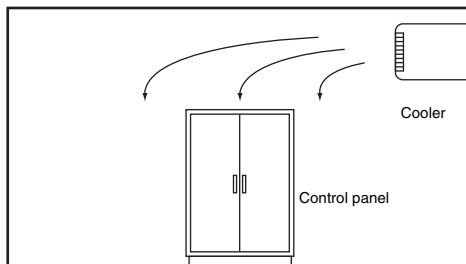
Forced Ventilation Method

- **Forced Air Circulation (by Fan in Closed Panel)**



Forced Air Circulation

- **Room Cooling (Cooling the Entire Room Where the Control Panel Is Located)**



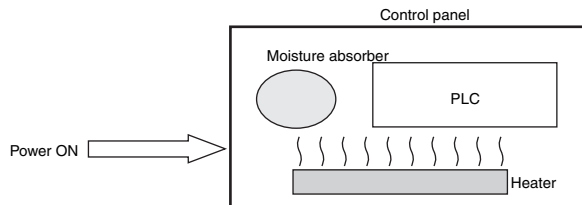
Room Cooling

## 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 air-tight 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.

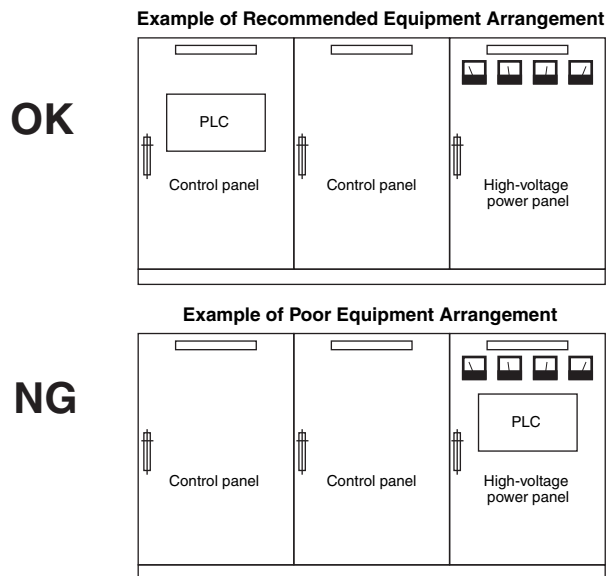


## 5-4-5 Electrical Environment

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.

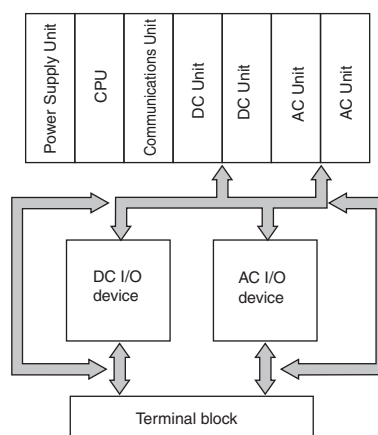


Examples of Equipment Arrangement in Panel with High-voltage Devices

### 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.

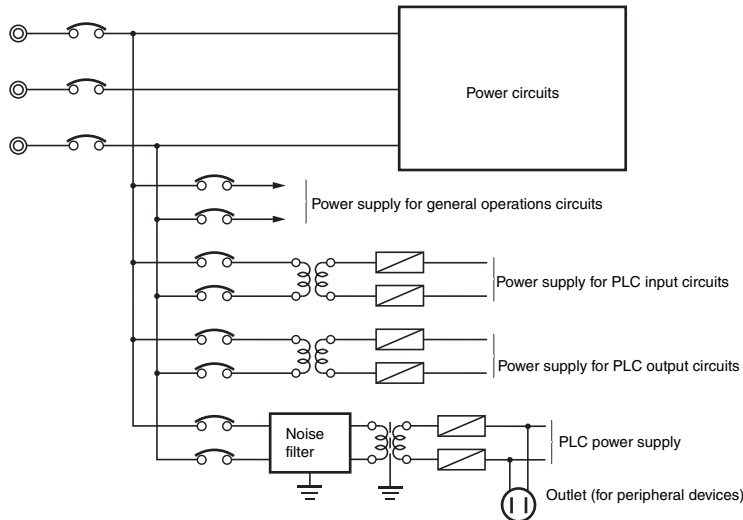


Example of Arrangement in Panel

## 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.

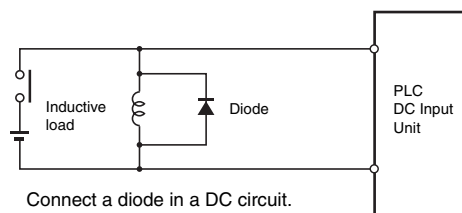


Power Supply System Diagram

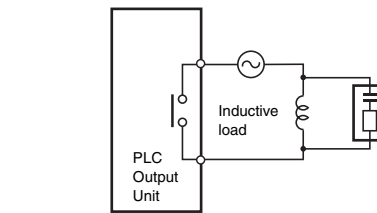
## Wiring External I/O Signal Lines

Observe the following points when wiring external I/O signal lines.

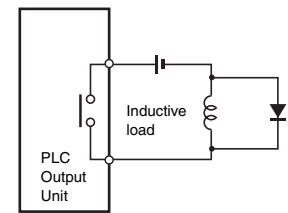
- To absorb reverse electromotive force when an inductive load is connected to an output signal, connect a surge suppressor near the inductive load in an AC circuit, and connect a diode near the inductive load in a DC circuit.



Input Signal Noise Countermeasures



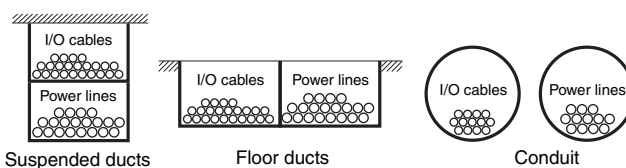
Connect a surge suppressor in an AC circuit.



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

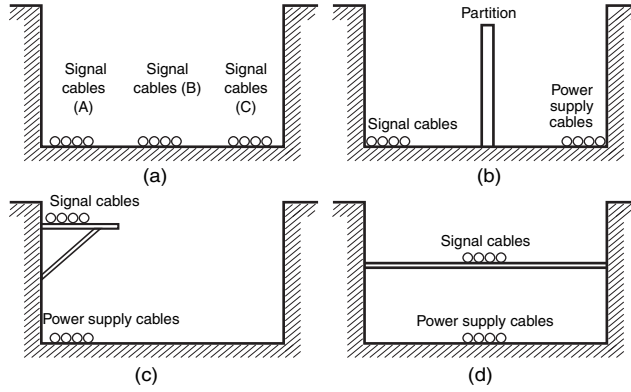
Each of the following combinations include different signal types, properties, or levels. They will cause the signal-to-noise ratio to drop due to factors such as electrical induction. As a general rule when wiring, either use separate cables or separate wiring routes for these items. Future maintenance 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**

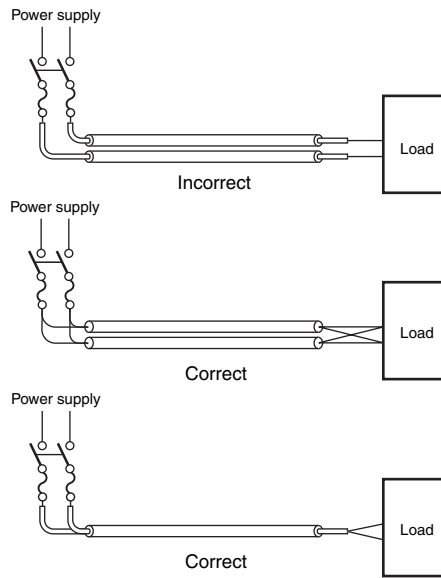
Observe the following points when wiring power supply and signal cables.

- 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.



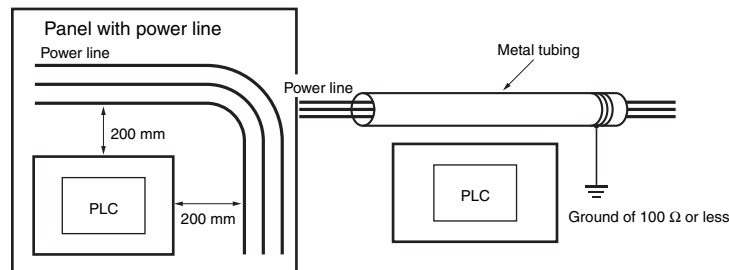
**Partitioning Methods for Signal and Power Supply Cables**

- 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.

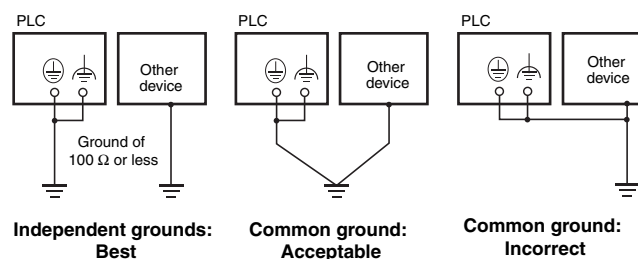
### Grounding Methods and Precautions

#### ● 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).

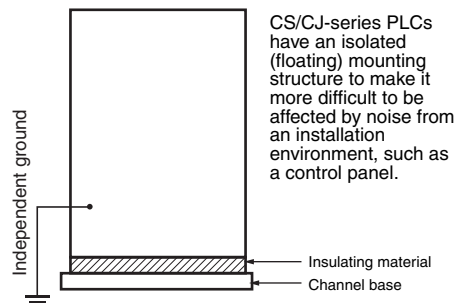
- Ground to 100  $\Omega$  or less, and if possible use a separate ground from those of other devices. (Refer to figure (a) in the diagram below.)
- If using an independent ground is not possible, then use a common ground as shown in figure (b). Connect to the ground pole of the other device.
- Never 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

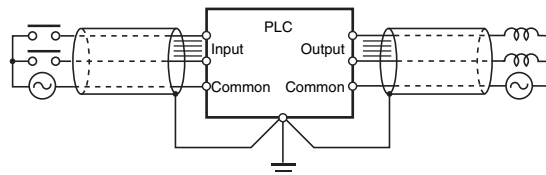
## ● Precautions when Grounding

- 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.



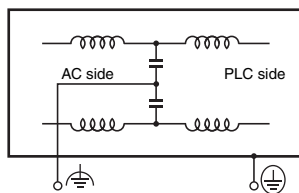
### Shielded Cable Ground

## ● 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.

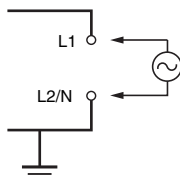
When the functional ground terminal is correctly grounded, it is generally effective in suppressing power supply common noise. Occasionally, however, grounding this terminal will result in picking up more noise, so be careful when using it.



### 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.







# 6

## Troubleshooting

This section describes how to troubleshoot problems that may occur with a CJ2 PLC.

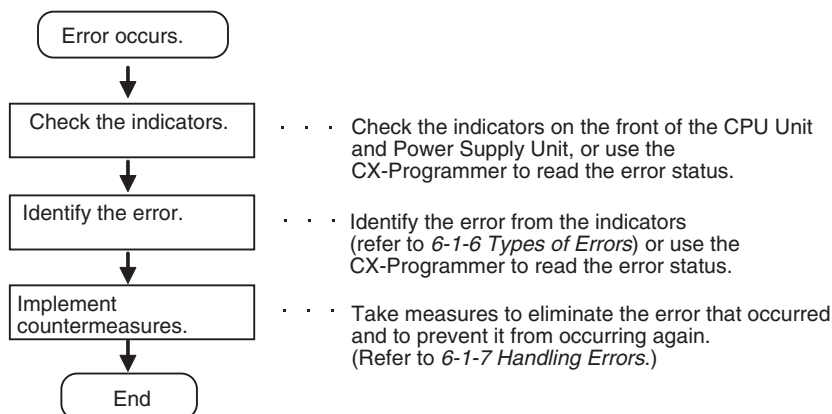
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|  |             |
|--|-------------|
| <b>6-1 CPU Unit Errors</b> .....   | <b>6-2</b>  |
| 6-1-1 Errors and Remedies .....  | 6-2         |
| 6-1-2 Checking Errors .....  | 6-2         |
| 6-1-3 Checking Detailed Status .....   | 6-3         |
| 6-1-4 Reading Error Log Information .....  | 6-3         |
| 6-1-5 I/O Table Verification .....   | 6-5         |
| 6-1-6 Types of Errors .....  | 6-6         |
| 6-1-7 Handling Errors .....  | 6-7         |
| <b>6-2 Troubleshooting Built-in EtherNet/IP Port Errors<br/>(CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)</b> ..... | <b>6-25</b> |
| 6-2-1 Checking Built-in EtherNet/IP Port Error Status .....  | 6-25        |
| 6-2-2 Checking Error Status at the EtherNet/IP Port Seven-segment Display .....                            | 6-26        |
| <b>6-3 Non-CPU Unit Errors and Remedies</b> .....  | <b>6-28</b> |
| 6-3-1 Error Causes and Remedies .....  | 6-28        |

# 6-1 CPU Unit Errors

## 6-1-1 Errors and Remedies

Use the following procedure when an error occurs.

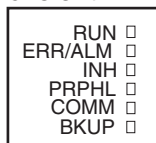


## 6-1-2 Checking Errors

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

Indicators on front of CPU Unit



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.

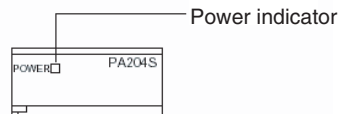
PRPHL: Flashing yellow when the CPU Unit is communicating through the peripheral (USB) port.

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

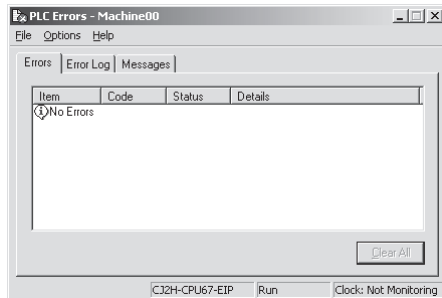


POWER: Lit when 5 V is output from the Power Supply Unit.

## 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.

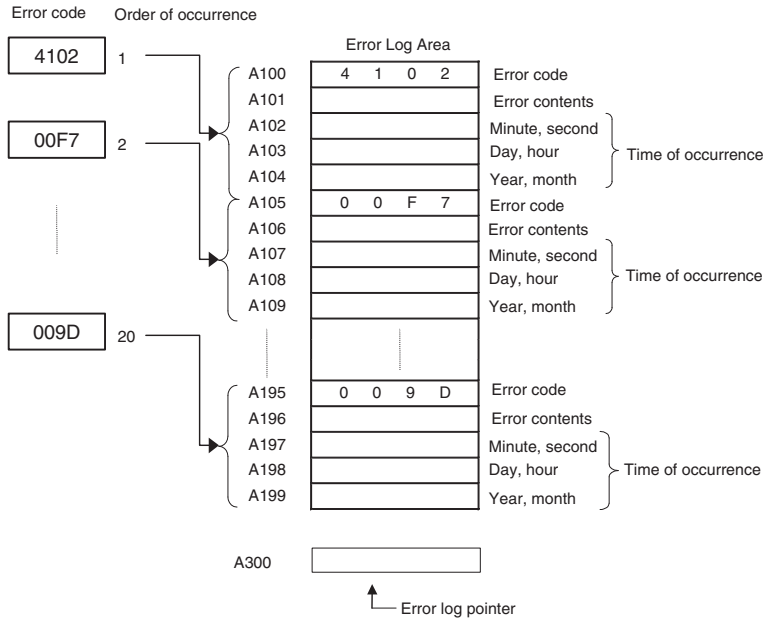
### 6-1-4 Reading Error Log Information

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.

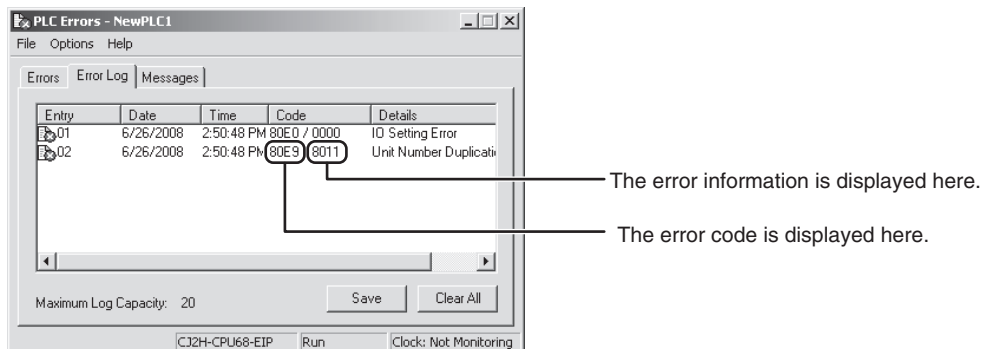


## Checking Error Log Information

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

- 1 Connect the CX-Programmer online.
- 2 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 Remedies.

| Error name                        | POWER | RUN | ERR/ALM  | INH | PRPHL | COMM | Error code (stored in A400) | Operation status     |                                |                                  |
|-----------------------------------|-------|-----|----------|-----|-------|------|-----------------------------|----------------------|--------------------------------|----------------------------------|
| Power supply error                | OFF   | OFF | OFF      | OFF | OFF   | OFF  | ---                         | Operation stops.     |                                |                                  |
| CPU Standby                       | ON    | OFF | OFF      | --- | ---   | ---  | ---                         | Operation stops.     |                                |                                  |
| CPU reset                         |       |     |          |     |       |      |                             |                      |                                |                                  |
| CPU error (WDT error)*1           | ON    | OFF | ON       | --- | ---   | ---  | ---                         | Operation stops.     |                                |                                  |
| USB port communications error     | ON    | ON  | OFF      | --- | OFF   | ---  | ---                         | Operation continues. |                                |                                  |
| RS-232C port communications error | ON    | ON  | OFF      | --- | ---   | OFF  | ---                         | Operation continues. |                                |                                  |
| Fatal errors*1*2                  | ON    | OFF | ON       | --- | ---   | ---  | 0x809F                      | Operation stops.     |                                |                                  |
|                                   |       |     |          |     |       |      |                             |                      | I/O bus error                  | 0x80C0 to 0x80C7, 0x80CE, 0x80CF |
|                                   |       |     |          |     |       |      |                             |                      | I/O setting error              | 0x80E0                           |
|                                   |       |     |          |     |       |      |                             |                      | Too many I/O points error      | 0x80E1                           |
|                                   |       |     |          |     |       |      |                             |                      | Unit number duplication error  | 0x80E9                           |
|                                   |       |     |          |     |       |      |                             |                      | Rack number duplication error  | 0x80EA                           |
|                                   |       |     |          |     |       |      |                             |                      | Program error                  | 0x80F0                           |
|                                   |       |     |          |     |       |      |                             |                      | Memory error                   | 0x80F1                           |
|                                   |       |     |          |     |       |      |                             |                      | Version error                  | 0x80F2                           |
|                                   |       |     |          |     |       |      |                             |                      | Memory Card Transfer Error     | 0x80F4                           |
|                                   |       |     |          |     |       |      |                             |                      | FALS (007) error               | 0xC101 to 0xC2FF                 |
| Non-fatal errors*2                | ON    | ON  | Flashing | --- | ---   | ---  | 0x008B                      | Operation continues. |                                |                                  |
|                                   |       |     |          |     |       |      |                             |                      | Duplicated refreshing error    |                                  |
|                                   |       |     |          |     |       |      |                             |                      | Basic I/O error                | 0x009A                           |
|                                   |       |     |          |     |       |      |                             |                      | PLC Setup error                | 0x009B                           |
|                                   |       |     |          |     |       |      |                             |                      | Option Board error             | 0x00D1                           |
|                                   |       |     |          |     |       |      |                             |                      | Backup memory error            | 0x00F1                           |
|                                   |       |     |          |     |       |      |                             |                      | Tag memory error*3             | 0x00F2                           |
|                                   |       |     |          |     |       |      |                             |                      | System work errors             | 0x00F3                           |
|                                   |       |     |          |     |       |      |                             |                      | Battery error                  | 0x00F7                           |
|                                   |       |     |          |     |       |      |                             |                      | 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                 |

\*1 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.

\*2 For details on fatal errors and non-fatal errors, refer to A-3 Fatal and Non-fatal Error Details.

\*3 CJ2H-CPU6□-EIP/CJ2M-CPU3□, CJ2H-CPU6□ with unit version 1.6 or later, and CJ2M-CPU1□ with unit version 2.2 or later only.

**Note** The indicator status shows the status of the errors that have occurred in RUN or MONITOR mode.

## 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 information |
|----------|----------|----------|------------|------------|-------------------|
| Not lit. | Not lit. | Not lit. | None       | None       | None              |

| Suspected cause of error  | Confirmation method   | Remedy   | Prevention of recurrence   |
|---|---|--|--|
| 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            | <ul style="list-style-type: none"> <li>• 100 VAC:<br/>Use a tester check for short-circuits.</li> <li>• 200 VAC:<br/>Check for disconnections.</li> </ul> | 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.  |

\*1 The following table shows the allowable power supply ranges for each Power Supply Unit model.

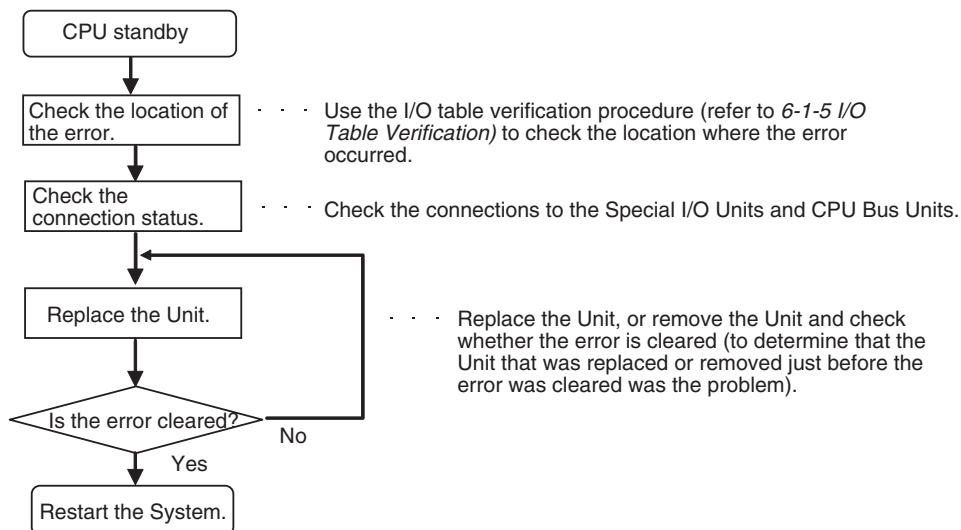
| Model             | Power supply voltage | Allowable power supply voltage fluctuation |
|-------------------|----------------------|--|
| CJ1W-PA205R/PA202 | 100 to 240 VAC       | 85 to 264 VAC                              |
| CJ1W-PD025        | 24 VDC               | 19.2 to 28.8 VDC                           |

## 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 information |
|-------|----------|----------|------------|------------|-------------------|
| 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. | <ul style="list-style-type: none"> <li>Replace the Special I/O Unit or Interrupt Unit for which "\$" is displayed when the I/O tables are read.</li> <li>Replace the failed Unit.</li> </ul> | (Determined by the cause of the failure.) |
| The remote I/O power supply is OFF or there is no terminator for SYS-MAC 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 information |
|-------|----------|----------|------------|------------|-------------------|
| 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.               |
| The I/O Connecting Cable is incorrectly installed. <ul style="list-style-type: none"> <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 mounted to an Expansion Rack.</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 recurrence   |
|--|---|---|--|
| Unit failure   | A CPU error has possibly occurred in the following cases. <ul style="list-style-type: none"> <li>• If the error is not cleared when the CPU Unit is restarted after the recovery measures.</li> <li>• If the error occurs frequently</li> <li>• If the condition improves when the Unit is replaced.</li> </ul> | Replace the CPU Unit.   | Same as at the left.   |
| 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 <ul style="list-style-type: none"> <li>• The microcomputer inside the CPU Unit is malfunctioning.</li> </ul> | 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.) <ul style="list-style-type: none"> <li>• FG</li> <li>• Power lines</li> </ul> | 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 recurrence   |
|---|---|-----------------------|--|
| 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   | Remedy   | Prevention of recurrence  |
|--|---|--|---|
| Communications settings are incorrect.           | <ul style="list-style-type: none"> <li>Check whether the DIP switch pin 5 setting 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> | <ul style="list-style-type: none"> <li>Correctly set DIP switch pin 5 and the serial port settings in the PLC Setup.</li> <li>Correct the host computer serial port settings and the program.</li> </ul> | Same as at the left.  |
| A communications cable is incorrectly connected. | <ul style="list-style-type: none"> <li>Check the cable connections.</li> </ul>  | <ul style="list-style-type: none"> <li>Correct the cable connections.</li> </ul>   | 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 information |
|-------|----------|---------|------------|------------|-------------------|
| Lit.  | Not lit. | Lit.    | A401.08    | 809F       | None              |

### ● Error Causes and Remedies

| Suspected cause of error  | Confirmation method   | Remedy                                   | Prevention of recurrence |
|---|---|--|--------------------------|
| 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.     |

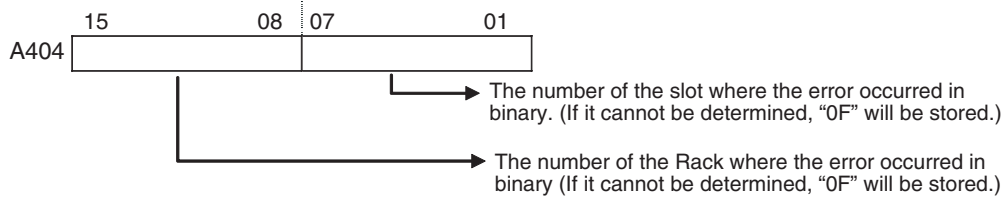
\* The maximum processing time for an interrupt task will not be stored in A440 if High-speed interrupt function is enabled in the PLC Setup.

## I/O Bus Error (Fatal Error)

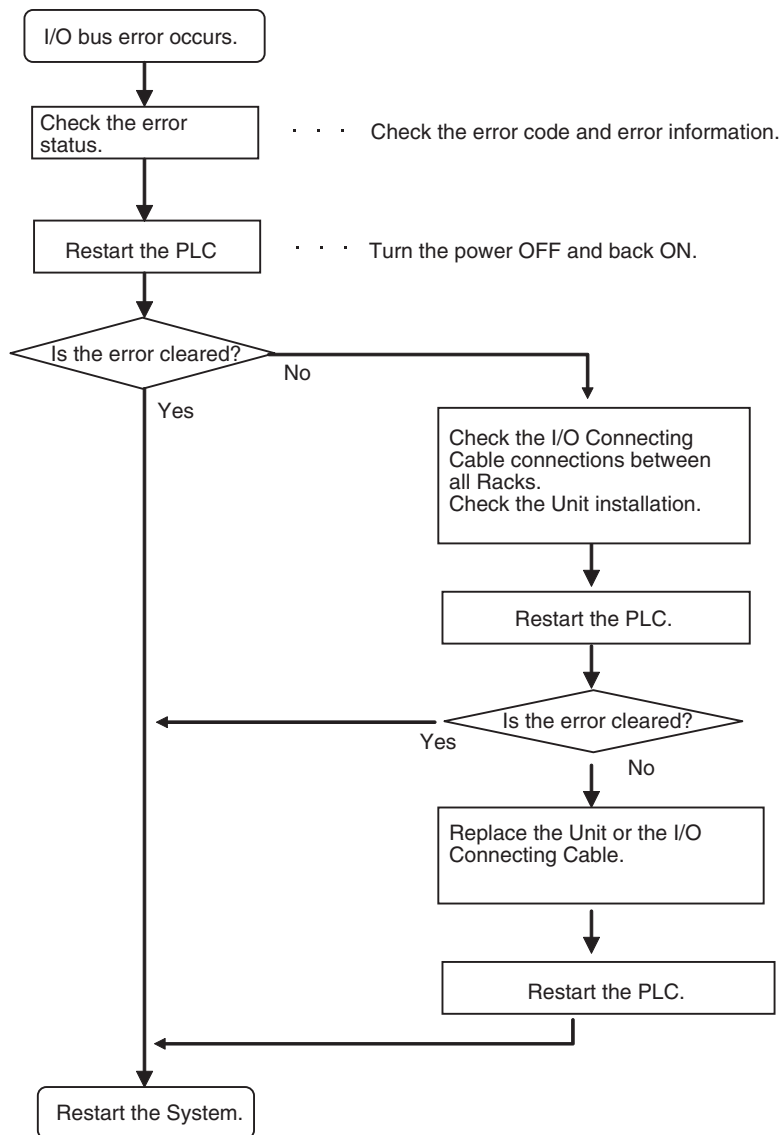
An I/O bus error will occur if there is an error in a data transfer between the CPU Unit and a Unit connected in the Rack.

| POWER | RUN      | ERR/ALM | Error flag | Error code           | Error information |
|-------|----------|---------|------------|----------------------|-------------------|
| 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



### ● Error Causes and Remedies

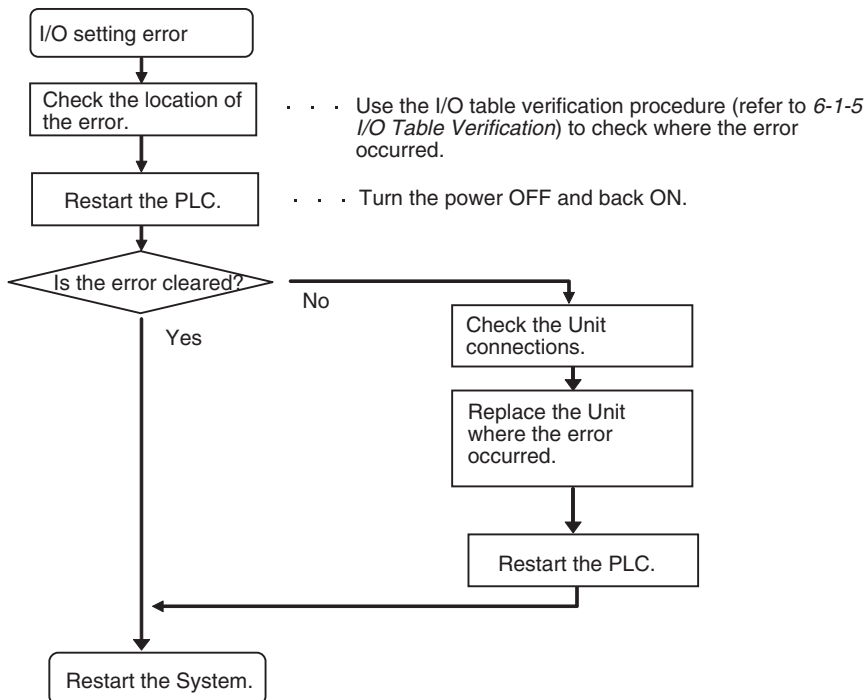
| Suspected cause of error   | Confirmation method   | Remedy  | Prevention of recurrence   |
|--|---|---|--|
| The I/O Connecting Cable is disconnected.  | Perform a visual inspection and pull on the Cables.   | Reconnect the cables.   | During operation, confirm that the connections are secure. Check for vibration or shock.   |
| Equipment failure <ul style="list-style-type: none"> <li>• CPU Unit</li> <li>• I/O Connecting Cable (damage to bus interface circuit)</li> </ul> | An I/O bus error has possibly occurred in the following cases. <ul style="list-style-type: none"> <li>• If the error is not cleared when the CPU Unit is restarted</li> <li>• If the error occurs frequently</li> <li>• If the condition improves when the Unit is replaced.</li> </ul> | Replace the equipment. <ul style="list-style-type: none"> <li>• CPU Unit</li> <li>• I/O Connecting Cable</li> </ul>   | ---  |
| 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 <ul style="list-style-type: none"> <li>• Data corruption in bus signals</li> <li>• Malfunctioning in bus interface circuit</li> </ul>      | 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.) <ul style="list-style-type: none"> <li>• FG</li> <li>• Power lines</li> <li>• I/O connecting cable (inductive noise)</li> </ul> | 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 information |
|-------|----------|-----------|------------|------------|-------------------|
| Lit.  | Not lit. | Flashing. | A401.10    | 80E0       | ---               |

### ● 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                               | 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<br>• 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.)<br>• FG<br>• 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 information |
|-------|----------|---------|------------|------------|-------------------|
| Lit.  | Not lit. | Lit.    | A401.15    | 80F1       | A403*1            |

\*1 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)

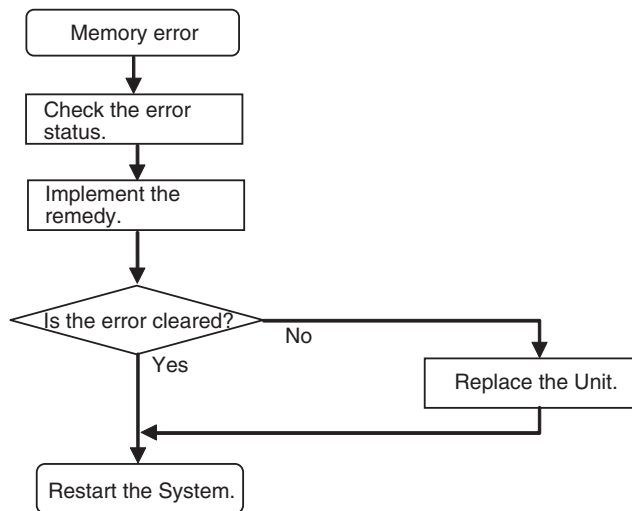
Use any of the following methods to transfer the data again.

- 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 recurrence   |
|--|---|---|--|
| Unit failure <ul style="list-style-type: none"> <li>• Memory element failure</li> <li>• Memory peripheral circuit failure</li> </ul>                                       | A memory error has probably occurred in the following cases. <ul style="list-style-type: none"> <li>• If the error is not cleared when the CPU Unit is restarted after the recovery measures</li> <li>• If the error occurs frequently</li> <li>• If the condition improves when the Unit is replaced.</li> </ul> | 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 <ul style="list-style-type: none"> <li>• Data corruption in memory</li> <li>• Microcomputer malfunctioning</li> <li>• Memory write circuit malfunctioning</li> </ul> | 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.) <ul style="list-style-type: none"> <li>• FG</li> <li>• Power lines</li> </ul> | Same as at the left.   |
| Software error*1   | None  | None  | None   |

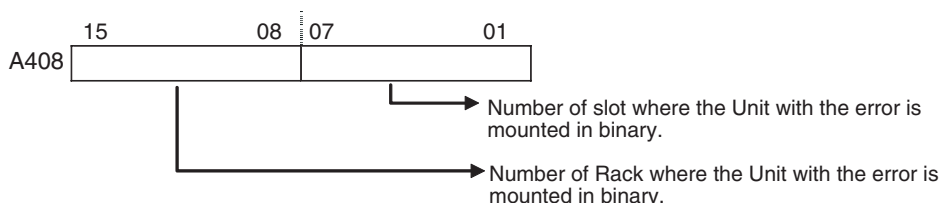
\*1 This refers to errors caused by data corruption. SRAM is used for the CPU Unit user memory. SRAM is affected by cosmic rays (neutrons) and naturally occurring radiation, so data can become corrupted.

## Basic I/O Error (Non-fatal Error)

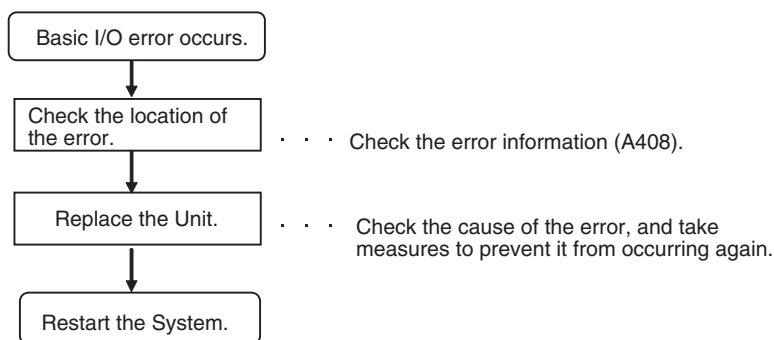
A basic I/O error occurs when there is an error at a Basic I/O Unit.

| POWER | RUN  | ERR/ALM   | Error flag | Error code | Error information |
|-------|------|-----------|------------|------------|-------------------|
| Lit.  | Lit. | Flashing. | A402.12    | 009A       | A408*1            |

\*1 Error Information



### ● Recovery Processing Flow



### ● Error Causes and Remedies

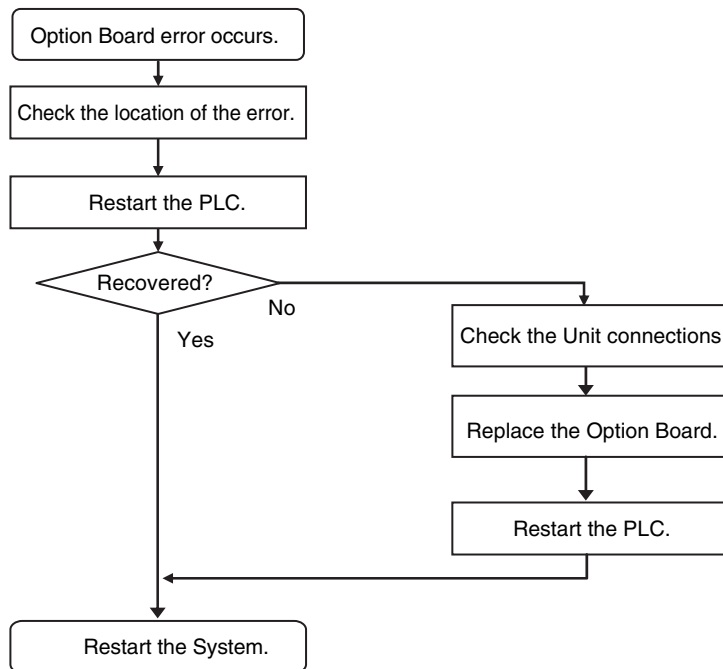
| Suspected cause of error                         | Confirmation method   | Remedy                    | Prevention of recurrence                              |
|--|---|---------------------------|---|
| A fuse is burned out.                            | Measure the voltage at the power supply terminals. 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 information |
|-------|------|-----------|--------------------|------------|-------------------|
| Lit.  | Lit. | Flashing. | A315.13<br>A402.00 | 00D1       | ---               |

### ● Recovery Processing Flow



### ● Error Causes and Remedies

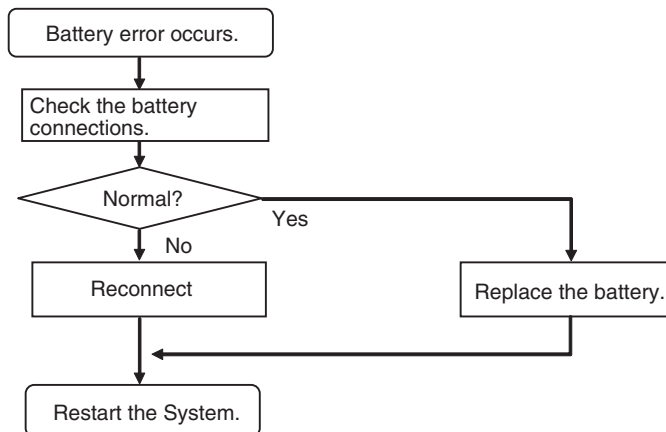
| Suspected cause of error                                     | Confirmation method   | Remedy                    | Prevention of recurrence       |
|--|---|---------------------------|--------------------------------|
| The Option Board was removed while the system was operating. | Check the mating 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 information |
|-------|------|-----------|------------|------------|-------------------|
| Lit.  | Lit. | Flashing. | A402.04    | 00F7       | ---               |

### ● Recovery Processing Flow



### ● Error Causes and Remedies

| Suspected cause of error     | Confirmation method  | Remedy   | Prevention of recurrence          |
|------------------------------|--|--|-----------------------------------|
| 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.<br>For details, refer to 7-2 <i>Replacing the Battery</i> . | Periodically replace the battery. |

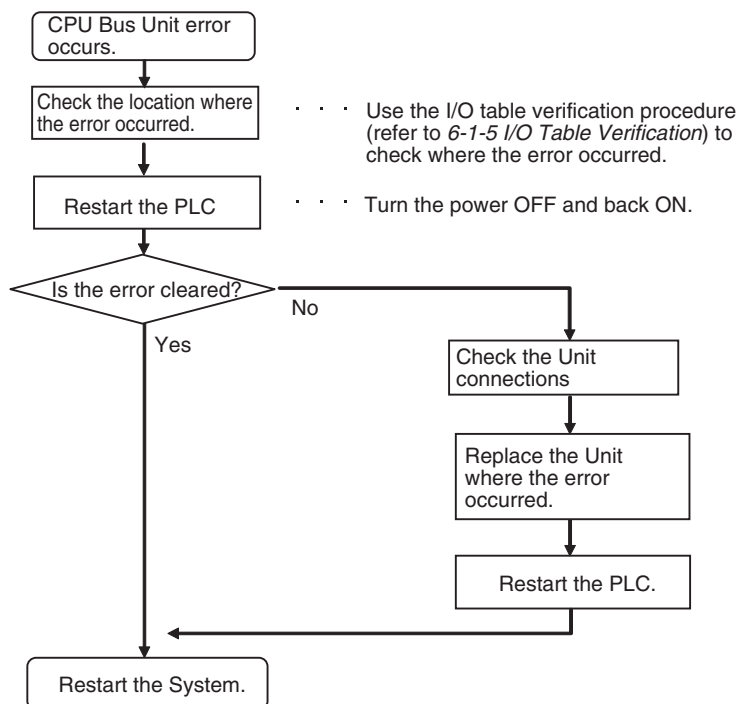
## CPU Bus Unit Error (Non-fatal Error)

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 information |
|-------|------|-----------|------------|--------------|-------------------|
| Lit.  | Lit. | Flashing. | A402.07    | 0200 to 020F | A417*             |

\* 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



### ● Error Causes and Remedies

| Suspected cause of error                   | Confirmation method  | Remedy   | Prevention of recurrence       |
|--|--|--|--------------------------------|
| 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<br>• Data corruption in bus signals  | Restart the CPU Unit and check whether the error occurs again.   | Take measures against noise. (Investigate the path of entry.)<br>• FG<br>• Power lines | Same as at the left.           |

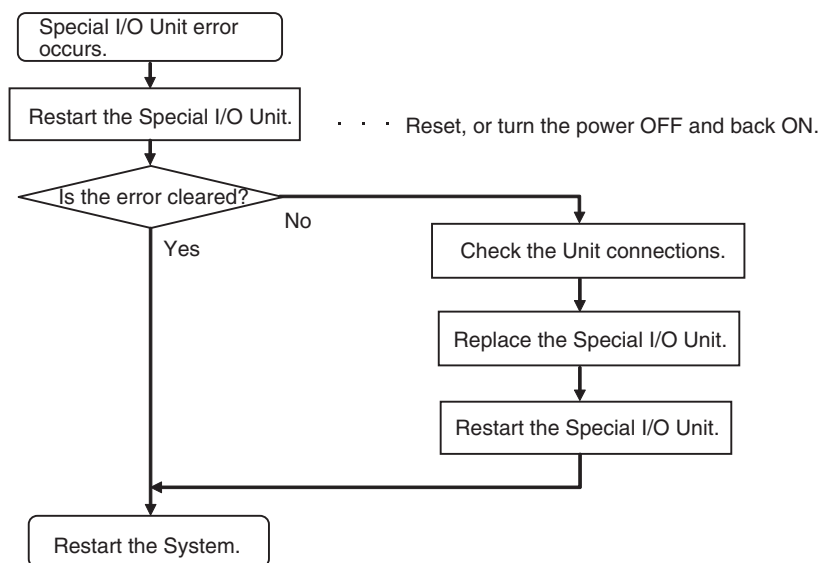
## Special I/O Unit Error (Non-fatal Error)

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<br>or 03FF | A418 to A423 *    |

\* The bit corresponding to the unit number where the error occurred turns ON.

### ● Recovery Processing Flow



### ● Error Causes and Remedies

| Suspected cause of error                   | Confirmation method  | Remedy   | Prevention of recurrence       |
|--|--|--|--------------------------------|
| 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<br>• 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.)<br>• FG<br>• Power lines | Same as at the left.           |

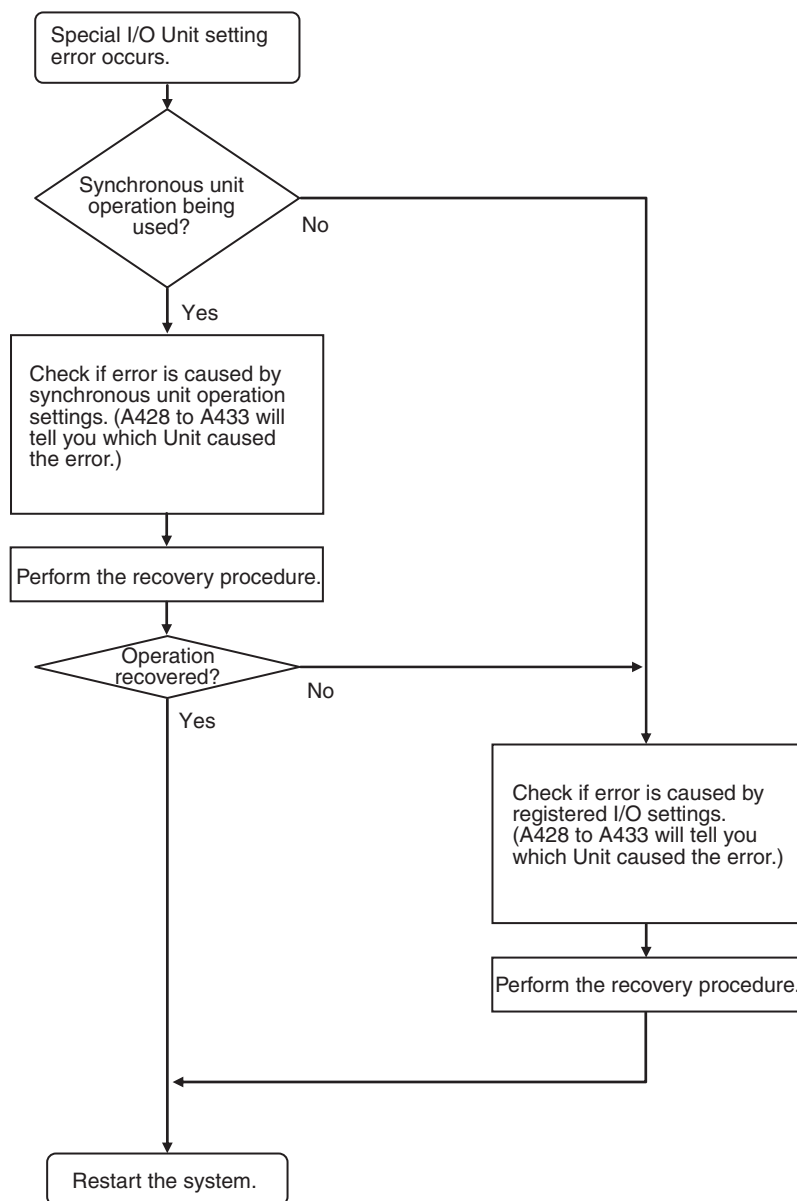
## Special I/O Unit Setting Error (Non-fatal Error)

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 information |
|-------|------|-----------|------------|--------------|-------------------|
| Lit.  | Lit. | Flashing. | A402.02    | 0500 to 055F | A428 to A433*     |

\* 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 recurrence |
|--|--|---|--------------------------|
| A Unit set in the synchronous unit operation settings does not support synchronous unit operation.                       | Check the operation manual for the Unit. | Transfer the settings again.  | Same as at the left.     |
| A Unit set in the synchronous unit operation settings 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 synchronous unit operation settings does not exist on the CPU Rack (i.e., it is on an Expansion Rack). | Check the Units in the PLC.              | Move the Synchronous Unit to the CPU Rack.<br>If I/O tables have been registered, change the registered I/O tables. | Same as at the left.     |

### ● Error Causes and Remedies for Registered I/O Table Settings

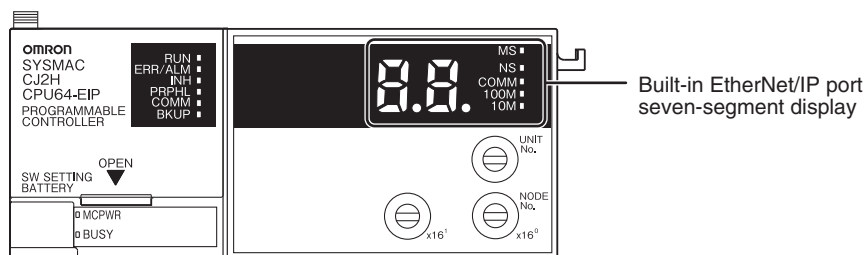
| Suspected cause of error   | Confirmation method         | Remedy                          | Prevention of recurrence |
|--|-----------------------------|---------------------------------|--------------------------|
| The model of a CPU Bus Unit in the registered I/O tables is different from the model 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.



Built-in EtherNet/IP port seven-segment display



#### 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).

## 6-2-2 Checking Error Status at the EtherNet/IP Port Seven-segment 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                              |        |
| Lit green   | Lit or flashing green | Built-in EtherNet/IP port node address | Normal |

### ● Errors Related to CPU Unit Data Exchange

| Indications  |         |           | Error                                |
|--------------|---------|-----------|--------------------------------------|
| MS           | NS      | 7-segment |                                      |
| 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 | ---     | HA        | 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 |                      |
| Flashing red | --- | HH        | CPU Unit Fatal Error |
| ---          | --- | ---       | Output OFF Error     |

### ● Errors Related to the Control Bits

| Indications |     |           | Error                |
|-------------|-----|-----------|----------------------|
| MS          | NS  | 7-segment |                      |
| ---         | --- | C6        | Multiple Switches ON |

### ● Errors Related to the Tag Data Links

| Indications |     |           | Error                                    |
|-------------|-----|-----------|--|
| MS          | NS  | 7-segment |  |
| ---         | --- | 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 |                               |
| 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 |   |
| ---          | ---     | 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 |                    |
| 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: <ul style="list-style-type: none"> <li>• Install surge suppressor.</li> <li>• Install insulation transformer.</li> <li>• Install shielded cables between the Input Unit and the loads.</li> </ul> |
|     |   | 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. | Common terminal screws are loose.        | Tighten screws.                   |
|     |  | 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 not lit). | Faulty output bit (Relay Output Units only)  | Replace relay.   |
|     |   | 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 style="list-style-type: none"> <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 or 16 points, i.e., for the same common. | Loose common terminal screw.   | 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. | 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 <i>A-6-1 Load Short-circuit Protection and Line Disconnection Detection for CJ1W-OD202</i> .   |

### ● Special I/O Units

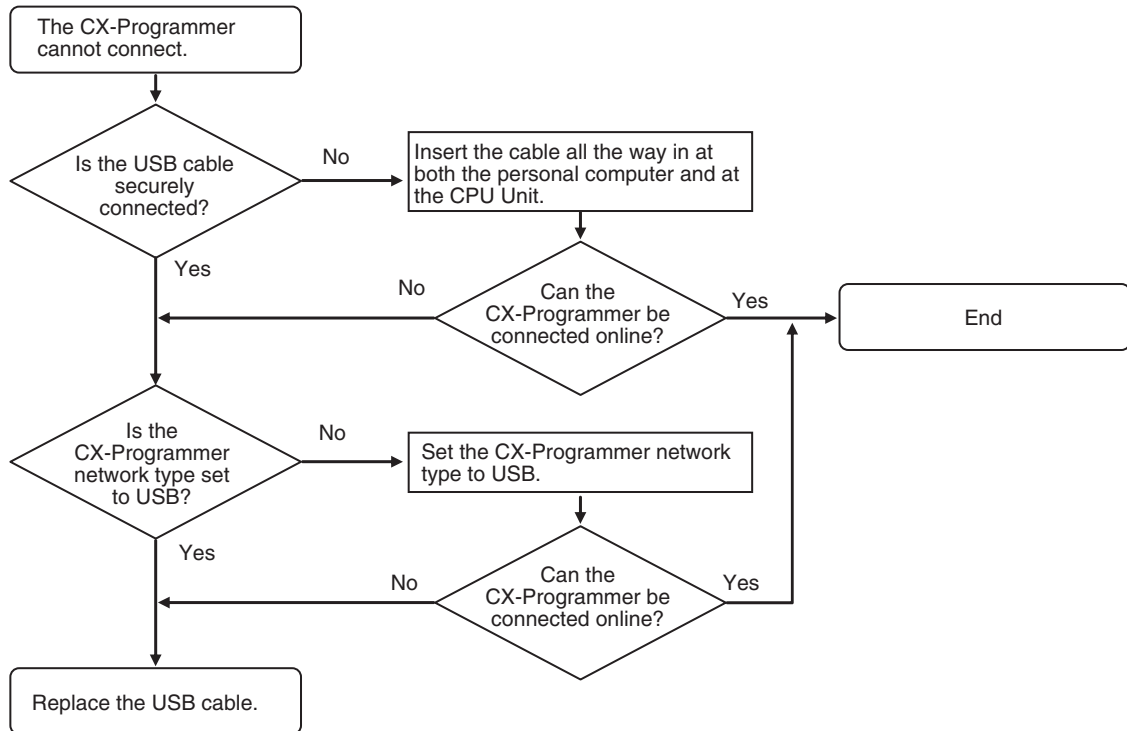
Refer to the *Operation Manual* for the Special I/O Unit to troubleshoot any other errors.

| 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. |

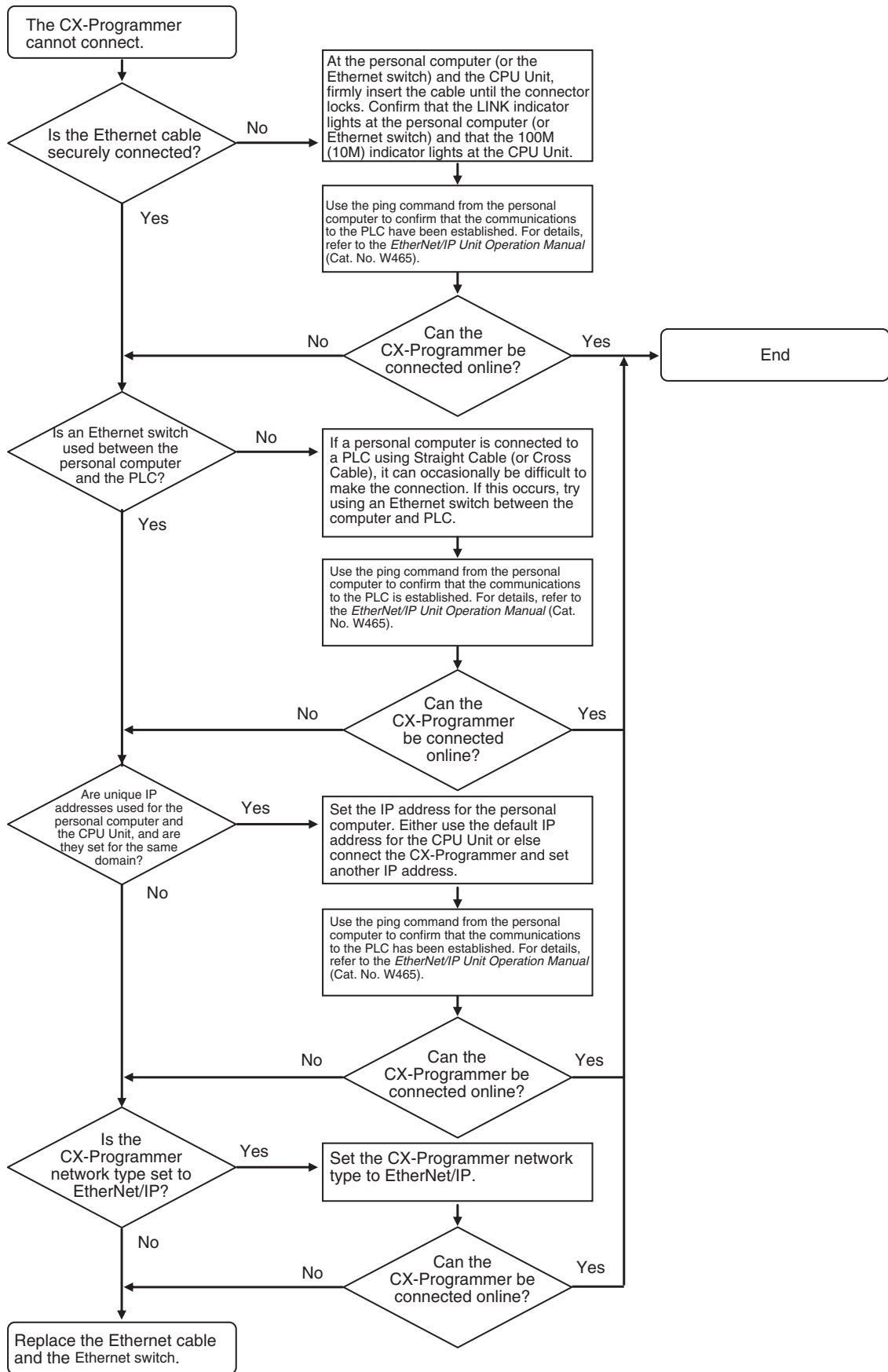
## CX-Programmer Connections

Use the following procedure if the CX-Programmer cannot be connected.

### ● Connecting via the Peripheral (USB) Port

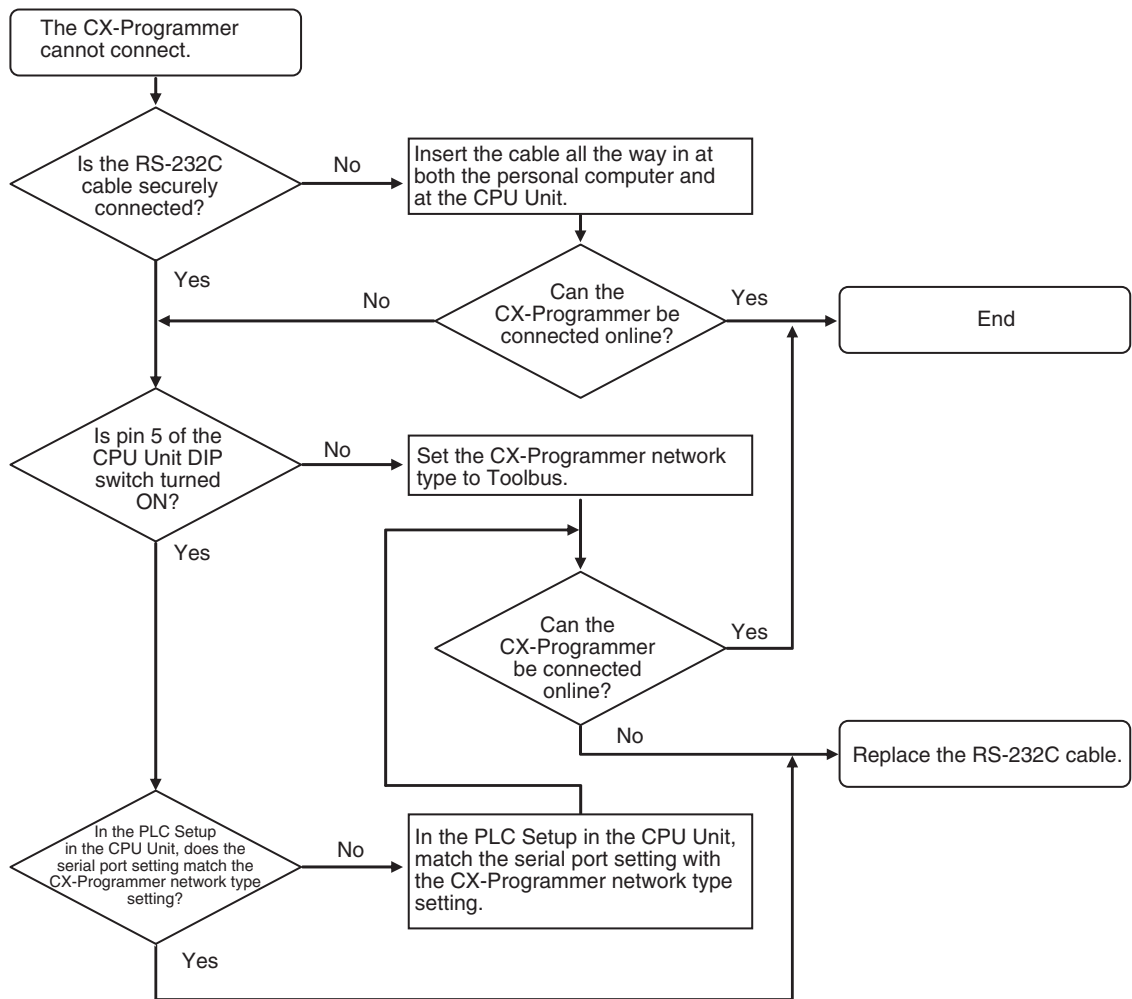


● Connection to the EtherNet/IP Port (CJ2H-CPU6□-EIP and CJ2M-CPU3□ Only)





● Connecting via the Serial Port





# 7

## Inspection and Maintenance

This section describes the inspection and maintenance that is required for CJ2 PLCs.

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|            |  |             |
|------------|--|-------------|
| <b>7-1</b> | <b>Inspections</b> .....                                   | <b>7-2</b>  |
| 7-1-1      | Inspection Points .....                                    | 7-2         |
| 7-1-2      | Unit Replacement Precautions .....                         | 7-4         |
| <b>7-2</b> | <b>Replacing the Battery</b> .....                         | <b>7-5</b>  |
| 7-2-1      | Battery Replacement .....                                  | 7-5         |
| 7-2-2      | Operation When Battery Is Exhausted or Not Installed ..... | 7-8         |
| <b>7-3</b> | <b>Power Supply Unit Replacement Time</b> .....            | <b>7-10</b> |

# 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 temperature. (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 flammable 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.<br>(From 0.75 to 5 years depending on model, power supply rate, and ambient temperature.) | Replace the battery when its service life has passed even if a battery error has not occurred.<br>(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**

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- 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**

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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.

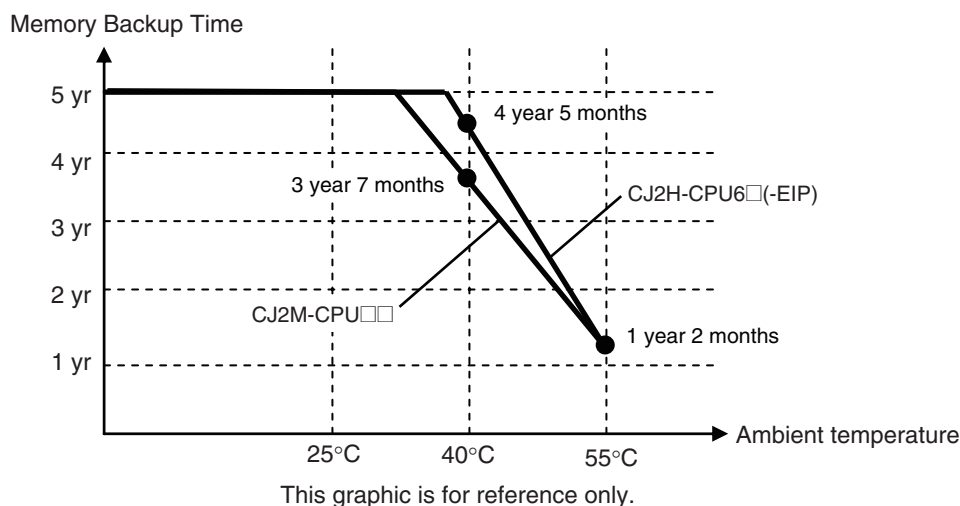
#### Battery Service Life and Replacement Period

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).

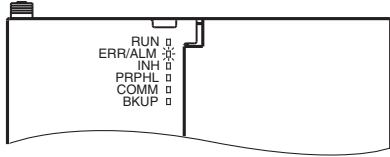
| Model                          | Approx. maximum lifetime | Approx. minimum lifetime*1 | Typical lifetime*1 |
|--------------------------------|--------------------------|----------------------------|--------------------|
| CJ2H-CPU6□(-EIP)<br>CJ2M-CPU□□ | 5 years                  | 1 year 2 months            | 5 years            |

\*1 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.



## 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<sup>\*1</sup>, 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<sup>\*2</sup>) 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.

- \*1 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.

- 1** 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.

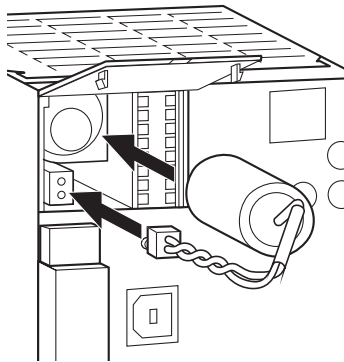




### Additional Information

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 right
  - CJ2M-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 of 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 apply.

- 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.

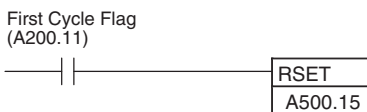
The following table shows when the Battery is required according to the purpose of CPU Unit operation.

| Saving I/O memory is required.        |  | The Battery is required.   |
|---------------------------------------|--|--|
| Saving to I/O memory is not required. | DM/EM Area initial values are required at startup.       | 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 Memory Card.  | Normal operation from flash memory or operation using the Memory Card is possible. |
|                                       | DM/EM Area initial values are set from the user program. |  |
|                                       | DM/EM Area initial values are not required at startup.   |  |

### 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.

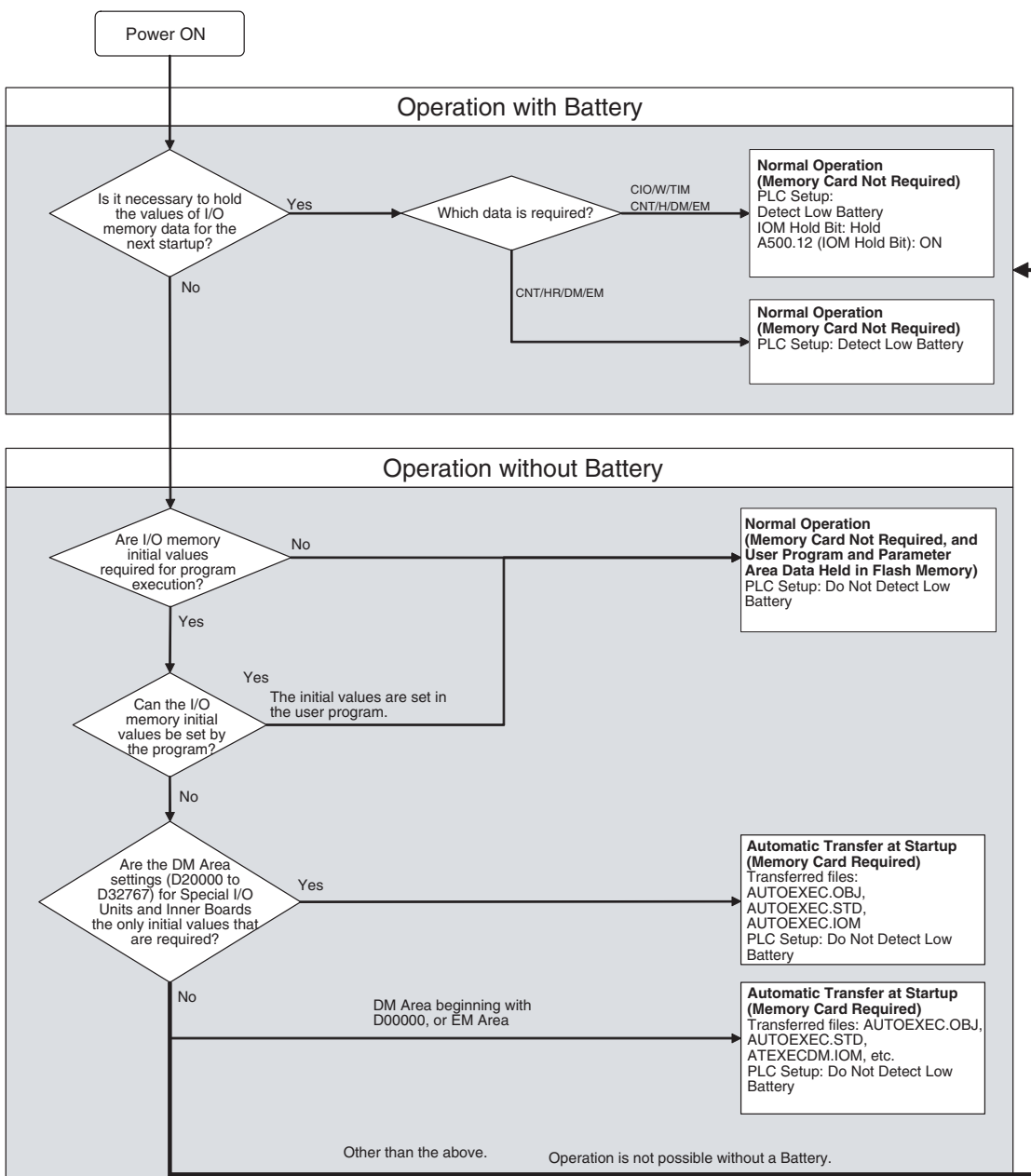
- The value for the Output OFF Bit (A500.15) will become unstable. Moreover, when the Output OFF Bit turns ON, the outputs of all Output Units will turn OFF. To prevent the outputs of all Output Units from turning OFF at startup, take countermeasures such as writing the following program section into 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.



## 7-3 Power Supply Unit Replacement 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.

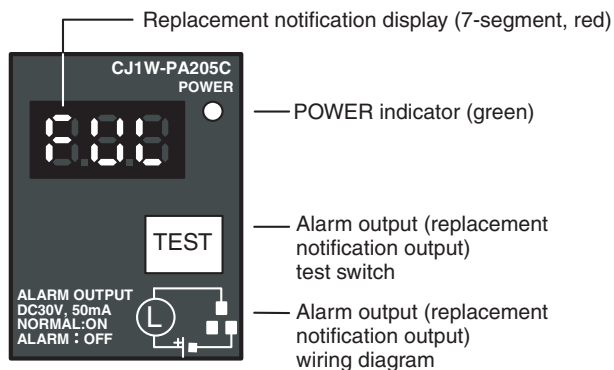
**Note** The replacement notification function provides an indication of when the deterioration of the electrolytic capacitor will prevent the power supply functioning at its full capacity. It does not provide information on failures occurring due to other causes.

### 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<br>With replacement notification |

### Power Supply Unit Replacement Notification Module

- CJ1W-PA205C

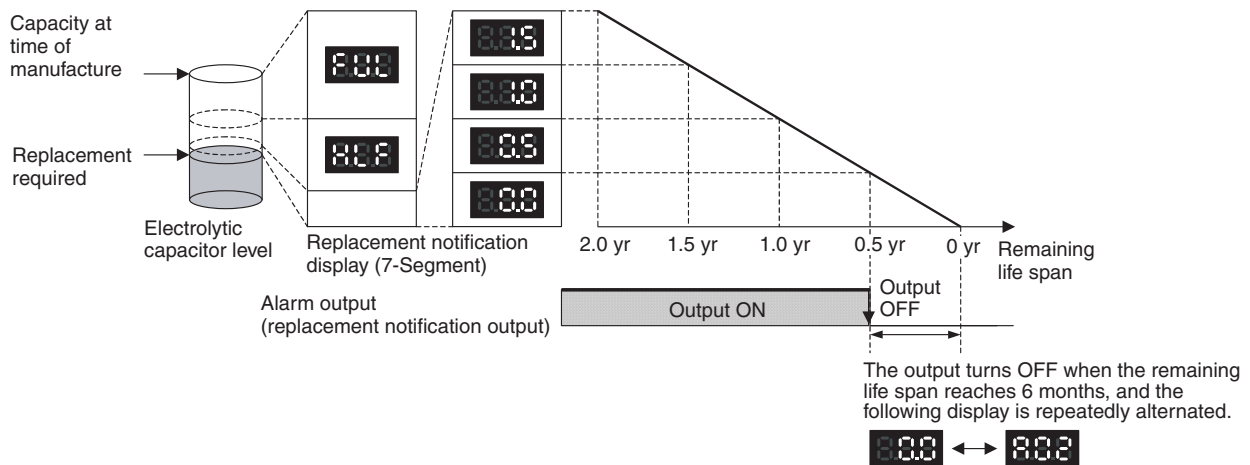


## Function

### ● 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.

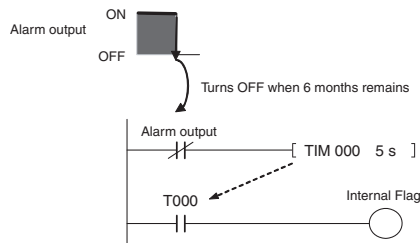
- The AC input to the Power Supply Unit is turned OFF.
- An error is detected by the self-diagnostic function.
- The TEST switch is pressed for at least 3 seconds.



**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.



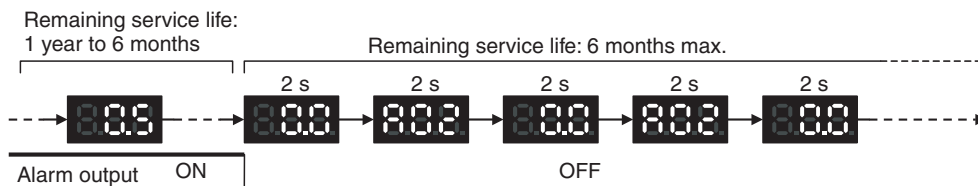
**Precautions for Correct Use**

- 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 OFF.
- 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**

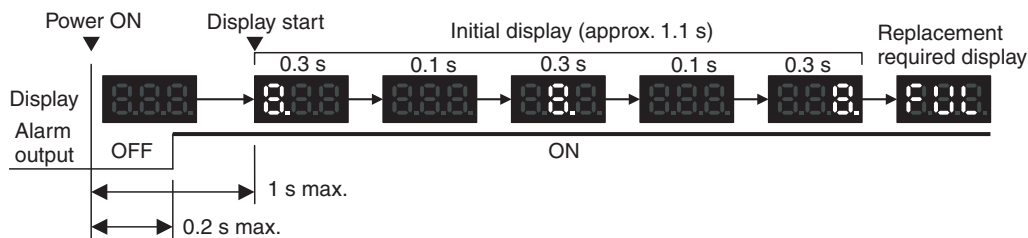
● **Normal Display: Replacement Notification Display**

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.

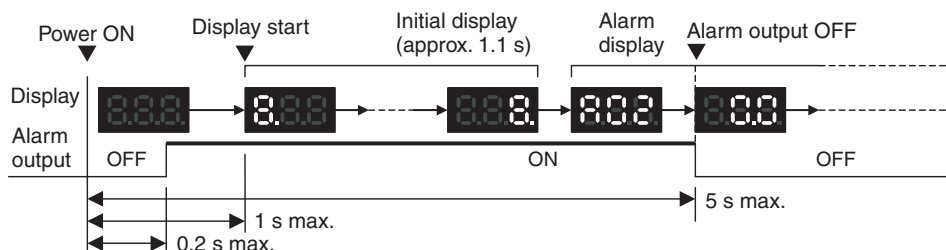


● **Operation When Turning ON the Power**

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.

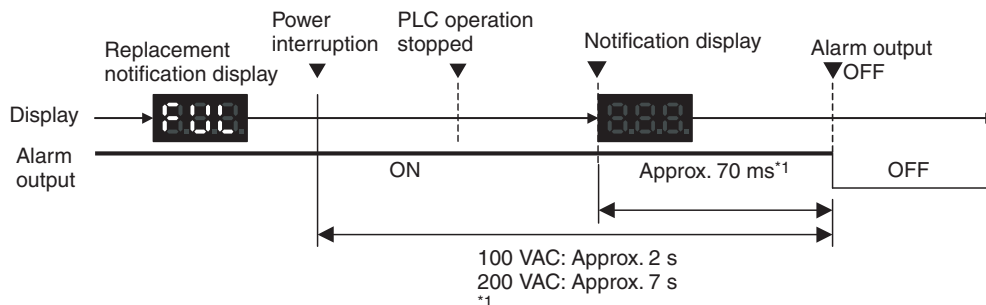


When replacement is already required, the alarm display will follow the initial display. The alarm output will turn ON approximately 0.2 seconds after the power is turned ON, and then turn OFF after approximately 5 seconds.



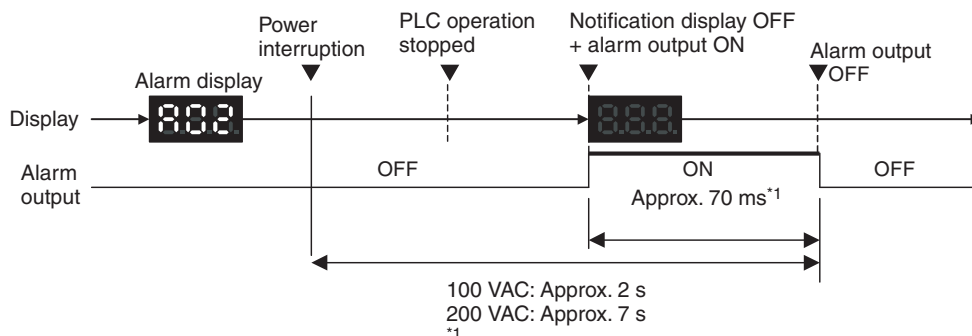
● **Operation at Power OFF**

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).

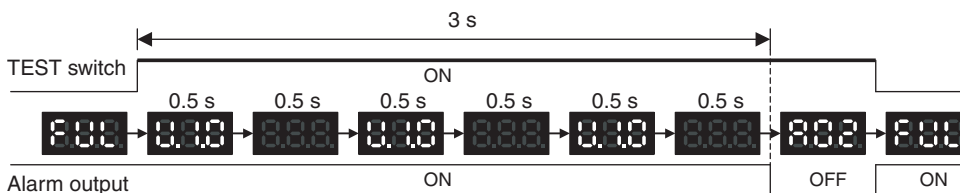
● **Operation When TEST Switch Is Pressed**

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 at least 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 output status | Error details (cause)   | Recovery method  |
|-----------------------|---------|---------------------|---|--|
| Unit overheated error |         | OFF                 | Internal overheating has occurred in the Power Supply Unit as a result of usage under conditions that exceed the specified values, insufficient ventilation, or incorrect installation.*1 | Remove the cause of the overheating error.   |
| Unit error            |         | 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. |

\*1 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 | <p><b>CJ1W-PA205C</b></p> <p>100 to 240 VAC INPUT</p> <ul style="list-style-type: none"> <li>L1</li> <li>L2/N</li> <li>AC input</li> <li>LG</li> <li>GR</li> <li>Unconnected terminals (NC)</li> </ul> | <p><b>CJ1W-PA205R</b></p> <p>100 to 240 VAC INPUT</p> <ul style="list-style-type: none"> <li>L1</li> <li>L2/N</li> <li>AC input</li> <li>LG</li> <li>GR</li> <li>RUN output (RUN contact)</li> </ul> |
| Terminal block position    | <p>Located on the left side of the Unit.</p> <p>Terminal block Alarm output terminals</p>  | <p>Located on the right side of the Unit.</p> <p>Terminal block</p>  |
| POWER indicator            | On replacement notification module   | On hood of Power Supply Unit   |
| Replacement notification   | Supported<br>(7-segment display + transistor outputs)  | Not supported  |



# 8

## Backup Operations

This section describes operations used to back up and restore data.

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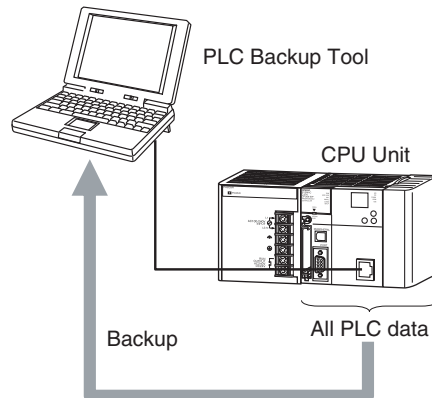
|            |   |            |
|------------|---|------------|
| <b>8-1</b> | <b>Backing Up Data</b> .....                      | <b>8-2</b> |
| <b>8-2</b> | <b>Using a Computer to Back Up Data</b> .....     | <b>8-3</b> |
| 8-2-1      | PLC Backup Tool .....                             | 8-3        |
| 8-2-2      | PLC Backup Tool Operations .....                  | 8-4        |
| <b>8-3</b> | <b>Simple Backup</b> .....                        | <b>8-7</b> |
| 8-3-1      | Overview .....                                    | 8-7        |
| 8-3-2      | Operating Procedures .....                        | 8-8        |
| 8-3-3      | Verifying Backup Operations with Indicators ..... | 8-10       |
| 8-3-4      | Related Auxiliary Bits/Words .....                | 8-12       |
| 8-3-5      | Time Required for Simple Backup .....             | 8-12       |
| 8-3-6      | Data Backed Up Using Simple Backup .....          | 8-13       |

## 8-1 Backing Up Data

There are two methods for backing up PLC data.

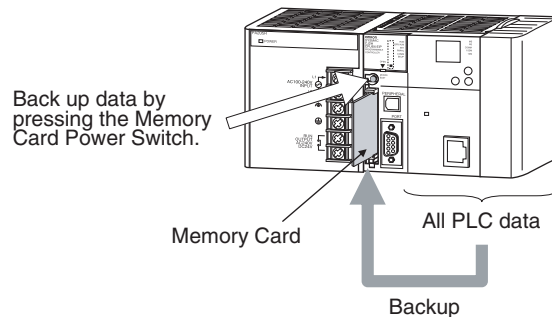
### Using a Computer to Back Up Data to the Computer

- 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

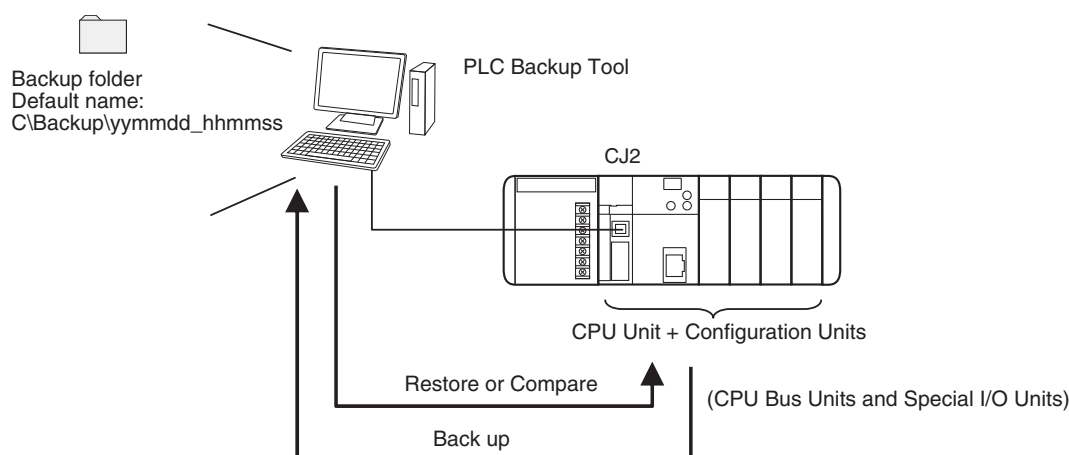
- Operation: DIP switch and Memory Card Power Switch
- Backup destination: A Memory Card inserted in the CPU Unit



## 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<br>Data in the following Units is not backed up: <ul style="list-style-type: none"> <li>• Screen data for an NSJ Controller</li> <li>• SYSMAC SPU Unit data</li> <li>• Customizable Counter Unit data</li> </ul> |
| 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 force-set/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

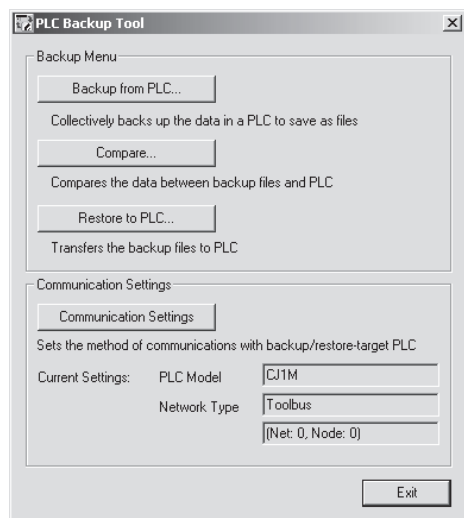
An overview of the PLC Backup Tool is provided below. For details on specific procedures and functions, refer to the *CX-Programmer Operation Manual* (Cat. No. W446).

### ● Starting the PLC Backup Tool

Either of the following methods can be used to start the PLC Backup Tool.

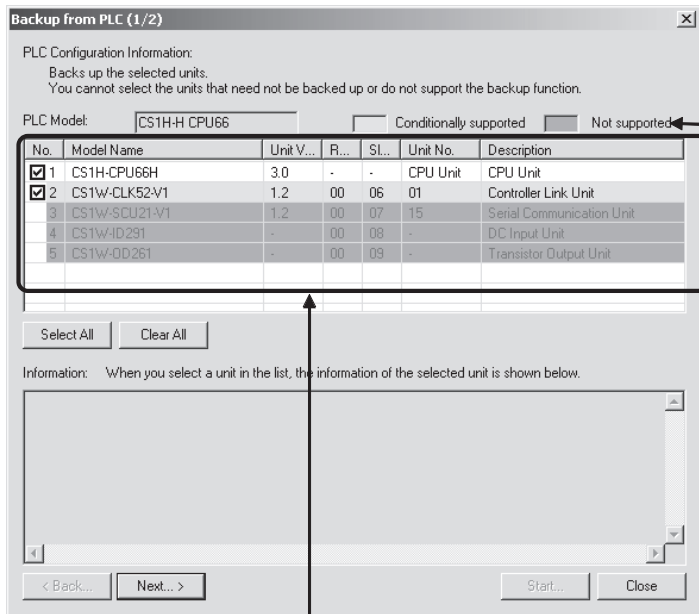
- Select **PLC Backup Tool** from the CX-Programmer Tools Menu.
- Select **Programs – OMRON – CX-One – CX Programmer – PLC Backup Tool** from the Windows Start Menu.

The PLC Backup Tool Dialog Box will be displayed.



## ● Backing Up Data

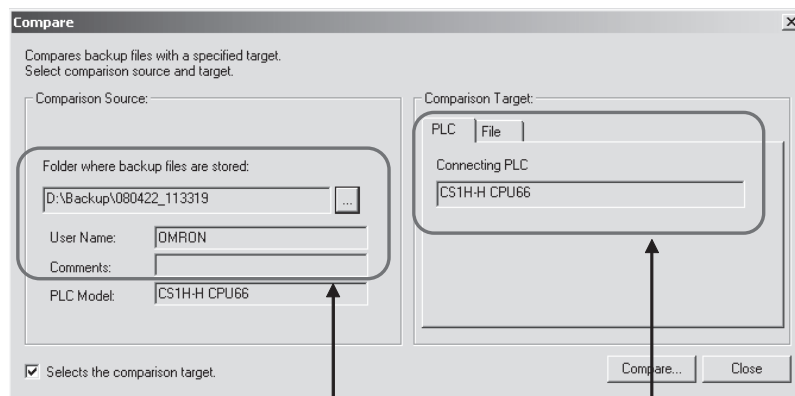
The data in the connected PLC can be backed up to the computer as a batch. A folder named with the date and time will be automatically created under the user-specified folder, and the backup files will be created in that folder.



All Units in the PLC are displayed here.  
Individual Units can be selected for backup.

## ● 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.



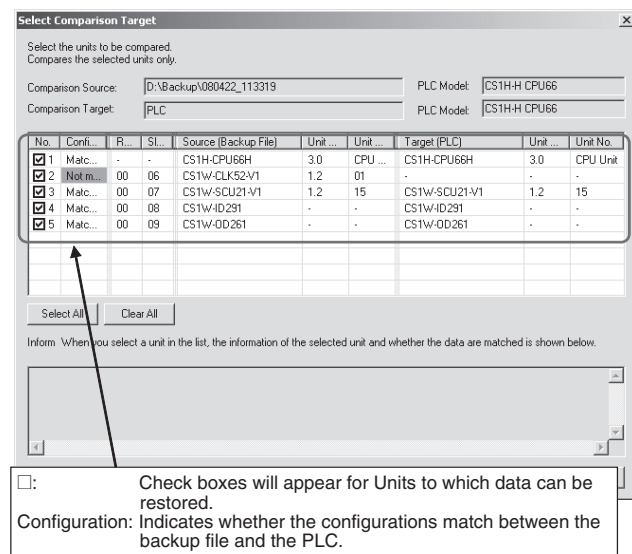
Specify the source backup file on the computer.

Specify the target PLC or backup file to compare.  
PLC: The currently connected PLC will be displayed as the target.  
File: Specify another backup file on the computer as the target.

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 data is restored.
- 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

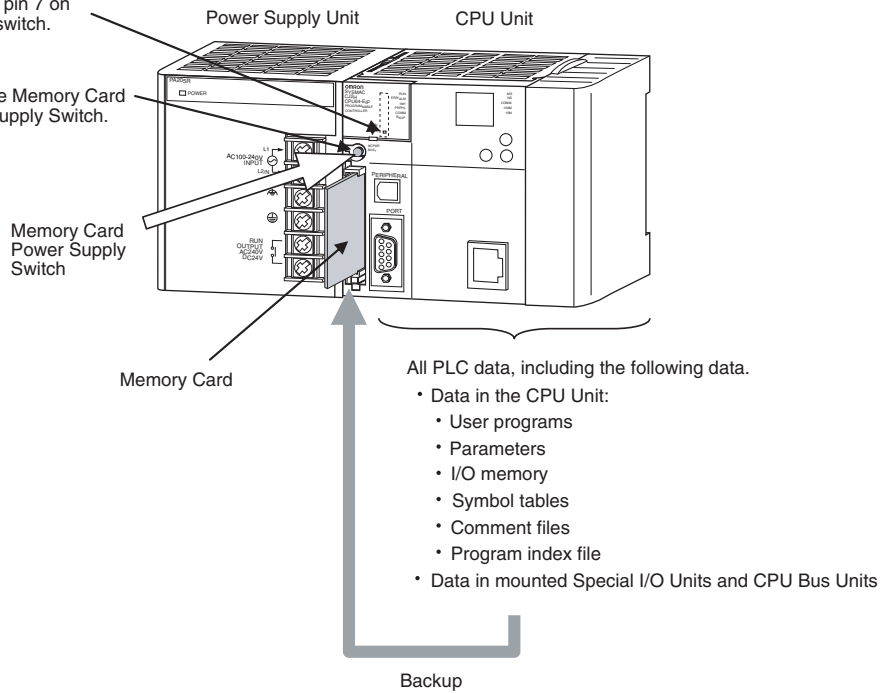
### 8-3-1 Overview

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.

Backing Up Data

1. Turn ON pin 7 on the DIP switch.

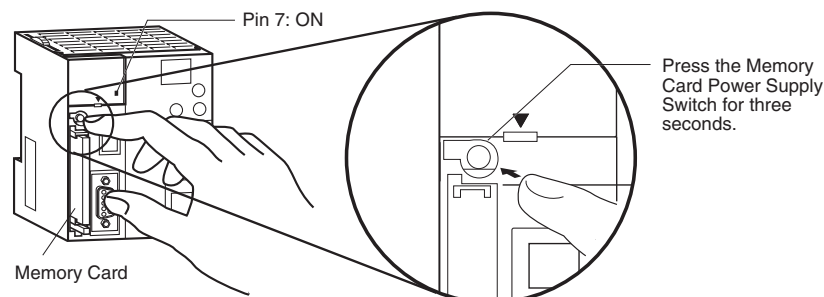
2. Press the Memory Card Power Supply Switch.



| 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.   |
| Restoring data from the Memory Card |                                 |  | Turn the PLC OFF and ON again.<br>(Data restoration is given priority over the automatic transfer at startup.) |
| Comparing data to the Memory Card   | OFF                             |  | Press the Memory Card Power Supply Switch for three seconds.   |

## 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.
- 5** 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

- 1** Turn OFF the PLC power supply.
- 2** 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

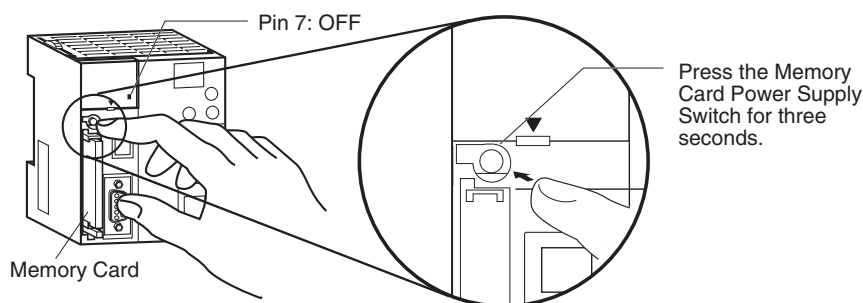
- When the backup files are read from the Memory Card by the backup function, the status of I/O memory and force-set/force-reset bits will be cleared unless the necessary settings are made in the Auxiliary Area and PLC Setup.  
If the IOM Hold Bit (A500.12) is ON and the PLC Setup is set to maintain 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 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, 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.

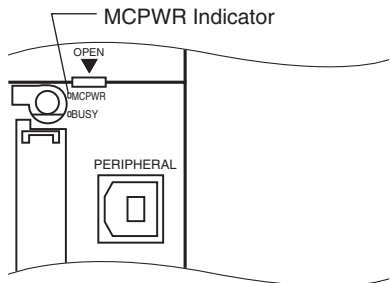
The MCPWR and BUSY indicators will both turn OFF if the data matches. If the MCPWR and BUSY indicators both flash, it means that the data does not match or that an error has occurred. (Refer to *8-3-3 Verifying Backup Operations with Indicators*.)























- 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  |  |
|--|---|---|--|
|  | MCPWR status  | MCPWR status  | Error  |
| Backing up data from the CPU Unit to the Memory Card | <p>█ MCPWR Lit</p> <p>↓</p> <p>Remains lit while the Memory Card Power Switch is pressed.</p> <p>↓</p> <p>█ MCPWR Flashes once.</p> <p>↓</p> <p>█ MCPWR Lit while writing.</p> <p>↓</p> <p>█ MCPWR OFF after data is written.</p> | <p>█ MCPWR Lit</p> <p>↓</p> <p>Remains lit while the Memory Card Power Switch is pressed.</p> <p>↓</p> <p>█ MCPWR Remains flashing.</p> | <p>The data was not backed up due to one of the following errors, and no backup file was created.</p> <ul style="list-style-type: none"> <li>• Insufficient Memory Card capacity</li> <li>• Memory error in CPU Unit</li> <li>• I/O bus error</li> <li>• Data was not read from the Unit to be backed up.</li> </ul> |

| Backup operation  | Normal completion*1  |   | Error occurred   |  |  |
|---|--|---|--|--|--|
|   | MCPWR status   |   | MCPWR status   | Error  |  |
| Restoring data from the Memory Card to the CPU Unit     |  MCPWR        | Lit when power is turned ON.  |  MCPWR        | The data was not restored due to one of the following causes. <ul style="list-style-type: none"> <li>• Program in Memory Card exceeds CPU Unit capacity</li> <li>• Required backup files do not exist in Memory Card.</li> <li>• Program can't be written because it is write-protected (Pin 1 of the DIP switch is ON.)</li> <li>• The EM file was not complete, i.e., a portion was missing.</li> <li>• There are fewer CPU Unit EM banks than backup EM files.</li> </ul> |  |
|   | ↓<br> MCPWR   | Flashes once.   | ↓<br> MCPWR   |  |  |
|   | ↓<br> MCPWR   | Lit while reading.  | ↓<br>Flashes five times.   |  |  |
|   | ↓<br> MCPWR   | OFF after data is read.   | ↓<br> MCPWR   |  | Goes OFF.  |
|   |  |   |  MCPWR        |  | Lit when power is turned ON.                               |
|   |  | ↓<br> MCPWR                                      | Flashes once.  | The I/O tables are not correct (e.g., the same unit number was set twice).   |  |
|   |  | ↓<br> MCPWR                                      | Remains lit.   |  |  |
|   |  |  MCPWR   | Same as for normal completion.   | <ul style="list-style-type: none"> <li>• A Unit was added to the configuration since the data was backed up.</li> <li>• The unit number settings for Special I/O Units or CPU Bus Units are not correct.</li> </ul>  |  |
|   |  | +<br> Special I/O or CPU Bus Unit ERR indicator | Displayed as "H8"  |  |  |
|   |  |  MCPWR   | Same as for normal completion.   | A Unit was added to the configuration since the data was backed up.  |  |
|   |  | +<br> INEE Board READY indicator               | Flashing   |  |  |
| Comparing data between the CPU Unit and the Memory Card |  MCPWR      | Lit   |  MCPWR      | The following comparison errors can occur: <ul style="list-style-type: none"> <li>• Memory error in CPU Unit*2</li> <li>• Incorrect I/O tables (e.g., the same unit number set twice)</li> <li>• Comparison results (of backup files on Memory Card and data in PLC) do not match.</li> <li>• Required backup files do not exist in Memory Card.*2</li> <li>• I/O bus error</li> </ul>   |  |
|   | ↓  | Remains lit while the Memory Card Power Switch is pressed.  | ↓  |  | Remains lit while the Memory Card Power Switch is pressed. |
|   | ↓<br> MCPWR | Flashes once.   | ↓<br> MCPWR |  | Remains flashing.  |
|   | ↓<br> MCPWR | Lit while comparing.  |  |  |  |
|   | ↓<br> MCPWR | OFF after data is compared.   |  |  |  |

\*1 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.

\*2 The backup files for Units and Boards are also compared.

### 8-3-4 Related Auxiliary Bits/Words

| Name                         | Address | Description  |
|------------------------------|---------|--|
| File Memory Operation Flag   | A343.13 | ON when any of the following are being performed. OFF when execution has been completed. <ul style="list-style-type: none"> <li>• Memory Card detection</li> <li>• CMND instruction executed for local CPU Unit</li> <li>• FREAD/FWRIT instructions</li> <li>• Program replacement via special control bits</li> <li>• Simple backup operation</li> </ul> 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.   |

### 8-3-5 Time Required for Simple Backup

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 |
|--|--------|---------|---------|-----------|-----------|----------|
| <ul style="list-style-type: none"> <li>User program</li> <li>Network symbols*</li> </ul> | Yes    | Yes     | Yes     | BACKUP    | .OBJ      | Yes      |

\* Network symbols are supported by the CJ2 CPU Units of CJ2H-CPU6□-EIP/CJ2M-CPU3□, CJ2H-CPU6□ with unit version 1.6 or later, and CJ2M-CPU1□ with unit version 2.2 or later. Program files including network symbols cannot be transferred to the CJ2 CPU Unit that does not support the network symbols.

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 |
|--|--------|---------|---------|-----------|-----------|----------|
| <ul style="list-style-type: none"> <li>PLC Setup</li> <li>PLC name</li> <li>Registered I/O tables</li> <li>Routing tables</li> <li>CPU Bus Unit setup</li> <li>Etc.</li> </ul> | Yes    | Yes     | Yes     | BACKUP    | .STD      | Yes      |

#### 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.)

| I/O memory                               |   | Backup | Restore              | Compare | File name | Extension | Required |
|--|---|--------|----------------------|---------|-----------|-----------|----------|
| Area                                     | Addresses   |        |                      |         |           |           |          |
| DM Area                                  | D20000 to D32767  | Yes    | Yes                  | No      | BACKUP    | .IOM      | Yes      |
| CIO Area                                 | CIO 0000 to CIO 6143<br>(Includes forced status.)   | Yes    | ---<br>(See note 3.) | No      | BAUPIOR   | .IOR      | Yes      |
| Work Area                                | W000 to W511<br>(Includes forced status.)   | Yes    | ---<br>(See note 3.) | No      |           |           |          |
| 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    | ---<br>(See note 3.) | No      |           |           |          |
| Counter Completion Flags and Counter PVs | C0000 to C4095  | Yes    | Yes                  | No      |           |           |          |
| DM Area                                  | D00000 to D19999  | Yes    | Yes                  | No      | BACK-UPDM | .IOM      | Yes      |
| EM Area (See notes 1 and 2.)             | E□_0 to E□_32767<br>(□: Bank No. 0 to 18 hex. The maximum bank number depends on the CPU Unit model.) | Yes    | Yes                  | No      | BKU-PEM□  | .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 □□<br>(The contents depend on the Unit.) | Yes    | Yes     | Yes     | BACKUP<br>□□ | .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.

File name: BACKUP□□.PRM



**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<br>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)<br><br>(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                                    | <ul style="list-style-type: none"> <li>• Registration tables</li> <li>• Software settings</li> <li>• Network parameters</li> <li>• Slave parameters</li> </ul>   | 3.5 Kbytes                        |
| Motion Control Units        | CJ1W-MCH71                                    | <ul style="list-style-type: none"> <li>• Positioning data</li> <li>• System parameters</li> <li>• G-language programming</li> </ul>  | 8,192 Kbytes                      |

| Applicable Units       | Model numbers                  | Data backed up for simple backup  | Data capacity used in Memory Card |
|------------------------|--------------------------------|---|-----------------------------------|
| Position Control Units | CJ1W-NCF71(-MA)                | <ul style="list-style-type: none"> <li>• Common parameters</li> <li>• Individual axis parameters</li> </ul>   | 64 Kbytes                         |
|                        | CJ1W-NC113/133/213/233/413/433 | <ul style="list-style-type: none"> <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         | <ul style="list-style-type: none"> <li>• Common parameters</li> <li>• Axis parameters</li> <li>• Memory operation parameters</li> <li>• Memory operation data</li> <li>• Memory operation conditions data</li> </ul>                                      | 220 Kbytes                        |
|                        | CJ1W-NC281/481/881/F81/482/882 | <ul style="list-style-type: none"> <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                     | <ul style="list-style-type: none"> <li>• Unit settings</li> <li>• Tag data link settings</li> </ul>   | 459 Kbytes                        |
|                        | CJ1W-EIP21S                    | <ul style="list-style-type: none"> <li>• Unit settings</li> <li>• Tag data link settings</li> <li>• User authentication setting</li> </ul>  | 364 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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|   |              |
|---|--------------|
| <b>A-1 Specifications of Basic I/O Units</b>  | <b>A-3</b>   |
| A-1-1 Overview of Units   | A-3          |
| A-1-2 Basic I/O Units   | A-5          |
| A-1-3 Precautions on Contact Output Units   | A-62         |
| A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals            | A-64         |
| <b>A-2 Dimensions</b>   | <b>A-101</b> |
| A-2-1 CJ2H CPU Units  | A-101        |
| A-2-2 CJ2M CPU Units  | A-102        |
| A-2-3 Power Supply Units  | A-103        |
| A-2-4 Basic I/O Units   | A-105        |
| A-2-5 I/O Control Unit and I/O Interface Unit   | A-108        |
| A-2-6 I/O Memory Card   | A-108        |
| A-2-7 Pulse I/O Modules (CJ2M CPU Unit Only)  | A-108        |
| A-2-8 Serial Option Boards (CJ2M-CPU3□ Only)  | A-109        |
| A-2-9 B7A Interface Unit  | A-110        |
| <b>A-3 Fatal and Non-fatal Error Details</b>  | <b>A-111</b> |
| A-3-1 Fatal Errors  | A-111        |
| A-3-2 Non-fatal Errors  | A-119        |
| <b>A-4 Connecting to a Serial Port on the CPU Unit</b>  | <b>A-122</b> |
| A-4-1 Serial Port Interface Types and Specifications  | A-122        |
| A-4-2 Connection Examples   | A-128        |
| A-4-3 Applicable Connectors and Recommended Cables  | A-143        |
| <b>A-5 Installing the USB Driver</b>  | <b>A-150</b> |
| <b>A-6 Load Short-circuit Protection and Line Disconnection Detection for Basic I/O Units</b> | <b>A-160</b> |
| A-6-1 Load Short-circuit Protection and Line Disconnection Detection for CJ1W-OD202           | A-160        |
| A-6-2 Load Short-circuit Protection for CJ1W-OD204/OD212/OD232/MD232                          | A-162        |
| <b>A-7 Relay Output Noise Reduction Methods</b>   | <b>A-164</b> |

**A-8 Functions Supported for Unit Versions .....A-166**  
A-8-1 CJ2H CPU Units .....A-166  
A-8-2 CJ2M CPU Units .....A-169

# A-1 Specifications of Basic I/O Units

## A-1-1 Overview of Units

### Basic I/O Units

#### ● Basic Input Units

| Type of Unit              | Name                           | Specifications                 |            | Model        | Page       |
|---------------------------|--------------------------------|--------------------------------|------------|--------------|------------|
| Basic Input Units         | DC Input Units                 | Terminal block, 12 to 24 VDC   | 8 inputs   | CJ1W-ID201*1 | A-5        |
|                           |                                | Terminal block, 24 VDC,        | 16 inputs  | CJ1W-ID211   | A-7        |
|                           |                                |                                |            |              | CJ1W-ID212 |
|                           |                                | Fujitsu/OTAX connector, 24 VDC | 32 inputs  | CJ1W-ID231   | A-9        |
|                           |                                | MIL connector, 24 VDC          | 32 inputs  | CJ1W-ID232   | A-11       |
|                           |                                |                                |            |              | CJ1W-ID233 |
|                           | Fujitsu/OTAX 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         |            |

\*1 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 Output 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 Output Unit       | Terminal block, 250 VAC/24 VDC, 0.6 A                        | 8 outputs                                   | CJ1W-OA201*1   | A-27         |              |
|                    | Transistor Output Units | Sinking outputs  | Terminal block, 12 to 24 VDC, 2 A           | 8 outputs  | CJ1W-OD201*1 | A-28         |
|                    |                         |  | 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/OTAX 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/OTAX 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         |
|                    |                         |  | Sourcing outputs                            | Terminal block, 24 VDC, 2 A, load short-circuit protection, line disconnection detection | 8 outputs    | CJ1W-OD202*1 |
|                    |                         | 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         |

\*1 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 Units   | 24-VDC Inputs/Transistor Output Units | Sinking output  | Fujitsu/OTAX connector<br>Inputs: 24 VDC<br>Outputs: 12 to 24 VDC, 0.5 A | 16 inputs<br>16 outputs | CJ1W-MD231 | A-50 |
|   |                                       |   | MIL connector<br>Inputs: 24 VDC<br>Outputs: 12 to 24 VDC, 0.5 A          |                         | CJ1W-MD233 | A-52 |
|   |                                       | Sinking output  | Fujitsu/OTAX connector<br>Inputs: 24 VDC<br>Outputs: 12 to 24 VDC, 0.3 A | 32 inputs<br>32 outputs | CJ1W-MD261 | A-54 |
|   |                                       |   | MIL connector<br>Inputs: 24 VDC<br>Outputs: 12 to 24 VDC, 0.3 A          |                         | CJ1W-MD263 | A-56 |
|   | Sourcing output                       | MIL connector<br>Input: 24 VDC<br>Outputs: 24 VDC, 0.5 A, load short-circuit protection | 16 inputs<br>16 outputs  | CJ1W-MD232              | A-58       |      |
|   | TTL I/O Units                         |   | Inputs: 5 VDC<br>Outputs: 5 VDC, 35 mA                                   | 32 inputs<br>32 outputs | CJ1W-MD563 | A-60 |
|   | Precautions on Contact Output Units   |   |  |                         |            | A-62 |
| Load short-circuit protection and line disconnection detection for CJ1W-OD202 |                                       |   |  |                         | A-160      |      |
| Load short-circuit protection for CJ1W-OD204/OD212/OD232/MD232                |                                       |   |  |                         | A-162      |      |

**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:

$$\text{Current capacity} = (\text{Maximum load current}) + (\text{Consumption current in the drive circuit})$$

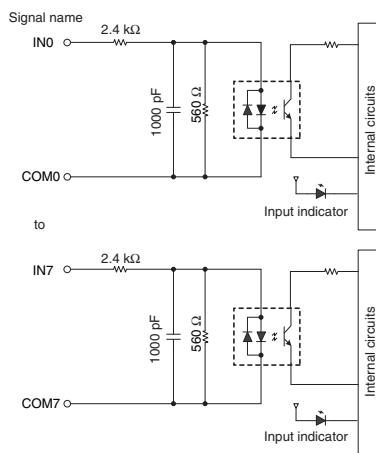
**A-1-2 Basic I/O Units**

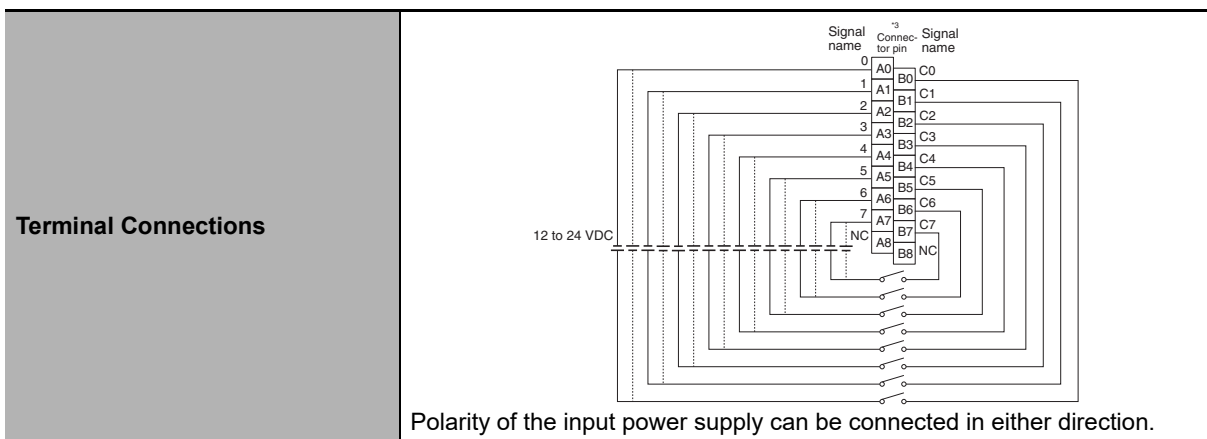
**Basic Input Units with Terminal Blocks**

● **CJ1W-ID201 DC Input Unit (12 to 24-VDC, 8 Points)**

|   |   |
|---|---|
| <b>Name</b>                               | 8-point DC Input Unit with Terminal Block   |
| <b>Model</b>                              | CJ1W-ID201  |
| <b>Rated Input Voltage</b>                | 12 to 24 VDC  |
| <b>Rated Input Voltage Range</b>          | 10.2 to 26.4 VDC  |
| <b>Input Impedance</b>                    | 2.4 kΩ  |
| <b>Input Current</b>                      | 10 mA typical (at 24 VDC)   |
| <b>ON Voltage/ON Current</b>              | 8.8 VDC min./3 mA min.  |
| <b>OFF Voltage/OFF Current</b>            | 3 VDC max./1 mA max.  |
| <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Number of Circuits</b>                 | 8 independent circuits  |
| <b>Number of Simultaneously ON Points</b> | 100% simultaneously ON  |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.                        |
| <b>Internal Current Consumption</b>       | 80 mA max.  |
| <b>Weight</b>                             | 110 g max.  |

**Circuit Configuration**





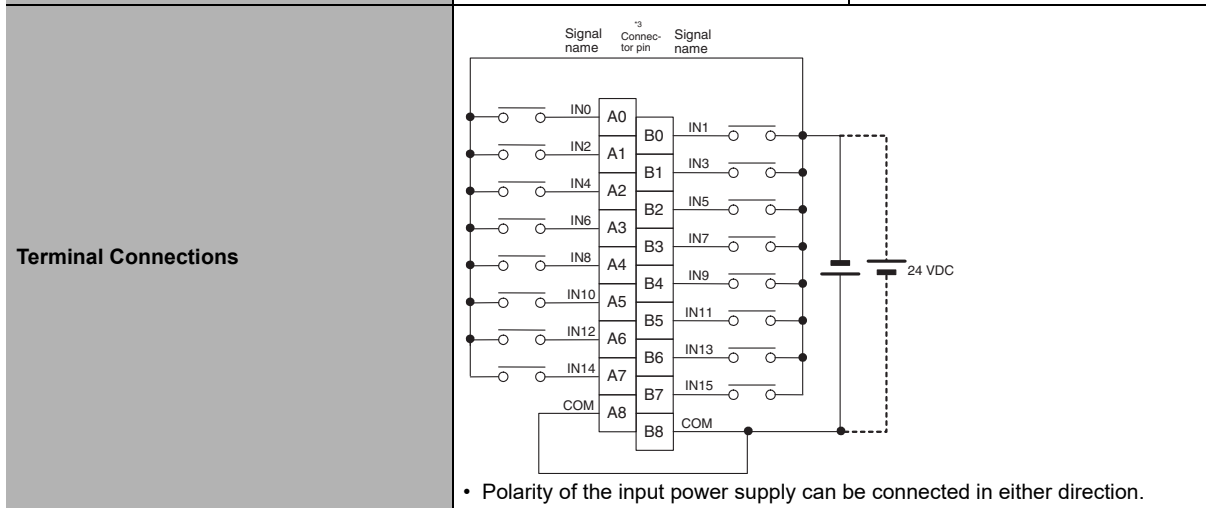
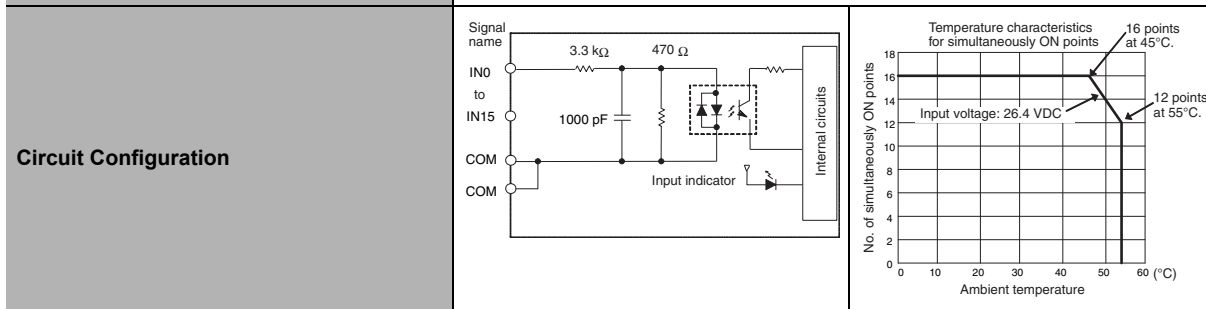
- \*1 The ON response time will be 20  $\mu$ s maximum and OFF response time will be 400  $\mu$ s maximum even if the response time are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.
- \*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)

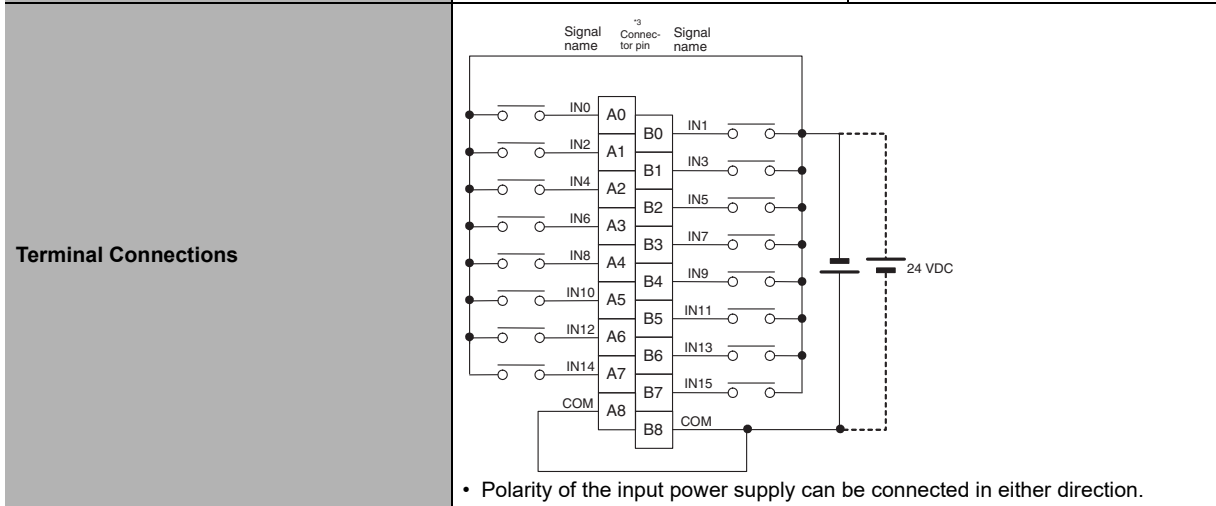
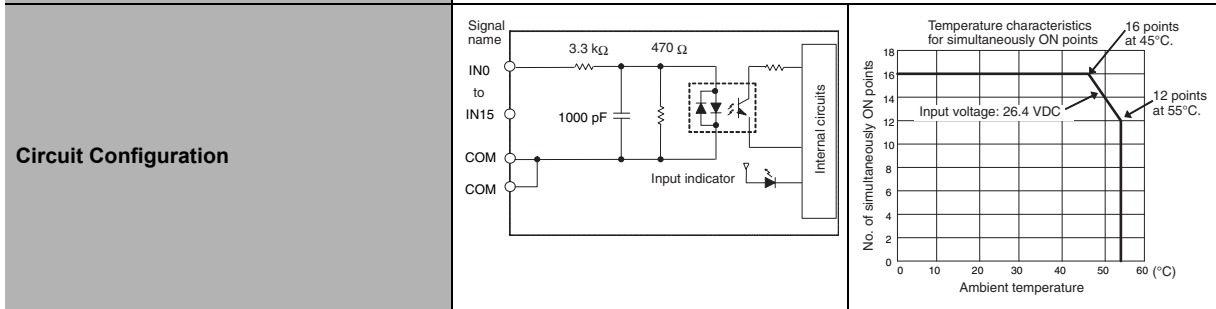
|   |  |
|---|--|
| <b>Name</b>                               | 16-point DC Input Unit with Terminal Block   |
| <b>Model</b>                              | CJ1W-ID211   |
| <b>Rated Input Voltage</b>                | 24 VDC   |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC   |
| <b>Input Impedance</b>                    | 3.3 kΩ   |
| <b>Input Current</b>                      | 7 mA typical (at 24 VDC)   |
| <b>ON Voltage/ON Current</b>              | 14.4 VDC min./3 mA min.  |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.   |
| <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)* <sup>1</sup> , * <sup>2</sup> |
| <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup)* <sup>1</sup> , * <sup>2</sup> |
| <b>Number of Circuits</b>                 | 16 (16 points/common, 1 circuit)   |
| <b>Number of Simultaneously ON Points</b> | 100% simultaneously ON (at 24 VDC)<br>(Refer to the following illustration.)   |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>                | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.                                     |
| <b>Internal Current Consumption</b>       | 80 mA max.   |
| <b>Weight</b>                             | 110 g max.   |



- \*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs 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)

|   |   |
|---|---|
| <b>Name</b>                               | 16-point DC Input Unit with Terminal Block  |
| <b>Model</b>                              | CJ1W-ID212  |
| <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC  |
| <b>Input Impedance</b>                    | 3.3 kΩ  |
| <b>Input Current</b>                      | 7 mA typical (at 24 VDC)  |
| <b>ON Voltage/ON Current</b>              | 14.4 VDC min./3 mA min.   |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Number of Circuits</b>                 | 16 (16 points/common, 1 circuit)  |
| <b>Number of Simultaneously ON Points</b> | 100% simultaneously ON (at 24 VDC)<br>(Refer to the following illustration.)  |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.                        |
| <b>Internal Current Consumption</b>       | 130 mA max.   |
| <b>Weight</b>                             | 110 g max.  |



- \*1 The ON response time will be 15 μs maximum and OFF response time will be 90 μs 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.

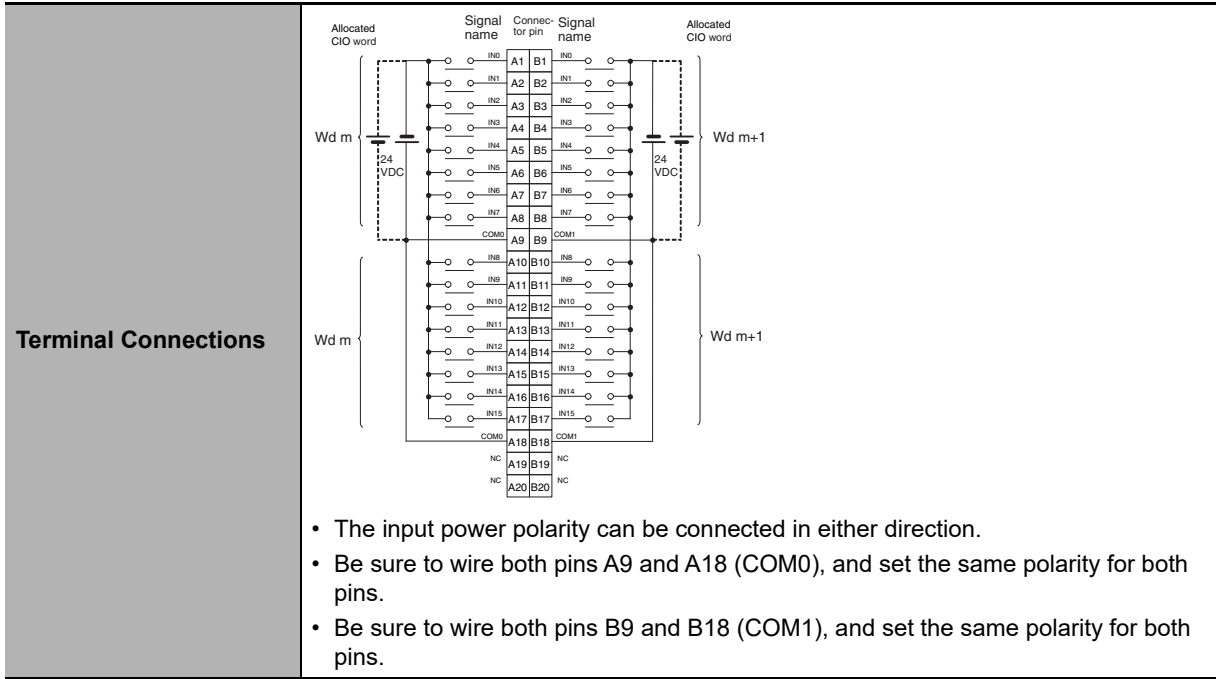
● CJ1W-ID231 DC Input Unit (24 VDC, 32 Points)

|   |   |
|---|---|
| <b>Name</b>                               | 32-point DC Input Unit with Fujitsu/OTAX Connector  |
| <b>Model</b>                              | CJ1W-ID231  |
| <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC  |
| <b>Input Impedance</b>                    | 5.6 kΩ  |
| <b>Input Current</b>                      | 4.1 mA typical (at 24 VDC)  |
| <b>ON Voltage/ON Current</b>              | 19.0 VDC min./3 mA min.   |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Number of Circuits</b>                 | 32 (16 points/common, 2 circuits)   |
| <b>Number of Simultaneously ON Points</b> | 75% (12 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustration.)   |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.                        |
| <b>Internal Current Consumption</b>       | 90 mA max.  |
| <b>Weight</b>                             | 70 g max.   |
| <b>Accessories</b>                        | None  |

**Circuit Configuration**

**Number of Simultaneously ON Points vs. Ambient Temperature Characteristic**

| Ambient Temperature (°C) | 24 VDC (Points) | 26.4 VDC (Points) |
|--------------------------|-----------------|-------------------|
| 40                       | 32              | 32                |
| 48                       | 32              | 26                |
| 55                       | 12              | 10                |



\*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.

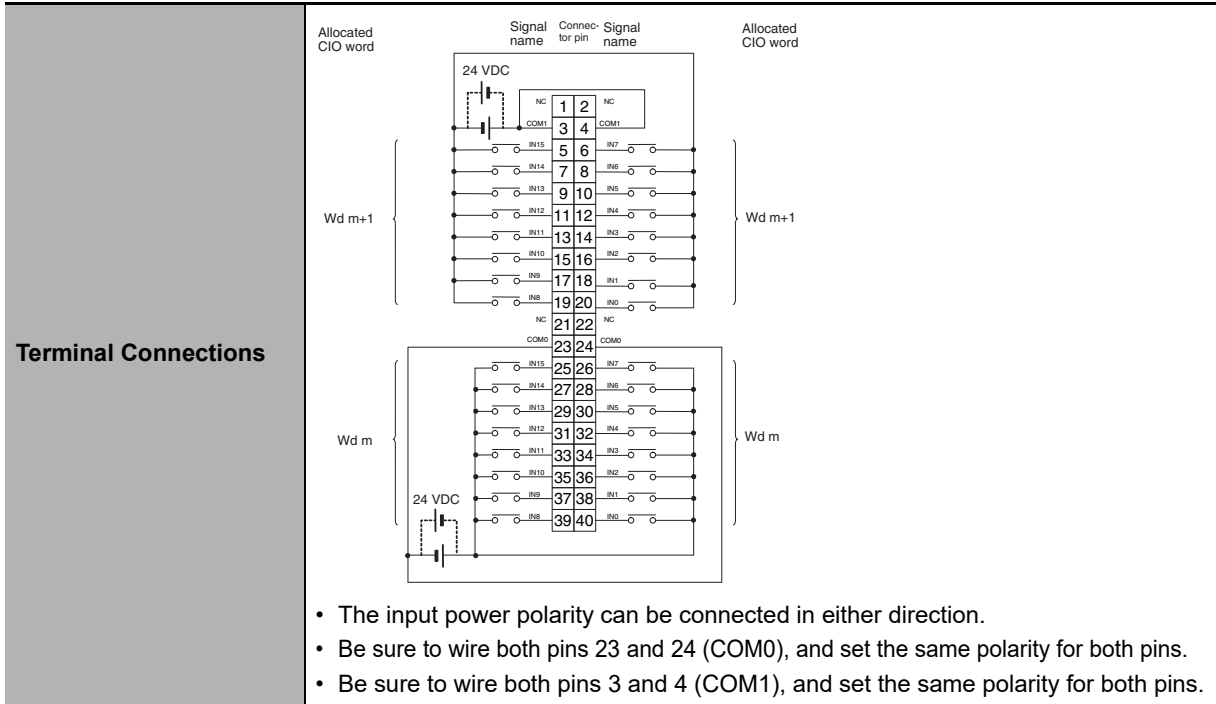
**Note** Observe the following restrictions when connecting to a 2-wire sensor.

- 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)

|   |   |
|---|---|
| <b>Name</b>                               | 32-point DC Input Unit with MIL Connector   |
| <b>Model</b>                              | CJ1W-ID232  |
| <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC  |
| <b>Input Impedance</b>                    | 5.6 kΩ  |
| <b>Input Current</b>                      | 4.1 mA typical (at 24 VDC)  |
| <b>ON Voltage/ON Current</b>              | 19.0 VDC min./3 mA min.   |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Number of Circuits</b>                 | 32 (16 points/common, 2 circuits)   |
| <b>Number of Simultaneously ON Points</b> | 75% (12 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustration.)   |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.                        |
| <b>Internal Current Consumption</b>       | 90 mA max.  |
| <b>Weight</b>                             | 70 g max.   |
| <b>Accessories</b>                        | None  |

| <b>Circuit Configuration</b> | <p>The diagram illustrates the internal circuitry for two rows of inputs. Each row (A and B) has 16 terminals: IN0 to IN15, COM0, and COM1. Each input terminal (IN0-IN15) is connected to a 5.6 kΩ resistor and a 1000 pF capacitor. The COM0 and COM1 terminals are connected to a common ground through a 560 Ω resistor. An internal switch (SW) and an input indicator are also shown.</p> | <p><b>Number of Simultaneously ON Points vs. Ambient Temperature Characteristic</b></p> <table border="1"> <thead> <tr> <th>Ambient Temperature (°C)</th> <th>Number of Simultaneously ON Points</th> </tr> </thead> <tbody> <tr> <td>0 to 40</td> <td>32</td> </tr> <tr> <td>40 to 48</td> <td>32</td> </tr> <tr> <td>48 to 55</td> <td>12 (common)</td> </tr> <tr> <td>55 to 60</td> <td>10 (common)</td> </tr> </tbody> </table> <p>Input voltage: 24 VDC<br/>Input voltage: 26.4 VDC</p> | Ambient Temperature (°C) | Number of Simultaneously ON Points | 0 to 40 | 32 | 40 to 48 | 32 | 48 to 55 | 12 (common) | 55 to 60 | 10 (common) |
|------------------------------|---|--|--------------------------|------------------------------------|---------|----|----------|----|----------|-------------|----------|-------------|
|                              | Ambient Temperature (°C)  | Number of Simultaneously ON Points   |                          |                                    |         |    |          |    |          |             |          |             |
| 0 to 40                      | 32  |  |                          |                                    |         |    |          |    |          |             |          |             |
| 40 to 48                     | 32  |  |                          |                                    |         |    |          |    |          |             |          |             |
| 48 to 55                     | 12 (common)   |  |                          |                                    |         |    |          |    |          |             |          |             |
| 55 to 60                     | 10 (common)   |  |                          |                                    |         |    |          |    |          |             |          |             |



\*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.

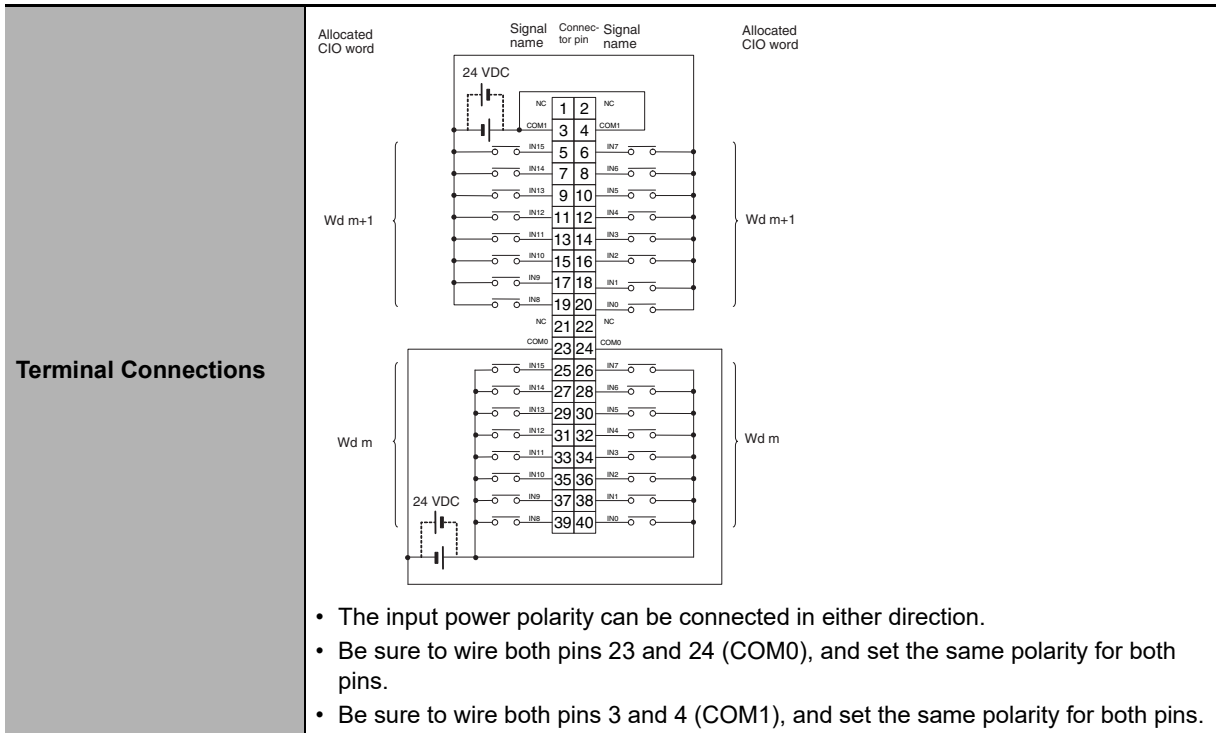
**Note** Observe the following restrictions when connecting to a 2-wire sensor.

- 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)

|   |   |
|---|---|
| <b>Name</b>                               | 32-point DC Input Unit with MIL Connector   |
| <b>Model</b>                              | CJ1W-ID233  |
| <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC  |
| <b>Input Impedance</b>                    | 5.6 kΩ  |
| <b>Input Current</b>                      | 4.1 mA typical (at 24 VDC)  |
| <b>ON Voltage/ON Current</b>              | 19.0 VDC min./3 mA min.   |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Number of Circuits</b>                 | 32 (16 points/common, 2 circuits)   |
| <b>Number of Simultaneously ON Points</b> | 75% (12 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustration.)   |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.                        |
| <b>Internal Current Consumption</b>       | 200 mA max.   |
| <b>Weight</b>                             | 70 g max.   |
| <b>Accessories</b>                        | None  |

| <b>Circuit Configuration</b> | <p>The diagram illustrates the internal circuitry for two rows of inputs. Each row (A and B) has 16 terminals labeled IN0 to IN15. Each terminal is connected to a 5.6 kΩ resistor and a 1000 pF capacitor in parallel. The other end of these components is connected to a common terminal (COM0 for row A, COM1 for row B). A switch (SW) is shown in the common line. An input indicator is also shown. The entire circuit is connected to internal PLC circuits.</p> | <p><b>Number of Simultaneously ON Points vs. Ambient Temperature Characteristic</b></p> <p>The graph plots the number of simultaneously ON points (y-axis, 0 to 35) against ambient temperature in °C (x-axis, 0 to 60). The data points are as follows:</p> <table border="1"> <thead> <tr> <th>Ambient Temperature (°C)</th> <th>Number of Simultaneously ON Points</th> </tr> </thead> <tbody> <tr> <td>0 to 40</td> <td>32</td> </tr> <tr> <td>40 to 48</td> <td>32</td> </tr> <tr> <td>48 to 55</td> <td>12</td> </tr> <tr> <td>55 to 60</td> <td>10</td> </tr> </tbody> </table> <p>Input voltage: 24 VDC<br/>         Input voltage: 26.4 VDC<br/>         12 points/common at 55°C<br/>         10 points/common at 55°C</p> | Ambient Temperature (°C) | Number of Simultaneously ON Points | 0 to 40 | 32 | 40 to 48 | 32 | 48 to 55 | 12 | 55 to 60 | 10 |
|------------------------------|--|--|--------------------------|------------------------------------|---------|----|----------|----|----------|----|----------|----|
|                              | Ambient Temperature (°C)   | Number of Simultaneously ON Points   |                          |                                    |         |    |          |    |          |    |          |    |
| 0 to 40                      | 32   |  |                          |                                    |         |    |          |    |          |    |          |    |
| 40 to 48                     | 32   |  |                          |                                    |         |    |          |    |          |    |          |    |
| 48 to 55                     | 12   |  |                          |                                    |         |    |          |    |          |    |          |    |
| 55 to 60                     | 10   |  |                          |                                    |         |    |          |    |          |    |          |    |



\*1 The ON response time will be 15 μs maximum and OFF response time will be 90 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.

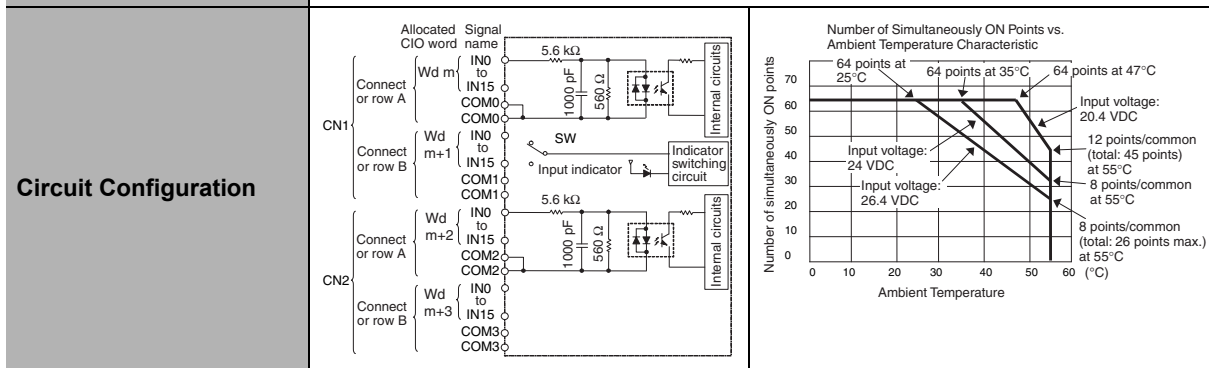
**Note** Observe the following restrictions when connecting to a 2-wire sensor.

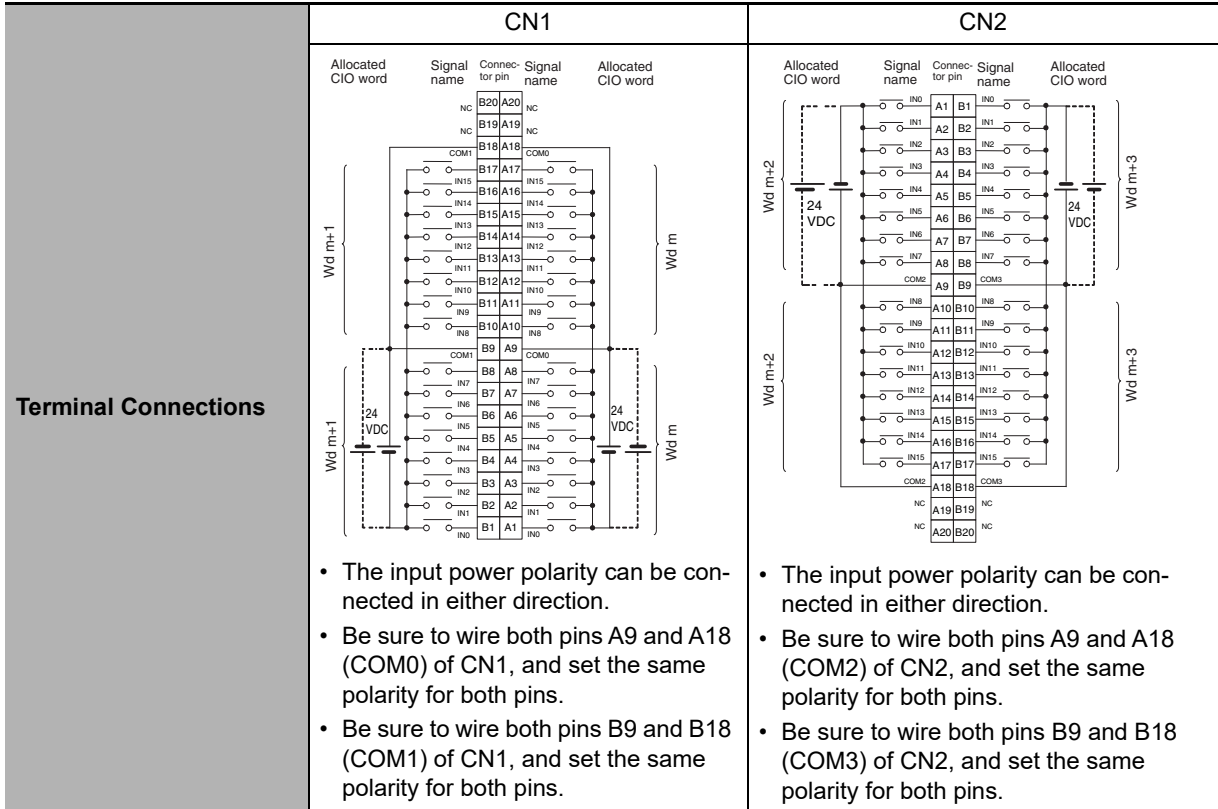
- Make sure the input power supply voltage is larger than the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.



● CJ1W-ID261 DC Input Unit (24 VDC, 64 Points)

|   |   |
|---|---|
| <b>Name</b>                               | 64-point DC Input Unit with Fujitsu/OTAX Connector  |
| <b>Model</b>                              | CJ1W-ID261  |
| <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC  |
| <b>Input Impedance</b>                    | 5.6 kΩ  |
| <b>Input Current</b>                      | 4.1 mA typical (at 24 VDC)  |
| <b>ON Voltage/ON Current</b>              | 19.0 VDC min./3 mA min.   |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Number of Circuits</b>                 | 64 (16 points/common, 4 circuits)   |
| <b>Number of Simultaneously ON Points</b> | 50% (16 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustrations.)  |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.                        |
| <b>Internal Current Consumption</b>       | 90 mA max.  |
| <b>Weight</b>                             | 110 g max.  |
| <b>Accessories</b>                        | None  |





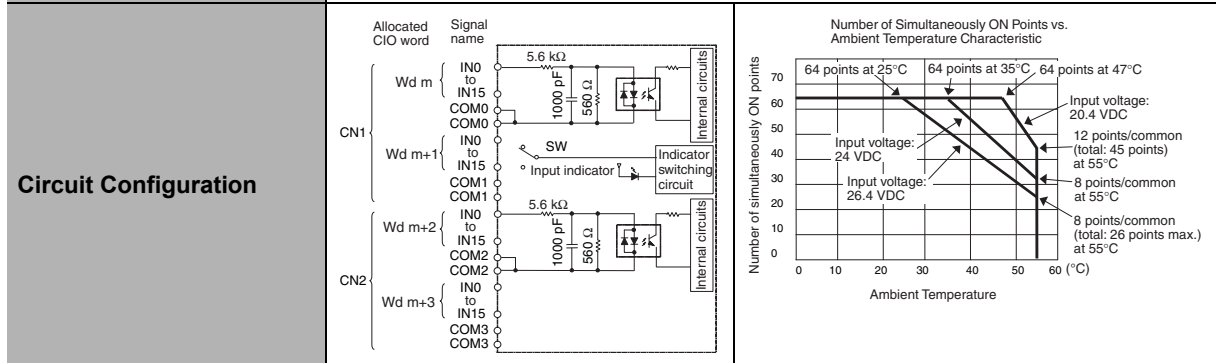
- \*1 The ON response time will be 120  $\mu$ s maximum and OFF response time will be 400  $\mu$ s maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

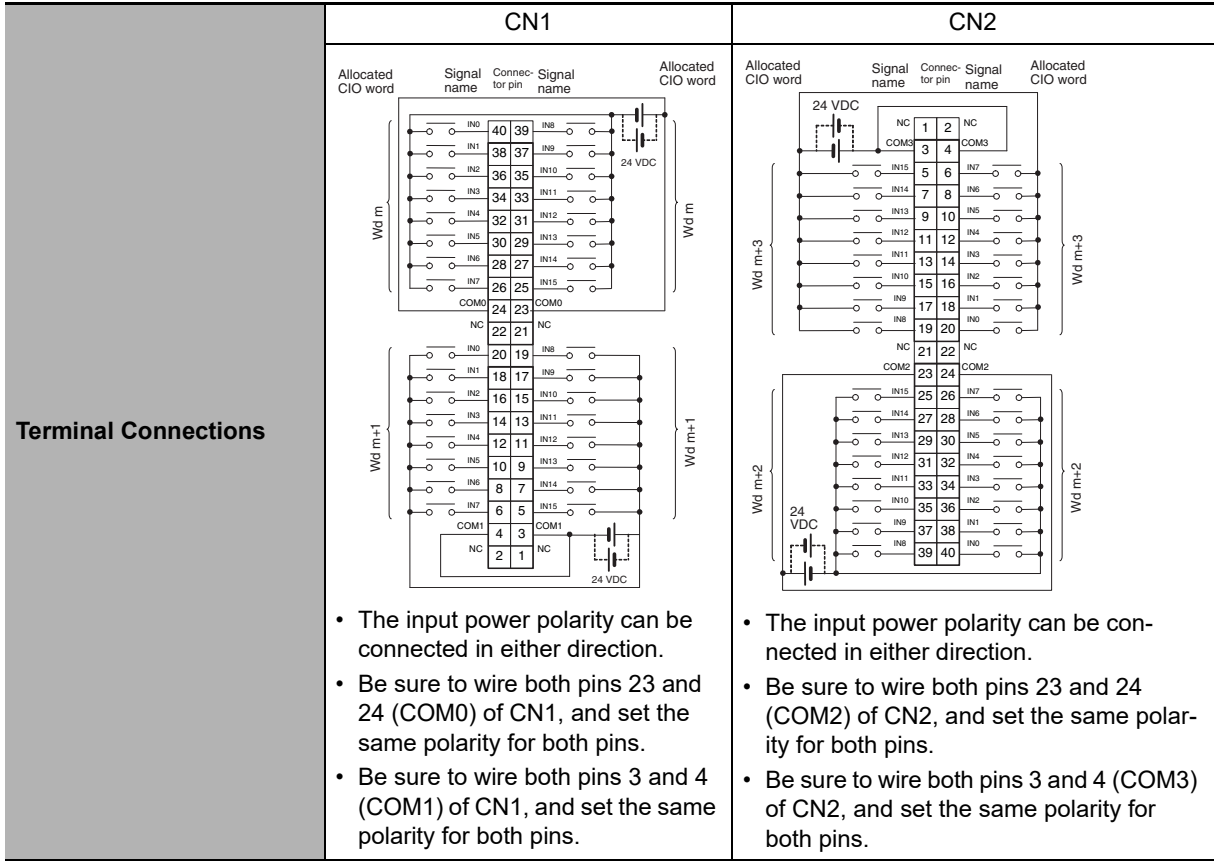
**Note** Observe the following restrictions when connecting to a 2-wire sensor.

- 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)

|   |   |
|---|---|
| <b>Name</b>                               | 64-point DC Input Unit with MIL Connector   |
| <b>Model</b>                              | CJ1W-ID262  |
| <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC  |
| <b>Input Impedance</b>                    | 5.6 kΩ  |
| <b>Input Current</b>                      | 4.1 mA typical (at 24 VDC)  |
| <b>ON Voltage/ON Current</b>              | 19.0 VDC min./3 mA min.   |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Number of Circuits</b>                 | 64 (16 points/common, 4 circuits)   |
| <b>Number of Simultaneously ON Points</b> | 50% (8 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustrations.)   |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.                        |
| <b>Internal Current Consumption</b>       | 90 mA max.  |
| <b>Weight</b>                             | 110 g max.  |
| <b>Accessories</b>                        | None  |





\*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.

**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-IA201 AC Input Unit (200 VAC, 8 Points)

|   |  |
|---|--|
| <b>Name</b>                               | 8-point AC Input Unit with Terminal Block  |
| <b>Model</b>                              | CJ1W-IA201   |
| <b>Rated Input Voltage</b>                | 200 to 240 VAC 50/60 Hz  |
| <b>Rated Input Voltage Range</b>          | 170 to 264 VAC   |
| <b>Input Impedance</b>                    | 21 kΩ (50 Hz), 18 kΩ (60 Hz)   |
| <b>Input Current</b>                      | 9 mA typical (at 200 VAC, 50 Hz),<br>11 mA typical (at 200 VAC, 60 Hz)                                       |
| <b>ON Voltage/ON Current</b>              | 120 VAC min./4 mA min.   |
| <b>OFF Voltage/OFF Current</b>            | 40 VAC max./2 mA max.  |
| <b>ON Response Time</b>                   | 18.0 ms max. (PLC Setup default setting: 8 ms) <sup>*1</sup>   |
| <b>OFF Response Time</b>                  | 48.0 ms max. (PLC Setup default setting: 8 ms) <sup>*1</sup>   |
| <b>Number of Circuits</b>                 | 8 (8 points/common, 1 circuit)   |
| <b>Number of Simultaneously ON Points</b> | 100% (8 points/common) simultaneously ON   |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (500 VDC)   |
| <b>Dielectric Strength</b>                | 2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Internal Current Consumption</b>       | 80 mA max.   |
| <b>Weight</b>                             | 130 g max.   |
| <b>Accessories</b>                        | None   |
| <b>Circuit Configuration</b>              |  |
| <b>Terminal Connections</b>               |  |

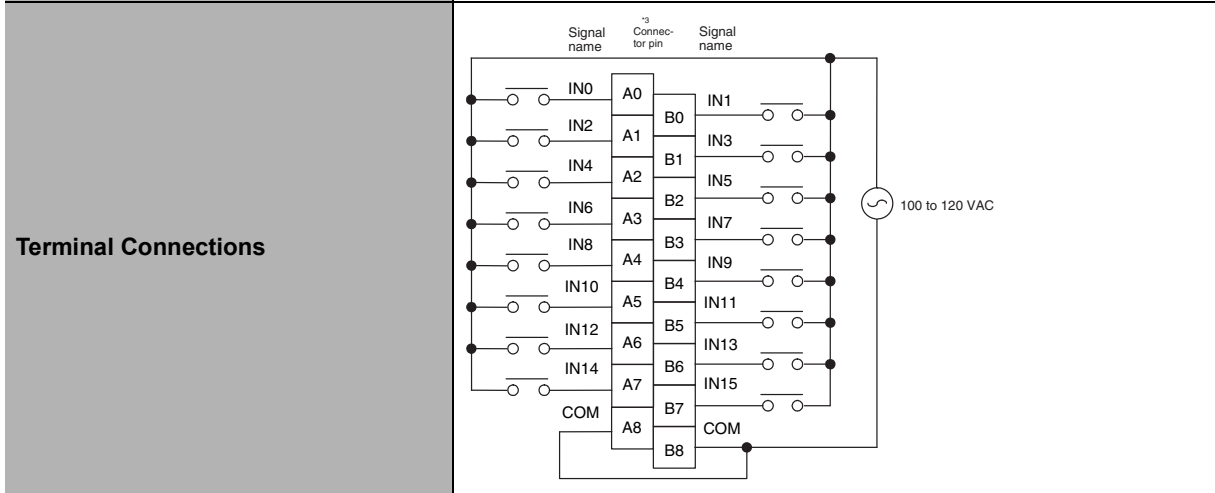
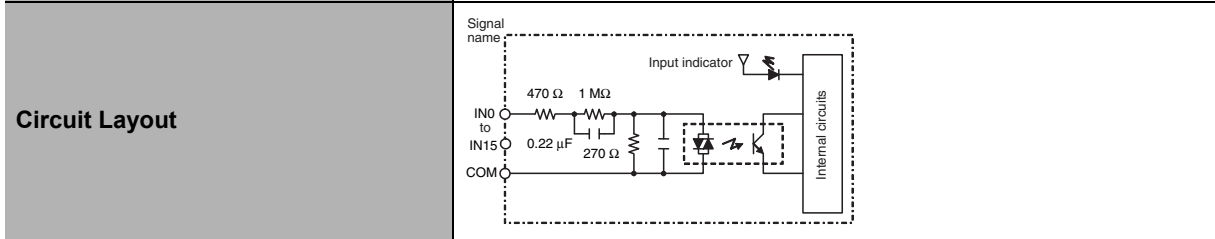
\*1 The Input ON and OFF response times for Basic I/O Units can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup. When the response times have been set to 0 ms, the ON response time will be 10 ms maximum and the OFF response time will be 40 ms maximum due to internal element delays.

\*2 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-IA111 AC Input Unit (100 VAC, 16 points)**

|   |  |
|---|--|
| <b>Name</b>                               | 16-point AC Input Unit with Terminal Block   |
| <b>Model</b>                              | CJ1W-IA111   |
| <b>Rated input voltage</b>                | 100 to 120 VAC 50/60 Hz* <sup>2</sup>  |
| <b>Rated Input Voltage Range</b>          | 85 to 132 VAC  |
| <b>Input Impedance</b>                    | 14.5 kΩ (50 Hz), 12 kΩ (60 Hz)   |
| <b>Input Current</b>                      | 7 mA typical (at 100 VAC, 50 Hz),<br>8 mA typical (at 100 VAC, 60 Hz)  |
| <b>ON Voltage/ON Current</b>              | 70 VAC min./4 mA min   |
| <b>OFF Voltage/OFF Current</b>            | 20 VAC max./2 mA max   |
| <b>ON Response Time</b>                   | 18 ms max. (PLC Setup default setting: 8 ms)* <sup>1</sup>   |
| <b>OFF Response Time</b>                  | 48 ms max. (PLC Setup default setting: 8 ms)* <sup>1</sup>   |
| <b>Number of Circuits</b>                 | 16 (16 points/common, 1 circuit)   |
| <b>Number of Inputs ON Simultaneously</b> | 100% simultaneously ON (16 points/common)  |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and the GR terminal (500 VDC)   |
| <b>Dielectric Strength</b>                | 2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Internal Current Consumption</b>       | 90 mA max.   |
| <b>Weight</b>                             | 130 g max.   |
| <b>Accessories</b>                        | None   |

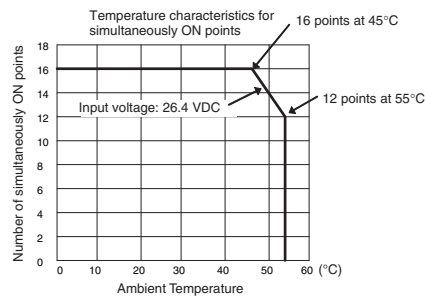
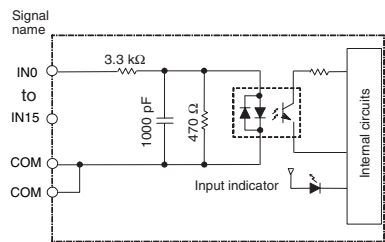


- \*1 The Input ON and OFF response times for Basic I/O Units can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup. When the response times have been set to 0 ms, the ON response time will be 10 ms maximum and the OFF response time will be 40 ms maximum due to internal element delays.
- \*2 Use an input voltage of 90 VAC or higher when connecting 2-wire sensors.
- \*3 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)

|   |  |
|---|--|
| <b>Name</b>                               | 16-point Interrupt Input Unit with Terminal Block  |
| <b>Model</b>                              | CJ1W-INT01   |
| <b>Rated Input Voltage</b>                | 24 VDC   |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC   |
| <b>Input Impedance</b>                    | 3.3 kΩ   |
| <b>Input Current</b>                      | 7 mA typical (at 24 VDC)   |
| <b>ON Voltage/ON Current</b>              | 14.4 VDC min./3 mA min.  |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.   |
| <b>ON Response Time</b>                   | 0.05 ms max.   |
| <b>OFF Response Time</b>                  | 0.5 ms max.  |
| <b>Number of Circuits</b>                 | 16 (16 points/common, 1 circuit)   |
| <b>Number of Simultaneously ON Points</b> | 100% (16 points/common) simultaneously ON (24 VDC)   |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and GR terminal (at 100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between external terminals and GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Internal Current Consumption</b>       | 80 mA max.   |
| <b>Weight</b>                             | 110 g max.   |
| <b>Accessories</b>                        | None   |

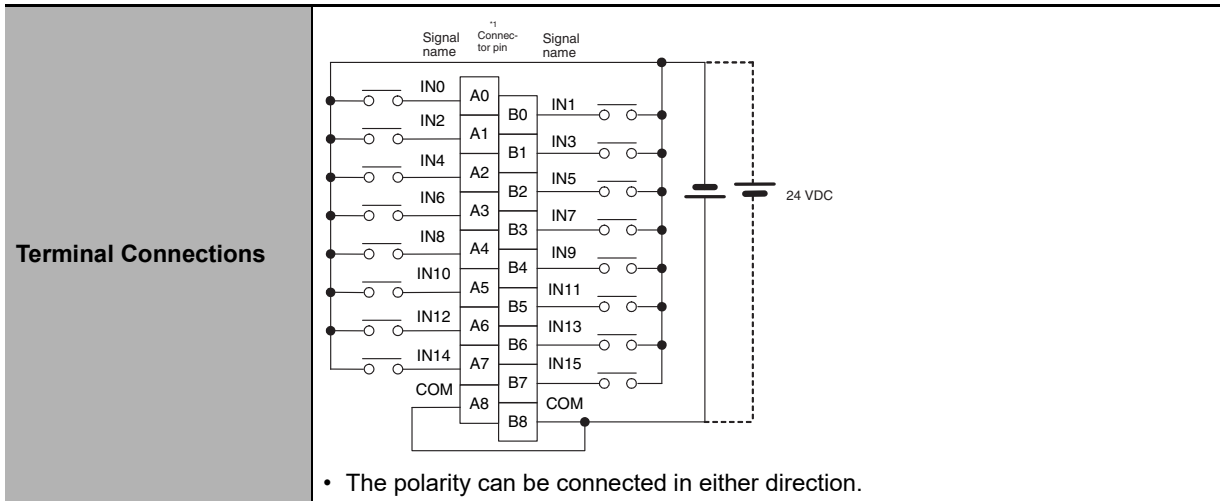
**Circuit Configuration**



- Up to two Interrupt Input Units can be mounted to the CPU Rack, but they must be connected as one the five Unit\*1 immediately next to the CPU Unit. If an Interrupt Input Unit is connected in any other position, an I/O setting error will occur.
- Set the pulse width of signals input to the Interrupt Input Unit so they satisfy the following conditions.



\*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.



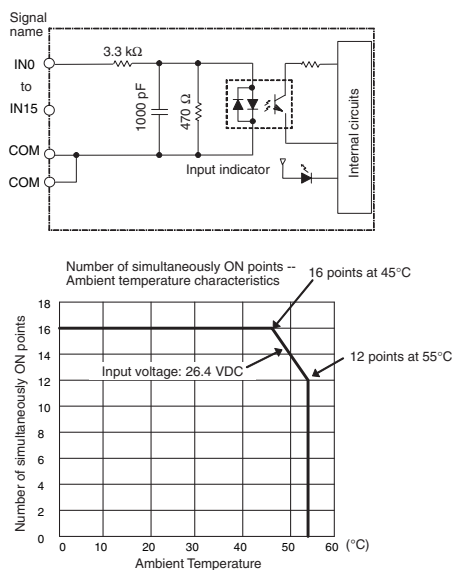
\*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.



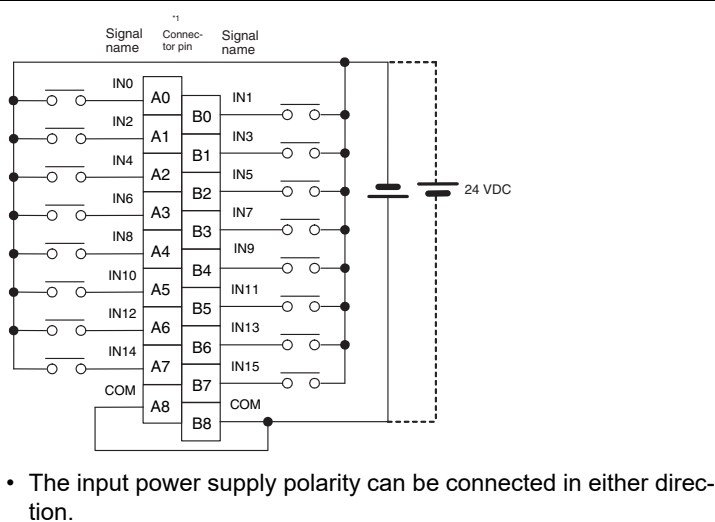
● CJ1W-IDP01 Quick-response Input Unit (16 Points)

|   |  |
|---|--|
| <b>Name</b>                               | 16-point Quick-response Input Unit with Terminal Block   |
| <b>Model</b>                              | CJ1W-IDP01   |
| <b>Rated Input Voltage</b>                | 24 VDC   |
| <b>Rated Input Voltage Range</b>          | 20.4 to 26.4 VDC   |
| <b>Input Impedance</b>                    | 3.3 kΩ   |
| <b>Input Current</b>                      | 7 mA typical (at 24 VDC)   |
| <b>ON Voltage/ON Current</b>              | 14.4 VDC min./3 mA min.  |
| <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.   |
| <b>ON Response Time</b>                   | 0.05 ms max.   |
| <b>OFF Response Time</b>                  | 0.5 ms max.  |
| <b>Number of Circuits</b>                 | 16 (16 points/common, 1 circuit)   |
| <b>Number of Simultaneously ON Points</b> | 100% (16 points/common) simultaneously ON (24 VDC)   |
| <b>Insulation Resistance</b>              | 20 MΩ between external terminals and GR terminal (at 100 VDC)  |
| <b>Dielectric Strength</b>                | 1,000 VAC between external terminals and GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Internal Current Consumption</b>       | 80 mA max.   |
| <b>Weight</b>                             | 110 g max.   |
| <b>Accessories</b>                        | None   |

**Circuit Configuration**



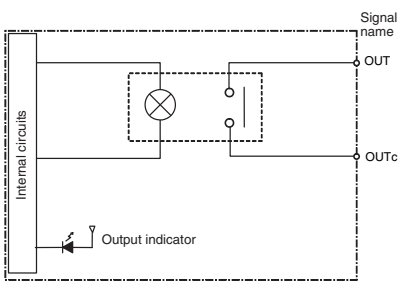
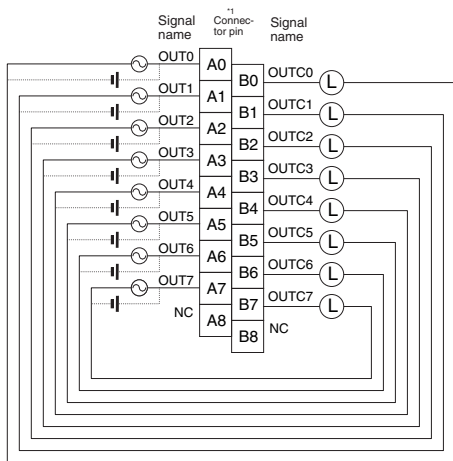
**Terminal Connections**



- 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)

|                                     |   |
|-------------------------------------|---|
| <b>Name</b>                         | 8-point Contact Output Unit with Terminal Block (Independent Relays)  |
| <b>Model</b>                        | CJ1W-OC201  |
| <b>Max. Switching Capacity</b>      | 2 A 250 VAC ( $\cos\phi = 1$ ), 2 A 250 VAC ( $\cos\phi = 0.4$ ), 2 A 24 VDC (16 A/Unit)  |
| <b>Min. Switching Capacity</b>      | 1 mA 5 VDC  |
| <b>Relays</b>                       | NY-24W-K-IE (Fujitsu Takamizawa Components, Ltd.), Cannot be replaced.  |
| <b>Service Life of Relay</b>        | Electrical: 150,000 operations (24 VDC, resistive load)/100,000 operations (240 VAC, $\cos\phi = 0.4$ , inductive load)<br>Mechanical: 20,000,000 operations<br>Service life will vary depending on the connected load. Refer to page A-62 for information on service life according to the load. |
| <b>ON Response Time</b>             | 15 ms max.  |
| <b>OFF Response Time</b>            | 15 ms max.  |
| <b>Number of Circuits</b>           | 8 independent contacts  |
| <b>Insulation Resistance</b>        | 20 M $\Omega$ between external terminals and the GR terminal (500 VDC)  |
| <b>Dielectric Strength</b>          | 2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.  |
| <b>Internal Current Consumption</b> | 90 mA 5 VDC max.<br>48 mA 24 VDC max. (6 mA $\times$ No. of ON points)  |
| <b>Weight</b>                       | 140 g max.  |
| <b>Circuit Configuration</b>        |   |
| <b>Terminal Connections</b>         |  <p>2 A 250 VAC,<br/>2 A 24 VDC max.</p> <ul style="list-style-type: none"> <li>The input power supply polarity can be connected in either direction.</li> </ul>  |

\*1 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.

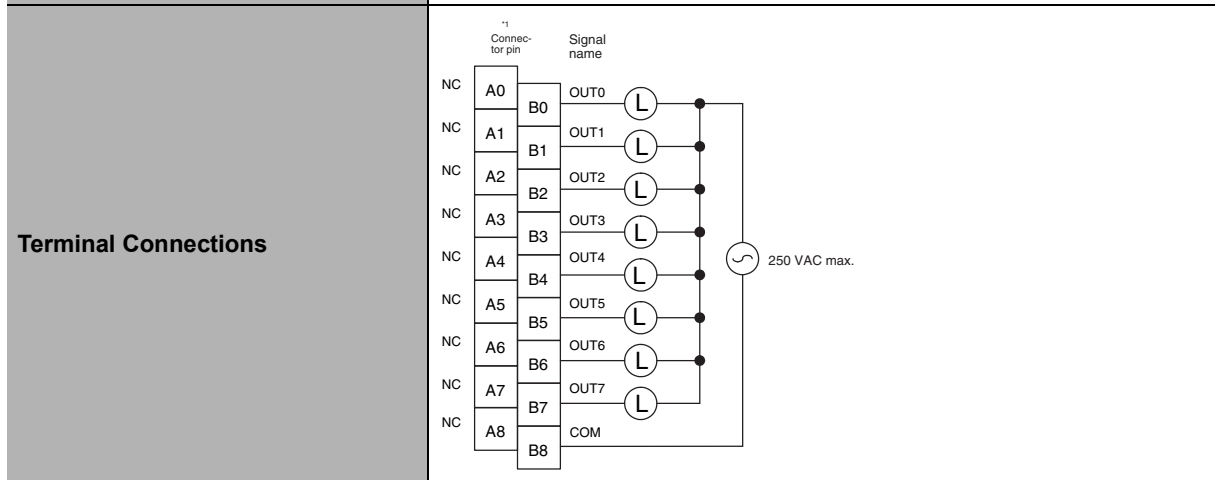
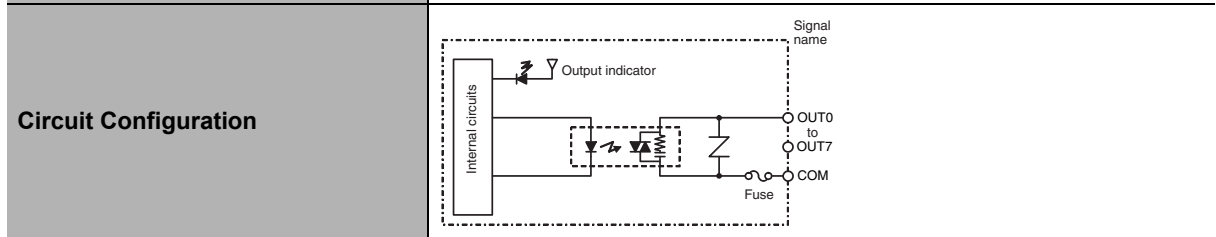
● CJ1W-OC211 Contact Output Unit (16 Points)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 16-point Contact Output Unit with Terminal Block   |
| <b>Model</b>                        | CJ1W-OC211   |
| <b>Max. Switching Capacity</b>      | 2 A 250 VAC ( $\cos\phi = 1$ ), 2 A 250 VAC ( $\cos\phi = 0.4$ ), 2 A 24 VDC (8 A/Unit)  |
| <b>Min. Switching Capacity</b>      | 1 mA 5 VDC   |
| <b>Relays</b>                       | NY-24W-K-IE (Fujitsu Takamizawa Components, Ltd.), Cannot be replaced.   |
| <b>Service Life of Relay</b>        | Electrical: 150,000 operations (24 VDC, resistive load)/ 100,000 operations (240 VAC, $\cos\phi = 0.4$ , inductive load)<br>Mechanical: 20,000,000 operations<br>Service life will vary depending on the connected load. Refer to page A-62 for information on service life according to the load. |
| <b>ON Response Time</b>             | 15 ms max.   |
| <b>OFF Response Time</b>            | 15 ms max.   |
| <b>Number of Circuits</b>           | 16 points/common, 1 circuit  |
| <b>Insulation Resistance</b>        | 20 M $\Omega$ between external terminals and the GR terminal (500 VDC)   |
| <b>Dielectric Strength</b>          | 2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.   |
| <b>Internal Current Consumption</b> | 110 mA 5 VDC max.<br>96 mA 24 VDC max. (6 mA $\times$ No. of ON points)  |
| <b>Weight</b>                       | 170 g max.   |
| <b>Circuit Configuration</b>        |  |
| <b>Terminal Connections</b>         |  |

\*1 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)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 8-point Triac Output Unit with Terminal Block  |
| <b>Model</b>                        | CJ1W-OA201   |
| <b>Max. Switching Capacity</b>      | 0.6 A 250 VAC, 50/60 Hz (2.4 A/Unit)   |
| <b>Max. Inrush Current</b>          | 15 A (pulse width: 10 ms max.)   |
| <b>Min. Switching Capacity</b>      | 50 mA 75 VAC   |
| <b>Leakage Current</b>              | 1.5 mA (200 VAC) max.  |
| <b>Residual Voltage</b>             | 1.6 VAC max.   |
| <b>ON Response Time</b>             | 1 ms max.  |
| <b>OFF Response Time</b>            | 1/2 of load frequency + 1 ms or less.  |
| <b>Number of Circuits</b>           | 8 (8 points/common, 1 circuit)   |
| <b>Surge Protector</b>              | C.R Absorber + Surge Absorber  |
| <b>Fuses</b>                        | 5 A (1/common, 1 used)<br>The fuse cannot be replaced by the user.   |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (500 VDC)   |
| <b>Dielectric Strength</b>          | 2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Internal Current Consumption</b> | 220 mA max.  |
| <b>Weight</b>                       | 150 g max.   |

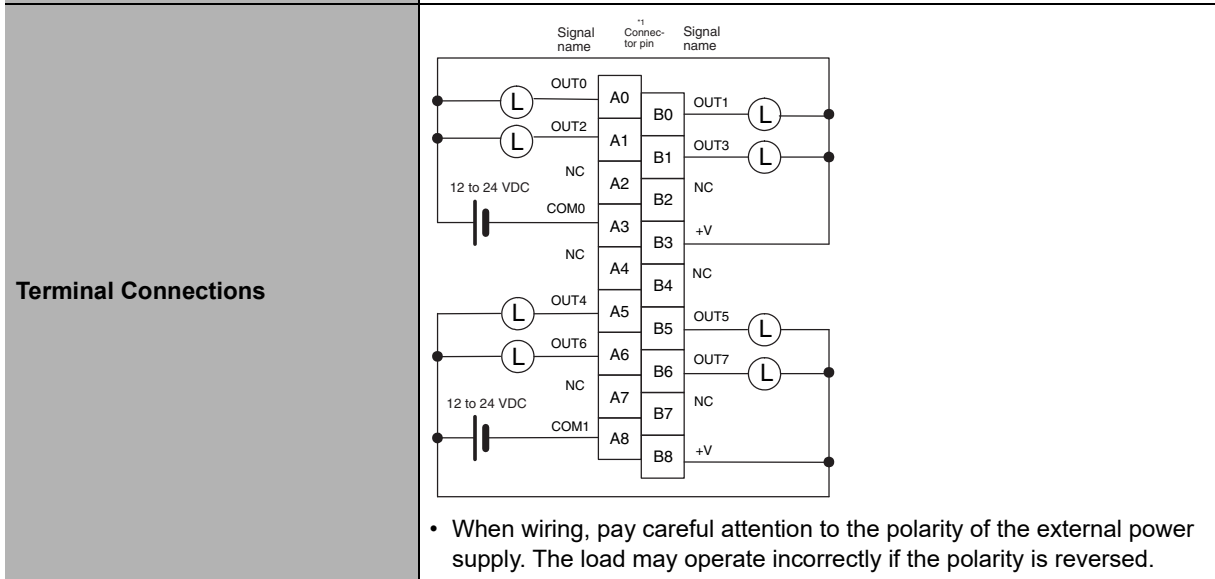
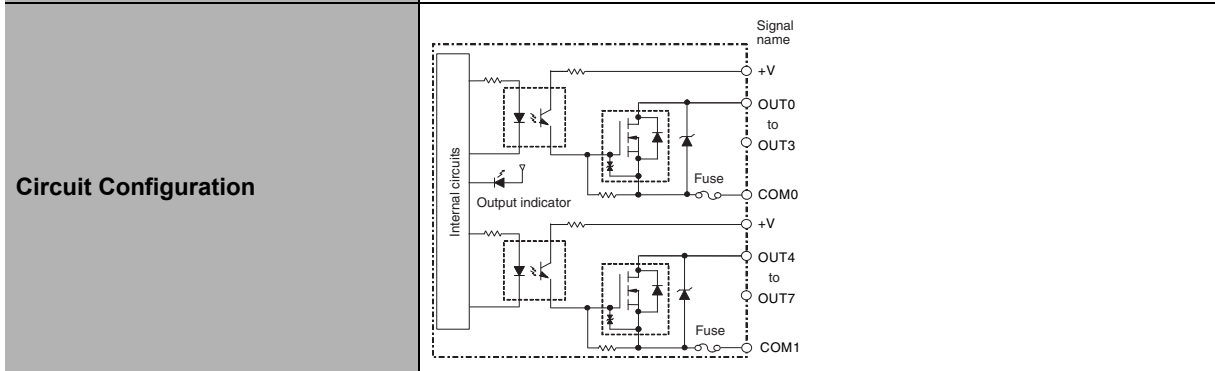


\*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

**Note** Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O.

● CJ1W-OD201 Transistor Output Unit (8 Points)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 8-point Transistor Output Unit with Terminal Block (Sinking Outputs)   |
| <b>Model</b>                        | CJ1W-OD201   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 2.0 A/point, 8.0 A/Unit  |
| <b>Maximum Inrush Current</b>       | 10 A/point, 10 ms max.   |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 0.5 ms max.  |
| <b>OFF Response Time</b>            | 1.0 ms max.  |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 8 (4 points/common, 2 circuits)  |
| <b>Internal Current Consumption</b> | 90 mA max.   |
| <b>Fuse</b>                         | 6.3 A (1/common, 2 used)<br>The fuse cannot be replaced by the user.   |
| <b>External Power Supply</b>        | 12 to 24 VDC, 10 mA min.   |
| <b>Weight</b>                       | 110 g max.   |

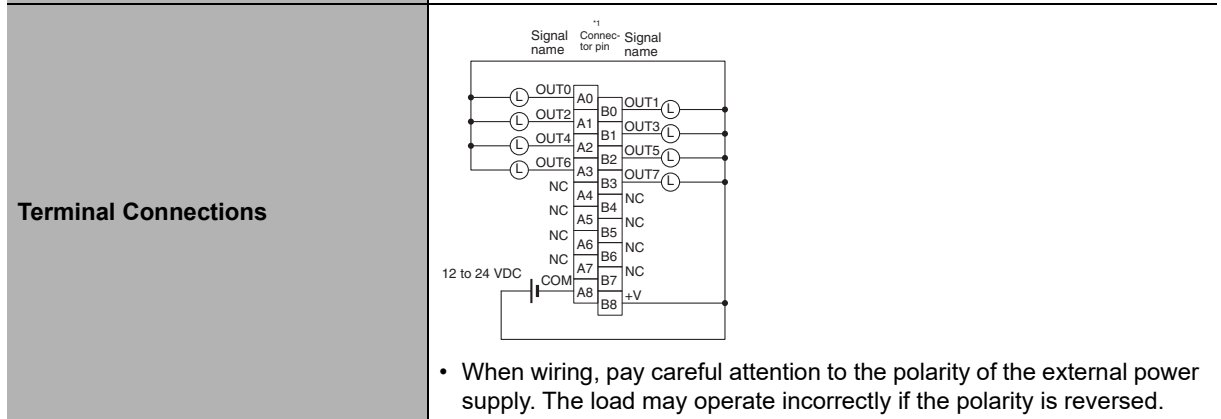
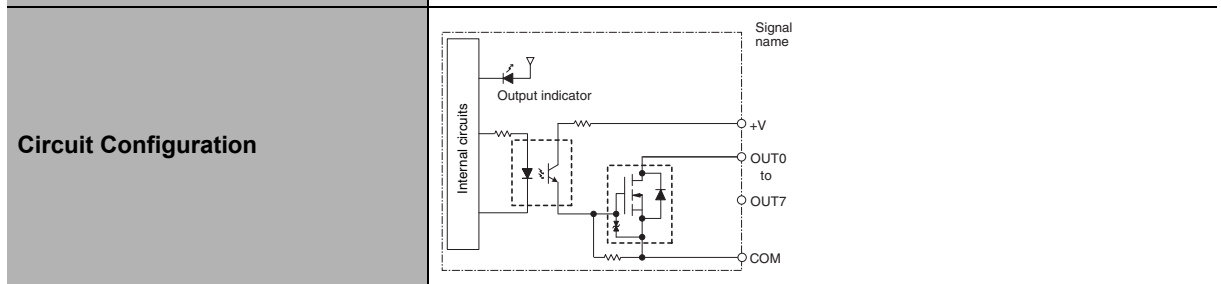


\*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

**Note** Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O.

● CJ1W-OD203 Transistor Output Unit (8 Points)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 8-point Transistor Output Unit with Terminal Block (Sinking Outputs)   |
| <b>Model</b>                        | CJ1W-OD203   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.5 A/point, 4.0 A/Unit  |
| <b>Maximum Inrush Current</b>       | 4.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 0.1 ms max.  |
| <b>OFF Response Time</b>            | 0.8 ms max.  |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 8 (8 points/common, 1 circuit)   |
| <b>Internal Current Consumption</b> | 100 mA max.  |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 10.2 to 26.4 VDC, 20 mA min.   |
| <b>Weight</b>                       | 110 g max.   |

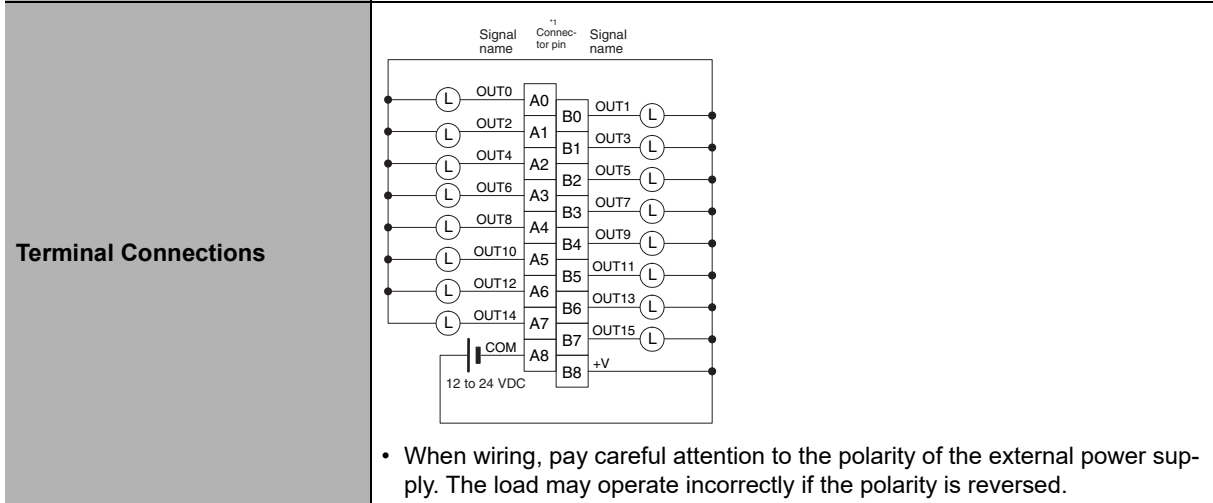
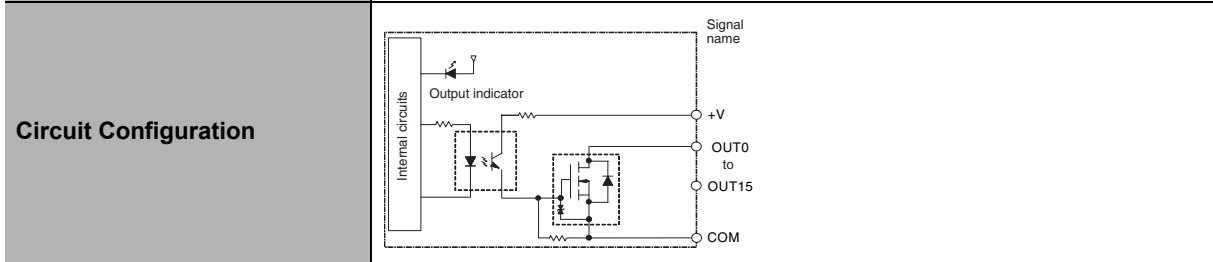


\*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

**Note** Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O.

● CJ1W-OD211 Transistor Output Unit (16 Points)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 16-point Transistor Output Unit with Terminal Block (Sinking Outputs)  |
| <b>Model</b>                        | CJ1W-OD211   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.5 A/point, 5.0 A/Unit  |
| <b>Maximum Inrush Current</b>       | 4.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 0.1 ms max.  |
| <b>OFF Response Time</b>            | 0.8 ms max.  |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 16 (16 points/common, 1 circuit)   |
| <b>Internal Current Consumption</b> | 5 VDC 100 mA max.  |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 10.2 to 26.4 VDC, 20 mA min.   |
| <b>Weight</b>                       | 110 g max.   |

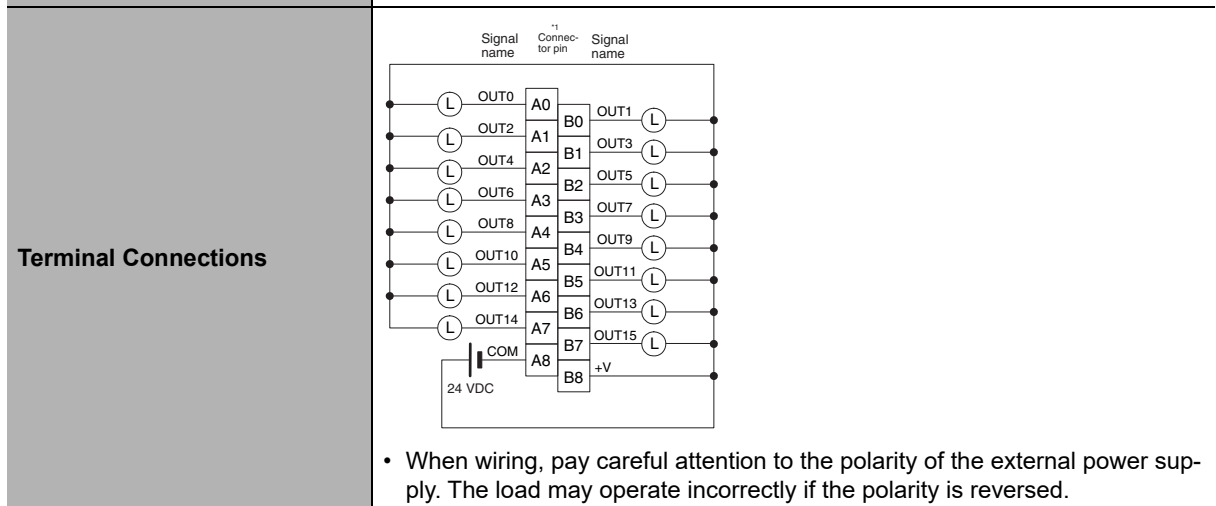
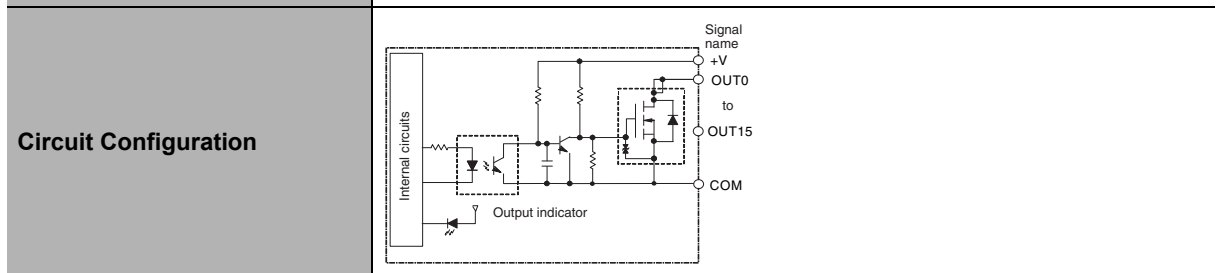


\*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.



● CJ1W-OD213 Transistor Output Unit (16 Points)

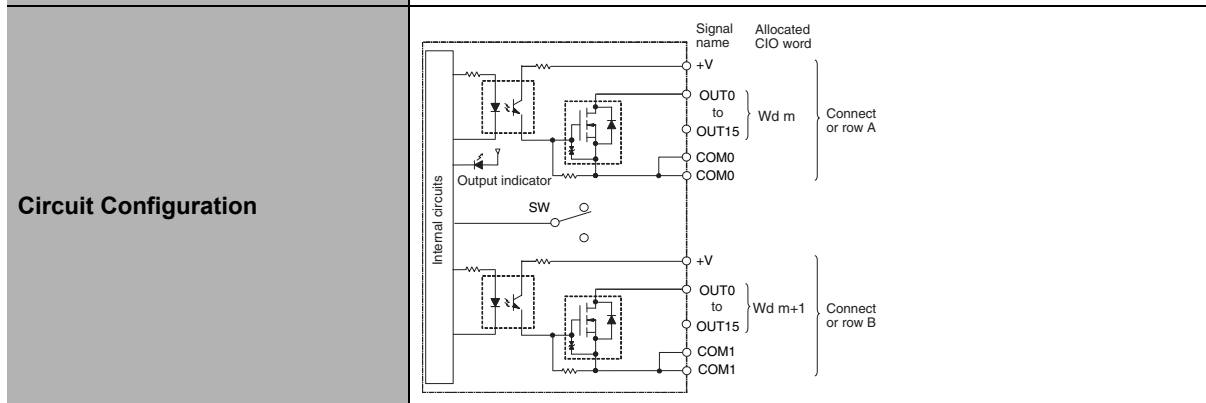
|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 16-point Transistor Output Unit with Terminal Block (Sinking Outputs)  |
| <b>Model</b>                        | CJ1W-OD213   |
| <b>Rated Voltage</b>                | 24 VDC   |
| <b>Operating Load Voltage Range</b> | 20.4 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.5 A/point, 5.0 A/Unit  |
| <b>Maximum Inrush Current</b>       | 4.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 15 μs max.   |
| <b>OFF Response Time</b>            | 80 μs max.   |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 16 (16 points/common, 1 circuit)   |
| <b>Internal Current Consumption</b> | 5 VDC 150 mA max.  |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 20.4 to 26.4 VDC, 55 mA min.   |
| <b>Weight</b>                       | 110 g max.   |

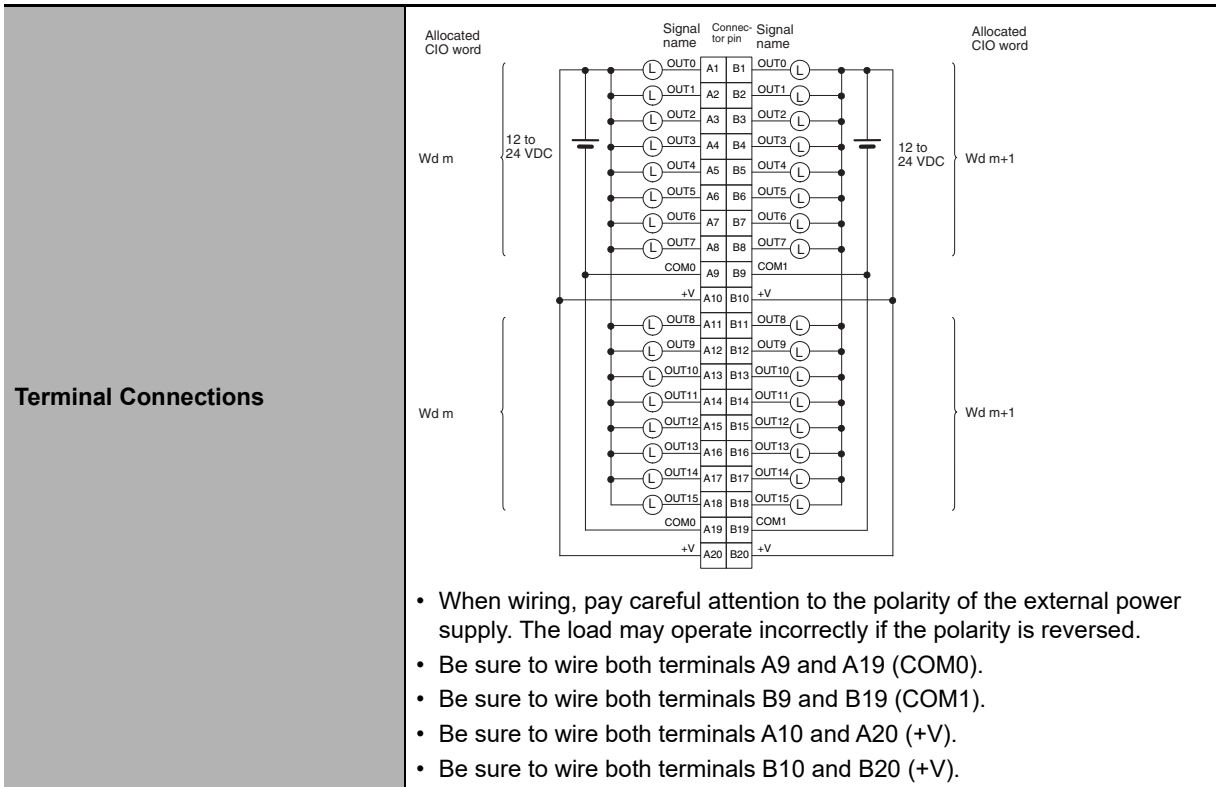


\*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

● CJ1W-OD231 Transistor Output Unit (32 Points)

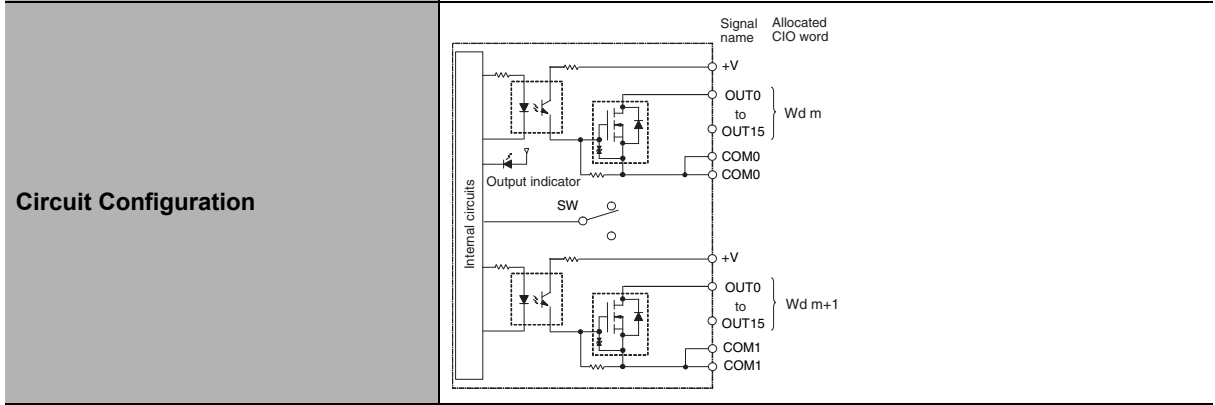
|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 32-point Transistor Output Unit with Fujitsu/OTAX Connector (Sinking Outputs)                                |
| <b>Model</b>                        | CJ1W-OD231   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.5 A/point, 2.0 A/common, 4.0 A/Unit  |
| <b>Maximum Inrush Current</b>       | 4.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 0.1 ms max.  |
| <b>OFF Response Time</b>            | 0.8 ms max.  |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 32 (16 points/common, 2 circuits)  |
| <b>Internal Current Consumption</b> | 5 VDC 140 mA max.  |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 10.2 to 26.4 VDC, 30 mA min.   |
| <b>Weight</b>                       | 70 g max.  |
| <b>Accessories</b>                  | None   |

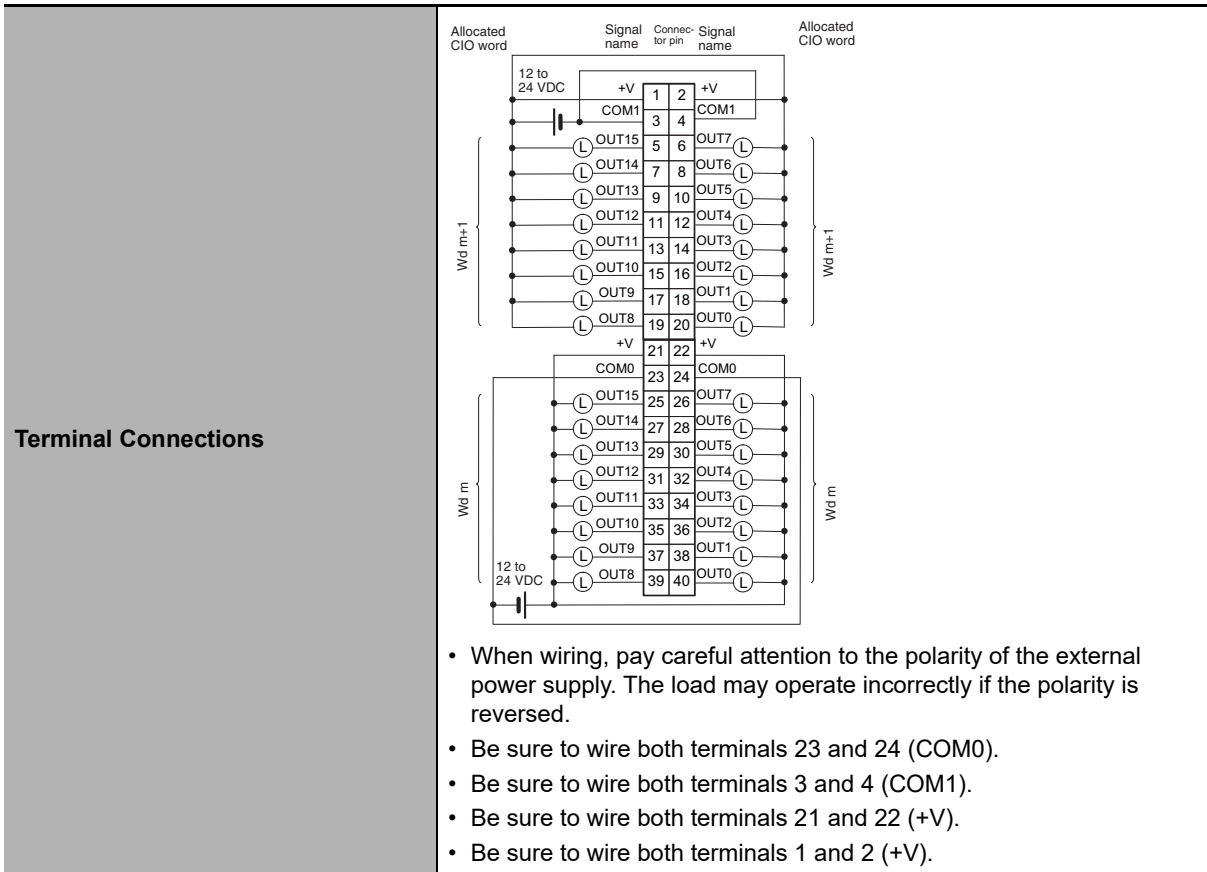




● CJ1W-OD233 Transistor Output Unit (32 Points)

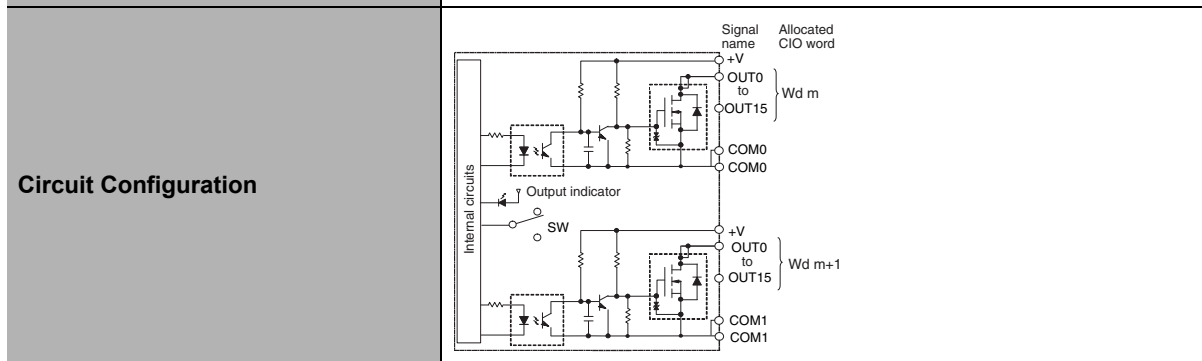
|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 32-point Transistor Output Unit with MIL Connector (Sinking Outputs)   |
| <b>Model</b>                        | CJ1W-OD233   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.5 A/point, 2 A/common, 4 A/Unit  |
| <b>Maximum Inrush Current</b>       | 4.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 0.1 ms max.  |
| <b>OFF Response Time</b>            | 0.8 ms max.  |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 32 (16 points/common, 2 circuits)  |
| <b>Internal Current Consumption</b> | 140 mA max.  |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 12 to 24 VDC, 30 mA min.   |
| <b>Weight</b>                       | 70 g max.  |



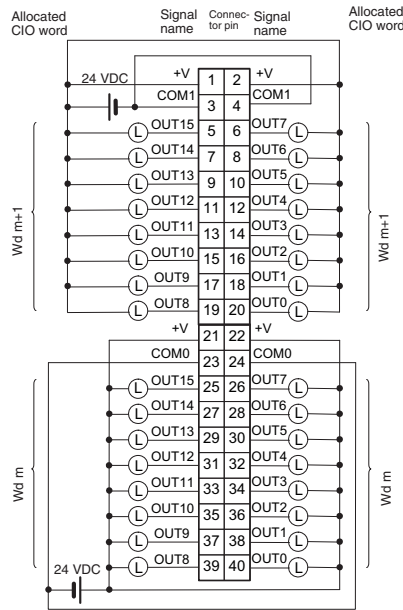


● CJ1W-OD234 Transistor Output Unit (32 Points)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 32-point Transistor Output Unit with MIL Connector (Sinking Outputs)   |
| <b>Model</b>                        | CJ1W-OD234   |
| <b>Rated Voltage</b>                | 24 VDC   |
| <b>Operating Load Voltage Range</b> | 20.4 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.5 A/point, 2 A/common, 4 A/Unit  |
| <b>Maximum Inrush Current</b>       | 4.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 15 μs max.   |
| <b>OFF Response Time</b>            | 80 μs max.   |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 32 (16 points/common, 2 circuits)  |
| <b>Internal Current Consumption</b> | 220 mA max.  |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 20.4 to 26.4 VDC, 110 mA min.  |
| <b>Weight</b>                       | 70 g max.  |



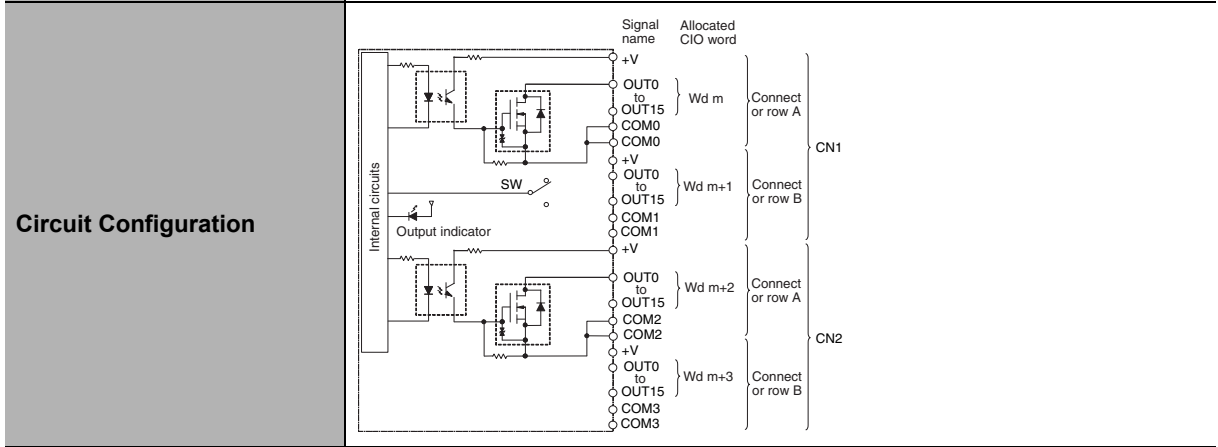
**Terminal Connections**



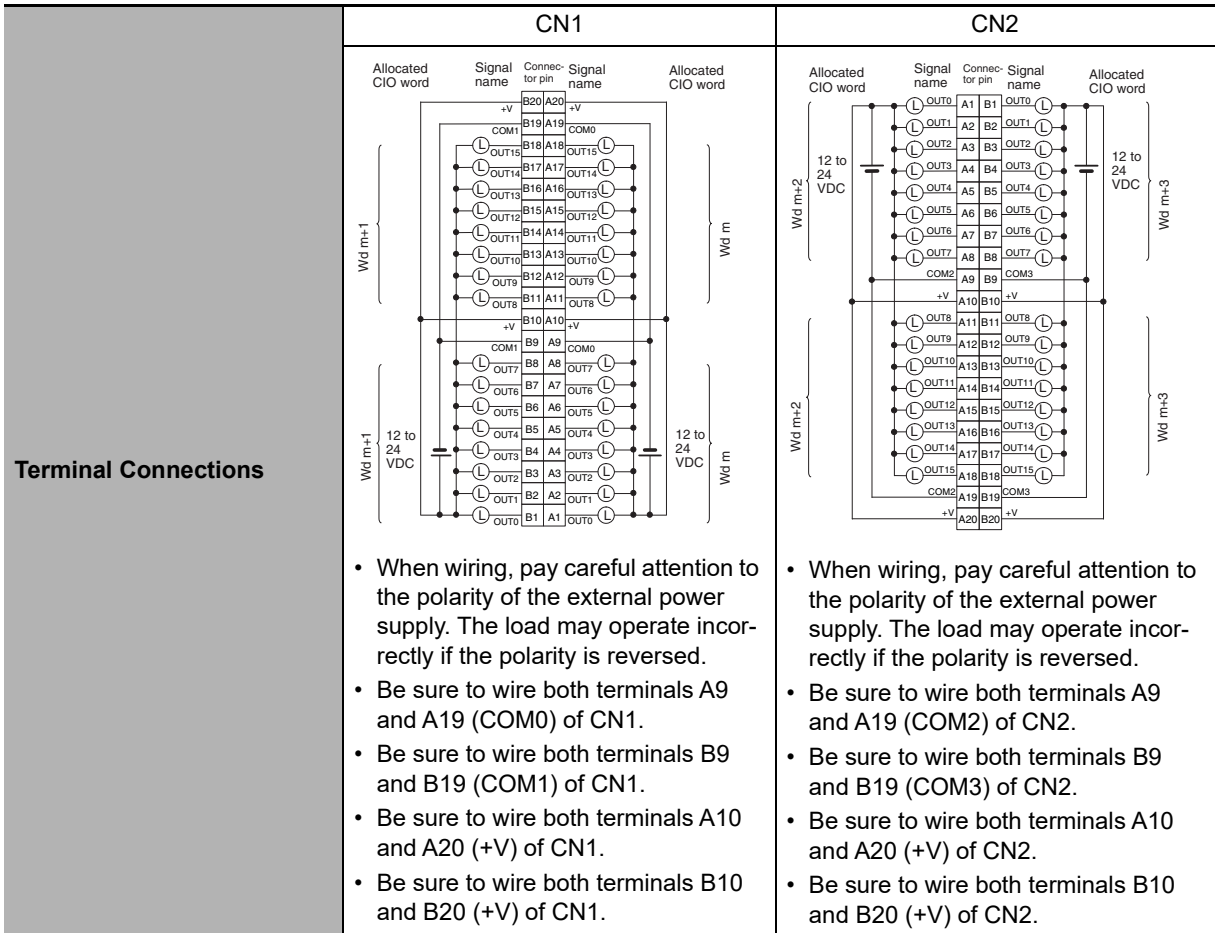
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.
- Be sure to wire both terminals 23 and 24 (COM0).
- Be sure to wire both terminals 3 and 4 (COM1).
- Be sure to wire both terminals 21 and 22 (+V).
- Be sure to wire both terminals 1 and 2 (+V).

● CJ1W-OD261 Transistor Output Unit (64 Points)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 64-point Transistor Output Unit with Fujitsu/OTAX Connectors (Sinking Outputs)                               |
| <b>Model</b>                        | CJ1W-OD261   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.3 A/point, 1.6 A/common, 6.4 A/Unit  |
| <b>Maximum Inrush Current</b>       | 3.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 0.5 ms max.  |
| <b>OFF Response Time</b>            | 1.0 ms max.  |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 64 (16 points/common, 4 circuits)  |
| <b>Internal Current Consumption</b> | 5 VDC, 170 mA max.   |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 10.2 to 26.4 VDC, 50 mA min.   |
| <b>Weight</b>                       | 110 g max.   |
| <b>Accessories</b>                  | None   |

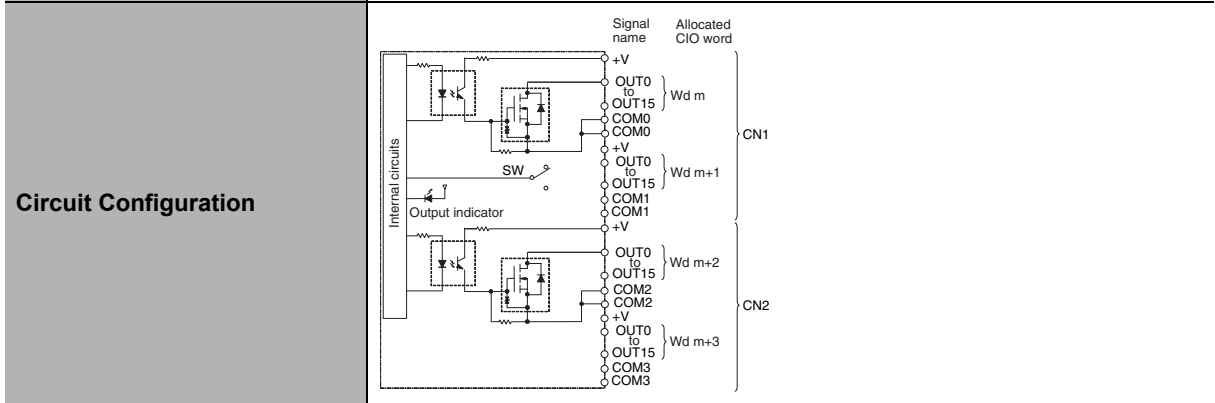


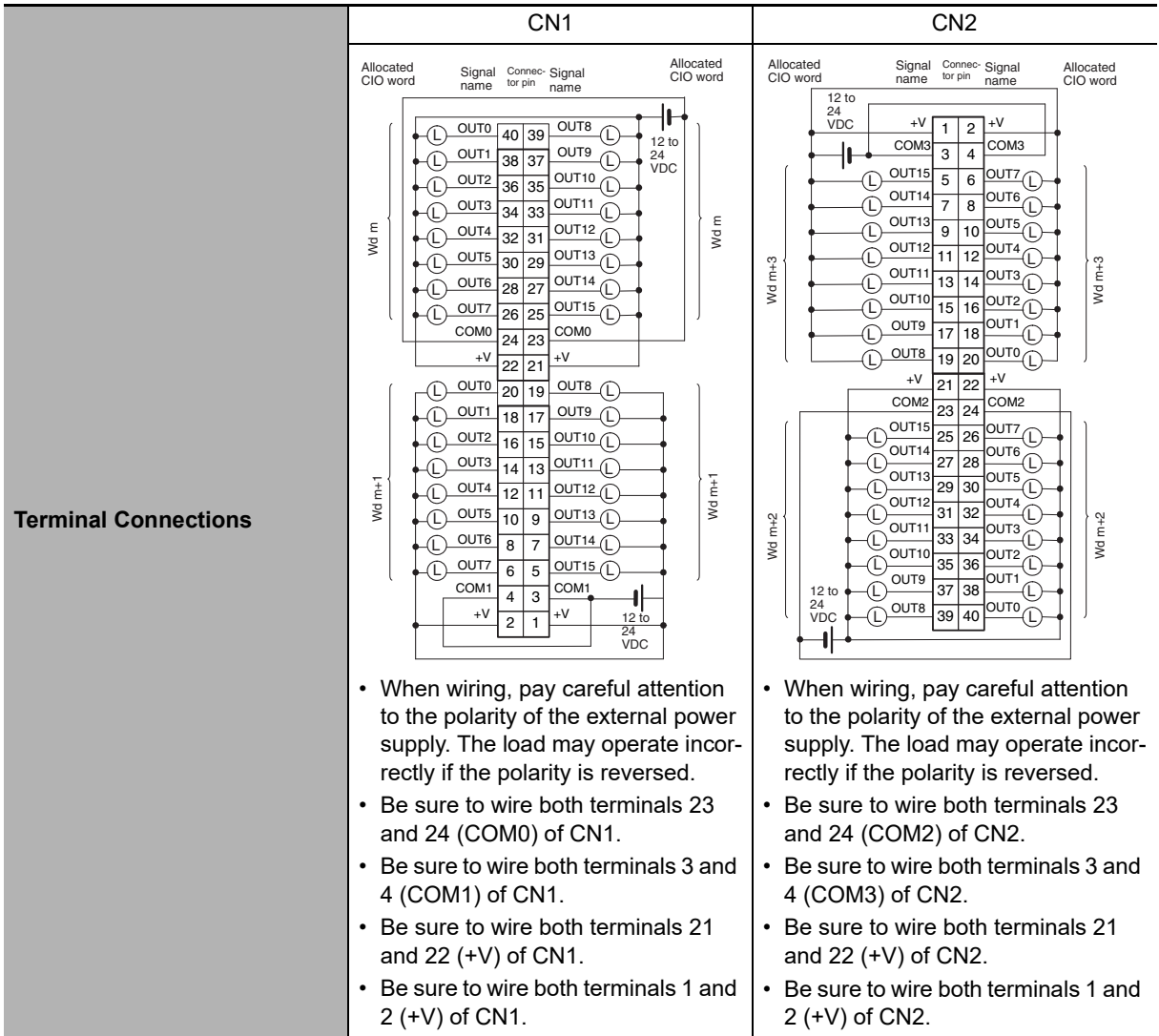




● CJ1W-OD263 Transistor Output Unit (64 Points)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 64-point Transistor Output Unit with MIL Connectors (Sinking Outputs)  |
| <b>Model</b>                        | CJ1W-OD263   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.3 A/point, 1.6 A/common, 6.4 A/Unit  |
| <b>Maximum Inrush Current</b>       | 3.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 0.5 ms max.  |
| <b>OFF Response Time</b>            | 1.0 ms max.  |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 64 (16 points/common, 4 circuits)  |
| <b>Internal Current Consumption</b> | 170 mA max.  |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 12 to 24 VDC, 50 mA min.   |
| <b>Weight</b>                       | 110 g max.   |



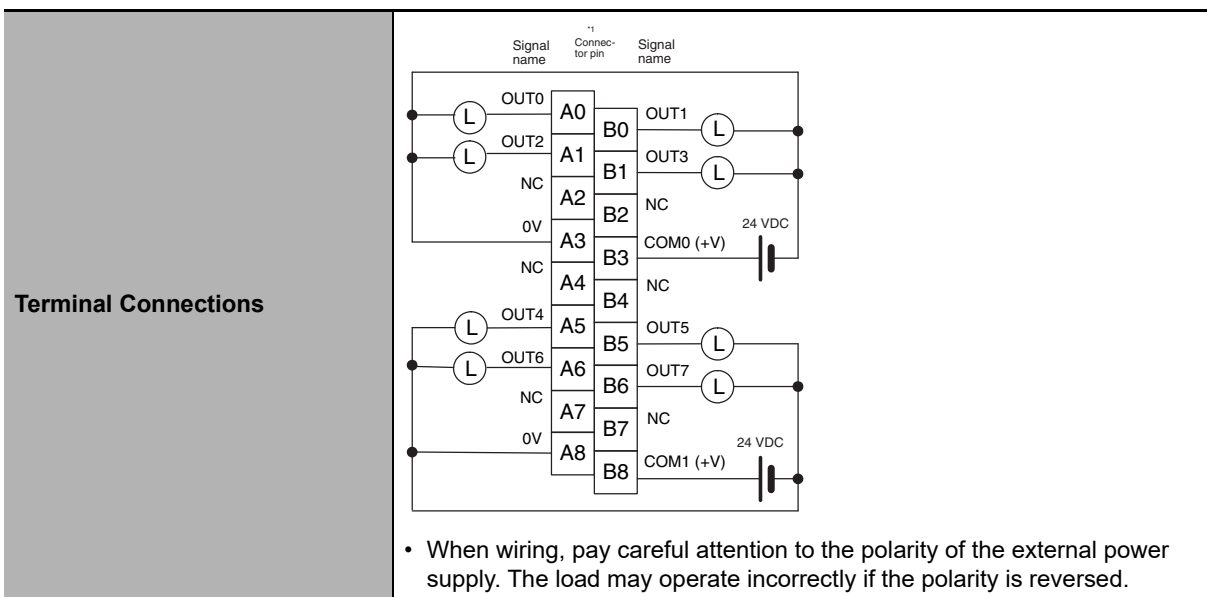


- When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.
- Be sure to wire both terminals 23 and 24 (COM2) of CN2.
- Be sure to wire both terminals 3 and 4 (COM3) of CN2.
- Be sure to wire both terminals 21 and 22 (+V) of CN2.
- Be sure to wire both terminals 1 and 2 (+V) of CN2.

● **CJ1W-OD202 Transistor Output Unit (8 Points)**

|                                      |  |
|--------------------------------------|--|
| <b>Name</b>                          | 8-point Transistor Output Unit with Terminal Block (Sourcing Outputs)  |
| <b>Model</b>                         | CJ1W-OD202   |
| <b>Rated Voltage</b>                 | 24 VDC   |
| <b>Operating Load Voltage Range</b>  | 20.4 to 26.4 VDC   |
| <b>Maximum Load Current</b>          | 2 A/point, 8 A/Unit  |
| <b>Leakage Current</b>               | 0.1 mA max.  |
| <b>Residual Voltage</b>              | 1.5 V max.   |
| <b>ON Response Time</b>              | 0.5 ms max.  |
| <b>OFF Response Time</b>             | 1.0 ms max.  |
| <b>Load Short-circuit Protection</b> | Detection current: 6 A min.<br>Automatic restart after error clearance. (Refer to page A-160.)               |
| <b>Line Disconnection Detection</b>  | Detection current: 200 mA (Refer to page A-160.)   |
| <b>Insulation Resistance</b>         | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>           | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>            | 8 (4 points/common, 2 circuits)  |
| <b>Internal Current Consumption</b>  | 110 mA max.  |
| <b>Fuse</b>                          | None   |
| <b>External Power Supply</b>         | 24 VDC, 50 mA min.   |
| <b>Weight</b>                        | 120 g max.   |

|                              |  |
|------------------------------|--|
| <b>Circuit Configuration</b> | <p>• 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.</p> |
|------------------------------|--|



\*1 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-OD204 Transistor Output Unit (8 Points)

|                                      |  |
|--------------------------------------|--|
| <b>Name</b>                          | 8-point Transistor Output Unit with Terminal Block (Sourcing Outputs)  |
| <b>Model</b>                         | CJ1W-OD204   |
| <b>Rated Voltage</b>                 | 24 VDC   |
| <b>Operating Load Voltage Range</b>  | 20.4 to 26.4 VDC   |
| <b>Maximum Load Current</b>          | 0.5 A/point, 4.0 A/Unit  |
| <b>Leakage Current</b>               | 0.1 mA max.  |
| <b>Residual Voltage</b>              | 1.5 V max.   |
| <b>ON Response Time</b>              | 0.5 ms max.  |
| <b>OFF Response Time</b>             | 1.0 ms max.  |
| <b>Load Short-circuit Protection</b> | Detection current: 0.7 to 2.5 A<br>Automatic restart after error clearance. (Refer to page A-160.)           |
| <b>Insulation Resistance</b>         | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>           | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>            | 8 (8 points/common, 1 circuit)   |
| <b>Internal Current Consumption</b>  | 100 mA max.  |
| <b>Fuse</b>                          | None   |
| <b>External Power Supply</b>         | 20.4 to 26.4 VDC, 40 mA min.   |
| <b>Weight</b>                        | 120 g max.   |

**Circuit Configuration**

- 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**

- When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

\*1 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)

|                                      |  |
|--------------------------------------|--|
| <b>Name</b>                          | 16-point Transistor Output Unit with Terminal Block (Sourcing Outputs)                                       |
| <b>Model</b>                         | CJ1W-OD212   |
| <b>Rated Voltage</b>                 | 24 VDC   |
| <b>Operating Load Voltage Range</b>  | 20.4 to 26.4 VDC   |
| <b>Maximum Load Current</b>          | 0.5 A/point, 5.0 A/Unit  |
| <b>Maximum Inrush Current</b>        | 0.1 mA max.  |
| <b>Leakage Current</b>               | 1.5 V max.   |
| <b>ON Response Time</b>              | 0.5 ms max.  |
| <b>OFF Response Time</b>             | 1.0 ms max.  |
| <b>Load Short-circuit Protection</b> | Detection current: 0.7 to 2.5 A<br>Automatic restart after error clearance. (Refer to page A-160.)           |
| <b>Insulation Resistance</b>         | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>           | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>            | 16 (16 points/common, 1 circuit)   |
| <b>Internal Current Consumption</b>  | 5 VDC, 100 mA max.   |
| <b>External Power Supply</b>         | 20.4 to 26.4 VDC, 40 mA min.   |
| <b>Weight</b>                        | 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**

- When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

\*1 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)

|                                      |  |
|--------------------------------------|--|
| <b>Name</b>                          | 32-point Transistor Output Unit with MIL Connector (Sourcing Outputs)  |
| <b>Model</b>                         | CJ1W-OD232   |
| <b>Rated Voltage</b>                 | 24 VDC   |
| <b>Operating Load Voltage Range</b>  | 20.4 to 26.4 VDC   |
| <b>Maximum Load Current</b>          | 0.5 A/point, 2.0 A/common, 4.0 A/Unit  |
| <b>Leakage Current</b>               | 0.1 mA max.  |
| <b>Residual Voltage</b>              | 1.5 V max.   |
| <b>ON Response Time</b>              | 0.5 ms max.  |
| <b>OFF Response Time</b>             | 1.0 ms max.  |
| <b>Load Short-circuit Protection</b> | Detection current: 0.7 to 2.5 A<br>Automatic restart after error clearance. (Refer to page A-160.)           |
| <b>Insulation Resistance</b>         | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>           | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>            | 32 (16 points/common, 2 circuits)  |
| <b>Internal Current Consumption</b>  | 5 VDC 150 mA max.  |
| <b>External Power Supply</b>         | 20.4 to 26.4 VDC, 70 mA min.   |
| <b>Weight</b>                        | 80 g max.  |
| <b>Accessories</b>                   | None   |

**Circuit Configuration**

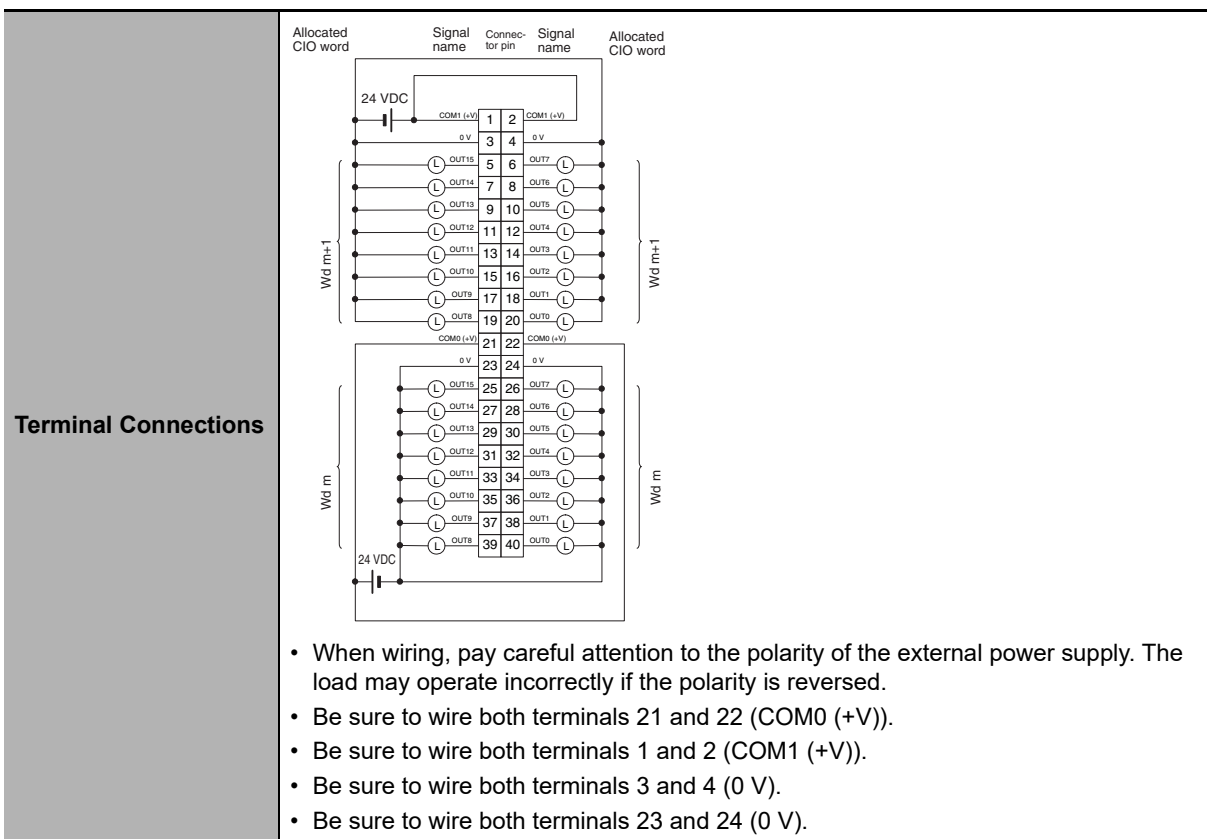
Signal name      Allocated CIO word

COM0 (+V)  
COM0 (+V)  
OUT0  
OUT15  
0 V      } Wd m

COM1 (+V)  
COM1 (+V)  
OUT0  
OUT15  
0 V      } Wd m+1

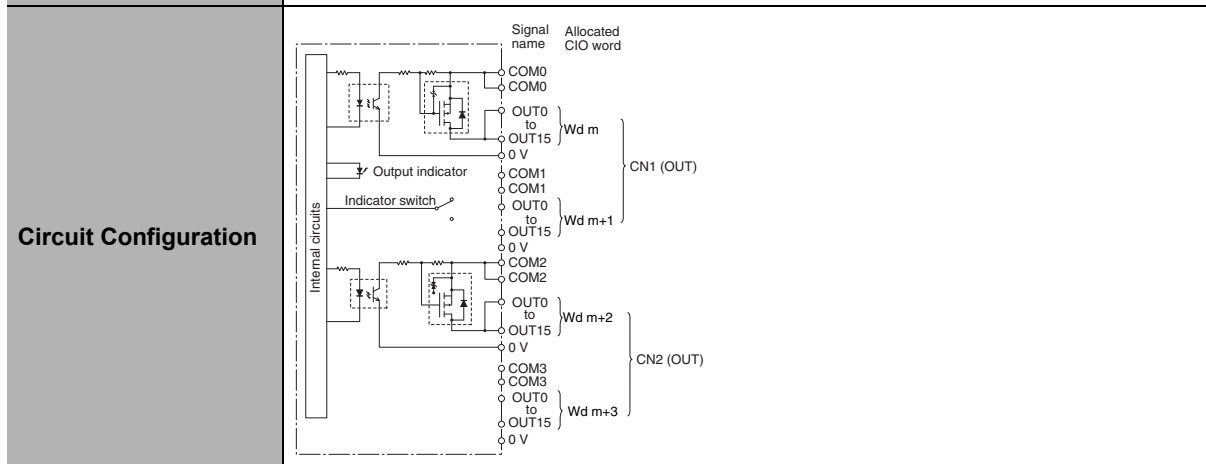
- The ERR indicator will light and the corresponding bit in A050 to A069 (Basic I/O Unit Information, one for each common) will turn ON if an overcurrent is detected.





● CJ1W-OD262 Transistor Output Unit (64 Points)

|                                     |  |
|-------------------------------------|--|
| <b>Name</b>                         | 64-point Transistor Output Unit with MIL Connectors (Sourcing Outputs)                                       |
| <b>Model</b>                        | CJ1W-OD262   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   |
| <b>Maximum Load Current</b>         | 0.3 A/point, 1.6 A/common, 6.4 A/Unit  |
| <b>Maximum Inrush Current</b>       | 3.0 A/point, 10 ms max.  |
| <b>Leakage Current</b>              | 0.1 mA max.  |
| <b>Residual Voltage</b>             | 1.5 V max.   |
| <b>ON Response Time</b>             | 0.5 ms max.  |
| <b>OFF Response Time</b>            | 1.0 ms max.  |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (100 VDC)   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |
| <b>Number of Circuits</b>           | 64 (16 points/common, 4 circuits)  |
| <b>Internal Current Consumption</b> | 170 mA max. (5 VDC)  |
| <b>Fuse</b>                         | None   |
| <b>External Power Supply</b>        | 10.2 to 26.4 VDC, 50 mA min.   |
| <b>Weight</b>                       | 110 g max.   |
| <b>Accessories</b>                  | None   |



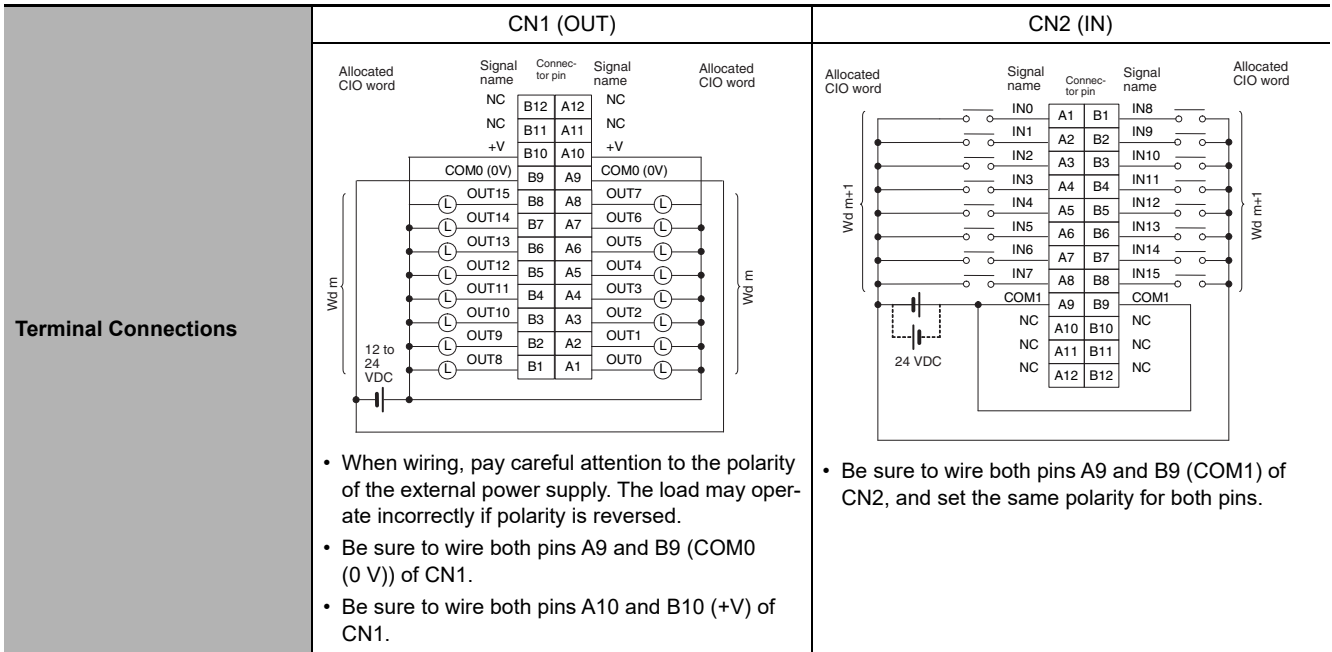
|                             | CN1  | CN2  |
|-----------------------------|--|--|
| <b>Terminal Connections</b> |  |  |
|                             | <ul style="list-style-type: none"> <li>• When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.</li> <li>• Be sure to wire both terminals 21 and 22 (COM0 (+V)) of CN1.</li> <li>• Be sure to wire both terminals 1 and 2 (COM1 (+V)) of CN1.</li> <li>• Be sure to wire both terminals 23 and 24 (0 V) of CN1.</li> <li>• Be sure to wire both terminals 3 and 4 (0 V) of CN1.</li> </ul> | <ul style="list-style-type: none"> <li>• When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.</li> <li>• Be sure to wire both terminals 21 and 22 (COM2 (+V)) of CN2.</li> <li>• Be sure to wire both terminals 1 and 2 (COM3 (+V)) of CN2.</li> <li>• Be sure to wire both terminals 23 and 24 (0 V) of CN2.</li> <li>• Be sure to wire both terminals 3 and 4 (0 V) of CN2.</li> </ul> |

## Mixed I/O Units

### ● CJ1W-MD231 DC Input/Transistor Output Unit (24 VDC, 16 Inputs/16 Outputs)

|                                     |  |   |   |
|-------------------------------------|--|---|---|
| <b>Name</b>                         | 16-point DC Input/16-point Transistor Output Unit with Fujitsu/OTAX Connectors (Sinking Outputs)             |   |   |
| <b>Model</b>                        | CJ1W-MD231   |   |   |
| <b>Output section (CN1)</b>         | <b>Input section (CN2)</b>   |   |   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   | <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   | <b>Operating Input Voltage</b>            | 20.4 to 26.4 VDC  |
| <b>Maximum Load Current</b>         | 0.5 A/point, 2.0 A/Unit  | <b>Input Impedance</b>                    | 3.3 k $\Omega$  |
| <b>Maximum Inrush Current</b>       | 4.0 A/point, 10 ms max.  | <b>Input Current</b>                      | 7 mA typical (at 24 VDC)  |
| <b>Leakage Current</b>              | 0.1 mA max.  | <b>ON Voltage/ON Current</b>              | 14.4 VDC min./3 mA min.   |
| <b>Residual Voltage</b>             | 1.5 V max.   | <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>             | 0.1 ms max.  | <b>ON Response Time</b>                   | 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 |
| <b>OFF Response Time</b>            | 0.8 ms max.  |   |   |
| <b>No. of Circuits</b>              | 16 (16 points/common, 1 circuit)   | <b>OFF Response Time</b>                  | 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 |
| <b>Fuse</b>                         |  |   |   |
| <b>External Power Supply</b>        | 12 to 24 VDC, 20 mA min.   | <b>No. of Circuits</b>                    | 16 (16 points/common, 1 circuit)  |
|                                     |  | <b>Number of Simultaneously ON Points</b> | 75% (at 24 VDC)   |
| <b>Insulation Resistance</b>        | 20 M $\Omega$ between the external terminals and the GR terminal (at 100 VDC)                                |   |   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |   |   |
| <b>Internal Current Consumption</b> | 5 VDC 130 mA max.  |   |   |
| <b>Weight</b>                       | 90 g max.  |   |   |
| <b>Accessories</b>                  | None   |   |   |

| <b>Circuit Configuration</b> | <b>CN1 (OUT)</b> | <b>CN2 (IN)</b>   |                          |              |                |    |    |    |    |    |    |    |    |   |
|------------------------------|------------------|---|--------------------------|--------------|----------------|----|----|----|----|----|----|----|----|---|
|                              |                  |   |                          |              |                |    |    |    |    |    |    |    |    |   |
|                              |                  | <p>Number of Simultaneously ON Points vs. Ambient Temperature Characteristic</p> <table border="1"> <caption>Number of Simultaneously ON Points vs. Ambient Temperature</caption> <thead> <tr> <th>Ambient Temperature (°C)</th> <th>24 VDC Input</th> <th>26.4 VDC Input</th> </tr> </thead> <tbody> <tr> <td>33</td> <td>16</td> <td>16</td> </tr> <tr> <td>45</td> <td>16</td> <td>16</td> </tr> <tr> <td>55</td> <td>12</td> <td>9</td> </tr> </tbody> </table> | Ambient Temperature (°C) | 24 VDC Input | 26.4 VDC Input | 33 | 16 | 16 | 45 | 16 | 16 | 55 | 12 | 9 |
| Ambient Temperature (°C)     | 24 VDC Input     | 26.4 VDC Input  |                          |              |                |    |    |    |    |    |    |    |    |   |
| 33                           | 16               | 16  |                          |              |                |    |    |    |    |    |    |    |    |   |
| 45                           | 16               | 16  |                          |              |                |    |    |    |    |    |    |    |    |   |
| 55                           | 12               | 9   |                          |              |                |    |    |    |    |    |    |    |    |   |



\*1 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.

\*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

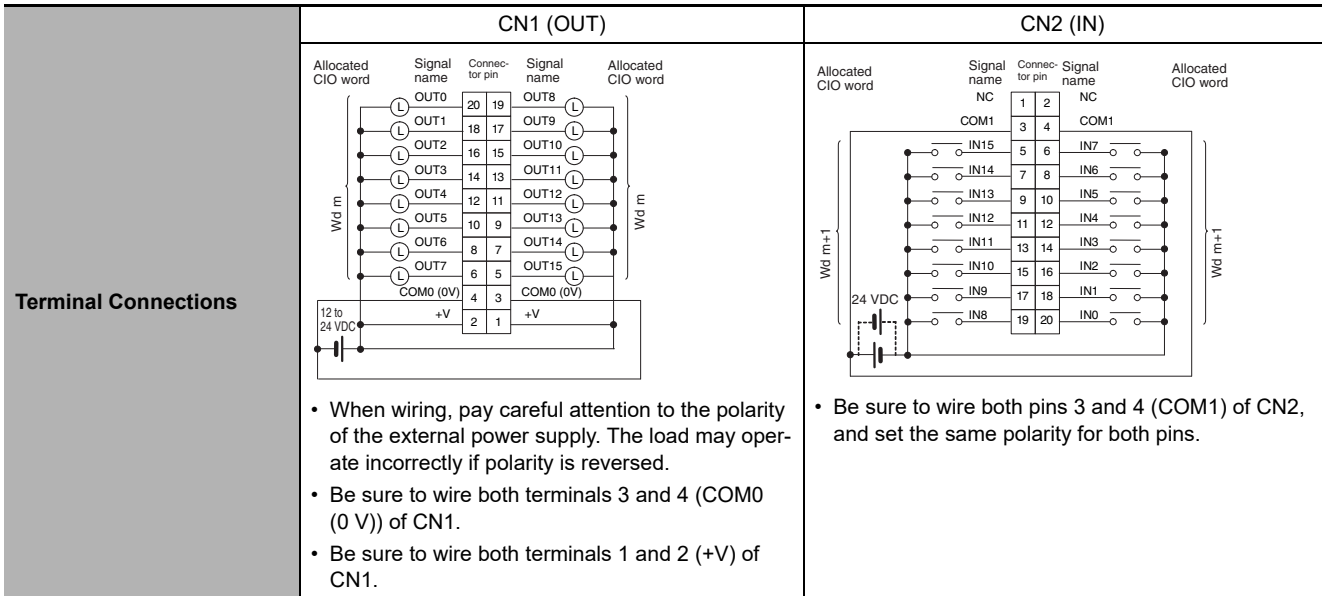
● CJ1W-MD233 DC Input/Transistor Output Unit (24 VDC, 16 Inputs/16 Outputs)

|                                     |  |   |   |
|-------------------------------------|--|---|---|
| <b>Name</b>                         | 16-point DC Input/16-point Transistor Output Unit with MIL Connectors (Sinking Outputs)                      |   |   |
| <b>Model</b>                        | CJ1W-MD233   |   |   |
| <b>Output section (CN1)</b>         | <b>Input section (CN2)</b>   |   |   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   | <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   | <b>Operating Input Voltage</b>            | 20.4 to 26.4 VDC  |
| <b>Maximum Load Current</b>         | 0.5 A/point, 2.0 A/Unit  | <b>Input Impedance</b>                    | 3.3 k $\Omega$  |
| <b>Maximum Inrush Current</b>       | 4.0 A/point, 10 ms max.  | <b>Input Current</b>                      | 7 mA typical (at 24 VDC)  |
| <b>Leakage Current</b>              | 0.1 mA max.  | <b>ON Voltage/ON Current</b>              | 14.4 VDC min./3 mA min.   |
| <b>Residual Voltage</b>             | 1.5 V max.   | <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>             | 0.1 ms max.  | <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>            | 0.8 ms max.  |   |   |
| <b>No. of Circuits</b>              | 16 (16 points/common, 1 circuit)   | <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Fuse</b>                         |  |   |   |
| <b>External Power Supply</b>        | 12 to 24 VDC, 20 mA min.   | <b>No. of Circuits</b>                    | 16 (16 points/common, 1 circuit)  |
|                                     |  | <b>Number of Simultaneously ON Points</b> | 75% (at 24 VDC)   |
| <b>Insulation Resistance</b>        | 20 M $\Omega$ between the external terminals and the GR terminal (at 100 VDC)                                |   |   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |   |   |
| <b>Internal Current Consumption</b> | 5 VDC 130 mA max.  |   |   |
| <b>Weight</b>                       | 90 g max.  |   |   |
| <b>Accessories</b>                  | None   |   |   |

|                              |                  |                 |
|------------------------------|------------------|-----------------|
| <b>Circuit Configuration</b> | <b>CN1 (OUT)</b> | <b>CN2 (IN)</b> |
|                              |                  |                 |

**Number of Simultaneously ON Points vs. Ambient Temperature Characteristic**

| Ambient Temperature (°C) | Number of simultaneously ON points (24 VDC) | Number of simultaneously ON points (26.4 VDC) |
|--------------------------|---|---|
| 33                       | 16  | 16  |
| 45                       | 16  | 16  |
| 55                       | 12  | 9   |



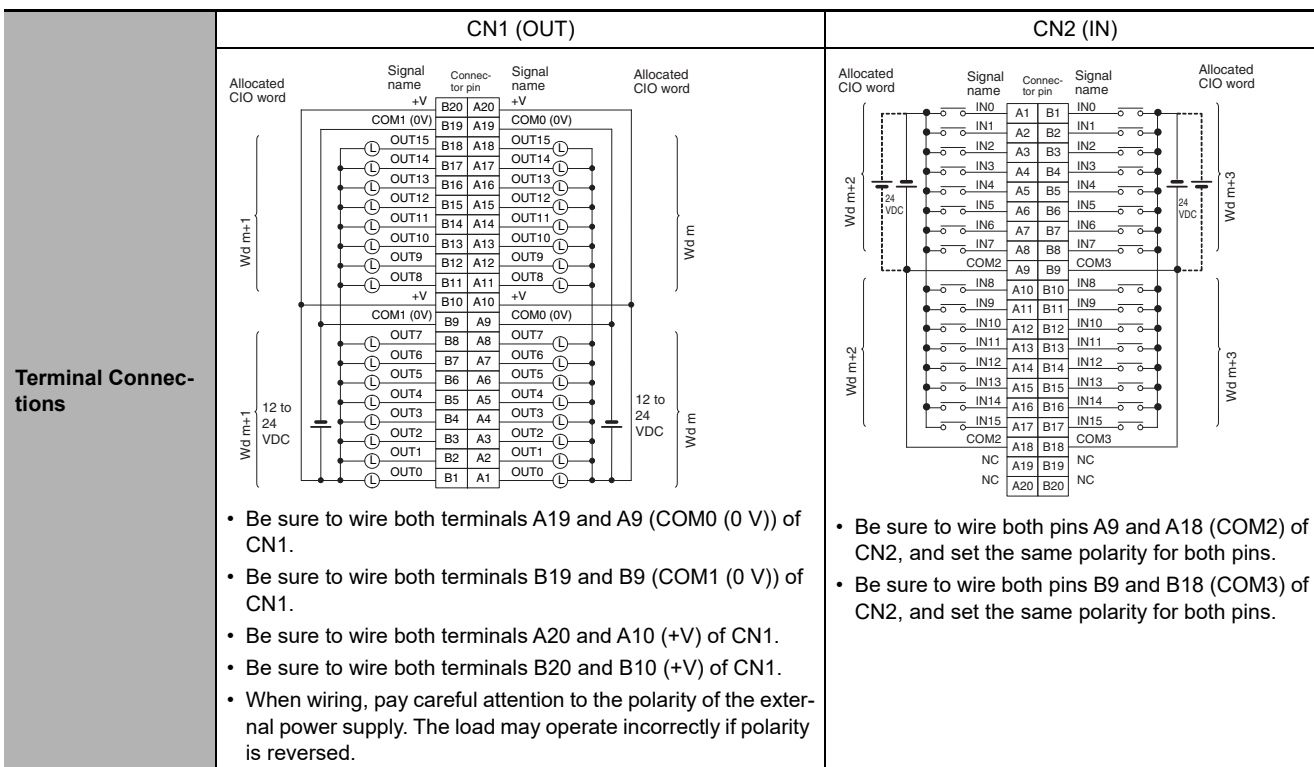
- \*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

● CJ1W-MD261 DC Input/Transistor Output Unit (24 VDC 32 Inputs/32 Outputs)

|                                     |  |   |   |
|-------------------------------------|--|---|---|
| <b>Name</b>                         | 32-point DC Input/32-point Transistor Output Unit with Fujitsu/OTAX Connectors (Sinking Outputs)             |   |   |
| <b>Model</b>                        | CJ1W-MD261   |   |   |
| <b>Output section (CN1)</b>         | <b>Input section (CN2)</b>   |   |   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   | <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   | <b>Operating Input Voltage</b>            | 20.4 to 26.4 VDC  |
| <b>Maximum Load Current</b>         | 0.3 A/point, 1.6 A/common, 3.2 A/Unit  | <b>Input Impedance</b>                    | 5.6 kΩ  |
| <b>Maximum Inrush Current</b>       | 3.0 A/point, 10 ms max.  | <b>Input Current</b>                      | 4.1 mA typical (at 24 VDC)  |
| <b>Leakage Current</b>              | 0.1 mA max.  | <b>ON Voltage/ON Current</b>              | 19.0 VDC min./3 mA min. *3  |
| <b>Residual Voltage</b>             | 1.5 V max.   | <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>             | 0.5 ms max.  | <b>ON Response Time</b>                   | 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 |
| <b>OFF Response Time</b>            | 1.0 ms max.  |   |   |
| <b>No. of Circuits</b>              | 32 (16 points/common, 2 circuits)  | <b>OFF Response Time</b>                  | 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 |
| <b>Fuse</b>                         | None   |   |   |
| <b>External Power Supply</b>        | 12 to 24 VDC, 30 mA min.   | <b>No. of Circuits</b>                    | 32 (16 points/common, 2 circuits)   |
|                                     |  | <b>Number of Simultaneously ON Points</b> | 75% (24 points) (at 24 VDC)   |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (at 100 VDC)  |   |   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |   |   |
| <b>Internal Current Consumption</b> | 5 VDC 140 mA max.  |   |   |
| <b>Weight</b>                       | 110 g max.   |   |   |
| <b>Accessories</b>                  | None   |   |   |

|                              |                  |                 |  |
|------------------------------|------------------|-----------------|--|
| <b>Circuit Configuration</b> | <b>CN1 (OUT)</b> | <b>CN2 (IN)</b> | <p>Number of Simultaneously ON Points vs. Ambient Temperature Characteristic</p> |
|                              |                  |                 |  |



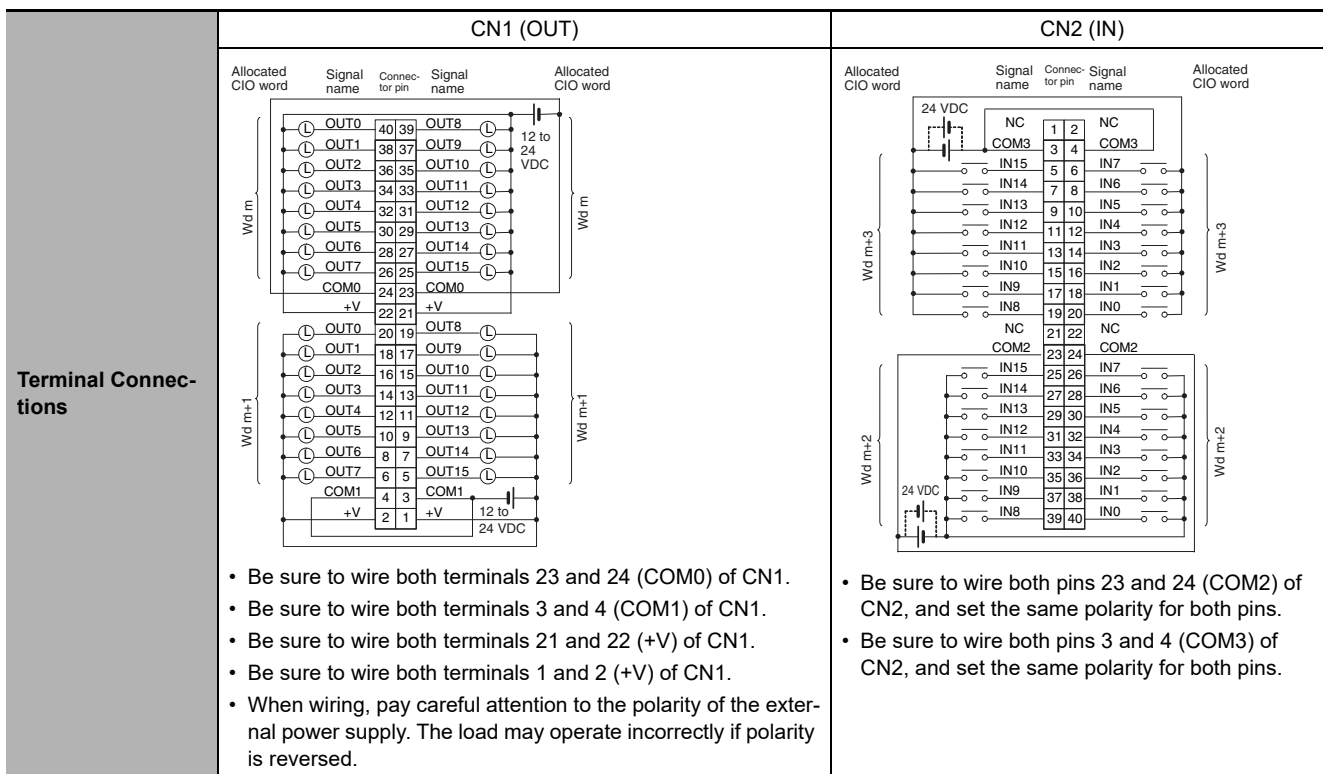


- \*1 The ON response time will be 120  $\mu$ s maximum and OFF response time will be 400  $\mu$ s maximum even if the response times are set to 0 ms due to internal element delays.
- \*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.
- \*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)

|                                     |  |   |   |
|-------------------------------------|--|---|---|
| <b>Name</b>                         | 32-point DC Input/32-point Transistor Output Unit with MIL Connectors (Sinking Outputs)                      |   |   |
| <b>Model</b>                        | CJ1W-MD263   |   |   |
| <b>Output section (CN1)</b>         | <b>Input section (CN2)</b>   |   |   |
| <b>Rated Voltage</b>                | 12 to 24 VDC   | <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Operating Load Voltage Range</b> | 10.2 to 26.4 VDC   | <b>Operating Input Voltage</b>            | 20.4 to 26.4 VDC  |
| <b>Maximum Load Current</b>         | 0.3 A/point, 1.6 A/common, 3.2 A/Unit  | <b>Input Impedance</b>                    | 5.6 kΩ  |
| <b>Maximum Inrush Current</b>       | 3.0 A/point, 10 ms max.  | <b>Input Current</b>                      | 4.1 mA typical (at 24 VDC)  |
| <b>Leakage Current</b>              | 0.1 mA max.  | <b>ON Voltage/ON Current</b>              | 19.0 VDC min./3 mA min.*3   |
| <b>Residual Voltage</b>             | 1.5 V max.   | <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>ON Response Time</b>             | 0.5 ms max.  | <b>ON Response Time</b>                   | 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 |
| <b>OFF Response Time</b>            | 1.0 ms max.  |   |   |
| <b>No. of Circuits</b>              | 32 (16 points/common, 2 circuits)  | <b>OFF Response Time</b>                  | 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 |
| <b>Fuse</b>                         | None   |   |   |
| <b>External Power Supply</b>        | 12 to 24 VDC, 30 mA min.   | <b>No. of Circuits</b>                    | 32 (16 points/common, 2 circuits)   |
|                                     |  | <b>Number of Simultaneously ON Points</b> | 75% (24 points) (at 24 VDC)   |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (at 100 VDC)  |   |   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |   |   |
| <b>Internal Current Consumption</b> | 5 VDC 140 mA max.  |   |   |
| <b>Weight</b>                       | 110 g max.   |   |   |
| <b>Accessories</b>                  | None   |   |   |

|                              |                  |                 |  |
|------------------------------|------------------|-----------------|--|
| <b>Circuit Configuration</b> | <b>CN1 (OUT)</b> | <b>CN2 (IN)</b> | <p>Number of Simultaneously ON Points vs. Ambient Temperature Characteristic</p> |
|                              |                  |                 |  |



- \*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)**

|                                      |  |   |   |
|--------------------------------------|--|---|---|
| <b>Name</b>                          | 16-point DC Input/16-point Transistor Output Unit with MIL Connectors (Sourcing Outputs)                     |   |   |
| <b>Model</b>                         | CJ1W-MD232   |   |   |
| <b>Output section (CN1)</b>          | <b>Input section (CN2)</b>   |   |   |
| <b>Rated Voltage</b>                 | 24 VDC   | <b>Rated Input Voltage</b>                | 24 VDC  |
| <b>Operating Load Voltage Range</b>  | 20.4 to 26.4 VDC   | <b>Operating Input Voltage</b>            | 20.4 to 26.4 VDC  |
| <b>Maximum Load Current</b>          | 0.5 A/point, 2.0 A/Unit  | <b>Input Impedance</b>                    | 3.3 kΩ  |
| <b>Leakage Current</b>               | 0.1 mA max.  | <b>Input Current</b>                      | 7 mA typical (at 24 VDC)  |
| <b>Residual Voltage</b>              | 1.5 V max.   | <b>ON Voltage/ON Current</b>              | 14.4 VDC min./3 mA min.   |
| <b>ON Response Time</b>              | 0.5 ms max.  | <b>OFF Voltage/OFF Current</b>            | 5 VDC max./1 mA max.  |
| <b>OFF Response Time</b>             | 1.0 ms max.  | <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>Load Short-circuit Protection</b> | Detection current: 0.7 to 2.5 A min.<br>Automatic restart after error clearance. (Refer to page A-162.)      | <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>No. of Circuits</b>               | 16 (16 points/common, 1 circuit)   | <b>No. of Circuits</b>                    | 16 (16 points/common, 1 circuit)  |
| <b>External Power Supply</b>         | 20.4 to 26.4 VDC, 40 mA min.   | <b>Number of Simultaneously ON Points</b> | 75% (at 24 VDC)   |
| <b>Insulation Resistance</b>         | 20 MΩ between the external terminals and the GR terminal (at 100 VDC)  |   |   |
| <b>Dielectric Strength</b>           | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |   |   |
| <b>Internal Current Consumption</b>  | 5 VDC 130 mA max.  |   |   |
| <b>Weight</b>                        | 100 g max.   |   |   |
| <b>Accessories</b>                   | None   |   |   |

|                              |  |                 |
|------------------------------|--|-----------------|
| <b>Circuit Configuration</b> | <b>CN1 (OUT)</b>   | <b>CN2 (IN)</b> |
|                              |  |                 |
|                              | <p>Number of Simultaneously ON Points vs. Ambient Temperature Characteristic</p> |                 |

**Terminal Connections**

### CN1 (OUT)

| Allocated CIO word | Signal name | Connector pin | Signal name | Allocated CIO word |
|--------------------|-------------|---------------|-------------|--------------------|
|                    | OUT0        | 20            | OUT8        |                    |
|                    | OUT1        | 18            | OUT9        |                    |
|                    | OUT2        | 16            | OUT10       |                    |
|                    | OUT3        | 14            | OUT11       |                    |
|                    | OUT4        | 12            | OUT12       |                    |
|                    | OUT5        | 10            | OUT13       |                    |
|                    | OUT6        | 8             | OUT14       |                    |
|                    | OUT7        | 6             | OUT15       |                    |
|                    | COM0 (+V)   | 4             | COM0 (+V)   |                    |
|                    | 0 V         | 2             | 0 V         |                    |

### CN2 (IN)

| Allocated CIO word | Signal name | Connector pin | Signal name | Allocated CIO word |
|--------------------|-------------|---------------|-------------|--------------------|
|                    | NC          | 1             | NC          |                    |
|                    | COM1        | 3             | COM1        |                    |
|                    | IN15        | 5             | IN7         |                    |
|                    | IN14        | 7             | IN6         |                    |
|                    | IN13        | 9             | IN5         |                    |
|                    | IN12        | 11            | IN4         |                    |
|                    | IN11        | 13            | IN3         |                    |
|                    | IN10        | 15            | IN2         |                    |
|                    | IN9         | 17            | IN1         |                    |
|                    | IN8         | 19            | IN0         |                    |

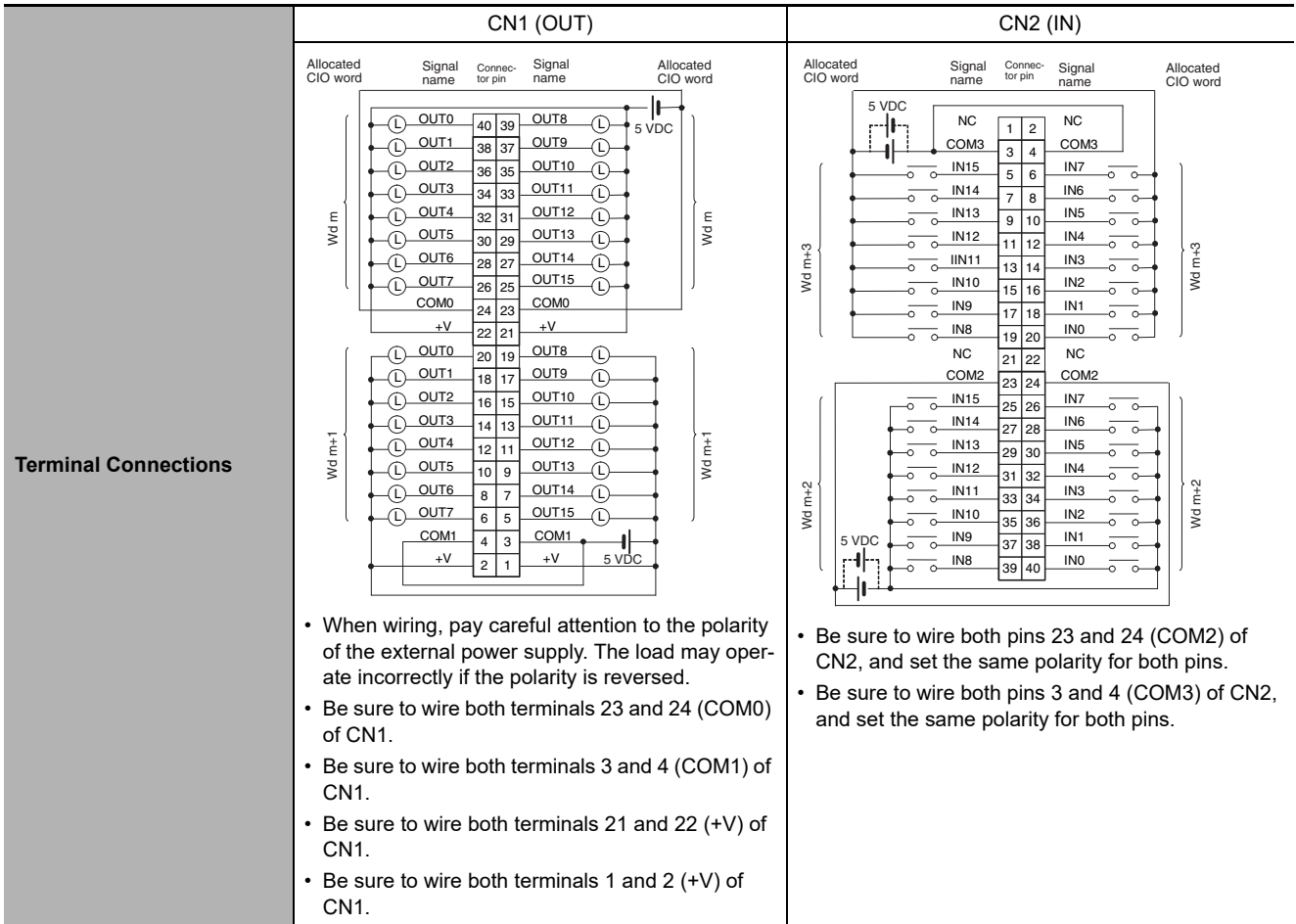
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed.
- Be sure to wire both terminals 3 and 4 (COM0 (+V)) of CN1.
- Be sure to wire both terminals 1 and 2 ((0 V)) of CN1.

- Be sure to wire both pins 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

- \*1 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.
- \*2 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)

|                                     |  |   |   |
|-------------------------------------|--|---|---|
| <b>Name</b>                         | 32-point Input /32-point Output TTL I/O Unit with MIL Connectors   |   |   |
| <b>Model</b>                        | CJ1W-MD563   |   |   |
| <b>Output section (CN1)</b>         |  | <b>Input section (CN2)</b>                |   |
| <b>Rated Voltage</b>                | 5 VDC±10%  | <b>Rated Input Voltage</b>                | 5 VDC±10%   |
| <b>Operating Load Voltage Range</b> | 4.5 to 5.5 VDC   | <b>Input Impedance</b>                    | 1.1 kΩ  |
| <b>Maximum Load Current</b>         | 35 mA/point, 560 mA/common, 1.12 A/Unit  | <b>Input Current</b>                      | Approx. 3.5 mA (at 5 VDC)   |
| <b>Leakage Current</b>              | 0.1 mA max.  | <b>ON Voltage</b>                         | 3.0 VDC min.  |
| <b>Residual Voltage</b>             | 0.4 V max.   | <b>OFF Voltage</b>                        | 1.0 VDC max.  |
| <b>ON Response Time</b>             | 0.2 ms max.  | <b>ON Response Time</b>                   | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>OFF Response Time</b>            | 0.3 ms max.  | <b>OFF Response Time</b>                  | 8.0 ms (default) max. (Can be set to between 0 and 32 ms in the Input Response Time Settings under the PLC Setup) <sup>*1, *2</sup> |
| <b>No. of Circuits</b>              | 32 points (16 points/common, 2 circuits)   |   |   |
| <b>Fuse</b>                         | None   | <b>No. of Circuits</b>                    | 32 points (16 points/common, 2 circuits)  |
| <b>External Power Supply</b>        | 5 VDC±10%, 40 mA min. (1.2 mA × No. of ON points)  | <b>Number of Simultaneously ON Points</b> | 100% (16 points/common)   |
| <b>Insulation Resistance</b>        | 20 MΩ between the external terminals and the GR terminal (at 100 VDC)  |   |   |
| <b>Dielectric Strength</b>          | 1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max. |   |   |
| <b>Internal Current Consumption</b> | 5 VDC 190 mA max.  |   |   |
| <b>Weight</b>                       | 110 g max.   |   |   |
| <b>Accessories</b>                  | None   |   |   |
| <b>Circuit Configuration</b>        | <b>CN1 (OUT)</b>   |   | <b>CN2 (IN)</b>   |
|                                     |  |   |   |



\*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.

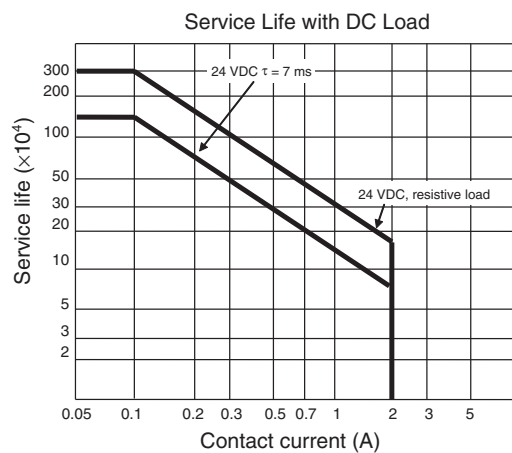
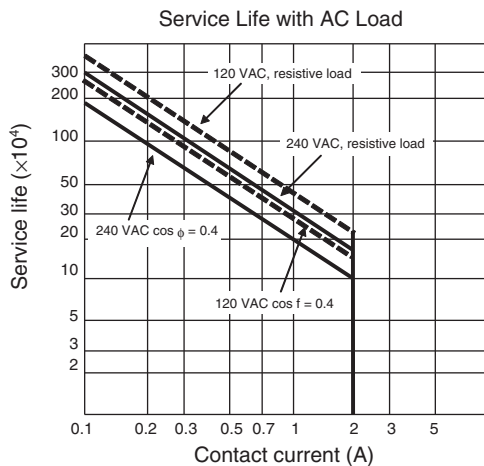
\*2 The unit accepts input signals with longer signal widths than the Input Response Time Settings under the PLC Setup.

## 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

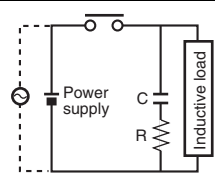
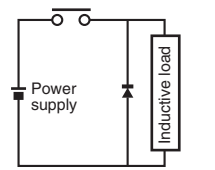
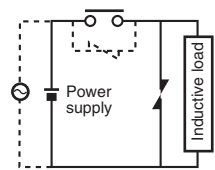
The life of the Relay varies with the load inductance. If any inductive load is connected to the Contact Output Unit, use an arc killer with the Contact Output Unit using an inductive load. (See next page.)

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.



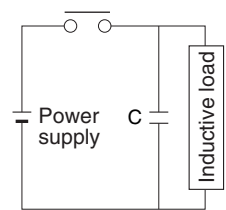
| Circuit   | Current |     | Characteristic   | Required element  |
|---|---------|-----|--|---|
|   | AC      | DC  |  |   |
| <p>CR method</p>         | Yes     | Yes | <p>If the load is a relay or solenoid, there is a time lag between the moment the circuit is opened and the moment the load is reset.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



### 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.

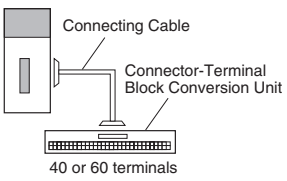
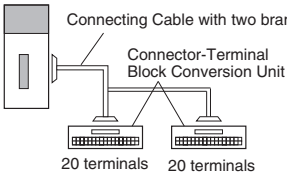
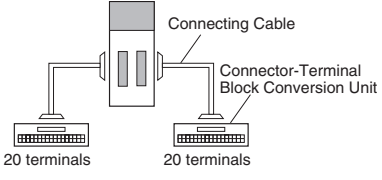
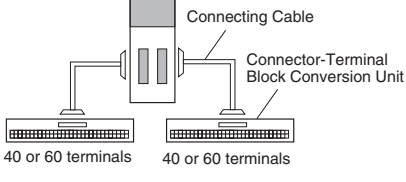
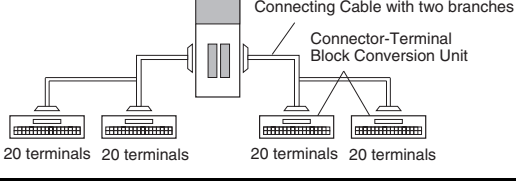


## A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals

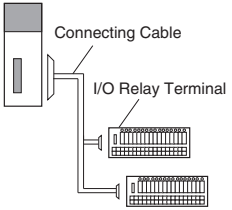
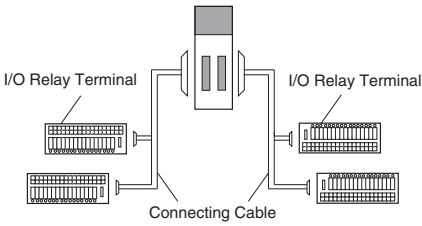
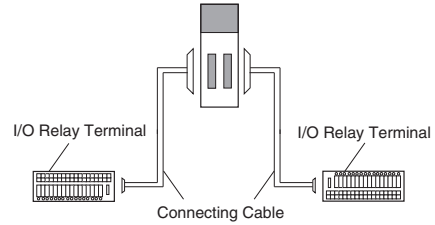
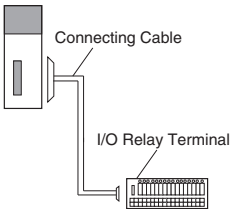
### Patterns for Combining Connector-Terminal Block Conversion Units and I/O Relay Terminals

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  |
|---------|--|----------------------|------------|
| A       |  <p>Connecting Cable<br/>Connector-Terminal Block Conversion Unit<br/>40 or 60 terminals</p>  | 1                    | None       |
| B       |  <p>Connecting Cable with two branches<br/>Connector-Terminal Block Conversion Unit<br/>20 terminals 20 terminals</p>                            |                      | 2 branches |
| C       |  <p>Connecting Cable<br/>Connector-Terminal Block Conversion Unit<br/>20 terminals 20 terminals</p>   | 2                    | None       |
| D       |  <p>Connecting Cable<br/>Connector-Terminal Block Conversion Unit<br/>40 or 60 terminals 40 or 60 terminals</p>                                 |                      |            |
| F       |  <p>Connecting Cable with two branches<br/>Connector-Terminal Block Conversion Unit<br/>20 terminals 20 terminals 20 terminals 20 terminals</p> |                      | 2 branches |

● Connection Patterns for I/O Relay Terminals

| Pattern | Configuration   |
|---------|---|
| A       |    |
| B       |    |
| E       |   |
| F       |  |

## 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 capacity | Number of connectors     | Polarity                   | Connection pattern*1 | Number of branches | Connecting Cable | Connector-Terminal Block Conversion Unit | Common terminal | Connection diagram |
|------------|--------------|--------------------------|----------------------------|----------------------|--------------------|------------------|--|-----------------|--------------------|
| CJ1W-ID231 | 32 inputs    | 1 Fujitsu/OTAX connector | NPN/PNP                    | A                    | None               | XW2Z-□□□B        | XW2D-40G6                                | None            | A-76               |
|            |              |                          |                            | A                    | None               | XW2Z-□□□B        | XW2D-40G6-RF*3                           | None            |                    |
|            |              |                          |                            | A                    | None               | XW2Z-□□□B        | XW2B-40G5                                | None            | ---                |
|            |              |                          |                            | A                    | None               | XW2Z-□□□B        | XW2B-40G4                                | None            | ---                |
|            |              |                          |                            | A                    | None               | XW2Z-□□□BU       | XW2D-40C6                                | None            | ---                |
|            |              |                          |                            | A                    | None               | XW2Z-□□□PF       | XW2R-□34GD-C1*4                          | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□D        | XW2D-20G6 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□D        | XW2B-20G5 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□D        | XW2B-20G4 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□D        | XW2C-20G6-IO16 (2 Units)                 | Yes             | A-76               |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□D        | XW2C-20G5-IN16 (2 Units)*2               | Yes             | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□D        | XW2E-20G5-IN16 (2 Units)*2               | Yes             | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□D        | XW2F-20G7-IN16 (2 Units)*2               | Yes             | ---                |
| B          | 2            | XW2Z-□□□D                | XW2N-20G8-IN16 (2 Units)*2 | Yes                  | ---                |                  |  |                 |                    |
| CJ1W-ID232 | 32 inputs    | 1 MIL connector          | NPN/PNP                    | A                    | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-77               |
|            |              |                          |                            | A                    | None               | XW2Z-□□□K        | XW2D-40G6-RM*3                           | None            |                    |
|            |              |                          |                            | A                    | None               | XW2Z-□□□K        | XW2B-40G5                                | None            | ---                |
|            |              |                          |                            | A                    | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                          |                            | A                    | None               | XW2Z-□□□PM       | XW2R-□34GD-C2*4                          | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2D-20G6 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2B-20G5 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2B-20G4 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2C-20G6-IO16 (2 Units)                 | Yes             | A-77               |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2C-20G5-IN16 (2 Units)*2               | Yes             | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2E-20G5-IN16 (2 Units)*2               | Yes             | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2F-20G7-IN16 (2 Units)*2               | Yes             | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2N-20G8-IN16 (2 Units)*2               | Yes             | ---                |
| CJ1W-ID233 | 32 inputs    | 1 MIL connector          | NPN/PNP                    | A                    | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-78               |
|            |              |                          |                            | A                    | None               | XW2Z-□□□K        | XW2D-40G6-RM*3                           | None            |                    |
|            |              |                          |                            | A                    | None               | XW2Z-□□□K        | XW2B-40G5                                | None            | ---                |
|            |              |                          |                            | A                    | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                          |                            | A                    | None               | XW2Z-□□□PM       | XW2R-□34GD-C2*4                          | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2D-20G6 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2B-20G5 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2B-20G4 (2 Units)                      | None            | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2C-20G6-IO16 (2 Units)                 | Yes             | A-78               |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2C-20G5-IN16 (2 Units)*2               | Yes             | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2E-20G5-IN16 (2 Units)*2               | Yes             | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2F-20G7-IN16 (2 Units)*2               | Yes             | ---                |
|            |              |                          |                            | B                    | 2                  | XW2Z-□□□N        | XW2N-20G8-IN16 (2 Units)*2               | Yes             | ---                |

| Unit       | I/O capacity | Number of connectors      | Polarity                               | Connection pattern <sup>*1</sup> | Number of branches | Connecting Cable | Connector-Terminal Block Conversion Unit | Common terminal | Connection diagram |
|------------|--------------|---------------------------|--|----------------------------------|--------------------|------------------|--|-----------------|--------------------|
| CJ1W-ID261 | 64 inputs    | 2 Fujitsu/OTAX connectors | NPN/PNP                                | D                                | None               | XW2Z-□□□B        | XW2D-40G6                                | None            | A-79               |
|            |              |                           |  | D                                | None               | XW2Z-□□□B        | XW2D-40G6-RF <sup>*3</sup>               | None            |                    |
|            |              |                           |  | D                                | None               | XW2Z-□□□B        | XW2B-40G5                                | None            | ---                |
|            |              |                           |  | D                                | None               | XW2Z-□□□B        | XW2B-40G4                                | None            | ---                |
|            |              |                           |  | D                                | None               | XW2Z-□□□BU       | XW2D-40C6                                | None            | ---                |
|            |              |                           |  | D                                | None               | XW2Z-□□□PF       | XW2R-□34GD-C1 <sup>*4</sup>              | 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-79               |
|            |              |                           |  | F                                | 2                  | XW2Z-□□□D        | XW2C-20G5-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            |              |                           |  | F                                | 2                  | XW2Z-□□□D        | XW2E-20G5-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            |              |                           |  | F                                | 2                  | XW2Z-□□□D        | XW2F-20G7-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
| F          | 2            | XW2Z-□□□D                 | XW2N-20G8-IN16 (2 Units) <sup>*2</sup> | Yes                              | ---                |                  |  |                 |                    |
| CJ1W-ID262 | 64 inputs    | 2 MIL connectors          | NPN/PNP                                | D                                | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-80               |
|            |              |                           |  | D                                | None               | XW2Z-□□□K        | XW2D-40G6-RM <sup>*3</sup>               | None            |                    |
|            |              |                           |  | D                                | None               | XW2Z-□□□K        | XW2B-40G5                                | None            | ---                |
|            |              |                           |  | D                                | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                           |  | D                                | None               | XW2Z-□□□PM       | XW2R-□34GD-C2 <sup>*4</sup>              | 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-80               |
|            |              |                           |  | F                                | 2                  | XW2Z-□□□N        | XW2C-20G5-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            |              |                           |  | F                                | 2                  | XW2Z-□□□N        | XW2E-20G5-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            |              |                           |  | F                                | 2                  | XW2Z-□□□N        | XW2F-20G7-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            |              |                           |  | F                                | 2                  | XW2Z-□□□N        | XW2N-20G8-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
| CJ1W-OD231 | 32 outputs   | 1 Fujitsu/OTAX connector  | NPN                                    | A                                | None               | XW2Z-□□□B        | XW2D-40G6                                | None            | A-81               |
|            |              |                           |  | A                                | None               | XW2Z-□□□B        | XW2B-40G5                                | None            |                    |
|            |              |                           |  | A                                | None               | XW2Z-□□□B        | XW2B-40G4                                | None            | ---                |
|            |              |                           |  | A                                | None               | XW2Z-□□□BU       | XW2D-40C6                                | None            | A-81               |
|            |              |                           |  | A                                | None               | XW2Z-□□□PF       | XW2R-□34GD-C3 <sup>*4</sup>              | None            | ---                |
|            |              |                           |  | B                                | 2                  | XW2Z-□□□L        | XW2D-20G6 (2 Units)                      | None            | ---                |
|            |              |                           |  | B                                | 2                  | XW2Z-□□□L        | XW2B-20G5 (2 Units)                      | None            | ---                |
|            |              |                           |  | B                                | 2                  | XW2Z-□□□L        | XW2B-20G4 (2 Units)                      | None            | ---                |
|            |              |                           |  | B                                | 2                  | XW2Z-□□□L        | XW2C-20G6-IO16 (2 Units)                 | Yes             | A-81               |
| B          | 2            | XW2Z-□□□L                 | XW2F-20G7-OUT16 (2 Units)              | Yes                              | ---                |                  |  |                 |                    |
| CJ1W-OD232 | 32 outputs   | 1 MIL connector           | PNP                                    | A                                | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-82               |
|            |              |                           |  | A                                | None               | XW2Z-□□□K        | XW2B-40G5                                | None            |                    |
|            |              |                           |  | A                                | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                           |  | A                                | None               | XW2Z-□□□PM       | XW2R-□34GD-C4 <sup>*4</sup>              | None            | ---                |
|            |              |                           |  | B                                | 2                  | XW2Z-□□□N        | XW2D-20G6 (2 Units)                      | None            | ---                |
|            |              |                           |  | B                                | 2                  | XW2Z-□□□N        | XW2B-20G5 (2 Units)                      | None            | ---                |
|            |              |                           |  | B                                | 2                  | XW2Z-□□□N        | XW2B-20G4 (2 Units)                      | None            | ---                |
|            |              |                           |  | B                                | 2                  | XW2Z-□□□N        | XW2C-20G6-IO16 (2 Units)                 | Yes             | A-82               |
| B          | 2            | XW2Z-□□□N                 | XW2F-20G7-OUT16 (2 Units)              | Yes                              | ---                |                  |  |                 |                    |

| Unit       | I/O capacity | Number of connectors      | Polarity                  | Connection pattern <sup>*1</sup> | Number of branches | Connecting Cable | Connector-Terminal Block Conversion Unit | Common terminal | Connection diagram |
|------------|--------------|---------------------------|---------------------------|----------------------------------|--------------------|------------------|--|-----------------|--------------------|
| CJ1W-OD233 | 32 outputs   | 1 MIL connector           | NPN                       | A                                | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-83               |
|            |              |                           |                           | A                                | None               | XW2Z-□□□K        | XW2B-40G5                                | None            | ---                |
|            |              |                           |                           | A                                | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                           |                           | A                                | None               | XW2Z-□□□PM       | XW2R-□34GD-C4 <sup>*4</sup>              | None            | ---                |
|            |              |                           |                           | B                                | 2                  | XW2Z-□□□N        | XW2D-20G6 (2 Units)                      | None            | ---                |
|            |              |                           |                           | B                                | 2                  | XW2Z-□□□N        | XW2B-20G5 (2 Units)                      | None            | ---                |
|            |              |                           |                           | B                                | 2                  | XW2Z-□□□N        | XW2B-20G4 (2 Units)                      | None            | ---                |
|            |              |                           |                           | B                                | 2                  | XW2Z-□□□N        | XW2C-20G6-IO16 (2 Units)                 | Yes             | A-83               |
| B          | 2            | XW2Z-□□□N                 | XW2F-20G7-OUT16 (2 Units) | Yes                              | ---                |                  |  |                 |                    |
| CJ1W-OD234 | 32 outputs   | 1 MIL connector           | NPN                       | A                                | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-84               |
|            |              |                           |                           | A                                | None               | XW2Z-□□□K        | XW2B-40G5                                | None            | ---                |
|            |              |                           |                           | A                                | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                           |                           | A                                | None               | XW2Z-□□□PM       | XW2R-□34GD-C4 <sup>*4</sup>              | None            | ---                |
|            |              |                           |                           | B                                | 2                  | XW2Z-□□□N        | XW2D-20G6 (2 Units)                      | None            | ---                |
|            |              |                           |                           | B                                | 2                  | XW2Z-□□□N        | XW2B-20G5 (2 Units)                      | None            | ---                |
|            |              |                           |                           | B                                | 2                  | XW2Z-□□□N        | XW2B-20G4 (2 Units)                      | None            | ---                |
|            |              |                           |                           | B                                | 2                  | XW2Z-□□□N        | XW2C-20G6-IO16 (2 Units)                 | Yes             | A-84               |
| B          | 2            | XW2Z-□□□N                 | XW2F-20G7-OUT16 (2 Units) | Yes                              | ---                |                  |  |                 |                    |
| CJ1W-OD261 | 64 outputs   | 2 Fujitsu/OTAX connectors | NPN                       | D                                | None               | XW2Z-□□□B        | XW2D-40G6                                | None            | A-85               |
|            |              |                           |                           | D                                | None               | XW2Z-□□□B        | XW2B-40G5                                | None            | ---                |
|            |              |                           |                           | D                                | None               | XW2Z-□□□B        | XW2B-40G4                                | None            | ---                |
|            |              |                           |                           | D                                | None               | XW2Z-□□□BU       | XW2D-40C6                                | None            | A-85               |
|            |              |                           |                           | D                                | None               | XW2Z-□□□PF       | XW2R-□34GD-C3 <sup>*4</sup>              | 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-85               |
| F          | 2            | XW2Z-□□□L                 | XW2F-20G7-OUT16 (2 Units) | Yes                              | ---                |                  |  |                 |                    |
| CJ1W-OD262 | 64 outputs   | 2 MIL connectors          | PNP                       | D                                | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-86               |
|            |              |                           |                           | D                                | None               | XW2Z-□□□K        | XW2B-40G5                                | None            | ---                |
|            |              |                           |                           | D                                | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                           |                           | D                                | None               | XW2Z-□□□PM       | XW2R-□34GD-C4 <sup>*4</sup>              | 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                              | ---                |                  |  |                 |                    |
| CJ1W-OD263 | 64 outputs   | 2 MIL connectors          | NPN                       | D                                | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-87               |
|            |              |                           |                           | D                                | None               | XW2Z-□□□K        | XW2B-40G5                                | None            | ---                |
|            |              |                           |                           | D                                | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                           |                           | D                                | None               | XW2Z-□□□PM       | XW2R-□34GD-C4 <sup>*4</sup>              | 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-87               |
| F          | 2            | XW2Z-□□□N                 | XW2F-20G7-OUT16 (2 Units) | Yes                              | ---                |                  |  |                 |                    |

| Unit       | I/O capacity | Number of connectors     | Polarity | Connection pattern <sup>*1</sup> | Number of branches | Connecting Cable | Connector-Terminal Block Conversion Unit | Common terminal | Connection diagram |
|------------|--------------|--------------------------|----------|----------------------------------|--------------------|------------------|--|-----------------|--------------------|
| CJ1W-MD231 | 16 inputs    | 1 Fujitsu/OTAX connector | NPN/PNP  | C                                | None               | XW2Z-□□□A        | XW2D-20G6                                | None            | A-88               |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2B-20G5                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2B-20G4                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2R-□20GD-T <sup>*4</sup>               | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2C-20G6-IO16                           | Yes             | A-89               |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2C-20G5-IN16 <sup>*2</sup>             | Yes             | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2E-20G5-IN16 <sup>*2</sup>             | Yes             | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2F-20G7-IN16 <sup>*2</sup>             | Yes             | ---                |
|            | 16 outputs   | 1 Fujitsu/OTAX connector | NPN      | C                                | None               | XW2Z-□□□A        | XW2D-20G6                                | None            | A-88               |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2B-20G5                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2B-20G4                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2R-□20GD-T <sup>*4</sup>               | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2C-20G6-IO16                           | Yes             | A-89               |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2F-20G7-OUT16                          | Yes             | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2N-20G8-IN16 <sup>*2</sup>             | Yes             | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□A        | XW2N-20G8-IN16 <sup>*2</sup>             | Yes             | ---                |
| CJ1W-MD232 | 16 inputs    | 1 MIL connector          | NPN/PNP  | C                                | None               | XW2Z-□□□X        | XW2D-20G6                                | None            | A-90               |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2B-20G5                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2B-20G4                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2R-□20GD-T <sup>*4</sup>               | None            | ---                |
|            | 16 outputs   | 1 MIL connector          | PNP      | C                                | None               | XW2Z-□□□X        | XW2D-20G6                                | None            | A-90               |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2B-20G5                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2B-20G4                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2R-□20GD-T <sup>*4</sup>               | None            | ---                |
| CJ1W-MD233 | 16 inputs    | 1 MIL connector          | NPN/PNP  | C                                | None               | XW2Z-□□□X        | XW2D-20G6                                | None            | A-90               |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2B-20G5                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2B-20G4                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2R-□20GD-T <sup>*4</sup>               | None            | ---                |
|            | 16 outputs   | 1 MIL connector          | NPN      | C                                | None               | XW2Z-□□□X        | XW2D-20G6                                | None            | A-90               |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2B-20G5                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2B-20G4                                | None            | ---                |
|            |              |                          |          | C                                | None               | XW2Z-□□□X        | XW2R-□20GD-T <sup>*4</sup>               | None            | ---                |

| Unit       | I/O capacity | Number of connectors     | Polarity   | Connection pattern <sup>*1</sup>       | Number of branches | Connecting Cable          | Connector-Terminal Block Conversion Unit | Common terminal | Connection diagram |
|------------|--------------|--------------------------|------------|--|--------------------|---------------------------|--|-----------------|--------------------|
| CJ1W-MD261 | 32 outputs   | 1 Fujitsu/OTAX connector | NPN/PNP    | D                                      | None               | XW2Z-□□□B                 | XW2D-40G6                                | None            | A-91               |
|            |              |                          |            | D                                      | None               | XW2Z-□□□B                 | XW2D-40G6-RF <sup>*3</sup>               | None            |                    |
|            |              |                          |            | D                                      | None               | XW2Z-□□□B                 | XW2B-40G5                                | None            | ---                |
|            |              |                          |            | D                                      | None               | XW2Z-□□□B                 | XW2B-40G4                                | None            | ---                |
|            |              |                          |            | D                                      | None               | XW2Z-□□□BU                | XW2D-40C6                                | None            | ---                |
|            |              |                          |            | D                                      | None               | XW2Z-□□□PF                | XW2R-□34GD-C1 <sup>*4</sup>              | 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-92               |
|            |              |                          |            | F                                      | 2                  | XW2Z-□□□D                 | XW2C-20G5-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            |              |                          |            | F                                      | 2                  | XW2Z-□□□D                 | XW2E-20G5-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            |              |                          |            | F                                      | 2                  | XW2Z-□□□D                 | XW2F-20G7-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            | F            | 2                        | XW2Z-□□□D  | XW2N-20G8-IN16 (2 Units) <sup>*2</sup> | Yes                | ---                       |  |                 |                    |
|            | 32 outputs   | 1 Fujitsu/OTAX connector | NPN        | D                                      | None               | XW2Z-□□□B                 | XW2D-40G6                                | None            | A-91               |
|            |              |                          |            | D                                      | None               | XW2Z-□□□B                 | XW2B-40G5                                | None            |                    |
|            |              |                          |            | D                                      | None               | XW2Z-□□□B                 | XW2B-40G4                                | None            | ---                |
|            |              |                          |            | D                                      | None               | XW2Z-□□□BU                | XW2D-40C6                                | None            | ---                |
|            |              |                          |            | D                                      | None               | XW2Z-□□□PF                | XW2R-□34GD-C3 <sup>*4</sup>              | 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-92            |                    |
| F          |              |                          |            | 2                                      | XW2Z-□□□L          | XW2F-20G7-OUT16 (2 Units) | Yes                                      | ---             |                    |
| CJ1W-MD263 |              |                          |            | 32 inputs                              | 1 MIL connector    | NPN/PNP                   | D  | None            | XW2Z-□□□K          |
|            | D            | None                     | XW2Z-□□□K  |  |                    |                           | XW2D-40G6-RM <sup>*3</sup>               | None            |                    |
|            | D            | None                     | XW2Z-□□□K  |  |                    |                           | XW2B-40G5                                | None            | ---                |
|            | D            | None                     | XW2Z-□□□K  |  |                    |                           | XW2B-40G4                                | None            | ---                |
|            | D            | None                     | XW2Z-□□□PM |  |                    |                           | XW2R-□34GD-C2 <sup>*4</sup>              | 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-94               |
|            | F            | 2                        | XW2Z-□□□N  |  |                    |                           | XW2C-20G5-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            | F            | 2                        | XW2Z-□□□N  |  |                    |                           | XW2E-20G5-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            | F            | 2                        | XW2Z-□□□N  |  |                    |                           | XW2F-20G7-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            | F            | 2                        | XW2Z-□□□N  |  |                    |                           | XW2N-20G8-IN16 (2 Units) <sup>*2</sup>   | Yes             | ---                |
|            | 32 outputs   | 1 MIL connector          | NPN        | D                                      | None               | XW2Z-□□□B                 | XW2D-40G6                                | None            | A-93               |
|            |              |                          |            | D                                      | None               | XW2Z-□□□B                 | XW2B-40G5                                | None            |                    |
|            |              |                          |            | D                                      | None               | XW2Z-□□□B                 | XW2B-40G4                                | None            | ---                |
|            |              |                          |            | D                                      | None               | XW2Z-□□□PM                | XW2R-□34GD-C4 <sup>*4</sup>              | 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-94               |
|            |              |                          |            | F                                      | 2                  | XW2Z-□□□L                 | XW2F-20G7-OUT16 (2 Units)                | Yes             | ---                |



| Unit       | I/O capacity | Number of connectors | Polarity            | Connection pattern <sup>*1</sup> | Number of branches | Connecting Cable | Connector-Terminal Block Conversion Unit | Common terminal | Connection diagram |
|------------|--------------|----------------------|---------------------|----------------------------------|--------------------|------------------|--|-----------------|--------------------|
| CJ1W-MD563 | 32 inputs    | 1 MIL connector      | NPN/PNP             | D                                | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-95               |
|            |              |                      |                     | D                                | None               | XW2Z-□□□K        | XW2D-40G6-RM <sup>*3</sup>               | None            |                    |
|            |              |                      |                     | D                                | None               | XW2Z-□□□K        | XW2B-40G5                                | None            | ---                |
|            |              |                      |                     | D                                | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                      |                     | D                                | None               | XW2Z-□□□PM       | XW2R-□34GD-C2 <sup>*4</sup>              | 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 connector      | NPN                 | D                                | None               | XW2Z-□□□K        | XW2D-40G6                                | None            | A-95               |
|            |              |                      |                     | D                                | None               | XW2Z-□□□K        | XW2B-40G5                                | None            |                    |
|            |              |                      |                     | D                                | None               | XW2Z-□□□K        | XW2B-40G4                                | None            | ---                |
|            |              |                      |                     | D                                | None               | XW2Z-□□□PM       | XW2R-□34GD-C4 <sup>*4</sup>              | 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                             | ---                |                  |  |                 |                    |

- \*1 For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.
- \*2 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.
- \*3 Bleeder resistance (5.6 kΩ) is built in.
- \*4 The symbol that shows a method for connecting line goes in □. J: Phillips screw type, E: Slotted screw type, P: Push-in type

● Connecting Cables

| Length | XW2Z-□□A  | XW2Z-□□B  | XW2Z-□□BU  | XW2Z-□□D  | XW2Z-□□L  |
|--------|-----------|-----------|------------|-----------|-----------|
| 0.25 m | ---       | ---       | ---        | ---       | ---       |
| 0.5 m  | XW2Z-050A | XW2Z-050B | XW2Z-050BU | ---       | ---       |
| 1.0 m  | XW2Z-100A | XW2Z-100B | XW2Z-100BU | XW2Z-100D | XW2Z-100L |
| 1.5 m  | XW2Z-150A | XW2Z-150B | XW2Z-150BU | XW2Z-150D | XW2Z-150L |
| 2.0 m  | XW2Z-200A | XW2Z-200B | XW2Z-200BU | XW2Z-200D | XW2Z-200L |
| 3.0 m  | XW2Z-300A | XW2Z-300B | XW2Z-300BU | XW2Z-300D | XW2Z-300L |
| 5.0 m  | XW2Z-500A | XW2Z-500B | XW2Z-500BU | XW2Z-500D | XW2Z-500L |
| 10.0 m | XW2Z-010A | XW2Z-010B | ---        | XW2Z-010D | XW2Z-010L |
| 15.0 m | XW2Z-15MA | XW2Z-15MB | ---        | XW2Z-15MD | XW2Z-15ML |
| 20.0 m | XW2Z-20MA | XW2Z-20MB | ---        | XW2Z-20MD | XW2Z-20ML |

| Length | XW2Z-□□X  | XW2Z-□□K  | XW2Z-□□PF  | XW2Z-□□PM  |
|--------|-----------|-----------|------------|------------|
| 0.25 m | ---       | XW2Z-C25K | ---        | ---        |
| 0.5 m  | XW2Z-C50X | XW2Z-C50K | XW2Z-050PF | XW2Z-050PM |
| 1.0 m  | XW2Z-100X | XW2Z-100K | XW2Z-100PF | XW2Z-100PM |
| 1.5 m  | ---       | XW2Z-150K | XW2Z-150PF | XW2Z-150PM |
| 2.0 m  | XW2Z-200X | XW2Z-200K | XW2Z-200PF | XW2Z-200PM |
| 3.0 m  | XW2Z-300X | XW2Z-300K | XW2Z-300PF | XW2Z-300PM |
| 5.0 m  | XW2Z-500X | XW2Z-500K | XW2Z-500PF | XW2Z-500PM |
| 10.0 m | XW2Z-010X | ---       | ---        | ---        |
| 15.0 m | ---       | ---       | ---        | ---        |
| 20.0 m | ---       | ---       | ---        | ---        |

| Length |         | XW2Z-□□N  |
|--------|---------|-----------|
| A      | B       |           |
| 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/OTAX connector  | NPN        | A                     | 2                  | G79-I□C-□        | G7TC-ID16              | A-96               |
|            |              |                           |            | A                     | 2                  | G79-I□C-□        | G7TC-IA16              |                    |
| CJ1W-ID232 | 32 inputs    | 1 MIL connector           | NPN        | A                     | 2                  | G79-O□-□-D1      | G7TC-ID16              |                    |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G7TC-IA16              |                    |
| CJ1W-ID233 | 32 inputs    | 1 MIL connector           | NPN        | A                     | 2                  | G79-O□-□-D1      | G7TC-ID16              |                    |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G7TC-IA16              |                    |
| CJ1W-ID261 | 64 inputs    | 2 Fujitsu/OTAX connectors | NPN        | B                     | 2                  | G79-I□C-□        | G7TC-ID16              |                    |
|            |              |                           |            | B                     | 2                  | G79-I□C-□        | G7TC-IA16              |                    |
| CJ1W-ID262 | 64 inputs    | 2 MIL connectors          | NPN        | B                     | 2                  | G79-O□-□-D1      | G7TC-ID16              |                    |
|            |              |                           |            | B                     | 2                  | G79-O□-□-D1      | G7TC-IA16              |                    |
| CJ1W-OD231 | 32 outputs   | 1 Fujitsu/OTAX connector  | NPN        | A                     | 2                  | G79-O□C-□        | G7TC-OC16              | A-99               |
|            |              |                           |            | A                     | 2                  | G79-O□C-□        | G7TC-OC08              |                    |
|            |              |                           |            | A                     | 2                  | G79-O□C-□        | G70D-SOC16             | A-98               |
|            |              |                           |            | A                     | 2                  | G79-O□C-□        | G70D-FOM16             | ---                |
|            |              |                           |            | A                     | 2                  | G79-O□C-□        | G70D-VSOC16            | A-97               |
|            |              |                           |            | A                     | 2                  | G79-O□C-□        | G70D-VFOM16            | ---                |
|            |              |                           |            | A                     | 2                  | G79-O□C-□        | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                           |            | A                     | 2                  | G79-O□C-□        | G70R-SOC08             | A-99               |
|            |              |                           |            | A                     | 2                  | G79-O□C-□        | G70D-SOC08             | A-98               |
| CJ1W-OD232 | 32 outputs   | 1 MIL connector           | PNP        | A                     | 2                  | G79-I□-□-D1      | G7TC-OC16-1            | A-100              |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-SOC16-1           | ---                |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-FOM16-1           | ---                |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70A-ZOC16-4 and Relay | ---                |
| CJ1W-OD233 | 32 outputs   | 1 MIL connector           | NPN        | A                     | 2                  | G79-O□-□-D1      | G7TC-OC16              | A-99               |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G7TC-OC08              |                    |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-SOC16             | A-98               |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-FOM16             | ---                |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-VSOC16            | A-97               |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-VFOM16            | ---                |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70R-SOC08             | A-99               |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-SOC08             | A-98               |
| CJ1W-OD234 | 32 outputs   | 1 MIL connector           | NPN        | A                     | 2                  | G79-O□-□-D1      | G7TC-OC16              | A-99               |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G7TC-OC08              |                    |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-SOC16             | A-98               |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-FOM16             | ---                |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-VSOC16            | A-97               |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70D-VFOM16            | ---                |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                           |            | A                     | 2                  | G79-O□-□-D1      | G70R-SOC08             | A-99               |
| A          | 2            | G79-O□-□-D1               | G70D-SOC08 | A-98                  |                    |                  |                        |                    |

\*1 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/OTAX connectors | NPN                    | B                     | 2                  | G79-O□C-□        | G7TC-OC16              | A-99               |
|            |              |                           |                        | B                     | 2                  | G79-O□C-□        | G7TC-OC08              |                    |
|            |              |                           |                        | B                     | 2                  | G79-O□C-□        | G70D-SOC16             | A-98               |
|            |              |                           |                        | B                     | 2                  | G79-O□C-□        | G70D-FOM16             | ---                |
|            |              |                           |                        | B                     | 2                  | G79-O□C-□        | G70D-VSOC16            | A-97               |
|            |              |                           |                        | B                     | 2                  | G79-O□C-□        | G70D-VFOM16            | ---                |
|            |              |                           |                        | B                     | 2                  | G79-O□C-□        | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                           |                        | B                     | 2                  | G79-O□C-□        | G70R-SOC08             | A-99               |
|            |              |                           |                        | B                     | 2                  | G79-O□C-□        | G70D-SOC08             | A-98               |
| CJ1W-OD262 | 64 outputs   | 2 MIL connectors          | PNP                    | B                     | 2                  | G79-I□-□-D1      | G7TC-OC16-1            | A-100              |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70D-SOC16-1           | ---                |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70D-FOM16-1           | ---                |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70A-ZOC16-4 and Relay | ---                |
| CJ1W-OD263 | 64 outputs   | 2 MIL connectors          | NPN                    | B                     | 2                  | G79-O□-□-D1      | G7TC-OC16              | A-99               |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G7TC-OC08              |                    |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70D-SOC16             | A-98               |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70D-FOM16             | ---                |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70D-VSOC16            | A-97               |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70D-VFOM16            | ---                |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70R-SOC08             | A-99               |
|            |              |                           |                        | B                     | 2                  | G79-O□-□-D1      | G70D-SOC08             | A-98               |
| CJ1W-MD231 | 16 inputs    | 1 Fujitsu/OTAX connector  | NPN                    | F                     | None               | G79-□C           | G7TC-ID16              | A-96               |
|            |              |                           |                        | F                     | None               | G79-□C           | G7TC-IA16              |                    |
|            | 16 outputs   | 1 Fujitsu/OTAX connector  | NPN                    | F                     | None               | G79-□C           | G7TC-OC16              | A-99               |
|            |              |                           |                        | F                     | None               | G79-□C           | G7TC-OC08              |                    |
|            |              |                           |                        | F                     | None               | G79-□C           | G70D-SOC16             | A-98               |
|            |              |                           |                        | F                     | None               | G79-□C           | G70D-FOM16             | ---                |
|            |              |                           |                        | F                     | None               | G79-□C           | G70D-VSOC16            | A-97               |
|            |              |                           |                        | F                     | None               | G79-□C           | G70D-VFOM16            | ---                |
|            |              |                           |                        | F                     | None               | G79-□C           | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                           |                        | F                     | None               | G79-□C           | G70R-SOC08             | A-99               |
| F          | None         | G79-□C                    | G70D-SOC08             | A-98                  |                    |                  |                        |                    |
| CJ1W-MD232 | 16 inputs    | 1 MIL connector           | PNP                    | E                     | None               | G79-O□C          | G7TC-ID16              | A-96               |
|            |              |                           |                        | E                     | None               | G79-O□C          | G7TC-IA16              |                    |
|            | 16 outputs   | 1 MIL connector           | PNP                    | F                     | None               | G79-O□C          | G7TC-OC16-1            | A-100              |
|            |              |                           |                        | F                     | None               | G79-I□C          | G70D-SOC16-1           | ---                |
|            |              |                           |                        | F                     | None               | G79-I□C          | G70D-FOM16-1           | ---                |
| F          | None         | G79-I□C                   | G70A-ZOC16-4 and Relay | ---                   |                    |                  |                        |                    |

\*1 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 <sup>*1</sup> | Number of branches | Connecting Cable | I/O Relay Terminal     | Connection diagram |
|------------|--------------|--------------------------|------------|----------------------------------|--------------------|------------------|------------------------|--------------------|
| CJ1W-MD233 | 16 inputs    | 1 MIL connector          | NPN        | E                                | None               | G79-O□C          | G7TC-ID16              | A-96               |
|            |              |                          |            | E                                | None               | G79-O□C          | G7TC-IA16              |                    |
|            | 16 outputs   | 1 MIL connector          | NPN        | E                                | None               | G79-O□C          | G7TC-OC16              | A-99               |
|            |              |                          |            | E                                | None               | G79-O□C          | G7TC-OC08              |                    |
|            |              |                          |            | E                                | None               | G79-O□C          | G70D-SOC16             | A-98               |
|            |              |                          |            | E                                | None               | G79-O□C          | G70D-FOM16             | ---                |
|            |              |                          |            | E                                | None               | G79-O□C          | G70D-VSOC16            | A-97               |
|            |              |                          |            | E                                | None               | G79-O□C          | G70D-VFOM16            | ---                |
|            |              |                          |            | E                                | None               | G79-O□C          | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                          |            | E                                | None               | G79-O□C          | G70R-SOC08             | A-99               |
| E          | None         | G79-O□C                  | G70D-SOC08 | A-98                             |                    |                  |                        |                    |
| CJ1W-MD261 | 32 inputs    | 1 Fujitsu/OTAX connector | NPN        | B                                | 2                  | G79-I□C-□        | G7TC-ID16              | A-96               |
|            |              |                          |            | B                                | 2                  | G79-I□C-□        | G7TC-IA16              |                    |
|            | 32 outputs   | 1 Fujitsu/OTAX connector | NPN        | B                                | 2                  | G79-O□C-□        | G7TC-OC16              | A-99               |
|            |              |                          |            | B                                | 2                  | G79O□C-□         | G7TC-OC08              |                    |
|            |              |                          |            | B                                | 2                  | G79-O□C-□        | G70D-SOC16             | A-98               |
|            |              |                          |            | B                                | 2                  | G79-O□C-□        | G70D-FOM16             | ---                |
|            |              |                          |            | B                                | 2                  | G79-O□C-□        | G70D-VSOC16            | A-97               |
|            |              |                          |            | B                                | 2                  | G79-O□C-□        | G70D-VFOM16            | ---                |
|            |              |                          |            | B                                | 2                  | G79O□C-□         | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                          |            | B                                | 2                  | G79-O□C-□        | G70R-SOC08             | A-99               |
| B          | 2            | G79-O□C-□                | G70D-SOC08 | A-98                             |                    |                  |                        |                    |
| CJ1W-MD263 | 32 inputs    | 1 MIL connector          | NPN        | B                                | 2                  | G79-O□-□-D1      | G7TC-ID16              | A-96               |
|            |              |                          |            | B                                | 2                  | G79-O□-□-D1      | G7TC-IA16              |                    |
|            | 32 outputs   | 1 MIL connector          | NPN        | B                                | 2                  | G79-O□-□-D1      | G7TC-OC16              | A-99               |
|            |              |                          |            | B                                | 2                  | G79-O□-□-D1      | G7TC-OC08              |                    |
|            |              |                          |            | B                                | 2                  | G79-O□-□-D1      | G70D-SOC16             | A-98               |
|            |              |                          |            | B                                | 2                  | G79-O□-□-D1      | G70D-FOM16             | ---                |
|            |              |                          |            | B                                | 2                  | G79-O□-□-D1      | G70D-VSOC16            | A-97               |
|            |              |                          |            | B                                | 2                  | G79-O□-□-D1      | G70D-VFOM16            | ---                |
|            |              |                          |            | B                                | 2                  | G79-O□-□-D1      | G70A-ZOC16-3 and Relay | A-100              |
|            |              |                          |            | B                                | 2                  | G79-O□-□-D1      | G70R-SOC08             | A-99               |
| B          | 2            | G79-O□-□-D1              | G70D-SOC08 | A-98                             |                    |                  |                        |                    |

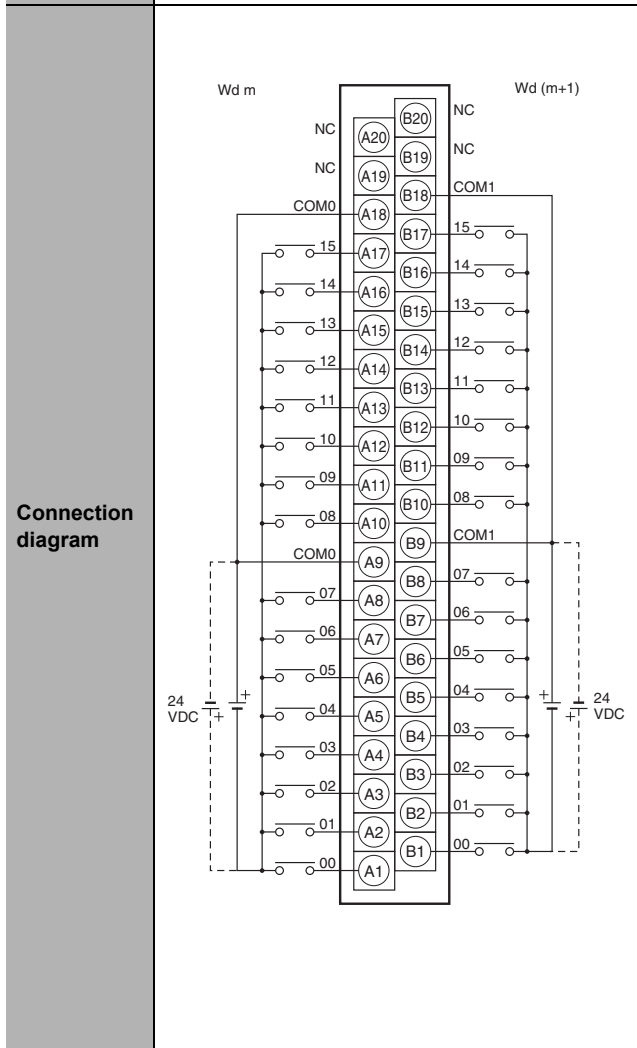
\*1 For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

## 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.

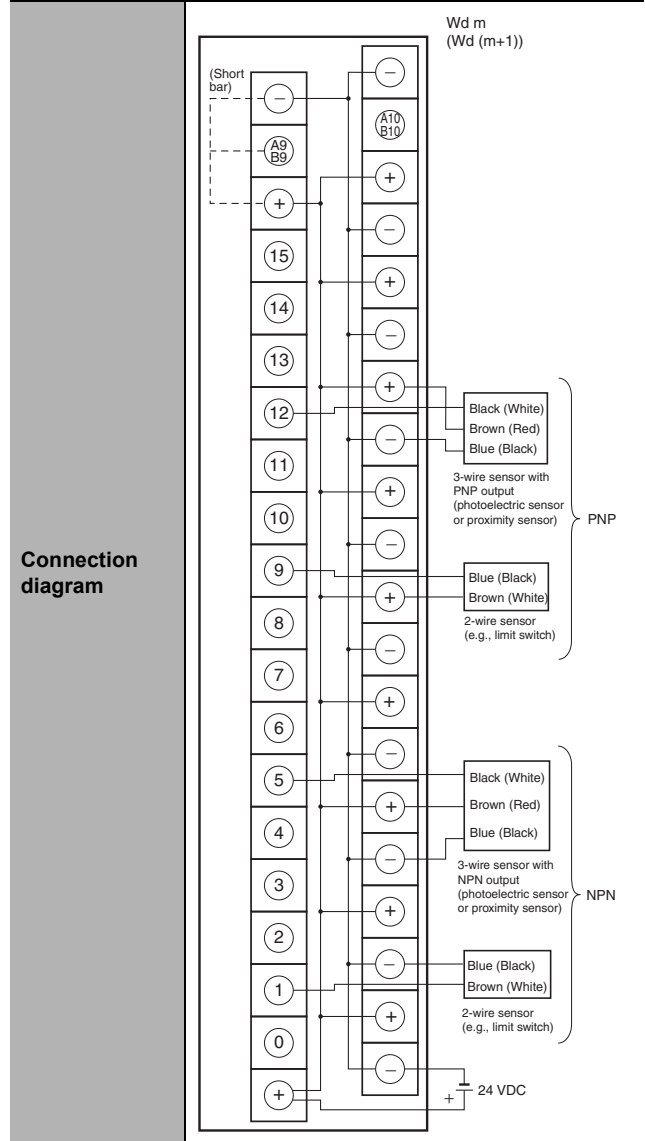
### ● Inputs

|  |                           |
|--|---------------------------|
| Programmable Controller I/O Unit         | CJ1W-ID231                |
| Connector-Terminal Block Conversion Unit | XW2D-40G6<br>XW2D-40G6-RF |
| Connecting Cables                        | XW2Z-□□□B                 |



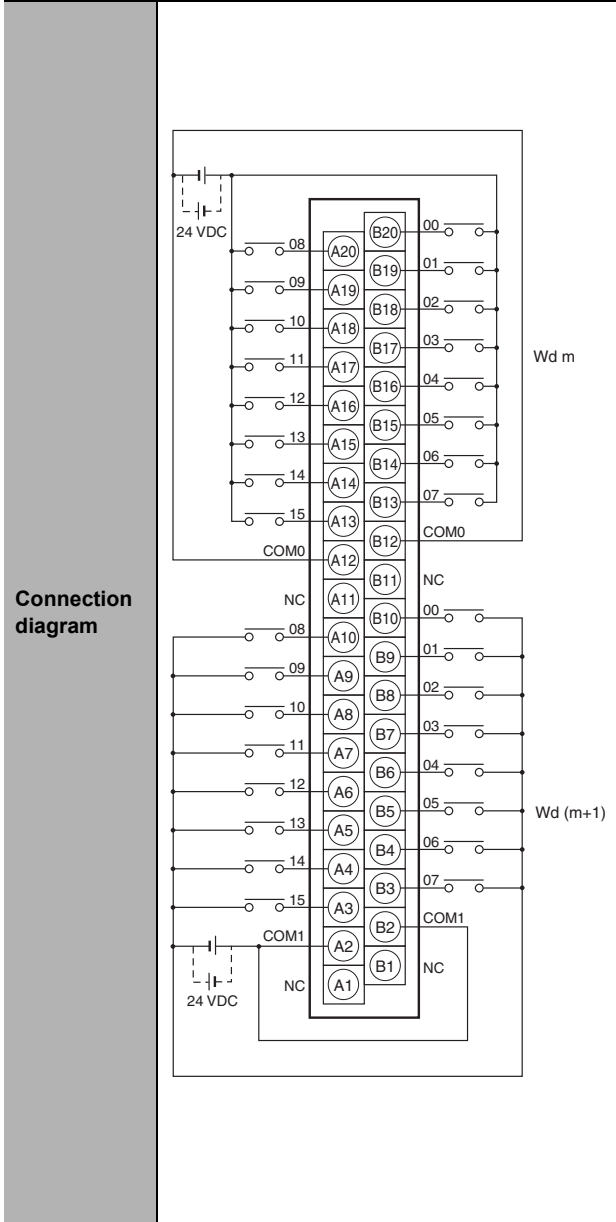
- Note 1** The polarity for input power supply connections indicated with dotted lines (-----) can be connected in either direction provided that the same polarity is used for the commons for rows A and B.
- 2** Both COM0 and COM1 have two pins each. They are internally connected inside the PLC, but they must all be wired.

|  |                            |
|--|----------------------------|
| Programmable Controller I/O Unit         | CJ1W-ID231                 |
| Connector-Terminal Block Conversion Unit | XW2C-20G6-IO16 (two Units) |
| Connecting Cables                        | XW2Z-□□□D                  |



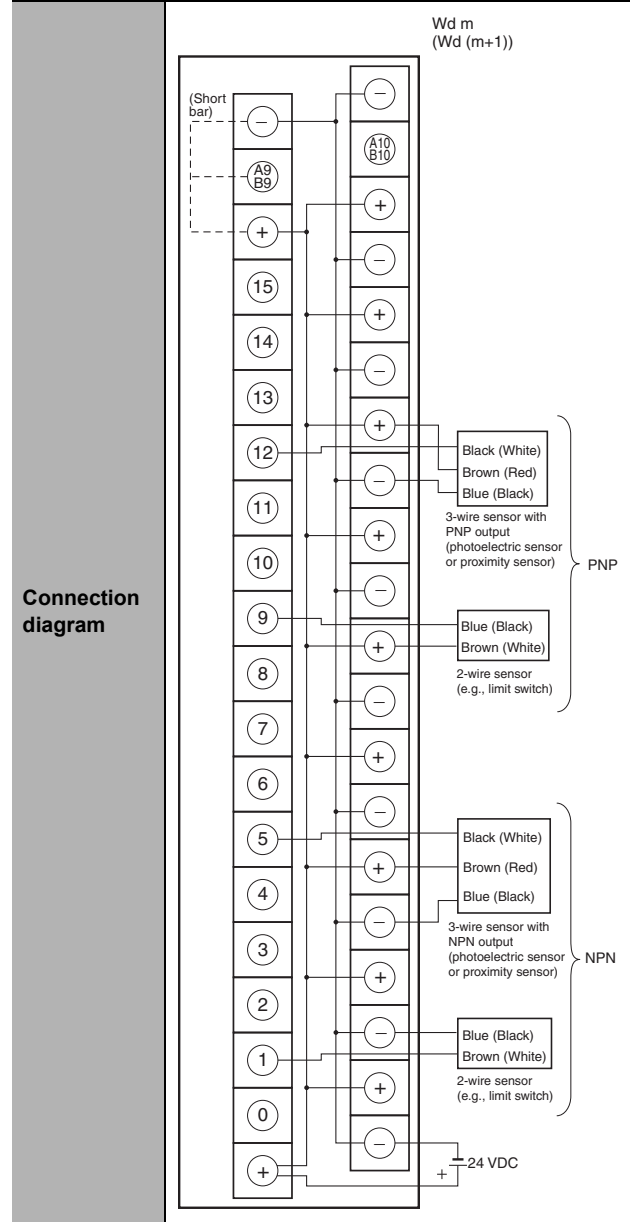
- Note 1** Connect the A9/B9 terminal and the ⊕ terminal for NPN.  
Connect the A9/B9 terminal and the ⊖ terminal for PNP.  
(Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

|   |                           |
|---|---------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-ID232                |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6<br>XW2D-40G6-RM |
| <b>Connecting Cables</b>                        | XW2Z-□□□K                 |



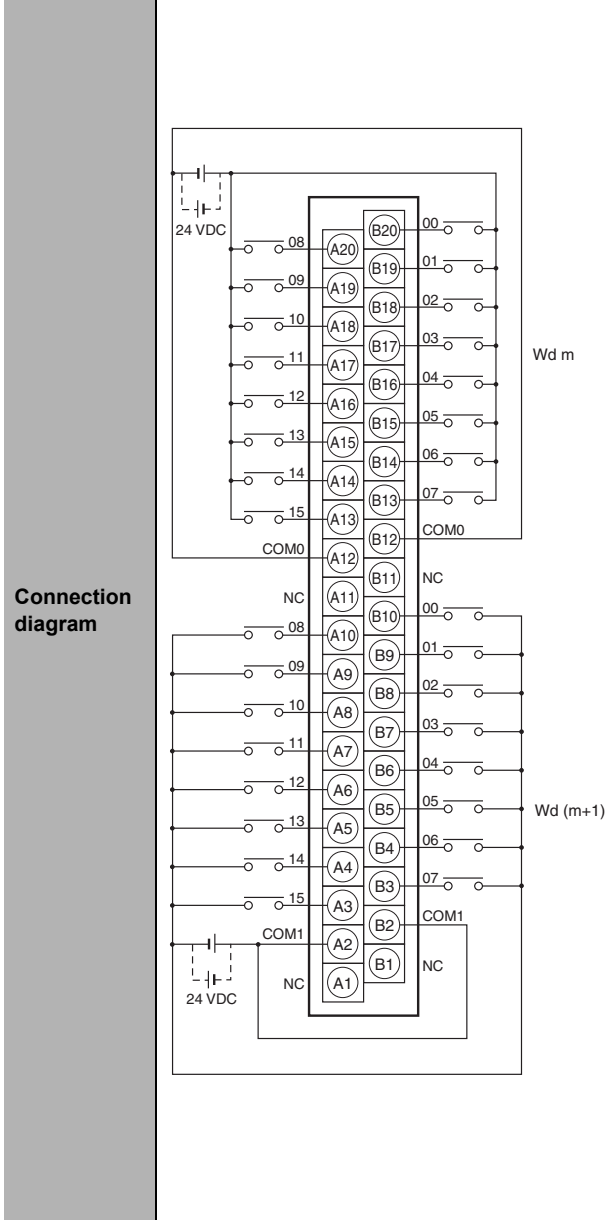
- Note 1** The polarity for input power supply connections indicated with dotted lines (-----) can be connected in either direction provided that the same polarity is used for the commons.
- 2** Both COM0 and COM1 have two pins each. They are internally connected inside the PLC, but they must all be wired.

|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-ID232               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□N                |



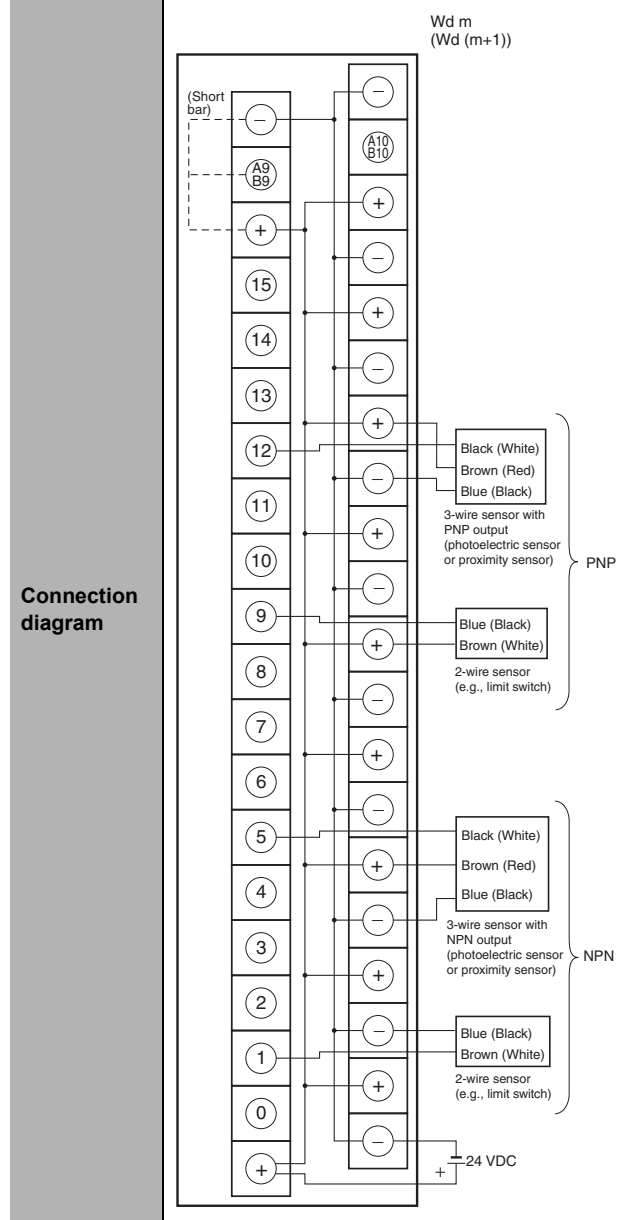
- Note 1** Connect the A9/B9 terminal and the ⊕ terminal for PNP.  
Connect the A9/B9 terminal and the ⊖ terminal for NPN.  
(Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

|   |                           |
|---|---------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-ID233                |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6<br>XW2D-40G6-RM |
| <b>Connecting Cables</b>                        | XW2Z-□□□K                 |



- 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.

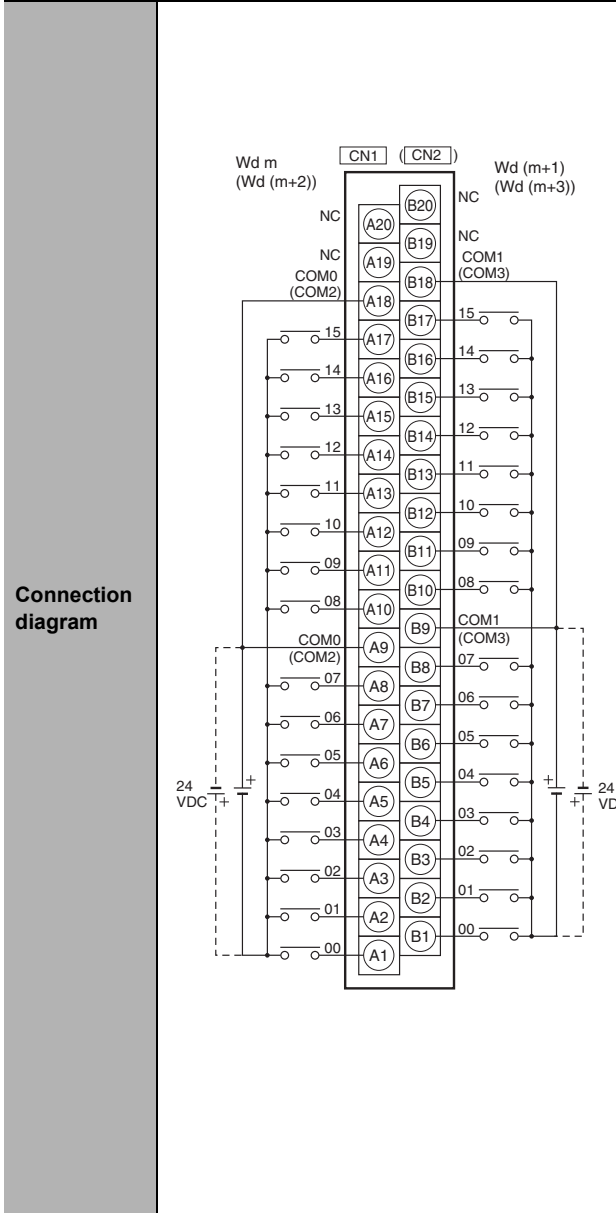
|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-ID233               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□N                |



- Note 1** Connect the A9/B9 terminal and the ⊕ terminal for NPN.  
Connect the A9/B9 terminal and the ⊖ terminal for PNP.  
(Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

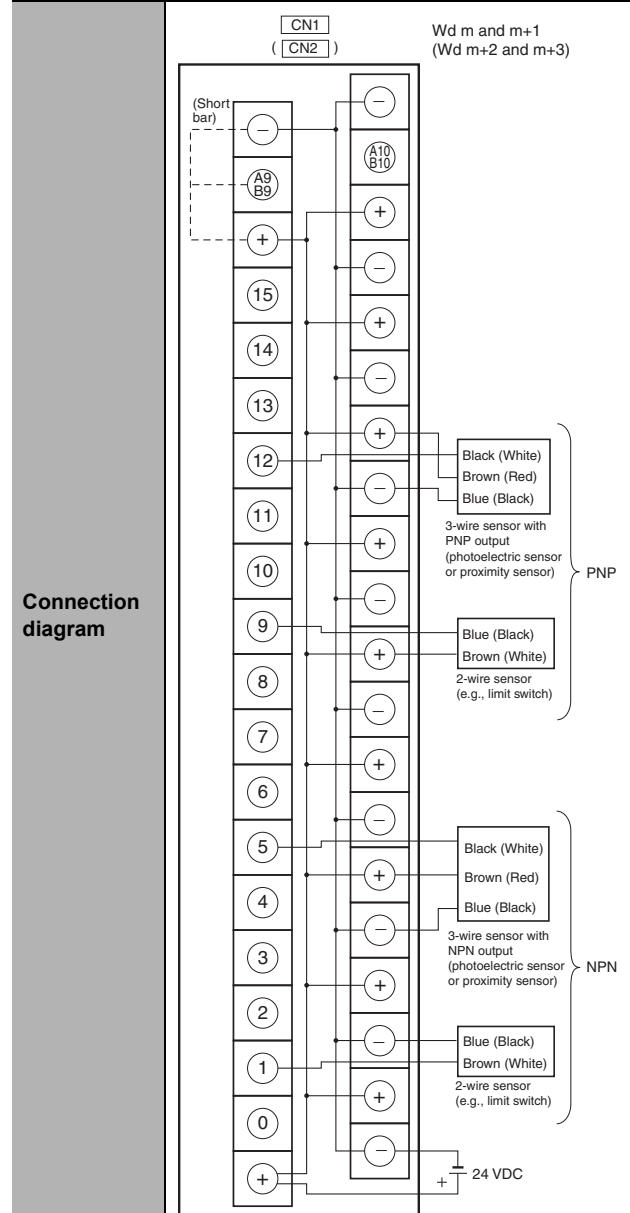


|   |                           |
|---|---------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-ID261                |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6<br>XW2D-40G6-RF |
| <b>Connecting Cables</b>                        | XW2Z-□□□B                 |



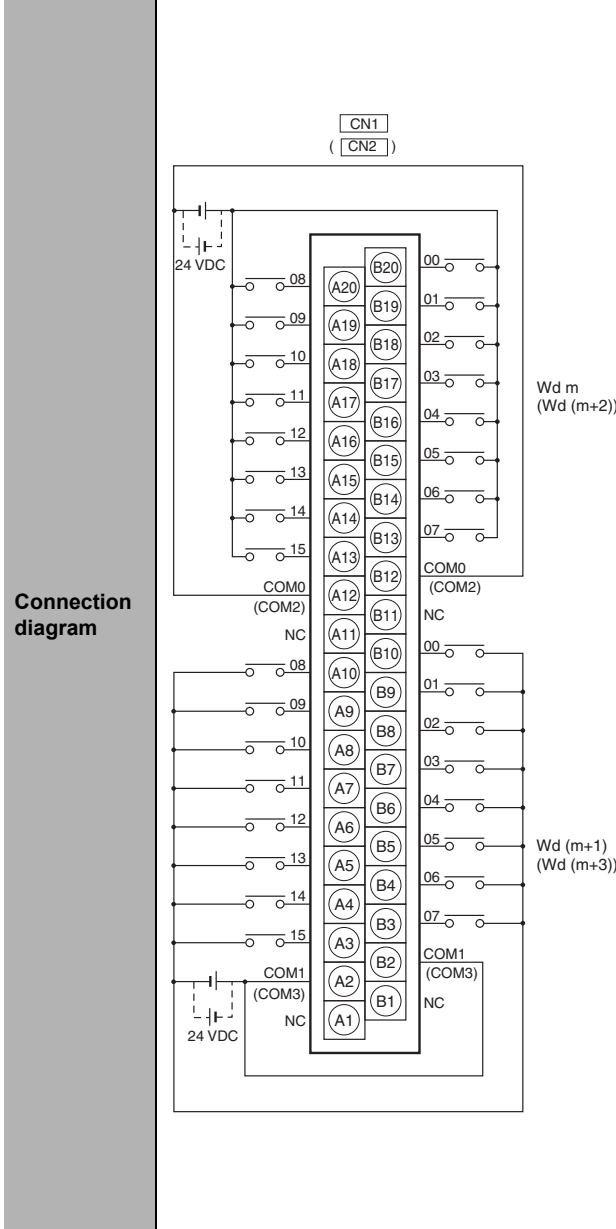
- Note 1** The polarity for input power supply connections indicated with dotted lines (-----) can be connected in either direction provided that the same polarity is used for the commons for rows A and B.
- 2** COM0, COM1, COM2, and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.

|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-ID261               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□D                |



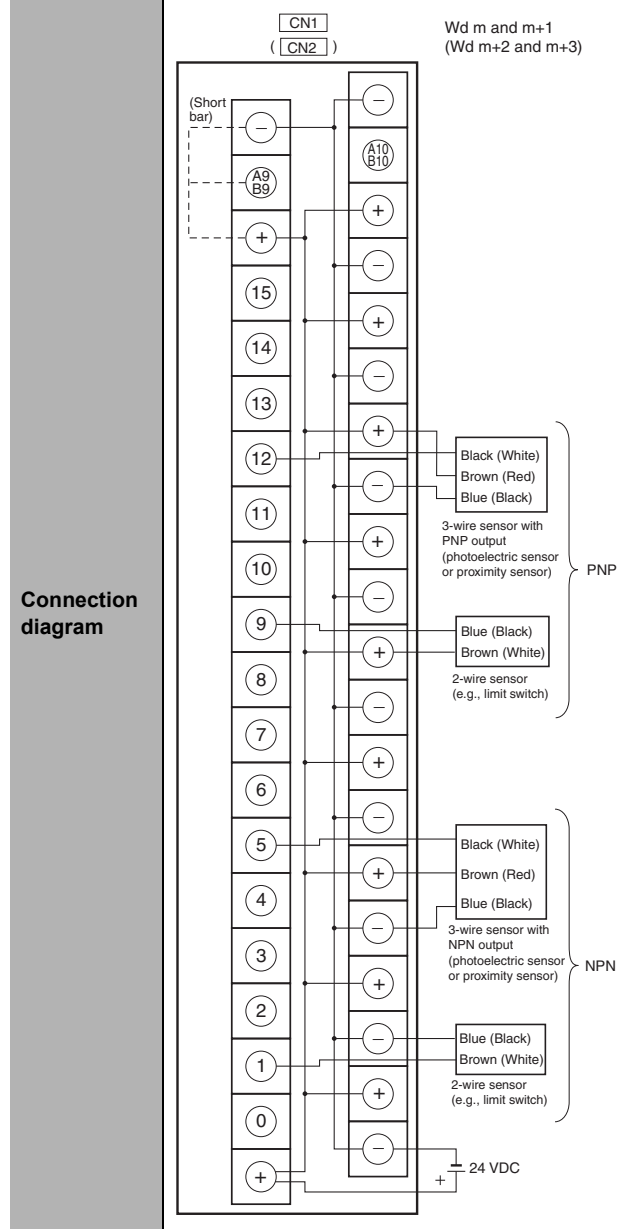
- Note 1** Connect the A9/B9 terminal and the ⊕ terminal for NPN.  
Connect the A9/B9 terminal and the ⊖ terminal for PNP.  
(Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

|   |                           |
|---|---------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-ID262                |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6<br>XW2D-40G6-RM |
| <b>Connecting Cables</b>                        | XW2Z-□□□K                 |



- 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.

|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-ID262               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□N                |

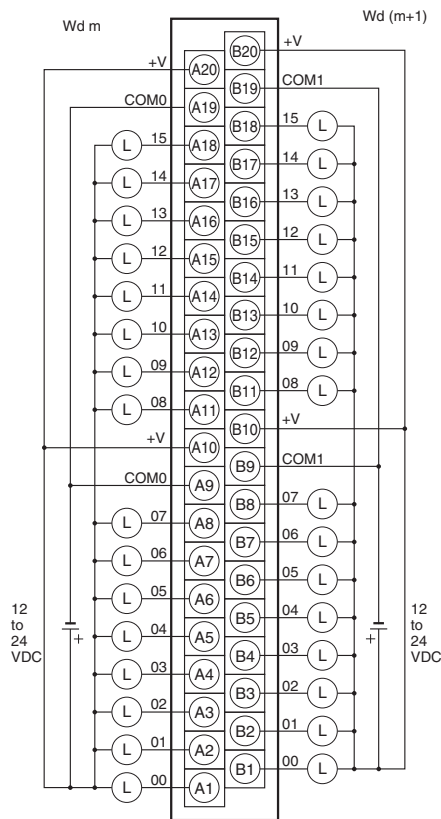


- Note 1** Connect the A9/B9 terminal and the ⊕ terminal for NPN.  
Connect the A9/B9 terminal and the ⊖ terminal for PNP.  
(Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

● Outputs

|   |                         |
|---|-------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-OD231              |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6<br>XW2D-40C6  |
| <b>Connecting Cables</b>                        | XW2Z-□□□B<br>XW2Z-□□□BU |

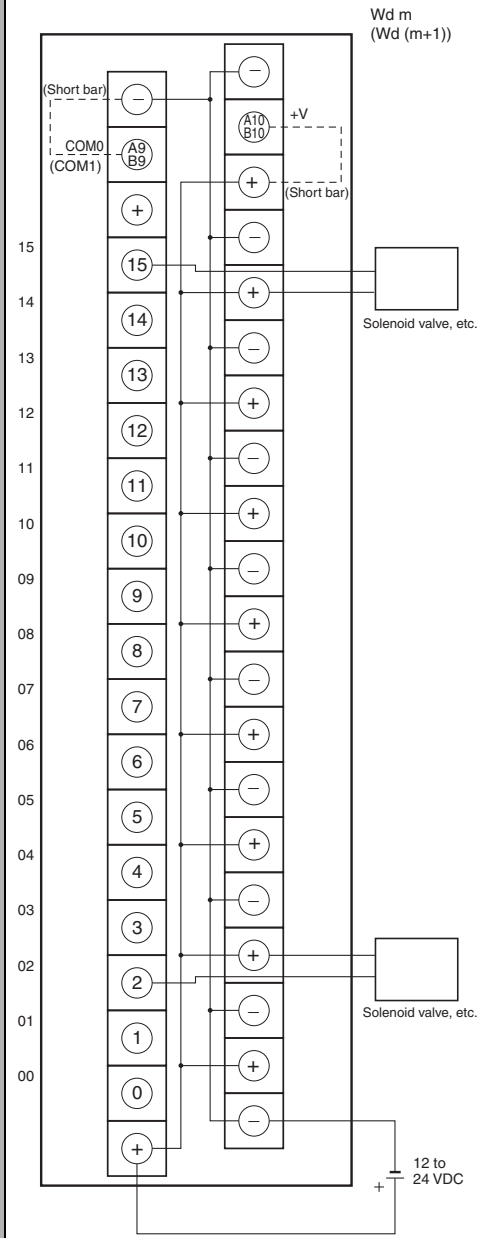
Connection diagram



**Note** The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-OD231               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□L                |

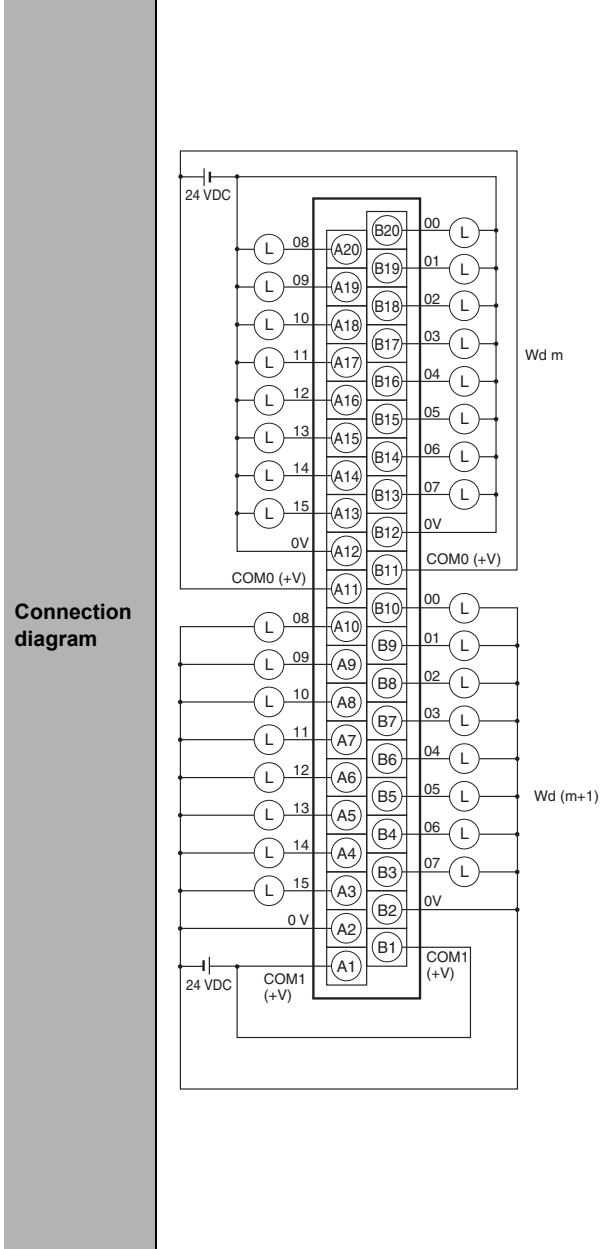
Connection diagram



**Note 1** Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)

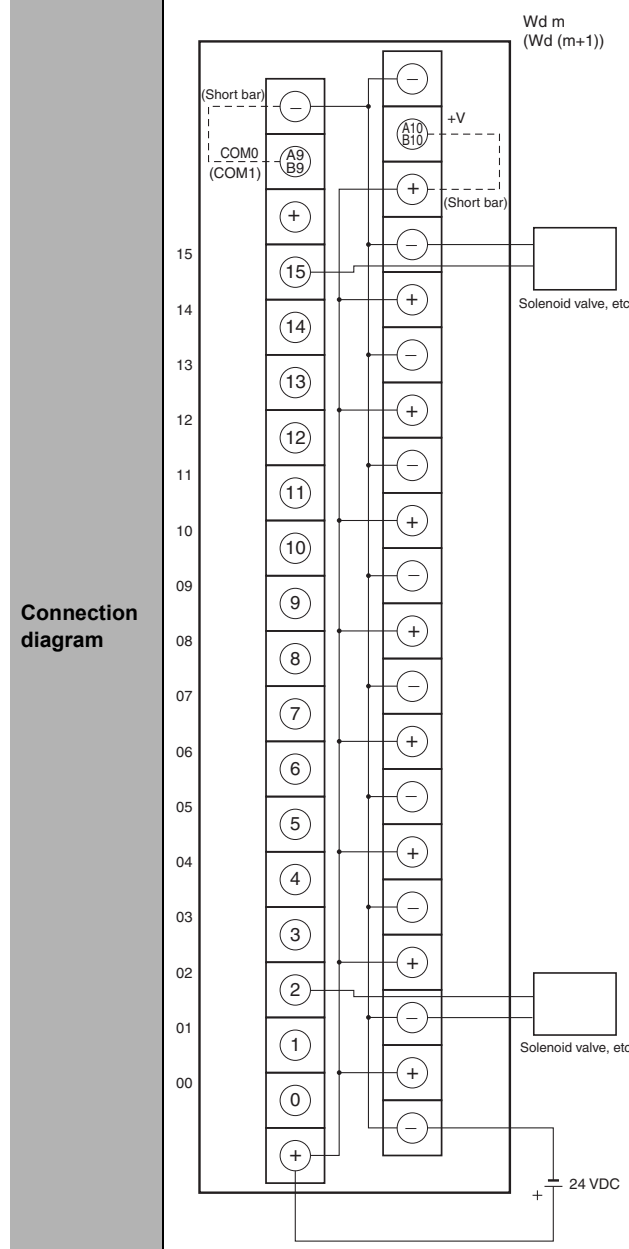
**2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

|   |            |
|---|------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-OD232 |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6  |
| <b>Connecting Cables</b>                        | XW2Z-□□□K  |



**Note** The COM (+V) terminals and 0 V terminals are internally connected inside the PLC, but they must all be wired.

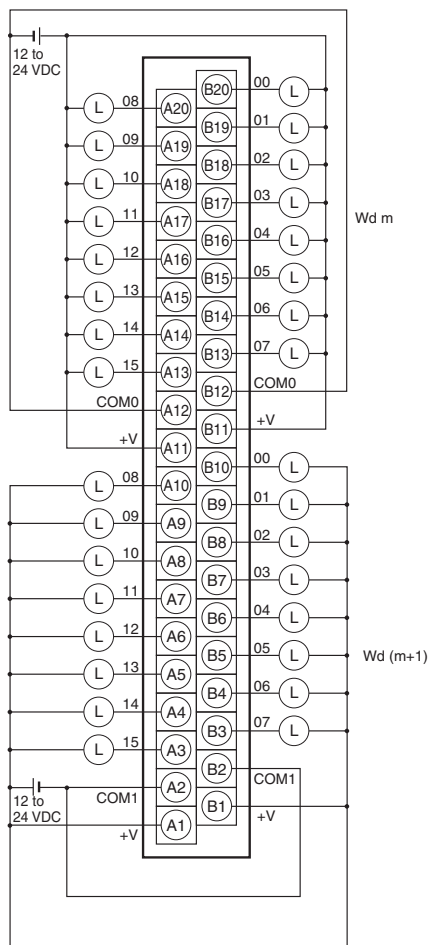
|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-OD232               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□N                |



- 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.

|   |            |
|---|------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-OD233 |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6  |
| <b>Connecting Cables</b>                        | XW2Z-□□□K  |

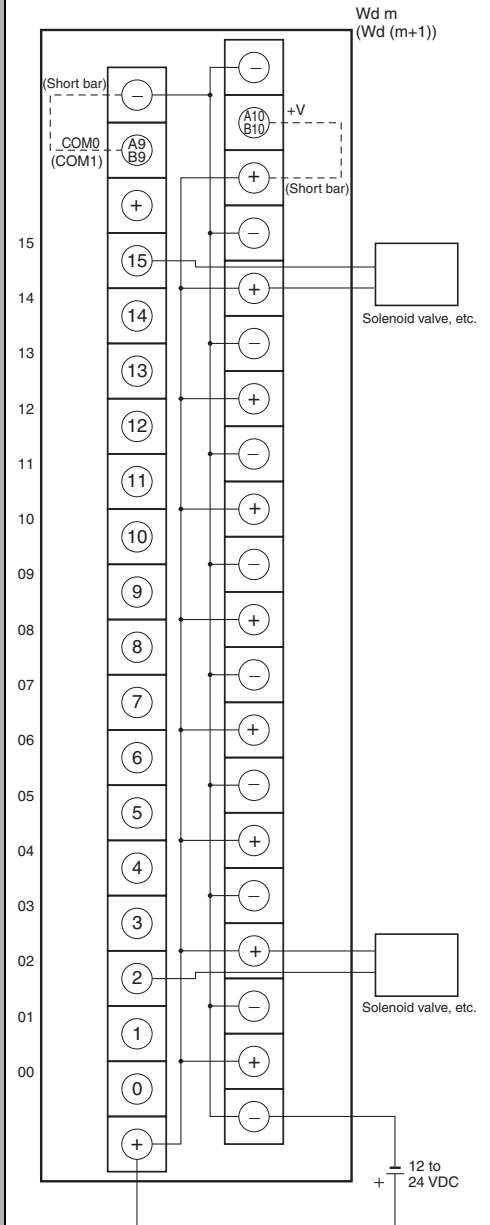
**Connection diagram**



**Note** The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

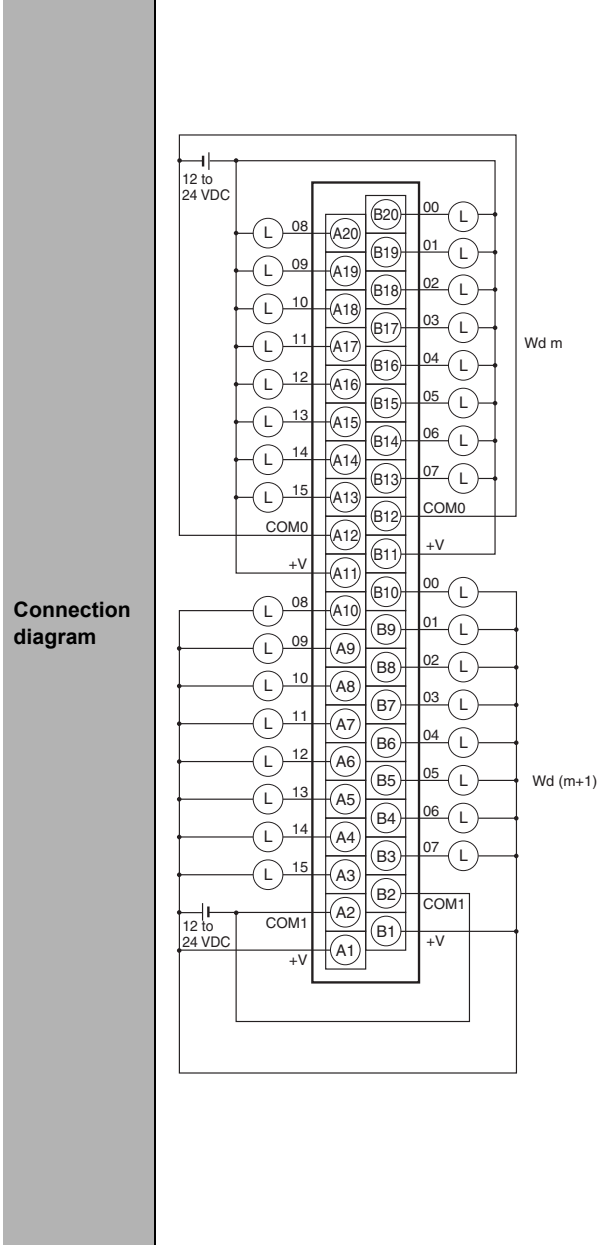
|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-OD233               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□N                |

**Connection diagram**



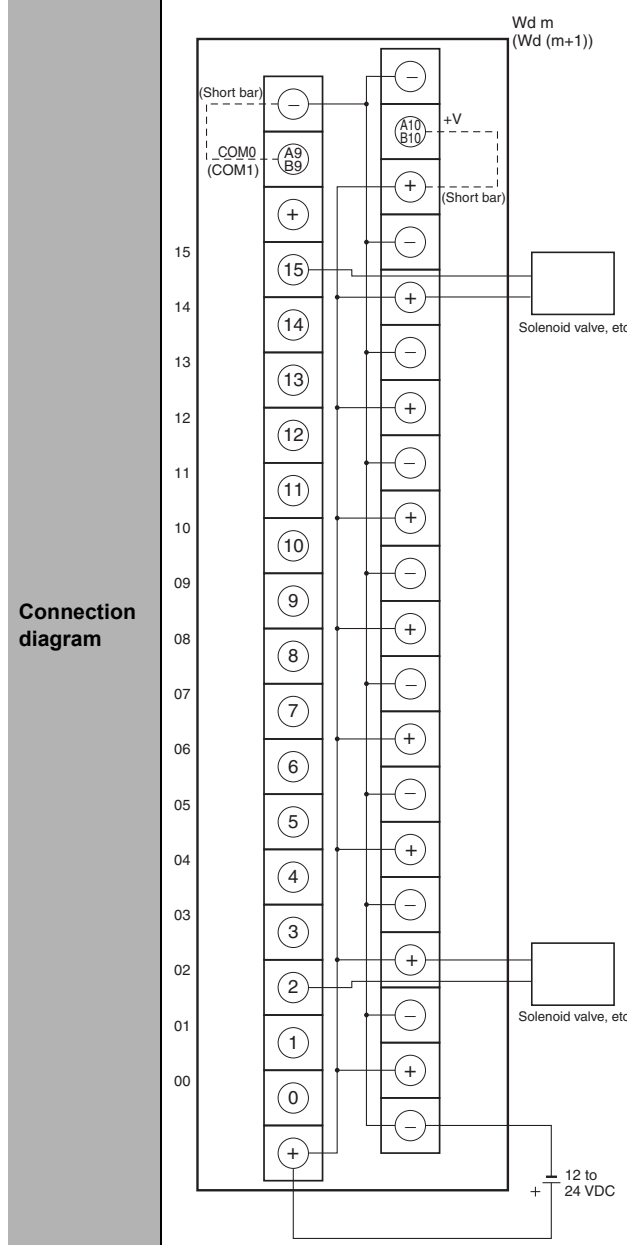
- Note 1** Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

|  |            |
|--|------------|
| Programmable Controller I/O Unit         | CJ1W-OD234 |
| Connector-Terminal Block Conversion Unit | XW2D-40G6  |
| Connecting Cables                        | XW2Z-□□□K  |



**Note** The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

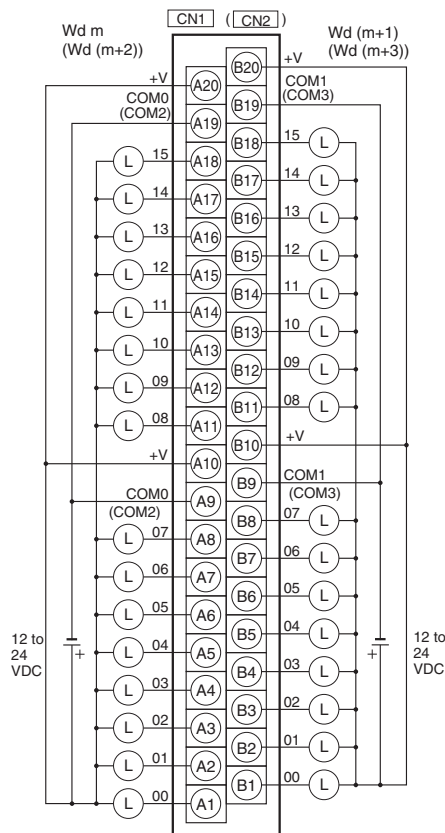
|  |                          |
|--|--------------------------|
| Programmable Controller I/O Unit         | CJ1W-OD234               |
| Connector-Terminal Block Conversion Unit | XW2C-20G6-IO16 (2 Units) |
| Connecting Cables                        | XW2Z-□□□N                |



- 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.

|   |                         |
|---|-------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-OD261              |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6<br>XW2D-40C6  |
| <b>Connecting Cables</b>                        | XW2Z-□□□B<br>XW2Z-□□□BU |

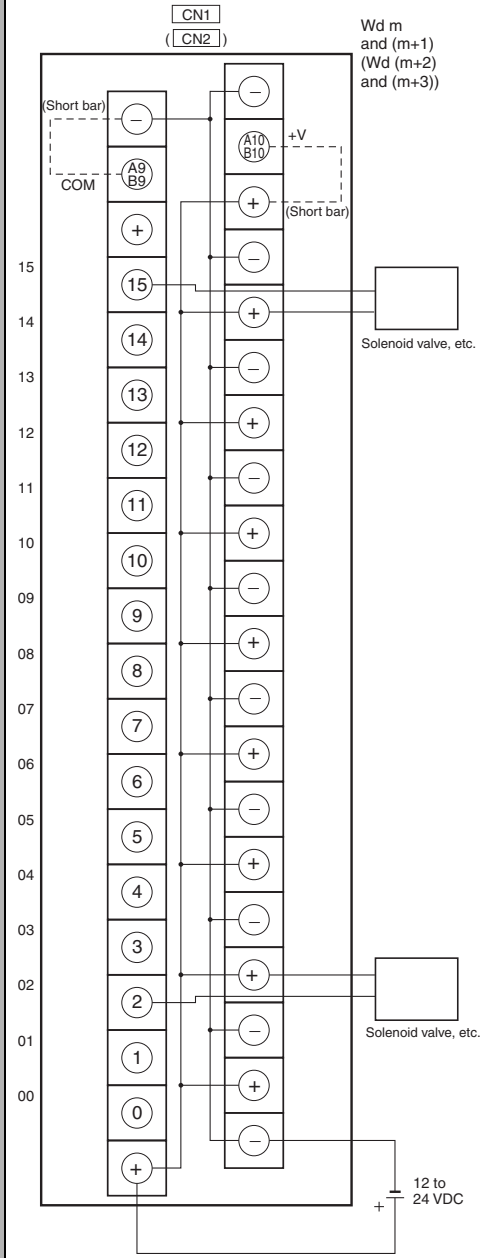
Connection diagram



**Note** The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

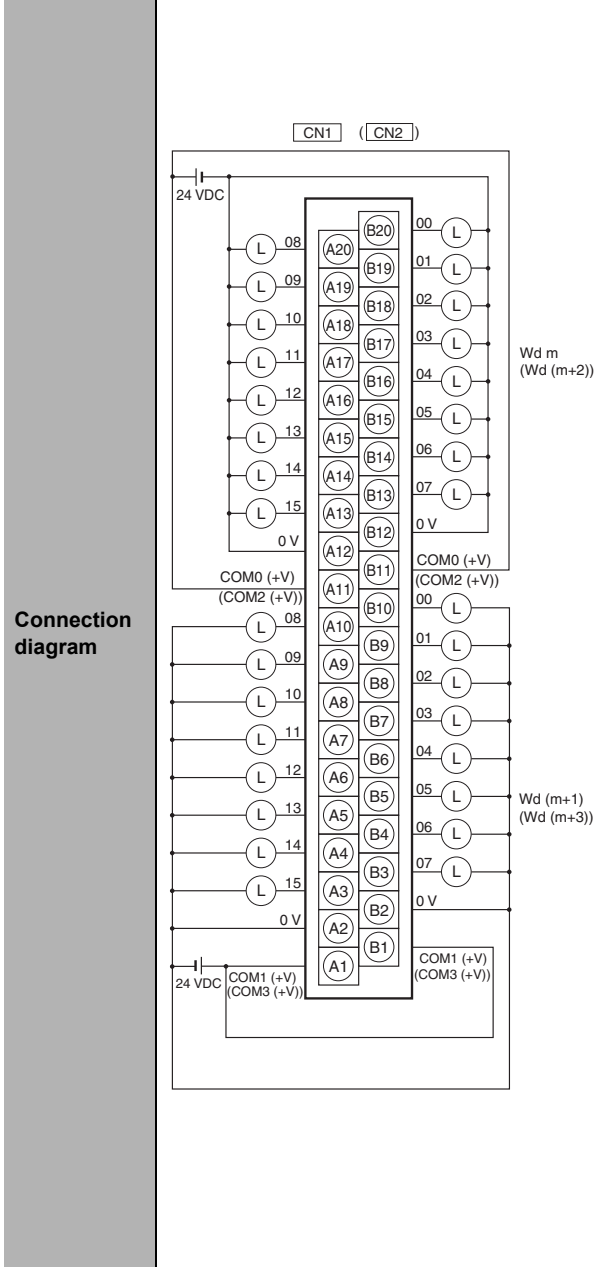
|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-OD261               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□L                |

Connection diagram



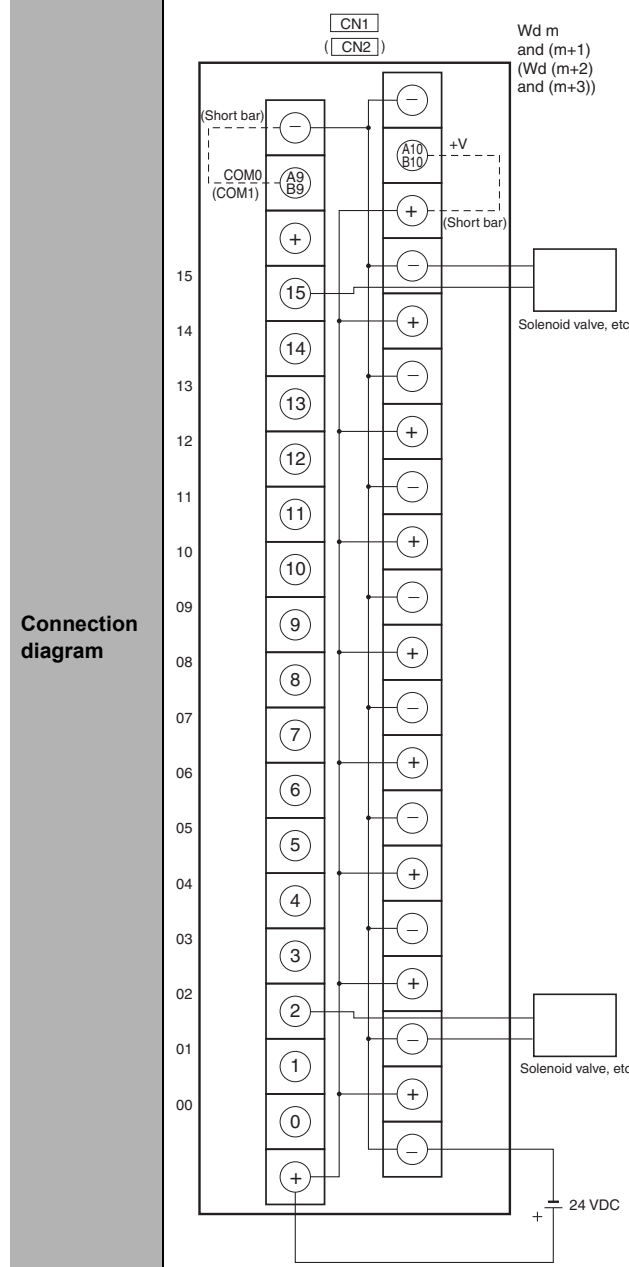
- Note 1** Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

|  |            |
|--|------------|
| Programmable Controller I/O Unit         | CJ1W-OD262 |
| Connector-Terminal Block Conversion Unit | XW2D-40G6  |
| Connecting Cables                        | XW2Z-□□□K  |



**Note** The COM (+V) terminals and 0 V terminals are internally connected inside the PLC, but they must all be wired.

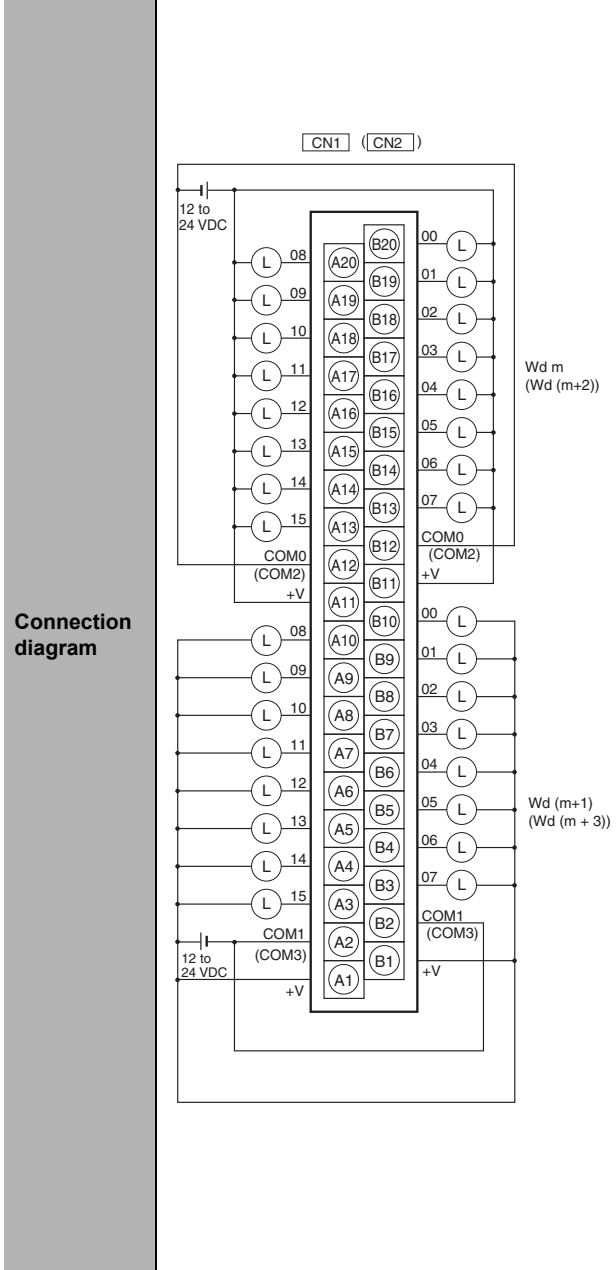
|  |                          |
|--|--------------------------|
| Programmable Controller I/O Unit         | CJ1W-OD262               |
| Connector-Terminal Block Conversion Unit | XW2C-20G6-IO16 (2 Units) |
| Connecting Cables                        | XW2Z-□□□N                |



- 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.

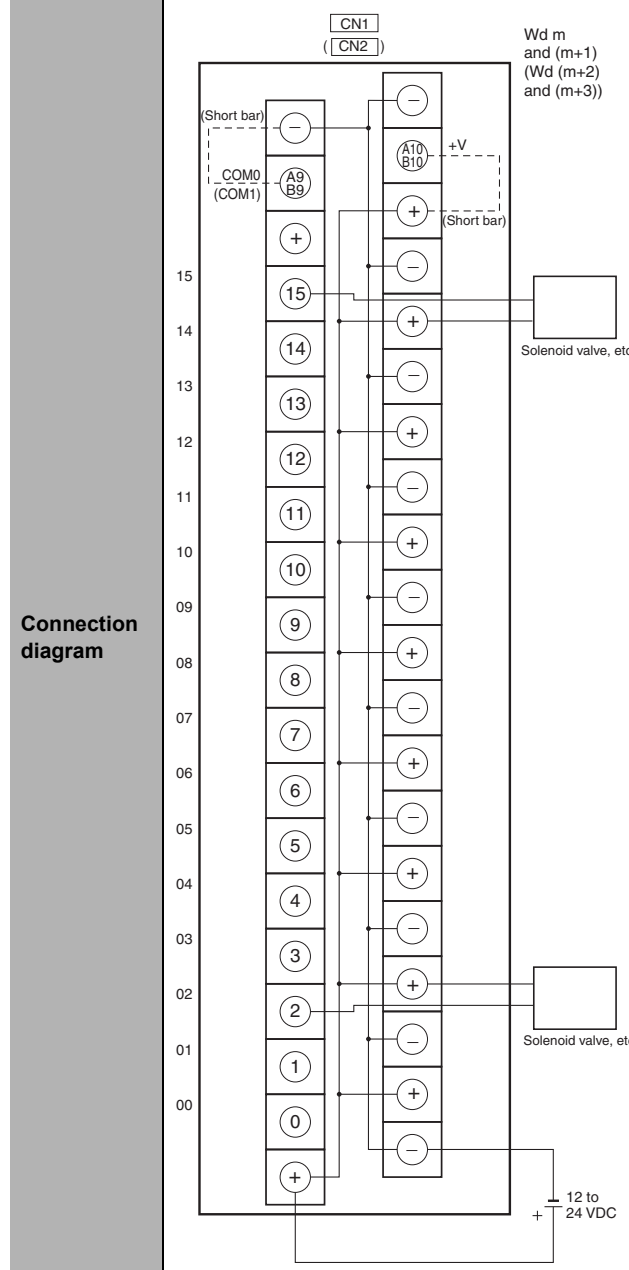


|  |            |
|--|------------|
| Programmable Controller I/O Unit         | CJ1W-OD263 |
| Connector-Terminal Block Conversion Unit | XW2D-40G6  |
| Connecting Cables                        | XW2Z-□□□K  |



**Note** The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

|  |                          |
|--|--------------------------|
| Programmable Controller I/O Unit         | CJ1W-OD263               |
| Connector-Terminal Block Conversion Unit | XW2C-20G6-IO16 (2 Units) |
| Connecting Cables                        | XW2Z-□□□N                |



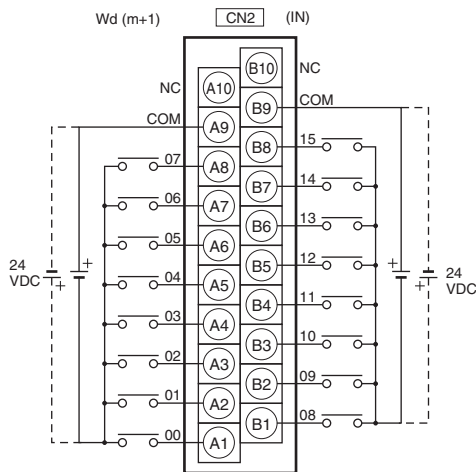
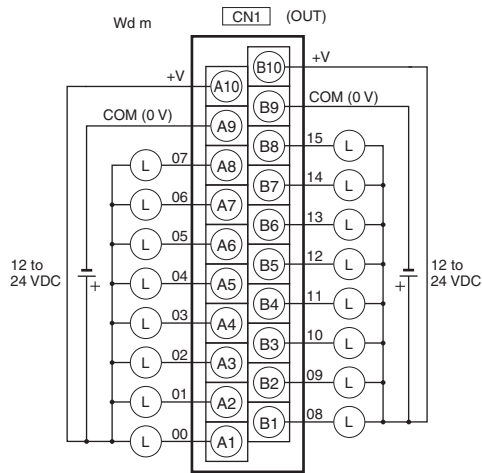
- Note 1** Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

A-1 Specifications of Basic I/O Units  
App  
A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals

● Inputs and Outputs

|   |            |
|---|------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-MD231 |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-20G6  |
| <b>Connecting Cables</b>                        | XW2Z-□□□A  |

Connection diagram

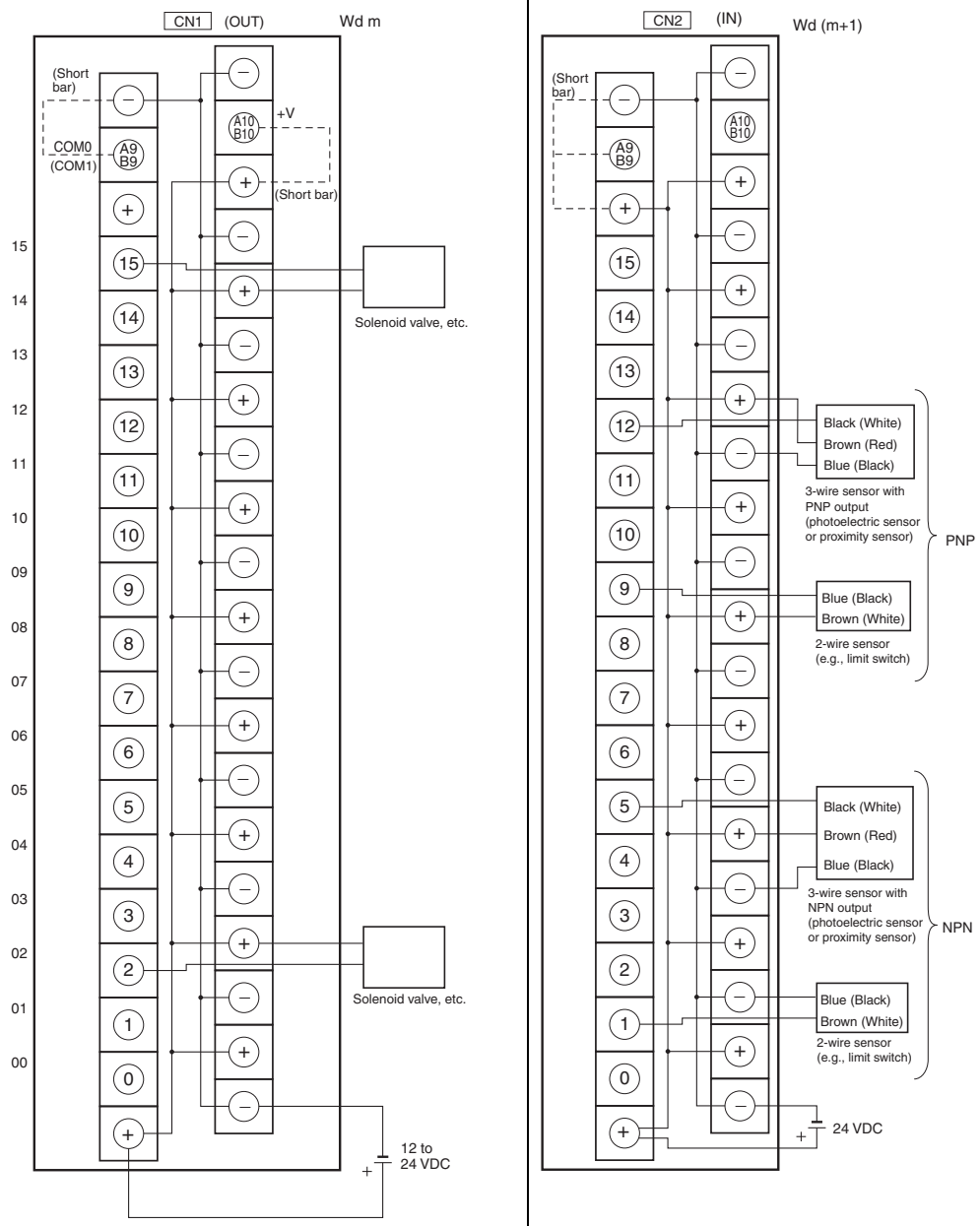


**Note 1** The polarity for input power supply connections indicated with dotted lines (-----) can be connected in either direction.

**2** The COM terminals are internally connected inside the PLC, but they must all be wired.

|   |                |
|---|----------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-MD231     |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 |
| <b>Connecting Cables</b>                        | XW2Z-□□□A      |

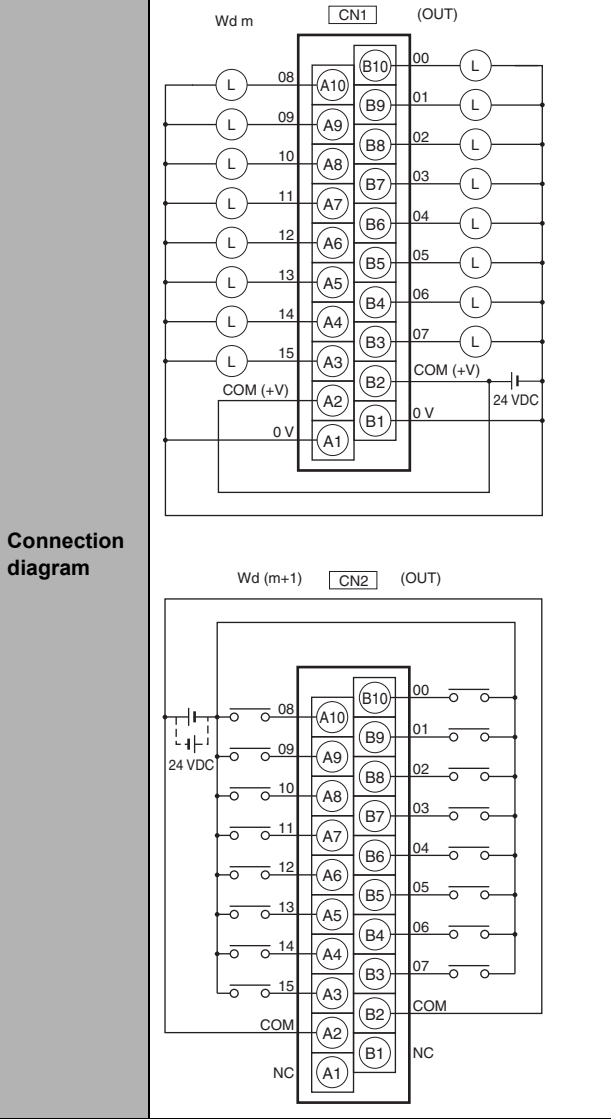
Connection diagram



- 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.

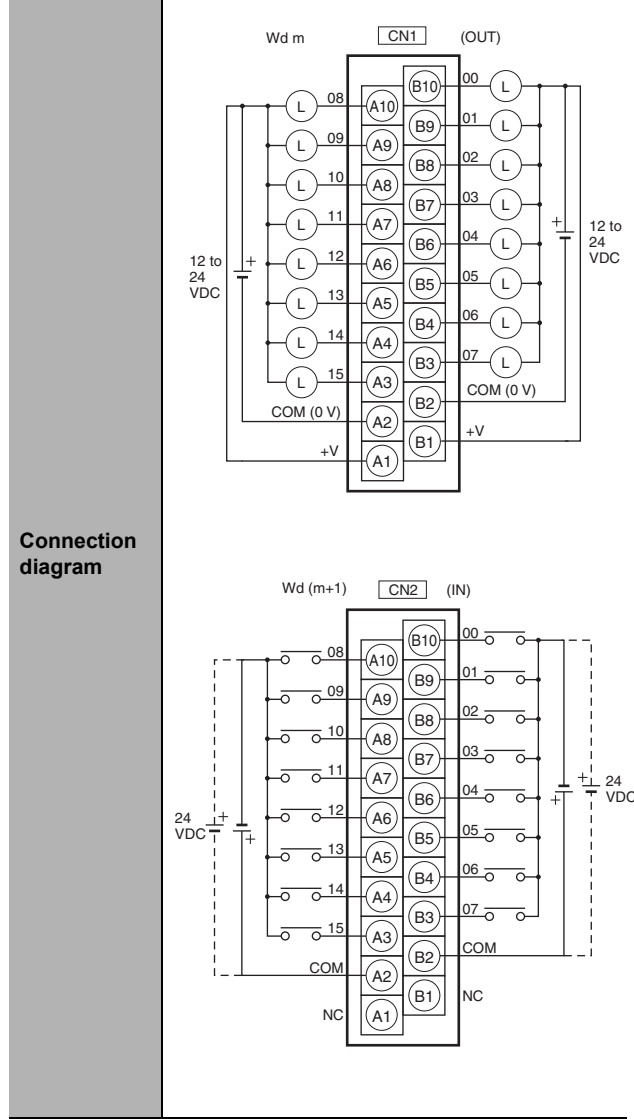
- Note 1** Connect the A9/B9 terminal and the ⊕ terminal for NPN.  
Connect the A9/B9 terminal and the ⊖ terminal for PNP.  
(Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

|   |            |
|---|------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-MD232 |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-20G6  |
| <b>Connecting Cables</b>                        | XW2Z-□□□X  |



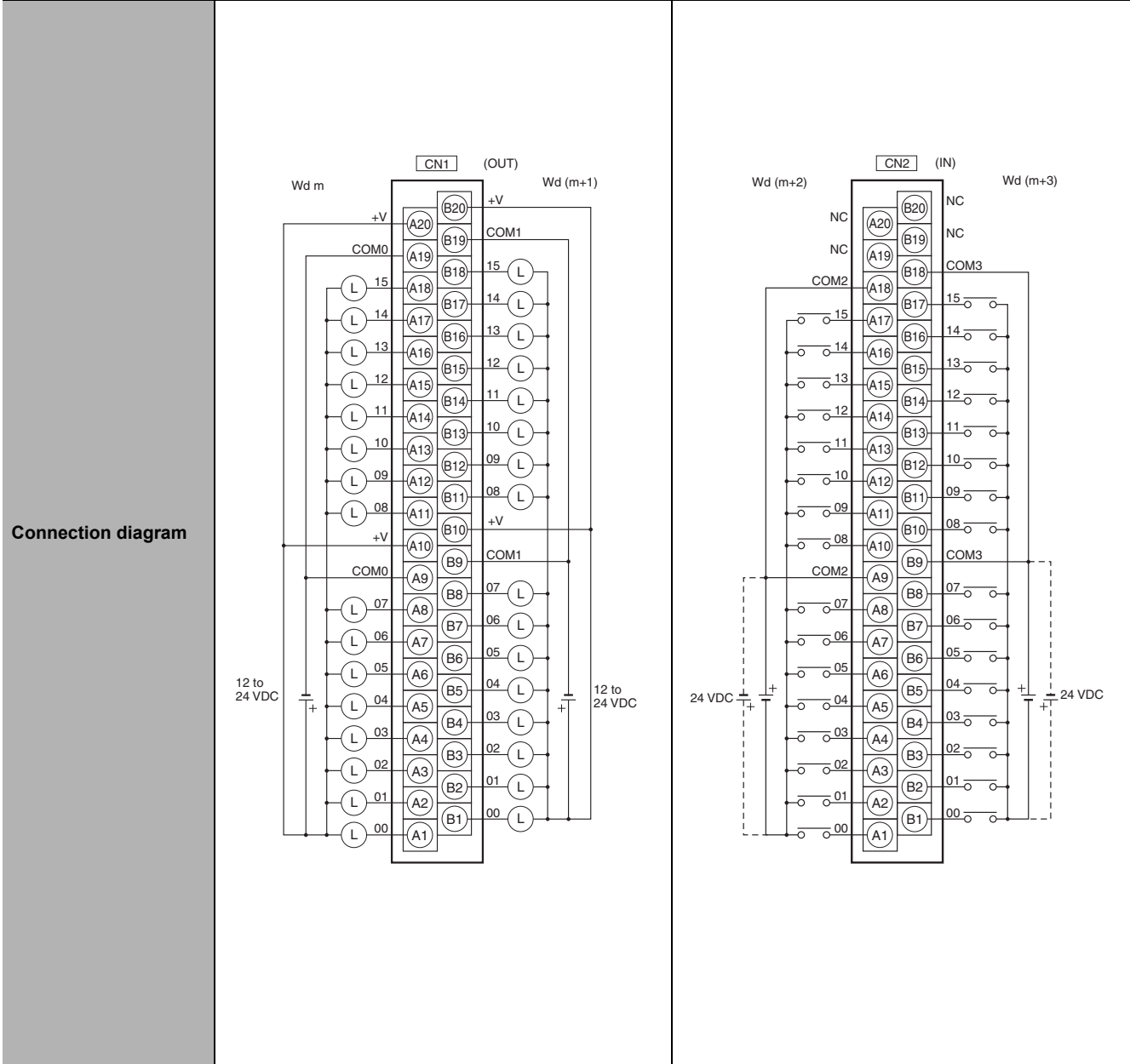
- Note 1** The polarity for input power supply connections indicated with dotted lines (-----) can be connected in either direction.
- 2** The COM terminals and 0V terminal are internally connected inside the PLC, but they must all be wired.

|   |            |
|---|------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-MD233 |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-20G6  |
| <b>Connecting Cables</b>                        | XW2Z-□□□X  |



- 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.

|  |                          |
|--|--------------------------|
| Programmable Controller I/O Unit         | CJ1W-MD261               |
| Connector-Terminal Block Conversion Unit | XW2D-40G6<br>XW2D-40G6RF |
| Connecting Cables                        | XW2Z-□□□B                |



**Note** The +V terminals and COM terminals 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 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.

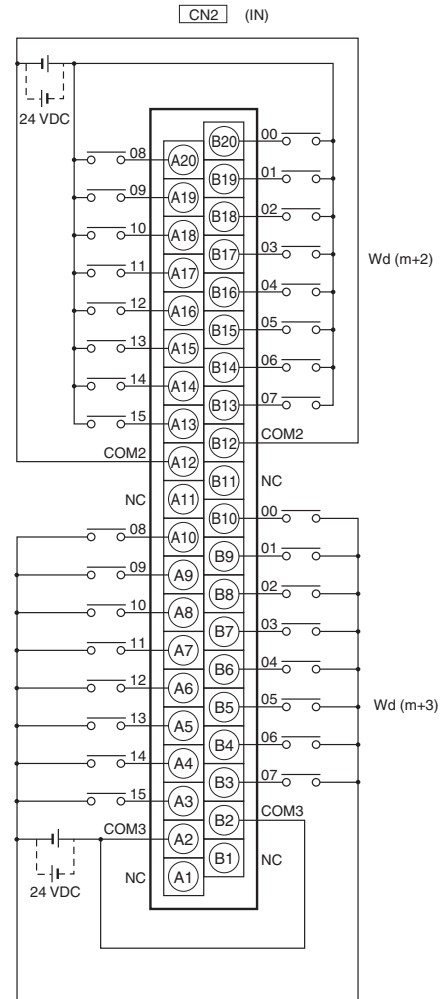
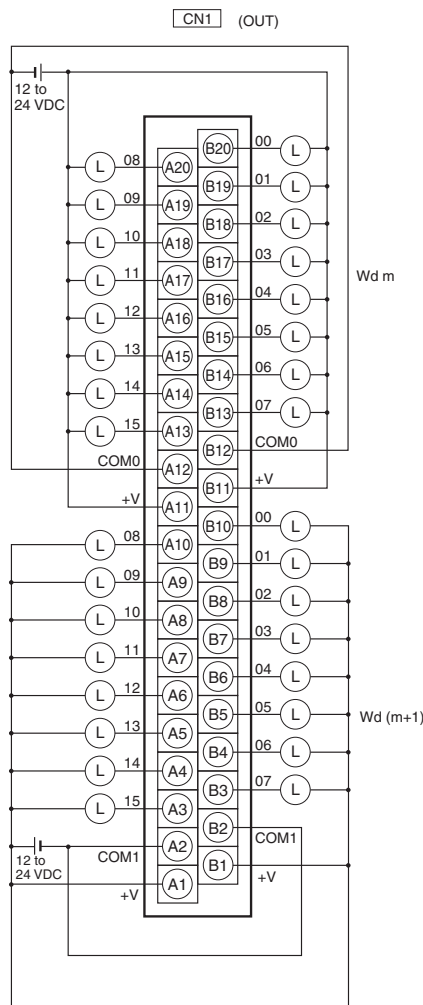
|   |                          |                          |
|---|--------------------------|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-MD261               |                          |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□L                | XW2Z-□□□D                |
| <b>Connection diagram</b>                       |                          |                          |

- 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.

- Note 1** Connect the A9/B9 terminal and the ⊕ terminal for NPN.  
 Connect the A9/B9 terminal and the ⊖ terminal for PNP.  
 (Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

|   |                           |
|---|---------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-MD263                |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6<br>XW2D-40G6-RM |
| <b>Connecting Cables</b>                        | XW2Z-□□□K                 |

Connection diagram

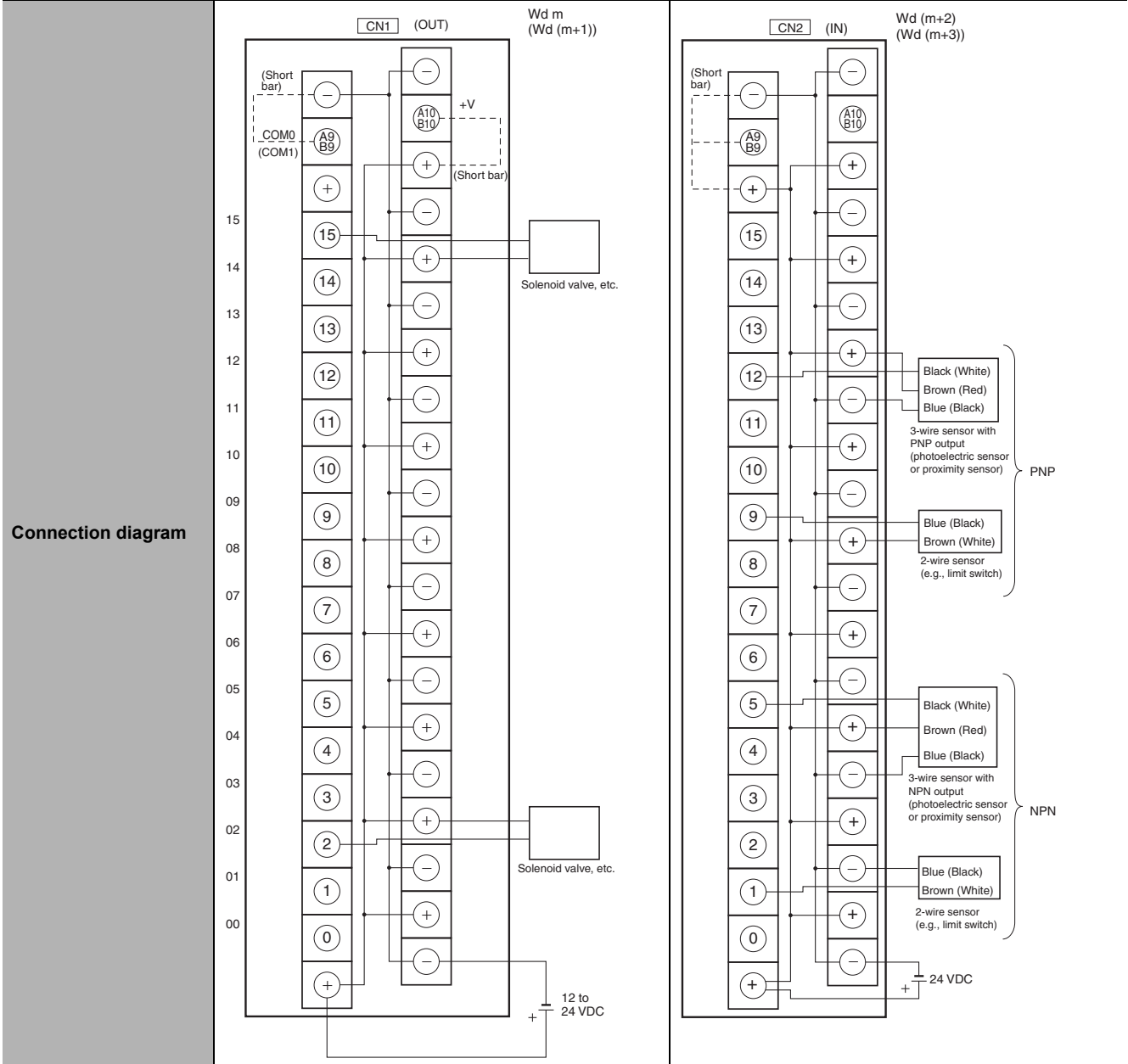


**Note** The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

**Note 1** The polarity for input power supply connections indicated with dotted lines (-----) can be connected in either direction.

**2** Both COM2 and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.

|   |                          |
|---|--------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-MD263               |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2C-20G6-IO16 (2 Units) |
| <b>Connecting Cables</b>                        | XW2Z-□□□N                |



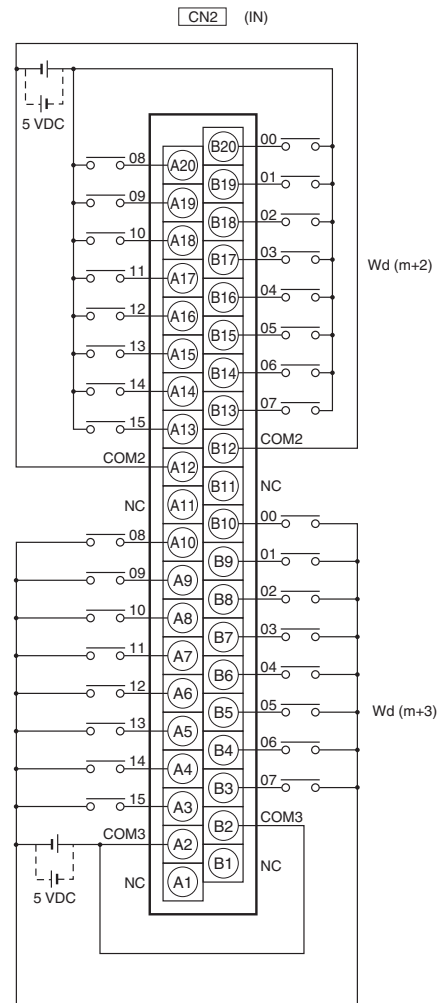
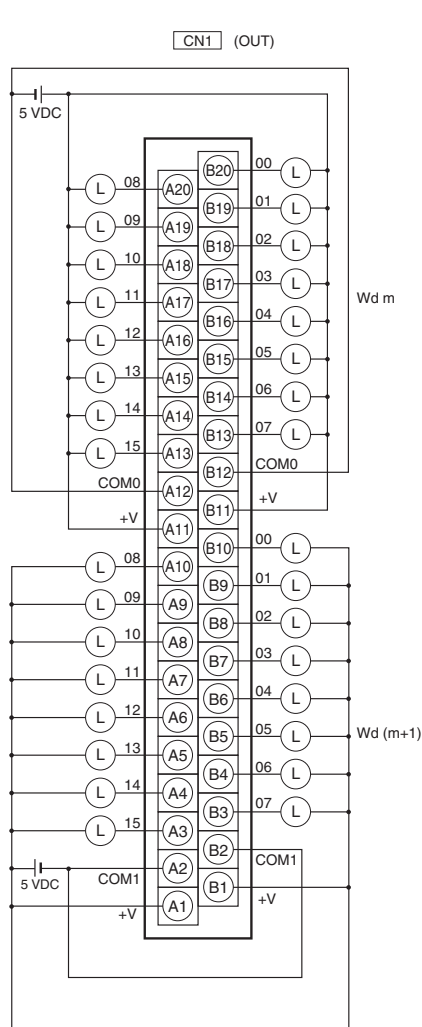
- Note 1** Connect the A9/B9 terminal and the ⊖ terminal.  
Connect the A10/B10 terminal and the ⊕ terminal.  
(Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

- Note 1** Connect the A9/B9 terminal and the ⊕ terminal for PNP.  
Connect the A9/B9 terminal and the ⊖ terminal for NPN.  
(Use the enclosed short bar.)
- 2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.



|   |                           |
|---|---------------------------|
| <b>Programmable Controller I/O Unit</b>         | CJ1W-MD563                |
| <b>Connector-Terminal Block Conversion Unit</b> | XW2D-40G6<br>XW2D-40G6-RM |
| <b>Connecting Cables</b>                        | XW2Z-□□□K                 |

Connection diagram



- Note 1** The +V terminals and 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.

- Note 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.

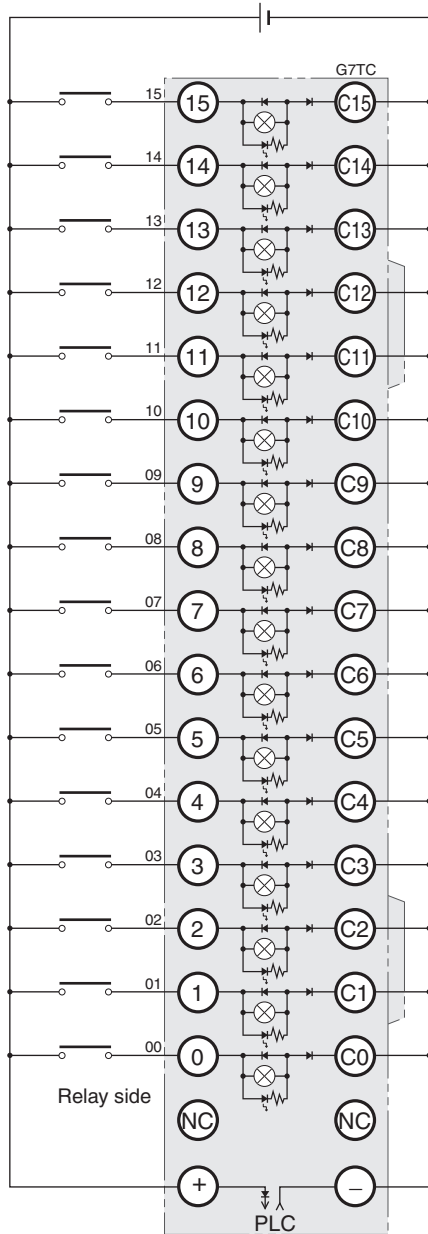
## Connection Diagrams for I/O Relay Terminals

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

**G7TC-ID16**

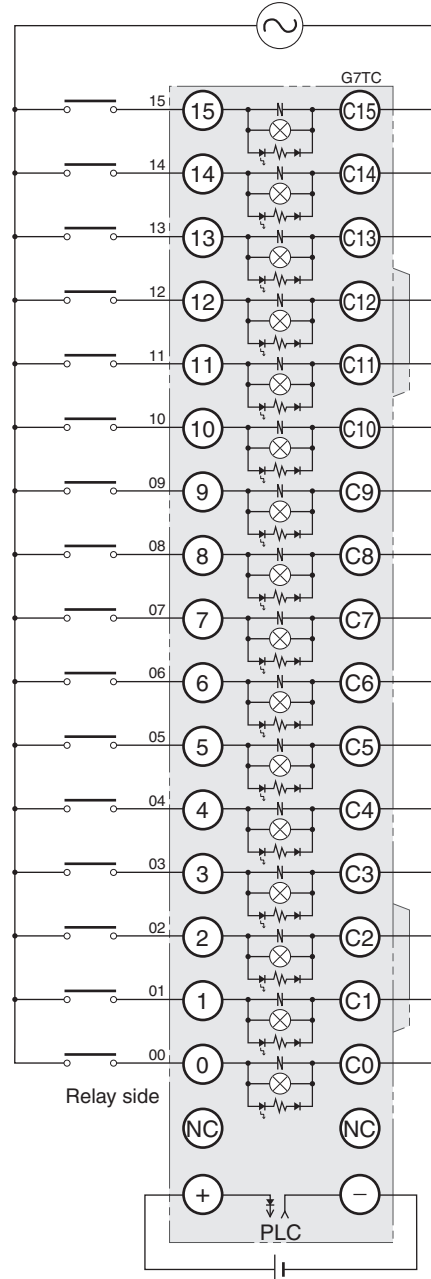


TOP VIEW

**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.

**G7TC-IA16**



TOP VIEW

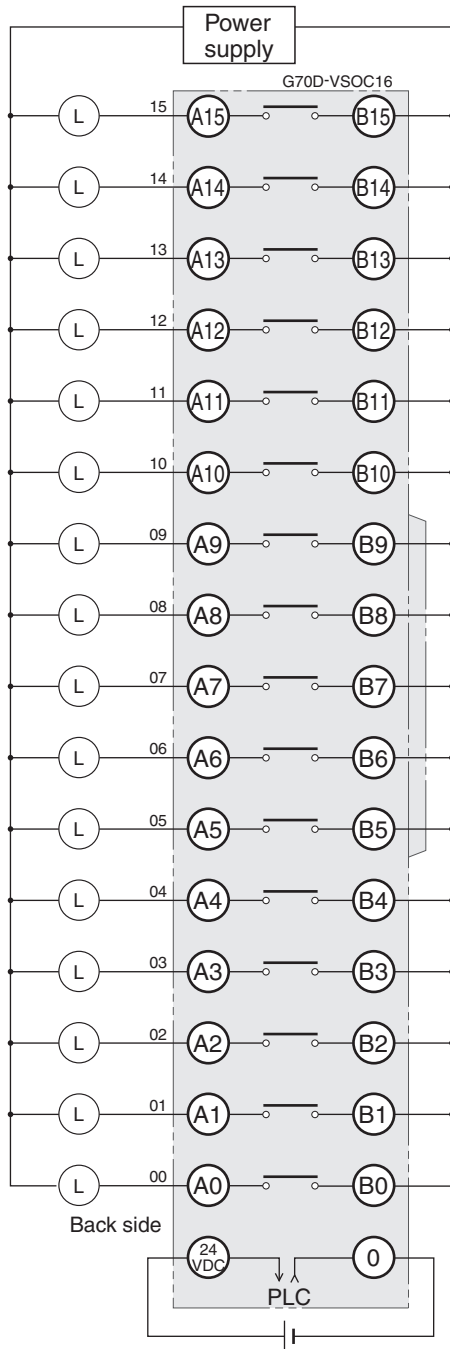
**Note 1** Inputs to the PLC Input Units and I/O Relay Terminals use isolated contacts. "00" to "15" are the input bit numbers for the PLC Input Unit and the input numbers for the I/O Relay Terminal.

**2** Use the G78-04 short bar to short to the common terminal.

● Outputs

G70D-V Relay Terminals

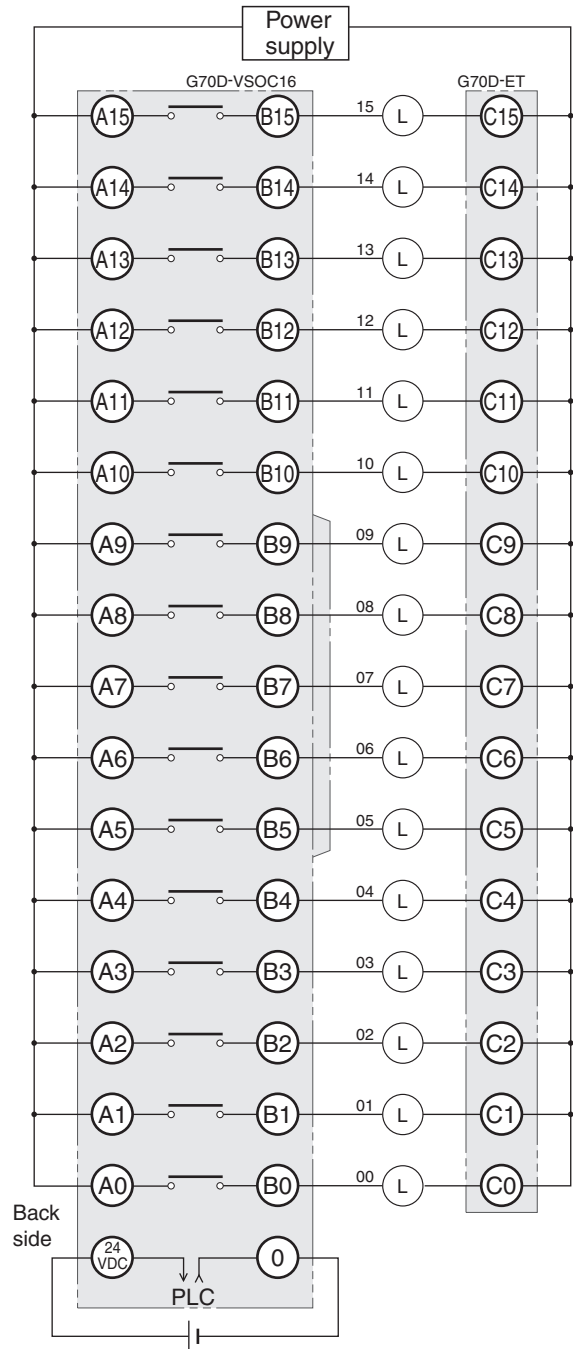
G70D-VSOC16



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

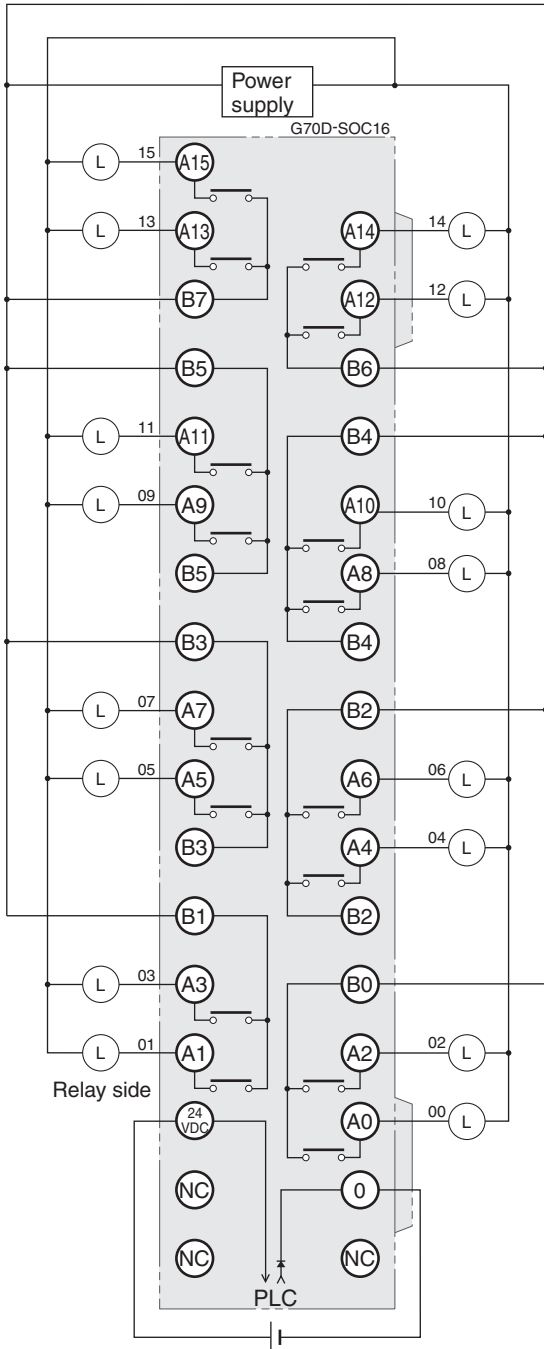


TOP VIEW

- 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 Relay Terminals

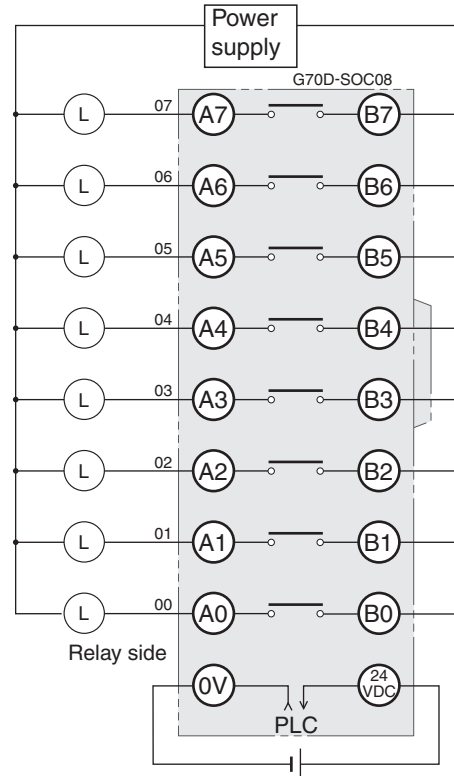
G70D-SOC16



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

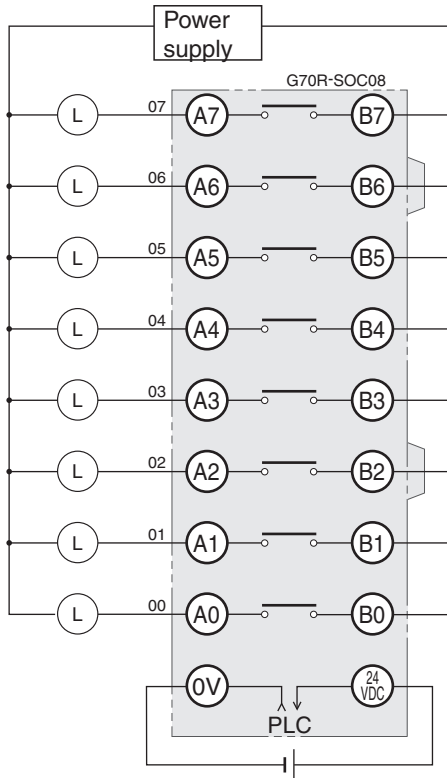


TOP VIEW

- 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.

**G70R Relay Terminals**

**G70R-SOC08**



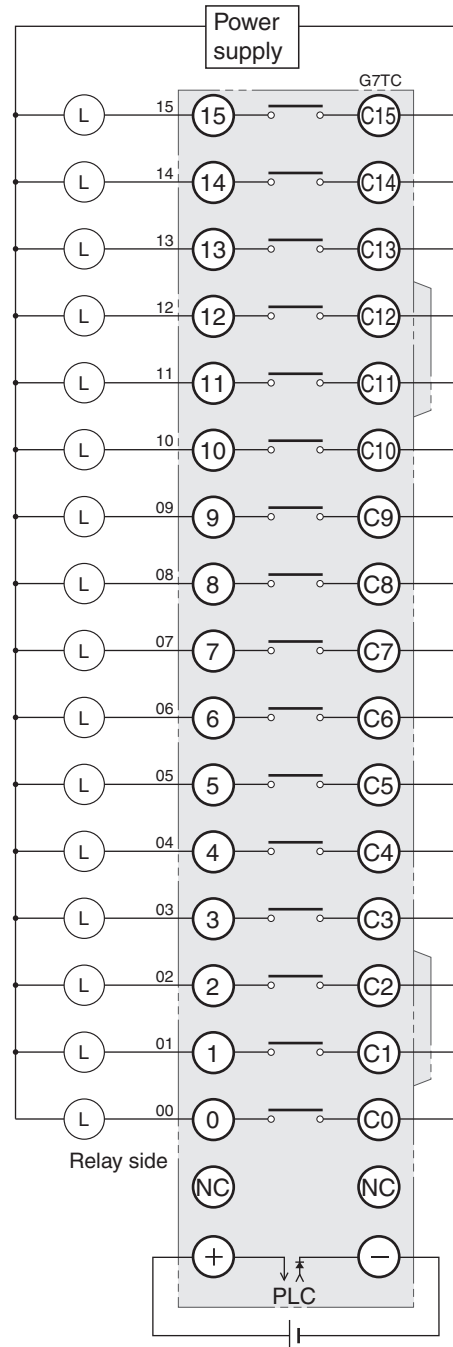
TOP VIEW

**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.

**G7TC I/O Relay Terminals**

**G7TC-OC16/OC08**



TOP VIEW

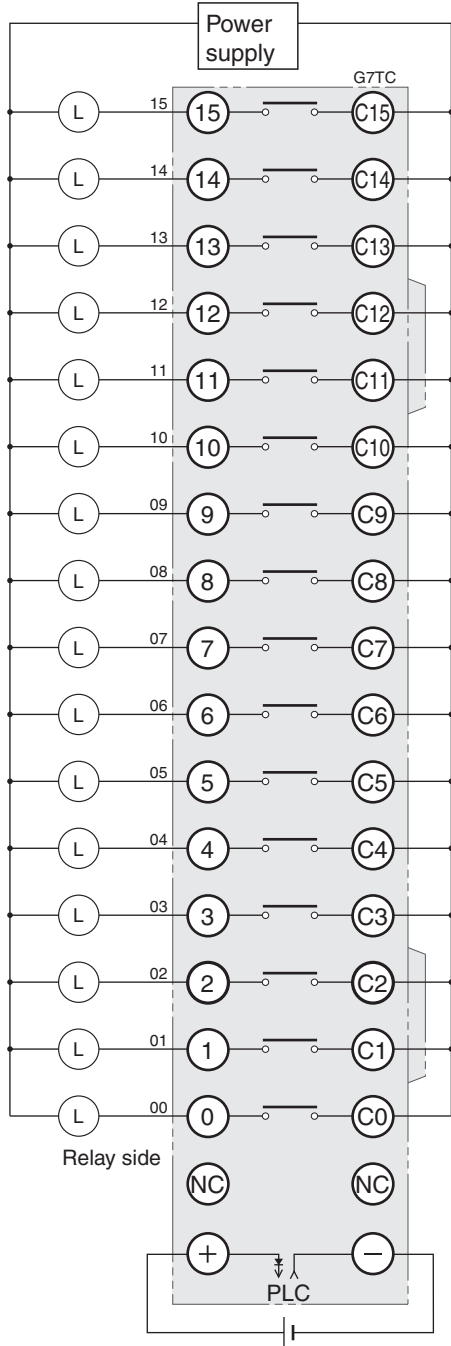
**Note 1** All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. "00" to "15" are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

**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**

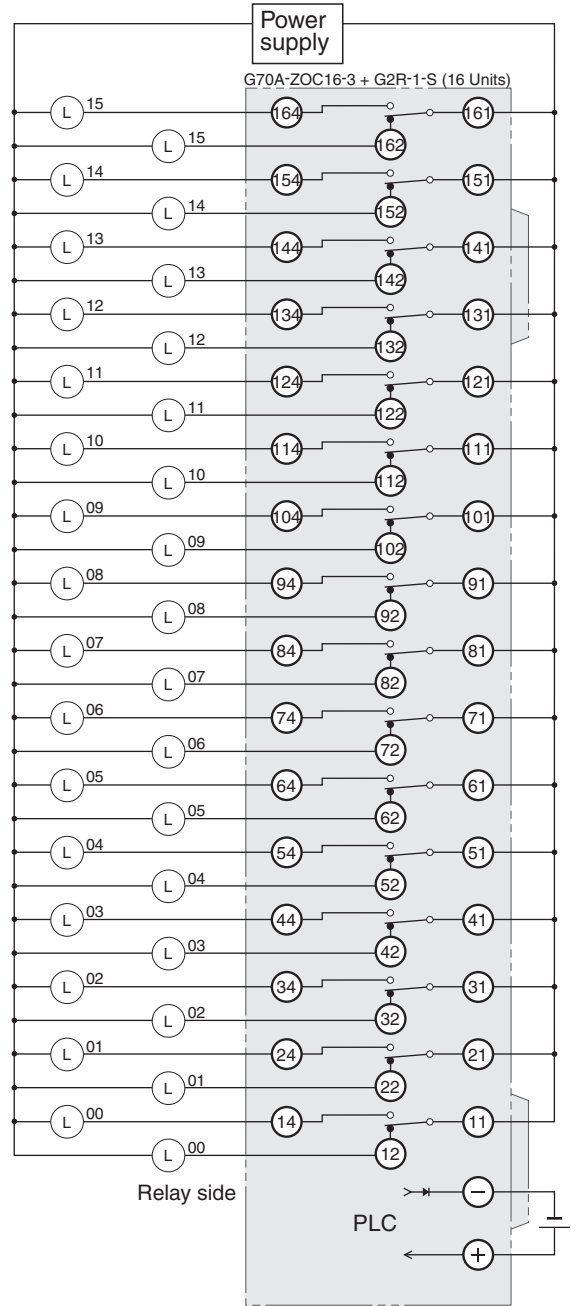


TOP VIEW

- 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.

**G70A-ZOC16 Relay Terminal Socket**

**G70A-ZOC16-3+G2R-1-S (16 Units)**



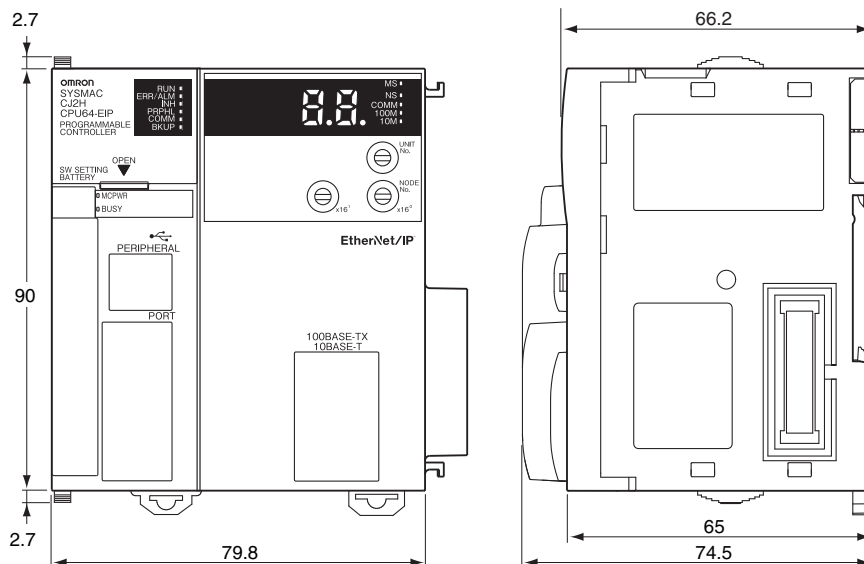
TOP VIEW

- 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

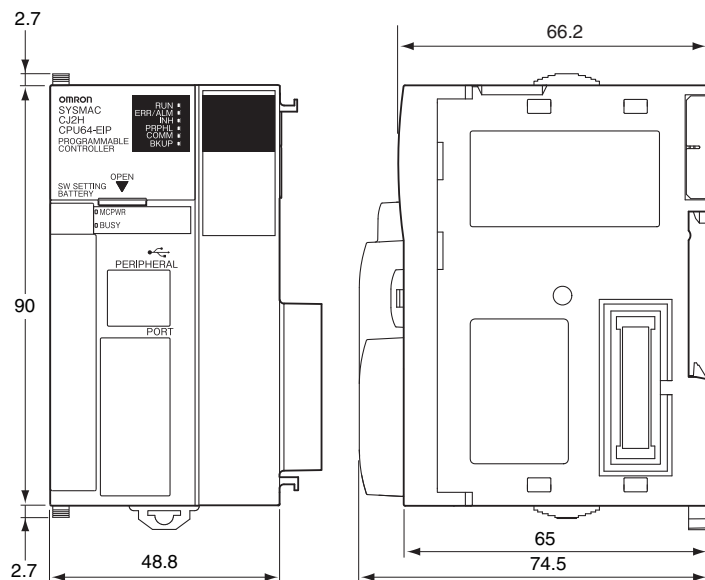
## A-2-1 CJ2H CPU Units

### CJ2H-CPU6□-EIP



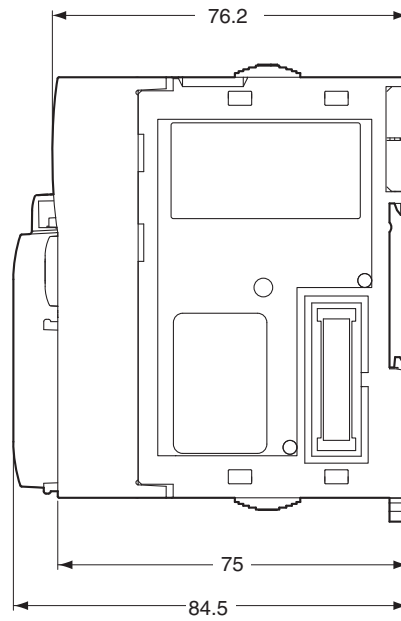
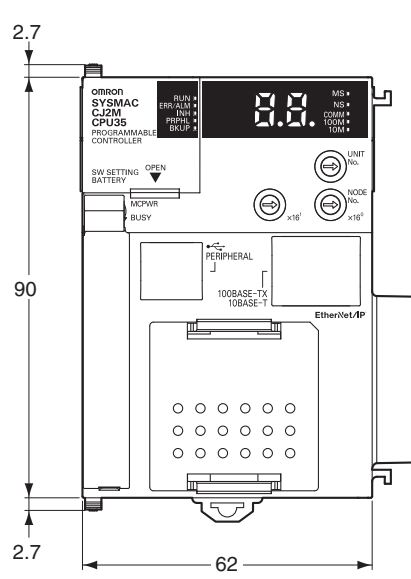
Unit: mm

### CJ2H-CPU6□



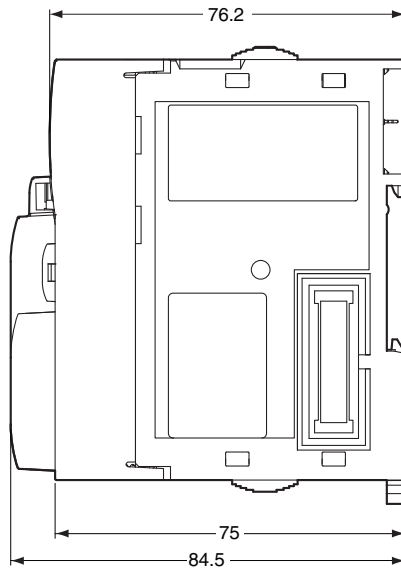
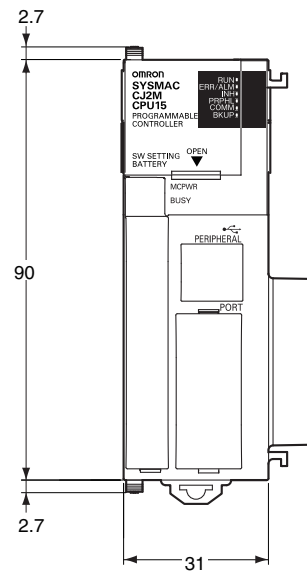
## A-2-2 CJ2M CPU Units

### CJ2M-CPU3□



Unit: mm

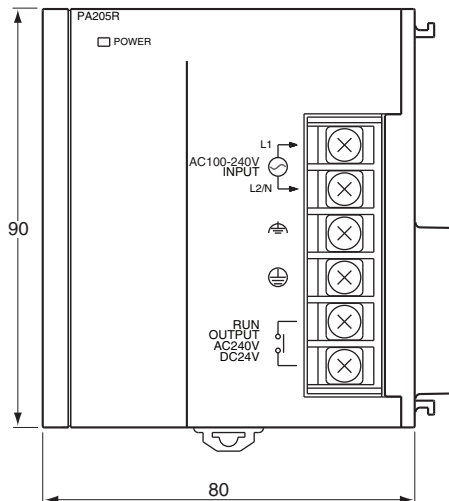
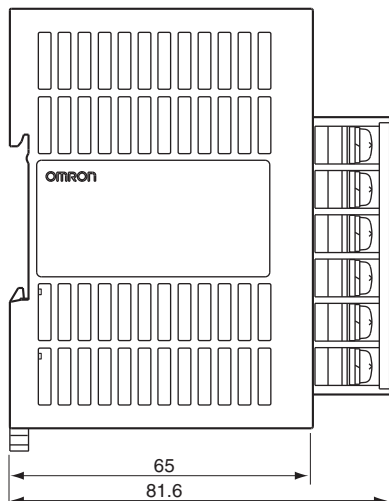
### CJ2M-CPU1□





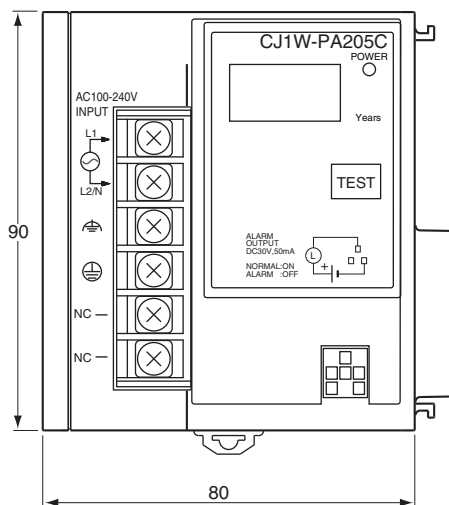
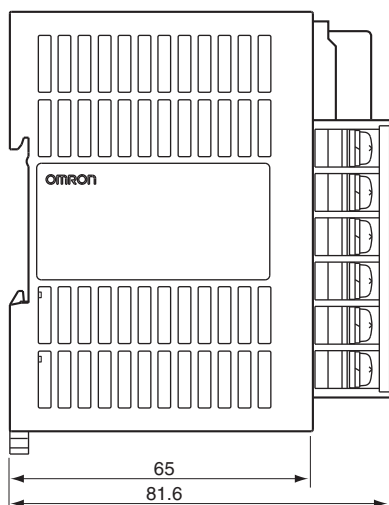
**A-2-3 Power Supply Units**

**CJ1W-PA205R**



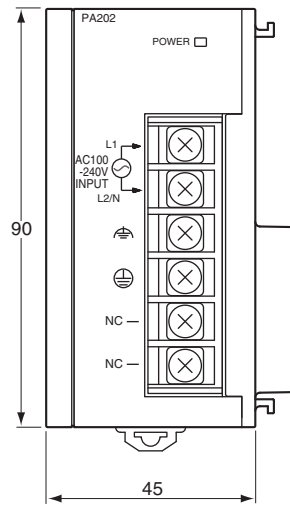
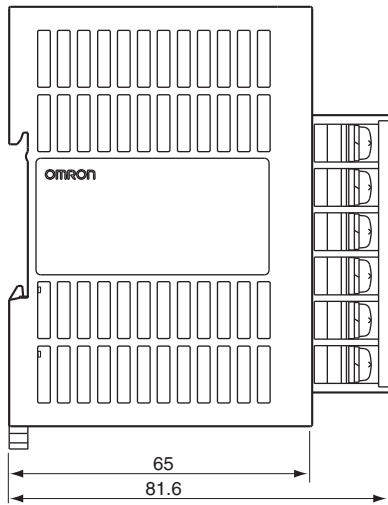
Unit: mm

**CJ1W-PA205C**



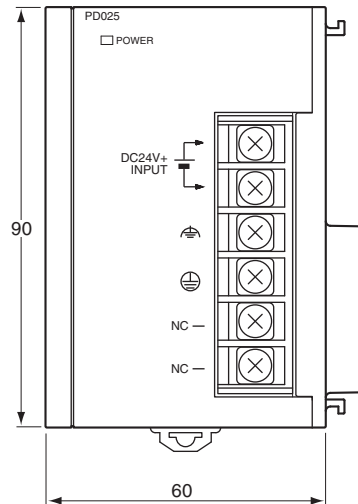
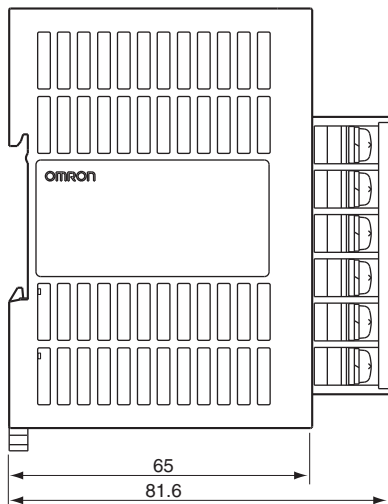
Unit: mm

### CJ1W-PA202



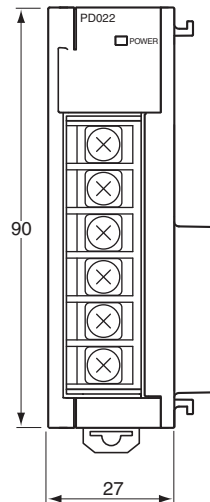
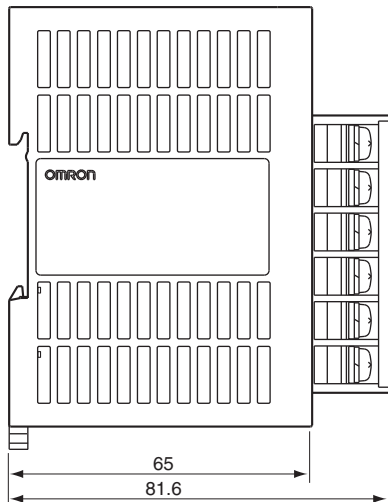
Unit: mm

### CJ1W-PD025



Unit: mm

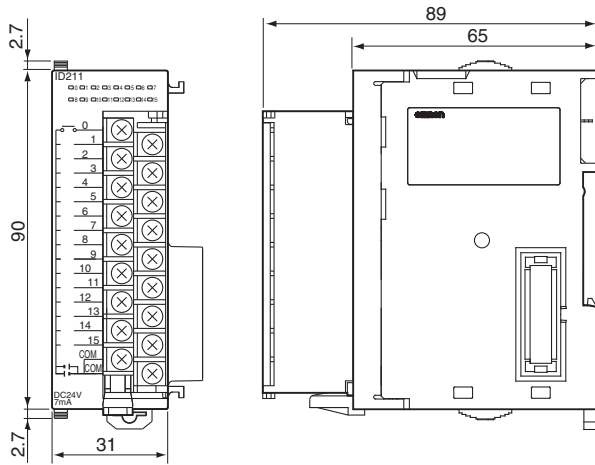
### CJ1W-PD022



Unit: mm

**A-2-4 Basic I/O Units**

**8/16-point Units with 18-terminal Terminal Blocks**

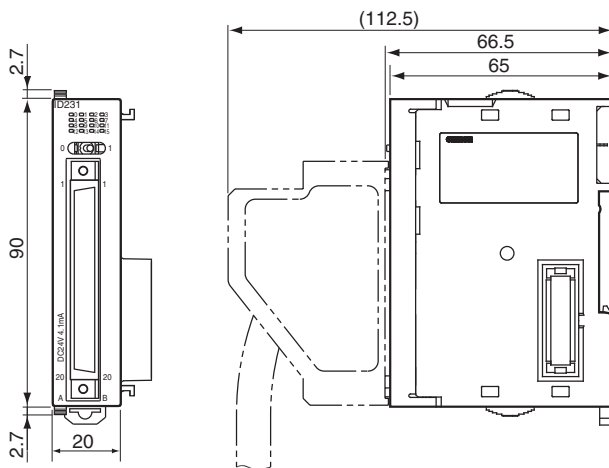


Unit: mm

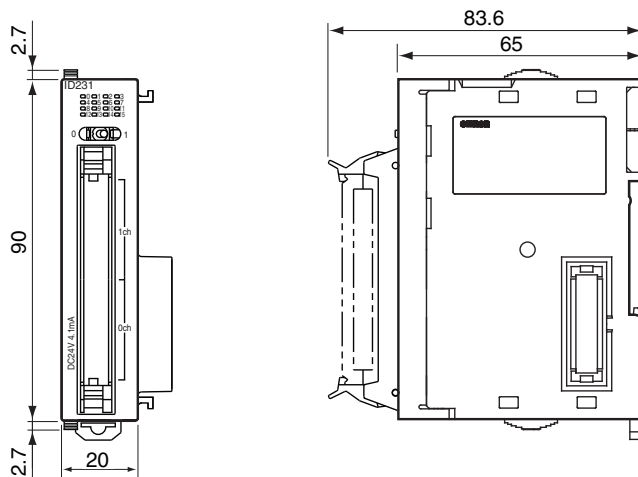
**32-point Units (Input Units and Output Units)**

Units with Fujitsu/OTAX Connector (40-pin × 1)

Unit: mm



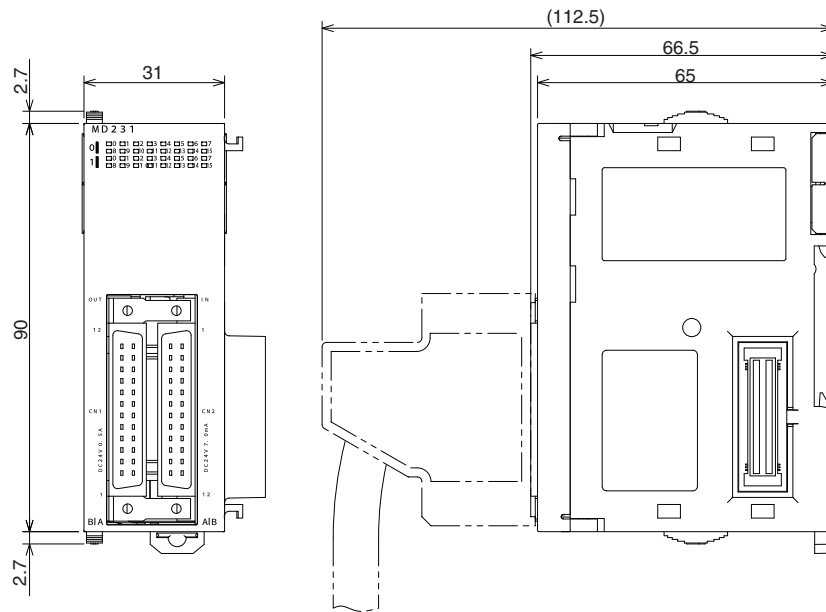
Units with MIL Connector (40-pin × 1)



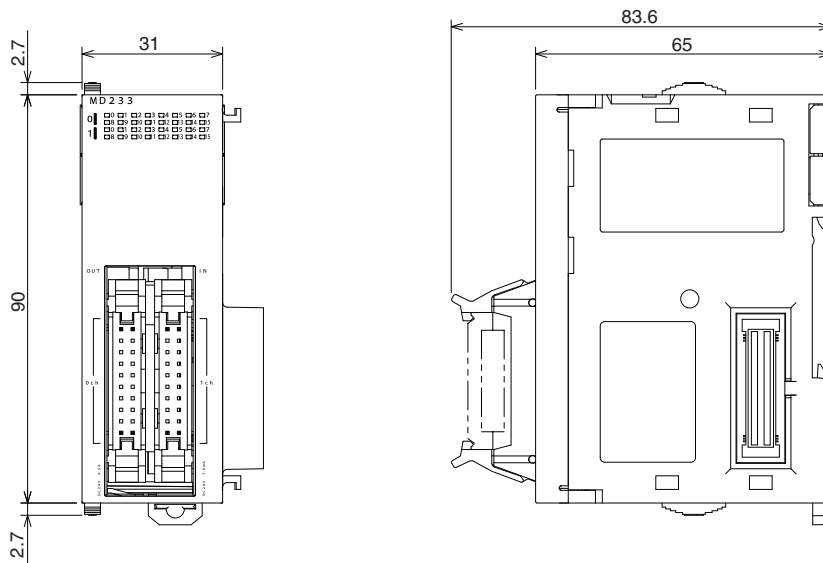
## 32-point Units (24-VDC Input/Transistor Output Units)

Units with Fujitsu/OTAX Connector (24-pin × 2)

Unit: mm



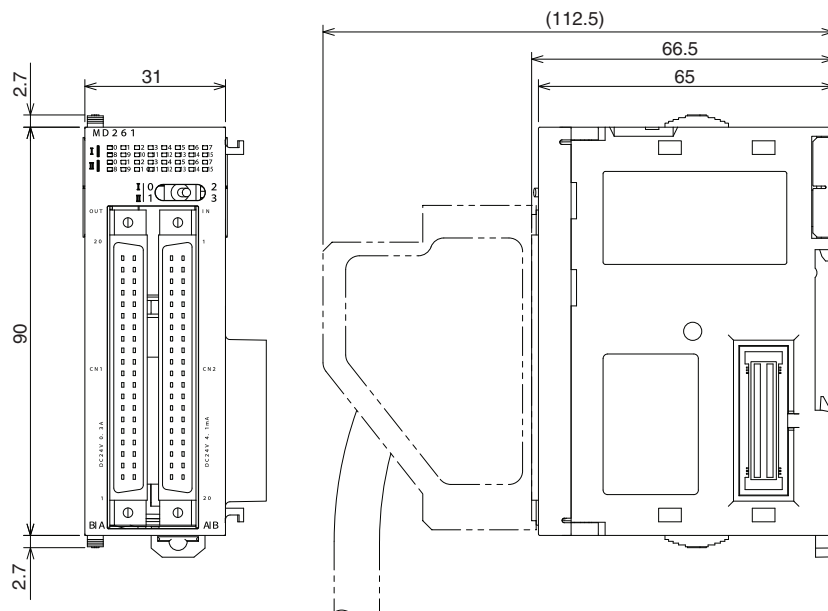
Units with MIL Connector (20-pin × 2)



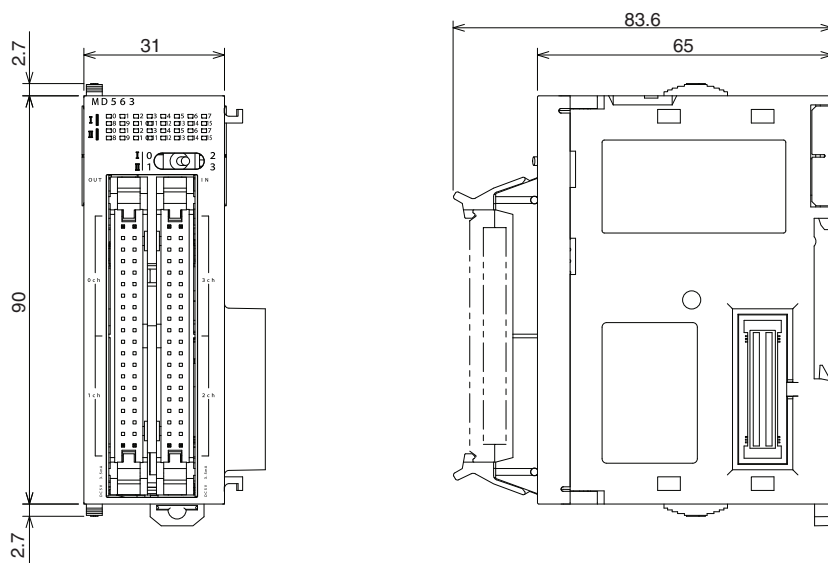
## 64-point Units (Input Units, Output Units, 24-VDC Input/Transistor Output Units, TTL I/O Units)

Units with Fujitsu/OTAX Connector (40-pin × 2)

Unit: mm



Units with MIL Connector (40-pin × 2)

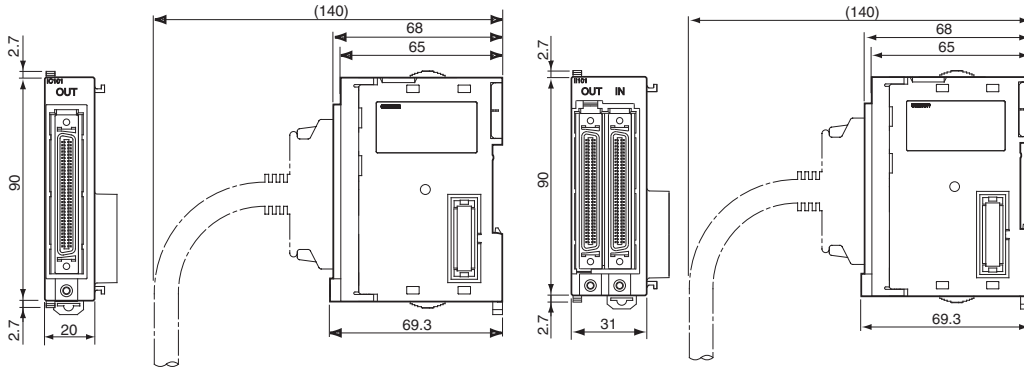


### A-2-5 I/O Control Unit and I/O Interface Unit

CJ1W-IC101  
I/O Control Unit

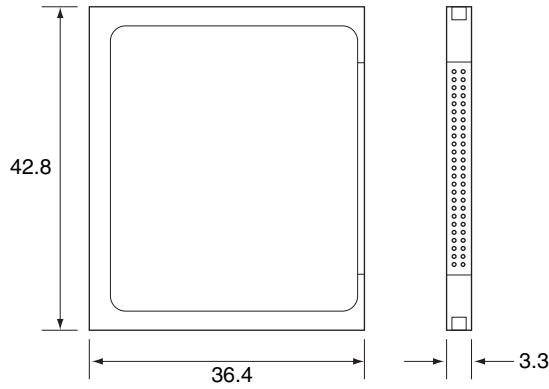
CJ1W-II101  
I/O Interface Unit

Unit: mm



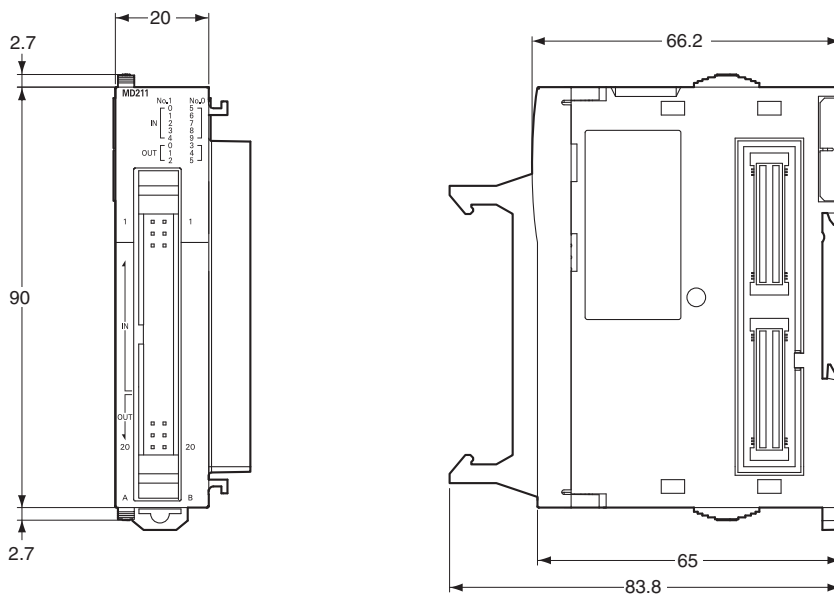
### A-2-6 I/O Memory Card

Unit: mm



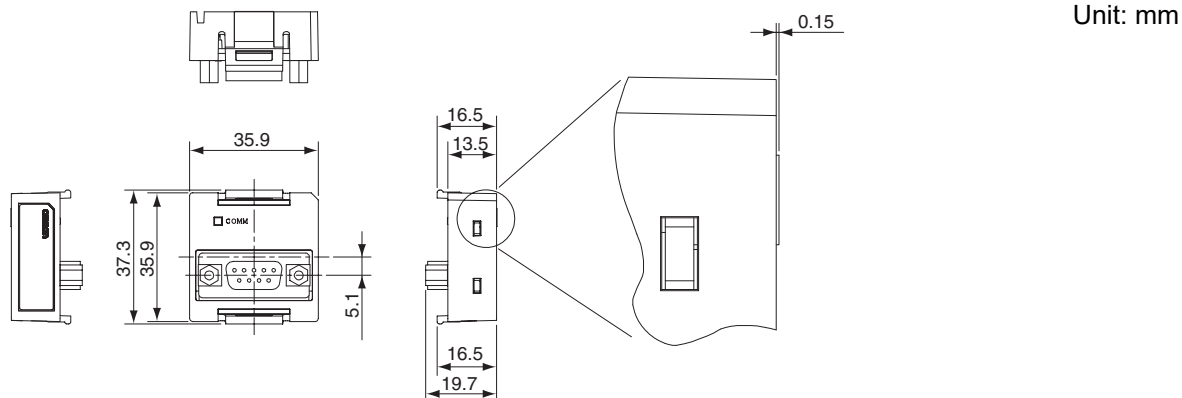
### A-2-7 Pulse I/O Modules (CJ2M CPU Unit Only)

Unit: mm

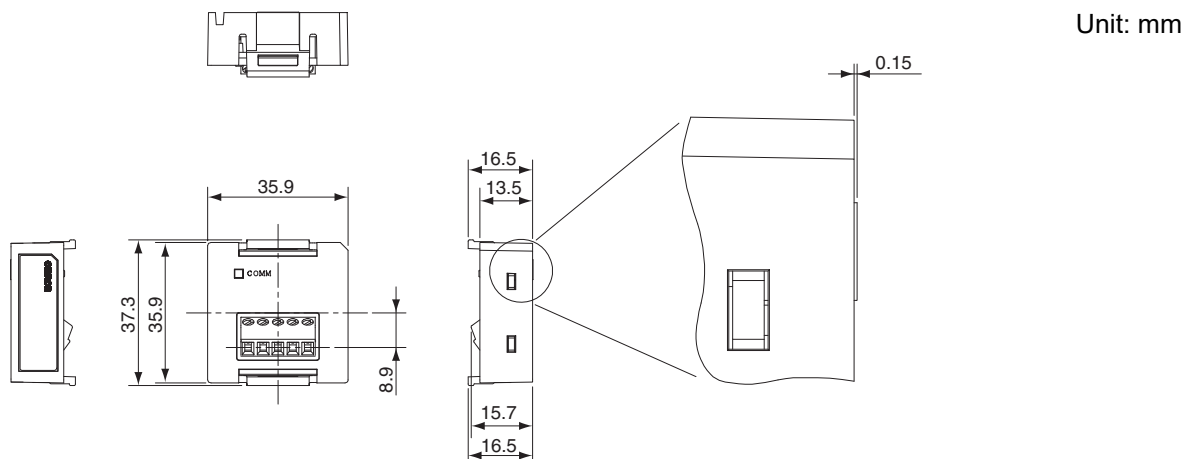


**A-2-8 Serial Option Boards (CJ2M-CPU3□ Only)**

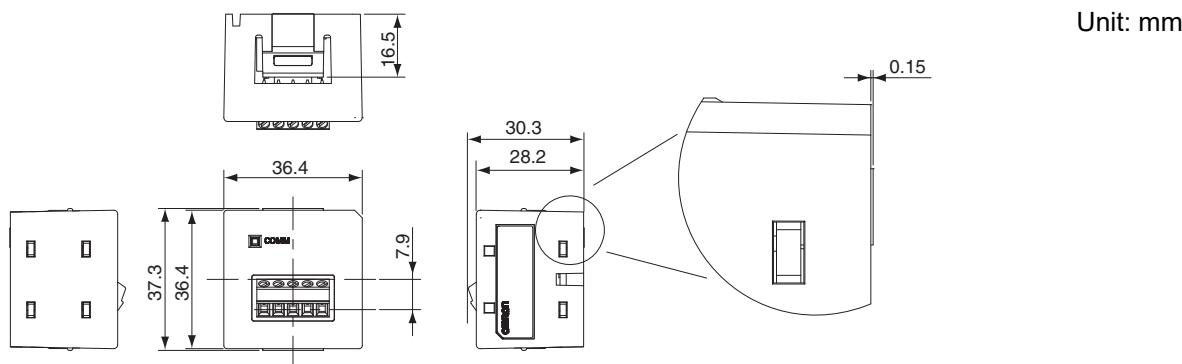
**CP1W-CIF01 RS-232C Option Board**



**CP1W-CIF11/CIF12-V1 RS-422A/485 Option Board**

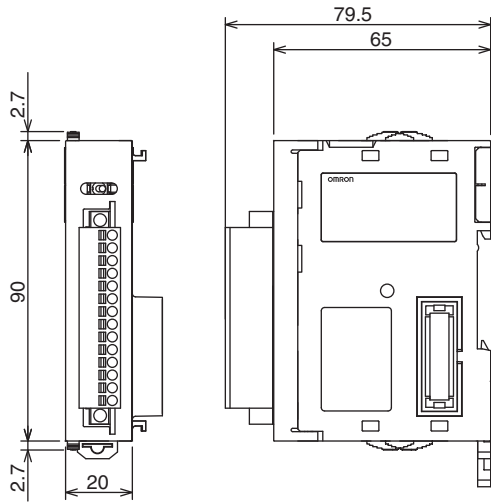


**CP1W-CIF12 RS-422A/485 Option Board (Not include CP1W-CIF12-V1)**



## A-2-9 B7A Interface Unit

### CJ1W-B7A□□ Interface Unit



Unit: mm

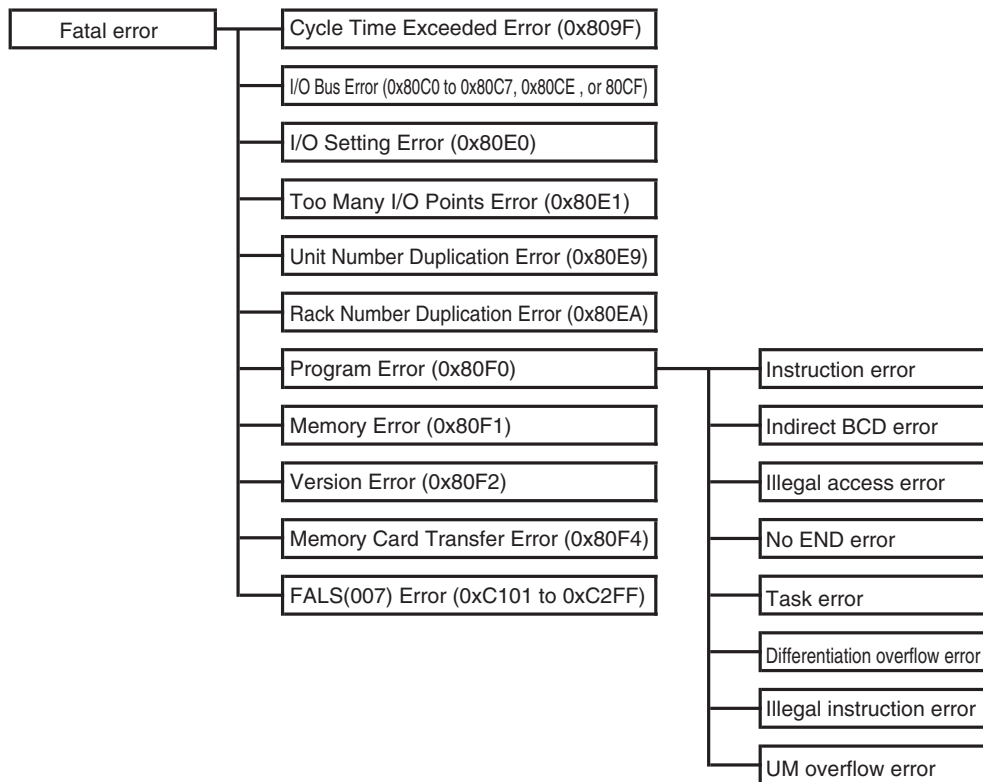


# A-3 Fatal and Non-fatal Error Details

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 Numbers | 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<br><br>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.   |

\*1 A404.00 to A404.07 contain the error slot number (00 to 09) in binary. "0F hex" indicates that the slot cannot be determined.  
 "0B hex" indicates a bus error occurred for the built-in EtherNet/IP port.  
 "0E hex" indicates the End Cover is not connected to the CPU Rack or an Expansion Rack.

\*2 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.  | <ul style="list-style-type: none"> <li>If the number of Units is not correct, turn OFF the power supply and correctly connect the proper Units.</li> <li>With the CJ2 CPU Unit, if the I/O verification operation<sup>*1</sup> 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.</li> <li>If the number of Units is correct, confirm the Unit in discrepancy, turn OFF the power supply, and then correct the Unit connections.</li> <li>If there is a mistake in the I/O tables, generate new I/O tables or edit the tables to correct the mistake.</li> </ul> |
|                           |                     |                                   |  | 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. <ul style="list-style-type: none"> <li>CJ2H-CPU6□-EIP: CPU Rack slots 0 to 3</li> <li>CJ2H-CPU6□ or CJ2M-CPU3□: Slots 0 to 4 in CPU Rack</li> </ul>   | <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul>  |
|                           |                     |                                   |  | 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 | <p>One of the following values exceeds the maximum or is allocated to more than one Unit.</p> <ol style="list-style-type: none"> <li>The total number of I/O points set in the I/O tables exceeds the maximum allowed for the CPU Unit (bits: 000)</li> <li>There are more than 32 interrupt inputs (bits: 001).</li> <li>Three or more Pulse I/O Modules were connected to a CJ2M CPU Unit (bits: 100).</li> <li>The number of Expansion Racks exceeds the maximum (bits: 101).</li> <li>More than 10 I/O Units are connected to one Rack (bits: 111).<sup>*2</sup></li> </ol> | Correct the problem and then turn the power supply OFF and back ON.   |

\*1 Execute the I/O verification operation by selecting **Options – Compare with Project** from the I/O Table Menu of the CX-Programmer.

\*2 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 Flag | 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 Duplicated Number 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 Duplicated Rack Number | 0x80EA              | A401.13: Duplication Error Flag | 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<br>The last address in UM (user program memory) has been exceeded.   | Transfer the program again.   |
|                                       |                     |                                 |  | A295.13: Differentiation overflow error<br>Too many differentiated instructions have been inserted or deleted during online editing.  | Return to PROGRAM mode and transfer the program again.  |
|                                       |                     |                                 |  | A295.12: Task error<br>A task error has occurred. The following conditions will generate a task error.<br>1. There is no executable cyclic task.<br>2. 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> .)   | <ul style="list-style-type: none"> <li>Check the startup cyclic task attributes.</li> <li>Check the execution status of each task as controlled by TKON(820) and TKOF(821).</li> <li>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.</li> <li>If the power OFF interrupt task is enabled in the PLC Setup, make sure that the power OFF interrupt task has been created.</li> </ul> |
|                                       |                     |                                 |  | A295.10: Illegal access error<br>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:<br>1. Reading/writing a parameter area.<br>2. Writing memory that is not installed.<br>3. Writing an EM bank that is EM file memory.<br>4. Writing to a read-only area.<br>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.  |

| Error                      | Error code (inA400) | Error flag (Auxiliary Area)     | Flag and word data                      | Probable cause   | Possible remedy  |
|----------------------------|---------------------|---------------------------------|---|--|--|
| Program Error              | 0x80F0              | A401.09: Program Error Flag     | 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<br>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.   | <ul style="list-style-type: none"> <li>• Check whether the unit version supports the user program.</li> <li>• Replace the CPU Unit with a CPU Unit with a supported unit version.</li> </ul>   |
| 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□ with unit version 1.5 or earlier and CJ2M-CPU1□ with unit version 2.1 or earlier 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 from 100 to 2FF hex and will correspond to FAL numbers 001 to 511.  | Correct according to cause indicated by the FAL number (set by user).  |

\*1 Bits A410.00 to A410.15 correspond to unit numbers 0 to F.

\*2 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.   | <ul style="list-style-type: none"> <li>If the number of Units is not correct, turn OFF the power supply and correctly connect the proper Units.</li> <li>With the CJ2 CPU Unit, if the I/O verification operation<sup>*1</sup> 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.</li> <li>If the number of Units is correct, confirm the Unit in discrepancy, turn OFF the power supply, and then correct the Unit connections.</li> <li>If there is a mistake in the I/O tables, generate new I/O tables or edit the tables to correct the mistake.</li> </ul> |
|                                    |                     |                                   |  | 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. <ul style="list-style-type: none"> <li>CJ2H-CPU6□-EIP: CPU Rack slots 0 to 3</li> <li>CJ2H-CPU6□ or CJ2M-CPU3□: Slots 0 to 4 in CPU Rack</li> </ul>  | <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul>  |
|                                    |                     |                                   |  | 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. <ol style="list-style-type: none"> <li>The total number of I/O points set in the I/O tables exceeds the maximum allowed for the CPU Unit (bits: 000)</li> <li>There are more than 32 interrupt inputs (bits: 001).</li> <li>Three or more Pulse I/O Modules were connected to a CJ2M CPU Unit (bits: 100).</li> <li>The number of Expansion Racks exceeds the maximum (bits: 101).</li> <li>More than 10 I/O Units are connected to one Rack (bits: 111).<sup>*2</sup></li> </ol> | Correct the problem and then turn the power supply OFF and back ON.   |
| Unit/Rack Number Duplication Error | 0x80E9              | A401.13: Duplication Error Flag   | A410: CPU Bus Unit Duplicated Number Flags             | The same number has been allocated to more than one CPU Bus Unit. <sup>*4</sup>  | 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 Duplicated Number Flags | The same number has been allocated to more than one Special I/O Unit. <sup>*5</sup>  | 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 Duplicated Rack Number | 0x80EA              | A401.13: Duplication Error Flag | 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<br>The last address in UM (user program memory) has been exceeded.   | Transfer the program again.   |
|                                       |                     |                                 |   | A295.13: Differentiation overflow error<br>Too many differentiated instructions have been inserted or deleted during online editing.  | Return to PROGRAM mode and transfer the program again.  |
|                                       |                     |                                 |   | A295.12: Task error<br>A task error has occurred. The following conditions will generate a task error.<br>1. There is no executable cyclic task.<br>2. 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> .)   | <ul style="list-style-type: none"> <li>• Check the startup cyclic task attributes.</li> <li>• Check the execution status of each task as controlled by TKON(820) and TKOF(821).</li> <li>• 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.</li> <li>• If the power OFF interrupt task is enabled in the PLC Setup, make sure that the power OFF interrupt task has been created.</li> </ul> |
|                                       |                     |                                 |   | A295.10: Illegal access error<br>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:<br>1. Reading/writing a parameter area.<br>2. Writing memory that is not installed.<br>3. Writing an EM bank that is EM file memory.<br>4. Writing to a read-only area.<br>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<br>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 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.  | <ul style="list-style-type: none"> <li>Check whether the unit version supports the user program.</li> <li>Replace the CPU Unit with a CPU Unit with a supported unit version.</li> </ul> |
| 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 from 100 to 2FF hex and will correspond to FAL numbers 001 to 511. | Correct according to cause indicated by the FAL number (set by user).  |

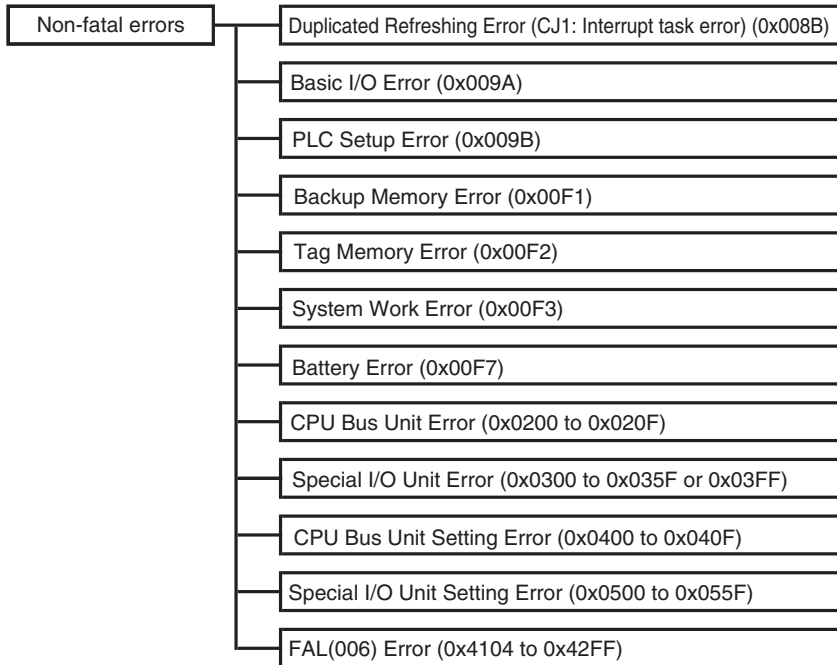
- \*1 Execute the I/O verification operation by selecting **Options – Compare with Project** from the I/O Table Menu of the CX-Programmer.
- \*2 Regardless of the error that occurred, the three bits in parentheses will be stored in A407.13 to A407.15. The value will simultaneously be stored in A407.00 to A407.12.
- \*3 Bits A410.00 to A410.15 correspond to unit numbers 0 to F.
- \*4 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 turn OFF.

| 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. <ul style="list-style-type: none"> <li>• 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.</li> <li>• IORF(097), FIORF(225), IORD(222) or IOWR(223) was executed in an interrupt task when I/O was being refreshed.*<sup>1</sup></li> </ul> | 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.* <sup>2</sup>   | 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<br>A402.00 Other Non-fatal Error Flag  | ---   | The Option Board was removed while the system was operating.<br>Option Board failure   | Check the mating of the Option Board connector and reconnect the connector. If the Option Board still fails, replace it.  |
| Backup Memory Error                                     | 0x00F1                     | A315.15: Backup Memory 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<br>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. Transfer the program again.   |
| Battery Error   | 0x00F7                     | A402.04: Battery 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 necessary. 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.* <sup>4</sup>  | 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.* <sup>5</sup>  | 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 Setting 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 | 0x0500 to 0x055F     | A402.02: Special I/O Unit Setting Error Flag | A428 to A433: Special I/O Unit Setting Error, Unit Number Flags | 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.  |
|                                |                      |  |   | <ul style="list-style-type: none"> <li>A Unit that is specified for synchronous unit operation does not support synchronous unit operation.*7</li> <li>A Unit that is specified for synchronous unit operation does not exist.*7</li> </ul> | Correct the settings for synchronous 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).   |

- \*1 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/CJ2M-CPU3□, CJ2H-CPU6□ with unit version 1.6 or later, and CJ2M-CPU1□ with unit version 2.2 or later 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 correspond 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.

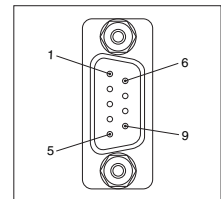
| Interface<br>Model             | RS-232C  | RS-422A/485   |   |
|--------------------------------|--|---|---|
|                                |  | Not isolated  | Isolated  |
| CJ2H-CPU6□(-EIP)<br>CJ2M-CPU1□ | Built into the CPU Unit as a standard feature. | A CJ1W-CIF11 RS-422A Converter is mounted directly to the built-in RS-232C interface. | The built-in RS-232C interface 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

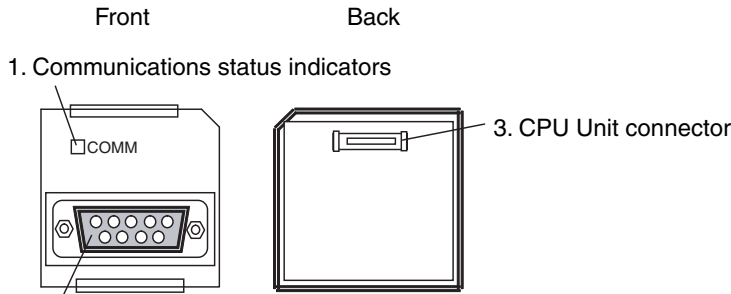
### ● CPU Unit Built-in RS-232C Interface Specifications

- 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    | ---       |

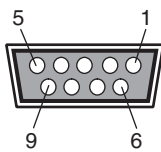


● **CP1W-CIF01 RS-232C Option Board Specifications**



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.

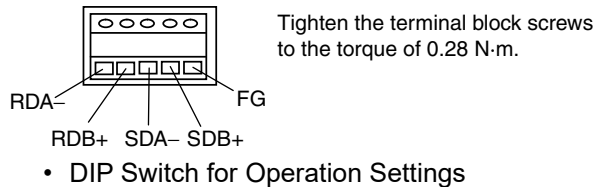
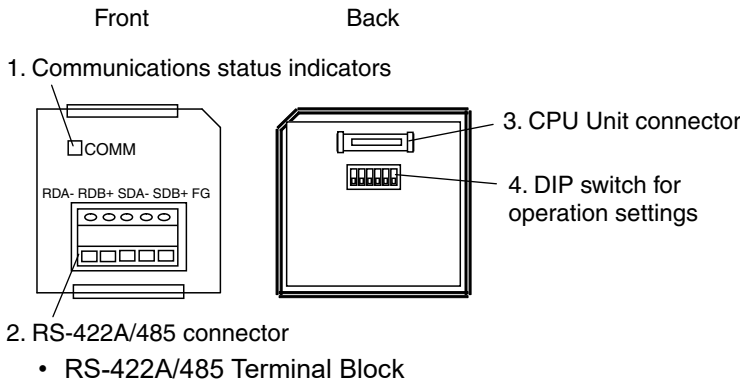
● **Communications Specifications**

| 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*1     |
| Transmission distance | 15 m max.   |
| Interface             | EIA RS-232C   |
| Protocol              | Host Link, NT Link, 1:N, No-protocol, or Peripheral Bus |

\*1 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



| CP1W-CIF11/12 | Pin | CP1W-CIF12-V1 | Pin | Setting |   |   |
|---------------|-----|---------------|-----|---------|---|---|
|               |     |               |     | SW      | ON  | OFF                                       |
|               | 1   | SW1           | 1   | ON      | ON (both ends)                              | Terminating resistance setting            |
|               | 2   |               | 2   | ON      | 2-wire                                      |   |
|               |     |               | 3   | ON      | 2-wire                                      |   |
|               | 3   |               | 2   | OFF     | 4-wire                                      |   |
|               |     | 3             | OFF | 4-wire  |   |   |
|               | 4   | 4             | --- | ---     | Not used.                                   |   |
|               | 5   | SW2           | 1   | ON      | RS control enabled                          | RS control selection for RD <sup>*2</sup> |
|               |     |               | 1   | OFF     | RS control disabled (Data always received.) |   |
|               | 6   | 2             | 2   | ON      | RS control enabled                          | RS control selection for SD <sup>*3</sup> |
|               |     |               | 2   | 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

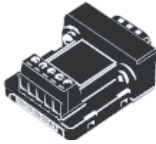
When converting the RS-232C port on a CJ2 CPU Unit to RS-422A, using one of the following Link Adapters and Conversion Units.

- 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

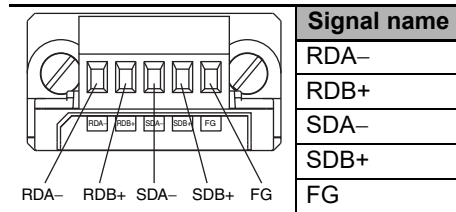
The CJ1W-CIF11 RS-422A Converter is used to convert RS-232C to RS-422A/485. It is connected directly to the RS-232C port on a CJ2 CPU Unit. It is not isolated, so the maximum distance for RS-422A/485 is 50 m.

#### Appearance

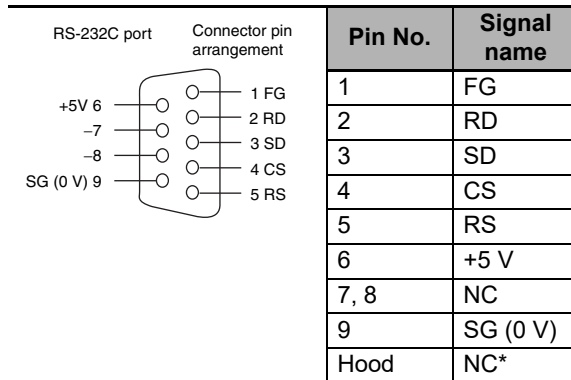


#### Electric Specifications

- RS-422A/485 Terminal Block



- RS-232C Connector



\* The hood will have the same electric potential as the connector hood where it is connected.

#### DIP Switch Settings

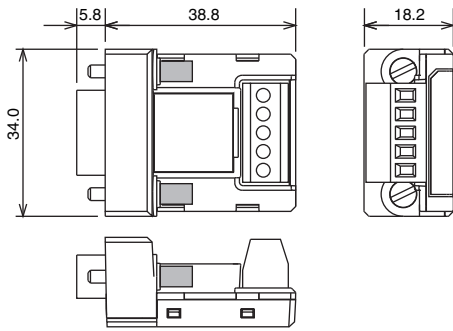
| Pin No. | Setting                                   | ON   | OFF   |
|---------|---|--|---|
| 1       | Terminating resistance setting            | Connects terminating resistance on both ends of the transmission path. | Disconnects terminating resistance.         |
| 2       | 2-wire/4-wire setting <sup>*1</sup>       | 2-wire   | 4-wire                                      |
| 3       | 2-wire/4-wire setting <sup>*1</sup>       | 2-wire   | 4-wire                                      |
| 4       | Not used.                                 | ---  | ---   |
| 5       | RS control selection for RD <sup>*2</sup> | RS control enabled   | RS control disabled (Data always received.) |
| 6       | RS control selection for SD <sup>*3</sup> | 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).

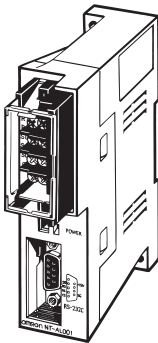
**Dimensions (Unit: mm)**



**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.

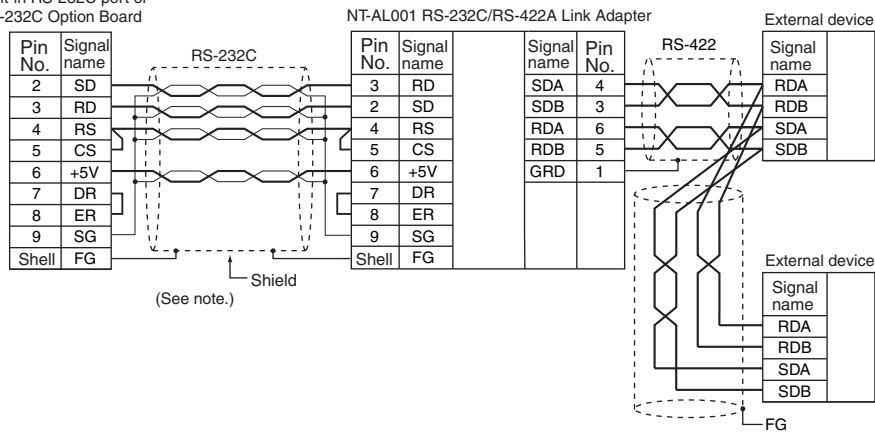
| Pin | Function  | Default setting |
|-----|---|-----------------|
| 1   | Not used. (Leave set to ON.)  | ON              |
| 2   | Internal terminating resistance setting.<br>ON: Terminating resistance connected.<br>OFF: Terminating resistance not connected. | ON              |
| 3   | 2-wire/4-wire setting   | OFF             |
| 4   | Both pins ON: 2-wire communications<br>Both pins OFF: 4-wire communications   | OFF             |
| 5   | Communications mode*  | ON              |
| 6   | Both pins OFF: Always send.<br>5 OFF/6 ON: Send when RS-232C's CS is high.<br>5 ON/6 OFF: Send when RS-232C's CS is low.        | OFF             |

\* When connecting to a CJ-series CPU Unit, turn OFF pin 5 and turn ON pin 6.



### Application Example

CJ2M CPU Unit  
Built-in RS-232C port or  
RS-232C Option Board

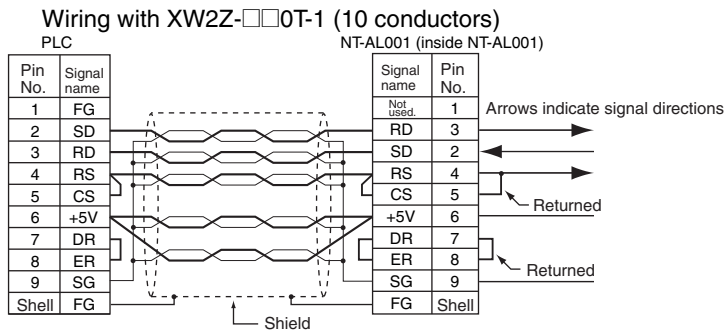


**Note** Use the special cables for the above cables.

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

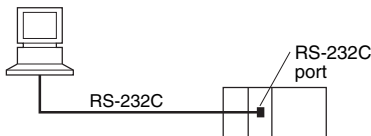
This section provides connection examples and corresponding connection diagrams.

Refer to *A-4-3 Applicable Connectors and Recommended Cables* for actual wiring methods.

### Host Computer (Host Link or Tool Bus)

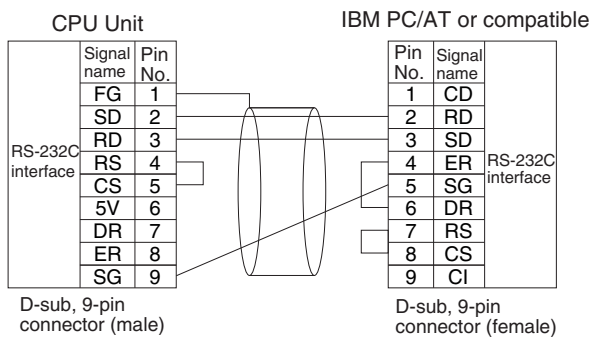
**Note** Connections to a computer running the CX-Programmer are the same as those shown here.

#### ● 1:1 Connections via RS-232C Port

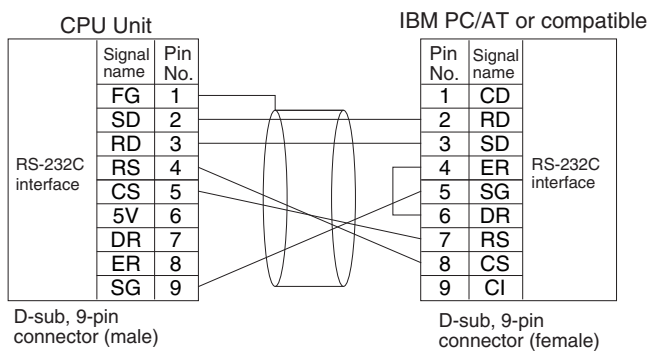


**Note** The maximum cable length for an RS-232C connection is 15 m. RS-232C communications specifications, however, do not cover transmissions at 19.2 Kbps. Refer to documentation of the device being connected when using this baud rate.

#### Connection Example for the Host Link Serial Communications Mode

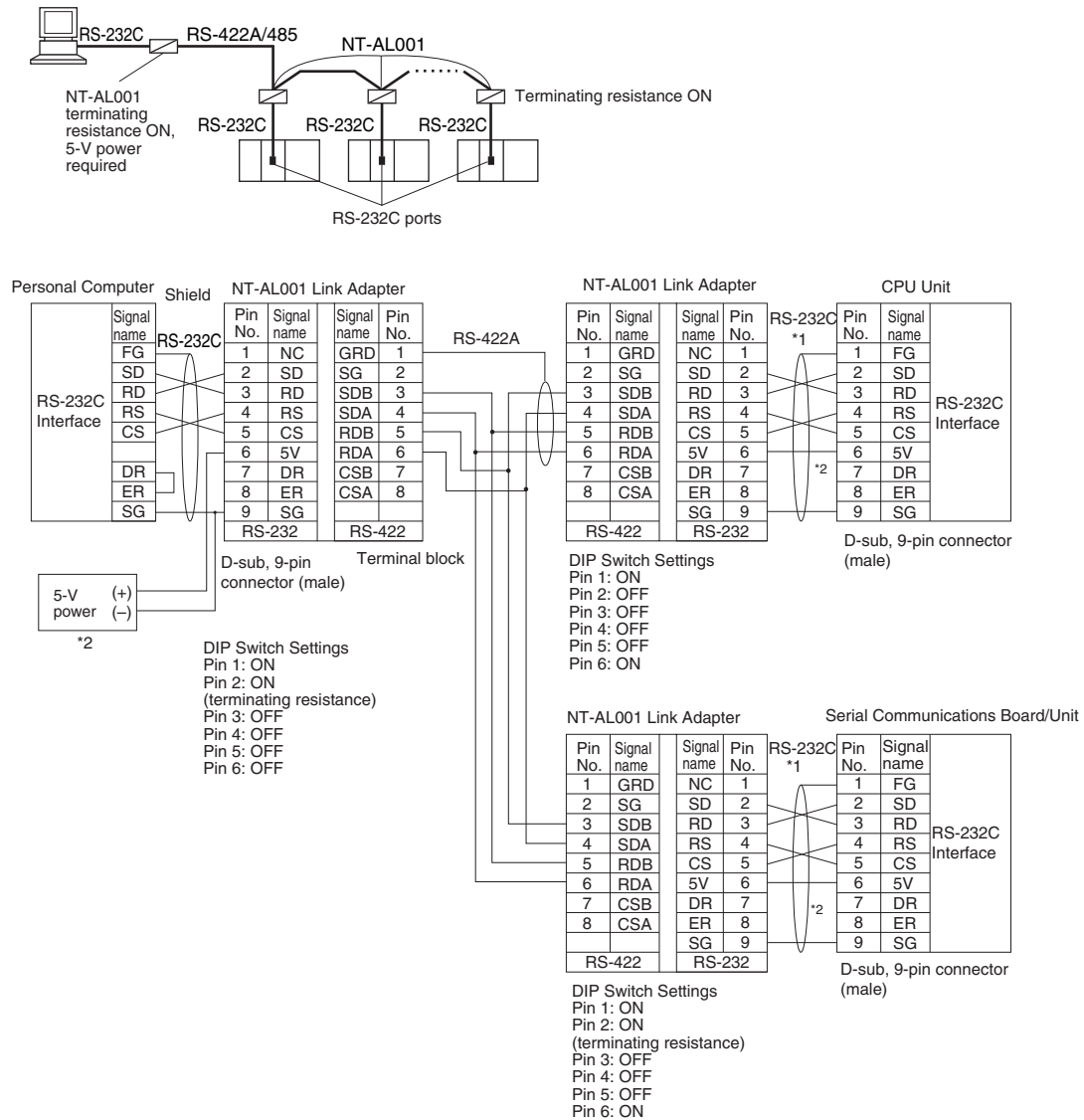


#### Connection Example for the Peripheral Bus (Toolbus) Serial Communications Mode



● 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.



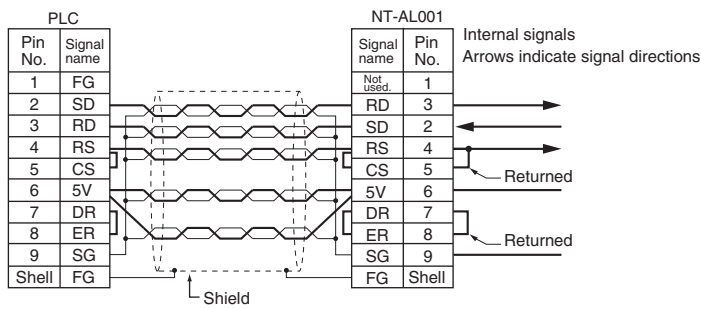
\*1 We recommend using the following NT-AL001 RS-232C/RS-422A Link Adapter Connecting Cables to connect to NT-AL001 Link Adapters.

- 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**

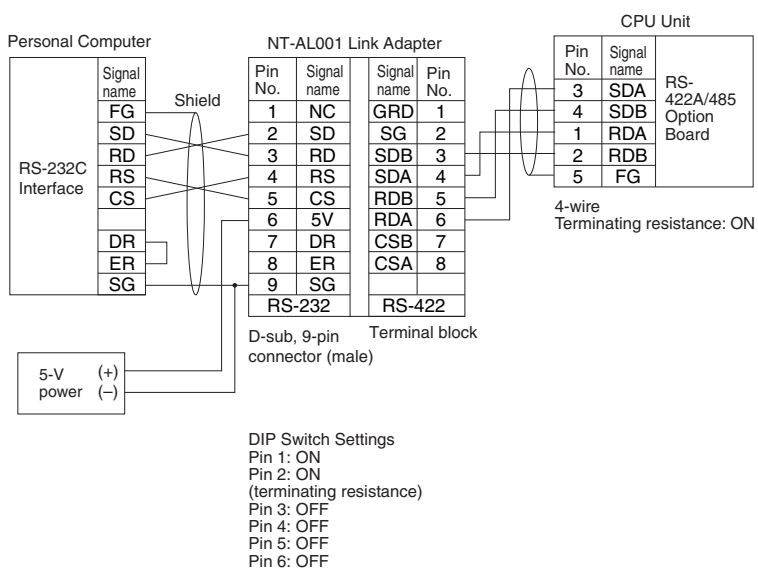
- Do not use the 5-V power from pin 6 of the RS-232C port for anything but the NT-AL001 Link Adapter, CJ1W-CIF11 RS-422A Converter, or NV3W-M□20L Programmable Terminals. Using this power supply for any other external device may damage the CPU Unit or the external device.
- The XW1Z-□□0T-1 Cable is designed 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**

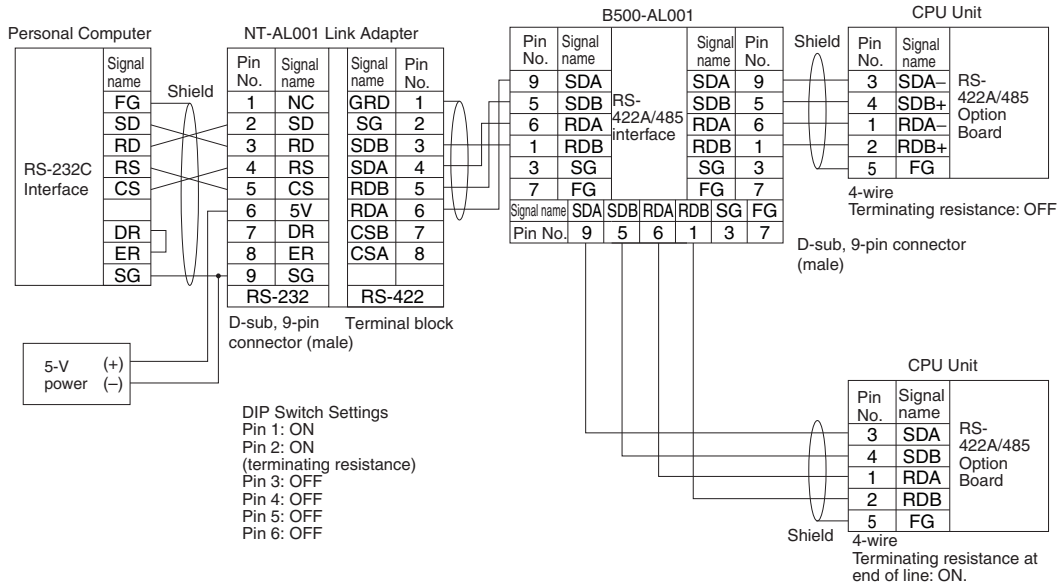
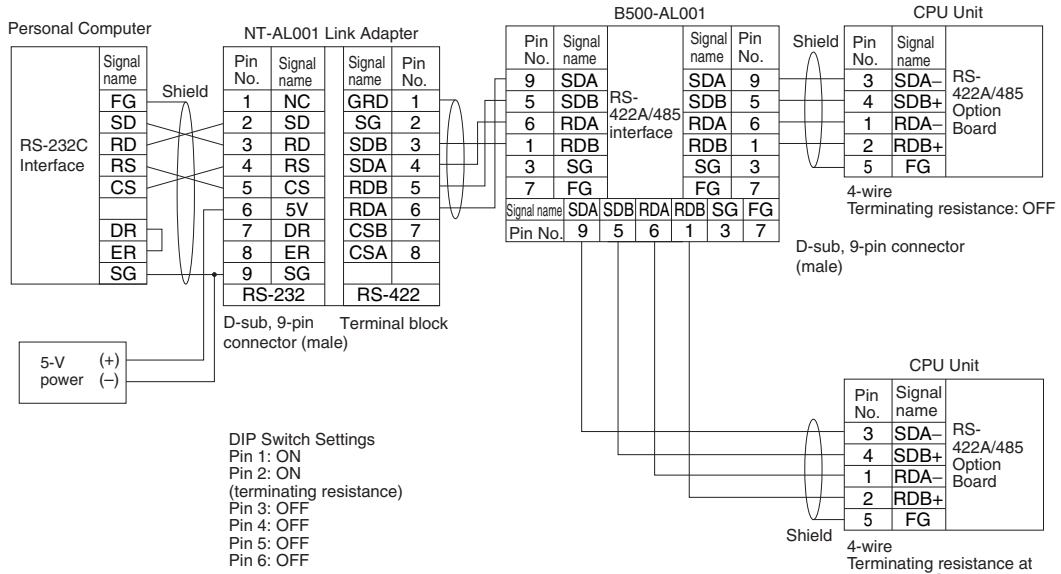
There is a DIP switch on the NT-AL001 Link Adapter that is used to set RS-422A/485 communications parameters. Set the DIP switch as required for the serial communications mode according to the following table.

| Pin | Function  | Default setting |
|-----|---|-----------------|
| 1   | Not used. (Leave set to ON.)  | ON              |
| 2   | Internal terminating resistance setting.<br>ON: Terminating resistance connected.<br>OFF: Terminating resistance not connected. | ON              |
| 3   | 2-wire/4-wire setting   | OFF             |
| 4   | Both pins ON: 2-wire communications<br>Both pins OFF: 4-wire communications   | OFF             |
| 5   | Communications mode   | ON              |
| 6   | Both pins OFF: Always send.<br>5 OFF/6 ON: Send when RS-232C's CS is high.<br>5 ON/6 OFF: Send when RS-232C's CS is low.        | OFF             |

● RS-422A/485 Ports with 1:1 Connection

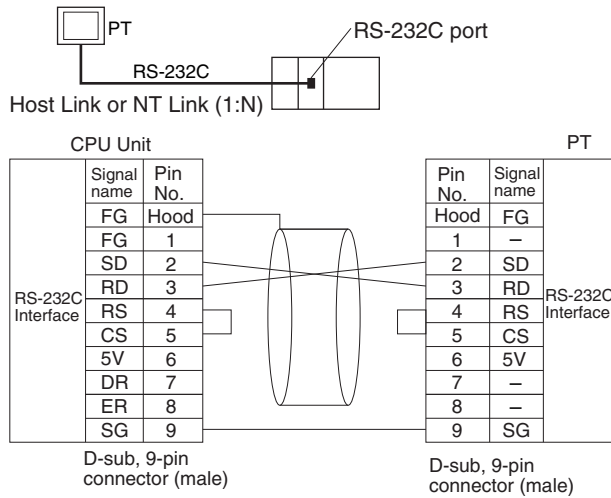


● RS-422A/485 Ports with 1:N Connections



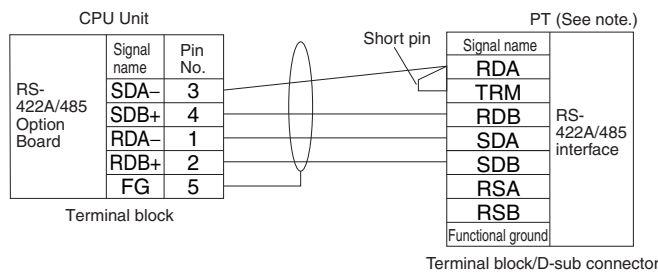
## OMRON PT (Host Link or 1:N NT Link)

### ● Direct Connection from RS-232C to RS-232C



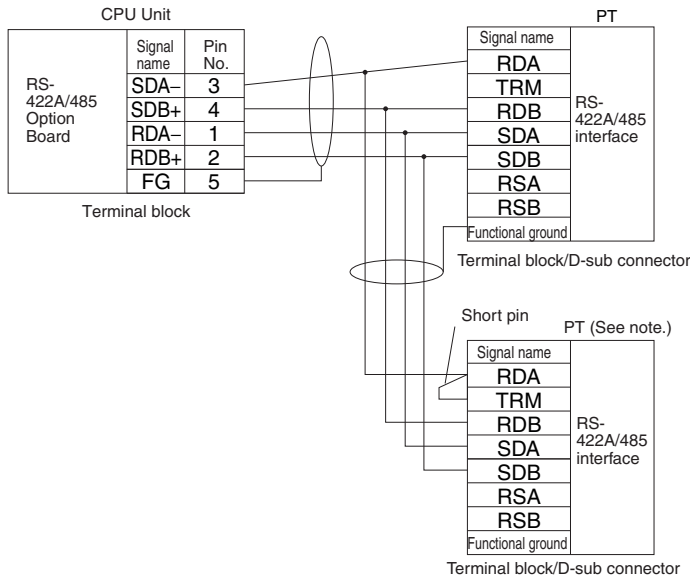
- Communications Mode: Host Link (unit number 0 only for Host Link)  
NT Link (1:N, N = 1 Unit only)
- OMRON Cables with Connectors:
  - XW2Z-200T-1: 2 m
  - XW2Z-500T-1: 5 m

### ● RS-422A/485 Ports with 1:1 Connection



- 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.

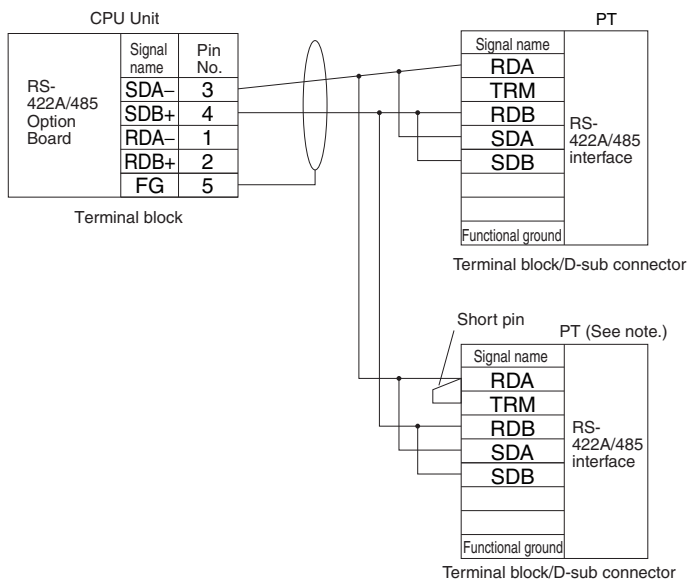
● **RS-422A/485 Ports with 1:N, 4-wire Connections**



- Communications Mode: 1:N NT Link
- \* Switch Settings on RS-422A/485 Option Board
  - Terminating resistance: 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, 2-wire Connections**



- Communications Mode: 1:N NT Link
- \* Switch Settings on RS-422A/485 Option Board
  - Terminating resistance: ON
  - 2-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.

| Port    | Connection type | Diagram |
|---------|-----------------|---------|
| RS-232C | 1:1             |         |
| RS-232C | 1:N             |         |

**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.

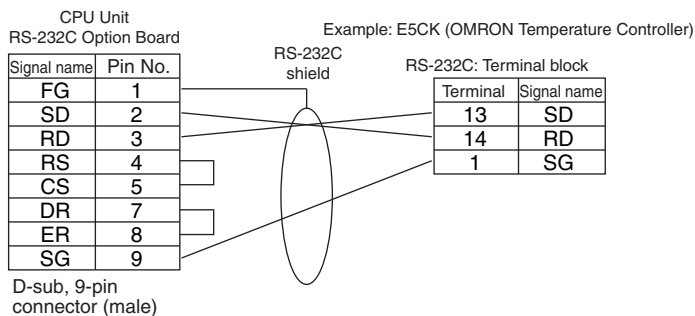
- 2 The maximum total cable length including branch lines is 500 m for RS-422A/485.
- 3 The maximum cable length for connecting to the NT-AL001 is 2 m.
- 4 The maximum branch cable length is 10 m.

| Port        | Connection type | Diagram |
|-------------|-----------------|---------|
| RS-422A/485 | 1:1             |         |
| RS-422A/485 | 1:N             |         |

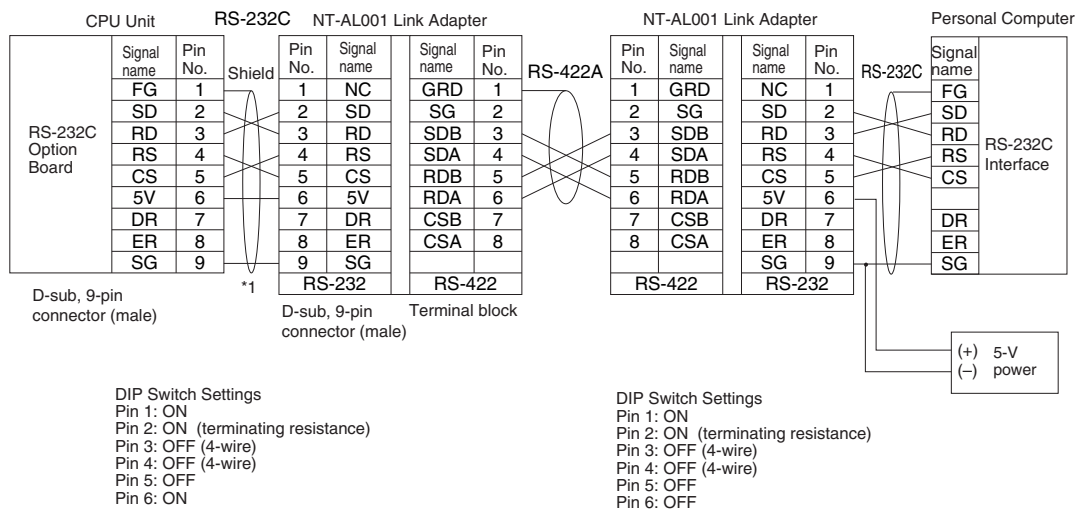
- Note 1** The maximum cable length for an RS-232C connection is 15 m. RS-232C communications specifications, however, do not cover transmissions at 19.2 Kbps. Refer to documentation of the device being connected when using this baud rate.
- The CP1W-CIF11 RS-422A/485 Option Board is not isolated. The 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.
  - The maximum cable length for connecting to the NT-AL001 is 2 m.
  - The maximum branch cable length is 10 m.

● **Examples of 1:1 Connections to RS-232C Ports**

**Connecting to E5CK Temperature Controllers**



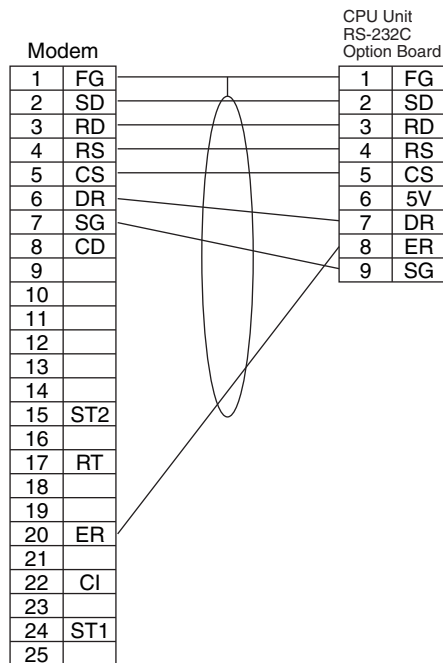
## Using an NT-AL-001 RS-232C/RS-422A Link Adapter



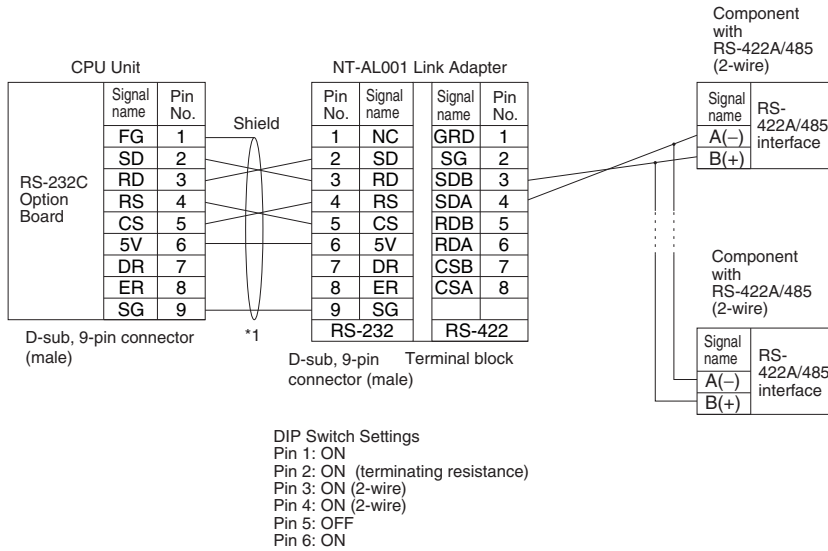
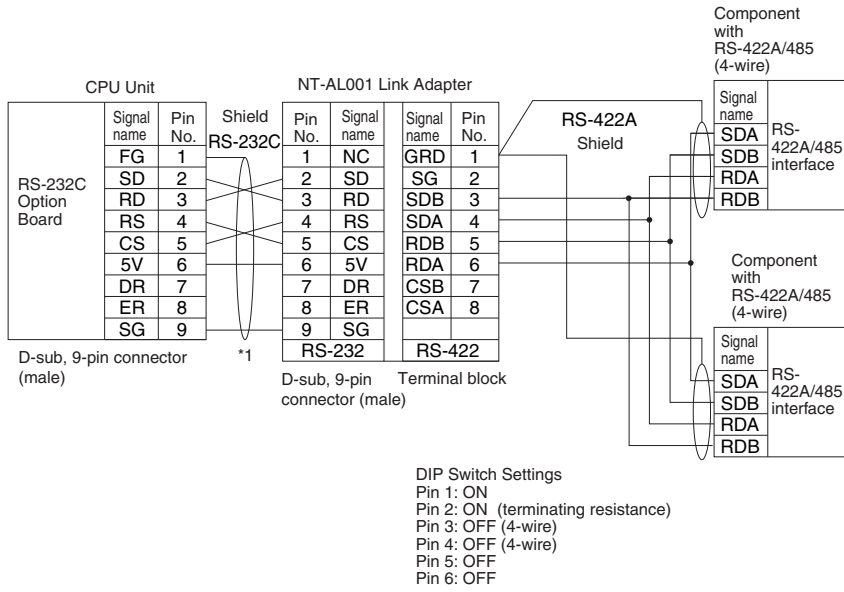
\*1 We recommend using the following NT-AL001 Link Adapter Connecting Cables to connect to NT-AL001 Link Adapters.

NT-AL001 Connecting Cables: XW2Z-070T-1 (0.7 m)  
XW2Z-200T-1 (2 m)

## Connecting to Modems



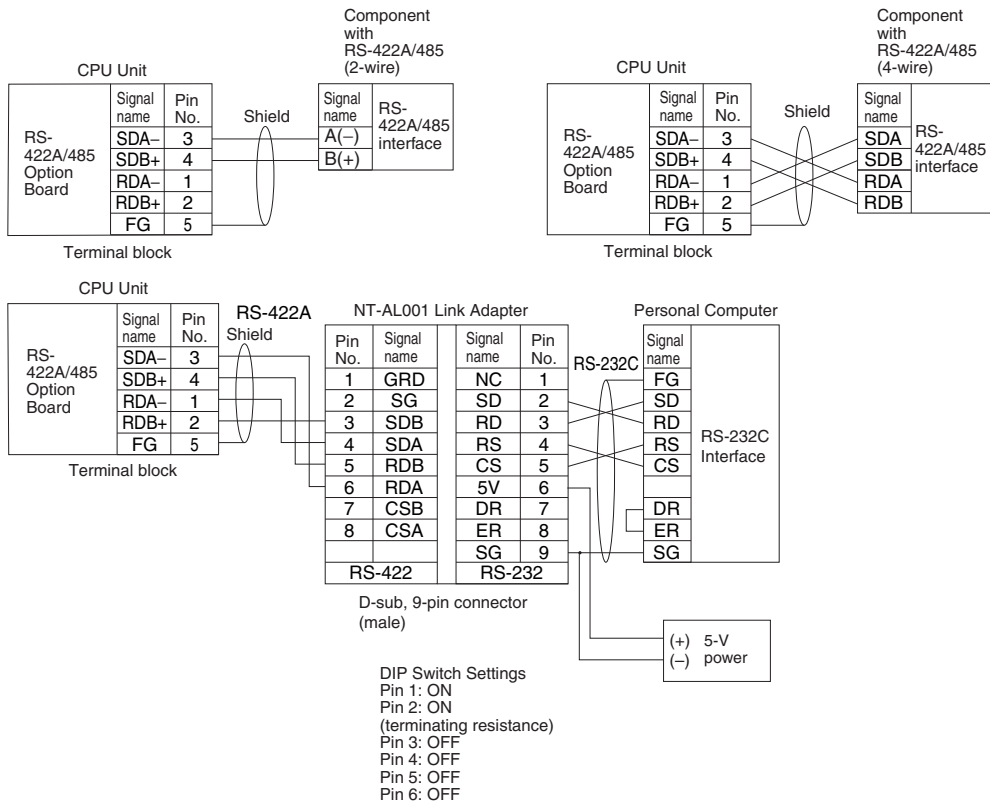
● Examples of 1:N Connections to RS-232C Ports



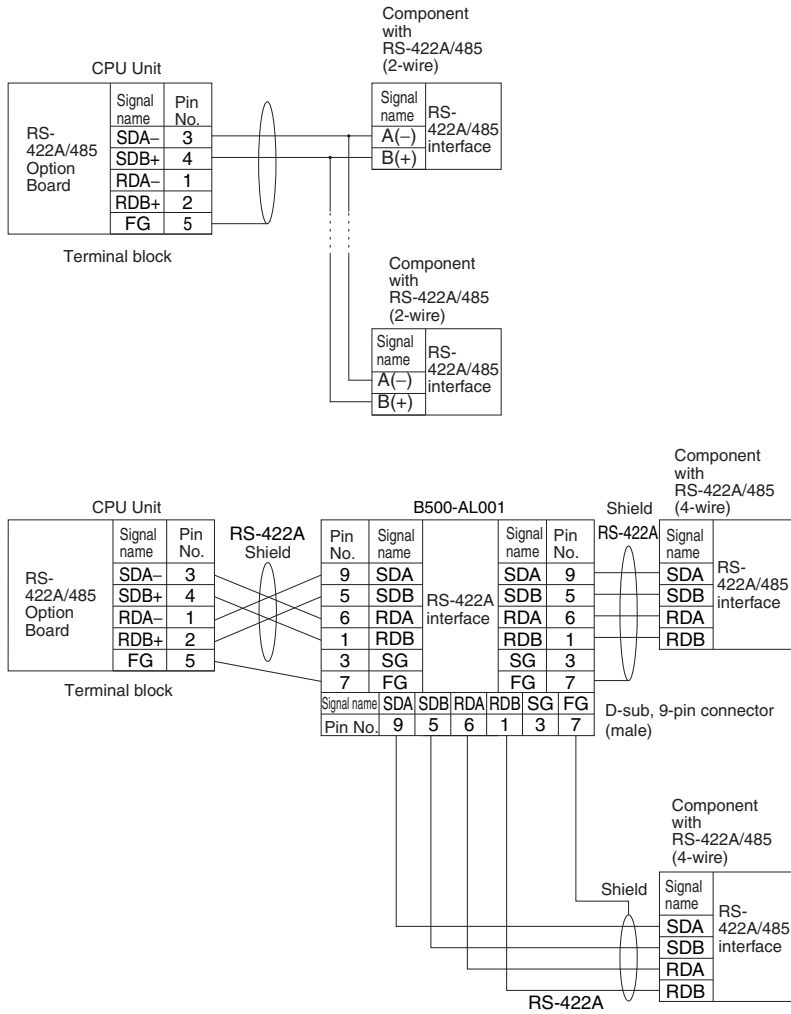
\*1 We recommend using the following NT-AL001 Link Adapter Connecting Cables to connect to NT-AL001 Link Adapters.

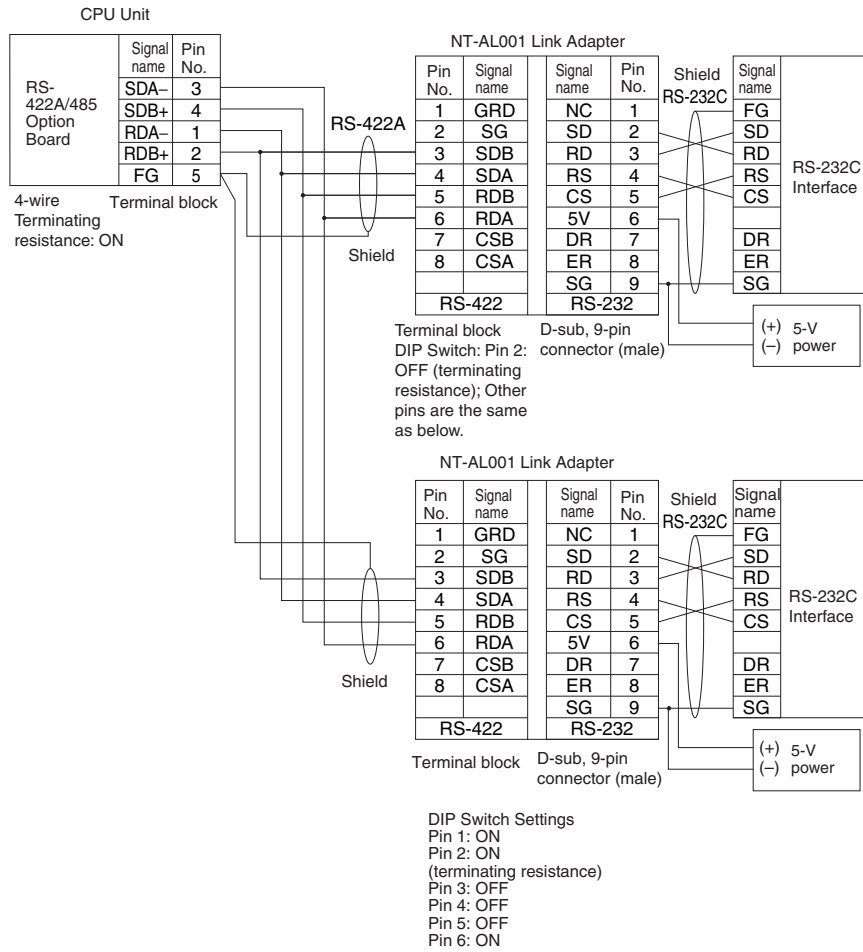
- NT-AL001 Connecting Cables: XW2Z-070T-1 (0.7 m)
- XW2Z-200T-1 (2 m)

● Examples of 1:1 Connections to RS-422A/485 Ports



● Examples of 1:N Connections to RS-422A/485 Ports

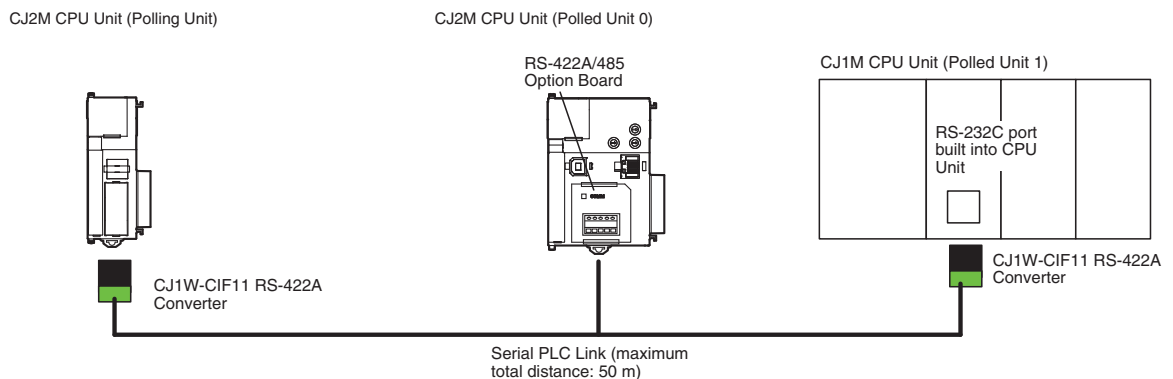




## Serial PLC Links for OMRON CJ2M, CJ1M, CP1H, CP1L, and CP1E PLCs

Examples of connections to use Serial PLC Links are provided below. The Serial PLC Link communications mode is used.

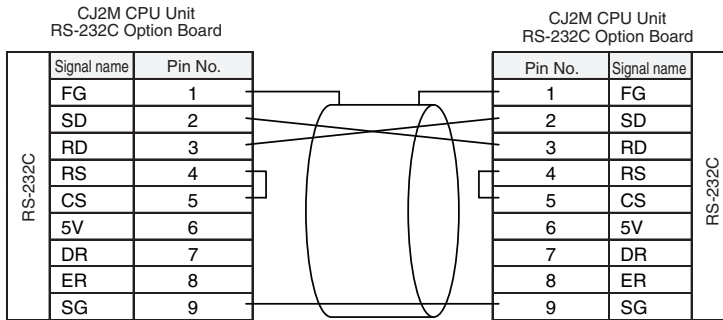
### ● Connecting with RS-422A Converters



**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.

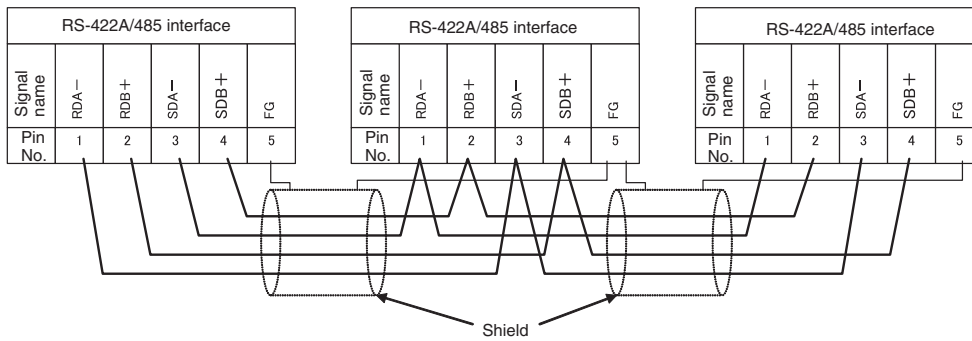


● **Connection Example**

CJ2M CPU Unit (Polling Unit)  
 RS-232C Option Board  
 CP1W-CIF01  
 CJ1W-CIF11  
 DIP SW  
 SW1: ON (terminating resistance ON)  
 SW2: OFF (4-wire)  
 SW3: OFF (4-wire)  
 SW4: OFF  
 SW5: OFF (no RS control for RD)  
 SW6: OFF (no RS control for SD)

CJ2M CPU Unit (Polled Unit 0)  
 RS-422A/485 Option Board  
 CP1W-CIF11/CIF12  
 DIP SW  
 SW1: ON (terminating resistance OFF)  
 SW2: OFF (4-wire)  
 SW3: OFF (4-wire)  
 SW4: OFF  
 SW5: OFF (no RS control for RD)  
 SW6: ON (RS control for SD)

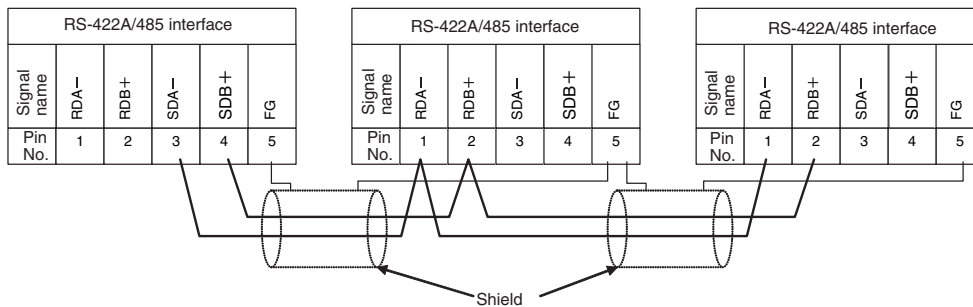
CJ1M CPU Unit (Polled Unit 1)  
 CJ1W-CIF11  
 DIP SW  
 SW1: ON (terminating resistance ON)  
 SW2: OFF (4-wire)  
 SW3: OFF (4-wire)  
 SW4: OFF  
 SW5: OFF (no RS control for RD)  
 SW6: ON (RS control for SD)



CJ2M CPU Unit (Polling Unit)  
 RS-232C Option Board  
 CP1W-CIF01  
 CP1W-CIF11  
 DIP SW  
 SW1: ON (terminating resistance ON)  
 SW2: ON (2-wire)  
 SW3: ON (2-wire)  
 SW4: OFF  
 SW5: OFF (no RS control for RD)  
 SW6: ON (RS control for SD)

CJ2M CPU Unit (Polled Unit 0)  
 RS-422A/485 Option Board  
 CP1W-CIF11/CIF12  
 DIP SW  
 SW1: OFF (terminating resistance OFF)  
 SW2: ON (2-wire)  
 SW3: ON (2-wire)  
 SW4: OFF  
 SW5: OFF (no RS control for RD)  
 SW6: ON (RS control for SD)

CJ1M CPU Unit (Polled Unit 1)  
 CJ1W-CIF11  
 DIP SW  
 SW1: ON (terminating resistance ON)  
 SW2: ON (2-wire)  
 SW3: ON (2-wire)  
 SW4: OFF  
 SW5: OFF (no RS control for RD)  
 SW6: ON (RS control for SD)





● **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          |
| 7            | DR          |

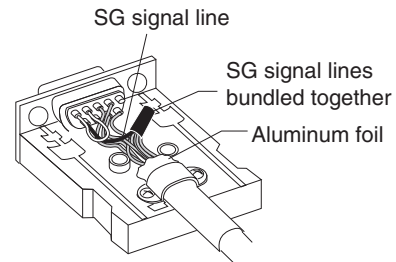
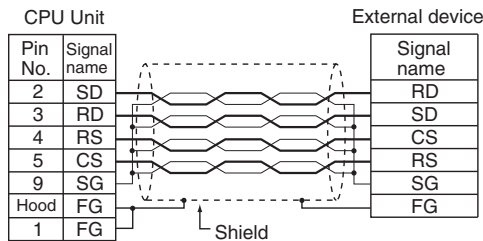
| RS-422A/485 port |             |
|------------------|-------------|
| Pin No.          | Signal name |
| 3                | SDA-        |
| 4                | SDB+        |
| 1                | RDA-        |
| 2                | RDB+        |
| 5                | FG          |

**A-4-3 Applicable Connectors and Recommended Cables**

**Examples of Recommended RS-232C Wiring**

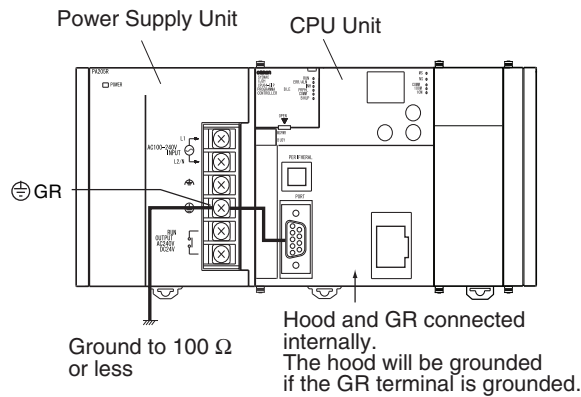
We recommend the following wiring methods for RS-232C, especially in environment prone to noise.

- 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 Ω 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.

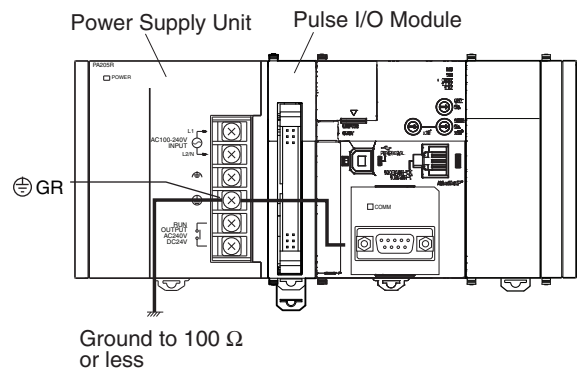


**Note** The hood (FG) is internally connected to the protective earth (GR) terminal on the Power Supply Unit through the CPU Rack. FG can thus be connected by connecting the protective earth (GR) terminal on the Power Supply Unit. The hood (FG) is also electrically connected to pin 1 (FG), but the connection 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



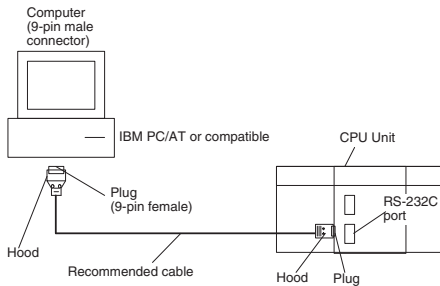
A-4 Connecting to a Serial Port on the CPU Unit

App

A-4-3 Applicable Connectors and Recommended Cables

● **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 × 28AWG (7/0.127) (UL product)  
 CO-MA-VV-SB 5P × 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**

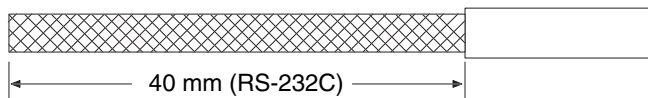
Lengths for steps in the procedure are provided in the diagrams.

**Connecting the Shield Line to the Hood (FG)**

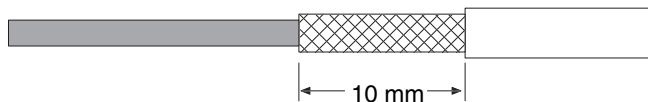
- 1** Cut the cable to the required length, leaving leeway for wiring and laying the cables.



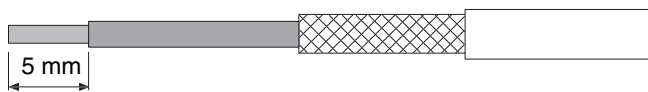
- 2** Use a razor blade to cut away the sheath, being careful not to damage the braiding.



- 3** Use scissors to cut away all but 10 mm of the exposed braiding.



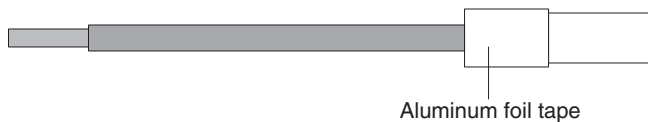
- 4** Use wire strippers to remove the insulation from the end of each wire.



- 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.

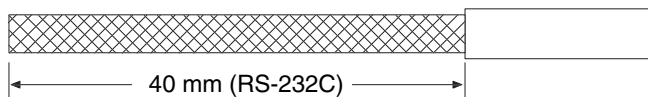


● **Not Connecting the Shield to the Hood (FG)**

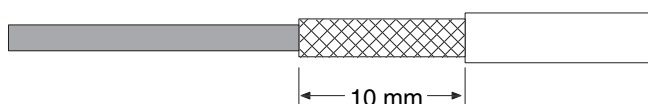
- 1** Cut the cable to the required length, leaving leeway for wiring and laying the cables.



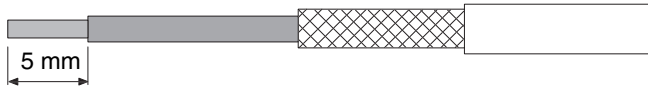
- 2** Use a razor blade to cut away the sheath, being careful not to damage the braiding.



- 3** Use scissors to cut away the exposed braiding.



- 4** Use wire strippers to remove the insulation from the end of each wire.

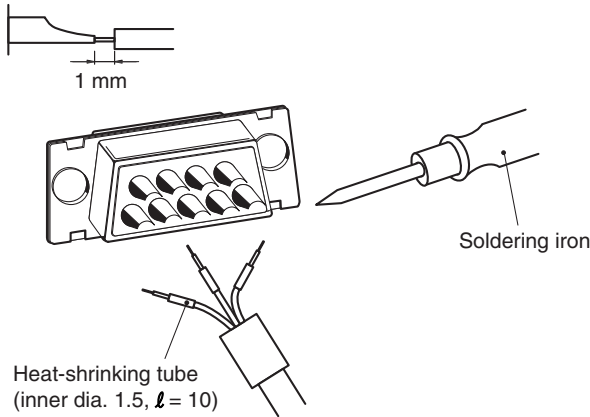


- 5** Wrap electrician's tape over the top and end of the cut sheath.

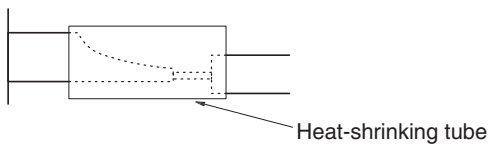


● **Soldering**

- 1** Place heat-shrinking tubes over all wires.
- 2** Pre-solder all wires and connector terminals.
- 3** Solder the wires.

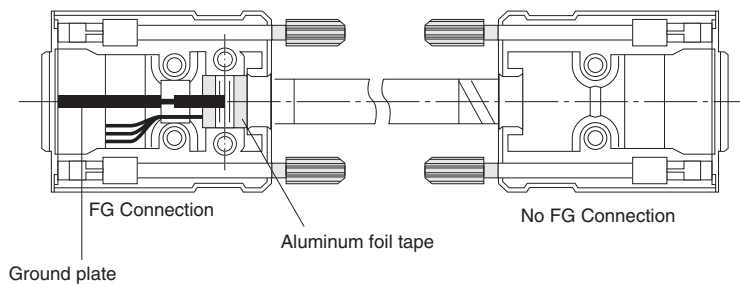


- 4** Move the heat-shrinking tubes onto the soldered area and shrink them into place.



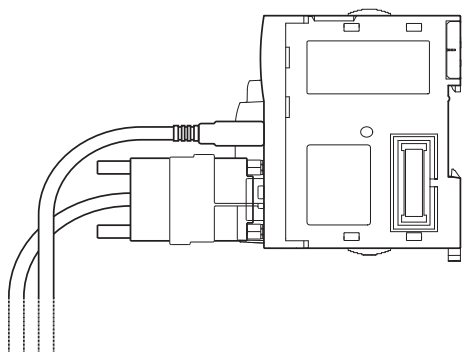
● **Assembling the Hood**

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 Ω 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)

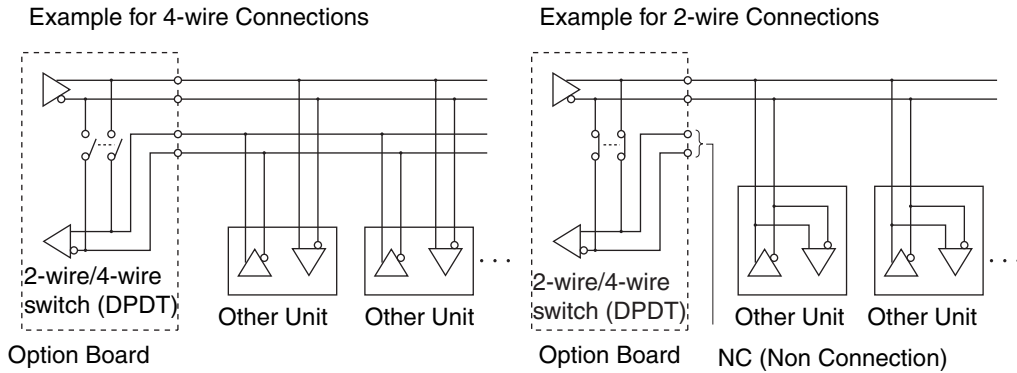
Use the CP1W-CIF12 if there is a difference in electrical potential between devices or for long-distance communications (500 m max.).

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.

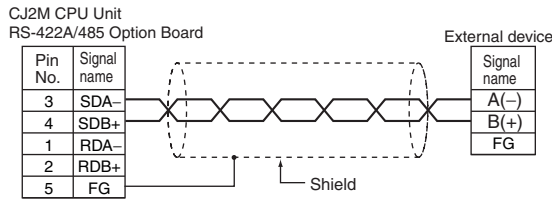


**Precautions for Correct Use**

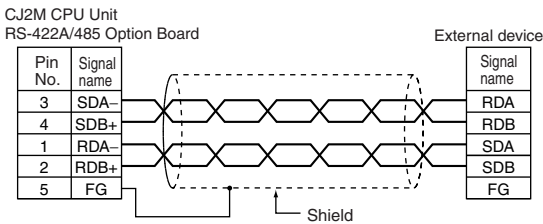
- All nodes must use either 2-wire connections or 4-wire connections.
- Do not use 4-wire connections with the switch on the Board set for 2-wire connections.

**Wiring Example for 1:1 Connections**

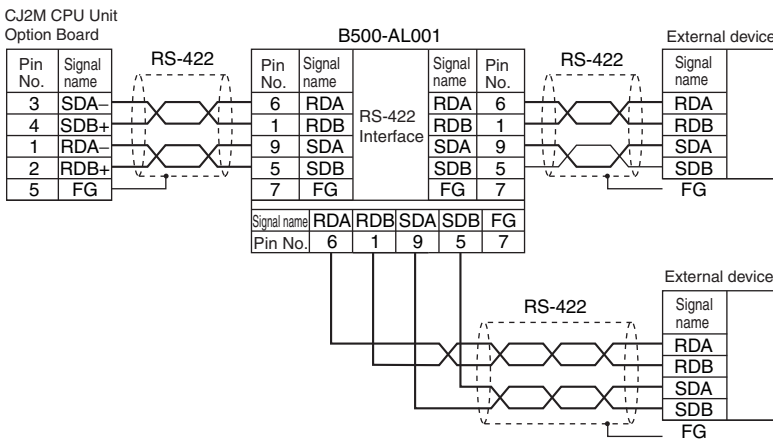
- Example for 2-wire Connections



- Example for 4-wire Connections



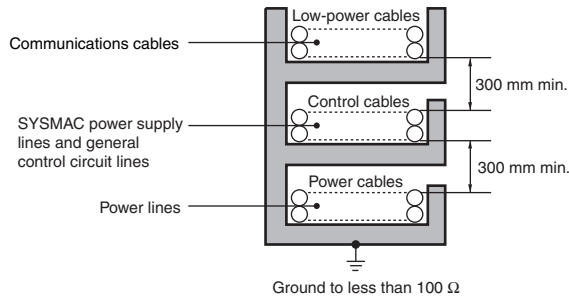
- Using a B500-AL001 Link Adapter



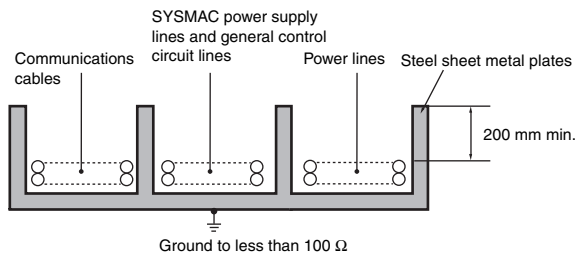
## Noise Countermeasures for External Wiring

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.

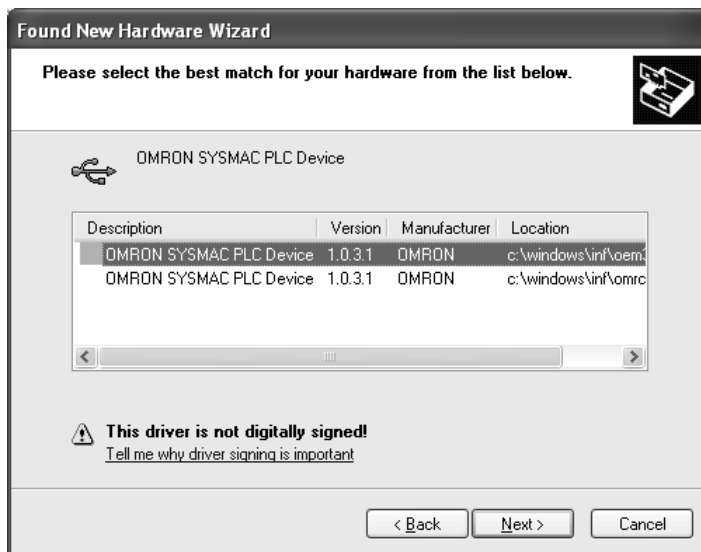




- 3** The following dialog box will be displayed. Select the *Install the software automatically (Recommended)* Option and click the **Next** Button.



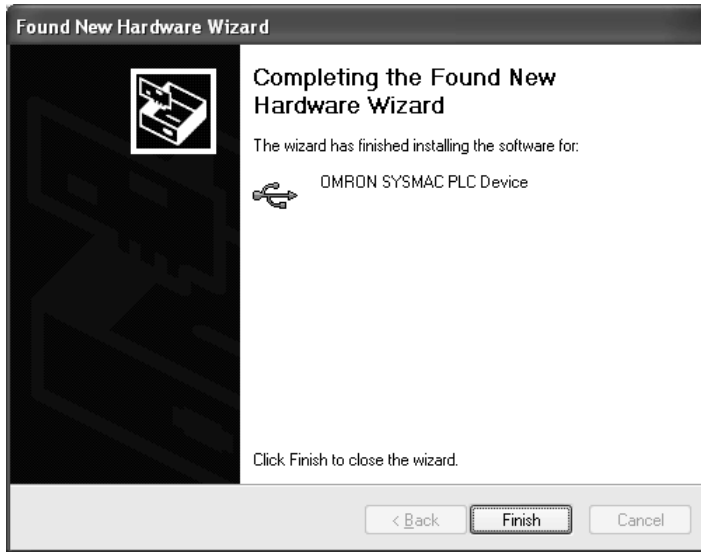
- Note 1** If the software cannot be installed automatically, refer to *Installing a Specified USB Driver* later in this section.
- 2** If the installation media is not inserted or the USB device driver is installed for another port, a Driver List Dialog Box will be displayed. Make sure that the newest 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.

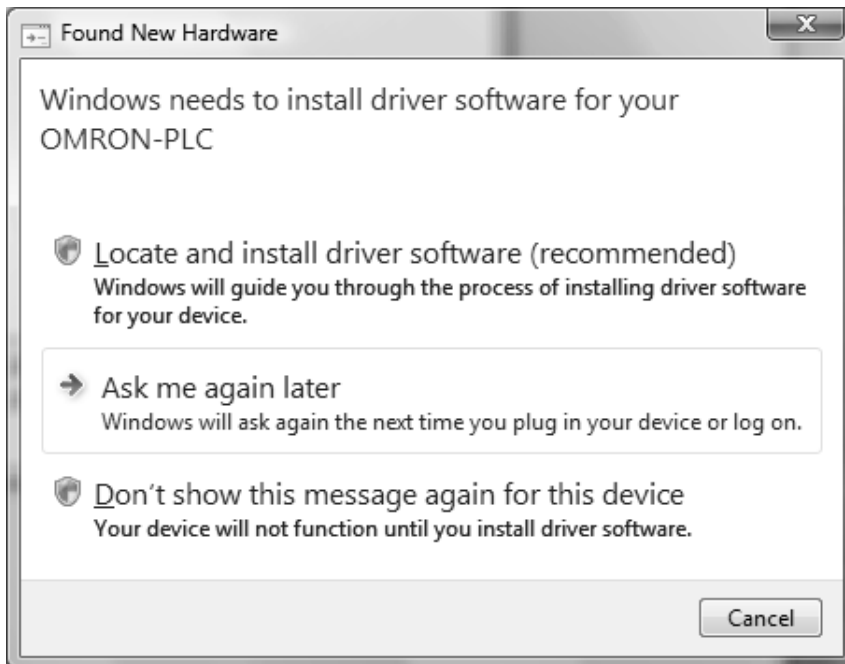


## Installing a Specified USB Driver

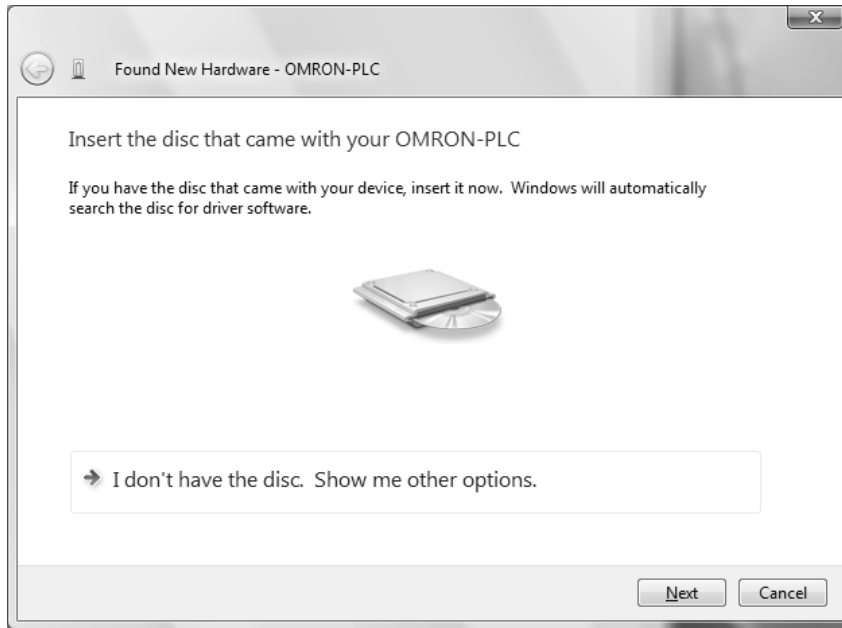
If the USB driver cannot be installed automatically, use the following procedure to install it.

- **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.
- 2** The following dialog box will be displayed. Select **Locate and install driver software (Recommended)**.

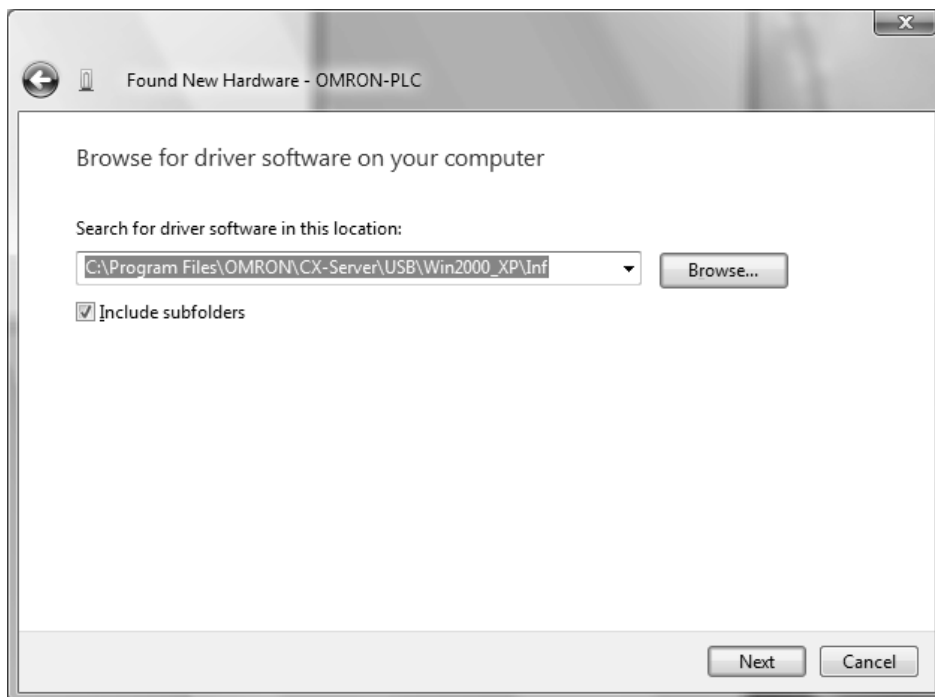


- 3** The following dialog box will be displayed. Select *I don't have the disc. Show me other options*.

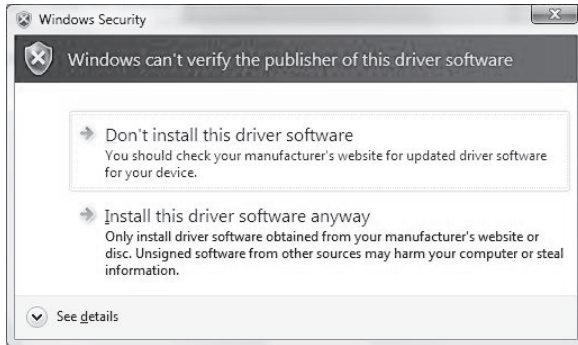


- 4** The following dialog box will be displayed. Click the **Browse** Button, specify the following location, and then click the **Next** Button.

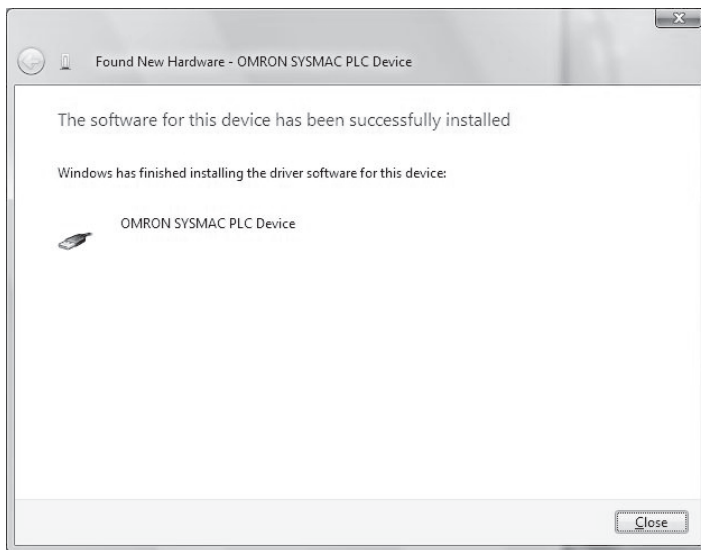
C:\Program Files\OMRON\CX-Server\USB\operation\_system\_name\inf



- 5** Ignore the following dialog box if it is displayed and select ***Install this driver software anyway.***

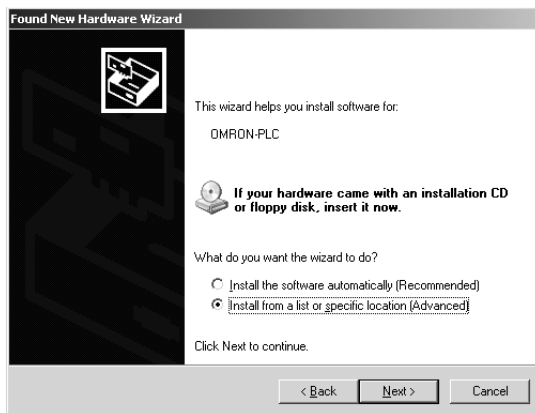


- 6** The following dialog box will be displayed when the driver software has been installed successfully.

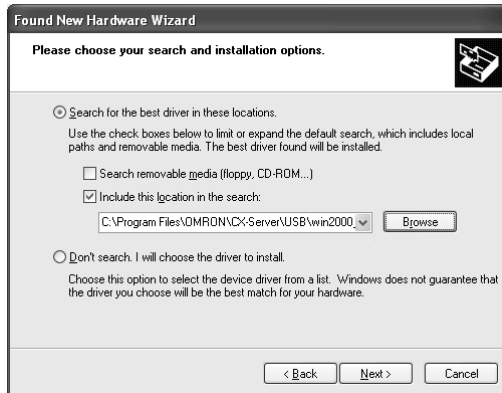


● **Windows XP**

- 1** 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.



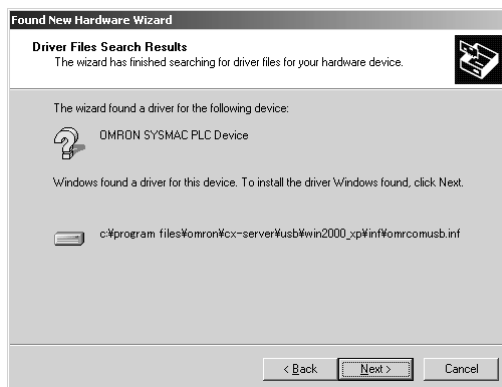
- 4** The following window will be displayed. From the list in the window, select the *Specify location* Check Box and then click the **Next** Button.



- 5** 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.

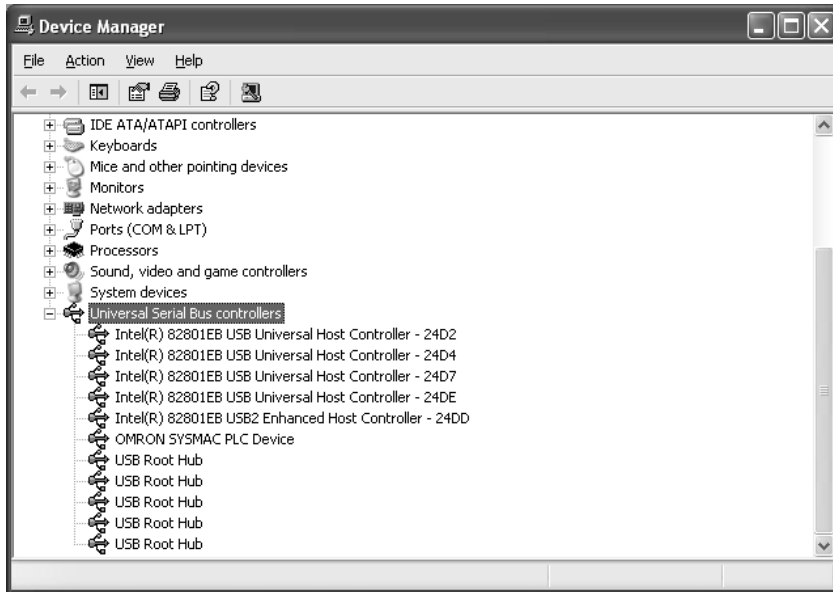


- 7** After the driver has been successfully installed, the following window will be displayed. Click the **Finish** Button.



## 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.

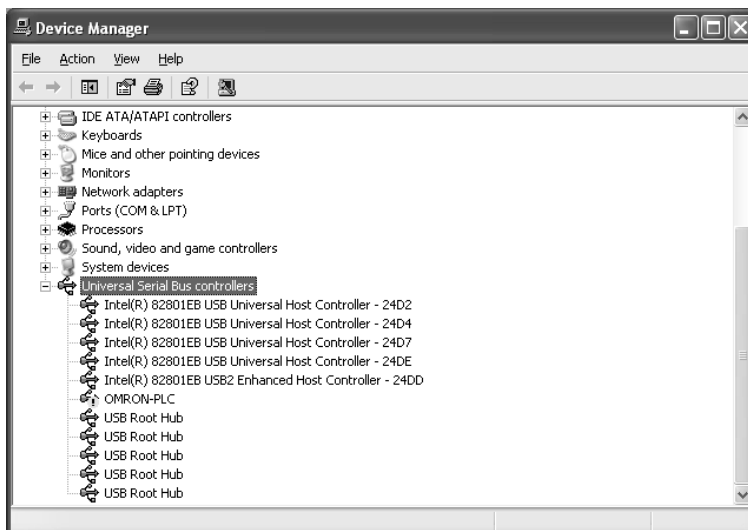


## Re-installing the USB Driver

If the USB driver installation fails for some reason or is cancelled in progress, the USB driver must be reinstalled.

### ● Checking USB Driver Status

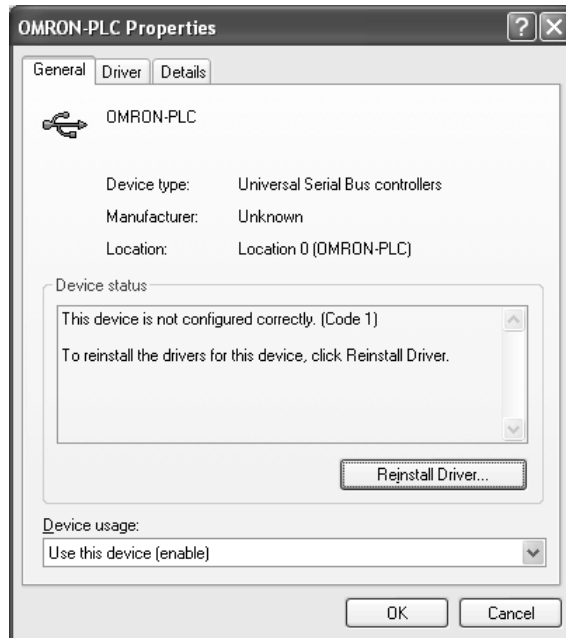
- 1 Display the Device Manager on the computer.
- 2 If the *OMRON-PLC* is displayed under *Universal Serial Bus controllers*, installation of the USB driver software failed.





## ● 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*.



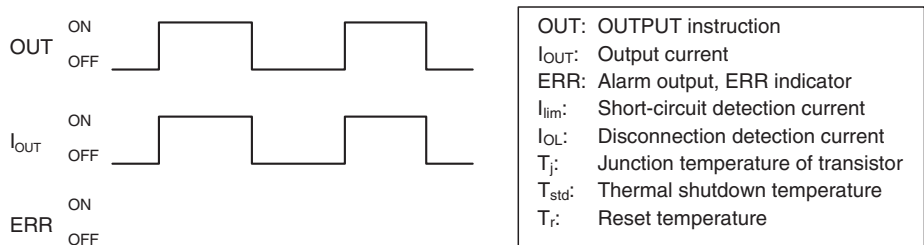
# A-6 Load Short-circuit Protection and Line Disconnection Detection for Basic I/O Units

## 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.

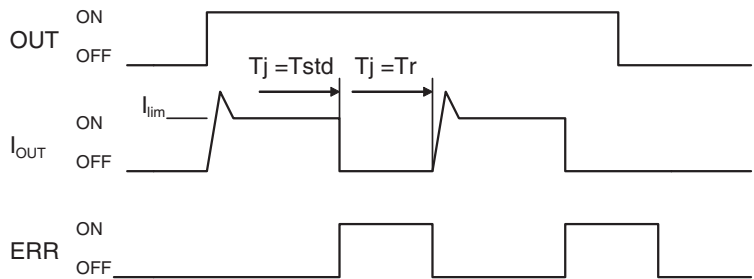
As shown below, normally when the output bit turns ON (OUT), the transistor will turn ON and then output current ( $I_{OUT}$ ) will flow.

Normal Operation



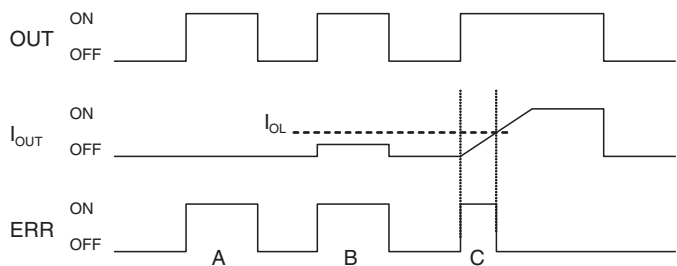
If the output ( $I_{OUT}$ ) is overloaded or short-circuited exceeding the detection current ( $I_{lim}$ ), the output current ( $I_{OUT}$ ) will be limited as shown in figure below. When the junction temperature ( $T_j$ ) of the output transistor reaches the thermal shutdown temperature ( $T_{std}$ ), 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 ( $T_j$ ) of the transistor drops down to the reset temperature ( $T_r$ ), 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 ( $I_{OUT}$ ) drops below the line disconnection detection current ( $I_{OL}$ ), 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  $T_j$  equals to  $T_r$ . 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.

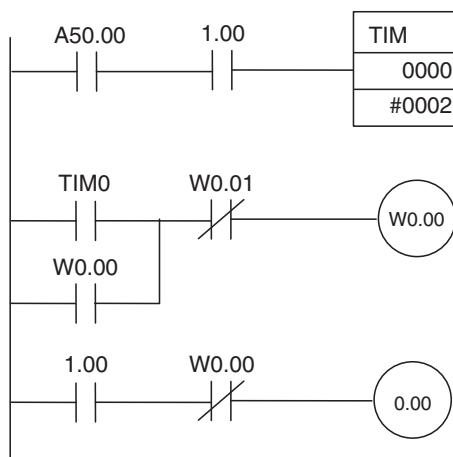
● **Programming Example**

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.

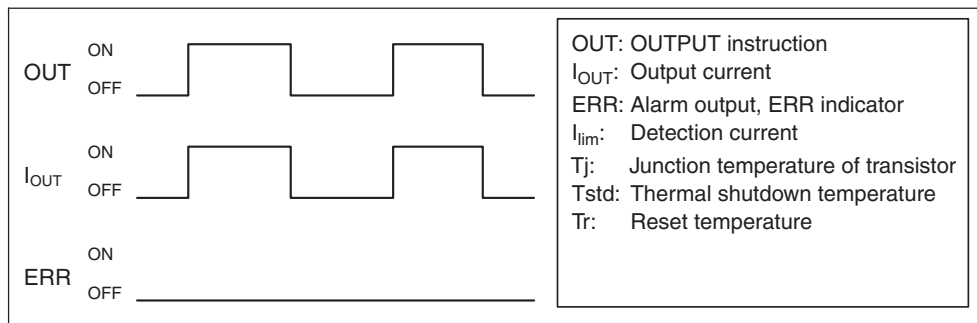
To prevent the alarm output bit from turning ON momentarily when the load turns ON, the alarm output is not turned ON for 200 ms after the input (CIO 1.00) turns ON.



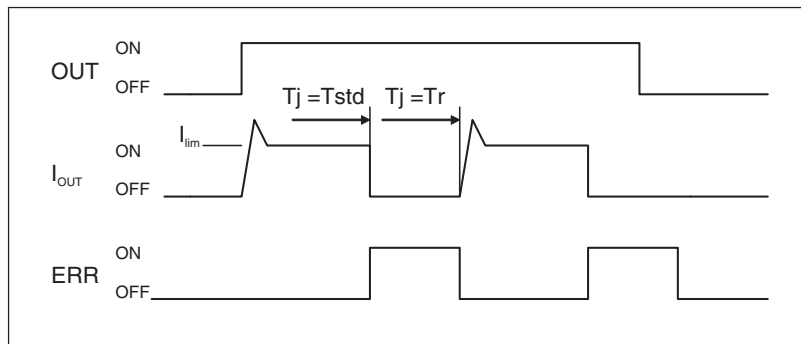
## A-6-2 Load Short-circuit Protection for CJ1W-OD204/OD212/OD232/MD232

As shown below, normally when the output bit turns ON (OUT), the transistor will turn ON and then output current ( $I_{OUT}$ ) will flow. If the output ( $I_{OUT}$ ) is overloaded or short-circuited exceeding the detection current ( $I_{lim}$ ), the output current ( $I_{OUT}$ ) will be limited as shown in second figure below. When the junction temperature ( $T_j$ ) of the output transistor reaches the thermal shutdown temperature ( $T_{std}$ ), 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 ( $T_j$ ) of the transistor drops down to the reset temperature ( $T_r$ ), 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  $T_j$  equals to  $T_r$ . 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.

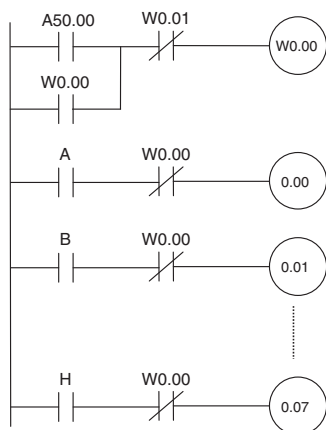
| Output bit |                      | m      |         | m+1     | m+2     | m+3     |
|------------|----------------------|--------|---------|---------|---------|---------|
|            |                      | 0 to 7 | 8 to 15 | 0 to 15 | 0 to 15 | 0 to 15 |
| CJ1W-OD204 | Mounted in even slot | 0      | /       | /       | /       | /       |
|            | 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

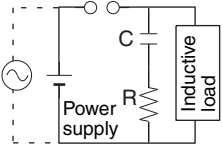
(Refer to EN61000-6-4 for more details.)

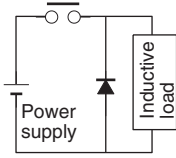
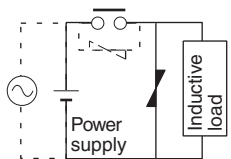
Countermeasures are not required if the frequency of load switching for the whole system with the PLC included is less than 5 times per minute.

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

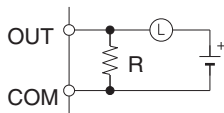
When switching an inductive load, connect an surge protector, diodes, etc., in parallel with the load or contact as shown below.

| Circuit  | Current |     | Characteristic  | Required element   |
|--|---------|-----|---|--|
|  | AC      | DC  |   |  |
| <p>CR method</p>  | Yes     | Yes | <p>If the load is a relay or solenoid, there is a time lag between the moment the circuit is opened and the moment the load is reset.</p> <p>If the supply voltage is 24 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.</p> | <p>The capacitance of the capacitor must be 1 to 0.5 <math>\mu\text{F}</math> per contact current of 1 A and resistance of the resistor must be 0.5 to 1 <math>\Omega</math> per contact voltage of 1 V. These values, however, vary with the load and the characteristics of the relay. Decide these values from experiments, and take into consideration that the capacitance suppresses spark discharge when the contacts are separated and the resistance limits the current that flows into the load when the circuit is closed again.</p> <p>The dielectric strength of the capacitor must be 200 to 300 V. If the circuit is an AC circuit, use a capacitor with no polarity.</p> |

| Circuit  | Current |     | Characteristic   | Required element  |
|--|---------|-----|--|---|
|  | AC      | DC  |  |   |
| <p>Diode method</p>     | No      | Yes | <p>The diode connected in parallel with the load changes energy accumulated by the coil into a current, which then flows into the coil so that the current will be converted into Joule heat by the resistance of the inductive load.</p> <p>This time lag, between the moment the circuit is opened and the moment the load is reset, caused by this method is longer than that caused by the CR method.</p>                  | <p>The reversed dielectric strength value of the diode must be at least 10 times as large as the circuit voltage value. The forward current of the diode must be the same as or larger than the load current.</p> <p>The reversed dielectric strength value of the diode may be two to three times larger than the supply voltage if the surge protector is applied to electronic circuits with low circuit voltages.</p> |
| <p>Varistor method</p>  | Yes     | Yes | <p>The varistor method prevents the imposition of high voltage between the contacts by using the constant voltage characteristic of the varistor. There is time lag between the moment the circuit is opened and the moment the load is reset.</p> <p>If the supply voltage is 24 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.</p> | ---   |

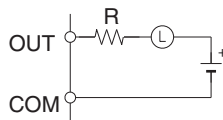
When switching a load with a high inrush current such as an incandescent lamp, suppress the inrush current as shown below.

**Countermeasure 1**



Providing a dark current of approx. one-third of the rated value through an incandescent lamp

**Countermeasure 2**



Providing a limiting resistor

# A-8 Functions Supported for Unit Versions

## A-8-1 CJ2H CPU Units

### Functions Supported for Unit Version 1.6 or Later

CX-Programmer version 9.81 or higher must be used to enable using the functions added for unit version 1.6.

| Units                                   | CJ2H CPU Units            |                             |
|---|---------------------------|-----------------------------|
| Models                                  | CJ2H-CPU6□ *1             |                             |
| Function                                | Unit version 1.6 or later | Unit version 1.5 or earlier |
| Network symbol and tag access functions | Supported.                | Not supported.              |

\*1 The CJ2H-CPU6□-EIP with unit version 1.6 does not have any functions added to that with unit version 1.5.

### Functions Supported for Unit Version 1.5 or Later

CX-Programmer version 9.6 or higher must be used to enable using the functions added for unit version 1.5.

| Units                           | CJ2H CPU Units               |                             |
|---------------------------------|------------------------------|-----------------------------|
| Models                          | CJ2H-CPU6□-EIP<br>CJ2H-CPU6□ |                             |
| Function                        | Unit version 1.5 or later    | Unit version 1.4 or earlier |
| Read protection using passwords | Supported.                   | Not supported.              |

### 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<br>CJ2H-CPU6□ |                             |
| Function   | Unit version 1.4 or later    | Unit version 1.3 or earlier |
| Synchronous unit operation function<br>Position Control Units with EtherCAT interface<br>CJ1W-NC□82 work for synchronous unit operation. | Supported.                   | Not supported.              |



## 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<br>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 COMPARE: 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<br>CJ2H-CPU6□ |                                |
| Function                        | 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<br>CJ2H-CPU6□ |                  |
| Function   | Unit version 1.1             | Unit version 1.0 |
| High-speed interrupt function<br>Reduced overhead time for interrupt tasks<br>Minimum interval for scheduled interrupt task execution: 0.1 ms  | Supported.                   | Not supported.   |
| 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<br>CJ1W-AD042 High-speed Analog Input Unit:<br>ANALOG INPUT DIRECT CONVERSION (AIDC(216))<br>CJ1W-DA042V High-speed Analog Output Unit:<br>ANALOG OUTPUT DIRECT CONVERSION (AODC(217)) | Supported.                   | Not supported.   |
| High-speed Serial Communications Units<br>CJ1W-SCU22/SCU32/SCU42 High-speed Serial Communications Units:<br>DIRECT RECEIVE VIA SERIAL COMMUNICATIONS UNIT (DRXDU(261))<br>and DIRECT TRANSMIT VIA SERIAL COMMUNICATIONS UNIT (DTXDU(262))                          | Supported.                   | Not supported.   |

\* 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 2.2 or Later

CX-Programmer version 9.81 or higher must be used to enable using the functions added for unit version 2.2.

| Units                                   |              | CJ2M CPU Units            |                             |
|---|--------------|---------------------------|-----------------------------|
| Models                                  |              | CJ2M-CPU1□ *1             |                             |
| Function                                | Unit version | Unit version 2.2 or later | Unit version 2.1 or earlier |
| Network symbol and tag access functions |              | Supported.                | Not supported.              |

\*1 The CJ2M-CPU3□ with unit version 2.2 does not have any functions added to that with unit version 2.1.

### Functions Supported for Unit Version 2.1 or Later

CX-Programmer version 9.6 or higher must be used to enable using the functions added for unit version 2.1.

| Units                           |              | CJ2M CPU Units            |                             |
|---------------------------------|--------------|---------------------------|-----------------------------|
| Models                          |              | CJ2M-CPU□                 |                             |
| Function                        | Unit version | Unit version 2.1 or later | Unit version 2.0 or earlier |
| Read protection using passwords |              | Supported.                | Not supported.              |

### 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□□                |                  |
| Function  | Unit version | Unit version 2.0 or later | Unit version 1.0 |
| Pulse I/O |              | Supported.                | Not supported.   |



# Index

## A

alarm output ..... 3-27

## B

Basic I/O Units ..... 2-15  
Basic I/O Units specifications ..... A-3  
battery replacement procedure ..... 7-6  
battery service life and replacement periods ..... 7-5

## C

calculating power consumption ..... 2-25  
calculating unit current consumption ..... 2-23  
checking errors ..... 6-2  
Connector-Terminal Block Conversion Unit ..... 5-33, A-64  
CPU Bus Units ..... 2-21  
CPU error ..... 6-10  
CPU error (WDT error) ..... 6-6  
CPU Rack ..... 2-3  
CPU reset ..... 6-9  
CPU reset error ..... 6-6  
CPU standby error ..... 6-6, 6-8  
current consumption ..... 2-5, 2-6, 2-7, 2-12, 2-15

## D

dimensions ..... 5-8, A-101  
DIN Track ..... 2-9, 5-15  
DIP switch ..... 3-4, 3-7

## E

End Cover ..... 2-3  
error log information ..... 6-3  
EtherNet/IP port ..... 2-9, 4-9  
Expansion Rack ..... 2-11

## F

fail-safe circuit ..... 5-2  
fatal errors ..... 6-6, A-111  
  cycle time exceeded error ..... 6-6, 6-12, A-112  
  FALS(007) error ..... 6-6, A-115, A-118  
  I/O setting error ..... A-113, A-116  
  I/O bus error ..... 6-6, 6-13, A-112  
  I/O setting error ..... 6-6, 6-15  
  Memory Card transfer error ..... 6-6, A-115, A-118  
  memory error ..... 6-6, 6-16, A-115, A-118  
  program error ..... 6-6, A-114, A-115, A-117  
  too many I/O points ..... 6-6  
  too many I/O points error ..... A-113, A-116  
  Unit/Rack number duplication error ..... A-114, A-116  
  version error ..... 6-6, A-115, A-118

## G

grounding ..... 5-50

## I

I/O Relay Terminal ..... 5-33  
I/O Relay Terminals connection patterns ..... A-65  
I/O table verification ..... 6-5  
indicators ..... 3-5, 6-2  
Interrupt Input Unit ..... 3-29  
IP address ..... 3-13

## L

line disconnection detection ..... A-160

## M

Memory Card ..... 3-4, 3-14  
Memory Card connector ..... 3-4  
Memory Card indicator ..... 3-6  
Memory Card indicators ..... 3-4  
Memory Card power supply switch ..... 3-4

## N

node address ..... 3-13  
non-fatal errors ..... 6-6, A-119  
  backup memory error ..... 6-6, A-120  
  Basic I/O error ..... 6-6, A-120  
  basic I/O error ..... 6-18  
  battery error ..... 6-6, 6-20, A-120  
  CPU Bus Unit error ..... 6-6, 6-21, A-120  
  CPU Bus Unit setting error ..... 6-6, A-121  
  duplicated refreshing error ..... 6-6, A-120  
  FAL(006) error ..... 6-6, A-121  
  PLC Setup error ..... 6-6, A-120  
  Special I/O Unit error ..... 6-6, 6-22, A-120  
  Special I/O Unit setting error ..... 6-6, A-121  
  tag memory error ..... 6-6, A-120

## O

Option Board error ..... 6-6, 6-19

## P

periodic inspection ..... 7-2  
peripheral (USB) port ..... 3-4, 4-5, 6-11  
PLC Backup Tool ..... 8-2  
Power supply error ..... 6-6  
power supply error ..... 6-7  
Power Supply Unit replacement time ..... 7-10  
Power Supply Units ..... 3-22  
program capacity ..... 2-5, 2-6  
Pulse I/O Module ..... 3-18, A-108

## R

---

|   |       |
|---|-------|
| replacement notification .....          | 7-10  |
| rotary switch .....                     | 3-12  |
| RS-232C .....                           | 6-11  |
| RS-232C interface .....                 | A-122 |
| RS-232C Option Board                    |       |
| specifications .....                    | A-123 |
| RS-232C port communications error ..... | 6-6   |
| RS-422A/485 Option Board                |       |
| specifications .....                    | A-124 |
| RUN output .....                        | 3-27  |

## S

---

|                                |             |
|--------------------------------|-------------|
| Serial Option Board .....      | 3-21, A-109 |
| serial port .....              | 2-9, 3-4    |
| serial port (RS-232C) .....    | 4-8         |
| seven-segment display .....    | 3-10, 6-26  |
| short-circuit protection ..... | A-160       |
| simple backup .....            | 8-7         |
| Special I/O Units .....        | 2-18        |
| Support Software .....         | 4-2         |

## U

---

|                                     |          |
|-------------------------------------|----------|
| unit address .....                  | 8-15     |
| USB driver .....                    | A-150    |
| USB port .....                      | 2-9, 4-5 |
| USB port communications error ..... | 6-6      |

## W

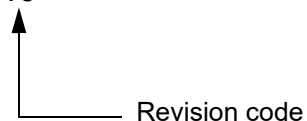
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|                   |                     |
|-------------------|---------------------|
| weight .....      | 2-5, 2-6, 2-7, 2-15 |
| wiring duct ..... | 5-7                 |

## Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. W472-E1-16



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□.<br>Added information on unit version 1.1 of the CJ2 CPU Units.<br>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.<br>Added the CJ1W-NC214/234/414/434 Position Control Units.  |
| 04            | July 2009      | Added the CJ1W-AD042 Analog Input Unit.<br>Added the CJ1W-DA042V Analog Output Unit.   |
| 05            | November 2009  | Added the CJ1W-SCU22/32/42 Serial Communications Units.<br>Added information on the EM Area force-setting/resetting function.<br>Corrected mistakes.                                     |
| 06            | February 2010  | Added the CJ2M-CPU□□.  |
| 07            | July 2010      | Added information on CJ2M-MD21□ Pulse I/O Modules.<br>Corrected mistakes.  |
| 08            | October 2010   | Added information on unit version 2.1 of the built-in EtherNet/IP section on CJ2M-CPU3□ CPU Units.<br>Corrected mistakes.  |
| 09            | March 2011     | Added CJ2H CPU Units with unit version 1.4.<br>Added information on synchronous unit operation (for the CJ1W-NC□82).<br>Added information on B7A Interface Units.<br>Corrected mistakes. |
| 10            | October 2014   | Corrected mistakes.<br>Added descriptions.   |
| 11            | October 2015   | Added CJ2H CPU Units with unit version 1.5.<br>Added CJ2M CPU Units with unit version 2.1.<br>Corrected mistakes.  |
| 12            | June 2016      | Updated the EtherNet/IP logo.<br>Corrected mistakes.   |
| 13            | September 2016 | Changed accessories.<br>Corrected mistakes.  |
| 14            | July 2017      | Added the CP1W-CIF12-V1 Serial Communications Option Board.  |
| 15            | July 2022      | Revisions for adding safety precautions regarding security.<br>Corrected mistakes.   |
| 16            | July 2023      | Added CJ2H CPU Units with unit version 1.6.<br>Added CJ2M CPU Units with unit version 2.2.<br>Added CJ1W-EIP21S EtherNet/IP Units.<br>Added OTAX connectors.<br>Corrected mistakes.      |







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