

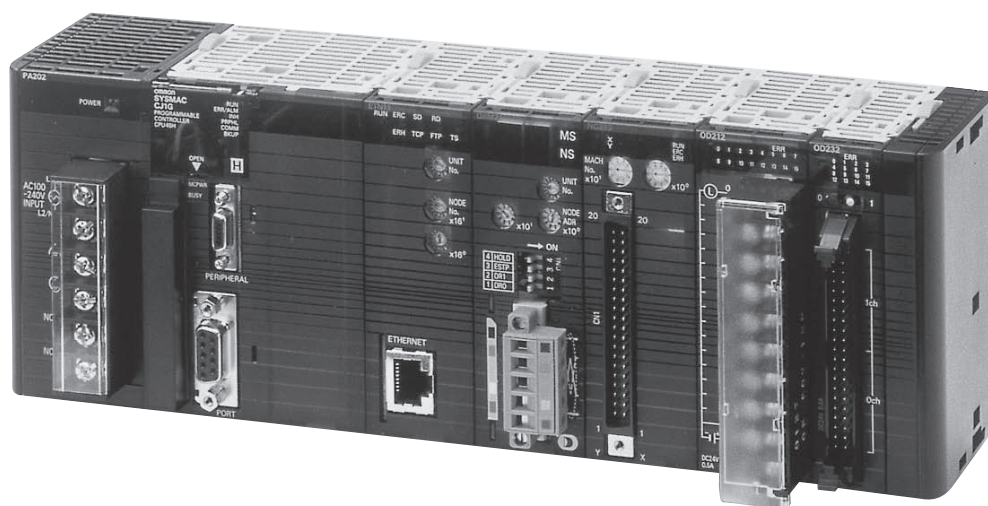
# Modular PLC series

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## Modular PLC series

## CJ1



## Sliceable Solutions

The family of CJ1 CPUs range from very small CPUs for simple sequence control to powerful and fast models that offer total machine control which can handle up to 2560 I/O points.

This enables you to modularize or 'slice' your machine into logical sections without changing PLC series.

You don't even need to consider where to slice the machine: any I/O units can be mounted on any CPU, enabling you to distribute all the function you need to, wherever you need them. This reduces the number of different modules you have to keep in stock. And no matter how complex your machine becomes, there's always a CPU and a combination of I/Os to match your needs. It's the ultimate in machine sliceability and scalability!

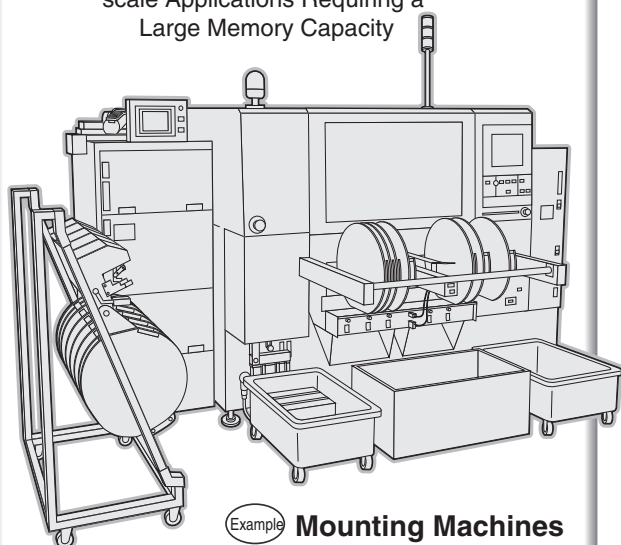
## New features in this edition

- **All CPUs (Ver.3.0)** Function Block programming in IEC 61131-3 Structured Text, and pre-tested Omron Function Block Libraries to reduce machine development time.
- **CJ1H-CPU67H** The ultimate high-capacity CPU in the CJ1 range
- **CJ1M-CPU1□-ETN** CPUs with integrated Ethernet port
- **CJ1W-PD022** Low-end DC power supply unit
- **CJ1W-□□□□ (SL)** Digital and analog I/O units with screwless terminal blocks.
- **CJ1W-(P)TS** Temperature input units, from simple non-isolated to fast high-resolution models.
- **CJ1W-SCU□1-V1** Gateway function for easy linking of various communication networks.
- **CJ1W-CORT21** CAN communication unit, fully configurable to support any protocol.

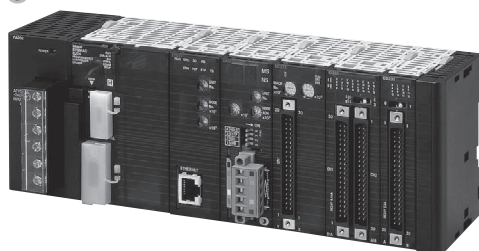
**Compact, fast and flexible. The CJ1-series offers the ultimate in scalability and seamless communication. A wide variation of models to handle essentially any type of machine control. Build the perfect CJ1-series PLC for your application.**

## CJ1H

For Applications Requiring Speed or Large-scale Applications Requiring a Large Memory Capacity



Example Mounting Machines

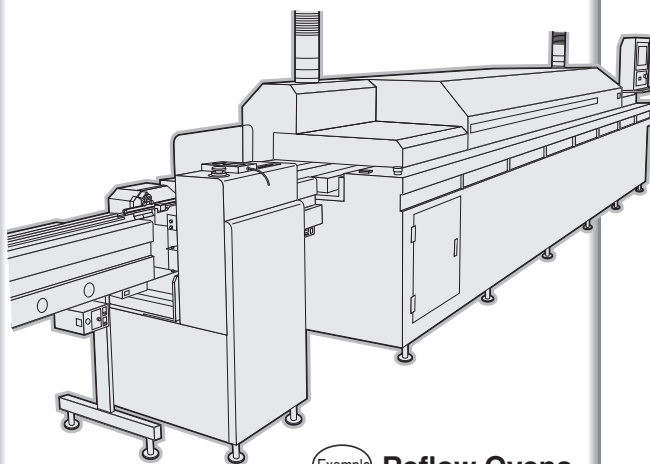


### SYSMAC CJ1H-CPU□□H

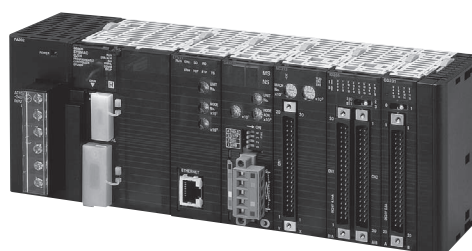
|                                                                                                                 |                          |
|-----------------------------------------------------------------------------------------------------------------|--------------------------|
|  Small                       | YES 62 mm wide           |
|  Backplane-free structure    | YES                      |
|  Speed                       | LD instruction: 20 ns    |
|  Seamless                    | YES                      |
|  Program capacity <b>NEW</b> | 250 to 60 Ksteps         |
|  Memory capacity <b>NEW</b>  | 448 to 128 Kwords        |
|  I/O capacity                | 2,560 points             |
|  Memory Cards                | YES Compact flash memory |
|  Task programming            | YES                      |
|  Function Block <b>NEW</b>   | YES                      |
|  Serial Gateway <b>NEW</b>   | YES                      |

## CJ1G

For Applications Requiring a Large Memory Capacity for Data Management



Example Reflow Ovens



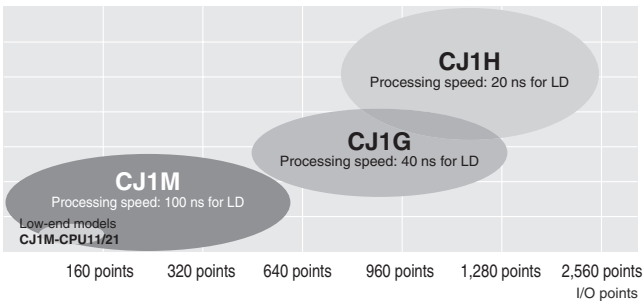
### SYSMAC CJ1G-CPU□□H

|                                                                                                               |                          |
|---------------------------------------------------------------------------------------------------------------|--------------------------|
|  Small                     | YES 62 mm wide           |
|  Backplane-free structure  | YES                      |
|  Speed                     | LD instruction: 40 ns    |
|  Seamless                  | YES                      |
|  Program capacity          | 60 to 10 Ksteps          |
|  Memory capacity           | 128 to 64 Kwords         |
|  I/O capacity              | 960 to 1,280 points      |
|  Memory Cards              | YES Compact flash memory |
|  Task programming          | YES                      |
|  Function Block <b>NEW</b> | YES                      |
|  Serial Gateway <b>NEW</b> | YES                      |

The CJ1H, CJ1G, and CJ1M are compatible for memory allocations, programming instructions, and I/O Units. Compatibility simplifies reusing designs from large-scale applications to small-scale applications. Select from the range of CJ-series CPU Units including a lineup of low-end models with 160 I/O points and 5 Ksteps for use in even smaller machines.

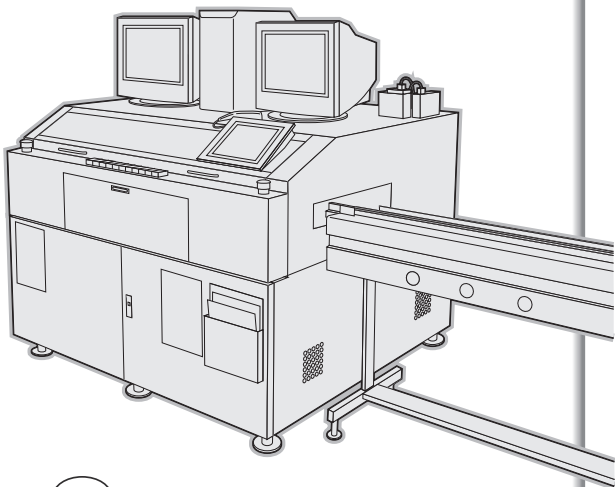
**NEW** The CJ1H-CPU67H delivers control on an even larger scale.

Program capacity  
250 Ksteps  
120 Ksteps  
60 Ksteps  
30 Ksteps  
20 Ksteps  
10 Ksteps  
5 Ksteps



## CJ1M

For Small -scale Applications , such as Automatic Machines , Inspection Devices , etc.



Example **Inspection Devices**



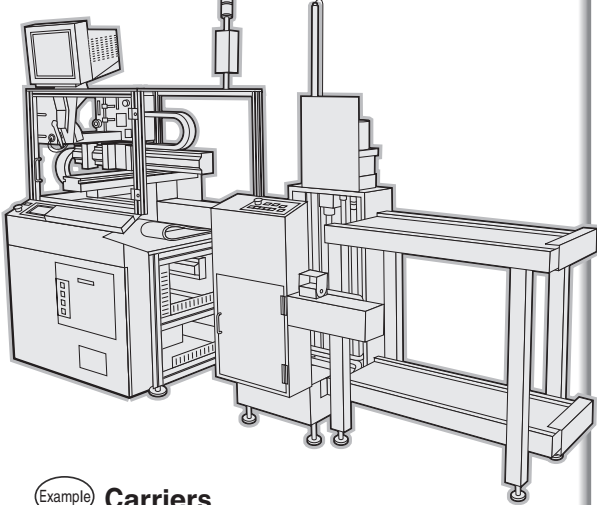
### SYSMAC CJ1M-CPU11/12/13

|                          |                       |                      |
|--------------------------|-----------------------|----------------------|
| Small                    | YES                   | 31 mm wide           |
| Backplane-free structure | YES                   |                      |
| Speed                    | LD instruction: 100ns |                      |
| Seamless                 | YES                   |                      |
| Memory                   | Program capacity      | 20 to 5 Ksteps       |
| Memory                   | Memory capacity       | 32Kwords             |
| I/O                      | I/O capacity          | 160to 640points      |
| Memory Cards             | YES                   | Compact flash memory |
| Task programming         | YES                   |                      |
| Function Block           | NEW                   | YES                  |
| Serial Gateway           | NEW                   | YES                  |
| Serial PLC Link          | YES                   |                      |

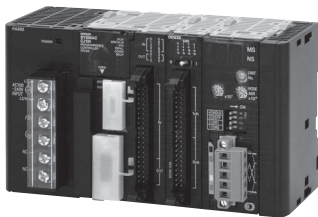
## CJ1M

Pulse I/O

For Small -scale Applications , such as Automatic Machines , Inspection Devices , etc.



Example **Carriers**



### SYSMAC CJ1M-CPU21/22/23

Pulse I/O

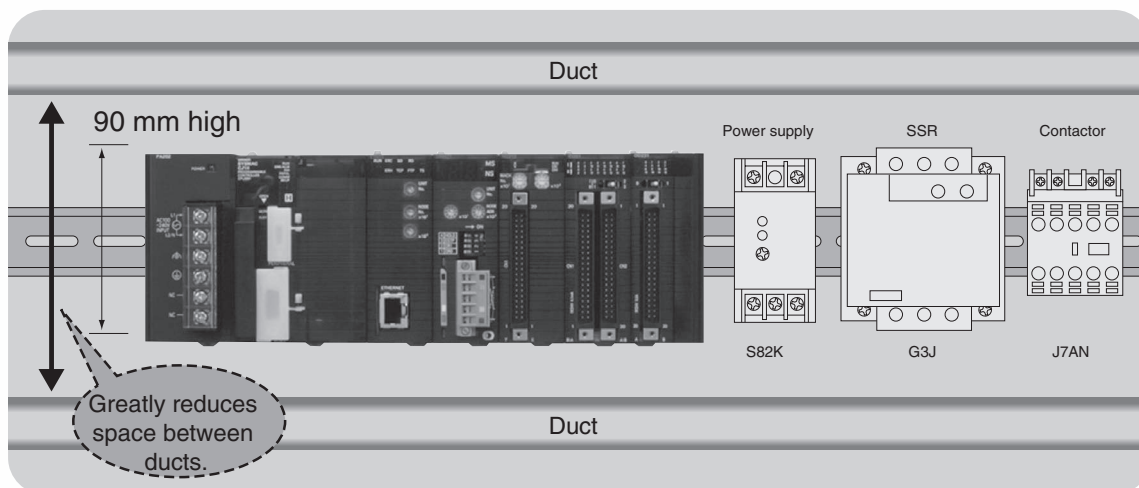
|                          |                       |                      |
|--------------------------|-----------------------|----------------------|
| Small                    | YES                   | 49 mm wide           |
| Backplane-free structure | YES                   |                      |
| Speed                    | LD instruction: 100ns |                      |
| Seamless                 | YES                   |                      |
| Memory                   | Program capacity      | 20 to 5 Ksteps       |
| Memory                   | Memory capacity       | 32Kwords             |
| I/O                      | I/O capacity          | 160to 640points      |
| Memory Cards             | YES                   | Compact flash memory |
| Task programming         | YES                   |                      |
| Function Block           | NEW                   | YES                  |
| Serial Gateway           | NEW                   | YES                  |
| Serial PLC Link          | YES                   |                      |
| Built-in pulse I/O       | YES                   |                      |

## Downsize machines and control cabinets – fits anywhere.



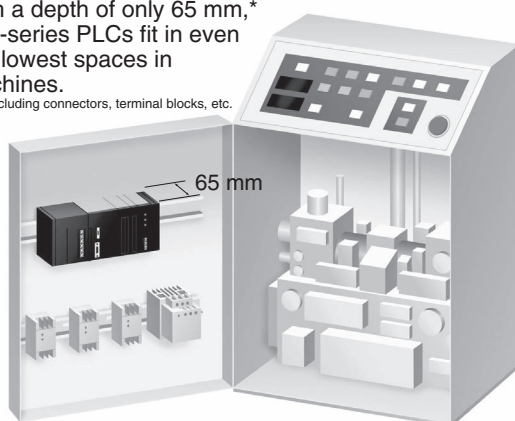
Super Compact: Only 90 mm High and 65 mm Deep, with I/O Units from 20 mm in width.

With a height of only 90 mm, CJ1-series PLCs fit between narrow ducts along with other components.

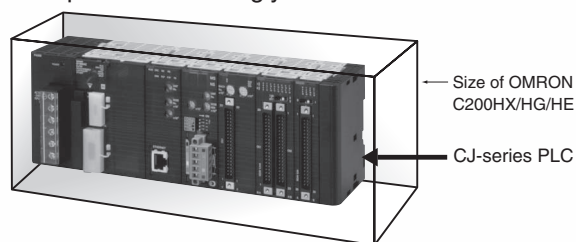


With a depth of only 65 mm,\* CJ1-series PLCs fit in even shallowest spaces in machines.

\*Not including connectors, terminal blocks, etc.



More power in a strongly reduced volume.



Volume compared to C200HX/HG/HE  
Approx. **37%**

Volume compared to CQM1H  
Approx. **50%**

### Unit Downsizing

#### ● CPU Units

CJ1M-CPU11/12/13



At only 31 mm wide, the CPU Units provide an RS-232C port in addition to a peripheral port. A CF memory card interface is also built in.

#### ● I/O Units Only 20 mm Wide

32-point Unit    CompoBus/S Master Unit



Minimum width with 20 mm space-saving I/O Units

#### ● I/O Units Only 31 mm Wide

Double-head ID Sensor Unit    Temperature Control Unit (4 control loops)



High-density Units for greater downsizing and integrated control functions

# Fast

## Reduce cycle Time and Increase Productivity with Higher Machine Speed.

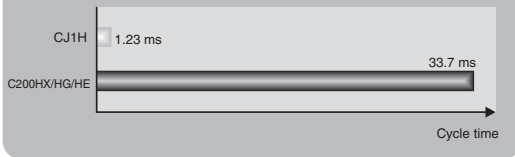


High speed, from input through processing to output, for better application performance.

- Top-of-the-Line CJ1-series PLC: Executes 38-Kstep program in **1 ms** (with basic instructions only)  
LD or OUT instruction is executed in 20 ns

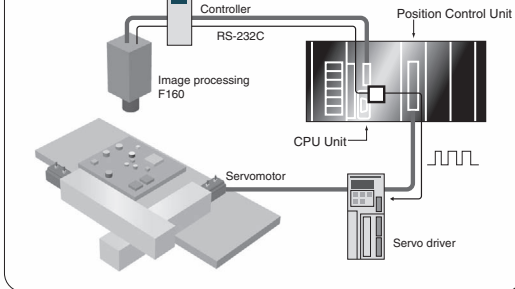
### Cycle Time for 30-Kstep Program

(Conditions: Basic instructions: 50%; MOV instructions: 30%; Arithmetic instructions: 20%)

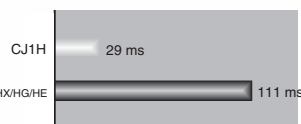


### Application Examples

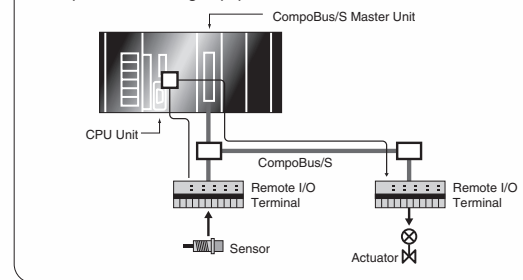
#### Example: Inspection Equipment



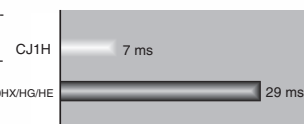
Time required to input image data, perform operations in the CPU Unit, and output pulses from the Position Control Unit (Conditions: 30-Kstep program; ratio of basic instructions to special instructions: 1:1)



#### Example: Assembling Equipment

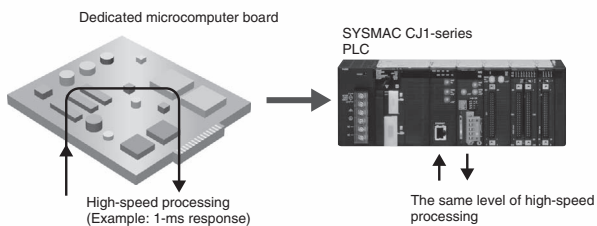


Time required to receive sensor input at the CompoBus/S Remote I/O Terminal, perform operations in the CPU Unit, and turn ON a solenoid valve via the CompoBus/S Remote I/O Terminal (Conditions: 10-Kstep program; ratio of basic instructions to special instructions: 1:1)



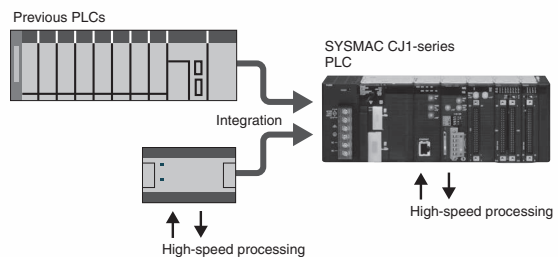
### Replace High-speed Microcomputer Boards with PLCs.

Although previously microcomputer boards were used where processing speeds below 1 ms were required, the CJ1-series PLCs can now take this role, AND provide scalability, and easier debugging and maintenance.



### Replace Two PLCs Used to Increase Processing Speed with One CJ1-series PLC.

Although previously two PLCs were sometimes used to enable reading short pulses, the CJ1-series PLCs can now take this role too.

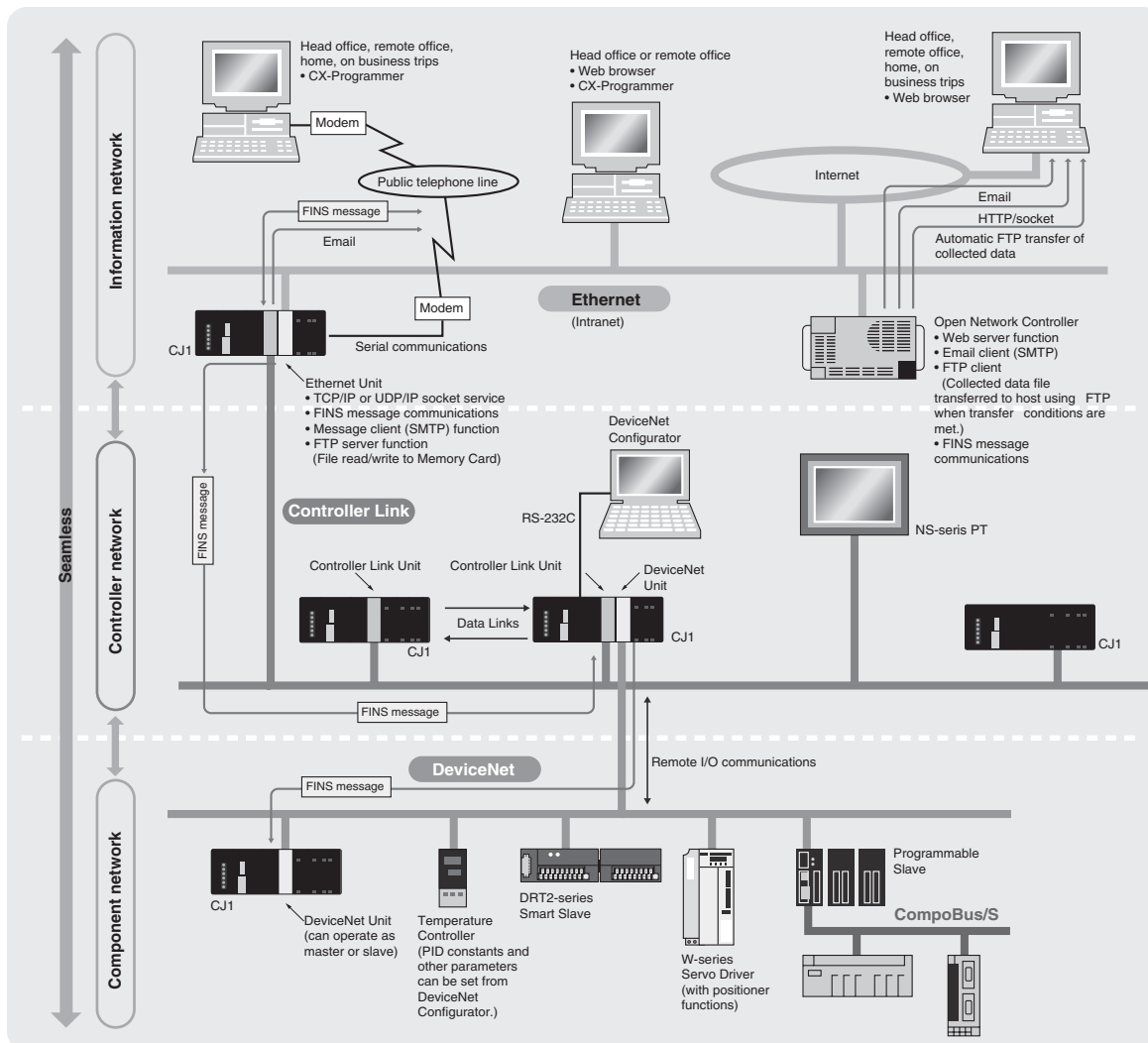


# Seamless

Seamless message communications across eight levels (See note) of component, controller, and information networks.



The CJ Series is suitable for equipment ranging from small to large scale, making it equally convenient for building systems for essentially any machine size.

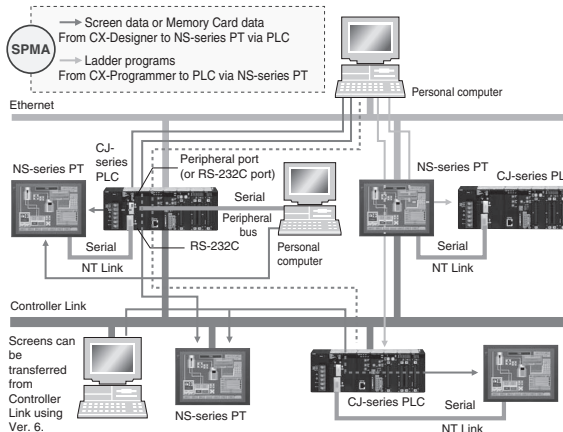


**Note:** Only Ethernet and Controller Link networks can be used for access across eight levels.

## Use SPMA (Single Port Multi Access) to Transfer Ladder Programs, NS-series PT Screen Data, and Memory Card Data without Connecting to a Personal Computer.

Screen data can be transferred from the NS-Designer via the PLC to an NS-series PT connected to the PLC either serially or through the network. The CX-Programmer can be used to monitor ladder programs or transfer them via an NS-series PT to the PLC connected to an NS-series PT either serially or through the network.

- NS-series PT: System Ver. 3.0 or higher
- NS-Designer: Ver. 3.0 or higher
- CX-Programmer: Ver. 3.1 or higher
- PLC CJ1H/CJ1G-CPU□□H/CJ1M-CPU□□: Lot No. 030201 or later



# Scalable

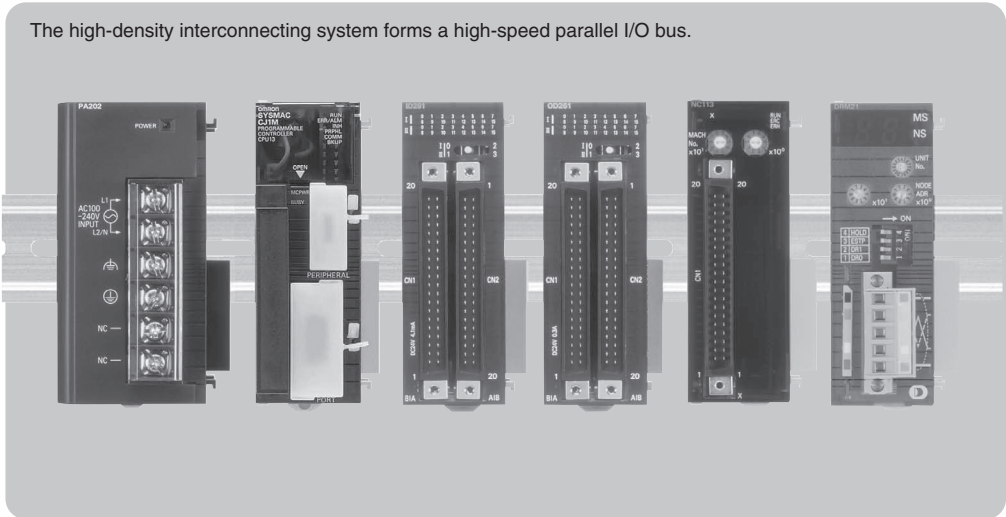
Distribute functionality to where you need it.



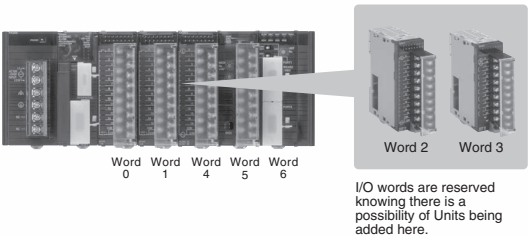
Any unit fits any CPU.

Eliminating the backplane enables more flexible combinations.  
Configurable memory allocation allows for easy machine variations. Adding or removing units does not mean you need to change your PLC program.

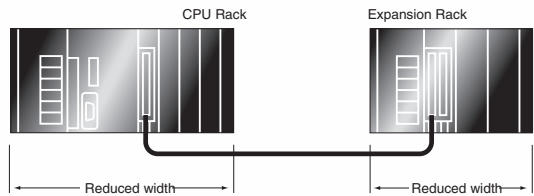
The high-density interconnecting system forms a high-speed parallel I/O bus.



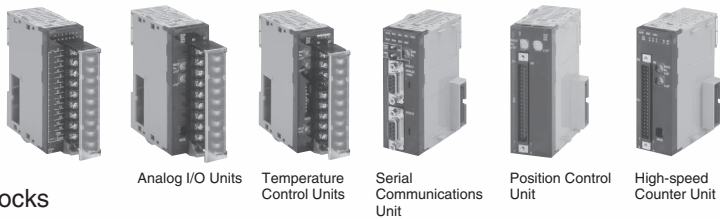
When modifying the system, I/O capacity can be added without changing I/O word allocations using words reserved through CX-Programmer.



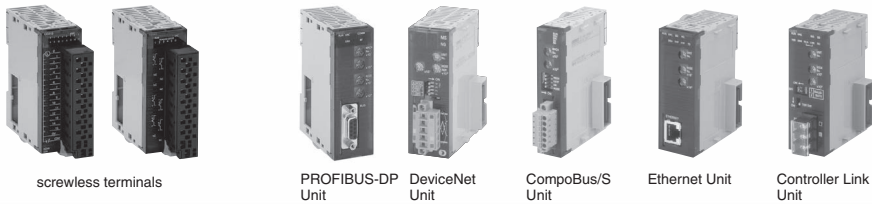
No backplane means you can distribute the I/O units over several blocks to reduce rack width.



Select the right units for your application



Select screw type or screwless terminal blocks



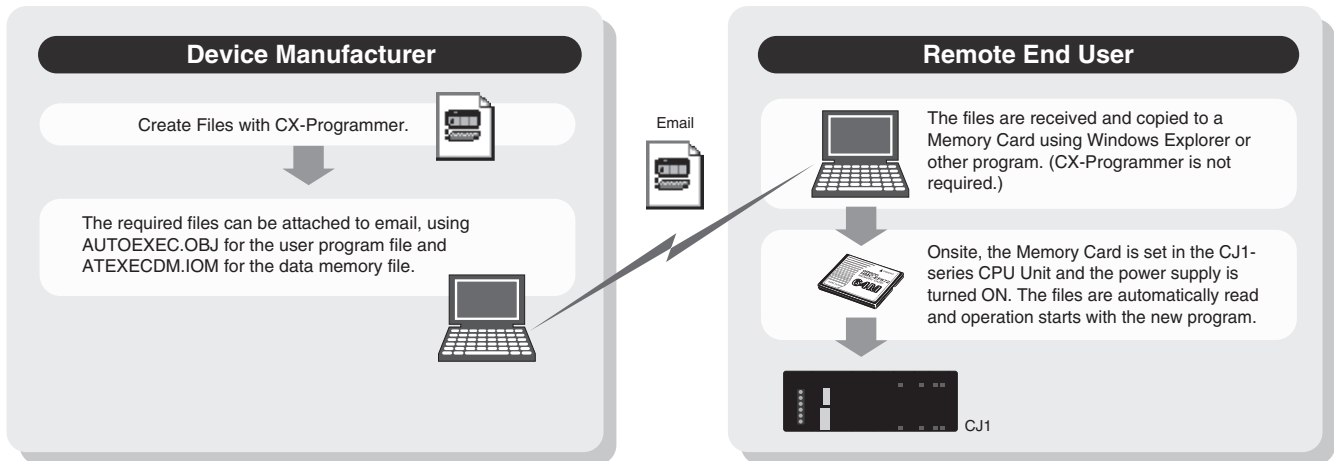
# Easier Maintenance with Memory Cards



## Memory Cards

### Easily change programs using Memory Cards.

Compact flash cards are used, enabling the Memory Cards to be shipped or mailed for speedy action even with offshore sites.

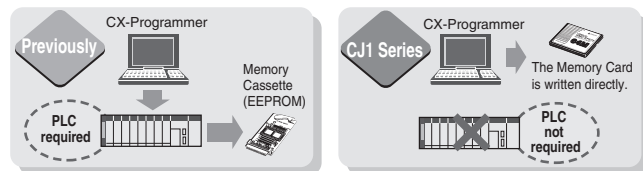


### Handle as Windows Files from a Personal Computer.

User programs, parameters, I/O memory, names (including I/O comments), and rung comments can be handled as files, enabling standardization of programs and initial setting data for each system.

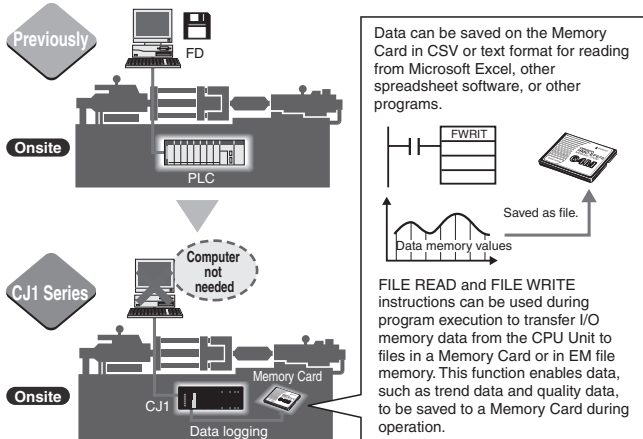
#### Advantages in Using Windows Files

The Memory Card contains a compact flash card enabling programs to be written without a PLC. A PC card slot, available on many notebook computers, can be used instead of a Programming Device.



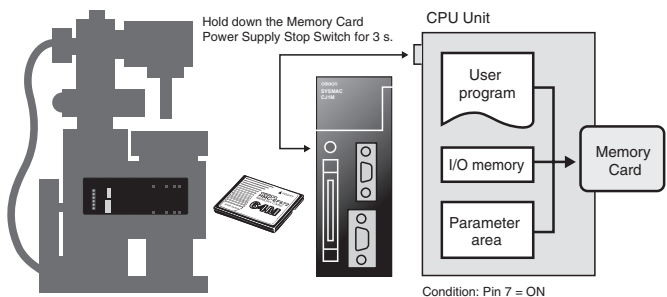
### Log production conditions, inspection data, and other valuable information.

Eliminates the need for an onsite computer for a low-cost system that requires little space.



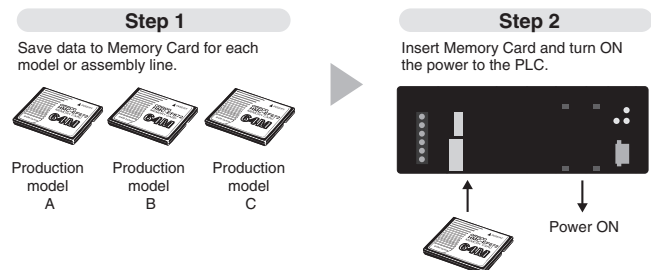
### Backup is Simple.

Backup data for the entire PLC, including DeviceNet Units, Serial Communications Units, and other CPU Bus Units can be saved or read to a Memory Card. As a result, the same operation as that using ROM can be achieved using a Memory Card.



### PLC Operation Can Be Switched by Changing the Memory Card.

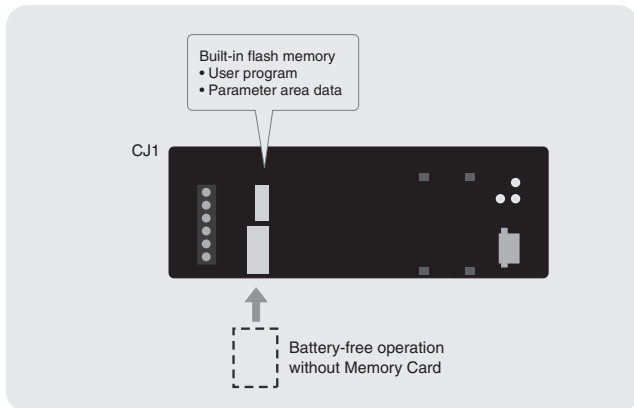
When the power is turned ON, the file in the Memory Card can be automatically transferred to the CPU Unit. As a result, the same operation as that using ROM can be achieved using a Memory Card.



## Built-in Flash Memory (Standard Feature)

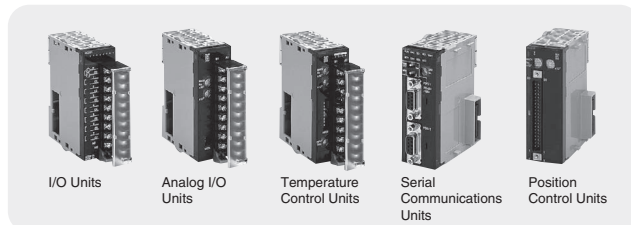
### Battery-free Operation Using Flash Memory

When the user program or parameter area data is transferred to the CPU Unit, it is automatically backed up in flash memory in the CPU Unit. (The flash memory data is automatically restored to the working memory in the CPU Unit when the power supply is turned ON.) This enables battery-free operation without using a Memory Card.



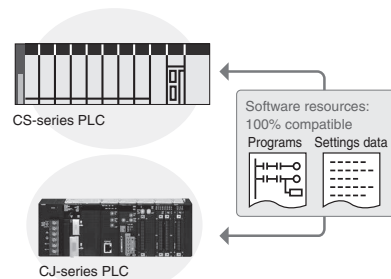
## Reduce Maintenance Unit Stocks

The CJ1-series PLCs can be used for anything from small-scale to large-scale applications, helping to reduce the quantity of maintenance Units stocked for unexpected troubles or system expansion.



## Software Compatibility with CS1-series PLCs

CJ-series architecture is 100% compatible with the CS-Series. User programs and other software resources can be shared to make standardizing software easier for all levels of the system.

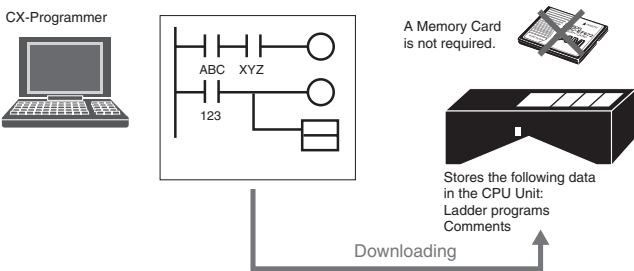


## Built-in Comment Memory <sup>NEW</sup>

(Unit version 3.0 or later and CX-Programmer Ver. 5.0 or higher are required.)

Comment memory is now provided in the CPU Unit.

This enables comments for the CJ1M and other PLCs to be stored without a Memory Card.



When downloading projects, the Memory Card, EM file memory, or comment memory (in the CPU Unit's flash memory) can be selected as the transfer destination for I/O comments, symbol names, rung comments, and other data. This enables data such as I/O comments, symbol names, and rung comments to be stored in the CPU Unit's internal comment memory when a Memory Card or EM file memory are both not available.

64 KB: Equivalent to the contents of EM bank 1

| Comment memory capacity | CJ1M  |       |       | CJ1G   |        |        |        | CJ1H   |        |        |
|-------------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
|                         | CPU□1 | CPU□2 | CPU□3 | CPU42H | CPU43H | CPU44H | CPU45H | CPU65H | CPU66H | CPU67H |
| Program indices         | 64 KB | 64 KB | 64 KB | 64 KB  | 64 KB  | 64 KB  | 64 KB  | 64 KB  | 128 KB | 128 KB |
| Comments                | 64 KB | 64 KB | 64 KB | 64 KB  | 64 KB  | 64 KB  | 64 KB  | 64 KB  | 128 KB | 128 KB |
| Symbol tables           | 64 KB | 64 KB | 64 KB | 64 KB  | 64 KB  | 64 KB  | 128 KB | 128 KB | 128 KB | 128 KB |

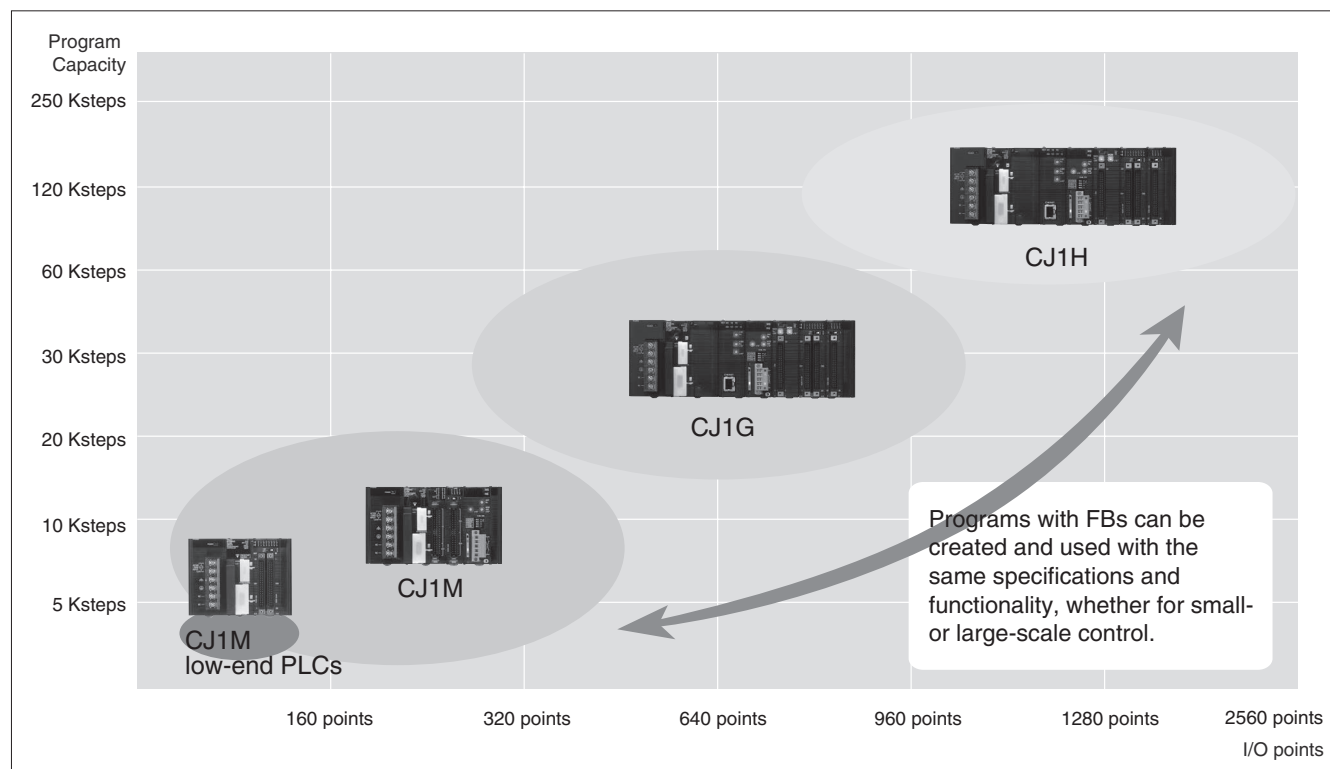
The comments can be stored in either of three locations: a) Memory Card, b) EM file memory, or c) Comment memory (added with this unit version). Select the location to store the comments in the user settings.

# Greater Connectability with Component Products, with FB Compatibility (Ladder Programming/Structured Text) More Attractive to Use with Greater Development Efficiency and Maintainability

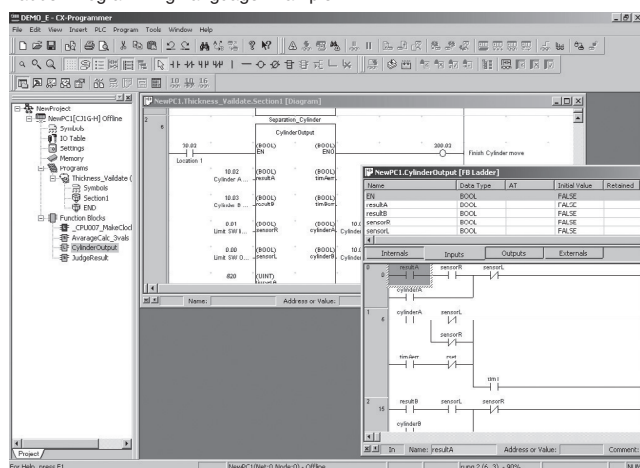


## Function Block <sup>NEW</sup> (Unit version 3.0 or later, and CX-Programmer Ver. 5.0 or higher are required.)

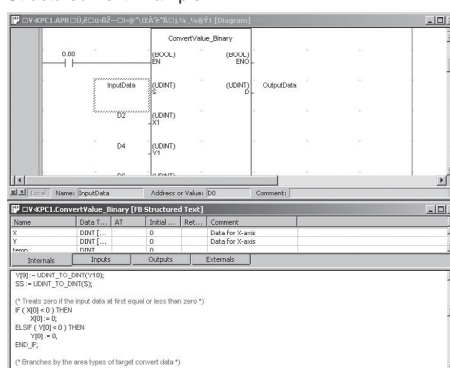
### FB (Ladder Programming/Structured Text) Compatibility with all CS/CJ-series Models



#### Ladder Programming Language Example



#### Structured Text Example

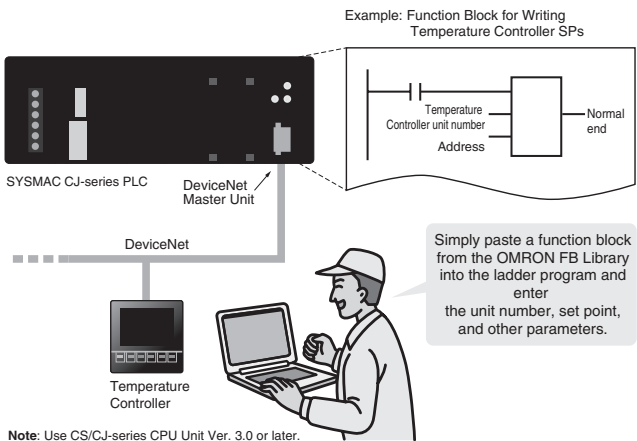


# OMRON FB Library

The OMRON FB library provides function blocks for setting SPs, reading PVs, and reading/writing RUN/STOP status and other Temperature Controller parameters. The programmer simply pastes function blocks from the OMRON FB Library into the ladder program. The desired functions can be utilized simply by inputting the Temperature Controller unit number and address.

## What Is the OMRON FB Library?

The OMRON FB Library is a set of functional objects for ladder programming for OMRON CS/CJ-series PLCs. By incorporating the OMRON function blocks provided by OMRON into a ladder program, the program interface for different control devices is easily completed. This reduces the number of working hours required for program development and, at the same time, improves product quality through standardization.



# The Structured Text (ST) Language Enables Trigonometric Functions and Other Arithmetic Processes

In addition to ladder programming, function block logic can be written in ST, which conforms to IEC61131-3. With ST, arithmetic processing is also possible, including processing of absolute values, square roots, logarithms, and trigonometric functions (SIN, COS, and TAN). Processing difficult to achieve in ladder programs becomes easy to write.

| Name  | Data Type | AT | Initial Value | Retained | Comment                                   |
|-------|-----------|----|---------------|----------|-------------------------------------------|
| EN    | BOOL      |    | FALSE         |          | Controls execution of the Function Block. |
| r     | REAL      |    | 0.0           |          | Radius                                    |
| theta | REAL      |    | 0.0           |          | Angle                                     |
| p     | REAL      |    | 0.0           |          | center coordinate: p                      |
| q     | REAL      |    | 0.0           |          | Center coordinate :q                      |

Internals Inputs Outputs Externals

(\* calculate circular arc coordination \*)

(\* Radius: r, Center coordinate: p, q \*)

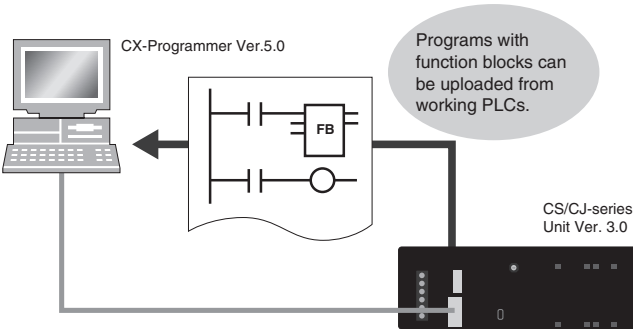
(\* x-coordinate: x, y-coordinate: y \*)

$x := r * \cos(\theta) + p;$

$y := r * \sin(\theta) + q;$

# Recovery Possible by Uploading Function Blocks from Working PLC

Programs with function blocks can be uploaded from CPU Units, just like normal programs, without the need for additional memory such as a Memory Card.



# Truly Seamless Incorporation of OMRON Components and Other Devices into Networks

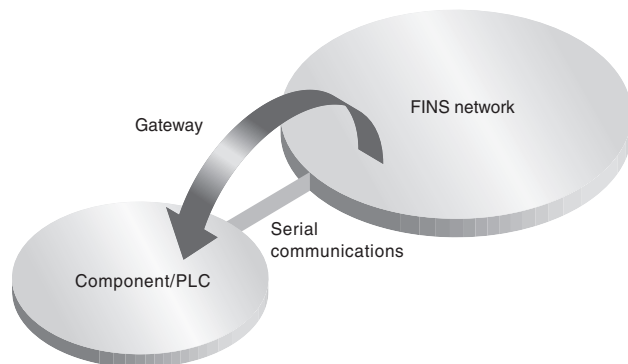
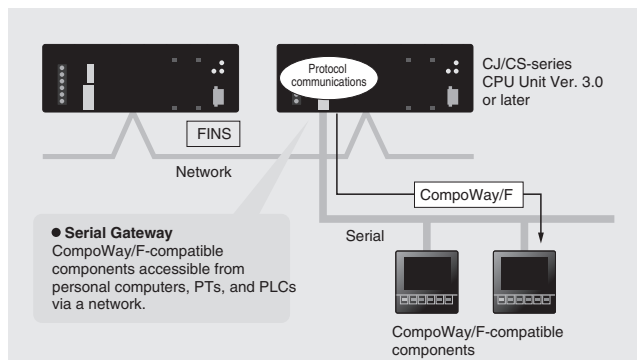


## Serial Gateway NEW CPU Units with Ver. 3.0 or later Serial Communications Units with Ver. 1.2 or later

When the CPU Unit (Ver. 3.0 or later) or Serial Communications Board or Serial Communications Unit (Ver. 1.2 or later) receives a FINS command containing a CompoWay/F command (See note 1.) via network or serial communications, the command is automatically converted to a protocol suitable for the message and forwarded using serial communications.

- CompoWay/F (See note 2.)
- Host Link FINS (Possible only with Serial Communications Boards or Serial Communications Units Ver. 1.2 or later)

### FINS network

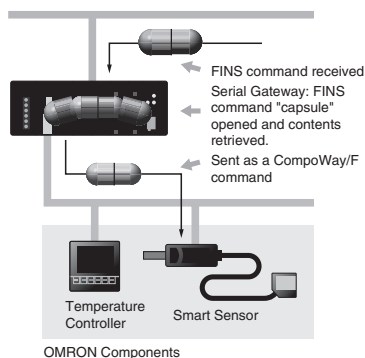


**Note 1:** FINS  
Abbreviation for Factory Interface Network Service. A command system for message services common to OMRON networks. FINS commands can be sent across up to 8 network levels, including serial communications paths using a serial gateway. (Possible only with CS/CJ-series CPU Unit Ver. 2.0 or later.)

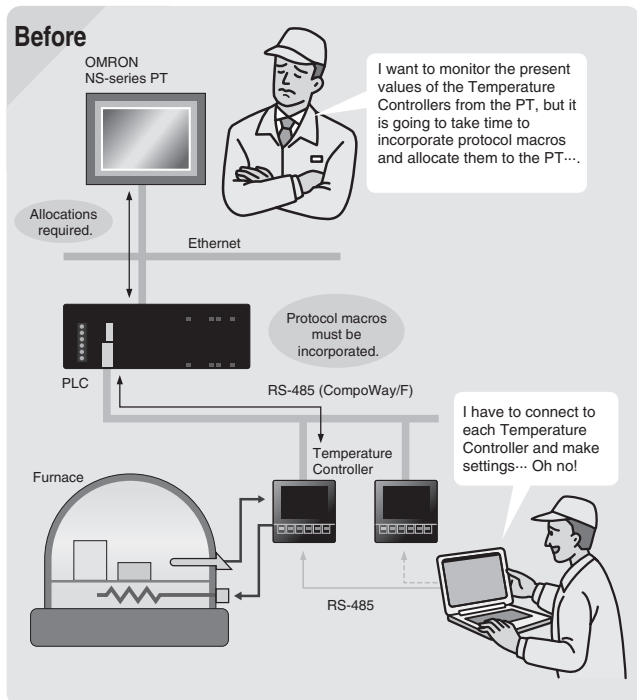
**Note 2:** CompoWay/F  
CompoWay/F is an integrated communications protocol used for OMRON general-purpose serial communications. It is used by Temperature Controllers, Digital Panel Meters, Timer/Counters, Smart Sensors, Cam Positioners, Safety Controllers, etc. (as of July 2004).

### Serial Gateway System (Reference)

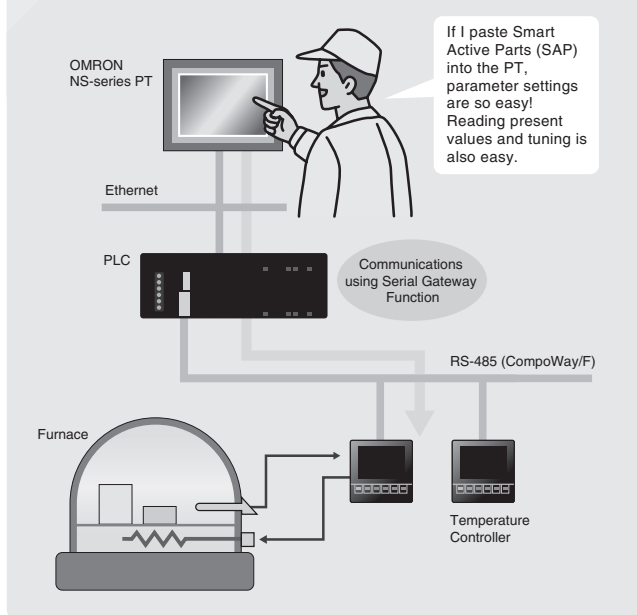
When CompoWay/F commands are enclosed in FINS commands and sent to Serial Communications Boards or Serial Communications Units (Ver. 1.2) or serial ports on CPU Unit Ver. 3.0, the enclosed CompoWay/F command is retrieved using a Serial Gateway Function and sent as a CompoWay/F command.



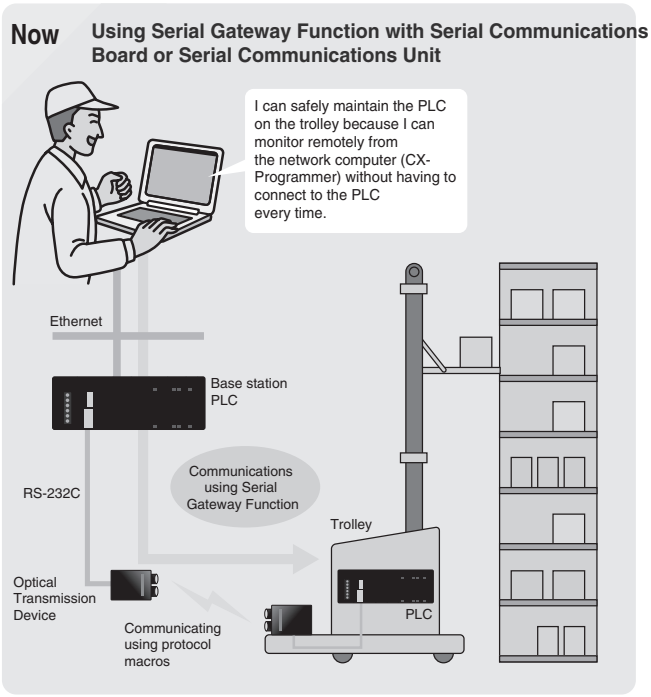
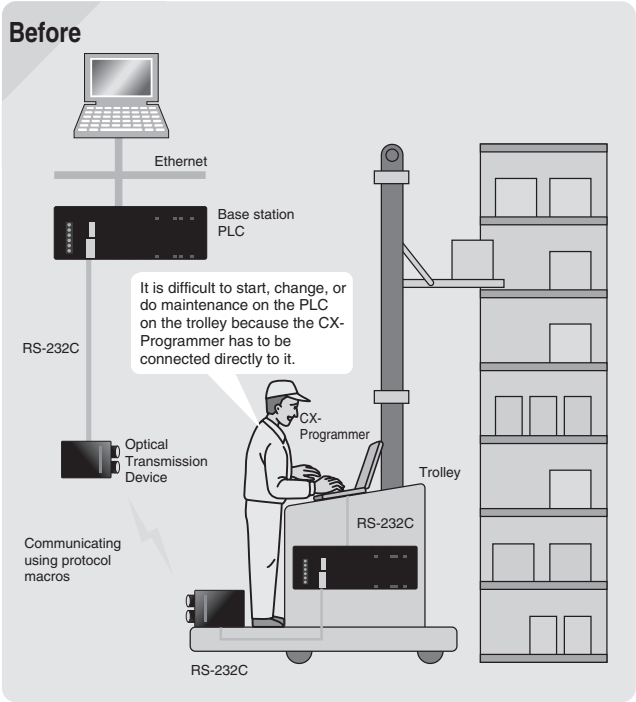
### Example Setting Parameters and Monitoring CompoWay/F-compatible OMRON Temperature Controllers in a Furnace System



### Now Use the Serial Gateway with a Serial Communications Board or Serial Communications Unit



**Example** Remote Maintenance and Monitoring of a PLC on a Trolley in an Automated Warehouse

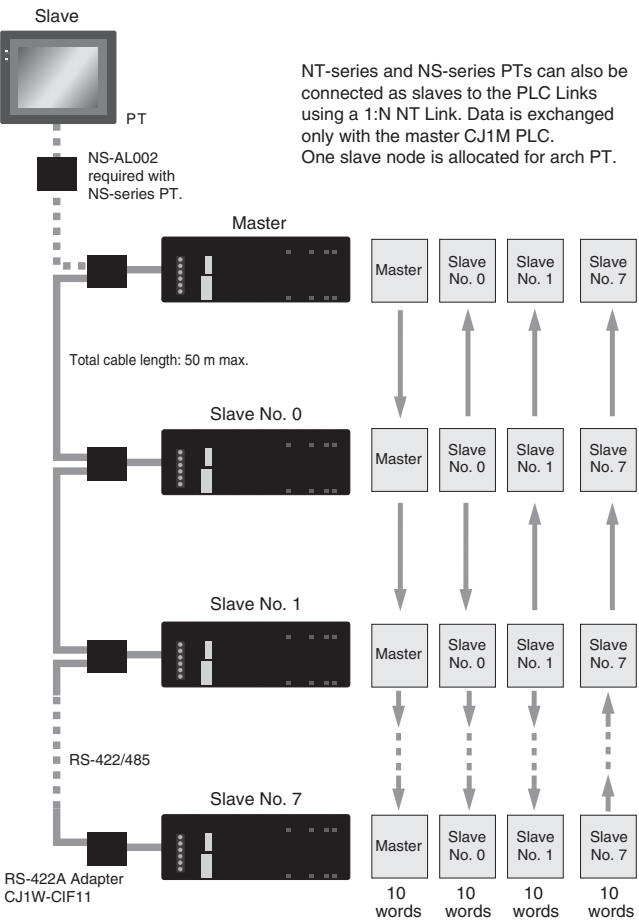
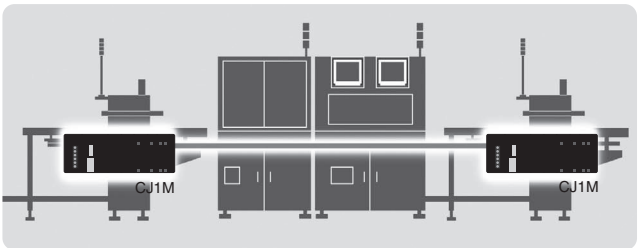


**Note:** Supported by Serial Communications Units only.

**Serial PLC Links**  
(Connecting Built-in RS-232C Ports on CJ1M CPU Units)

Use PLC Links for exclusive control on PCB carrier loaders and unloaders, or to exchange temperature and time information on conveyor ovens.

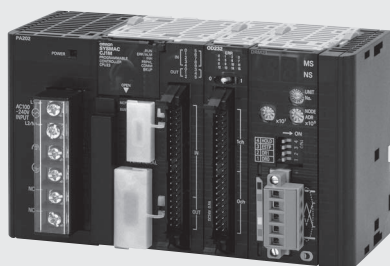
Data links can be created between up to nine CJ1M PLCs with up to 10 words each using the built-in RS-232C ports. RS-422A Adapters (CJ1W-CIF11) can be used to easily convert between RS-232C and RS-422A.



# Achieve More Flexible, More Precise Machines with Pulse I/O Control

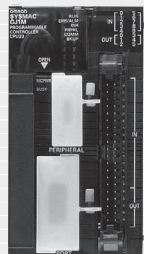
PULSE  
I/O

## Built-in Pulse I/O



SYSMAC CJ1M-CPU21/22/23

CJ1M-CPU21 (5-Kstep)  
CJ1M-CPU22 (10-Kstep)  
CJ1M-CPU23 (20-Kstep)



- Pulse outputs: 100 kHz, 2 axes
  - Counters: Single-phase, 100 kHz, 2 counters or Differential phases, 50 kHz, 2 counters
  - Interrupts: 4
- The above can all be used simultaneously.

## Pulse Outputs (CJ1M-CPU21/22/23)

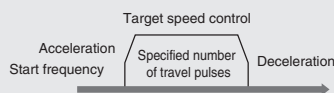
### Two Pulse Outputs at 100 kHz

#### ■ Origin Searches (ORG Instruction)

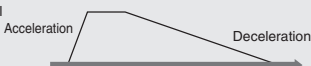
- Origin searches are possible with one ORG instruction.
- Even with servomotors, a differential-phase counter reset output minimizes position deviations for origin searches.

#### ■ Positioning with Trapezoidal Acceleration/Deceleration (PLS2 Instruction)

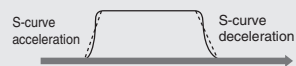
Easily achieved with special positioning instruction (PLS2).



Positioning is also possible with trapezoidal control with different acceleration and deceleration times.



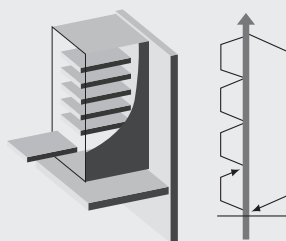
S-curve acceleration/deceleration can be used to reduce vibration in high-speed positioning. (Unit Ver. 2.0 or later)



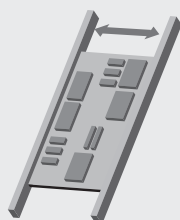
Positioning that does not reach the target speed is also possible (triangular control).



PCB Rack Positioning

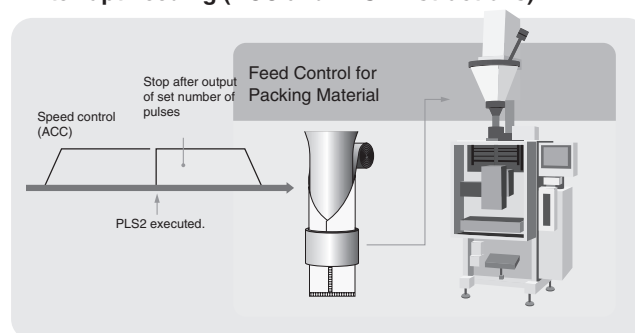


PCB Conveyor Rail Width Positioning



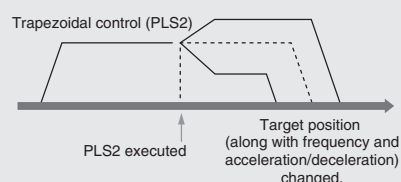
- Fast startup times (the time from instruction execution to start of pulse output): 46  $\mu$ s minimum, 70  $\mu$ s for trapezoidal acceleration/deceleration.

### ■ Interrupt Feeding (ACC and PLS2 Instructions)

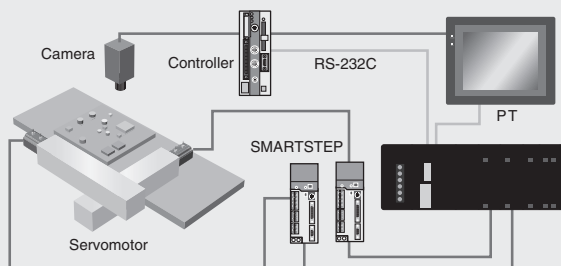


### ■ Changing Target Position during Positioning (PLS2 and PLS2 Instructions)

- The target position can be changed even after positioning has been started. Reversals (positioning in the opposite direction) are also possible.



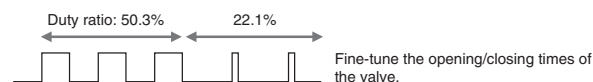
#### Position Control Using Length Measured at Startup



### High-precision Variable Duty Ratio (PWM output)

Specify a duty ratio in 0.1% units.

(Unit Ver. 2.0 or later)

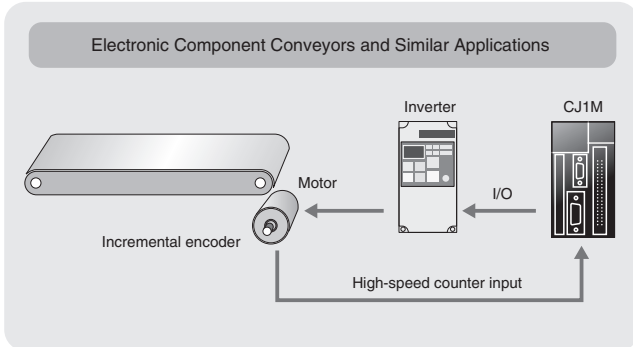


## High-speed Counter Inputs (CJ1M-CPU21/22/23)

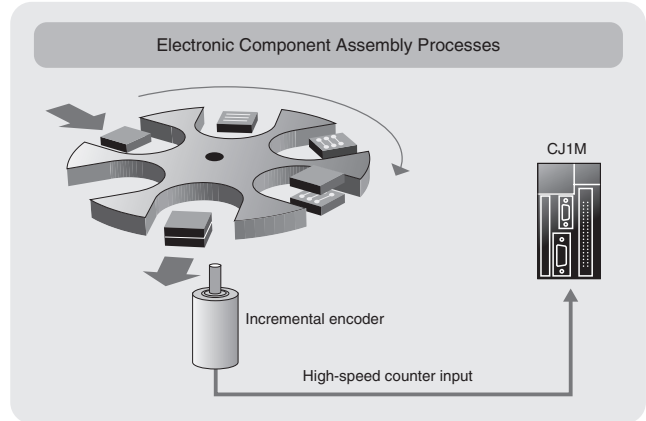
Two counter inputs, either single-phase, 100 kHz, or differential phases, 50 kHz

### ■ High-speed Counter in Linear Mode

High-speed line-driver inputs for either single-phase, 100 kHz, or differential phases, 50 kHz, can be input. (For 24 V DC: Single-phase, 60 kHz, or differential phases, 30 kHz)



### ■ High-speed Counter in Ring Mode

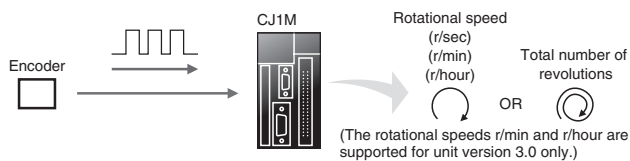


### ■ High-speed Counter Frequency (Speed) Measurements

For example, in rotational speed measurements in inspection applications or tact-time speed displays for conveyors, the speed can be monitored by counting pulses without using a special speed calculation device. The present value can be monitored during high-speed counter input by using the PRV instruction.

### Measure Revolution Data (Unit Ver. 2.0 or later)

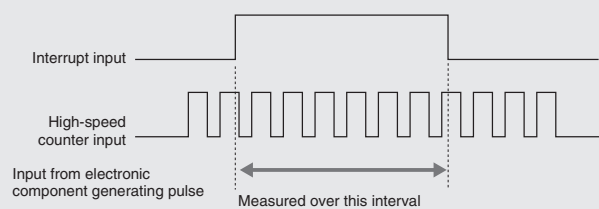
High-speed counter input pulses can be converted to rotational speed (or total number of revolutions) using the new PRV2(883) instruction.



## Interrupt Inputs (CJ1M-CPU21/22/23)

Use these inputs for either four interrupt inputs or four high-speed inputs (with a minimum pulse width of 30  $\mu$ s).

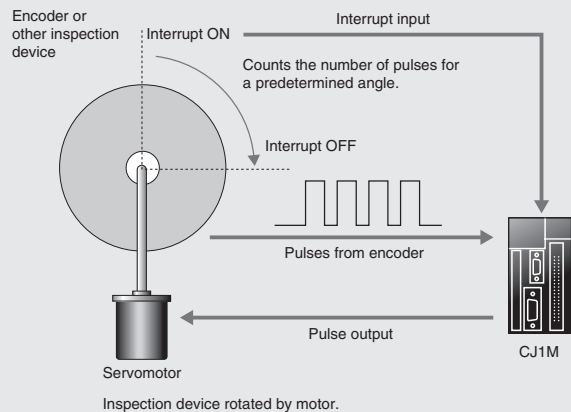
- Interrupts can be generated either on the rising or falling edge to enable accurate recording or judgement of inspection data, such as that for electronic components.



### Use Five or More Interrupt Inputs, or Use High-speed Inputs for CPU Units Other Than the CJ1M-CPU21/22/23

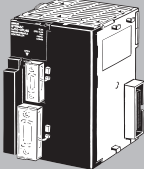
Interrupt Input Units with 16 points and High-speed Input Units with 16 points can be used with any of the CJ1-series CPU Units to add high-speed input or interrupt input capabilities to CPU Units that do not support built-in pulse I/O. High-speed Input Units read pulse signals with a minimum pulse width of 50  $\mu$ s, and Interrupt Input Units feature an interrupt response time of 370  $\mu$ s.

### ● Application Example



## A Complete Lineup to mix-and-match for your application.

**Power Supply Units**  
  
CJ1W-PA205R  
CJ1W-PA202  
CJ1W-PD025/PD022

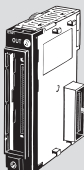
**CPU Units**  
  
CJ1H-CPU67/H66H/65H  
CJ1G-CPU45H/44H/43H/42H

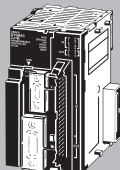
**Loop Control CPU Units**  
  
CJ1G-CPU45P/44P/43P/42P

**End Cover**  
  
CJ1W-TER01  
(included with CPU Unit)

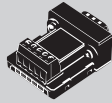
  
CJ1M-CPU11/12/13

  
CJ1M-CPU11-ETN  
CJ1M-CPU12-ETN  
CJ1M-CPU13-ETN

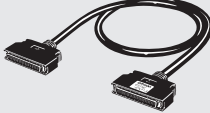
**I/O Control Unit**  
  
CJ1W-IC101 (required for Expansion Rack)

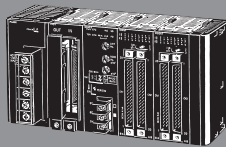
  
CPU Unit with Pulse I/O  
CJ1M-CPU21/22/23

**Memory Cards**  
  
HMC-EF372/EF672

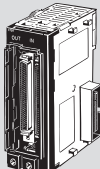
**RS-422A Adapter**  
  
CJ1W-CIF11  
(Converts RS-232C to RS-422A/485, no isolation)

**CPU Rack**  

**I/O Connecting Cables**  
  
CS1W-CN003  
(30 or 70 cm; 2, 3, 5, 10, or 12 m)

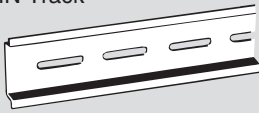
**Expansion Rack**  
  
Expansion Racks are not supported by the CJ1M-CPU12/CPU22 CPU Units.

**Power Supply Units**  
  
CJ1W-PA205R  
CJ1W-PA202  
CJ1W-PD025  
CJ1W-PD022

**I/O Interface Unit**  
  
CJ1W-II101

**End Cover**  
  
CJ1W-TER01  
(included with CPU Unit and I/O Interface Unit)

**End Plate**  
  
PFP-M  
(included with CPU Unit and I/O Interface Unit)

**DIN Track**  
  
PFP-50N/100N/100N2

**Note:** HMC-172/372/672 Memory Cards cannot be used with CS1G-CPU00H, CS1H-CPU00H, CJ1G-CPU00H, or CJ1H-CPU00H CPU Units prior to Lot No. 02108 (manufactured prior to January 8, 2002, nor with NS-7-series PTs prior to Lot. No. 0852 (manufactured prior to May 8, 2002). Check lot numbers before ordering.

Basic I/O Units (See note.)

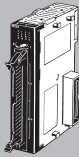
■ Input Units



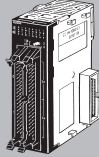
8 or 16-point  
DC Input Unit  
CJ1W-ID201/211



8 or 16-point  
AC Input Units  
CJ1W-IA111/201

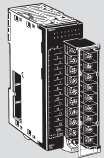


32-point  
DC Input Unit  
CJ1W-ID231  
CJ1W-ID232



64-point  
DC Input Unit  
CJ1W-ID261  
CJ1W-ID262

■ Interrupt Input Unit



16-point  
Interrupt Input Unit  
CJ1W-INT01

■ High-speed Input Unit



16-point  
High-speed Input Unit  
CJ1W-IDP01

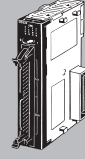
■ Output Units



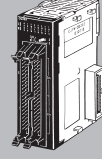
8-point  
Transistor Output Units  
CJ1W-OD201/202  
CJ1W-OD203/204



16-point  
Transistor Output Units  
CJ1W-OD211/212



32-point  
Transistor Output Unit  
CJ1W-OD231  
CJ1W-OD232/233



64-point  
Transistor Output Unit  
CJ1W-OD261  
CJ1W-OD262/263



8-point (Independent)  
Relay Contact  
Output Unit  
CJ1W-OC201

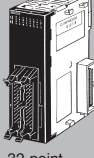


16-point  
Relay Contact  
Output Unit  
CJ1W-OC211

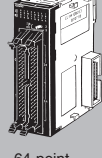


8-point  
Triac Output Unit  
CJ1W-OA201

■ I/O Units



32-point  
DC Input/Transistor  
Output Unit  
CJ1W-MD231/232/233



64-point  
DC Input/Transistor  
Output Unit  
CJ1W-MD261  
CJ1W-MD263



64-point  
TTL I/O Unit  
CJ1W-MD563

■ Temperature Sensor Units



6-channel Thermocouple  
Input Unit  
CJ1W-TS561  
6-channel RTD  
Input Unit  
CJ1W-TS562

Special I/O Units (See note.)



Analog Input Units  
CJ1W-AD081-V1  
CJ1W-AD041-V1  
(4 or 8 inputs)



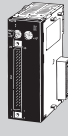
Analog Output Units  
CJ1W-DA041/021  
CJ1W-DA08V/08C  
(2, 4, or 8 outputs)



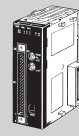
Analog I/O Unit  
CJ1W-MAD42  
(4 inputs and  
2 outputs)



CJ1W-TC□□□□  
(2 or 4 temperature  
control loops)



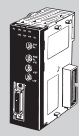
Position Control  
Units  
CJ1W-NC□□□□  
(1 to 4 axes)



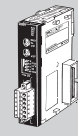
High-speed Counter  
Unit  
CJ1W-CT021  
(2 counters)



ID Sensor Units  
CJ1W-V600C1□  
(For 1 or 2 Heads)



PROFIBUS-DP  
slave Unit  
CJ1W-PRT21



CompoBus/S  
Master Unit  
CJ1W-SRM21



Process Analog  
Units  
CJ1W-PTS□□  
CJ1W-PDC11



4-Channel Counter  
Unit  
CJ1W-CTL41-E



2-Channel SSI Unit  
CJ1W-CTS21-E

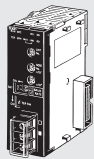
CPU Bus Units



Serial Communications Units  
CJ1W-SCU41-V1  
(RS-232C and RS-422/485)  
CJ1W-SCU21-V1 (RS-232C x 2)



Ethernet Units  
CJ1W-ETN21



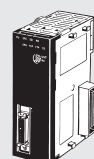
Controller Link Unit  
CJ1W-CLK21-V1



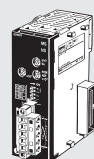
CAN Unit  
CJ1W-CORT21



Position Control Unit  
CJ1W-NCF71



PROFIBUS-DP  
master Unit  
CJ1W-PRM21



DeviceNet Units  
CJ1W-DRM21

**Note:** Most units with 18-point front connector are available with screw terminals, or with screwless terminal block.  
Units with screwless terminal block have (SL) added to the model code.

CJ1H-, CJ1G-CPU□□H, CJ1M-CPU□□

# CJ1 series CPU Units

## CJ1H-CPU6□□H CJ1G-CPU4□□H

**Memory Card Indicators**  
MCPWR (green): Lit when power is supplied to the Memory Card.  
BUSY (orange): Lit when Memory Card is being accessed.

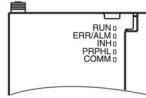
### Memory Card Power Supply Switch

Press the power supply switch to disconnect power before removing the Memory Card. Also, press the Memory Card Power Supply Switch to perform an easy backup operation.

Memory Card

**Slider**  
Secures the neighboring Unit.

### Indicators



### Peripheral Port

The peripheral port is connected to Programming Devices, such as Programming Consoles, or host computers.

### RS-232C Port

The RS-232C port is connected to Programming Devices other than Programming Consoles, host computers, general-purpose external devices, or Programmable Terminals.

### Connector

Connect to neighboring Unit by joining Connectors.

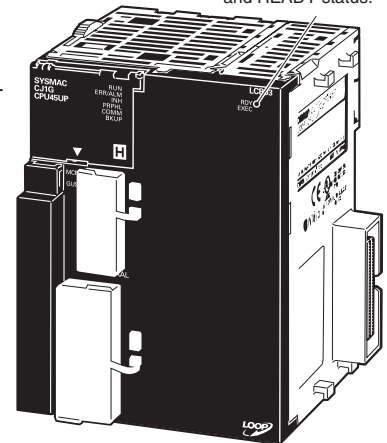
Memory Card Connector

### Memory Card Eject Button

Press the eject button to remove the Memory Card from the CPU Unit.

## CJ1-CPU□□P

**Loop Controller Element Indicators**  
Show the EXECUTING status and READY status.

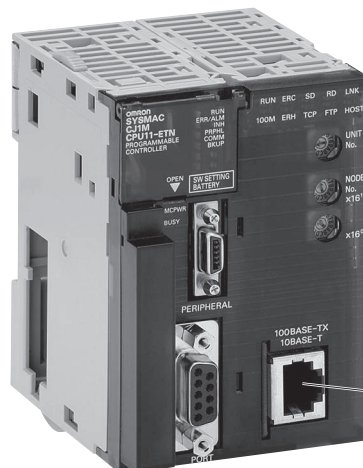
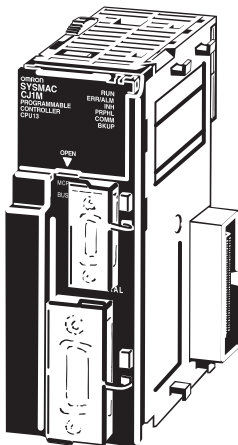


Other components are the same as the CJ1H-CPU6□□H and CJ1G-CPU4□□H CPU Units.

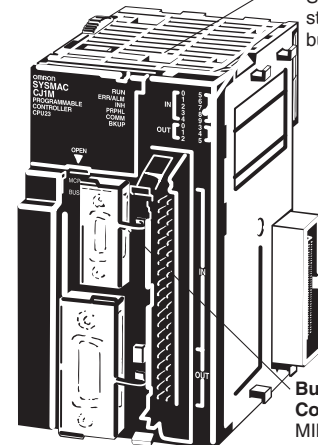
## CJ1M-CPU1□

## CJ1M-CPU1□-ETN

## CJ1M-CPU2□



**100Base-TX Ethernet Port**  
for data communication, programming, monitoring and FTP server functions



**I/O Indicators**  
Show the status of the built-in I/O.

**Built-in I/O Connector**  
MIL connector (40-pin)

Components are the same as the CJ1H-CPU6□□H and CJ1G-CPU4□□H CPU Units.

Other components are the same as the CJ1H-CPU6□□H and CJ1G-CPU4□□H CPU Units.

## CPU Units

| Model                        | I/O bits                             | Program capacity | Data memory capacity (See note.)                     | LD instruction processing speed | Built-in ports                                                                    | Options      | Built-in I/O                                 |                          |
|------------------------------|--------------------------------------|------------------|------------------------------------------------------|---------------------------------|-----------------------------------------------------------------------------------|--------------|----------------------------------------------|--------------------------|
| CJ1H-CPU67H                  | 2,560 bits (Up to 3 Expansion Racks) | 250 kSteps       | 448 kWords (DM: 32 kWords, EM: 32 kWords x 13 banks) | 0.02 μs                         | Peripheral port and RS-232C port. -ETN models include a 100Base-Tx Ethernet port. | Memory Cards | CPU□□P models include Process Control Engine |                          |
| CJ1H-CPU66H                  |                                      | 120 kSteps       | 256 kWords (DM: 32 kWords, EM: 32 kWords x 7 banks)  | 0.04 μs                         |                                                                                   |              |                                              |                          |
| CJ1H-CPU65H                  |                                      | 60 kSteps        | 128 kWords (DM: 32 kWords, EM: 32 kWords x 3 banks)  |                                 |                                                                                   |              |                                              |                          |
| CJ1G-CPU45H<br>CJ1G-CPU45P   | 1,280 bits (Up to 3 Expansion Racks) | 30 kSteps        | 64 kWords (DM: 32 kWords, EM: 32 kWords x 1 bank)    |                                 |                                                                                   |              |                                              |                          |
| CJ1G-CPU44H<br>CJ1G-CPU44P   |                                      |                  |                                                      |                                 |                                                                                   |              |                                              |                          |
| CJ1G-CPU43H<br>CJ1G-CPU43P   | 960 bits (Up to 2 Expansion Racks)   | 20 kSteps        | 32 kWords (DM: 32 kWords, EM: None)                  | 0.10 μs                         |                                                                                   |              |                                              |                          |
| CJ1G-CPU42H<br>CJ1G-CPU42P   |                                      | 10 kSteps        |                                                      |                                 |                                                                                   |              |                                              |                          |
| CJ1M-CPU13<br>CJ1M-CPU13-ETN | 640 bits (Only 1 Expansion Rack)     | 20 kSteps        | 32 kWords (DM: 32 kWords, EM: None)                  |                                 |                                                                                   |              |                                              |                          |
| CJ1M-CPU12<br>CJ1M-CPU12-ETN | 320 bits (No Expansion Rack)         | 10 kSteps        |                                                      |                                 |                                                                                   |              |                                              |                          |
| CJ1M-CPU11<br>CJ1M-CPU11-ETN | 160 bits (No Expansion Rack)         | 5 kSteps         |                                                      |                                 |                                                                                   |              |                                              |                          |
| CJ1M-CPU23                   | 640 bits (Only 1 Expansion Rack)     | 20 kSteps        |                                                      |                                 |                                                                                   |              |                                              |                          |
| CJ1M-CPU22                   | 320 bits (No Expansion Rack)         | 10 kSteps        |                                                      |                                 |                                                                                   |              |                                              |                          |
| CJ1M-CPU21                   | 160 bits (No Expansion Rack)         | 5 kSteps         |                                                      |                                 |                                                                                   |              |                                              |                          |
|                              |                                      |                  |                                                      |                                 |                                                                                   |              |                                              | Inputs: 10<br>Outputs: 6 |

**Note:** The available data memory capacity is the sum of the Data Memory (DM) and the Extended Data Memory (EM).

### Common Specifications

| Item                                      | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Control method                            | Stored program                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| I/O control method                        | Cyclic scan and immediate processing are both possible.                                                                                                                                                                                                                                                                                                                                                                                                             |
| Programming                               | Ladder diagram                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Instruction length                        | 1 to 7 steps per instruction                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Ladder instructions                       | Approx. 400 (3-digit function codes)                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Execution time                            | Basic instructions: 0.02 µs min.; Special instructions: 0.04 µs min.                                                                                                                                                                                                                                                                                                                                                                                                |
| Overhead time                             | CJ1G/H-CPU□□H: 0.3 ms<br>CJ1G-CPU□□P: 0.3ms<br>CJ1M-CPU□□(-ETN): 0.5 ms<br>CJ1M-CPU□□1(-ETN): 0.7 ms                                                                                                                                                                                                                                                                                                                                                                |
| Unit connection method                    | No backplane (Units joined together with connectors.)                                                                                                                                                                                                                                                                                                                                                                                                               |
| Mounting method                           | DIN rail mounting (screw mounting not supported)                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Maximum number of connectable Units       | Per CPU or Expansion Rack: 10 Units max. (Basic I/O Units, Special I/O Units, or CPU Bus Units)<br>Total per PLC: 10 Units on CPU Rack and 10 Units each on 3 Expansion Racks = 40 Units max. (See note.)                                                                                                                                                                                                                                                           |
| Maximum number of Expansion Racks         | 3 max. (A CJ-series I/O Control Unit is required on the CPU Rack and a CJ-series I/O Interface Unit is required on each Expansion Rack.) (See note.)                                                                                                                                                                                                                                                                                                                |
| Number of tasks                           | 288 (cyclic tasks: 32, interrupt tasks: 256)<br>Interrupt tasks can be defined as cyclic tasks to create cyclic interrupt tasks.<br><b>Note:</b> 1. Cyclic tasks are executed each cycle and are controlled with TKON(820) and TKOF(821) instructions.<br>2. The following 4 types of interrupt tasks are supported:<br>Power OFF interrupt task: 1 max.<br>Scheduled interrupt tasks: 2 max.<br>I/O interrupt tasks: 32 max.<br>External interrupt tasks: 256 max. |
| Interrupt types                           | Scheduled Interrupts: Interrupts generated at a time scheduled by CPU Unit's built-in timer (Interval: 1 to 9,999 ms or 10 to 99,990 ms; also 0.5 to 999.9 ms with CJ1M)<br>I/O interrupt tasks: Interrupts from Interrupt Input Units or, with CJ1M, built-in I/O<br>Power OFF Interrupts: Interrupts executed when CPU Unit's power is turned OFF<br>External interrupt tasks: Interrupts from Special I/O Units and CPU Bus Units                                |
| Calling subroutines from multiple tasks   | Supported using global subroutines.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Functions Blocks (CPU Ver. 3.0 or higher) | Languages supported for use in function block programming: Ladder program language and IEC 61131-3 Structured Text.                                                                                                                                                                                                                                                                                                                                                 |

**Note:** The CJ1G-CPU43H/42H support a maximum of 2 Expansion Racks with a total maximum of 30 Units.  
The CJ1M-CPU13/23 support only 1 Expansion Rack with a total maximum of 20 Units (19 Units for CJ1M-CPU13-ETN).  
The CJ1M-CPU11/12/21/22 do not support Expansion Racks and support a total maximum of 10 Units (9 Units for CJ1M-CPU11/CPU12-ETN).

| Item                |                                   | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CIO (Core I/O) Area | I/O Area                          | 2,560 (160 words): CIO 000000 to CIO 015915 (words CIO 0000 to CIO 0159)<br>Setting of first rack words can be changed from default (CIO 0000) so that CIO 0000 to CIO 0999 can be used.<br>I/O bits are allocated to Basic I/O Units.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                     | Built-in I/O Area                 | 10 points, Inputs: CIO 296000 to CIO 296009, Outputs: CIO 296100 to CIO 296105<br>Used for built-in I/O, CJ1M-CPU22/23 only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                     | Link Area                         | 3,200 (200 words): CIO 100000 to CIO 119915 (words CIO 1000 to CIO 1199)<br>Link bits are used for data links and are allocated to Units in Controller Link Systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                     | CPU Bus Unit Area                 | 6,400 (400 words): CIO 150000 to CIO 189915 (words CIO 1500 to CIO 1899)<br>CPU Bus Unit bits store the operating status of CPU Bus Units. (25 words per Unit, 16 Units max.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                     | Special I/O Unit Area             | 15,360 (960 words): CIO 200000 to CIO 295915 (words CIO 2000 to CIO 2959)<br>Special I/O Unit bits are allocated to Special I/O Units. (10 words per Unit, 96 Units max.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                     | Serial PLC Link Area              | 90 words, CIO 3100 to CIO 3189 (bits CIO 310000 to CIO 318915)<br>Used for data links in serial PLC links, CJ1M only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                     | DeviceNet Area / PROFIBUS-DP Area | 9,600 (600 words): CIO 320000 to CIO 379915 (words CIO3200 to CIO 3799)<br>DeviceNet bits are allocated to Slaves for DeviceNet Unit remote I/O communications when the master function is used with fixed allocations.<br>Fixed allocation setting 1Outputs:CIO 3200 to CIO 3263<br>Inputs:CIO 3300 to CIO 3363<br>Fixed allocation setting 2Outputs:CIO 3400 to CIO 3463<br>Inputs:CIO 3500 to CIO 3563<br>Fixed allocation setting 3Outputs:CIO 3600 to CIO 3663<br>Inputs:CIO 3700 to CIO 3763<br>The following words are allocated to the master function even when the DeviceNet Unit is used as a slave.<br>Fixed allocation setting 1Outputs:CIO 3370 (master to slave)<br>Inputs:CIO 3270 (slave to master)<br>Fixed allocation setting 2Outputs:CIO 3570 (master to slave)<br>Inputs:CIO 3470 (slave to master)<br>Fixed allocation setting 3Outputs:CIO 3770 (master to slave)<br>Inputs:CIO 3670 (slave to master) |
|                     | Internal I/O Area (work bits)     | 4,800 (300 words):CIO 120000 to CIO 149915 (words CIO 1200 to CIO 1499)<br>37,504 (2,344 words):CIO 380000 to CIO 614315 (words CIO 3800 to CIO 6143)<br>These bits in CIO Area are used as work bits in programming to control program execution. They cannot be used for external I/O.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Work Area           |                                   | 8,192 bits (512 words): W00000 to W51115 (words W000 to W511)<br>Control programs only. (I/O from external I/O terminals is not possible.)<br><b>Note:</b> When using work bits in programming, use bits in Work Area first before using bits from other areas.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Holding Area        |                                   | 8,192 bits (512 words): H00000 to H51115 (words H000 to H511)<br>Holding bits are used to control execution of program, and maintain their ON/OFF status when PLC is turned OFF or operating mode is changed. In CPU Ver.3.0 and higher, Words H512 to H1535 exist, but are internally allocated as Function Block Holding Area and cannot be used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Auxiliary Area      |                                   | Read only: 7,168 bits (448 words): A00000 to A44715 (words A000 to A447)<br>Read/write: 8,192 bits (512 words): A44800 to A95915 (words A448 to A959)<br>Auxiliary bits are allocated specific functions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Temporary Area      |                                   | 16 bits (TR00 to TR15) Temporary bits are used to store ON/OFF execution conditions at program branches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Timer Area          |                                   | 4,096: T0000 to T4095 (used for timers only)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Counter Area        |                                   | 4,096: C0000 to C4095 (used for counters only)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| DM Area             |                                   | 32 kWords: D00000 to D32767<br>Used as a general-purpose data area for reading and writing data in word units (16 bits). Words in DM Area maintain their status when PLC is turned OFF or operating mode is changed.<br>Internal Special I/O Unit DM Area: D20000 to D29599 (100 words × 96 Units). Used to set parameters for Special I/O Units.<br>CPU Bus Unit DM Area: D30000 to D31599 (100 words × 16 Units). Used to set parameters for CPU Bus Units.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| EM Area             |                                   | 32 kWords per bank, 7 banks max.: E0_00000 to E6_32767 max. (Not supported by CJ1M CPU Units.)<br>Used as a general-purpose data area for reading and writing data in word units (16 bits). Words in EM Area maintain their status when PLC is turned OFF or operating mode is changed.<br>The EM Area is divided into banks, and addresses can be set by either of following methods.<br>Changing current bank using EMBC(281) instruction and setting addresses for current bank.<br>Setting bank numbers and addresses directly.<br>EM data can be stored in files by specifying number of first bank. (EM file memory)                                                                                                                                                                                                                                                                                                     |
| Index Registers     |                                   | IR0 to IR15. Store PLC memory addresses for indirect addressing. Index registers can be used independently in each task. One register is 32 bits (2 words).<br>Index registers can be specified as shared or independent for each task.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Task Flag Area      |                                   | 32 (TK0000 to TK0031). Task Flags are read-only flags that are ON when corresponding cyclic task is executable and OFF when corresponding task is not executable or in standby status.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Trace Memory        |                                   | 4,000 words (trace data: 31 bits, 6 words)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| File Memory         |                                   | Memory Cards: OMRON Memory Cards with 15-MB, 30-MB, or 64-MB capacities can be used. (MS-DOS format).<br>EM file memory: Part of EM Area can be converted to file memory (MS-DOS format).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Function Specifications

| Item                                             | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Constant cycle time                              | 1 to 32,000 ms (Unit: 1 ms)<br><b>Note:</b> With the CJ1G/H-CPU□□H, using the Parallel Processing Mode will create a constant cycle time for program execution.                                                                                                                                                                                                                                                                                                                                                                                         |
| Cycle time monitoring                            | Possible (Unit stops operating if cycle is too long): 1 to 40,000 ms (Unit: 10 ms)<br><b>Note:</b> When the Parallel Processing Mode is used for the CJ1G/H-CPU□□H, the program execution cycle is monitored. Also, a fatal error will occur in the CPU Unit if the peripheral servicing time exceeds 2 s.                                                                                                                                                                                                                                              |
| I/O refreshing                                   | Cyclic refreshing, immediate refreshing, refreshing by IORF(097).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Special refreshing for CPU Bus Units             | Data links for Control Link Units, remote I/O communications for DeviceNet Units, and other special data for CPU Bus Units is refreshed at the following times.<br>During I/O refresh period or when CPU BUS UNIT I/O REFRESH (DLNK) instruction is executed.                                                                                                                                                                                                                                                                                           |
| I/O memory holding when changing operating modes | Depends on ON/OFF status of IOM Hold Bit in Auxiliary Area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Load OFF                                         | All outputs on Output Units can be turned OFF when the CPU Unit is RUN, MONITOR, or PROGRAM mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Input time constant setting                      | Time constants can be set for inputs from CJ-series Basic I/O Units. The time constant can be increased to reduce influence of noise and chattering or it can be decreased to detect shorter pulses on inputs.                                                                                                                                                                                                                                                                                                                                          |
| Operating mode setting at power-up               | Possible (By default, the CPU Unit will start in RUN mode if a Programming Console is not connected.)                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Built-in flash memory                            | <ul style="list-style-type: none"> <li>Always stores (automatically backs up/restores) the user program and parameter area data (PLC Setup, etc.)</li> <li>When downloading projects from the CX-Programmer Ver. 5.0 or later, symbol table files (including CX-Programmer symbol names and I/O comments), comment files (CX-Programmer rung comments and annotations), and program index files (CX-Programmer section names, section comments, and program comments) are stored in the flash memory's internal Comment Memory (See note 1).</li> </ul> |
| Memory Card functions                            | Automatically reading programs (autoboot) from the Memory Card when the power is turned ON.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                  | Possible                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                  | Program replacement during PLC operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                  | Possible                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Memory Card storage data                         | User program: Program file format<br>PLC Setup and other parameters: Data file format<br>I/O memory: Data file format (binary), text format, CSV format<br>CPU Bus Unit data: Special format                                                                                                                                                                                                                                                                                                                                                            |
|                                                  | Memory Card read/write method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Memory Card read/write method                    | User program instructions, Programming Devices (including CX-Programmer and Programming Console), Host Link computers, AR Area control bits, easy backup operation                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Filing                                           | Memory Card data and EM (Extended Data Memory) Area can be handled as files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Debugging                                        | Force-set/reset, differential monitoring, data tracing (scheduled, each cycle, or when instruction is executed)                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Online editing                                   | One or more program blocks in user programs can be overwritten when CPU Unit is in PROGRAM or MONITOR mode. This function is not available for block programming areas. With the CX-Programmer, more than one program block can be edited at the same time.                                                                                                                                                                                                                                                                                             |
| Program protection                               | Overwrite protection: Set using DIP switch.<br>Copy protection: Password set using CX-Programmer.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Error check                                      | User-defined errors (i.e., user can define fatal errors and non-fatal errors)<br>The FPD(269) instruction can be used to check execution time and logic of each programming block.<br>Error status can be simulated with the FAL and FALS instructions.                                                                                                                                                                                                                                                                                                 |
| Error log                                        | Up to 20 errors are stored in error log. Information includes error code, error details, and time error occurred.<br>The system can be set so that user-defined FAL errors are not stored in the error log.                                                                                                                                                                                                                                                                                                                                             |
| Serial communications                            | Built-in peripheral port: Programming Device (e.g., CX-Programmer or Programming Console), Host Links, NT Links<br>Built-in RS-232C port: Programming Device (e.g., CX-Programmer), Host Links, no-protocol communications, NT Links, Serial PLC Links (CJ1M only)                                                                                                                                                                                                                                                                                      |
|                                                  | Serial Communications Unit (sold separately): Protocol macros, Host Links, NT Links                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Clock                                            | Provided on all models. Accuracy: $\pm 1.5$ min/mo. at 25°C (accuracy varies with the temperature)<br><b>Note:</b> Used to store time when power is turned ON and when errors occur.                                                                                                                                                                                                                                                                                                                                                                    |
| Power OFF detection time                         | 10 to 25 ms (not fixed)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Power OFF detection delay time                   | 0 to 10 ms (user-defined, default: 0 ms)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Memory protection                                | Held Areas: Holding bits, user program, Data Memory, Extended Data Memory, and status of counter Completion Flags and present values.<br><b>Note:</b> If IOM Hold Bit in Auxiliary Area is turned ON, and PLC Setup is set to maintain IOM Hold Bit status when power to PLC is turned ON, contents of CIO Area, Work Area, part of Auxiliary Area, timer Completion Flag and PVs, Index Registers, and Data Registers will be saved for up to 20 days.                                                                                                 |
| Sending commands to a Host Link computer         | FINS commands can be sent to a computer connected via Host Link System by executing Network Communications Instructions from PLC.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Remote programming and monitoring                | Host Link communications can be used for remote programming and remote monitoring through a Controller Link System or Ethernet network.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Eight-level communications (See note 2.)         | Host Link communications can be used for remote programming and remote monitoring from devices on networks up to eight levels away (Controller Link Network, Ethernet Network, or other network). CPU Ver. 2.0 or higher. Older CPUs support up to three levels.                                                                                                                                                                                                                                                                                        |
| Storing comments in CPU Unit                     | I/O comments can be stored in Memory Cards, EM file memory, or (Ver. 3.0 and higher) in the comment memory (See note 3.) integrated in the CPU.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Program check                                    | Program checks are performed for items such as no END instruction and instruction errors. CX-Programmer can also be used to check programs.                                                                                                                                                                                                                                                                                                                                                                                                             |
| Control output signals                           | RUN output: The internal contacts will turn ON (close) while the CPU Unit is operating (CJ1W-PA205R).                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Battery life                                     | 5 years at 25°C (The battery life depends on the ambient operating temperature; 0.75 years min. for CJ1H/G, 1.5 years min. for CJ1M) (See note 4.)                                                                                                                                                                                                                                                                                                                                                                                                      |
| Self-diagnostics                                 | CPU errors (watchdog timer), I/O bus errors, memory errors, and battery errors                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Other functions                                  | Storage of number of times power has been interrupted. (Stored in A514.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Note:** 1. Supported for CPU Unit Ver. 3.0 or later only.

2. Supported for CPU Unit Ver. 2.0 or later only (Three-level communications are supported for Pre-Ver. 2.0 CPU Units.)

3. Supported for CX-Programmer Ver. 5.0 and CPU Unit Ver. 3.0 or later only.

4. Use a Replacement Battery that is within two years of its date of manufacture.

## Power Supply Unit Specifications

| Power Supply Unit                      | CJ1W-PA205R                                                                                                                                                                                 | CJ1W-PA202                                                                                                                                           | CJ1W-PD025                                      | CJ1W-PD022                                      |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Supply voltage                         | 100 to 240 V AC (wide-range), 50/60 Hz                                                                                                                                                      |                                                                                                                                                      | 24 V DC                                         | 24 V DC                                         |
| Operating voltage and frequency ranges | 85 to 264 V AC, 47 to 63 Hz                                                                                                                                                                 |                                                                                                                                                      | 19.2 to 28.8 V DC                               | 21.6 to 26.4 V DC                               |
| Power consumption                      | 100 VA max.                                                                                                                                                                                 | 50 VA max.                                                                                                                                           | 50 W max.                                       | 35 W max.                                       |
| Inrush current (See note 1.)           | At 100 to 120 V AC:<br>15 A/8 ms max. for cold start at room temperature<br>At 200 to 240 V AC:<br>30 A/8 ms max. for cold start at room temperature                                        | At 100 to 120 V AC:<br>20 A/8 ms max. for cold start at room temperature<br>At 200 to 240 V AC:<br>40 A/8 ms max. for cold start at room temperature | At 24 V DC:<br>30 A/20 ms max. for cold start   | At 24 V DC:<br>30 A/20 ms max. for cold start   |
| Output capacity                        | 5.0 A, 5 V DC<br>(including supply to CPU Unit)                                                                                                                                             | 2.8 A, 5 V DC<br>(including supply to CPU Unit)                                                                                                      | 5.0 A, 5 V DC<br>(including supply to CPU Unit) | 2.0 A, 5 V DC<br>(including supply to CPU unit) |
|                                        | 0.8 A, 24 V DC<br>Total: 25 W max.                                                                                                                                                          | 0.4 A, 24 V DC<br>Total: 14 W max.                                                                                                                   | 0.8 A, 24 V DC<br>Total: 25 W max.              | 0.4 A 24 V DC.<br>Total 16.6 W max.             |
| Power supply output terminals          | None                                                                                                                                                                                        |                                                                                                                                                      |                                                 |                                                 |
| RUN output (See note 2.)               | Contact configuration: SPST-NO<br>Switching capacity: 250 V AC, 2 A (resistive load)<br>120 V AC, 0.5 A (inductive load),<br>24 V DC, 2 A (resistive load)<br>24 V DC, 2 A (inductive load) | Not provided                                                                                                                                         |                                                 | Not provided                                    |
| Insulation resistance                  | 20 M $\Omega$ min. (at 500 V DC) between AC external and GR terminals (See note 3.)                                                                                                         | 20 MW min. (at 500 V DC) between DC external and GR terminals (See note 3.)                                                                          |                                                 | No Isolation                                    |

**Note: 1.** The values for inrush current given above for AC power supplies are for a cold start at room temperature. The values given for DC power supplies are for a cold start. The inrush control circuit in AC power supplies uses a thermistor element with a low-temperature current control characteristic. If the ambient temperature is high or the PC is hot-started, the thermistor will not be sufficiently cool, and the inrush currents given in the table may be exceeded by up to twice the given values. The inrush control circuit in DC power supplies uses a capacitor-charging delay circuit. If the PC is hot-started, the capacitor will have not discharged, and the inrush currents given in the table may be exceeded by up to twice the given values. When selecting fuses or breakers for external circuits, allow sufficient margin in shut-off performance.

- Supported only when mounted to CPU Rack.
- 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.

## General Specifications

| Item                          | Specifications                                                                                                                                                                                                                               |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dielectric strength           | 2,300 V AC 50/60 Hz for 1 min between AC external and GR terminals (See note 1.)                                                                                                                                                             |
|                               | Leakage current: 10 mA max.                                                                                                                                                                                                                  |
|                               | 1,000 V AC 50/60 Hz for 1 min between AC external and GR terminals (See note 1.)                                                                                                                                                             |
|                               | Leakage current: 10 mA max.                                                                                                                                                                                                                  |
| Noise immunity                | 2 kV on power supply line (conforming to IEC61000-4-4)                                                                                                                                                                                       |
| Vibration resistance          | 10 to 57 Hz, 0.075-mm amplitude, 57 to 150 Hz, acceleration: 9.8 m/s <sup>2</sup> in X, Y, and Z directions for 80 minutes (Time coefficient: 8 minutes x coefficient factor 10 = total time 80 min.) (according to IEC 60068-2-6/JIS C0040) |
| 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 IEC 60068-2-27/JIS C0041)                                                                                             |
| 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 75°C (excluding battery)                                                                                                                                                                                                              |
| Grounding                     | Less than 100 $\Omega$                                                                                                                                                                                                                       |
| Enclosure                     | Mounted in a panel.                                                                                                                                                                                                                          |
| Safety measures               | Conforms to cULus and EC Directives.                                                                                                                                                                                                         |

**Note: 1.** 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.

## Additional CJ1M-CPU21/22/23 Specifications

## Data Area Allocations for Built-in I/O

| I/O Code      |                         |                                       | IN0                                             | IN1                                   | IN2                                             | IN3                                            | IN4                                            | IN5                                                       | IN6                                                           | IN7                                                       | IN8                                                           | IN9 | OUT1                     | OUT2                     | OUT3                       | OUT4                       | OUT5                                         | OUT6                                         |
|---------------|-------------------------|---------------------------------------|-------------------------------------------------|---------------------------------------|-------------------------------------------------|------------------------------------------------|------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------|-----|--------------------------|--------------------------|----------------------------|----------------------------|----------------------------------------------|----------------------------------------------|
|               |                         | Address                               | CIO 2960                                        |                                       |                                                 |                                                |                                                |                                                           |                                                               |                                                           |                                                               |     | CIO 2961                 |                          |                            |                            |                                              |                                              |
|               |                         | Bit                                   | 00                                              | 01                                    | 02                                              | 03                                             | 04                                             | 05                                                        | 06                                                            | 07                                                        | 08                                                            | 09  | 00                       | 01                       | 02                         | 03                         | 04                                           | 05                                           |
| Inputs        | General-purpose inputs  | General-purpose input 0               | General-purpose input 1                         | General-purpose input 2               | General-purpose input 3                         | General-purpose input 4                        | General-purpose input 5                        | General-purpose input 6                                   | General-purpose input 7                                       | General-purpose input 8                                   | General-purpose input 9                                       | --- | ---                      | ---                      | ---                        | ---                        | ---                                          |                                              |
|               | Interrupt inputs        | Interrupt input 0                     | Interrupt input 1                               | Interrupt input 2                     | Interrupt input 3                               | ---                                            | ---                                            | ---                                                       | ---                                                           | ---                                                       | ---                                                           | --- | ---                      | ---                      | ---                        | ---                        | ---                                          |                                              |
|               | Quick-response inputs   | Quick-response input 0                | Quick-response input 1                          | Quick-response input 2                | Quick-response input 3                          | ---                                            | ---                                            | ---                                                       | ---                                                           | ---                                                       | ---                                                           | --- | ---                      | ---                      | ---                        | ---                        | ---                                          |                                              |
|               | High-speed counters     | ---                                   | ---                                             | High-speed counter 1 (phase-Z/reset)  | High-speed counter 0 (phase-Z/reset)            | ---                                            | ---                                            | High-speed counter 1 (phase-A, increment, or count input) | High-speed counter 1 (phase-B, decrement, or direction input) | High-speed counter 0 (phase-A, increment, or count input) | High-speed counter 0 (phase-B, decrement, or direction input) | --- | ---                      | ---                      | ---                        | ---                        | ---                                          |                                              |
| Outputs       | General-purpose outputs | ---                                   | ---                                             | ---                                   | ---                                             | ---                                            | ---                                            | ---                                                       | ---                                                           | ---                                                       | ---                                                           | --- | General-purpose output 0 | General-purpose output 1 | General-purpose output 2   | General-purpose output 3   | General-purpose output 4                     | General-purpose output 5                     |
|               | Pulse outputs           | CW/CCW outputs                        | ---                                             | ---                                   | ---                                             | ---                                            | ---                                            | ---                                                       | ---                                                           | ---                                                       | ---                                                           | --- | Pulse output 0 (CW)      | Pulse output 1 (CCW)     | Pulse output 1 (CW)        | Pulse output 1 (CCW)       | ---                                          | ---                                          |
|               |                         | Pulse + direction outputs             | ---                                             | ---                                   | ---                                             | ---                                            | ---                                            | ---                                                       | ---                                                           | ---                                                       | ---                                                           | --- | Pulse output 0 (pulse)   | Pulse output 1 (pulse)   | Pulse output 0 (direction) | Pulse output 1 (direction) | ---                                          | ---                                          |
|               |                         | Variable duty ratio outputs           | ---                                             | ---                                   | ---                                             | ---                                            | ---                                            | ---                                                       | ---                                                           | ---                                                       | ---                                                           | --- | ---                      | ---                      | ---                        | ---                        | PWM(891) output 0                            | PWM(891) output 1 (See note.)                |
| Origin search |                         | Origin search 0 (Origin Input Signal) | Origin search 0 (Origin Proximity Input Signal) | Origin search 1 (Origin Input Signal) | Origin search 1 (Origin Proximity Input Signal) | Origin search 0 (Positioning Completed Signal) | Origin search 1 (Positioning Completed Signal) | ---                                                       | ---                                                           | ---                                                       | ---                                                           | --- | ---                      | ---                      | ---                        | ---                        | Origin search 0 (Error Counter Reset Output) | Origin search 1 (Error Counter Reset Output) |

**Note: 1.** CJ1M-CPU21 CPU Units have one PWM output only and do not have PWM output 1.

## Built-in Input Specifications

## Interrupt Inputs and Quick-response Inputs

| Item                                          |                               | Specification                                                                                                                                                                                                                                                           |
|-----------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of interrupt inputs/quick-response inputs |                               | 4 total                                                                                                                                                                                                                                                                 |
| Input interrupts                              | Direct (Input Interrupt) Mode | Execution of an interrupt task is started at the interrupt input's rising or falling edge. Interrupt numbers 140 to 143 are used (fixed).<br>Response time from meeting input condition to start of interrupt task execution: 93 $\mu$ s min.                           |
|                                               | High-speed Counter Mode       | Rising or falling edges of the interrupt are counted using either an incrementing or decrementing counter, and an interrupt task is started when the input count reaches the set value. Interrupt numbers 140 to 143 are used (fixed).<br>I/O response frequency: 1 kHz |
| Quick-response inputs                         |                               | Signals that are shorter than the cycle time (30 $\mu$ s min.) can be read and treated the same as signals that are one for more than one cycle time.                                                                                                                   |

## High-speed Counter Inputs

| Item                                     |                         | Specification                                                                                                                                                                                                                                                                                                                                                                                                     |                                                       |                                                                         |                                                   |
|------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------|
| Number of high-speed counters            |                         | 2 (High-speed counters 0 and 1)                                                                                                                                                                                                                                                                                                                                                                                   |                                                       |                                                                         |                                                   |
| Pulse input mode (Selected in PLC Setup) |                         | Differential phase inputs (phase-A, phase-B, and phase-Z input)                                                                                                                                                                                                                                                                                                                                                   | Up/down inputs (up inputs, down inputs, reset inputs) | Pulse + direction inputs (pulse inputs, direction inputs, reset inputs) | Increment inputs (increment inputs, reset inputs) |
| Response frequency                       | Line-driver inputs      | 50 kHz                                                                                                                                                                                                                                                                                                                                                                                                            | 100 kHz                                               | 100 kHz                                                                 | 100 kHz                                           |
|                                          | 24-V DC inputs          | 30 kHz                                                                                                                                                                                                                                                                                                                                                                                                            | 60 kHz                                                | 60 kHz                                                                  | 60 kHz                                            |
| Counting mode                            |                         | Linear mode or Ring mode (Select in the PLC Setup.)                                                                                                                                                                                                                                                                                                                                                               |                                                       |                                                                         |                                                   |
| Count value                              |                         | Linear mode: 80000000 to 7FFFFFFF hex<br>Ring mode: 00000000 to Ring SV<br>(The Ring SV is set in the PLC Setup and the setting range is 00000001 to FFFFFFFF hex.)                                                                                                                                                                                                                                               |                                                       |                                                                         |                                                   |
| High-speed counter PV storage locations  |                         | High-speed counter 0: A271 (leftmost 4 digits) and A270 (rightmost 4 digits)<br>High-speed counter 1: A273 (leftmost 4 digits) and A272 (rightmost 4 digits)<br>Target value comparison interrupts or range comparison interrupts can be executed based on these PVs. The PVs are refreshed in the overseeing processes at the beginning of each cycle. Use the PRV(881) instruction to read the most recent PVs. |                                                       |                                                                         |                                                   |
| Control method                           | Target value comparison | Up to 48 target values and corresponding interrupt task numbers can be registered.                                                                                                                                                                                                                                                                                                                                |                                                       |                                                                         |                                                   |
|                                          | Range comparison        | Up to 8 ranges can be registered, with an upper limit, lower limit, and interrupt task number for each.                                                                                                                                                                                                                                                                                                           |                                                       |                                                                         |                                                   |
| Counter reset method                     |                         | Phase-Z + Software reset: Counter is reset when phase-Z input goes ON while Reset Bit is ON.<br>Software reset: Counter is reset when Reset Bit goes ON.<br>Reset Bits: High-speed Counter 0 Reset Bit is A53100, Counter 1 Reset Bit is A53101.                                                                                                                                                                  |                                                       |                                                                         |                                                   |

## Built-in Output Specifications

### Position Control and Speed Control

| Item                                             | Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output frequency                                 | 1 Hz to 100 kHz (1-Hz units from 1 to 100 Hz, 10-Hz units from 100 Hz to 4 kHz, and 100-Hz units from 4 to 100 kHz)                                                                                                                                                                                                                                                                                                                                                                                     |
| Frequency acceleration and deceleration rates    | Set in 1 Hz units for acceleration/deceleration rates from 1 Hz to 2 kHz (every 4 ms). The acceleration and deceleration rates can be set separately only with PLS2(887).                                                                                                                                                                                                                                                                                                                               |
| Changing SVs during instruction execution        | The target frequency, acceleration/deceleration rate, and target position can be changed. Changes to the target frequency and acceleration/deceleration rate must be made at constant speed.                                                                                                                                                                                                                                                                                                            |
| Pulse output method                              | CW/CCW inputs or Pulse + direction inputs                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Number of output pulses                          | Relative coordinates: 00000000 to 7FFFFFFF hex (Each direction accelerating or decelerating: 2,147,483,647)<br>Absolute coordinates: 80000000 to 7FFFFFFF hex (-2,147,483,648 to 2,147,483,647)                                                                                                                                                                                                                                                                                                         |
| Instruction used for origin searches and returns | ORIGIN SEARCH (ORG(889)): Origin search and origin return operations according to set parameters                                                                                                                                                                                                                                                                                                                                                                                                        |
| Instructions used for position and speed control | PULSE OUTPUT (PLS2(887)): Trapezoidal output control with separate acceleration and deceleration rate<br>SET PULSES (PULS(886)): Setting the number of pulses for pulse output<br>SPEED OUTPUT ((SPED(885): Pulse output without acceleration or deceleration (Number of pulses must be set in advance with PULS(886) for position control.)<br>ACCELERATION CONTROL (ACC(888)): Changes frequency or pulse output with acceleration and deceleration<br>MODE CONTROL (INI(880)): Stopping pulse output |
| Pulse output PV's storage location               | The following Auxiliary Area words contain the pulse output PVs:<br>Pulse output 0: A277 (leftmost 4 digits) and A276 (rightmost 4 digits)<br>Pulse output 1: A279 (leftmost 4 digits) and A278 (rightmost 4 digits)<br>The PVs are refreshed during regular I/O refreshing. PVs can be read to user-specified words with the PRV(881) instruction.                                                                                                                                                     |

### Variable-duty Pulse Outputs (PWM)

| Item        | Specifications                                                                 |
|-------------|--------------------------------------------------------------------------------|
| Duty ratio  | 0% to 100%, set in 0.1% units (See note.)                                      |
| Frequency   | 0.1 Hz to 999.9 Hz, Set in 0.1 Hz units.                                       |
| Instruction | PULSE WITH VARIABLE DUTY RATIO (PWM(891)): Sets duty ratio and outputs pulses. |

**Note:** CJ1M CPU Unit Ver. 2.0 or later only. (0% to 100%, set in 1% units for Pre-Ver. 2.0 CPU Units.)

## Hardware Specifications

### Input Specifications

| Item                                        | Specifications                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of inputs                            | 10 inputs                                                                                                                                                                                                                                                                                                                     |
| Input method                                | 24-V DC inputs or line driver (wiring changed to select)                                                                                                                                                                                                                                                                      |
| Input voltage specifications                | 24 V DC                                                                                                                                                                                                                                                                                                                       |
| Terminals                                   | IN0 to IN5      IN6 to IN9      IN0 to IN5      IN6 to IN9                                                                                                                                                                                                                                                                    |
| Input voltage                               | 20.4 to 26.4 V DC      RS-422A or RS-422 line driver (conforming to AM26LS31), Power supply voltage of 5 V $\pm$ 5%                                                                                                                                                                                                           |
| Input impedance                             | 3.6 k $\Omega$ 4.0 k $\Omega$ ---      ---                                                                                                                                                                                                                                                                                    |
| Input current (typical)                     | 6.2 mA      4.1 mA      13 mA      10 mA                                                                                                                                                                                                                                                                                      |
| Minimum ON voltage                          | 17.4 V DC/3 mA min.      ---      ---                                                                                                                                                                                                                                                                                         |
| Maximum OFF voltage                         | 5.0 V DC/1 mA max.      ---      ---                                                                                                                                                                                                                                                                                          |
| Response speed (for general-purpose inputs) | ON response time: Default setting: 8 ms max. (The input time constant 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.)<br>OFF response time: Default setting: 8 ms max. (The input time constant 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.) |

### Input Circuit Configuration

| Item                  | Specification              |
|-----------------------|----------------------------|
| Input                 | IN0 to IN5      IN6 to IN9 |
| Circuit configuration |                            |

General-purpose Output Specifications for Transistor Outputs (Sinking)

| Item                    | Specification                |              |
|-------------------------|------------------------------|--------------|
| Output                  | OUT0 to OUT3                 | OUT4 to OUT5 |
| Rated voltage           | 5 to 24 V DC                 |              |
| Allowable voltage range | 4.75 to 26.4 V DC            |              |
| Max. switching capacity | 0.3 A/output; 1.8 A/Unit     |              |
| Number of circuits      | 6 outputs (6 outputs/common) |              |
| Max. inrush current     | 3.0 A/output, 10 ms max.     |              |
| Leakage current         | 0.1 mA max.                  |              |
| Residual voltage        | 0.6 V max.                   |              |
| ON delay                | 0.1 ms max.                  |              |
| OFF delay               | 0.1 ms max.                  |              |
| Fuse                    | None                         |              |
| External power supply   | 10.2 to 26.4 V DC 50 mA min. |              |
| Circuit configuration   |                              |              |

Pulse Output Specifications (OUT0 to OUT3)

| Item                    | Specifications           |
|-------------------------|--------------------------|
| Max. switching capacity | 30 mA, 4.75 to 26.4 V DC |
| Min. switching capacity | 7 mA, 4.75 to 26.4 V DC  |
| Max. output frequency   | 100 kHz                  |
| Output waveform         |                          |

# CJ1G-CPU□□P (Loop-control CPU Units) Specifications

## Providing Effective Solutions by Integrating Sequence Control and Loop Control into the Same Basic Functionality of the CJ Series

### Overview

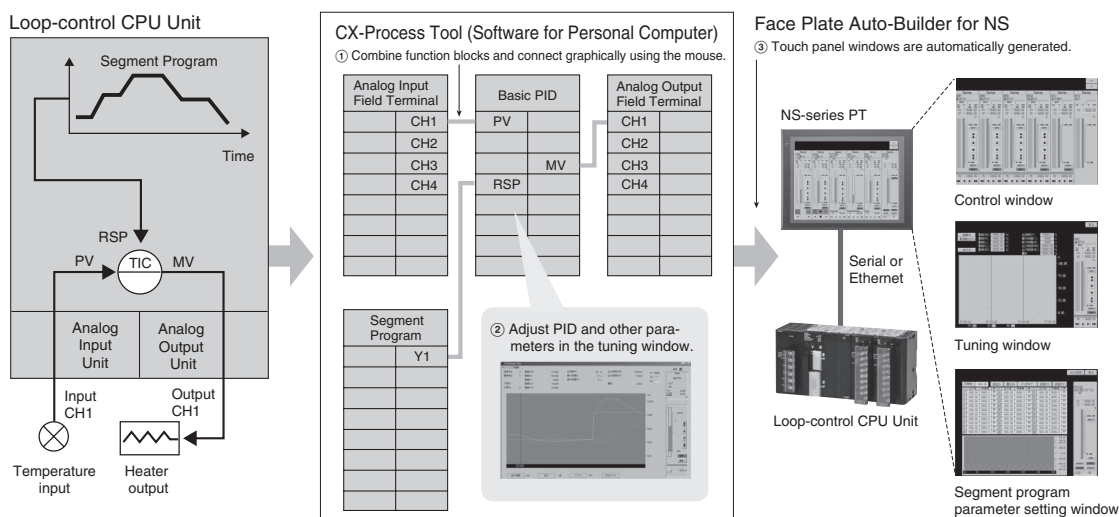
An engine for controlling analog quantities (e.g., temperature, pressure, flowrate) is built into the same CPU Unit as the engine for executing sequence control, delivering high-speed sequence control and high-speed, advanced analog quantity control in a single Unit.

### Features

- Program graphically by pasting function blocks for PID control, square root calculations, or other functions in a window and then connect them with the mouse.
- More than 70 types of function blocks are provided, including Bank Selector and Split Converter (for heating and cooling control), supporting a wide array of control methods from basic PID control to cascade control and feed-forward control.
- Function blocks enable a control cycle speed of up to 10 ms. A range of control methods are supported from detailed flowrate control and pressure control to high-speed temperature control.
- The CX-Process Tool can be used to open the tuning window and change parameters while monitoring PVs, SPs, and MVs.
- The Face Plate Auto-builder for NS (order separately) can be used to automatically create touch panel adjustment windows, including control windows, tuning windows, and segment program parameter setting windows, from function block data.

### Programming Example

#### Example: Program Control



### Function Specifications

#### CPU Element (Sequence Control)

| Name                  | I/O bits   | Program capacity | DM words  | EM words                                    | Model       |
|-----------------------|------------|------------------|-----------|---------------------------------------------|-------------|
| Loop-control CPU Unit | 1,280 bits | 60K steps        | 32K words | 32K words × 3 banks<br>E0_00000 to E2_32767 | CJ1G-CPU45P |
|                       |            | 30K steps        |           | 32K words × 1 bank<br>E0_00000 to E0_32767  | CJ1G-CPU44P |
|                       | 960 bits   | 20K steps        |           |                                             | CJ1G-CPU43P |
|                       |            | 10K steps        |           |                                             | CJ1G-CPU42P |

#### Loop Controller Element (Loop Control)

| Item                                                 |                     | Model                        | CJ1G-CPU42P                                                                                      | CJ1G-CPU43P                          | CJ1G-CPU44P | CJ1G-CPU45P |
|------------------------------------------------------|---------------------|------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------|-------------|-------------|
| Operation method                                     |                     |                              | Function block method                                                                            |                                      |             |             |
| Operation cycle                                      |                     |                              | 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, or 2 s (default: 1 s)<br>Can be set for each function block. |                                      |             |             |
| Number of function blocks                            | Analog operations   | Control and operation blocks | 50 blocks max.                                                                                   | 300 blocks max.                      |             |             |
|                                                      | Sequence control    | Step ladder program blocks   | 20 blocks max.<br>2,000 commands total                                                           | 200 blocks max. 4,000 commands total |             |             |
|                                                      | I/O blocks          | Field terminal blocks        | 30 blocks max.                                                                                   | 40 blocks max.                       |             |             |
|                                                      |                     | User link tables             | 2,400 data items max.                                                                            |                                      |             |             |
|                                                      |                     | Batch allocation             | HMI function, allocated 1 EM Area bank                                                           |                                      |             |             |
|                                                      | System Common block |                              | Single block                                                                                     |                                      |             |             |
| Method for creating and transferring function blocks |                     |                              | Created using CX-Process Tool (order separately) and transferred to Loop Controller.             |                                      |             |             |

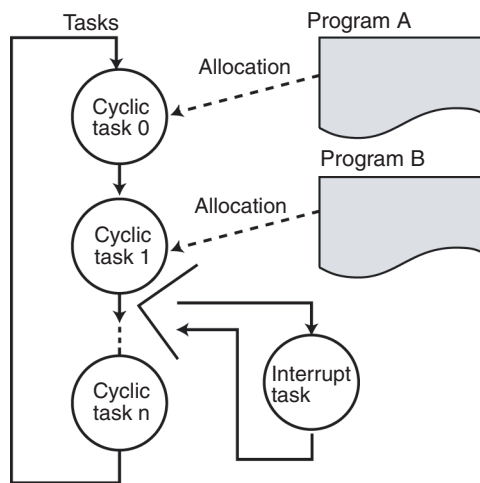
| Item           | Model                     | CJ1G-CPU42P                                                                                                                                                                                                                                                                       | CJ1G-CPU43P | CJ1G-CPU44P | CJ1G-CPU45P |
|----------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|
| Control method | PID control method        | PID with 2 degrees of freedom (with autotuning)                                                                                                                                                                                                                                   |             |             |             |
|                | Control combinations      | Any of the following function blocks can be combined:<br>Basic PID control, cascade control, feed-forward control, sample PI control, Smith dead time compensation control, PID control with differential gap, override control, program control, time-proportional control, etc. |             |             |             |
| Alarms         | PID block internal alarms | 4 PV alarms (upper upper-limit, upper limit, lower limit, lower lower-limit) and 1 deviation alarm per PID block.                                                                                                                                                                 |             |             |             |
|                | Alarm blocks              | High/low alarm blocks, deviation alarm blocks                                                                                                                                                                                                                                     |             |             |             |

## Task Programming

### Better Design/Development Efficiency

#### Structured Programming and Team Program Development Using Tasks

With CJ-series PLCs, programs can be divided into programming units called tasks. There are both cyclic tasks, which are executed each cycle in a specified order, and interrupt tasks, which are executed when an interrupt occurs.



With CJ1-series PLCs, up to 288 tasks can be executed as cyclic tasks.

#### Task Programming Example with CX-Programmer

Programs can be separated into tasks like "card-style programs" to make them easier to understand.

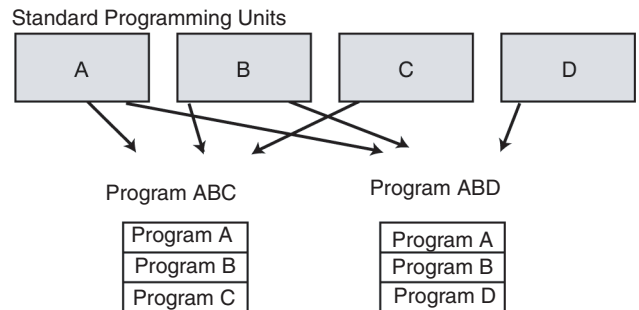
Task types (cyclic or interrupt) and task numbers are set in the project tree.

Starting tasks at startup is set in cyclic task 0 (the overall control task) using the TASK ON (TKON(820)) and TASK OFF (TKOF(821)) instructions.

### Advantages

#### Program Standardization

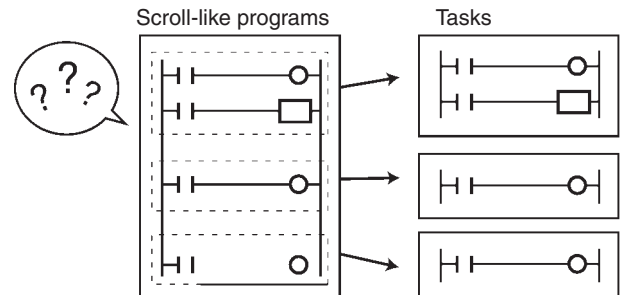
Task programs are created in units divided by functionally by purpose. These functional units can be easily reused when programming new PLCs or systems with the same functionality.



#### Easier-to-understand Programs

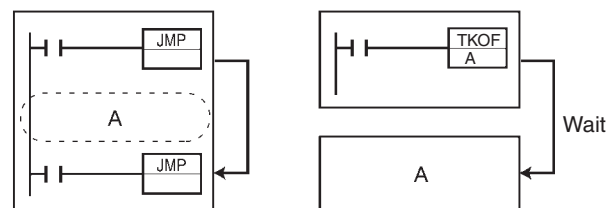
With scroll-like programs, individual functional units are extremely difficult to find just by looking at the program.

Tasks are used to separate a program functionally and make the program much easier to understand.



#### Shorter Cycle Times

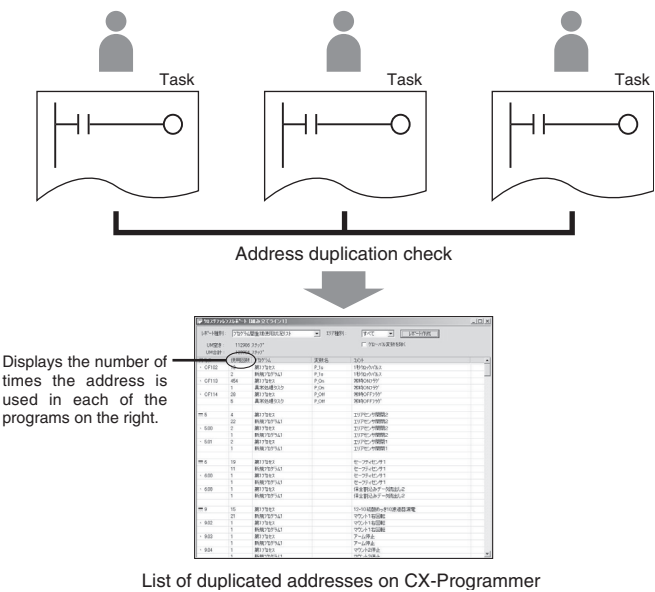
With a scroll-like program, many jump and similar instructions had to be used to avoid executing specific parts of the program. This not only slows down the programs, but makes them more difficult to understand. With task programming, special instructions enable controlling the execution of tasks so that only the required tasks are executed during any particular cycle.



Greater Efficiency in Team Program Development (Unit Ver. 2.0 or Later Only)

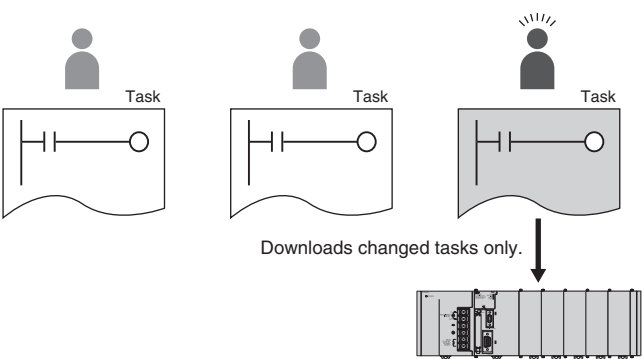
Checking Address Duplication between Tasks (CX-Programmer Ver. 4.0 or Higher)

The CX-Programmer automatically executes a cross-reference report that checks whether the same addresses have been used by two or more tasks (programs) created by two or more people.



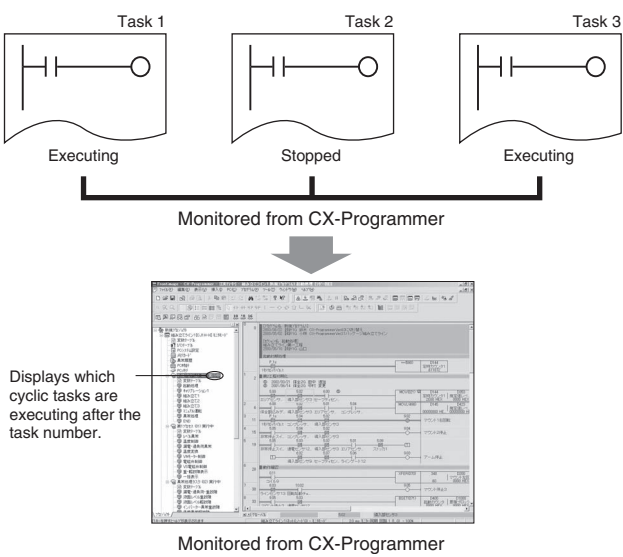
Downloading in Task Units (CX-Programmer Ver. 4.0 or Higher)

When a program has been created by two or more people, each person can use the CX-Programmer to download only the task (program) they have changed.



Monitoring Operating Status for Each Task (CX-Programmer Ver. 4.0 or Higher)

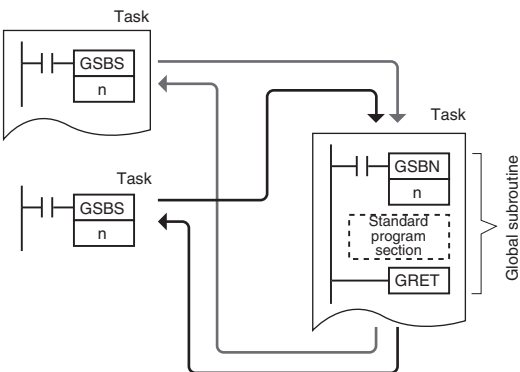
The execution status for each task can be monitored from the CX-Programmer, contributing to improved debugging efficiency.



Task Features

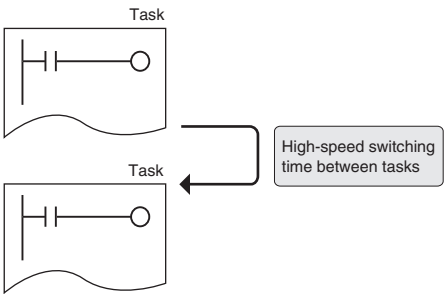
Standardization of Common Processing

Global subroutines are supported that can be called from different tasks. This enables removing standard programming sections from individual tasks for execution as global subroutines, greatly reducing the size of the overall program.



Faster Switching between Tasks

Switching between tasks is faster than ever before to ensure high-speed cycle times even with structured programming.



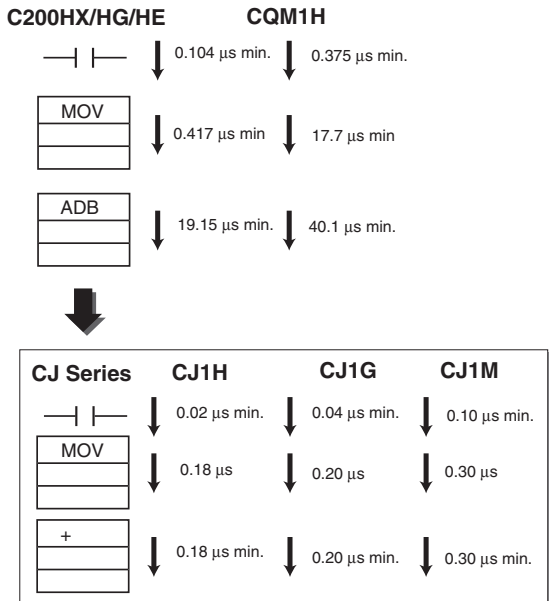
## High-speed Processing

### Ample Speed for Advanced Machine Interfaces, Communications, and Data Processing

#### High-speed Instructions and System Bus

##### Faster Execution Times (from 20 ns) and Faster Processing of Frequently Used Instructions

Faster instruction processing includes 0.02  $\mu$ s for LD and 0.18  $\mu$ s for MOV. A complete range of instructions (more than 400) is supported, more than 100 of which are frequently used special instructions that can be processed almost as fast as basic instructions, as fast as 0.18  $\mu$ s for some instructions.



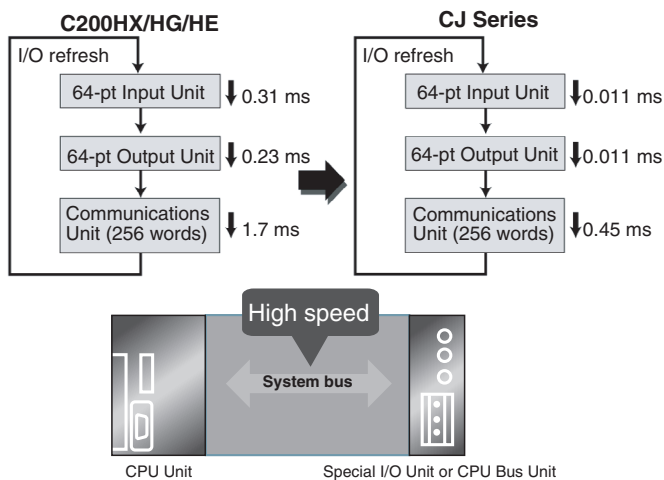
##### Four Times the Peripheral Servicing and I/O Refresh Speed

Increased efficiency in data transmission between the CPU Unit and Special I/O Units/CPU Bus Units further improves performance of the entire system.

Refresh time for CJ-series 64-point Input Units:  
0.011 ms (16 times faster)

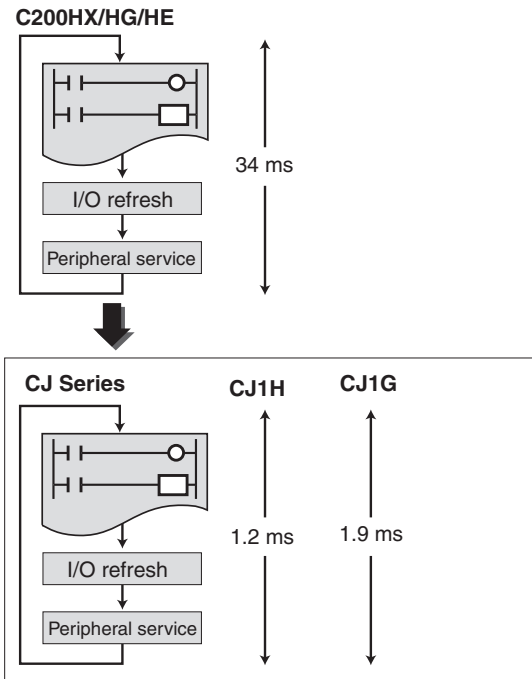
Refresh time for CJ-series 64-point Output Units:  
0.011 ms (8 times faster)

Refresh time for 256 words for Communications Unit:  
0.45 ms (4 times faster)

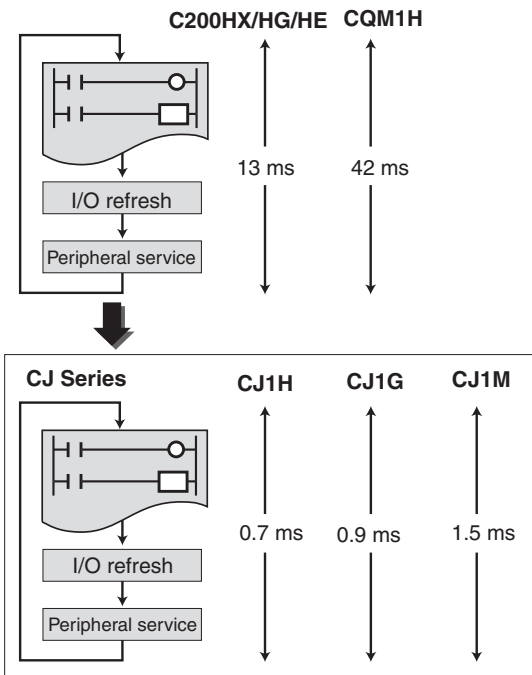


##### 30 Times the Overall Cycle Speed

**Example 1:** The following example is for 30-Kstep programs (basic instructions: 50%; MOV instructions: 30%; arithmetic operation instructions: 20%).



**Example 2:** The following example is for 10-Kstep programs (basic instructions: 50%; MOV instructions: 30%; arithmetic operation instructions: 20%).

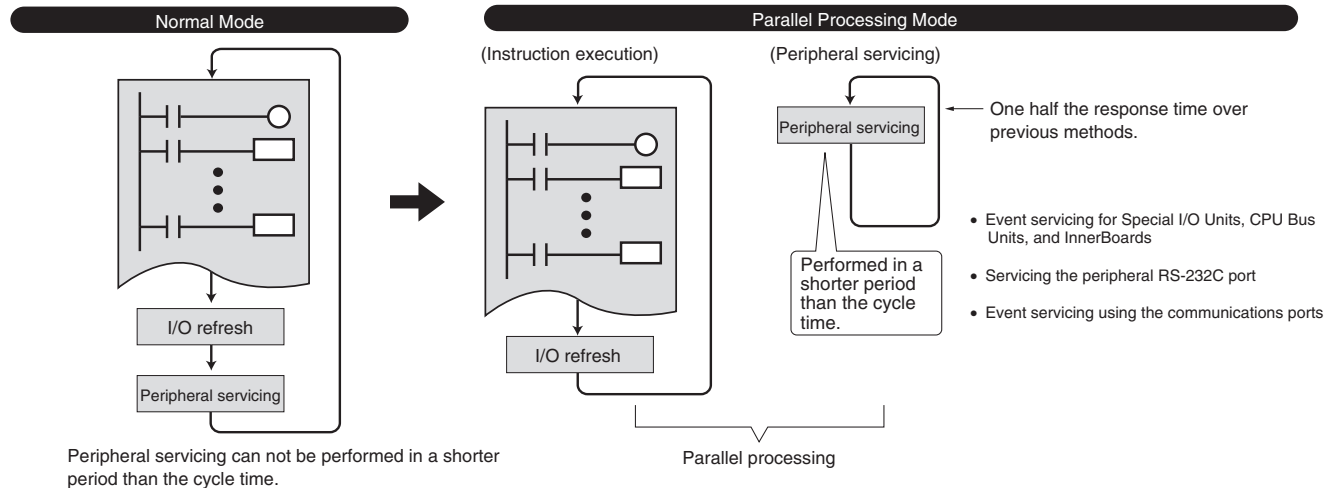


## High-speed Exchange with Communications Units and High-speed Data Processing

### Response Time for both Instruction Execution and Peripheral Servicing Can Be Emphasized

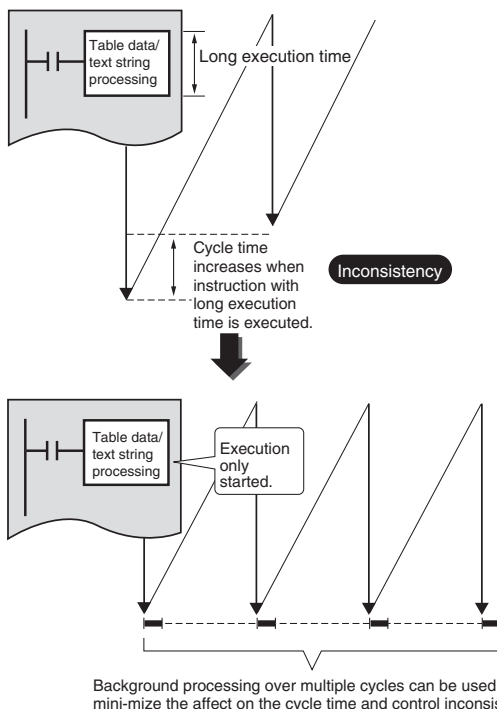
With CJ1G and CJ1H CPU Units, a Parallel Processing Mode can be used to perform program execution and peripheral servicing in parallel. Parallel processing doubles the speed of peripheral serving time over previous PLCs, enabling the following types of application.

- High-volume, high-speed data exchange is possible with a host without the speed being affected by the size of the program in the CPU Unit.
- Data can be exchanged with SCADA software with consistent timing for smooth data updates.
- The cycle time is not affected even if communications are increased or networks added in future system expansions.



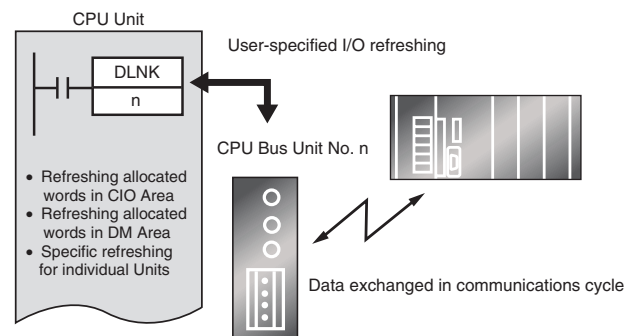
### Control Inconsistencies in the Cycle Time for Data Processing

Table data, text string, or other instructions requiring long execution times can be executed over multiple cycles to minimize the affect on the cycle time and maintain more consistent I/O response characteristics.



### Better Refresh Performance for Data Links, DeviceNet Remote I/O, and More

I/O refresh processing with CPU Bus Units, which was previously performed only during I/O refreshing after instruction execution, is now possible at any time using the DLNK instruction. The CPU Bus Unit's refresh response performance has been improved by enabling refresh processing specific to CPU Bus Units, such as data links and DeviceNet remote I/O communications, and refreshing of words allocated to the Units in the CIO Area and DM Area any time during instruction execution.



| Unit                       | Refresh function                                |
|----------------------------|-------------------------------------------------|
| Controller Link Unit       | Data links                                      |
| DeviceNet Unit             | Remote I/O                                      |
| Serial Communications Unit | Protocol macros                                 |
| Ethernet Unit              | Socket servicing for specific bit manipulations |

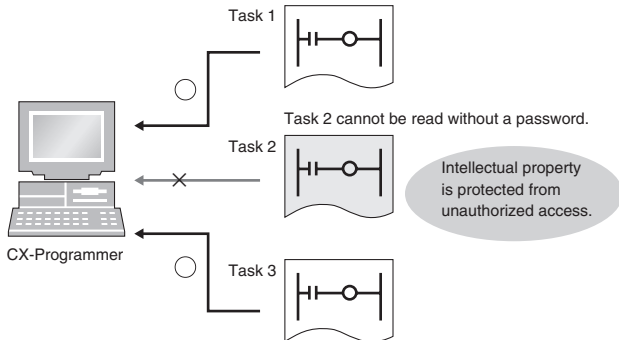
## Increased Security

### Various Forms of Protection Provide Better Security

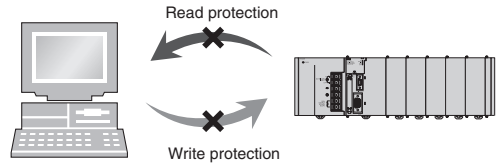
#### Conceal Intellectual Property Contained in Programs (Unit Ver. 2.0 or Later)

##### Password Read Protection for Tasks (CX-Programmer Ver. 4.0 or Higher)

Specific tasks (programs) can be set to prohibit reading unless the correct password is input.



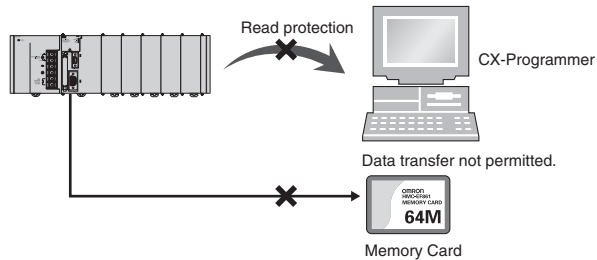
This function enables concealment of intellectual property contained in programs. The overwrite prohibit function also protects programs concealing intellectual property from being carelessly overwritten.



#### Prevent Leakage of Intellectual Property (Unit Ver. 2.0 or Later)

##### Prohibit/Allow File Memory Program File Creation (CX-Programmer Ver. 4.0 or Higher)

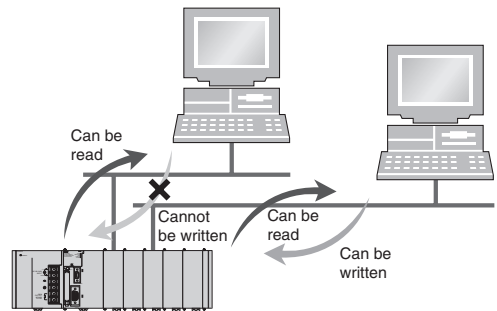
In addition to UM read protection and task read protection, user programs can also be protected from being illegally transferred to a Memory Card. This function enables complete read protection of programs in the PLC and prevents leakage of intellectual property.



#### Write Protection from Specific Nodes through Networks (Unit Ver. 2.0 or Later)

##### CPU Unit FINS Write/Protection through Networks (CX-Programmer Ver. 4.0 or Higher)

Specific nodes can be prohibited from writing to other nodes on the network. Data transmissions through the network are monitored, preventing data being carelessly written to the PLC, and preventing problems in the system.



## Instruction Features

### High-volume Data Processing with One Instruction

The basic data format for specifying instruction operands has been changed from BCD to binary, enabling specification of more data for each instruction.

**Example:** BLOCK TRANSFER Instruction

| Address type         | C200HX/HG/HE PLCs  | CJ-series PLCs    |
|----------------------|--------------------|-------------------|
| Direct               | 0 to 6,655 words   | 0 to 65,535 words |
| Indirect for DM Area | DM 0000 to DM 9999 | D00000 to D32767  |

### Binary Specifications for Timer/Counter Instructions

Either BCD or binary can be used to specify the set values for timer and counter instructions. Using a binary specification enables specifying longer periods of time and higher count values.

**Examples:** TIM instruction (BCD): 0 to 999.9 s  
 TIMX instruction (binary) 0 to 6,553.5 s  
 CNT instruction (BCD): 0 to 9,999 counts  
 CNTX instruction (binary): 0 to 65,535 counts

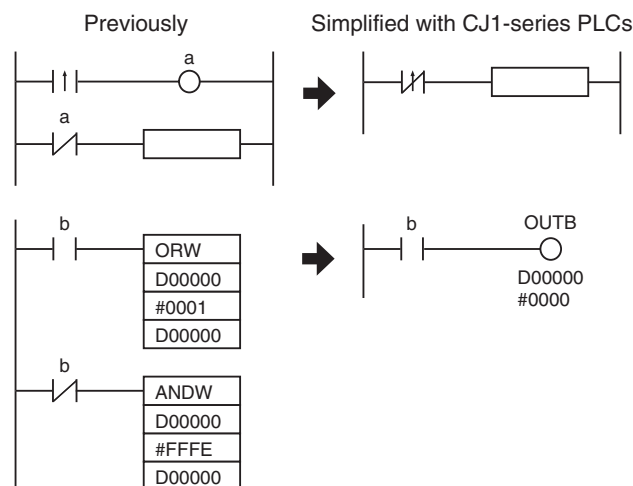
### Applicable Instructions:

Binary Timer/Counter Instructions:

BINARY TIMER: TIMX(550)  
 BINARY COUNTER: CNTX(546)  
 BINARY HIGH-SPEED TIMER: TIMHX(551)  
 BINARY ONE-MS TIMER: TMHHX(552)  
 BINARY ACCUMULATIVE TIMER: TTIMX(555)  
 BINARY LONG TIMER: TIMLX(553)  
 BINARY MULTI-OUTPUT TIMER: MTIMX(554)  
 BINARY REVERSIBLE COUNTER: CNTRX(548)  
 BINARY RESET TIMER/COUNTER: CNRX(547)

### Simplifier Ladder Programming

Programs using many basic instructions can be simplified greatly by using differentiated versions of the LD NOT, AND NOT, and OR NOT instructions, as well as bit access instructions for the DM and EM Areas.

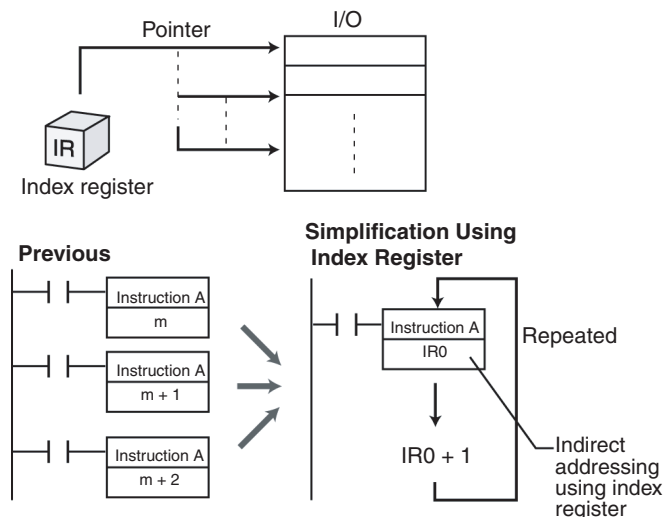


### Applicable Instructions:

Bit Access Instructions:  
 SINGLE BIT OUTPUT (OUTB(534))

### Simplify Programs with Index Registers

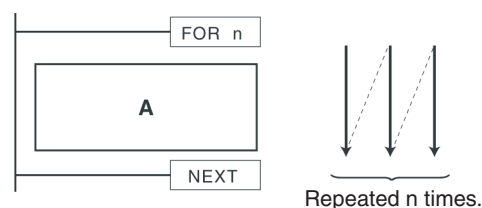
Index registers can be used as memory pointers to enable easily changing the addresses specified for instructions. Using an index register can often enable one instruction to perform the processing previously performed by many instructions.



**Index Registers:** IR00 to IR15

### Easily Repeat Processing

Instructions are provided that let you easily repeat sections of the program. Repeat execution can also be ended for a specified condition.



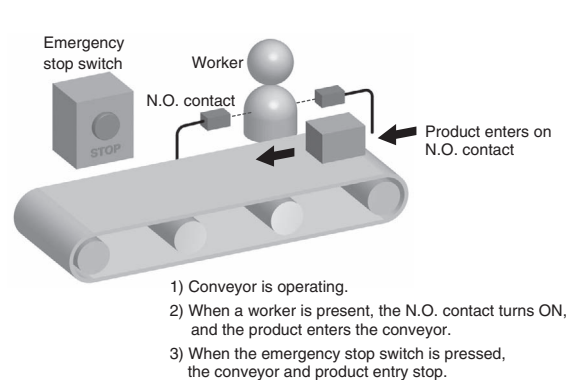
### Applicable Instructions:

Loop Control Instructions:  
 START FOR-NEXT LOOPS (FOR(512))  
 END FOR-NEXT LOOPS (NEXT(513))  
 BREAK LOOP (BREAK(514))

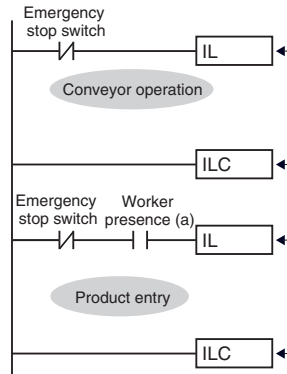
## Interlock Nesting (Unit Ver. 2.0 or Later Only)

### (CX-Programmer Ver 4.0 or Higher)

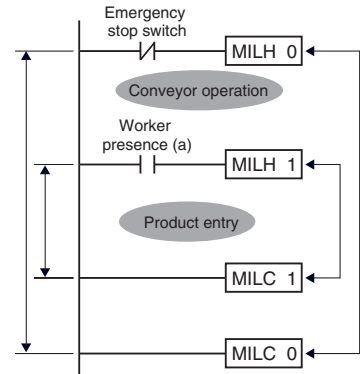
The previous interlock instructions cannot be nested. In actual applications, however, the entire interlock condition is often combined with partial interlock conditions. Multi-interlock instructions can be nested to better handle real applications.



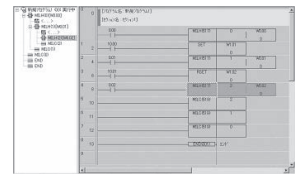
#### Using Existing IL Instructions



#### Using Multi-interlock Instructions



#### ● CX-Programmer Screen



Interlock status is easy to understand using the software.

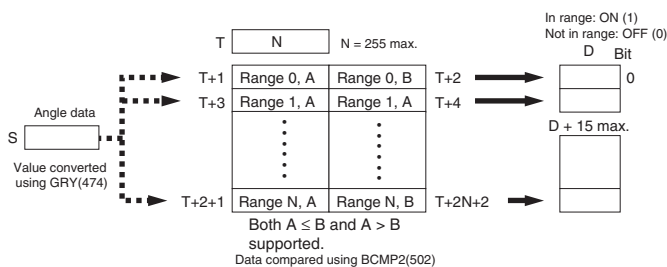
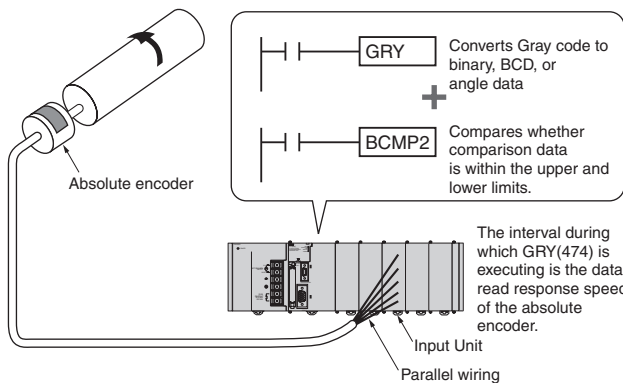
#### Applicable Instructions:

Sequence Control Instructions:

MULTI-INTERLOCK DIFFERENTIATION HOLD (MILH(517))  
MULTI-INTERLOCK DIFFERENTIATION RELEASE (MILR(518))  
MULTI-INTERLOCK CLEAR (MILC(519))

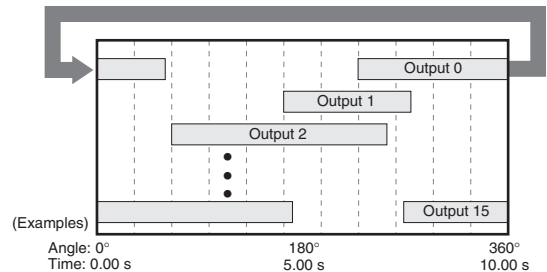
### Easily Program Cam Switch Control (Unit Ver. 2.0 or Later Only)

The EXPANDED BLOCK COMPARE (BCMP2(502)) instruction can be used to compare data converted from Gray binary code to binary data, BCD data, or an angle using the GRAY CODE CONVERT (GRY(474)) instruction. It can also compare data in ranges including 0, such as angle data.



If the comparison data (S) is within an of the 256 ranges, BCMP2(502) will turn ON the corresponding output bit in the results. If the upper limit is less than the lower limit, the comparison range will include 0.

#### Example of Compare Data



#### Angle Data

Controlling a Machine that Adjusts Timing According to Angles (Cam Switch Control)

#### Repeatedly Starting a Timer

Controlling Machine Timing Directly (Rotary Timer Control)

#### Applicable Instructions:

Conversion instructions:

GRAY CODE CONVERT (GRY(474))

Comparison instructions:

EXPANDED BLOCK COMPARE (BCMP2(502))

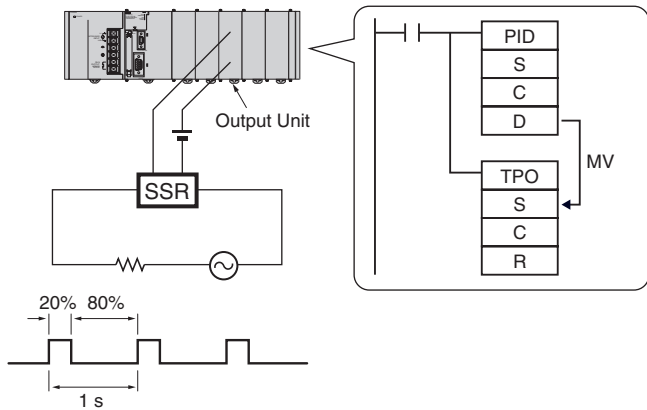
BCMP2(502) is supported by Pre-Ver. 2.0 CJ1M CPU Units or later.

PID Autotuning

PID constants can be automatically tuned for the PID instructions. The limit cycle method is used for tuning, allowing tuning to be completely quickly. This is particularly effective when there are many PID control loops.



PID instructions can be combined with the TIME-PROPORTIONAL OUTPUT (TPO(685)) instruction to enable time-proportional output of a manipulated variable (MV).

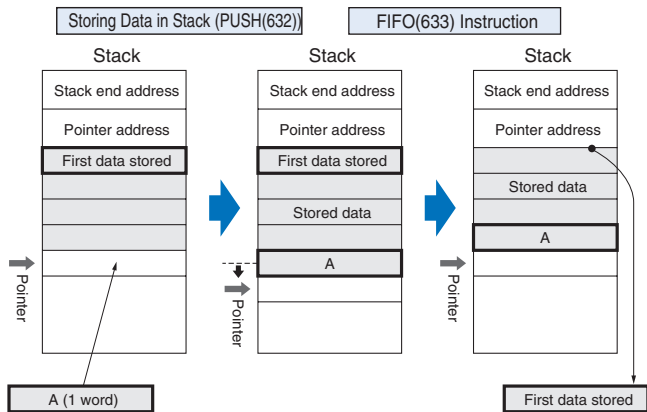


Applicable Instructions:

Control instructions:  
PID CONTROL WITH AUTOTUNING (PIDAT(191))  
TIME-PROPORTIONAL OUTPUT (TPO(685))

Easily Process Stacks: One-word Records for FIFO Processing

Stacks can be created in the DM Area or other areas for FIFO or other stack processing. The SET STACK (SSET(630)) instruction is used to create a stack.

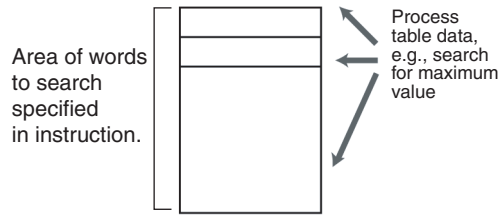


Applicable Instructions:

Stack Instructions:  
SET STACK (SSET(630))  
PUSH ONTO STACK (PUSH(632))  
FIRST IN FIRST OUT (FIFO(633))  
LAST IN FIRST OUT (LIFO(634))

Simple Data Searches (Single Words)

Instructions are provided to find the maximum value, minimum value, and search values.

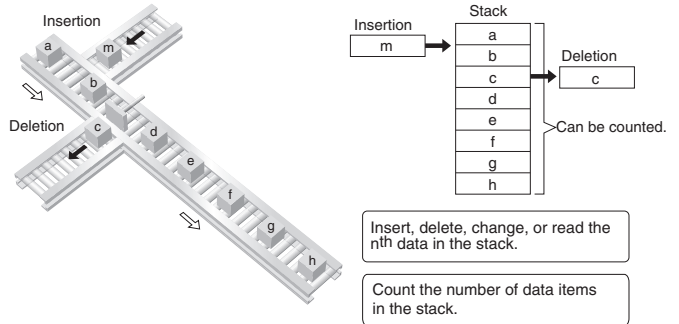


Applicable Instructions:

Search Instructions:  
DATA SEARCH (SRCH(181))  
FIND MAXIMUM (MAX(182))  
FIND MINIMUM (MIN(183))

Real-time Data Management for Conveyors and Other Applications

When workpieces are added and removed during processing, such as with conveyors, the CJ1-series PLCs enable stack data to be inserted or deleted as required to easily manage workpiece data in real-time.



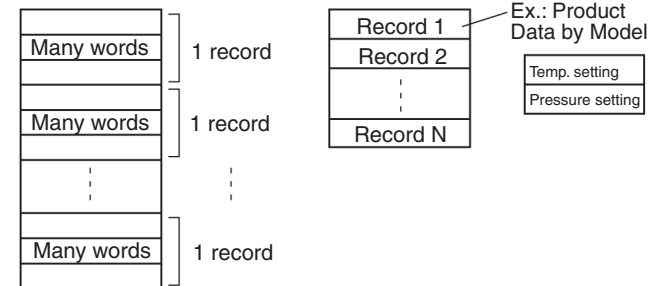
Applicable Instructions:

Table Data Processing Instructions:  
SET STACK (SSET(630))  
STACK SIZE READ (SNUM(638))  
STACK DATA READ (SREAD(639))  
STACK DATA OVERWRITE (SWRIT(640))  
STACK DATA INSERT (SINS(641))  
STACK DATA DELETE (SDEL(642))

Process Data Tables: Multi-word Records

Areas of memory can be defined as tables with the specified record size (words). Index registers can be used with such tables to easily sort records, search for values, or otherwise process the records in the table.

For example, the temperature, pressure, and other settings for each model of a product can be set in separate records and the data handled by record.

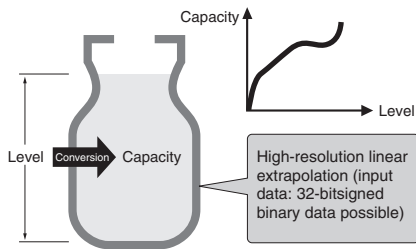


Applicable Instructions:

Table Data Instructions:  
DIMENSION RECORD TABLE (DIM(631))  
SET RECORD LOCATION (SETR(635))  
GET RECORD NUMBER (GETR(636))

### High-precision Approximations

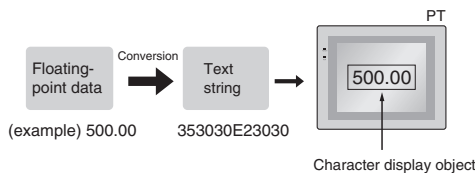
Converting a level meter reading in mm to tank capacity in liters according to the shape of the tank and other difficult linear extrapolations requiring high data resolution can be performed. (Linear data can be handled as 16-bit unsigned binary or BCD data, 16-bit or 32-bit signed binary data, or floating-point decimal data.)



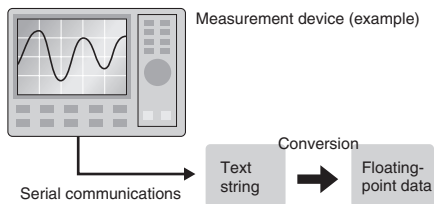
**Applicable Instructions:**  
ARITHMETIC PROCESS (APR(069))

### Convert between Floating-point and Text Data

Instructions are provided to easily convert floating-point decimal numbers (real numbers) to text strings (ASCII) for display on PTs. These are display as character display objects on the PT.



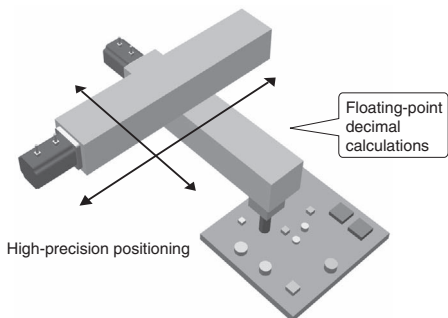
You can also convert ASCII data (text strings) received from measurement devices to floating-point decimal data for use in calculations.



**Applicable Instructions:**  
Floating-point Decimal Math instructions  
FLOATING- POINT TO ASCII (FSTR(448))  
ASCII TO FLOATING-POINT (FVAL(449))

### High-precision Positioning for XY Tables and Other Applications

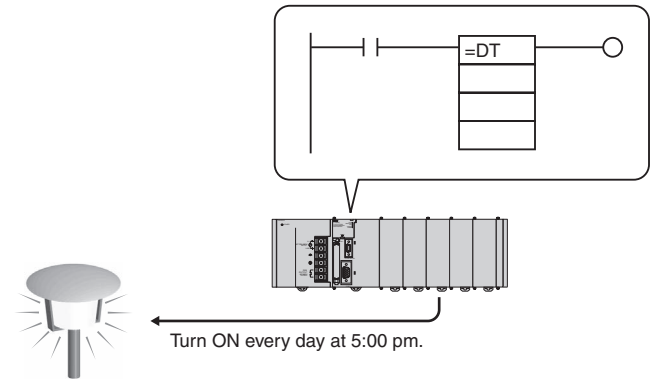
Floating-point decimal and double-precision calculation instruction have been supported. These are essential for position control operations. Now more precise position control is possible than ever before.



**Applicable Instructions:**  
Floating-point Decimal and Double-precision Math instructions

### Easily Programmed Calendar Timers (Unit Ver. 2.0 or Later)

Two sets of calendar data can be compared. The calendar data to be compared can be restricted to the year, month, day, hour, minutes, or seconds.



Example: The calendar timer function can be easily set for a specific function to operate every day at 17:00:00 (H:M:S).

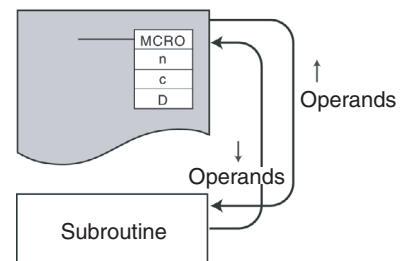
**Applicable Instructions:**  
Comparison instructions

Time comparison:

= DT(341)  
<> DT(342)  
< DT(343)  
<= DT(344)  
> DT(345)  
>= DT(346)

### Simplified Execution of Subroutines with Different Operands

Macro instructions can be used to execute the same subroutine program with different operands from different locations in the programs.

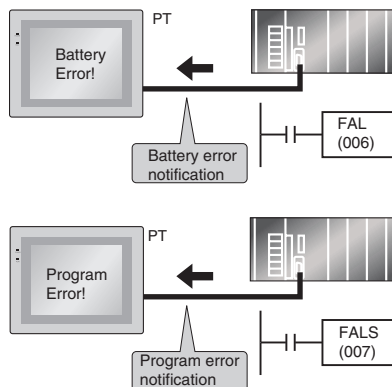


**Applicable Instructions:**  
Subroutine instruction: MACRO (MCRO(099))

## Simulate Specific Error Statuses for Debugging

The FAL(006) and FALS(007) instructions can be used to simulate a desired error condition. This can be used, for example, to intentionally create error conditions in the CPU Unit while debugging to check to see if the correct error messages are displayed on a PT.

### Example

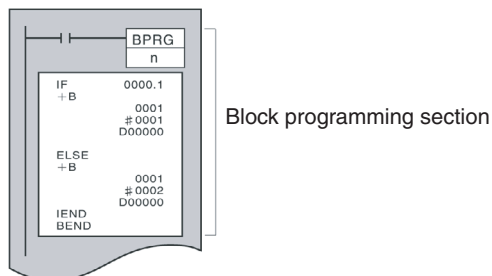


### Applicable Instructions:

Diagnostic Instructions  
FAILURE ALARM (FAL(006))  
SEVERE FAILURE ALARM (FALS(007))

## Easily Program Logic Flow Control with Block Programming Sections

A block of mnemonic programming instructions can be executed as a group based on a single execution condition. IF/THEN, WAIT, TIMER WAIT, and other instructions can be used inside the block programming section to easily program logic flow control that is difficult to program with ladder diagrams.

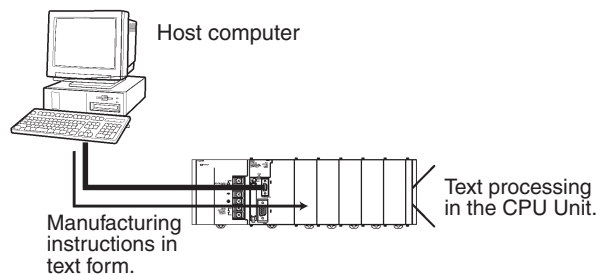


### Applicable Instructions:

Block Programming instructions

## Easily Handle Text Strings

Manufacturing instruction can be obtained from a host computer or other external source, stored in memory, and then manipulated as text strings (ASCII data) as required by the applications. The text strings can be searched, fetched, reordered, or other processed in the CPU Unit of the PLC.

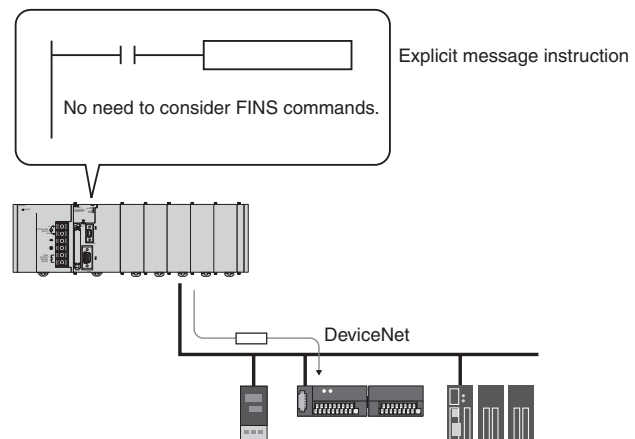


### Applicable Instructions:

Text String Processing instructions

## Read Maintenance Information Easily through DeviceNet (Unit Ver. 2.0 or Later) NEW!

Send user-set explicit messages easily without having to consider FINS commands. Data transmission between PLCs can also be achieved simply using explicit messages.

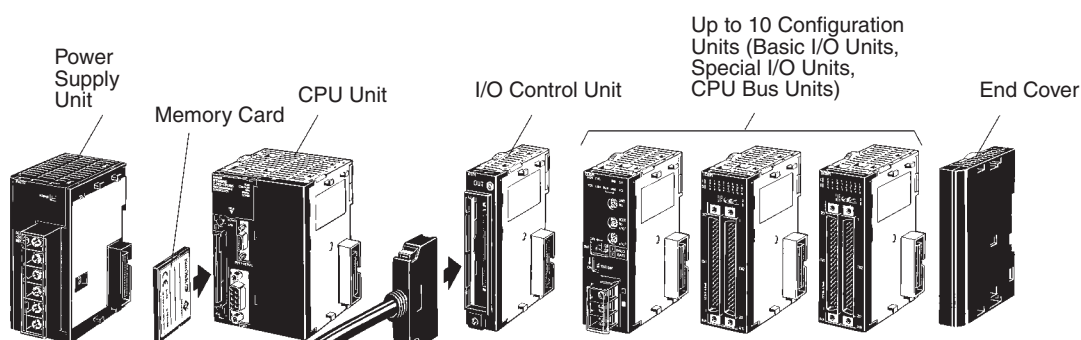


### Applicable Instructions:

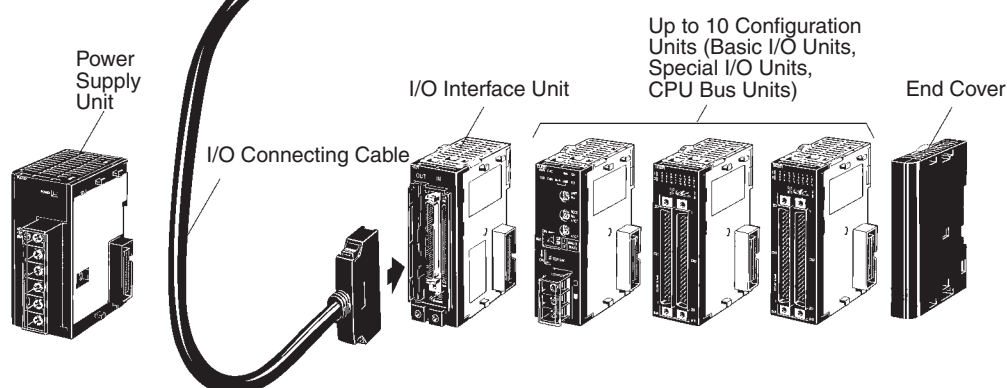
Network Instructions  
EXPLICIT MESSAGE SEND (EXPLT(720))  
EXPLICIT GET ATTRIBUTE (EGATR(721))  
EXPLICIT SET ATTRIBUTE (ESATR(722))  
EXPLICIT WORD READ (ECHRD(723))  
EXPLICIT WORD WRITE (ECHWR(724))

## Basic System Configuration

### CPU Rack



### Expansion Rack



### CJ-series CPU Rack

A CJ-series CPU Rack consists of a CPU Unit, Power Supply Unit, Basic I/O Units, Special I/O Units, CPU Bus Units, and an End Cover. I/O Control Units are required to connect CJ-series Expansion Racks. Memory Cards are optional.

### CJ-series Expansion Racks

CJ-series Expansion Racks can be connected to CJ-series CPU Racks or other CJ-series Expansion Racks.

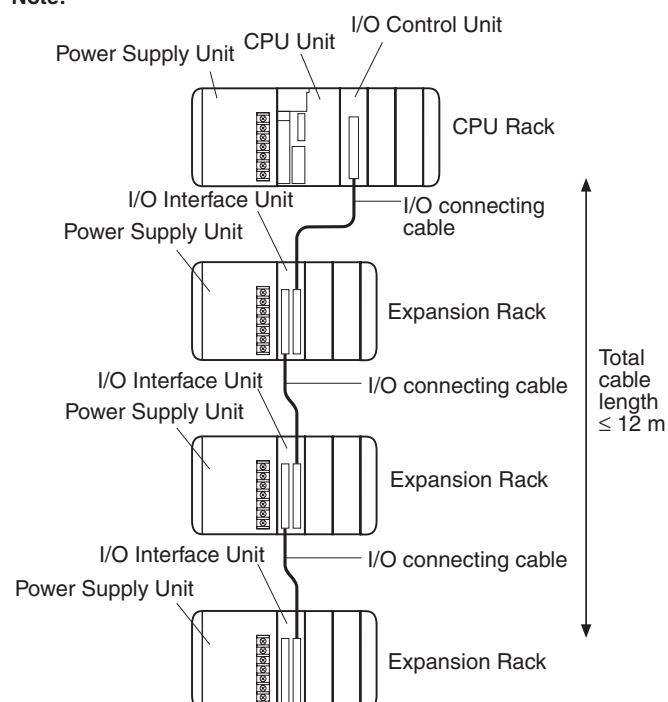
A CJ-series Expansion Rack consists of a Power Supply Unit, an I/O Interface Unit, Basic I/O Units, Special I/O Units, CPU Bus Units, and an End Cover.

**Note:** Connection of CS-series Expansion Racks is not supported.

### Number of Expansion Racks

| CPU Unit        | No. of Expansion Racks | Max. No. of Units |
|-----------------|------------------------|-------------------|
| CJ1H-CPU67H     | 3                      | 40                |
| CJ1H-CPU66H     |                        |                   |
| CJ1H-CPU65H     |                        |                   |
| CJ1G-CPU45H/45P |                        |                   |
| CJ1G-CPU44H/44P | 2                      | 30                |
| CJ1G-CPU43H/43P |                        |                   |
| CJ1G-CPU42H/42P | 1                      | 20                |
| CJ1M-CPU23      |                        |                   |
| CJ1M-CPU13      |                        |                   |
| CJ1M-CPU13-ETN  |                        |                   |
| CJ1M-CPU22      |                        |                   |
| CJ1M-CPU12      |                        |                   |
| CJ1M-CPU12-ETN  |                        |                   |
| CJ1M-CPU21      |                        |                   |
| CJ1M-CPU11      |                        |                   |
| CJ1M-CPU11-ETN  |                        |                   |
|                 |                        |                   |
|                 |                        |                   |
|                 |                        |                   |
|                 |                        |                   |

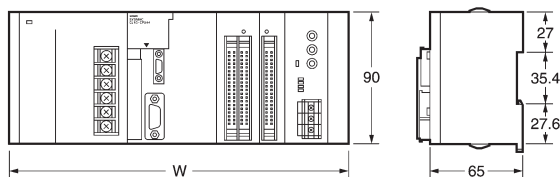
### Note:



## Dimensions

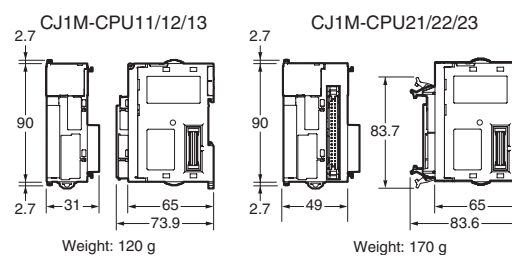
**Note:** Units are in mm unless specified otherwise.

### Product Dimensions



| Unit/product      | Model number     | Width |
|-------------------|------------------|-------|
| Power Supply Unit | CJ1W-PA205R      | 80    |
|                   | CJ1W-PA202       | 45    |
|                   | CJ1W-PD025       | 60    |
|                   | CJ1W-PD022       | 27    |
| CPU Unit          | CJ1M-CPU11/12/13 | 31    |
|                   | CJ1M-CPU21/22/23 | 49    |
|                   | CJ1H-CPU□□H      | 62    |
|                   | CJ1G-CPU□□H      | 62    |
|                   | CJ1G-CPU□□P      | 69    |
|                   | CJ1M-CPU1□-ETN   | 62    |
| End Cover         | CJ1W-TER01       | 14.7  |

#### CPU Unit



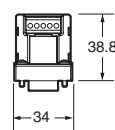
#### End Plate

(Provided with the CPU Unit.)



#### RS-422A Converter

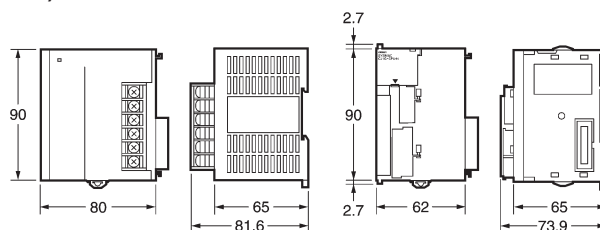
CJ1W-CIF11



Weight: 20 g

### Width W (mm) When Used with a CJ1W-PA202 Power Supply Unit (AC, 14 W)

| Number of I/O Units with 31-mm width | CJ1M-CPU11/12/13 | CJ1M-CPU21/22/23 |
|--------------------------------------|------------------|------------------|
| 1                                    | 121.7            | 139.7            |
| 2                                    | 152.7            | 170.7            |
| 3                                    | 183.7            | 201.7            |
| 4                                    | 214.7            | 232.7            |
| 5                                    | 245.7            | 263.7            |
| 6                                    | 276.7            | 294.7            |
| 7                                    | 307.7            | 325.7            |
| 8                                    | 338.7            | 356.7            |
| 9                                    | 369.7            | 387.7            |
| 10                                   | 400.7            | 418.7            |



CJ-series Units other than CPU Units and Power Supply Units have a width of either 20 mm or 31 mm, as shown in the tables below.

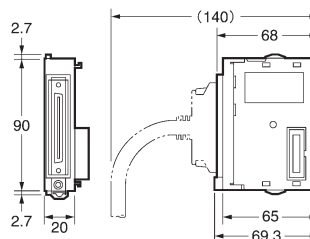
### Units of Width 20 mm

| Unit                     | Model number   | Width |
|--------------------------|----------------|-------|
| I/O Control Unit         | CJ1W-IC101     | 20    |
| 32-point Basic I/O Units | CJ1W-ID231/232 |       |
|                          | CJ1W-OD231/232 |       |
| CompoBus/S Master Unit   | CJ1W-SRM21     |       |

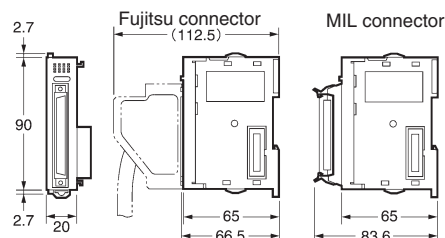
### Units of Width 80 mm

| Unit                | Model number | Width |
|---------------------|--------------|-------|
| Motion Control Unit | CJ1W-MCH71   | 80    |

#### I/O Control Unit



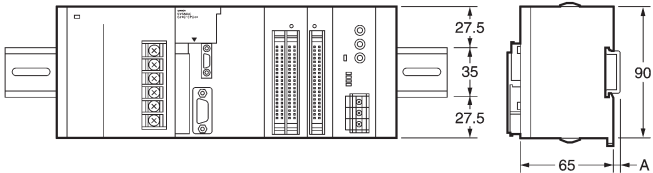
#### 32-point I/O Unit



# Units of Width 31 mm

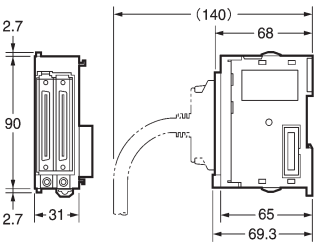
| Unit                       | Model number                           | Width |
|----------------------------|----------------------------------------|-------|
| I/O Interface Unit         | CJ1W-II101                             | 31    |
| 8/16-point Basic I/O Units | CJ1W-ID201/211                         |       |
|                            | CJ1W-IA111/201                         |       |
|                            | CJ1W-OD201/202/203/204                 |       |
|                            | CJ1W-OD211/212                         |       |
|                            | CJ1W-OC201/211                         |       |
|                            | CJ1W-OA201                             |       |
| 32-point Basic I/O Units   | CJ1W-MD231/232/233                     | 31    |
| 64-point Basic I/O Units   | CJ1W-ID261/262                         |       |
|                            | CJ1W-OD261/262/263                     |       |
|                            | CJ1W-MD261/263/563                     |       |
| Interrupt Input Unit       | CJ1W-INT01                             | 31    |
| High-Speed Input Unit      | CJ1W-IDP01                             |       |
| Analogue I/O Unit          | CJ1W-AD□□□<br>CJ1W-DA□□□<br>CJ1W-MAD42 |       |
| Process Input Units        | CJ1W-PDC15                             | 31    |
|                            | CJ1W-PTS15/16                          |       |
|                            | CJ1W-PTS51/52                          |       |
| Temperature Input Units    | CJ1W-TS561/562                         | 31    |
| Temperature Control Units  | CJ1W-TC□□□                             |       |
| Position Control Units     | CJ1W-NC113/133                         |       |
|                            | CJ1W-NC213/233                         | 31    |
|                            | CJ1W-NC413/433                         |       |
| High-speed Counter Unit    | CJ1W-CT021                             | 31    |
| 4-channel Counter Unit     | CJ1W-CTL41-E                           |       |
| SSI encoder Unit           | CJ1W-CTS21-E                           |       |
| Controller Link Unit       | CJ1W-CLK21                             | 31    |
| Serial Communications Unit | CJ1W-SCU21-V1                          |       |
|                            | CJ1W-SCU41-V1                          |       |
| Ethernet Unit              | CJ1W-ETN11/21                          | 31    |
| DeviceNet Unit             | CJ1W-DRM21                             |       |
| PROFIBUS-DP Units          | CJ1W-PRM21                             |       |
|                            | CJ1W-PRT21                             | 31    |
| CAN Unit                   | CJ1W-CORT21                            |       |
| RFID Sensor Units          | CJ1W-V600C11                           |       |
|                            | CJ1W-V600C12                           | 31    |
| Position Control Unit      | CJ1W-NCF71                             |       |

## Mounting Dimensions

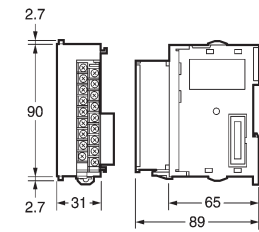


| DIN rail model number | A      |
|-----------------------|--------|
| PFP-100N2             | 16 mm  |
| PFP-100N              | 7.3 mm |
| FPP-50N               | 7.3 mm |

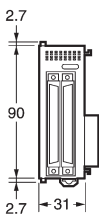
## I/O Interface Unit



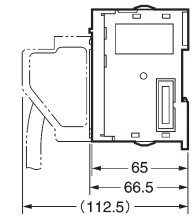
## 8/16-point Basic I/O Unit and Interrupt Input Unit



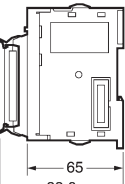
## 64-point Basic I/O Unit



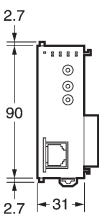
## Fujitsu connector



## MIL connector



## Special I/O Unit /CPU Bus Unit



W, the total width is given by the following formula:

$$W = 80 \text{ (Power Supply Unit)} + 62 \text{ (CPU Unit)} + 20 \times n + 31 \times m + 14.7 \text{ (End Cover) (mm)}$$

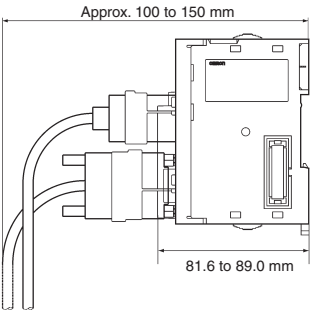
where n is the number of Units of width 20 mm and m is the number of Units of width 31 mm.

Example: For configurations with 2 32-point Basic I/O Units and 8 Units of width 31 mm:

$$W = 156.7 + 20 \times 2 + 31 \times 8 = 444.7 \text{ mm}$$

## Mounting Depth

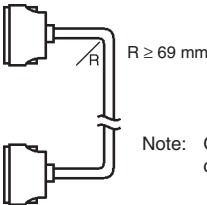
The mounting depth of CJ-series CPU Racks and Expansion Racks is from 81.6 to 89.0 mm depending on the Units that are mounted. Additional depth is required to connect Programming Devices (e.g., CX-Programmer or Programming Console) and Cables. Be sure to allow sufficient mounting depth.



**Note:** Consider the following points when expanding the configuration:

- The total length of I/O Connecting Cable must not exceed 12 m.
- I/O Connecting Cables require the bending radius indicated below.

## CS/CJ-series Connecting Cable



## 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. The system must be designed so that the total current consumption of the 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.

### CPU Racks and Expansion Racks

The following table shows the maximum currents and power that can be supplied by Power Supply Units on 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.  
When expanding the configuration, be sure to include the power required by the I/O Control Unit.
2. When calculating current/power consumption in an Expansion Rack, be sure to include the power required by the I/O Interface Unit itself.

| Power Supply Unit | Maximum current consumption |                                          |                                 | (C) Maximum total power consumption |
|-------------------|-----------------------------|------------------------------------------|---------------------------------|-------------------------------------|
|                   | (A) 5-V group               | (B) 24-V group relay driver power supply | 24-V group service power supply |                                     |
| CJ1W-PA205R       | 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                              |

Be sure that both conditions 1 and 2 below are met.

#### Condition 1: Maximum Current Supply

- Current required at 5 V DC by all Units (A)  $\leq$  Maximum current consumption shown in table
- Current required at 24 V DC by all Units (B)  $\leq$  Maximum current consumption shown in table

#### Condition 2: Maximum Total Power Supply

$A \times 5 \text{ V DC} + B \times 24 \text{ V DC} + C \times 24 \text{ V DC} \leq$  Maximum total power consumption shown in table (C)

### Example Calculations

In this example, the following Units are mounted to a CJ-series CPU Rack with a CJ1W-PA202 Power Supply Unit.

| Unit                | Model       | Quantity | 5- V DC                                                                            | 24- V DC                                                |
|---------------------|-------------|----------|------------------------------------------------------------------------------------|---------------------------------------------------------|
| CPU Unit            | CJ1G-CPU45H | 1        | 0.910 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 Units        | CJ1W-OC201  | 2        | 0.090 A                                                                            | 0.048 A                                                 |
| Special I/O Unit    | CJ1W-DA041  | 1        | 0.120 A                                                                            | ---                                                     |
| CPU Bus Unit        | CJ1W-CLK21  | 1        | 0.350 A                                                                            | ---                                                     |
| Current consumption | Calculation |          | $0.910 + 0.020 + 0.080 \times 2 + 0.090 \times 2 + 0.090 \times 2 + 0.120 + 0.350$ | $0.048 \text{ A} \times 2$                              |
|                     | Result      |          | 1.92 A (£5.0 A)                                                                    | 0.096 A (£0.8 A)                                        |
| Power consumption   | Calculation |          | $1.92 \times 5 \text{ V} = 9.60 \text{ W}$                                         | $0.096 \text{ A} \times 24 \text{ V} = 2.304 \text{ W}$ |
|                     | Result      |          | $9.60 + 2.304 = 11.904 \text{ W} (\leq 25 \text{ W})$                              |                                                         |

## Current Consumption Tables

## CPU Units and Expansion Units

| Name                                                                                                | Model                   | Current consumption at 5 V (A)          |
|-----------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------|
| CPU Units<br>(These values include current consumption for a Programming Console or CX-Programmer.) | CJ1H-CPU67H/66H/65H     | 0.99 (See note.)                        |
|                                                                                                     | CJ1G-CPU45P/44P/43P/42P | 1.06 (See note.)                        |
|                                                                                                     | CJ1G-CPU45H/44H/43H/42H | 0.91 (See note.)                        |
|                                                                                                     | CJ1M-CPU11/12/13        | 0.58 (See note.)                        |
|                                                                                                     | CJ1M-CPU21/22/23        | 0.64 (See note.)                        |
|                                                                                                     | CJ1M-CPU1□-ETN          | 0.95 (See note.)                        |
| Expansion Unit                                                                                      | CJ1W-IC101              | 0.02                                    |
|                                                                                                     | CJ1W-II101              | 0.13                                    |
| End Cover                                                                                           | CJ1W-TER01              | Included in CPU Unit or Expansion Unit. |

**Note:** Add 0.15 A per Unit when the NT-AL001-E is connected and 0.04 A when the CJ1W-CIF11 RS-422A Adapter is connected.

## CJ-series Basic I/O Units and Interrupt Input Unit

| Category                | Name                             | Model      | Current consumption at 5 V (A) | Current consumption at 24 V (A)     |
|-------------------------|----------------------------------|------------|--------------------------------|-------------------------------------|
| Basic Input Units       | DC Input Units                   | CJ1W-ID201 | 0.08                           | ---                                 |
|                         |                                  | CJ1W-ID211 | 0.08                           |                                     |
|                         |                                  | CJ1W-ID231 | 0.09                           |                                     |
|                         |                                  | CJ1W-ID232 | 0.09                           |                                     |
|                         |                                  | CJ1W-ID261 | 0.09                           |                                     |
|                         |                                  | CJ1W-ID262 | 0.09                           |                                     |
|                         | AC Input Units                   | CJ1W-IA111 | 0.09                           |                                     |
|                         |                                  | CJ1W-IA201 | 0.08                           |                                     |
| Basic Output Units      | Transistor Output Units          | CJ1W-OD201 | 0.09                           |                                     |
|                         |                                  | CJ1W-OD202 | 0.11                           |                                     |
|                         |                                  | CJ1W-OD203 | 0.10                           |                                     |
|                         |                                  | CJ1W-OD204 | 0.10                           |                                     |
|                         |                                  | CJ1W-OD211 | 0.10                           |                                     |
|                         |                                  | CJ1W-OD212 | 0.10                           |                                     |
|                         |                                  | CJ1W-OD231 | 0.14                           |                                     |
|                         |                                  | CJ1W-OD232 | 0.15                           |                                     |
|                         |                                  | CJ1W-OD233 | 0.14                           |                                     |
|                         |                                  | CJ1W-OD261 | 0.17                           |                                     |
|                         |                                  | CJ1W-OD262 | 0.17                           |                                     |
|                         |                                  | CJ1W-OD263 | 0.17                           |                                     |
|                         | Relay Output Units               | CJ1W-OC201 | 0.09                           | 0.048<br>(0.006 × No. of ON points) |
|                         |                                  | CJ1W-OC211 | 0.11                           | 0.096<br>(0.006 × No. of ON points) |
|                         | Triac Output Unit                | CJ1W-OA201 | 0.22                           | ---                                 |
| Basic I/O Units         | DC Input/Transistor Output Units | CJ1W-MD231 | 0.13                           | ---                                 |
|                         |                                  | CJ1W-MD233 | 0.13                           |                                     |
|                         |                                  | CJ1W-MD234 | 0.13                           |                                     |
|                         |                                  | CJ1W-MD261 | 0.14                           |                                     |
|                         |                                  | CJ1W-MD263 | 0.14                           |                                     |
|                         | TTL I/O Unit                     | CJ1W-MD563 | 0.19                           |                                     |
| Interrupt Input Unit    |                                  | CJ1W-INT01 | 0.08                           |                                     |
| High-speed Input Unit   |                                  | CJ1W-IDP01 | 0.08                           |                                     |
| B7A Interface Units     |                                  | CJ1W-B7A22 | 0.07                           |                                     |
|                         |                                  | CJ1W-B7A14 | 0.07                           |                                     |
|                         |                                  | CJ1W-B7A04 | 0.07                           |                                     |
| Thermocouple Input Unit |                                  | CJ1W-TS561 | 0.22                           |                                     |
| RTD Input Unit          |                                  | CJ1W-TS562 | 0.25                           |                                     |

**Note:** This table may contain Units that are no longer in production

## CJ-series Special I/O Units

| Name                      | Model          | Current consumption at 5 V (A) | Current consumption at 24 V (A) |
|---------------------------|----------------|--------------------------------|---------------------------------|
| Analog Input Units        | CJ1W-AD081-V1  | 0.42                           | ---                             |
|                           | CJ1W-AD041-V1  | 0.42                           |                                 |
| Analog Output Units       | CJ1W-DA041     | 0.12                           |                                 |
|                           | CJ1W-DA021     | 0.12                           |                                 |
|                           | CJ1W-DA08V/08C | 0.14                           |                                 |
| Analog I/O Unit           | CJ1W-MAD42     | 0.58                           |                                 |
| Process Input Units       | CJ1W-PDC15     | 0.18                           | 0.09 (external)                 |
|                           | CJ1W-PTS15     | 0.18                           | 0.06 (external)                 |
|                           | CJ1W-PTS16     | 0.18                           | 0.07 (external)                 |
|                           | CJ1W-PTS51/52  | 0.25                           | ---                             |
| Temperature Control Units | CJ1W-TC□□□     | 0.25                           | ---                             |
| Position Control Units    | CJ1W-NC113/133 | 0.25                           |                                 |
|                           | CJ1W-NC213/233 | 0.36                           |                                 |
|                           | CJ1W-NC413/433 | 0.36                           |                                 |
| High-speed Counter Unit   | CJ1W-CT021     | 0.28                           |                                 |
| Counter Unit              | CJ1W-CTL41-E   | 0.32                           |                                 |
| SSI encoder Unit          | CJ1W-CTS21-E   | 0.30                           |                                 |
| ID Sensor Units           | CJ1W-V600C11   | 0.26                           | 0.12                            |
|                           | CJ1W-V600C12   | 0.32                           | 0.24                            |
| PROFIBUS-DP Slave Unit    | CJ1W-PRT21     | 0.40                           | ---                             |
| CompoBus/S Master Unit    | CJ1W-SRM21     | 0.15                           | ---                             |

## CJ-series CPU Bus Units

| Name                       | Model         | Current consumption at 5 V (A) |
|----------------------------|---------------|--------------------------------|
| Controller Link Unit       | CJ1W-CLK21-V1 | 0.35                           |
| Serial Communications Unit | CJ1W-SCU41    | 0.38 (See note.)               |
|                            | CJ1W-SCU21    | 0.28 (See note.)               |
| Position Control Unit      | CJ1W-NCF71    | 0.36                           |
| Motion Control Unit        | CJ1W-MCH71    | 0.60                           |
| CAN Unit                   | CJ1W-CORT21   | 0.33                           |
| Ethernet Unit              | CJ1W-ETN11/21 | 0.38                           |
| DeviceNet Unit             | CJ1W-DRM21    | 0.33                           |
| PROFIBUS-DP Master Unit    | CJ1W-PRM21    | 0.40                           |

**Note:** Add 0.15 A per Unit when the NT-AL001-E is connected and 0.04 A when the CJ1W-CIF11 RS-422A Adapter is connected.

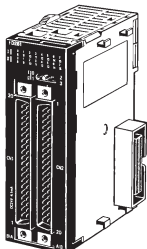
## I/O Allocations

### I/O Allocations

In CJ-series PLCs, part of the I/O memory is allocated to each Unit. Units are divided into the following 3 groups for allocations.

- Basic I/O Units
- Special I/O Units
- CPU Bus Units

#### Basic I/O Units



Basic I/O Units

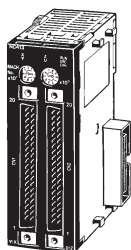


#### Allocations

CIO Area:  
CIO 0000 to CIO 0079 (See note.)  
(Memory is allocated in word units based on mounting position in the Racks.)

**Note:** The Rack's first word setting can be changed from the default setting (CIO 0000) to any word from CIO 0000 to CIO 9999. The first word setting can be changed only with a Programming Device other than a Programming Console.

#### Special I/O Units



Special I/O Units

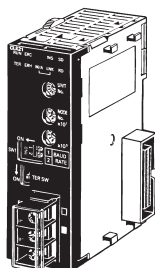


#### Allocations

Special I/O Unit Area:  
CIO 2000 to CIO 2959 (See note.)  
(Each Unit is allocated ten words based on its unit number.)

**Note:** A maximum of 40 Units can actually be mounted to a PLC because that is the maximum number of slots possible.

#### CJ1 CPU Bus Units



CJ1 CPU Bus Units



#### Allocations

CPU Bus Unit Area:  
CIO 1500 to CIO 1899  
(Each Unit is allocated 25 words based on its unit number.)

## Allocations to Basic I/O Unit Groups

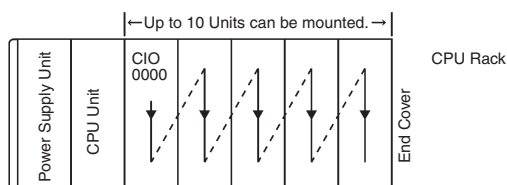
Allocated words in the CIO Area: CIO 0000 to CIO 0079

Basic I/O Units can be mounted to the CPU Rack and Expansion Racks.

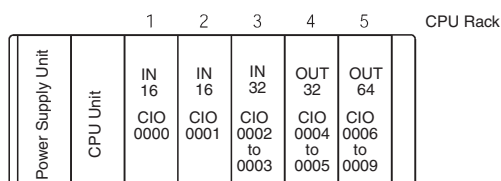
### Allocation Methods

#### 1. CPU Rack

Basic I/O Units on the CPU Rack are allocated words left to right (i.e., from the Unit nearest the CPU Unit) starting from CIO 0000. Units are allocated as many words as required in word units. Words can be reserved using the CX-Programmer.



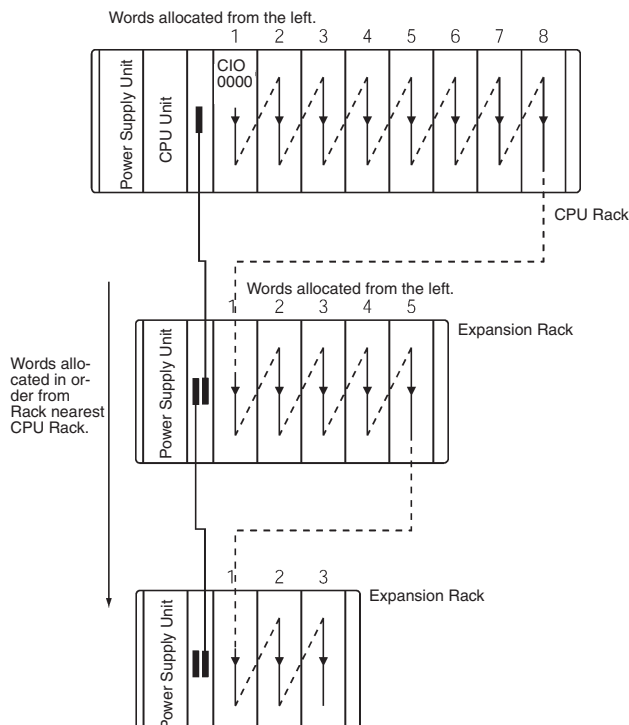
**Example** Words allocated from the left.



**Note:** Units with between 1 and 16 I/O points are allocated 1 word (16 bits) and Units with between 17 and 32 I/O points are allocated 2 words (32 bits). For example, 8-point Relay Units are allocated 1 word, with bits 00 to 07 actually allocated to the I/O points.

#### 2. Allocations to Expansion Racks

I/O allocation to Basic I/O Units continues from the CPU Rack to the Expansion Racks. Words are allocated from left to right and each Unit is allocated as many words as it requires in word units, just like Units in the CPU Rack. A Rack's first word setting can be changed set to any word from CIO 0000 to CIO 9999 using a Programming Device.



#### Allocations to Special I/O Units

Each of these Units is allocated ten words in the Special I/O Unit Area (CIO 2000 to CIO 2959).

Special I/O Units can be mounted to the CPU Rack and Expansion Racks.

Each Unit is allocated 10 words in the Special I/O Unit Area according to its unit number, as shown in the following table.

| Unit number | Words allocated      |
|-------------|----------------------|
| 0           | CIO 2000 to CIO 2009 |
| 1           | CIO 2010 to CIO 2019 |
| 2           | CIO 2020 to CIO 2029 |
|             |                      |
| 15          | CIO 2150 to CIO 2159 |
|             |                      |
| 95          | CIO 2950 to CIO 2959 |

**Note:** Special I/O Units are ignored during I/O allocation to Basic I/O Units. Slots containing Special I/O Units are treated as empty slots.

#### Allocations to CPU Bus Units

Each CPU Bus Unit is allocated 25 words in the CPU Bus Unit Area (CIO 1500 to CIO 1899).

CPU Bus Units can be mounted to the CPU Rack or Expansion Racks.

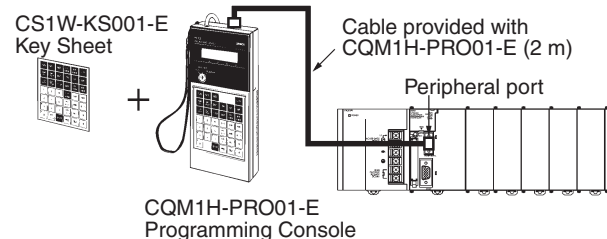
Each Unit is allocated 25 words in the CPU Bus Unit Area according to its unit number, as shown in the following table.

| Unit number | Words allocated      |
|-------------|----------------------|
| 0           | CIO 1500 to CIO 1524 |
| 1           | CIO 1525 to CIO 1549 |
| 2           | CIO 1550 to CIO 1574 |
|             |                      |
| 15          | CIO 1875 to CIO 1899 |

**Note:** CPU Bus Units are ignored during I/O allocation to Basic I/O Units. The same unit numbers can be used for Special I/O Units and CPU Bus Units.

### Programming Consoles

#### CQM1H-PRO01-E



| Model         | Cable         | Cable length |
|---------------|---------------|--------------|
| CQM1H-PRO01-E | Not required. | ---          |

#### Windows-based Programming Software: CX-One

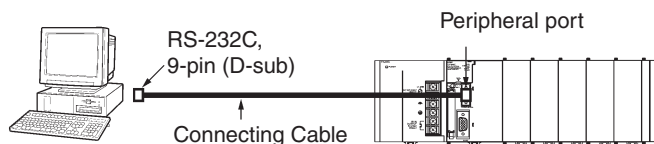
Omron's integrated software for programming and configuration of all control system components, including PLCs, HMI, drives, temperature controllers and advanced sensors.

| Name   | Model                        | Specifications    |
|--------|------------------------------|-------------------|
| CX-One | CX-ONE-AL□□C-E <sup>*1</sup> | Windows 2000 / XP |

<sup>\*1</sup> □□ = Number of licences; 01, 03, 10

**Note:** CX-One includes the PLC programming tool CX-Programmer, previously released as a separate package. CX-Programmer Version 2.04 or higher is required to program CJ-series PLCs.

## Connecting to the Peripheral Port

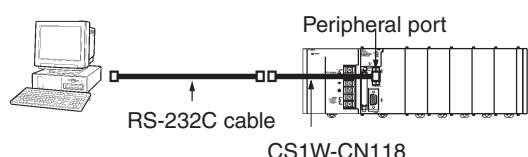


### Peripheral Port Connecting Cables

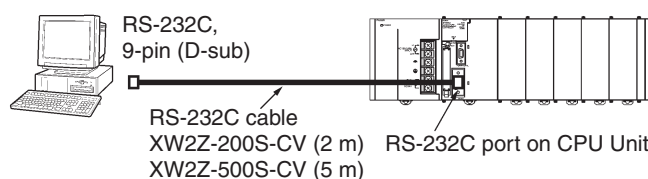
| Cable      | Length | Computer connector |
|------------|--------|--------------------|
| CS1W-CN226 | 2.0 m  | D-sub, 9-pin, male |
| CS1W-CN626 | 6.0 m  |                    |

The following cables can be used for an RS-232C connection from the computer to the peripheral port.

| Mode                        | Connecting cables            | Length           | Computer connector |
|-----------------------------|------------------------------|------------------|--------------------|
| Peripheral bus or Host Link | XW2Z-200S-CV or XW2Z-500S-CV | 2 or 5 m + 0.1 m | D-sub, 9-pin, male |
| Host Link                   | XW2Z-200S-V or XW2Z-500S-V   |                  |                    |



## Connecting to the RS-232C Port



### RS-232C Port Connecting Cables

| Mode                        | Cable        | Length | Computer connector |
|-----------------------------|--------------|--------|--------------------|
| Peripheral Bus or Host Link | XW2Z-200S-CV | 2.0 m  | D-sub, 9-pin       |
|                             | XW2Z-500S-CV | 5.0 m  |                    |

**Note:** Cables with model numbers ending in "CV" are anti-static.

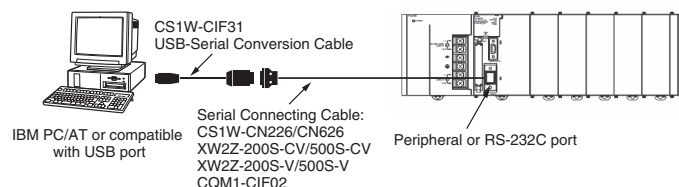
The following cables can be used for an RS-232C connection from the computer to an RS-232C port. (Unlike "CV" models, however, they do not support Peripheral Bus and do not use anti-static connectors.)

| Mode      | Cable       | Length | Computer connector |
|-----------|-------------|--------|--------------------|
| Host Link | XW2Z-200S-V | 2.0 m  | D-sub, 9-pin       |
|           | XW2Z-500S-V | 5.0 m  |                    |

The following serial communications modes can be used to connect a computer with the CX-Programmer to a CJ-series PLC.

| Mode           | Features                                                                                                                                                                  |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Peripheral Bus | The faster mode, peripheral bus is generally used for CX-Programmer connections. Only 1:1 connections are possible. The baud rate is automatically detected with the CJ1. |
| Host Link      | A standard protocol for host computers. Slower than peripheral bus, but allows modem or optical adapter connections, or long-distance or 1:N connections via RS-422A/485. |

## Using a USB-Serial Conversion Cable to Connect to a Peripheral or RS-232C Port



### General Specifications of USB-Serial Conversion Cable

|                        |             |                                            |
|------------------------|-------------|--------------------------------------------|
| USB interface standard |             | Conforms to USB Specification 1.1.         |
| DTE speed              |             | 115.2 Kbits/s                              |
| Connectors             | On computer | USB (A plug connector, male)               |
|                        | On PLC      | RS-232C (D-sub, 9-pin, female)             |
| Power supply           |             | Bus power (supplied from upstream, 5 V DC) |

|                       |                     |                                   |
|-----------------------|---------------------|-----------------------------------|
| Current consumption   |                     | 35 mA                             |
| Operating environment | Ambient temperature | 0 to 55 °C                        |
|                       | Ambient humidity    | 10% to 90% (with no condensation) |
|                       | Ambient atmosphere  | No corrosive gases                |
| Weight                |                     | 50 g                              |

**OS with Drivers for USB-Serial Conversion Cable**  
Windows 98, ME, 2000, or XP

### Applicable Software

CX-One is the integrated software for programming and configuration of all Omron control system components, including PLCs, HMI, drives, temperature controllers and advanced sensors.

It includes the functionality of previously released individual software tools like CX-Programmer, CX-Designer, CX-Simulator, CX-Protocol, and network configuration tools.

### Peripheral Port Connecting Cables

| Computer                | Serial Communications Mode | Connecting Cable model number |                            | Length                           | Computer connector     |
|-------------------------|----------------------------|-------------------------------|----------------------------|----------------------------------|------------------------|
| IBM PC/AT or compatible | Tool bus or SYSMAC WAY     | CS1W-CIF31                    | CS1W-CN226                 | 0.5 m + 2.0 m                    | USB (A plug connector) |
|                         |                            |                               | CS1W-CN626                 | 0.5 m + 6.0 m                    |                        |
|                         |                            | CS1W-CIF31                    | XW2Z-200S-CV/ XW2Z-500S-CV | 0.5 m + (2.0 m or 5.0 m) + 0.1 m |                        |
|                         | SYSMAC WAY                 | CS1W-CIF31                    | XW2Z-200S-V/ XW2Z-500S-V   | 0.5 m + (2.0 m or 5.0 m) + 0.1 m |                        |
|                         |                            |                               |                            |                                  |                        |

### RS-232C Port Connecting Cables

| Computer                | Serial Communications Mode | Connecting Cable model number |                         | Length        | Computer connector     |
|-------------------------|----------------------------|-------------------------------|-------------------------|---------------|------------------------|
| IBM PC/AT or compatible | Tool bus or SYSMAC WAY     | CS1W-CIF31                    | XW2Z-200S-CV            | 0.5 m + 2.0 m | USB (A plug connector) |
|                         |                            |                               | XW2Z-500S-CV            | 0.5 m + 5.0 m |                        |
|                         | SYSMAC WAY                 | CS1W-CIF31                    | XW2Z-200S-V (See note.) | 0.5 m + 2.0 m |                        |
|                         |                            |                               | XW2Z-500S-V (See note.) | 0.5 m + 5.0 m |                        |

Connection in Tool Bus Mode is not possible. The connector does not have ESD measures.

# CJ1 Unit Descriptions

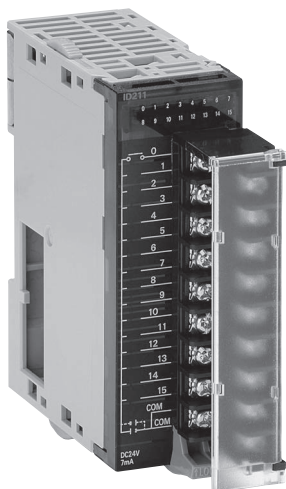
**Table of Units**

| Unit                             |                        | Classification                        | Model                        | Page |
|----------------------------------|------------------------|---------------------------------------|------------------------------|------|
| I/O Units                        | Input Units            | Basic I/O Unit                        | CJ1W-ID□□□/IA□□□             | 182  |
|                                  | Output Units           |                                       | CJ1W-OD□□□/OC□□□/OA□□□       | 182  |
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| Temperature Control Units        |                        | Special I/O Unit                      | CJ1W-TC□□□                   | 205  |
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| Controller Link Boards/<br>Units | Controller Link Units  | CPU Bus Unit                          | CJ1W-CLK21-V1                | 230  |
|                                  | Controller Link Boards | Personal computer board (for PCI bus) | 3G8F7-CLK21-EV1              |      |
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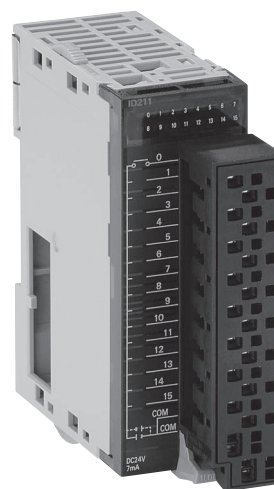
## I/O Terminal Blocks

Most I/O units that use a 18-point removable terminal block are available in two variations:

- Conventional M3 Screw type connection
- Screwless clamp connection



This type requires wiring to be terminated by fork- or ring terminals



This type can be used with standard or solid wire up to 1.5 mm<sup>2</sup>, with or without ferrules. This option is designated by the suffix (SL).

CJ1W-ID/-IA/-OC/-OD/-OA/-MD

# Basic I/O Units

## I/O Units



Input Unit (8/16 points)  
CJ1W-ID201/211  
CJ1W-IA□□□  
Output Units (8/16 points)  
CJ1W-OD20□/21□  
CJ1W-OA201



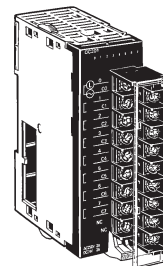
Input Units (32 points)  
CJ1W-ID23□  
Output Units (32 points)  
CJ1W-OD23□



I/O Units (32 points)  
CJ1W-MD23□



Input Units (64 points)  
CJ1W-ID26□  
Output Units (64 points)  
CJ1W-OD26□



Relay Contact Output Units  
(8 independent contacts)  
CJ1W-OC201  
Relay Contact Output Units  
(16 points)  
CJ1W-OC211

## DC Input Units

| Classification | Inputs | Input Specifications | Connections                  | Model          |
|----------------|--------|----------------------|------------------------------|----------------|
| Basic I/O Unit | 8 pts  | 24 V DC, 10 mA       | Removable terminal block     | CJ1W-ID201     |
|                | 16 pts | 24 V DC, 7 mA        | Removable terminal block     | CJ1W-ID211(SL) |
|                | 32 pts | 24 V DC, 4.1 mA      | Fujitsu-compatible connector | CJ1W-ID231     |
|                | 32 pts | 24 V DC, 4.1 mA      | MIL connector                | CJ1W-ID232     |
|                | 64 pts | 24 V DC, 4.1 mA      | Fujitsu-compatible connector | CJ1W-ID261     |
|                | 64 pts | 24 V DC, 4.1 mA      | MIL connector                | CJ1W-ID262     |

## AC Input Units

| Classification | Inputs | Input Specifications                 | Connections              | Model      |
|----------------|--------|--------------------------------------|--------------------------|------------|
| Basic I/O Unit | 16 pts | 100 to 120 V AC, 7 mA (100 V, 50 Hz) | Removable terminal block | CJ1W-IA111 |
|                | 8 pts  | 200 to 240 V AC, 9 mA (200 V, 50 Hz) |                          | CJ1W-IA201 |

## Relay Contact Output Units

| Classification | Outputs                      | Maximum switching capacity                   | Connections              | Model          |
|----------------|------------------------------|----------------------------------------------|--------------------------|----------------|
| Basic I/O Unit | 8 pts (independent contacts) | 2 A 250 V AC per contact, max. 8A per common | Removable terminal block | CJ1W-OC201(SL) |
|                | 16 pts                       |                                              |                          | CJ1W-OC211(SL) |

## Transistor Output Units

| Classification | Outputs | Maximum switching capacity                                                                   | Connections                  | Model          |
|----------------|---------|----------------------------------------------------------------------------------------------|------------------------------|----------------|
| Basic I/O Unit | 8 pts   | 12 to 24 V DC, 2 A/pt, 8 A/Unit sinking                                                      | Removable terminal block     | CJ1W-OD201     |
|                |         | 24 V DC, 2 A/pt, 8 A/Unit, sourcing, load short protection, disconnection detection, alarm   |                              | CJ1W-OD202     |
|                |         | 12 to 24 V DC, 0.5 A/pt, 4 A/Unit, sinking                                                   | Removable terminal block     | CJ1W-OD203     |
|                |         | 24 V DC, 0.5 A/pt, 4 A/Unit, sourcing, load short protection, disconnection detection, alarm | Removable terminal block     | CJ1W-OD204     |
|                | 16 pts  | 12 to 24 V DC, 0.5 A/pt, 5 A/Unit sinking                                                    | Removable terminal block     | CJ1W-OD211(SL) |
|                |         | 24 V DC, 0.5 A/pt, 5 A/Unit, sourcing, load short protection, alarm                          |                              | CJ1W-OD212(SL) |
|                | 32 pts  | 12 to 24 V DC, 0.5 A/pt, 4 A/Unit, sinking                                                   | Fujitsu-compatible connector | CJ1W-OD231     |
|                |         | 24 V DC, 0.5 A/pt, 4 A/Unit, sourcing, load short protection, alarm                          | MIL connector                | CJ1W-OD232     |
|                |         | 12 to 24 V DC, 0.5 A/pt, 4 A/Unit, sinking                                                   |                              | CJ1W-OD233     |
|                | 64 pts  | 12 to 24 V DC, 0.3 A/pt, 6.4 A/Unit, sinking                                                 | Fujitsu-compatible connector | CJ1W-OD261     |
|                |         | 12 to 24 V DC, 0.3 A/pt, 6.4 A/Unit, sourcing                                                | MIL connector                | CJ1W-OD262     |
|                |         | 12 to 24 V DC, 0.3 A/pt, 6.4 A/Unit, sinking                                                 | MIL connector                | CJ1W-OD263     |
|                | 8 pts   | 250 V AC, 0.6 A/pt, 2.4 A/Unit, 50/60 Hz                                                     | Removable terminal block     | CJ1W-OA201     |

**Note:** Units with a suffix "(SL)" are available with screwless terminal blocks as well as M3 screw terminals.

# DC Input/Transistor Output Units

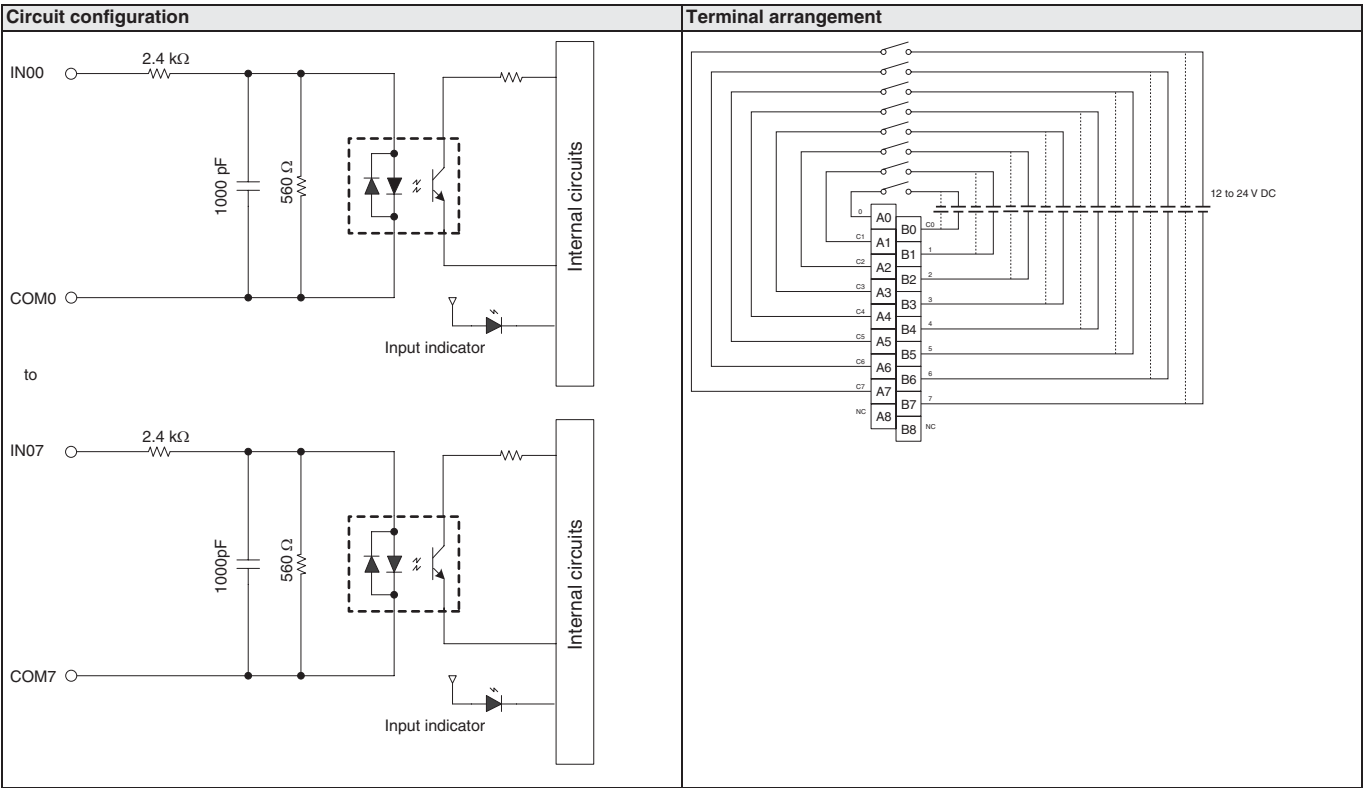
| Classification | Inputs/Outputs           | Input voltage | Input current (typical) | Max. output switching capacity                                                                            | Connections                  | Model      |
|----------------|--------------------------|---------------|-------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------|------------|
| Basic I/O Unit | 16 inputs/<br>16 outputs | 24 V DC       | 7 mA                    | 12 to 24 V DC, 0.5 A/pt. 2.0 A/Unit, sinking outputs                                                      | Fujitsu-compatible connector | CJ1W-MD231 |
|                |                          |               |                         |                                                                                                           | MIL connector                | CJ1W-MD233 |
|                | 32 inputs/<br>32 outputs | 24 V DC       | 4.1 mA                  | 12 to 24 V DC inputs, 24 V DC outputs, 0.5 A/pt, 2 A/Unit, sourcing, load short circuit protection, alarm | MIL connector                | CJ1W-MD232 |
|                |                          |               |                         | 12 to 24 V DC, 0.3 A/pt. 3.2 A/Unit, sinking outputs                                                      | Fujitsu-compatible connector | CJ1W-MD261 |
|                |                          |               |                         |                                                                                                           | MIL connector                | CJ1W-MD263 |

# TTL I/O Units

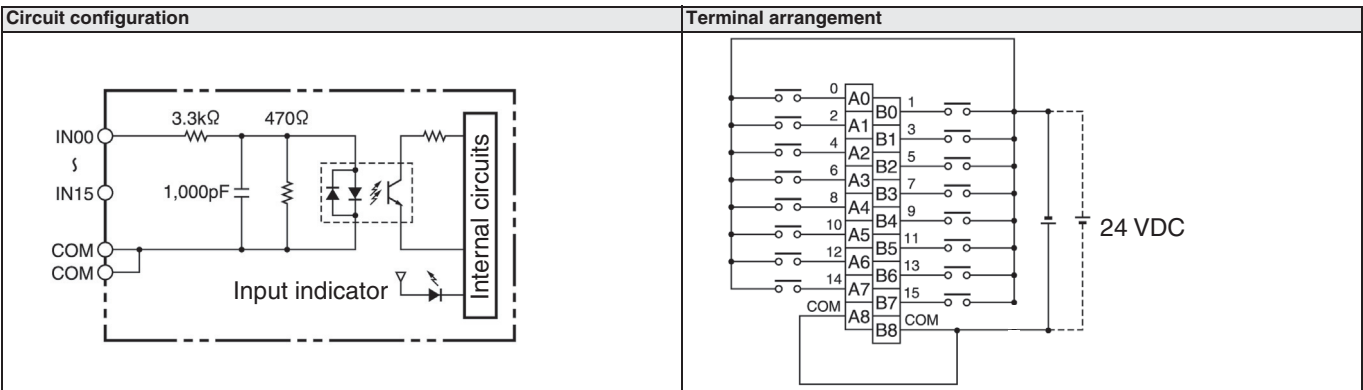
| Classification | Inputs/Outputs           | Input voltage | Input current (typical) | Max. output switching capacity | Connections   | Model      |
|----------------|--------------------------|---------------|-------------------------|--------------------------------|---------------|------------|
| Basic I/O Unit | 32 inputs/<br>32 outputs | 5 V DC        | 3.5 mA                  | 5 V DC, 35 mA/pt. 1.12 A/Unit  | MIL connector | CJ1W-MD563 |

# Circuit Configuration and Terminal Arrangement

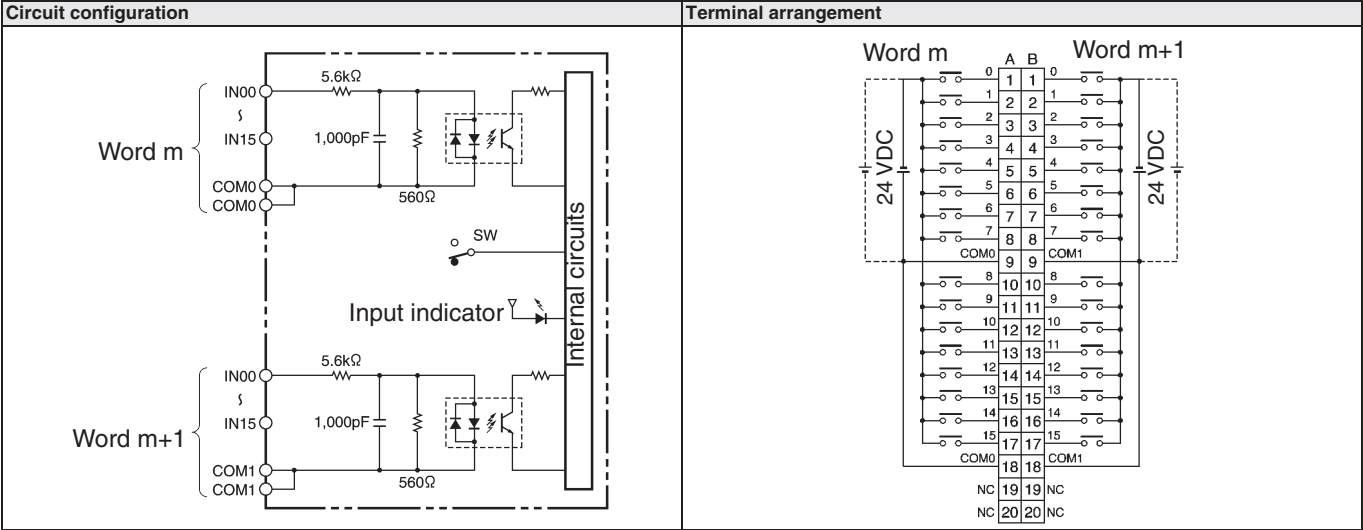
## CJ1W-ID201



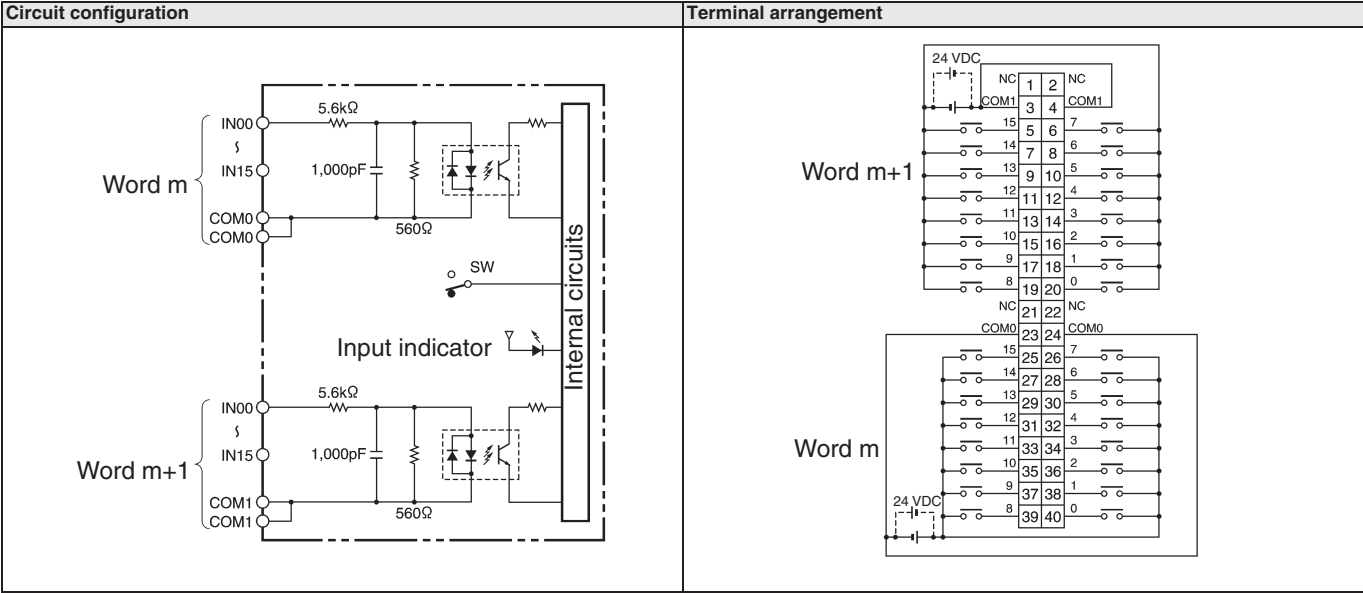
## CJ1W-ID211(SL)



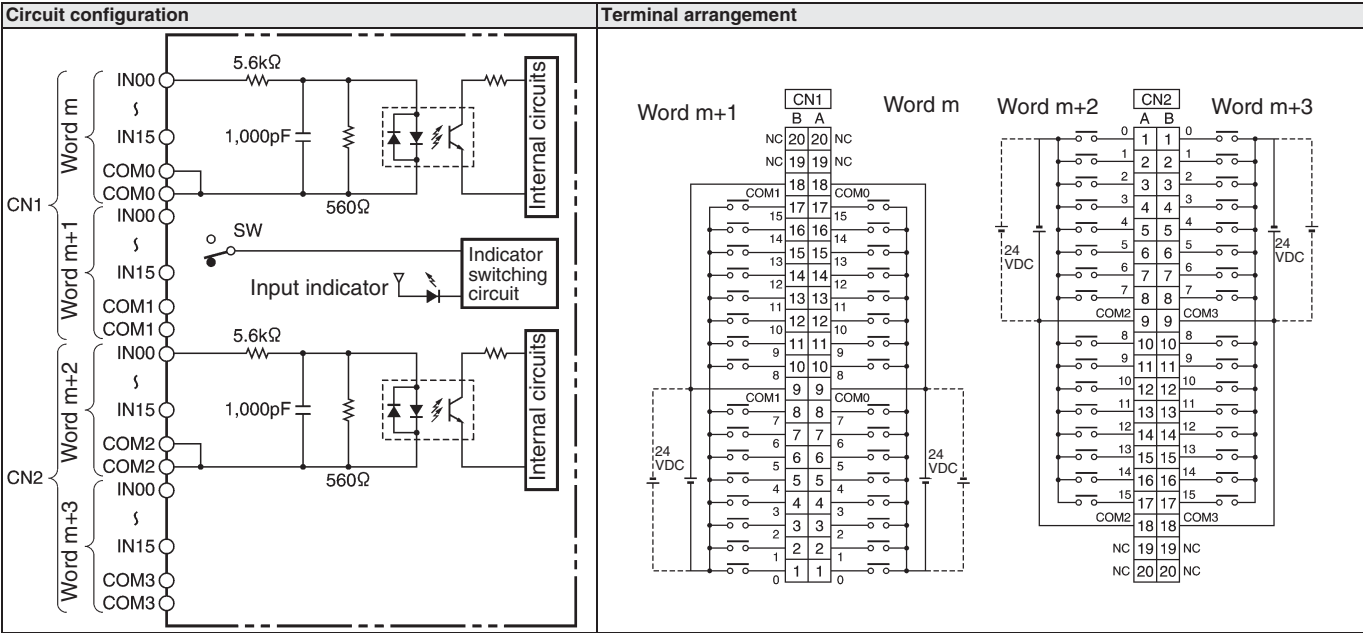
CJ1W-ID231



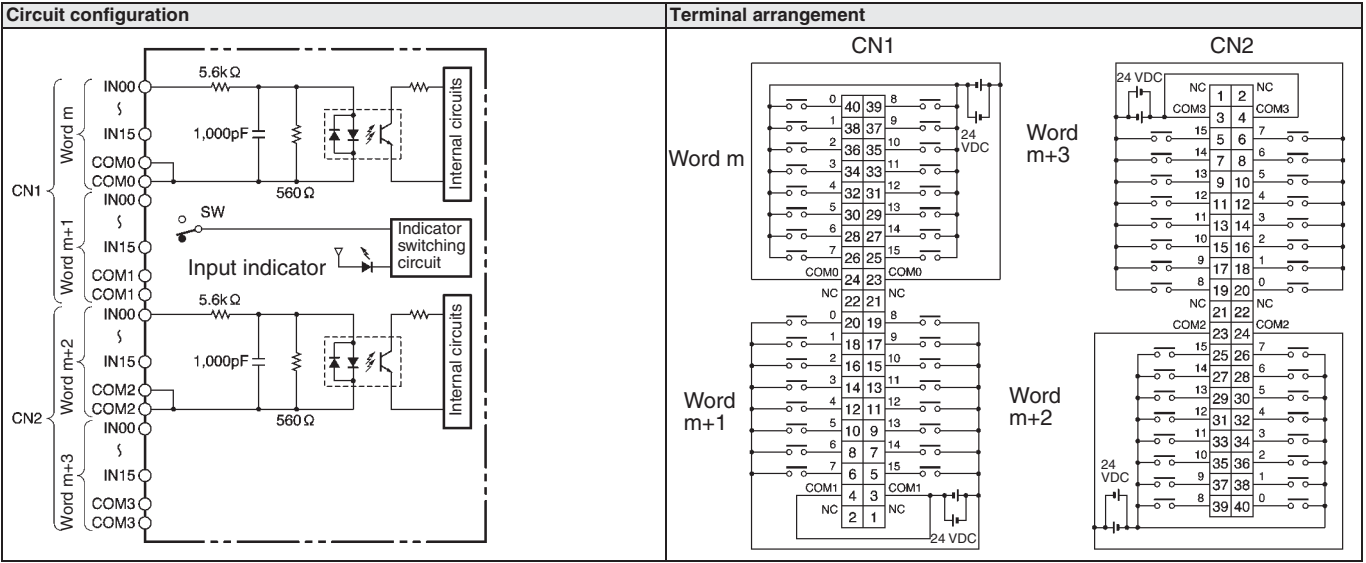
CJ1W-ID232



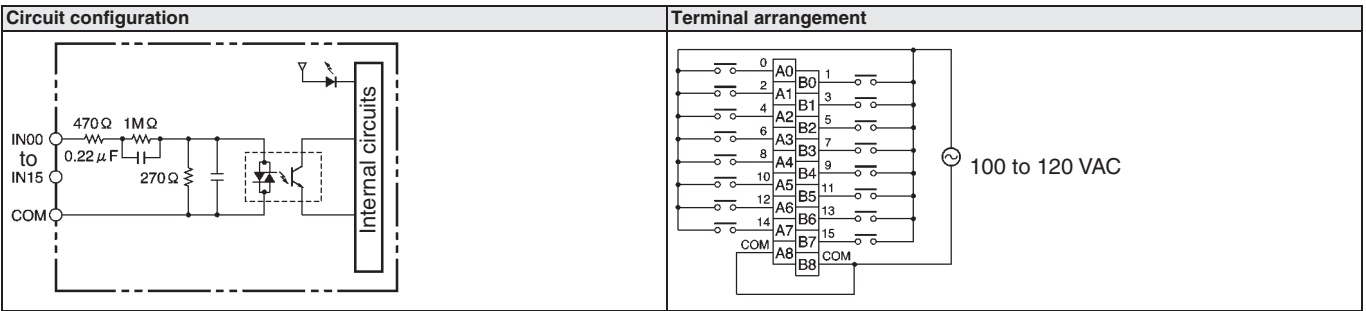
CJ1W-ID261



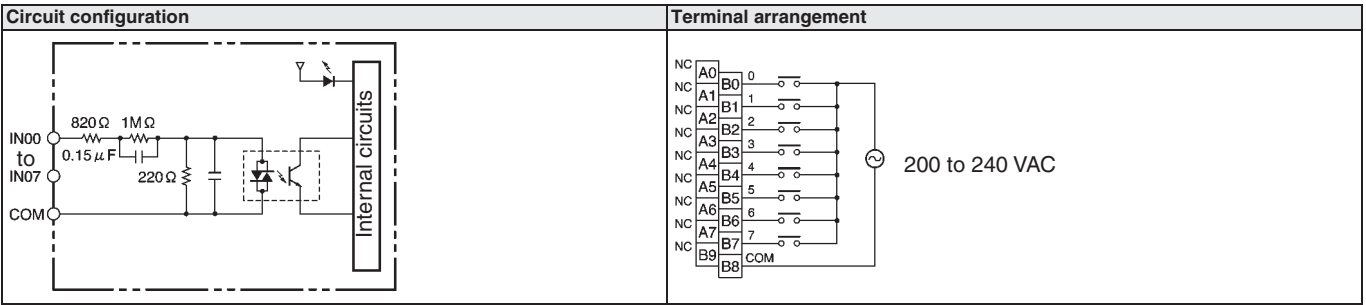
CJ1W-ID262



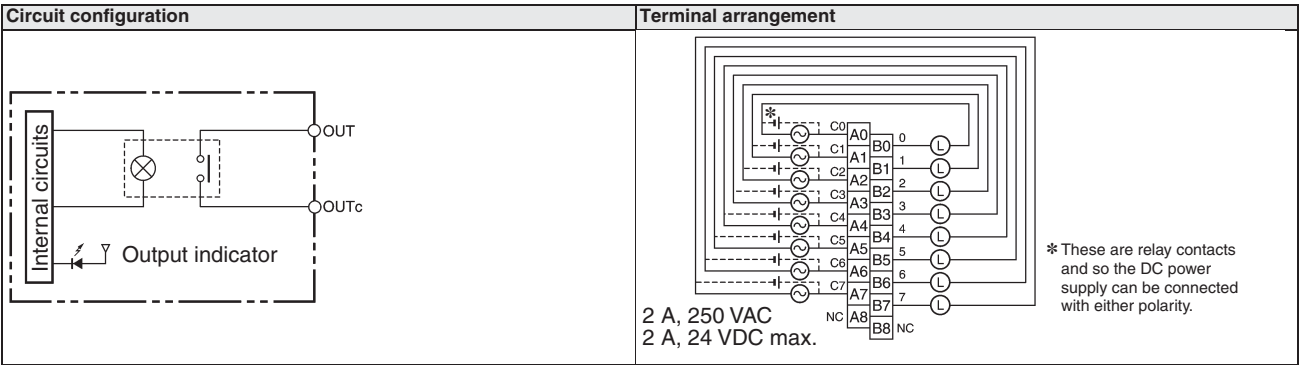
CJ1W-IA111



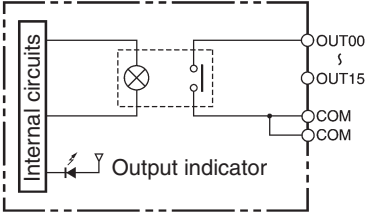
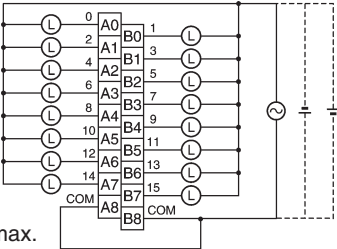
CJ1W-IA201



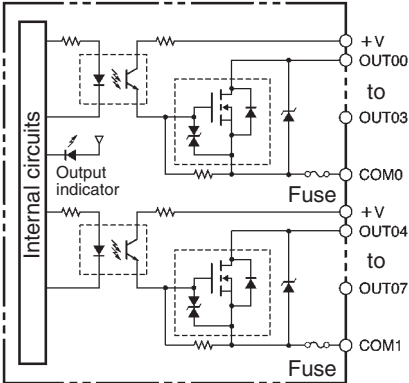
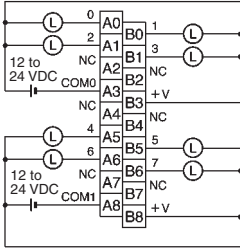
CJ1W-OC201(SL)



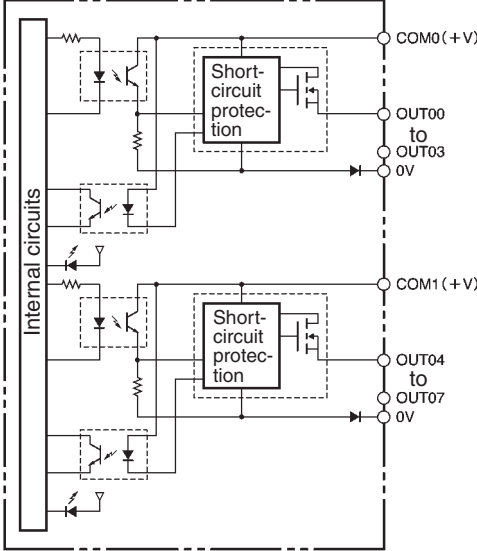
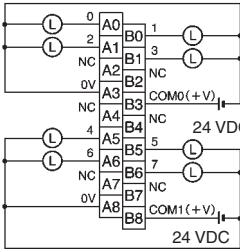
CJ1W-OC211(SL)

| Circuit configuration                                                             | Terminal arrangement                                                                                                        |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|  |  <p>2 A, 250 VAC<br/>2 A, 24 VDC max.</p> |

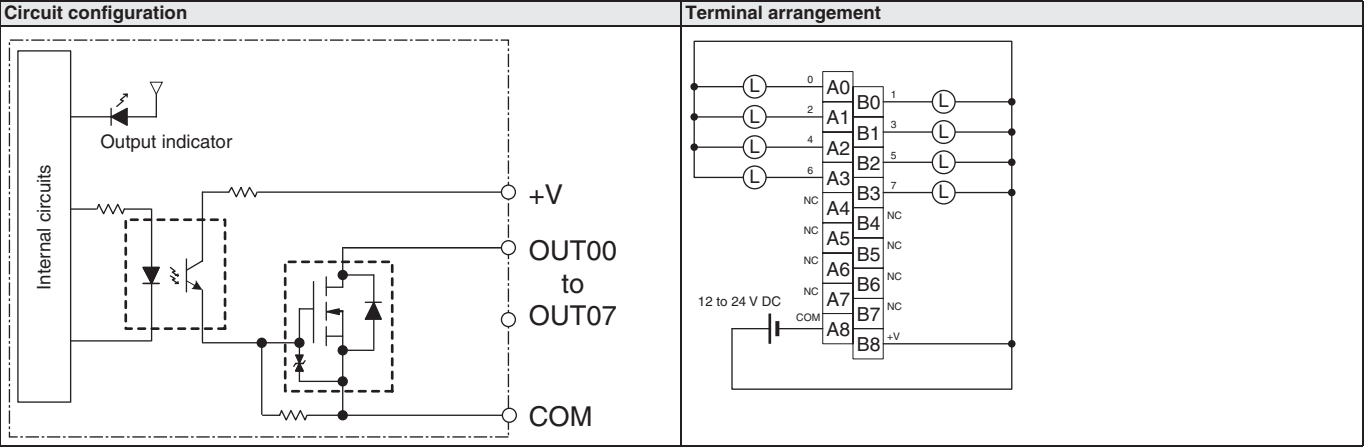
CJ1W-OD201

| Circuit configuration                                                             | Terminal arrangement                                                               |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |

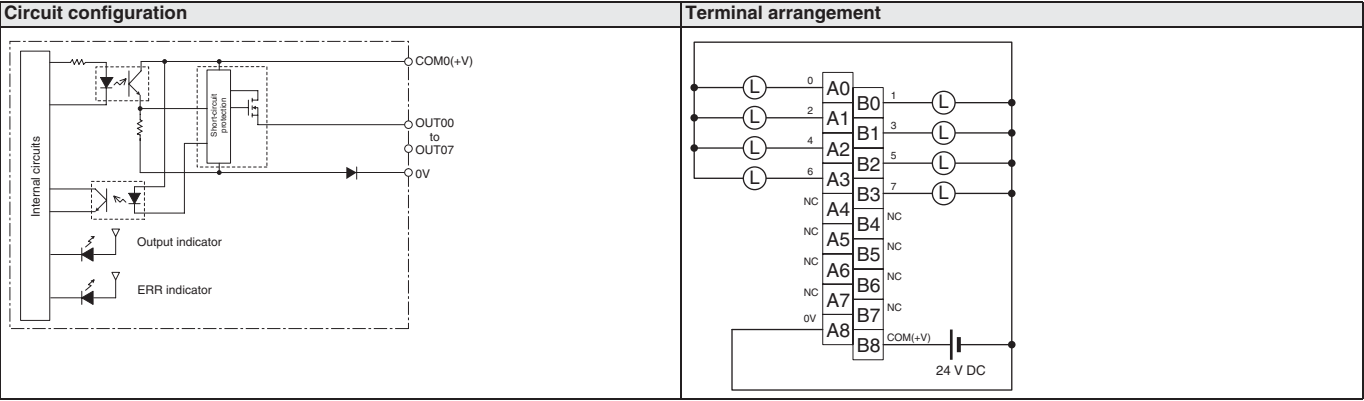
CJ1W-OD202

| Circuit configuration                                                              | Terminal arrangement                                                                 |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  |  |

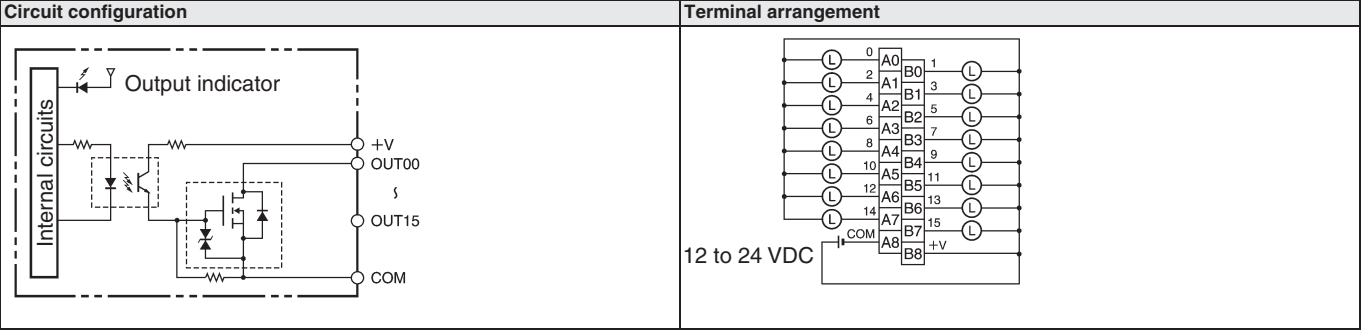
CJ1W-OD203



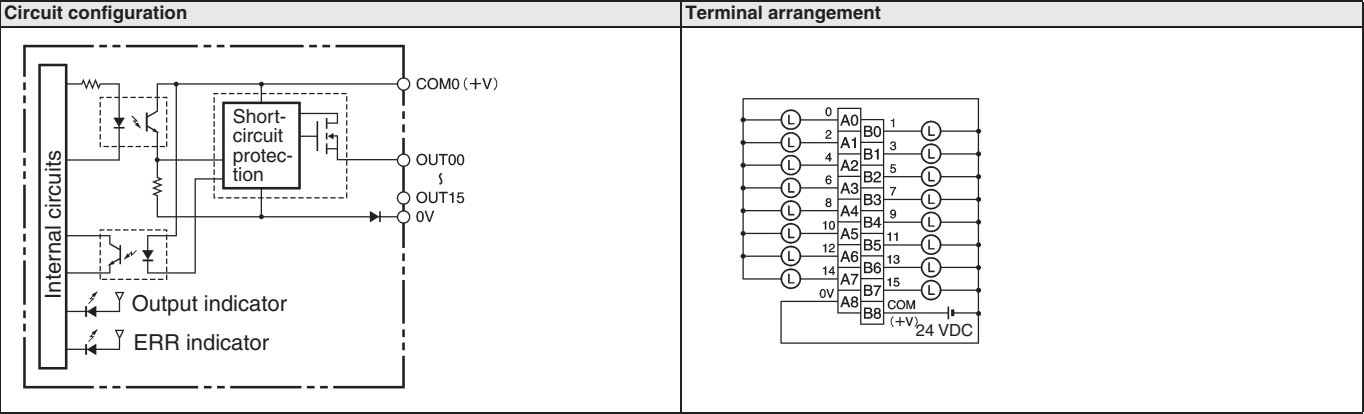
CJ1W-OD204



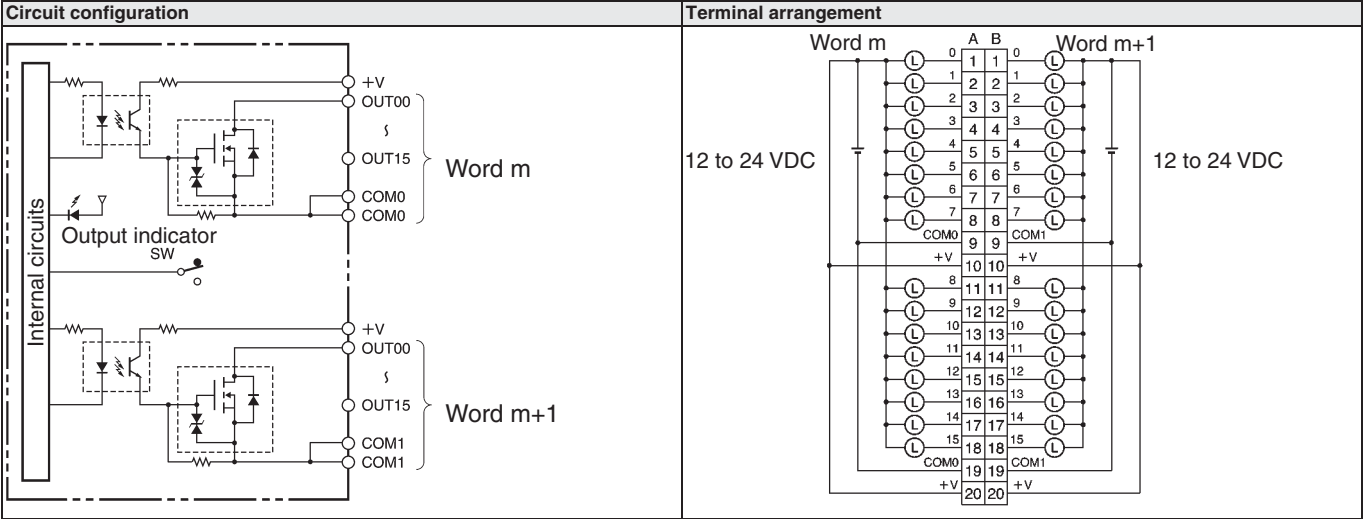
CJ1W-OD211(SL)



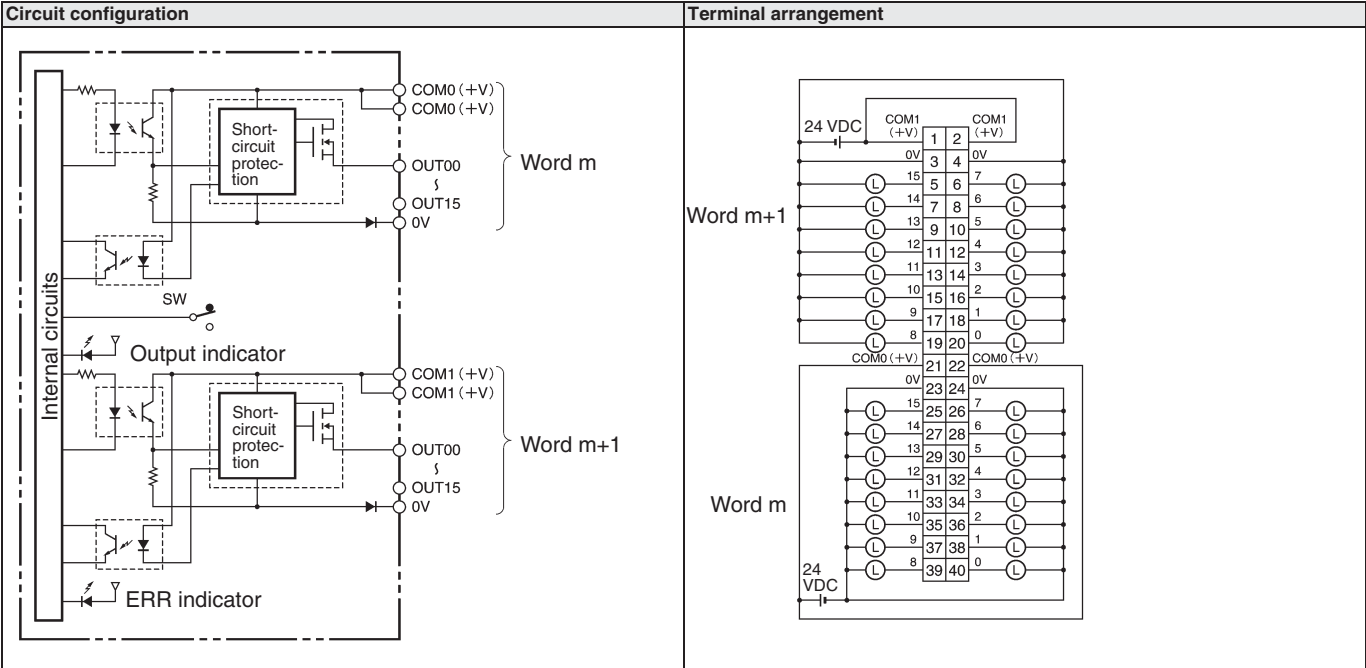
CJ1W-OD212(SL)



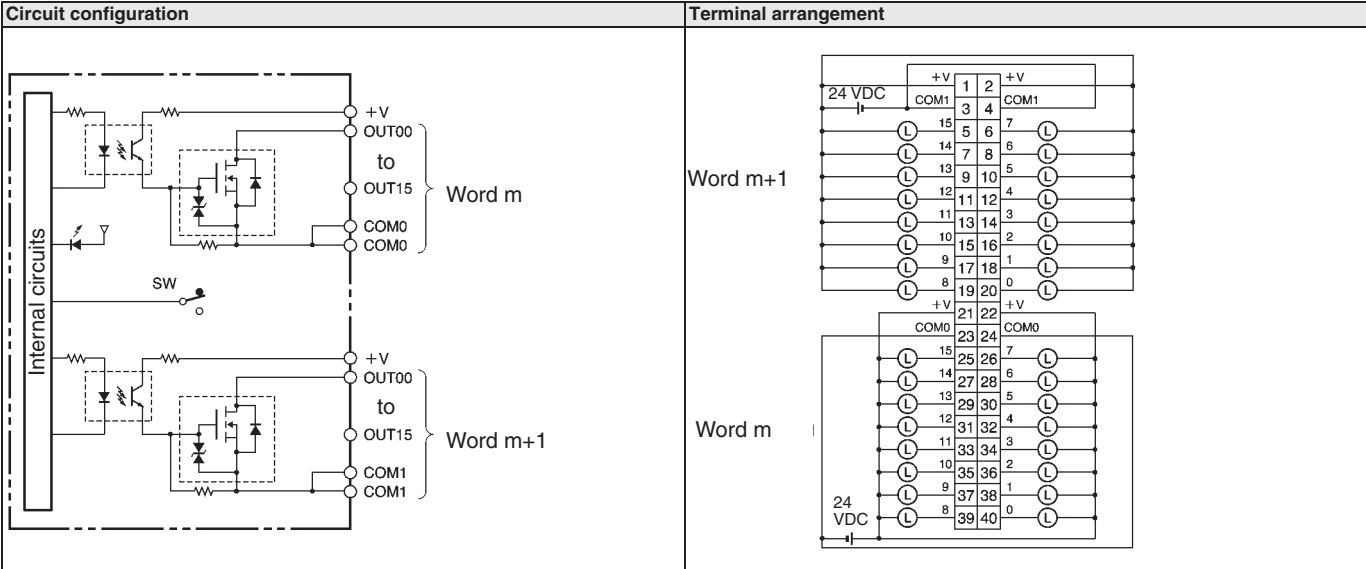
CJ1W-OD231



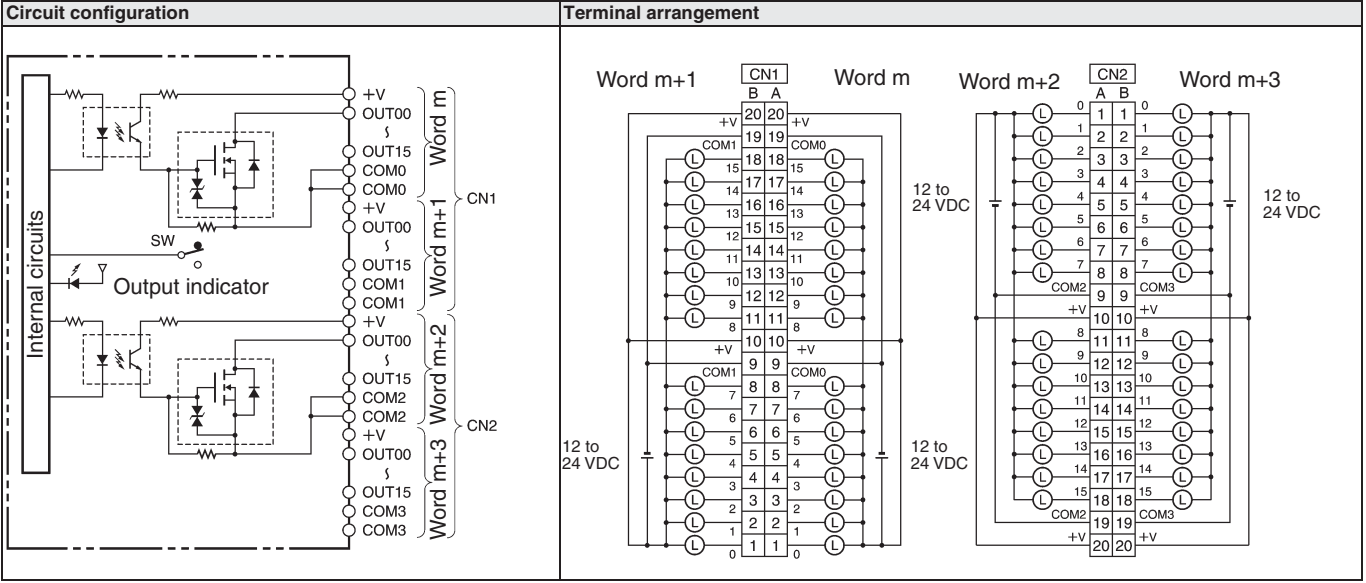
CJ1W-OD232



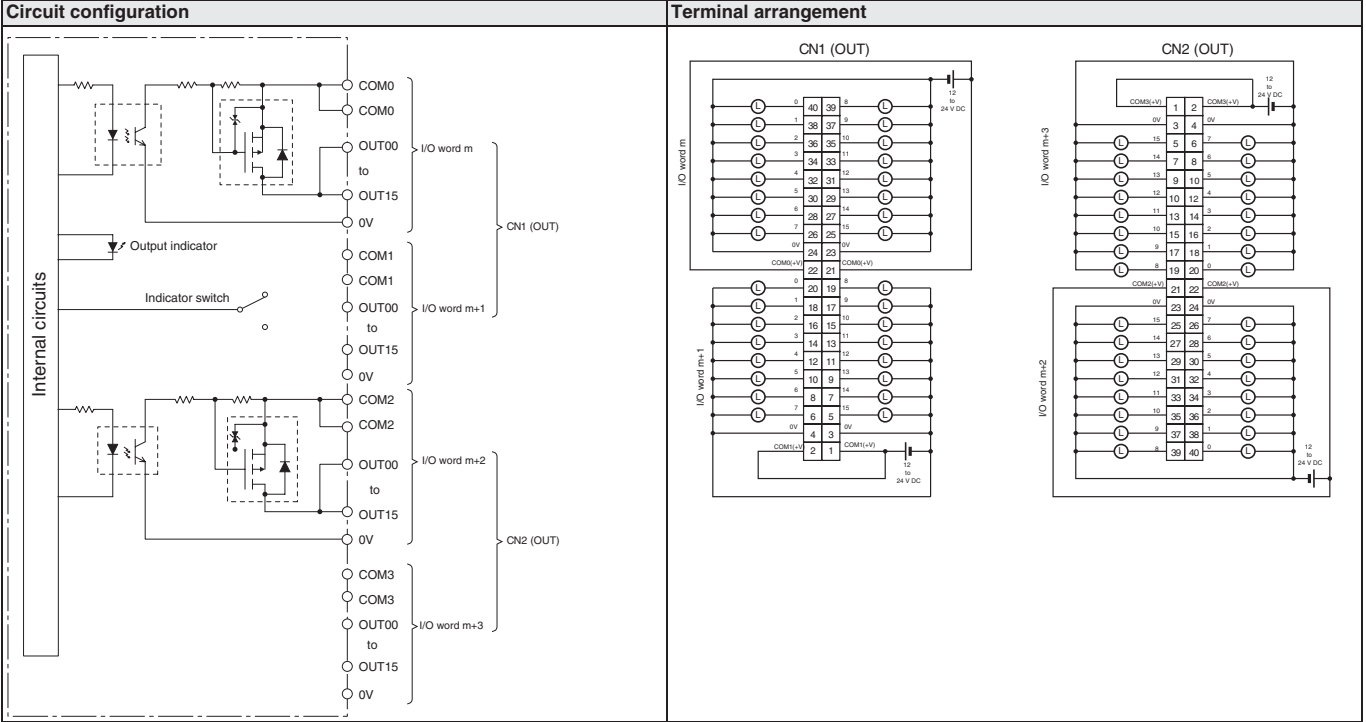
CJ1W-OD233



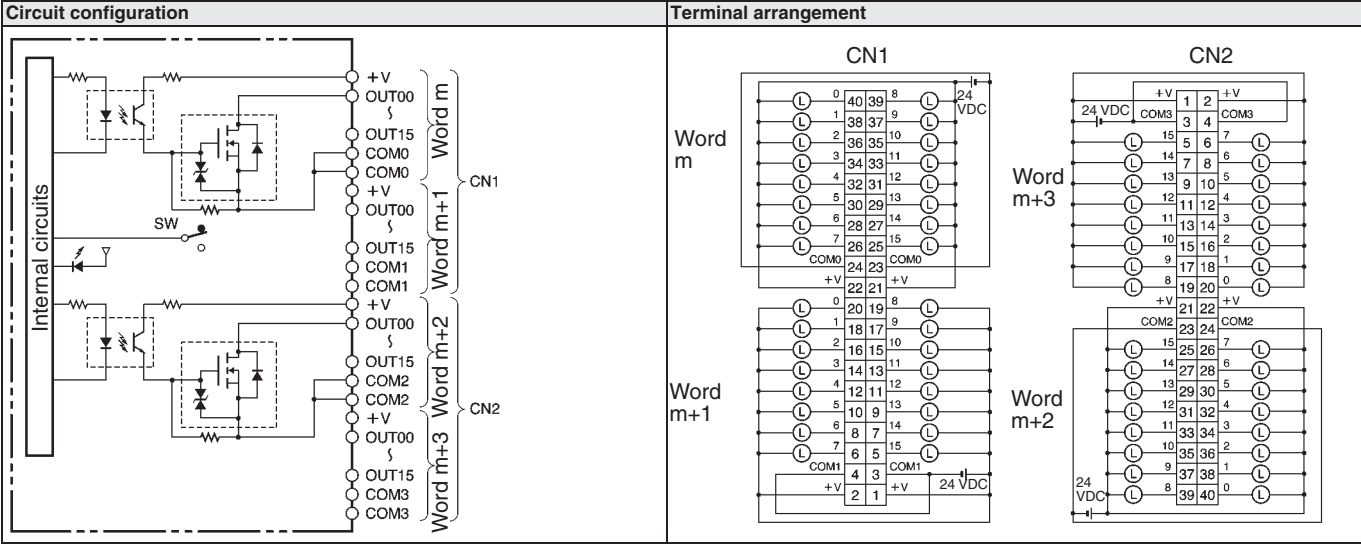
CJ1W-OD261



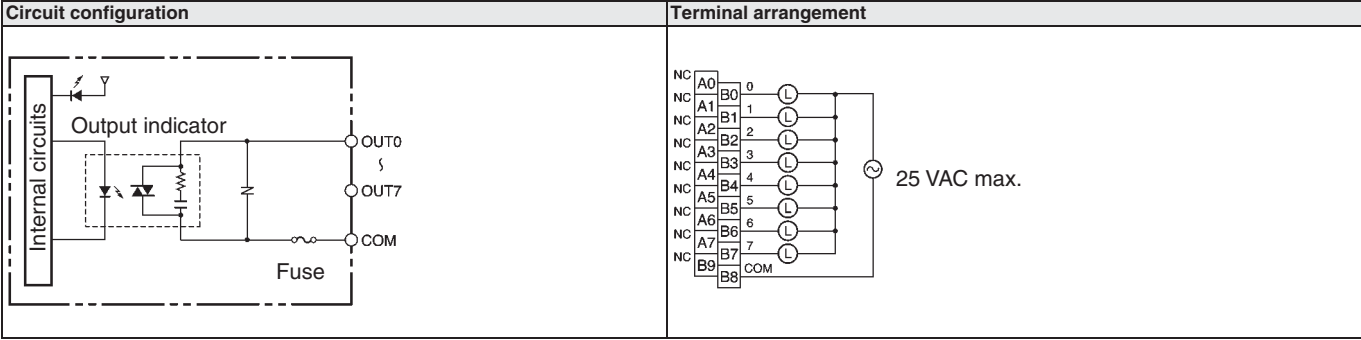
CJ1W-OD262



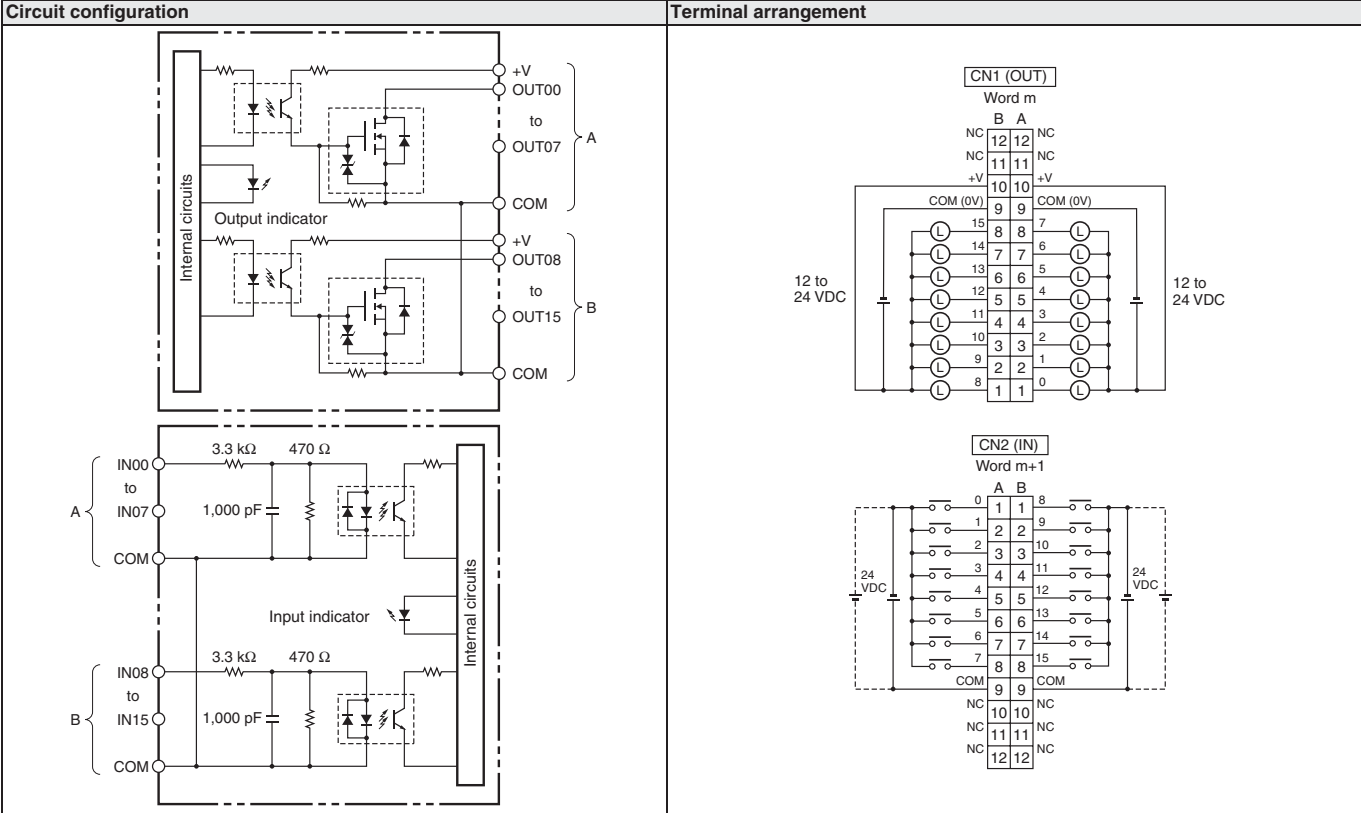
CJ1W-OD263



CJ1W-OA201

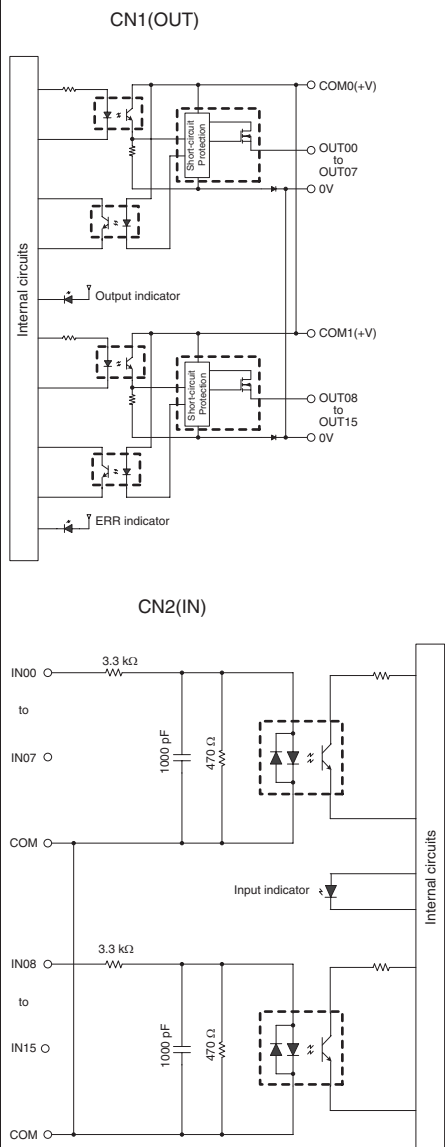


CJ1W-MD231

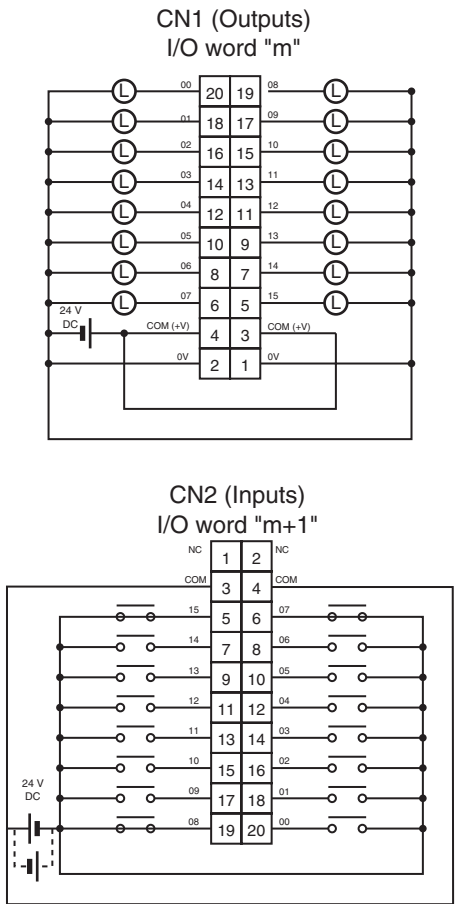


CJ1W-MD232

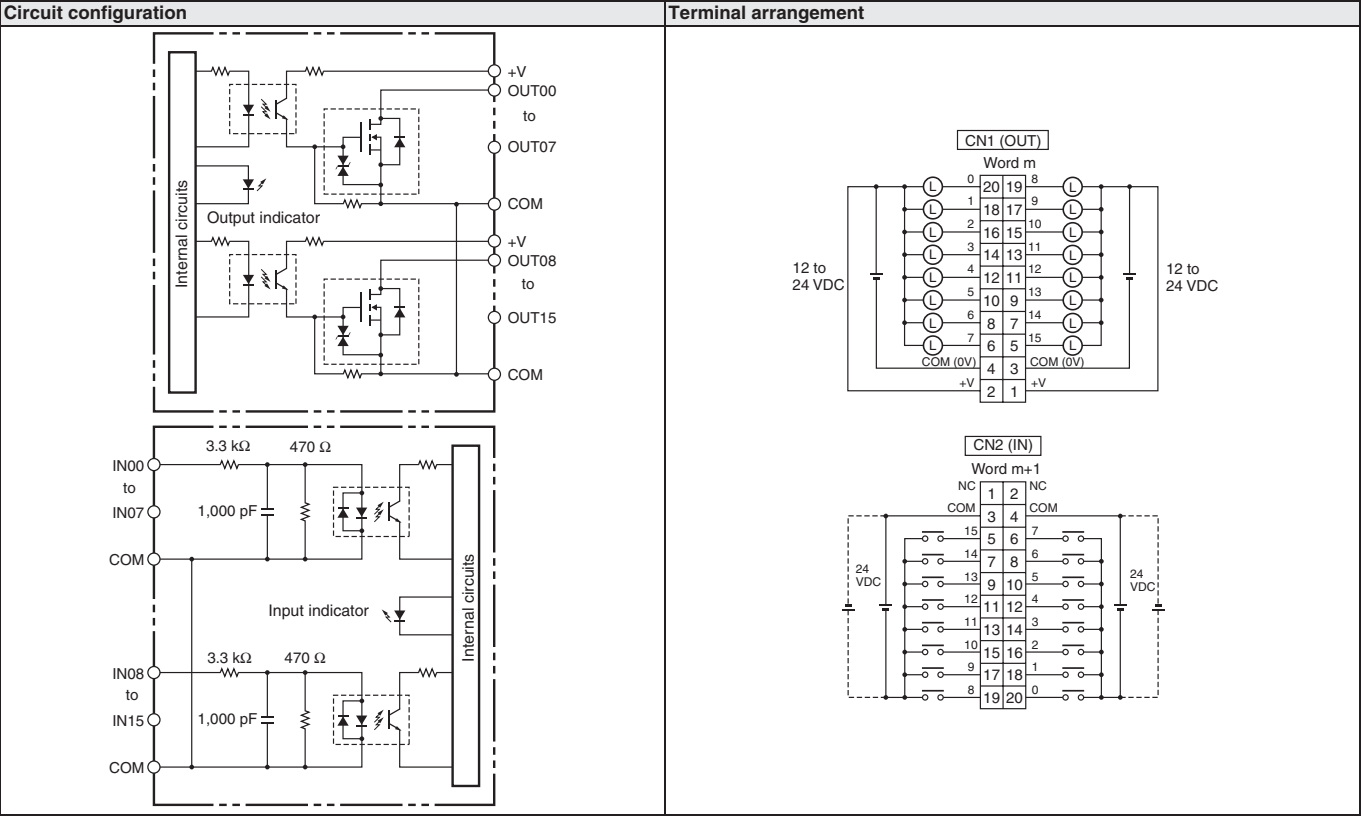
Circuit configuration



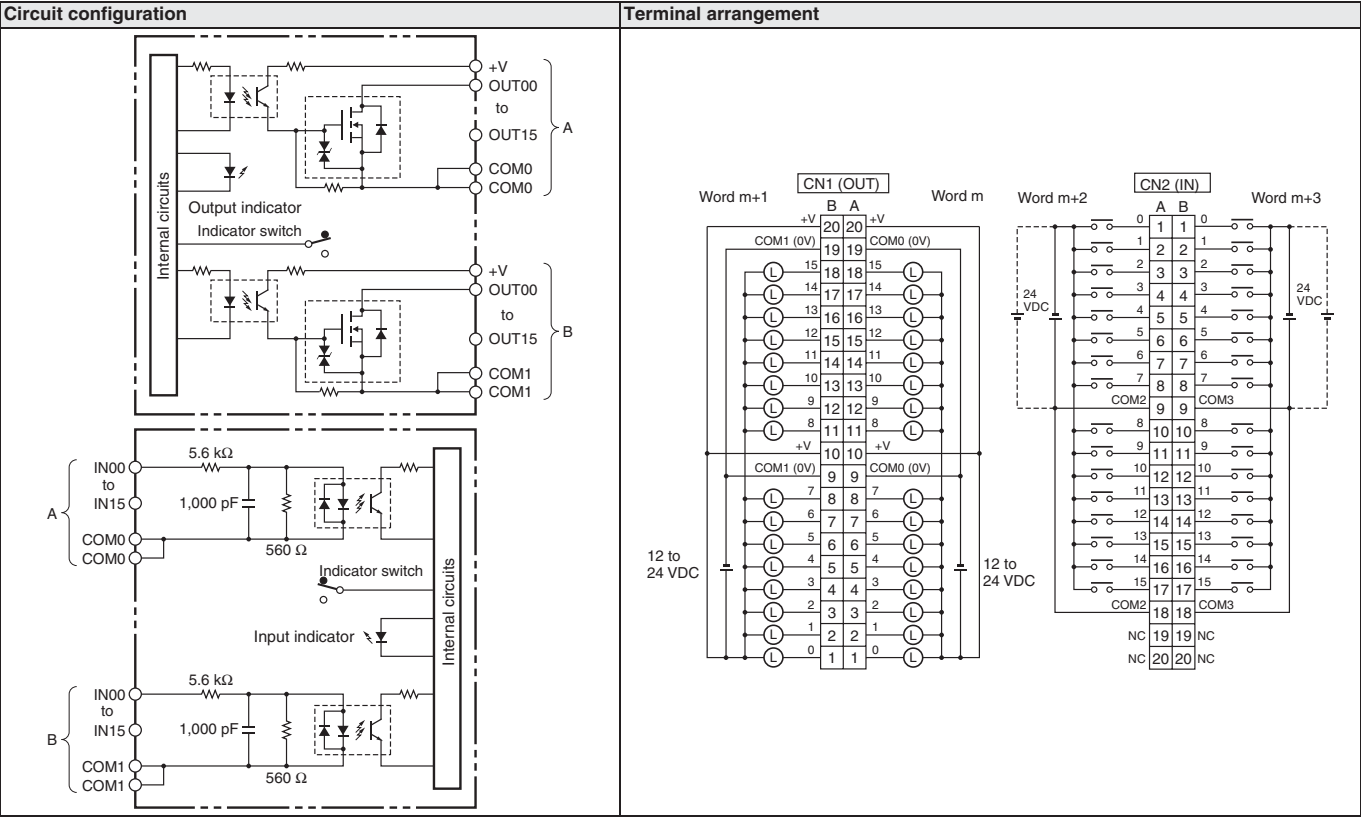
Terminal arrangement



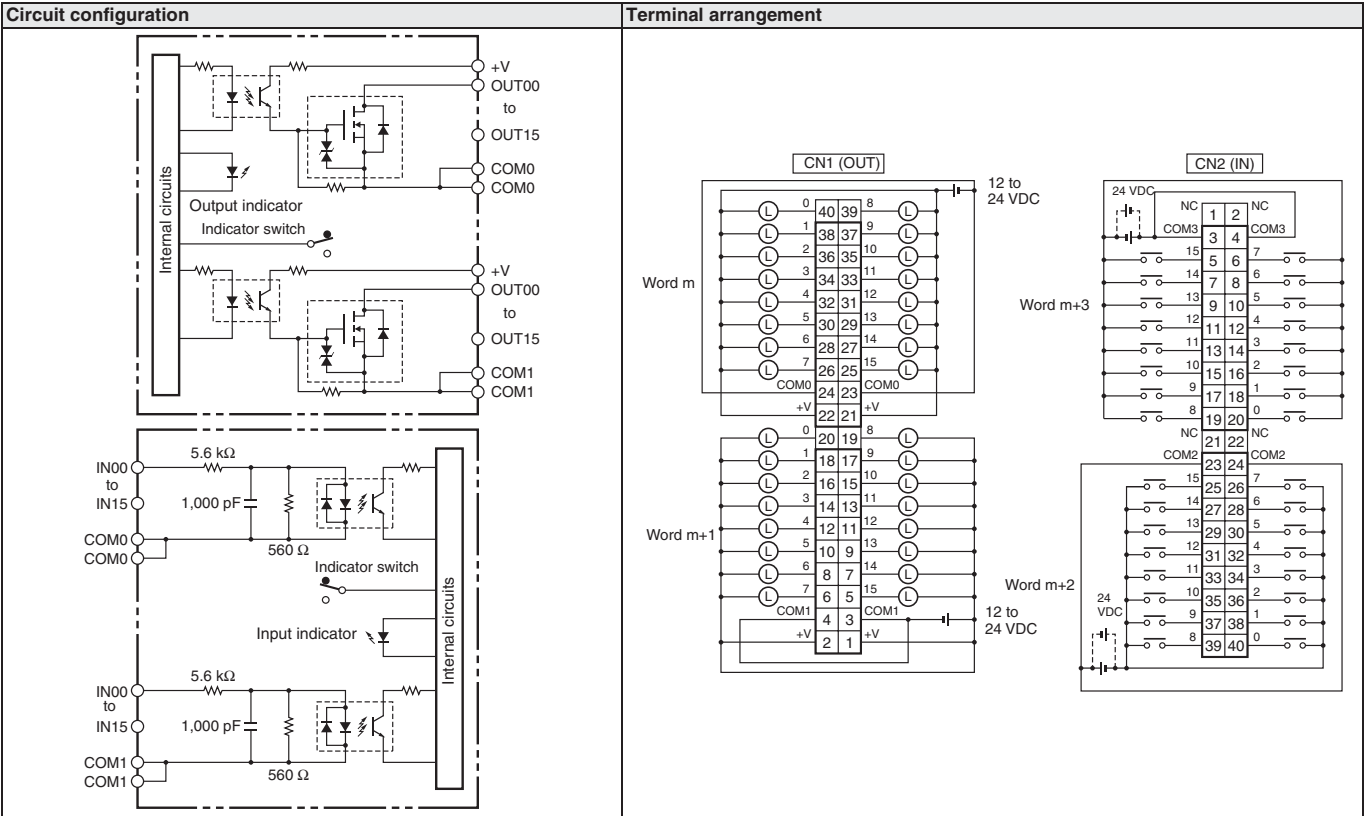
CJ1W-MD233



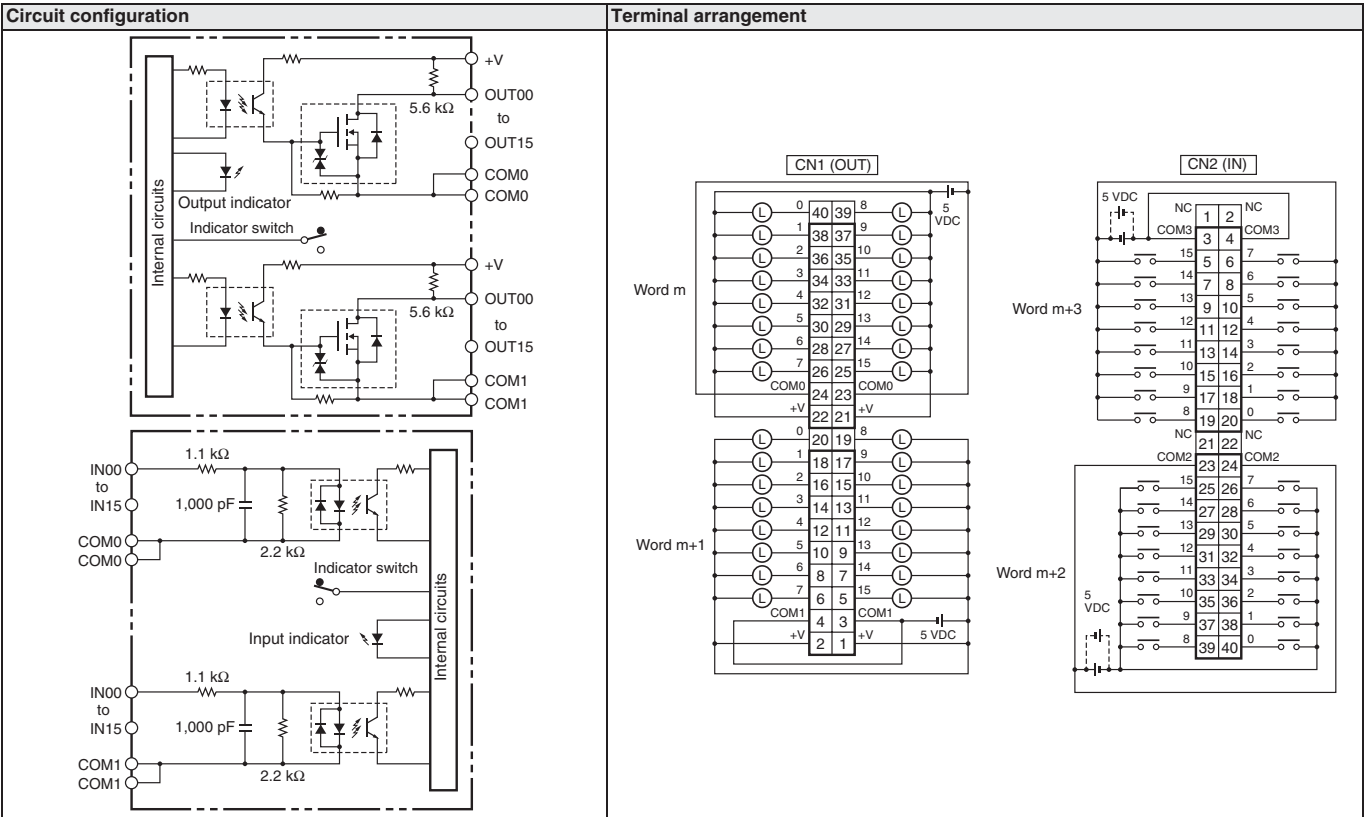
CJ1W-MD261



CJ1W-MD263



CJ1W-MD563



CJ1W-INT01

# Interrupt Input Unit

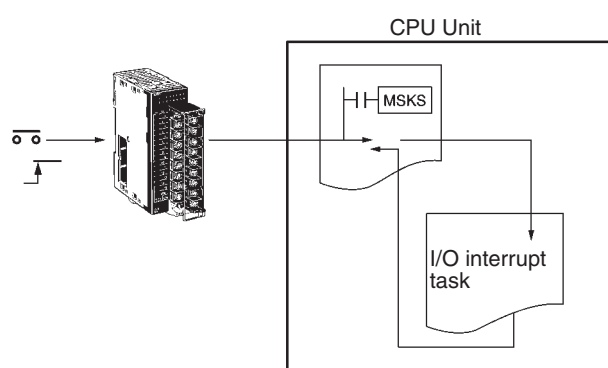
## High-speed Response for Interrupt Task

Execution: 0.37 ms OFF to ON and 0.82 ms ON to OFF

- An input to the Interrupt Input Unit immediately interrupts CPU Unit processing to suspend execution of cyclic tasks (i.e., the normal programming) and execute an I/O interrupt task.



## System Configuration



## Specifications

| Input voltage | Inputs    | Input signal pulse width             | No. of mountable Units | Mounting location                                                                 | External connections     |
|---------------|-----------|--------------------------------------|------------------------|-----------------------------------------------------------------------------------|--------------------------|
| 24 V DC       | 16 inputs | ON: 0.05 ms min.<br>OFF: 0.5 ms min. | 2 max.                 | Any of the leftmost 5 slots (CJ1M: 3 slots) next to the CPU Unit on the CPU Rack. | Removable terminal block |

| Circuit configuration | Terminal connections |
|-----------------------|----------------------|
|                       |                      |

CJ1W-IDP01

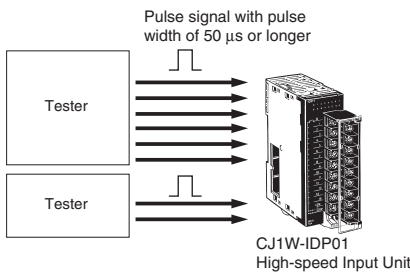
# High-speed Input Unit

**Latches input pulses as short as 50  $\mu$ s.**

- Reads pulses that are too fast for normal I/O, such as is often required for signal exchange with inspection devices.
- Reads pulse widths (ON time) as short as 0.05 ms.
- Inputs stored in the internal circuits are cleared in I/O refresh period.



## System Configuration



## Specifications

| Input voltage | Inputs    | Input signal pulse width             | No. of mountable Units                            | Mounting location | External connections     |
|---------------|-----------|--------------------------------------|---------------------------------------------------|-------------------|--------------------------|
| 24 V DC       | 16 inputs | ON: 0.05 ms min.<br>OFF: 0.5 ms min. | No restrictions beyond normal limits for CPU Unit | No restrictions   | Removable terminal block |

## Circuit Configuration and Terminal Connections

| Circuit configuration | Terminal connections |
|-----------------------|----------------------|
|                       |                      |

CJ1W-TS561/-TS562

# Temperature Input Units

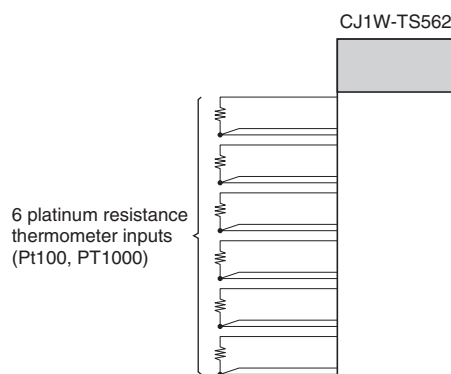
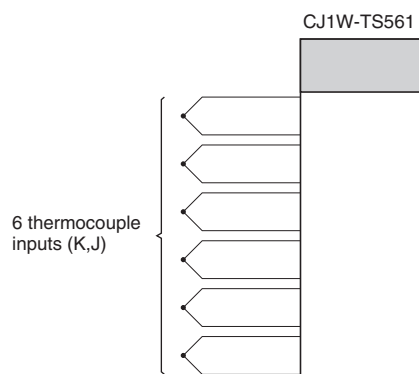
## Connect up to 6 temperature sensors per Unit.

These Basic I/O units allow up to 6 temperature sensors to be connected.

- Input types (TS561: thermocouple J/K, TS562 : Pt100/Pt1000) can be selected per channel.
- The unit presents the temperature data in the basic I/O area of the PLC occupying from 3 to 6 CIO words.
- Cold junction compensation (TS561) is provided internally.
- Adjustable filtering allows mains frequencies (50/60 Hz) to be suppressed.
- Broken wire (TC/RTD) and short-circuit alarms (RTD) are provided as error code in the PLC, and by LED indication.
- The unit does not provide galvanic isolation between the input signals.



## System Configuration



## Terminal arrangement

### CJ1W-TS561(SL)

|             |    |    |             |
|-------------|----|----|-------------|
| Input 2 (-) | B1 | A1 | Input 1 (-) |
| Input 2 (+) | B2 | A2 | Input 1 (+) |
| NC          | B3 | A3 | NC          |
| NC          | B4 | A4 | NC          |
| Input 4 (-) | B5 | A5 | Input 3 (-) |
| Input 4 (+) | B6 | A6 | Input 3 (+) |
| Input 6 (-) | B7 | A7 | Input 5 (-) |
| Input 6 (+) | B8 | A8 | Input 5 (+) |
| NC          | B9 | A9 | NC          |

### CJ1W-TS562(SL)

|            |    |    |            |
|------------|----|----|------------|
| Input 2 B' | B1 | A1 | Input 1 B' |
| Input 2 B  | B2 | A2 | Input 1 B  |
| Input 2 A  | B3 | A3 | Input 1 A  |
| Input 4 B' | B4 | A4 | Input 3 B' |
| Input 4 B  | B5 | A5 | Input 3 B  |
| Input 4 A  | B6 | A6 | Input 3 A  |
| Input 6 B' | B7 | A7 | Input 5 B' |
| Input 6 B  | B8 | A8 | Input 5 B  |
| Input 6 A  | B9 | A9 | Input 5 A  |

## Specifications

| Item                   | Classification: Basic I/O Unit                                                                |                                                                     |
|------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
|                        | CJ1W-TS561 (SL)                                                                               | CJ1W-TS562 (SL)                                                     |
| Inputs                 | 6 points                                                                                      |                                                                     |
| Input Type             | Thermocouple types J or K (IEC 60584)                                                         | 3-wire RTD types Pt100 or Pt1000 (IEC 60751)                        |
| Measurement Range      | Type J: -100.0 to +850.0 °C,<br>Type K: -200.0 to 1300.0 °C                                   | Pt100/Pt1000: -200.0 to +650.0 °C                                   |
| Input Assignment       | by DIP-switch, any combination of input types is possible                                     |                                                                     |
| Output Data            | 16-bit signed integer, resolution 0.1 °C                                                      |                                                                     |
| Conversion time        | 40 ms to 400 ms per active input<br>(depending on filter setting OFF / 50 Hz / 60 Hz / 10 Hz) |                                                                     |
| Accuracy               | +/- 0.5% of PV or +/- 0.7 °C, whichever is larger, +/- 1 digit max.                           | +/- 0.5% of PV or +/- 0.8 °C, whichever is larger, +/- 1 digit max. |
| Cold Junction accuracy | +/- 2.0 °C                                                                                    | n.a.                                                                |
| Sensor connection      | terminal block, screw type or screwless clamp (model code + (SL))                             |                                                                     |

CJ1W-AD□□□(SL)

# Analog Input Units

## Convert Analog Signals to Binary Data

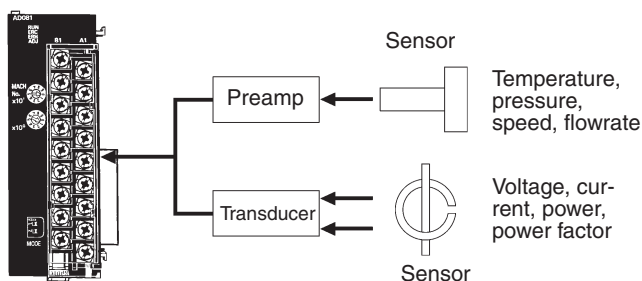
- Wire burnout detection
- Peak-hold function
- Mean function
- Offset gain setting
- Range selection per input
- 1/8000 resolution
- 2 ms conversion time for 8 channels



## Function

Convert input signals such as 1 to 5 V or 4 to 20 mA to binary values between 0000 and 1F40 Hex and store the results in the allocated words each cycle. The ladder diagram can be used to transfer the data to the DM Area or the SCALING instructions (e.g., SCL(194)) can be used to scale the data to the desired range.

## System Configuration



## Terminal Arrangement

|             |    |    |             |
|-------------|----|----|-------------|
| Input 2 (+) | B1 | A1 | Input 1 (+) |
| Input 2 (-) | B2 | A2 | Input 1 (-) |
| Input 4 (+) | B3 | A3 | Input 3 (+) |
| Input 4 (-) | B4 | A4 | Input 3 (-) |
| AG          | B5 | A5 | AG          |
| Input 6 (+) | B6 | A6 | Input 5 (+) |
| Input 6 (-) | B7 | A7 | Input 5 (-) |
| Input 8 (+) | B8 | A8 | Input 7 (+) |
| Input 8 (-) | B9 | A9 | Input 7 (-) |

## Specifications

| Item                          |                        |             | Classification: Special I/O Unit                   |                                 |
|-------------------------------|------------------------|-------------|----------------------------------------------------|---------------------------------|
|                               |                        |             | CJ1W-AD081-V1(SL)                                  | CH1W-AD041-V1(SL)               |
| Inputs                        |                        |             | 8 pts                                              | 4 pts                           |
| Signal range                  | Voltages               | 1 to 5 V    | Yes                                                |                                 |
|                               |                        | 0 to 10 V   | Yes                                                |                                 |
|                               |                        | 0 to 5 V    | Yes                                                |                                 |
|                               |                        | −10 to 10 V | Yes                                                |                                 |
|                               | Currents               | 4 to 20 mA  | Yes                                                |                                 |
| Signal range settings         |                        |             | 8 settings (one for each point)                    | 4 settings (one for each point) |
| Resolution                    |                        |             | 1/4000 (default) or 1/8000 (selectable)            |                                 |
| Conversion speed              |                        |             | 1 ms/point (default), or 250 μs/point (selectable) |                                 |
| Overall accuracy (at 23 °C)   |                        |             | Voltage: ±0.2%<br>Current: ±0.4%                   |                                 |
| Overall accuracy (0 to 55 °C) |                        |             | Voltage: ±0.4%<br>Current: ±0.6%                   |                                 |
| Connections                   |                        |             | Terminal block                                     |                                 |
| Features                      | Wire burnout detection |             | Yes                                                |                                 |
|                               | Peak-hold function     |             | Yes                                                |                                 |
|                               | Averaging              |             | Yes                                                |                                 |
| Unit No.                      |                        |             | 0 to 95                                            |                                 |

CJ1W-DA□□□(SL)

# Analog Output Units

## Convert Binary Data to Analog Signals

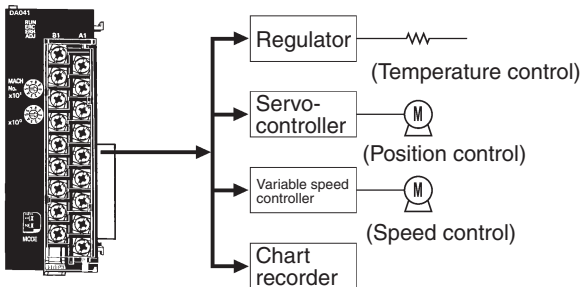
- Output hold
- Offset gain adjustment
- Range selection per output
- 1 ms conversion time per channel
- 1/8000 resolution



## Function

Binary data between 0000 to 0FA0 Hex in the allocated words can be convert to analog signals such as 1 to 5 V or 4 to 20 mA for output. All that is required in the ladder diagram is to place the data in the allocated words.

## System Configuration



## Terminal Arrangement

### CJ1W-DA08V/DA08C(SL)

|              |    |    |              |
|--------------|----|----|--------------|
| Output 2 (+) | B1 | A1 | Output 1 (+) |
| Output 2 (-) | B2 | A2 | Output 1 (-) |
| Output 4 (+) | B3 | A3 | Output 3 (+) |
| Output 4 (-) | B4 | A4 | Output 3 (-) |
| Output 6 (+) | B5 | A5 | Output 5 (+) |
| Output 6 (-) | B6 | A6 | Output 5 (-) |
| Output 8 (+) | B7 | A7 | Output 7 (+) |
| Output 8 (-) | B8 | A8 | Output 7 (-) |
| 0 V          | B9 | A9 | 24 V         |

### CJ1W-DA041(SL)

|                      |    |    |                      |
|----------------------|----|----|----------------------|
| Voltage output 2 (+) | B1 | A1 | Voltage output 1 (+) |
| Output 2 (-)         | B2 | A2 | Output 1 (-)         |
| Current output 2 (+) | B3 | A3 | Current output 1 (+) |
| Voltage output 4 (+) | B4 | A4 | Voltage output 3 (+) |
| Output 4 (-)         | B5 | A5 | Output 3 (-)         |
| Current output 4 (+) | B6 | A6 | Current output 3 (+) |
| N.C.                 | B7 | A7 | N.C.                 |
| N.C.                 | B8 | A8 | N.C.                 |
| 0 V                  | B9 | A9 | 24 V                 |

### CJ1W-DA021(SL)

|                      |    |    |                      |
|----------------------|----|----|----------------------|
| Voltage output 2 (+) | B1 | A1 | Voltage output 1 (+) |
| Output 2 (-)         | B2 | A2 | Output 1 (-)         |
| Current output 2 (+) | B3 | A3 | Current output 1 (+) |
| N.C.                 | B4 | A4 | N.C.                 |
| N.C.                 | B5 | A5 | N.C.                 |
| N.C.                 | B6 | A6 | N.C.                 |
| N.C.                 | B7 | A7 | N.C.                 |
| N.C.                 | B8 | A8 | N.C.                 |
| 0 V                  | B9 | A9 | 24 V                 |

## Specifications

| Item                                        |          |             | Classification: Special I/O Unit                    |                                                     |                                   |                                   |
|---------------------------------------------|----------|-------------|-----------------------------------------------------|-----------------------------------------------------|-----------------------------------|-----------------------------------|
|                                             |          |             | CJ1W-DA08V(SL)                                      | CJ1W-DA08C(SL)                                      | CJ1W-DA041(SL)                    | CJ1W-DA021(SL)                    |
| Outputs                                     |          |             | 8 points                                            | 8 points                                            | 4 points                          | 2 points                          |
| Signal range                                | Voltages | 1 to 5 V    | Yes                                                 | No                                                  | Yes                               | Yes                               |
|                                             |          | 0 to 10 V   | Yes                                                 | No                                                  | Yes                               | Yes                               |
|                                             |          | 0 to 5 V    | Yes                                                 | No                                                  | Yes                               | Yes                               |
|                                             |          | -10 to 10 V | Yes                                                 | No                                                  | Yes                               | Yes                               |
|                                             | Currents | 4 to 20 mA  | No                                                  | Yes                                                 |                                   |                                   |
| Maximum load current (for voltage outputs): |          |             | 2,4 mA                                              | n.a.                                                | 12 mA                             |                                   |
| Maximum load resistance (current outputs):  |          |             | n.a.                                                | 350 Ω                                               | 600 Ω                             |                                   |
| Signal range settings                       |          |             | 8 settings (one for each point)                     | 8 settings (one for each point)                     | 4 settings (one for each point)   | 2 settings (one for each point)   |
| Resolution                                  |          |             | 1/4000 (default) or 1/8000 (selectable)             | 1/4000 (default) or 1/8000 (selectable)             | 1/4000                            |                                   |
| Conversion speed                            |          |             | 1.0 ms/point (default) or 250 μs/point (selectable) | 1.0 ms/point (default) or 250 μs/point (selectable) | 1.0 ms/pt max.                    |                                   |
| Overall accuracy (at 23 °C)                 |          |             | Voltage: ±0.3%<br>Current: ±0.5%                    |                                                     |                                   |                                   |
| Overall accuracy (0 to 55 °C)               |          |             | Voltage: ±0.5%<br>Current: ±0.8%                    |                                                     |                                   |                                   |
| Connections                                 |          |             | Terminal block                                      |                                                     |                                   |                                   |
| Unit No.                                    |          |             | 0 to 95                                             |                                                     |                                   |                                   |
| External power supply                       |          |             | 24 V DC +10%/–15%,<br>140 mA max.                   | 24 V DC +10%/–15%,<br>170 mA max.                   | 24 V DC +10%/–15%,<br>200 mA max. | 24 V DC +10%/–15%,<br>140 mA max. |

CJ1W-MAD42(SL)

# Analog I/O Unit

## Handles 4 Analog Inputs and 2 Analog Outputs

- Conversion time: 3 ms for all 6 channels combined
- Resolution: 1/8000

### Analog Inputs

- Wire burnout detection
- Peak hold function
- Mean function
- Offset gain setting

### Analog Outputs

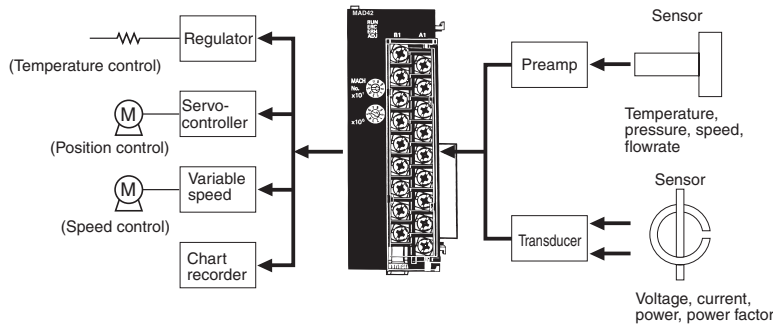
- Output hold
- Offset gain adjustment

### Other Features

- Scaling function



## System Configuration



## Terminal Arrangement

|                      |    |    |                      |
|----------------------|----|----|----------------------|
| Voltage output 2 (+) | B1 | A1 | Voltage output 1 (+) |
| Output 2 (-)         | B2 | A2 | Output 1 (-)         |
| Current output 2 (+) | B3 | A3 | Current output 1 (+) |
| N.C.                 | B4 | A4 | N.C.                 |
| Input 2 (+)          | B5 | A5 | Input 1 (+)          |
| Input 2 (-)          | B6 | A6 | Input 1 (-)          |
| AG                   | B7 | A7 | AG                   |
| Input 4 (+)          | B8 | A8 | Input 3 (+)          |
| Input 4 (-)          | B9 | A9 | Input 3 (-)          |

## Specifications

| Item                                       |              |             | Classification: Special I/O Unit                    |                                  |
|--------------------------------------------|--------------|-------------|-----------------------------------------------------|----------------------------------|
|                                            |              |             | Inputs                                              | Outputs                          |
| Inputs/outputs                             |              |             | 4 pts                                               | 2 pts                            |
| Signal range                               | Voltages     | 1 to 5 V    | Yes                                                 |                                  |
|                                            |              | 0 to 10 V   | Yes                                                 |                                  |
|                                            |              | 0 to 5 V    | Yes                                                 |                                  |
|                                            |              | –10 to 10 V | Yes                                                 |                                  |
|                                            | Currents     | 4 to 20 mA  | Yes                                                 |                                  |
| Input impedance                            |              |             | Voltage inputs 1 MΩ    Current inputs 250 Ω         | ---                              |
| Maximum load current (for voltage outputs) |              |             |                                                     | 2.4 mA                           |
| Maximum load resistance (current outputs)  |              |             |                                                     | 600 Ω                            |
| Signal range settings                      |              |             | 4 settings (one for each point)                     | 2 settings (one for each point)  |
| Resolution                                 |              |             | 1/4000 (default), 1/8000 (selectable)               |                                  |
| Conversion speed                           |              |             | 1.0 ms/point (default) or 500 μs/point (selectable) |                                  |
| Overall accuracy (at 23 °C)                |              |             | Voltage: ±0.2%<br>Current: ±0.2%                    | Voltage: ±0.3%<br>Current: ±0.3% |
| Overall accuracy (0 to 55 °C)              |              |             | Voltage: ±0.5%<br>Current: ±0.6%                    |                                  |
| Connections                                |              |             | Terminal block                                      |                                  |
| Functions                                  | Wire burnout |             | Yes                                                 | ---                              |
|                                            | Peak hold    |             | Yes                                                 | ---                              |
|                                            | Mean         |             | Yes                                                 | ---                              |
|                                            | Output hold  |             | ---                                                 | Yes                              |
|                                            | Scaling      |             | Yes                                                 |                                  |
| Unit No.                                   |              |             | 0 to 95                                             |                                  |

CJ1W-PTS5□

# Process Input Units

## Directly Input Four Temperature Sensors

- Up to four temperature sensor inputs can be directly connected to a single Unit (input signal/range shared by the four inputs)
- Models with isolation between channels prevent unwanted current paths between Temperature Sensor inputs.
- Measurement value alarm with hysteresis/ON delay (two inputs per channel, one of which can be set as a DO output from the Unit).
- High-resolution, high-speed 2 channel input models provide configurable alarms and maintenance functions



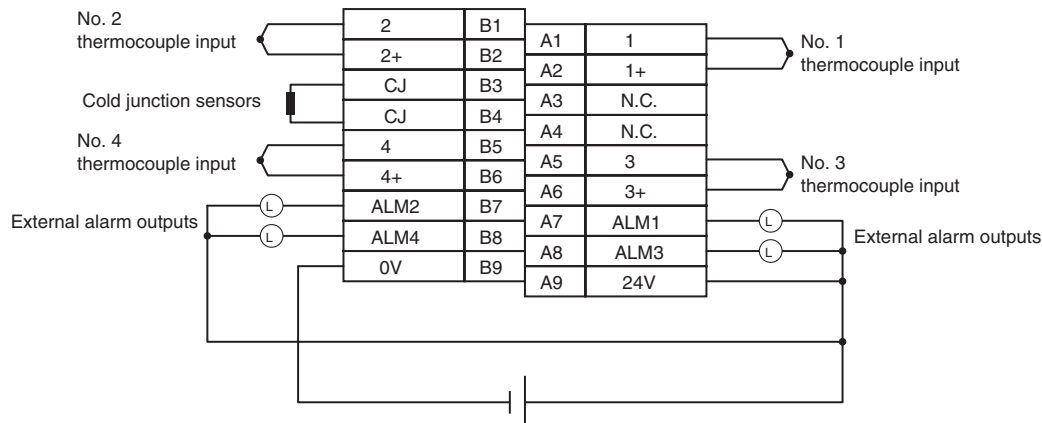
## Function

Converts the measured value of DC voltage/current signals, thermocouple or platinum-resistance thermometer inputs (up to 4 points) into binary or BCD code, and stores in the allocated memory area every

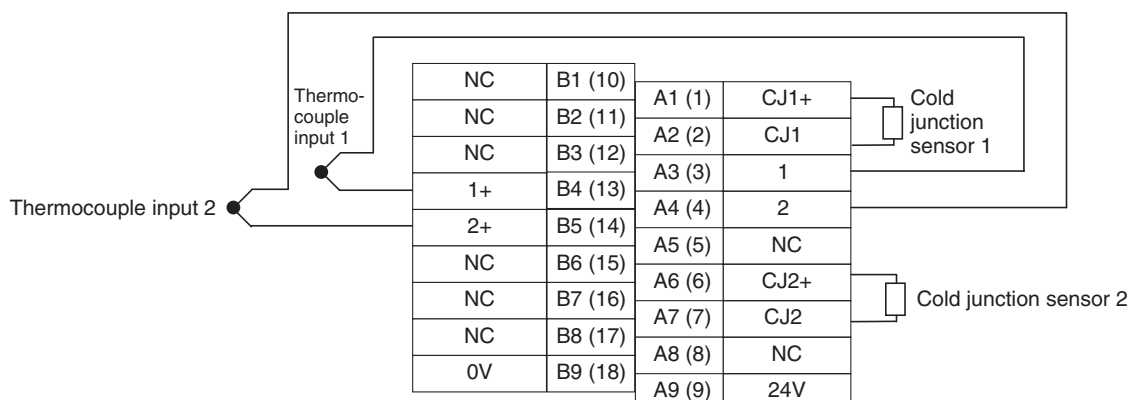
cycle. The ladder program can be used to transfer the data to a specified words in data memory for use.

## Terminal arrangements

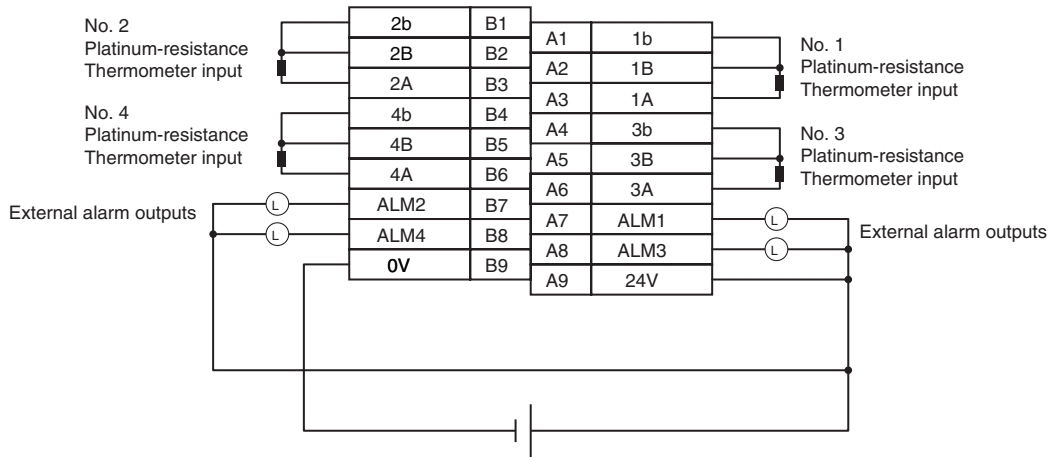
### CJ1W-PTS51



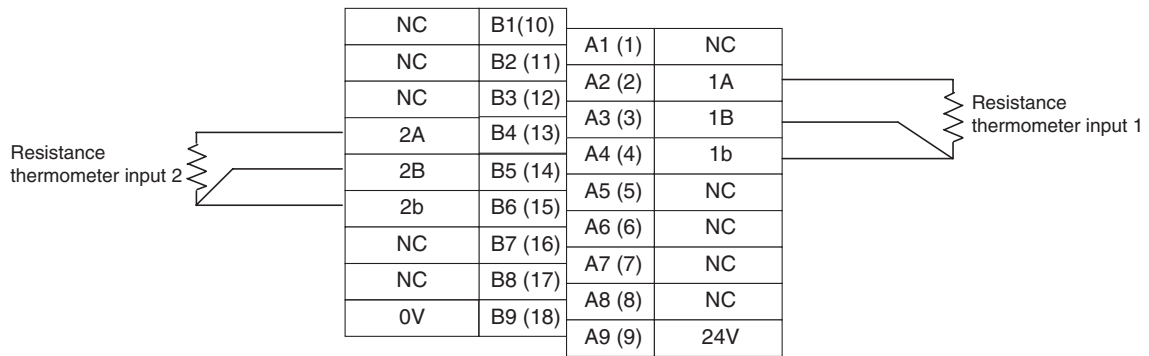
### CJ1W-PTS15



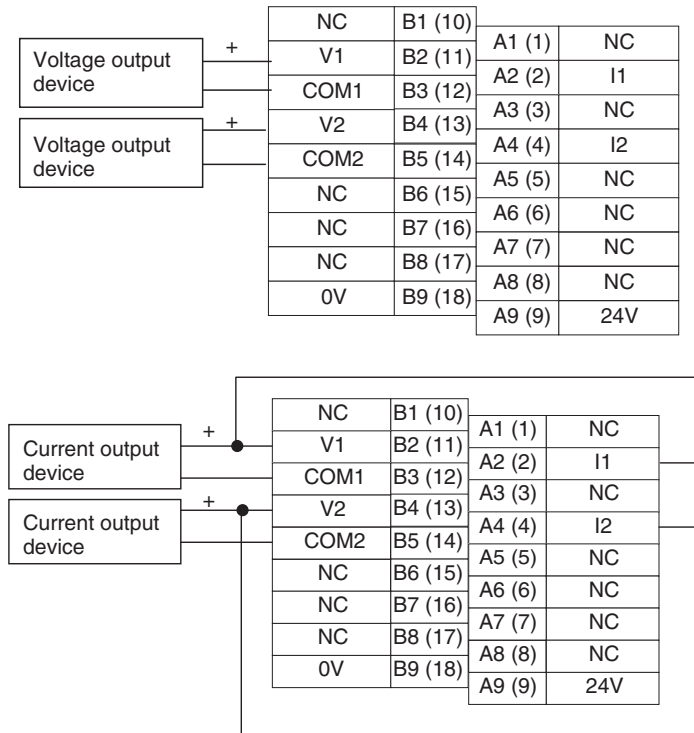
CJ1W-PTS52



CJ1W-PTS16



CJ1W-PDC15



## Specifications

| Item                       | Specification                                                                                                             |                                                                                                                                 |                                                                          |                                                                                                    |                                                                                        |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
|                            | CJ1W-PDC15                                                                                                                | CJ1W-PTS15                                                                                                                      | CJ1W-PTS16                                                               | CJ1W-PTS51                                                                                         | CJ1W-PTS52                                                                             |
| Inputs                     | 2 inputs                                                                                                                  |                                                                                                                                 |                                                                          | 4 inputs                                                                                           |                                                                                        |
| Input signals              | 4 to 20 mA, 0 to 20 mA, 0 to 10 V, -10 to 10 V, 0 to 5 V, -5 to 5 V, 1 to 5 V, 0 to 1.25 V, -1.25 to 1.25 V, User-defined | Thermocouple B, E, J, K, L, N, R, S, T, U, WRe5-26, PLII, -100 to 100 mV                                                        | Pt50, Pt100 JPt100, Ni508.4                                              | Thermocouple B, J, K, L, R, S, T                                                                   | Pt100, JPt100                                                                          |
| Input signal ranges        | Selectable per input                                                                                                      |                                                                                                                                 |                                                                          | Same for all 4 inputs                                                                              |                                                                                        |
| A/D conversion output data | 16-bit binary data, user-adjustable zero/span                                                                             |                                                                                                                                 |                                                                          | Temperature data in binary or BCD (16 bit)                                                         |                                                                                        |
| Conversion speed           | 10 ms / 2 inputs                                                                                                          |                                                                                                                                 |                                                                          | 250 ms / 4 inputs                                                                                  |                                                                                        |
| Overall accuracy           | $\pm 0.05\%$ at 25 °C                                                                                                     | $\pm 0.05\%$ at 25 °C <sup>*1</sup><br>Cold junction compensation error<br>$\pm 1^\circ\text{C}$ , at 20 $\pm 10^\circ\text{C}$ | $\pm 0.05\%$ or $\pm 0.1^\circ\text{C}$ , whichever is larger (at 25 °C) | $\pm 0.3\%$ of PV or $\pm 1^\circ\text{C}$ , whichever is larger, $\pm 1$ digit max. <sup>*1</sup> | $\pm 0.3\%$ of PV or $\pm 0.8^\circ\text{C}$ , whichever is larger, $\pm 1$ digit max. |
| Connections                | Terminal block                                                                                                            |                                                                                                                                 |                                                                          |                                                                                                    |                                                                                        |
| Unit classification        | CJ1-series Special I/O Unit                                                                                               |                                                                                                                                 |                                                                          |                                                                                                    |                                                                                        |
| Unit No.                   | 0 to 95                                                                                                                   |                                                                                                                                 |                                                                          |                                                                                                    |                                                                                        |

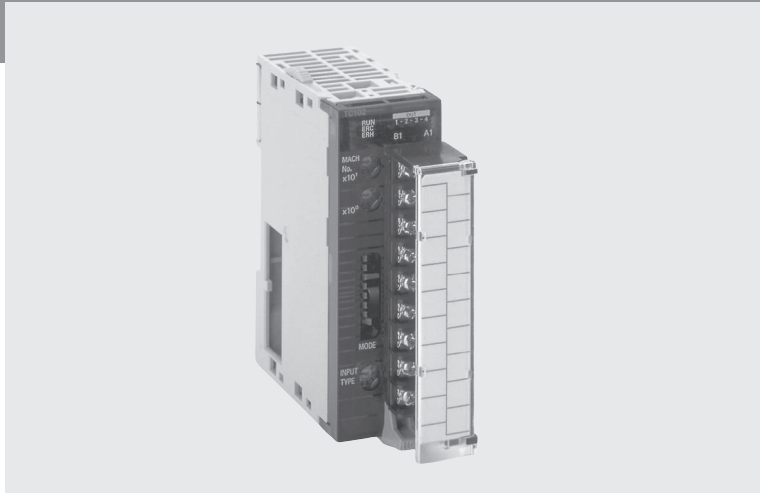
<sup>\*1</sup> Accuracy of the measured value depends on thermocouple type and actual temperature. Consult Operation Manual W368-E1 for details.

CJ1W-TC□□

# Temperature Control Units

## One Unit Functions as Four Temperature Controllers

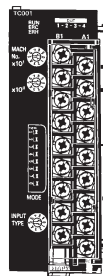
- Supports 2-loop or 4-loop PID control or ON/OFF control.
- The PID constants for PID control can be set using auto-tuning (AT).
- Select either forward (cooling) operation or reverse (heating) operation.
- Input directly from temperature sensors. (Thermocouples: R, S, K, J, T, B, or L; or platinum resistance thermometers: JPt100 or Pt100.)
- Open collector output
- Sampling period: 500 ms
- RUN/STOP control.
- Two internal alarms per loop.
- With 2-loop models, a current transformer can be connected to each loop to detect heater burnout.



## Function

Perform PID control (two degrees of freedom) or ON/OFF control based on inputs from thermocouples or platinum resistance thermometers to control open collector output. Four-loop models and two-loop models (with heater burnout detection function) are available. Words allocated to the Unit in memory can be manipulated from the ladder diagram to start/stop operation, set the target value, read the process value, or perform other operations.

## System Configuration



Temperature sensor

Control output

## Terminal Wiring Examples

### Thermocouple Temperature Control Units

| CJ1W-TC001<br>(4 loops, NPN outputs) |    |    |           | CJ1W-TC002<br>(4 loops, PNP outputs) |    |    |              |
|--------------------------------------|----|----|-----------|--------------------------------------|----|----|--------------|
| Input 2 –                            | B1 | A1 | Input 1 – | Input 2 –                            | B1 | A1 | Input 1 –    |
| Input 2 +                            | B2 | A2 | Input 1 + | Input 2 +                            | B2 | A2 | Input 1 +    |
| Cold-junction comp.                  | B3 | A3 | N.C.      | Cold-junction comp.                  | B3 | A3 | N.C.         |
| Cold-junction comp.                  | B4 | A4 | N.C.      | Cold-junction comp.                  | B4 | A4 | N.C.         |
| Input 4 –                            | B5 | A5 | Input 3 – | Input 4 –                            | B5 | A5 | Input 3 –    |
| Input 4 +                            | B6 | A6 | Input 3 + | Input 4 +                            | B6 | A6 | Input 3 +    |
| Output 2                             | B7 | A7 | Output 1  | Output 2                             | B7 | A7 | Output 1     |
| Output 4                             | B8 | A8 | Output 3  | Output 4                             | B8 | A8 | Output 3     |
| 0 V COM (–)                          | B9 | A9 | 24 V      | 0 V                                  | B9 | A9 | 24 V COM (+) |

| CJ1W-TC003<br>(2 loops, NPN outputs, HB alarm) |    |    |             | CJ1W-TC004<br>(2 loops, PNP outputs, HB alarm) |    |    |              |
|------------------------------------------------|----|----|-------------|------------------------------------------------|----|----|--------------|
| Input 2 –                                      | B1 | A1 | Input 1 –   | Input 2 –                                      | B1 | A1 | Input 1 –    |
| Input 2 +                                      | B2 | A2 | Input 1 +   | Input 2 +                                      | B2 | A2 | Input 1 +    |
| Cold-junction comp.                            | B3 | A3 | N.C.        | Cold-junction comp.                            | B3 | A3 | N.C.         |
| Cold-junction comp.                            | B4 | A4 | N.C.        | Cold-junction comp.                            | B4 | A4 | N.C.         |
| CT input 2                                     | B5 | A5 | CT input 1  | CT input 2                                     | B5 | A5 | CT input 1   |
| CT input 2                                     | B6 | A6 | CT input 1  | CT input 2                                     | B6 | A6 | CT input 1   |
| Output 2                                       | B7 | A7 | Output 1    | Output 2                                       | B7 | A7 | Output 1     |
| HB output 2                                    | B8 | A8 | HB output 1 | HB output 2                                    | B8 | A8 | HB output 1  |
| 0 V COM (–)                                    | B9 | A9 | 24 V        | 0 V                                            | B9 | A9 | 24 V COM (+) |

**Note:** Do not connect any wiring to the N. C. terminals.

Platinum Resistance Thermometer  
Temperature Control Units

| CJ1W-TC101<br>(4 loops, NPN outputs) |    |    |            |  | CJ1W-TC102<br>(4 loops, PNP outputs) |    |    |              |  |
|--------------------------------------|----|----|------------|--|--------------------------------------|----|----|--------------|--|
| Input 2 B'                           | B1 | A1 | Input 1 B' |  | Input 2 B'                           | B1 | A1 | Input 1 B'   |  |
| Input 2 B                            | B2 | A2 | Input 1 B  |  | Input 2 B                            | B2 | A2 | Input 1 B    |  |
| Input 2 A                            | B3 | A3 | Input 1 A  |  | Input 2 A                            | B3 | A3 | Input 1 A    |  |
| Input 4 B'                           | B4 | A4 | Input 3 B' |  | Input 4 B'                           | B4 | A4 | Input 3 B'   |  |
| Input 4 B                            | B5 | A5 | Input 3 B  |  | Input 4 B                            | B5 | A5 | Input 3 B    |  |
| Input 4 A                            | B6 | A6 | Input 3 A  |  | Input 4 A                            | B6 | A6 | Input 3 A    |  |
| Output 2                             | B7 | A7 | Output 1   |  | Output 2                             | B7 | A7 | Output 1     |  |
| Output 4                             | B8 | A8 | Output 3   |  | Output 4                             | B8 | A8 | Output 3     |  |
| 0 V COM (-)                          | B9 | A9 | 24 V       |  | 0 V COM (-)                          | B9 | A9 | 24 V COM (+) |  |

| CJ1W-TC103<br>(2 loops, NPN outputs, HB alarm) |    |    |             |  | CJ1W-TC104<br>(2 loops, PNP outputs, HB alarm) |    |    |              |  |
|------------------------------------------------|----|----|-------------|--|------------------------------------------------|----|----|--------------|--|
| Input 2 B'                                     | B1 | A1 | Input 1 B'  |  | Input 2 B'                                     | B1 | A1 | Input 1 B'   |  |
| Input 2 B                                      | B2 | A2 | Input 1 B   |  | Input 2 B                                      | B2 | A2 | Input 1 B    |  |
| Input 2 A                                      | B3 | A3 | Input 1 A   |  | Input 2 A                                      | B3 | A3 | Input 1 A    |  |
| N.C.                                           | B4 | A4 | N.C.        |  | N.C.                                           | B4 | A4 | N.C.         |  |
| CT input 2                                     | B5 | A5 | CT input 1  |  | CT input 2                                     | B5 | A5 | CT input 1   |  |
| CT input 2                                     | B6 | A6 | CT input 1  |  | CT input 2                                     | B6 | A6 | CT input 1   |  |
| Output 2                                       | B7 | A7 | Output 1    |  | Output 2                                       | B7 | A7 | Output 1     |  |
| HB output 2                                    | B8 | A8 | HB output 1 |  | HB output 2                                    | B8 | A8 | HB output 1  |  |
| 0 V COM (-)                                    | B9 | A9 | 24 V        |  | 0 V                                            | B9 | A9 | 24 V COM (+) |  |

**Note:** Do not connect any wiring to the N. C. terminals.

## Specifications

| Classification   | Temperature sensor inputs                          | Number of loops                                   | Control outputs                   | Unit numbers | Model      |
|------------------|----------------------------------------------------|---------------------------------------------------|-----------------------------------|--------------|------------|
| Special I/O Unit | Thermocouples (R, S, K, J, T, B, or L)             | 4 loops                                           | Open collector NPN output (pulse) | 0 to 94      | CJ1W-TC001 |
|                  |                                                    |                                                   | Open collector PNP output (pulse) |              | CJ1W-TC002 |
|                  |                                                    | 2 loops (with heater burn-out detection function) | Open collector NPN output (pulse) |              | CJ1W-TC003 |
|                  |                                                    |                                                   | Open collector PNP output (pulse) |              | CJ1W-TC004 |
|                  | Platinum resistance thermometers (JPt100 or Pt100) | 4 loops                                           | Open collector NPN output (pulse) |              | CJ1W-TC101 |
|                  |                                                    |                                                   | Open collector PNP output (pulse) |              | CJ1W-TC102 |
|                  |                                                    | 2 loops (with heater burn-out detection function) | Open collector NPN output (pulse) |              | CJ1W-TC103 |
|                  |                                                    |                                                   | Open collector PNP output (pulse) |              | CJ1W-TC104 |

CJ1W-NC□□

# Position Control Units

## High-speed, High-precision Positioning with 1, 2, or 4 Axes

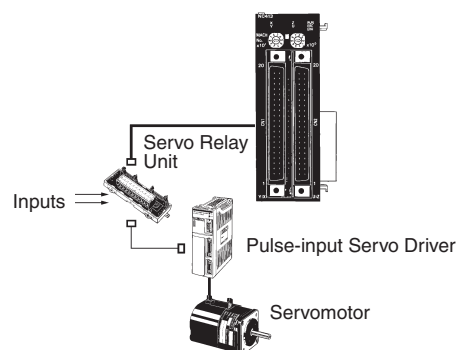
- Simple positioning systems can be created by directly specifying operation from the CPU Unit when required.
- Positioning data is saved in internal flash memory, eliminating the need to maintain a backup battery.
- Use Windows-based Support Software (CX-Position) to easily create positioning data and store data and parameters in files.
- S-curve acceleration/deceleration, forced starting, and other features also supported.
  - Position, speed and acceleration settings can be changed during operation
  - Speed and acceleration can be modified during Jog operation
  - Parameters and data are easily backed up to a memory card in the CPU unit



## Function

These Position Control Units support open-loop control with pulse-train outputs. Position using automatic trapezoid or S-curve acceleration and deceleration. Models available with 1, 2, or 4 axes. Use in combination with servomotors or stepping motors what accept pulse-train inputs.

## System Configuration



## Specifications

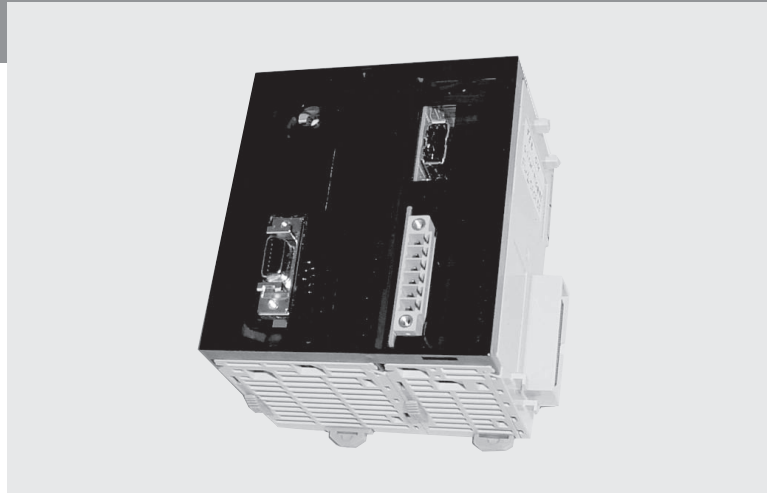
| Model                                | CJ1W-NC113<br>CJ1W-NC133                                            | CJ1W-NC213<br>CJ1W-NC233 | CJ1W-NC413<br>CJ1W-NC433                                |
|--------------------------------------|---------------------------------------------------------------------|--------------------------|---------------------------------------------------------|
| Unit name                            | Position Control Unit                                               |                          |                                                         |
| Classification                       | Special I/O Unit                                                    |                          |                                                         |
| Unit numbers                         | 0 to 95                                                             |                          | 0 to 94                                                 |
| Control method                       | Open-loop control by pulse train output                             |                          |                                                         |
| Control output interface             | CJ1W-NC□13: Open-collector output<br>CJ1W-NC□33: Line-driver output |                          |                                                         |
| Controlled axes                      | 1                                                                   | 2                        | 4                                                       |
| Operating modes                      | Direct operation or memory operation                                |                          |                                                         |
| Data format                          | Binary (hexadecimal)                                                |                          |                                                         |
| Affect on scan time for end refresh  | 0.29 to 0.41 ms max./unit                                           |                          |                                                         |
| Affect on scan time for IOWR/IORD    | 0.6 to 0.7 ms max./instructions                                     |                          |                                                         |
| Startup time                         | 2 ms max. (Refer to operation manual for conditions.)               |                          |                                                         |
| Position data                        | -1,073,741,823 to +1,073,741,823 pulses                             |                          |                                                         |
| No. of positions                     | 100 per axis                                                        |                          |                                                         |
| Speed data                           | 1 to 500 kpps (in 1-pps units)                                      |                          |                                                         |
| No. of speeds                        | 100 per axis                                                        |                          |                                                         |
| Acceleration/<br>deceleration times  | 0 to 250 s (time to max. speed)                                     |                          |                                                         |
| Acceleration/<br>deceleration curves | Trapezoidal or S-curve                                              |                          |                                                         |
| Saving data in CPU                   | Flash memory                                                        |                          |                                                         |
| Windows-based Support Software       | CX-Position (WS02-NCTC1-E)                                          |                          |                                                         |
| Ambient operating temperature        | 0 to 55 °C                                                          |                          | 0 to 50 °C                                              |
| External power supply                | 24 V DC $\pm 10\%$ , 5 V DC $\pm 5\%$ (line driver only)            |                          | 24 V DC $\pm 5\%$ , 5 V DC $\pm 5\%$ (line driver only) |

CJ1W-MCH71 - MECHATROLINK-II

# Motion Control Unit

## Multi-axes Motion Control over high-speed MECHATROLINK-II

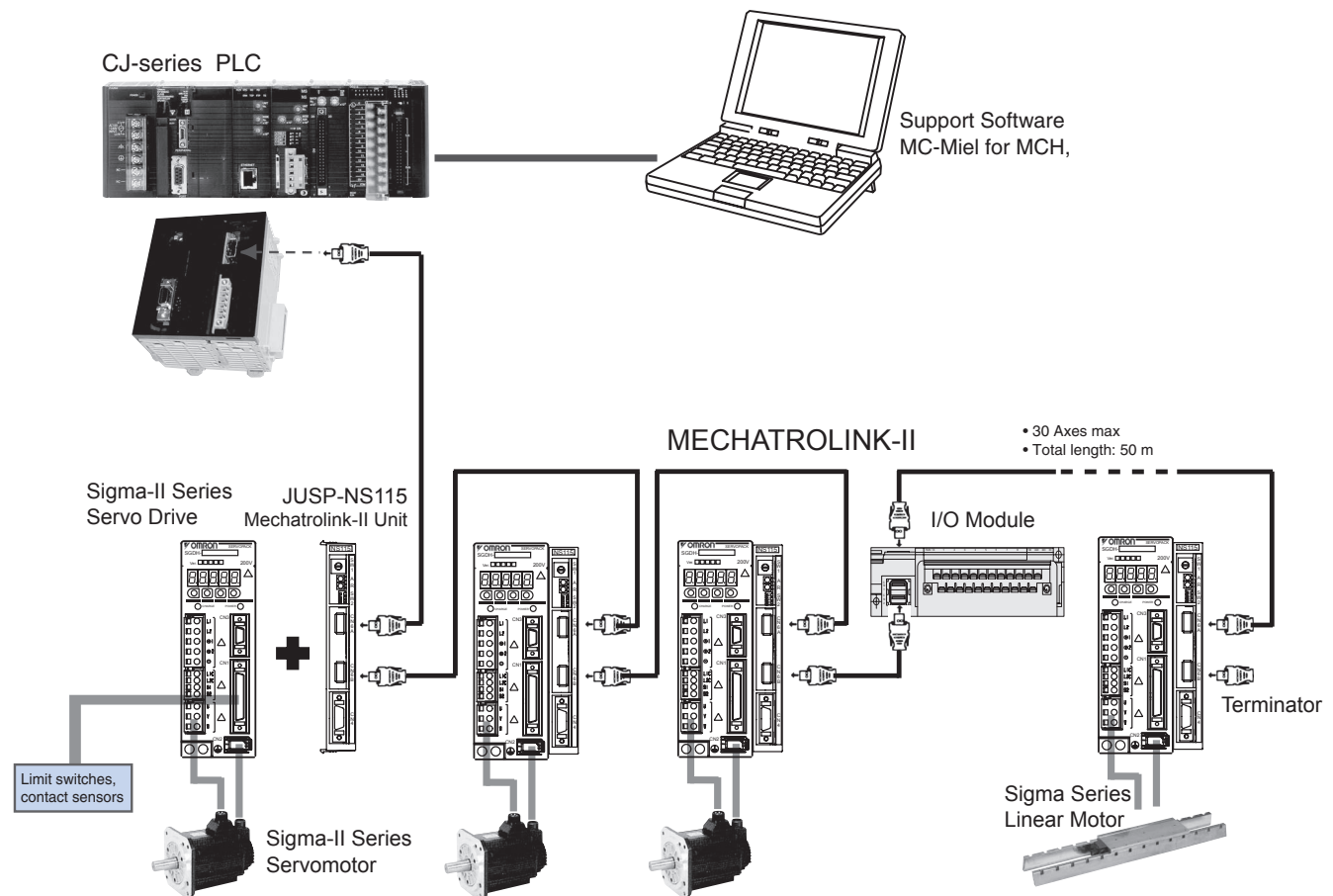
- Up to 30 axes controlled with minimum wiring
- High-speed bus MECHATROLINK-II is specially designed for Motion Control
- Supports Position, speed and Torque control
- Electronic CAM profiles and axes synchronization
- Hardware registration input for every axis
- Program control commands, like Multi-task programming and branching commands, and various arithmetic operations for maximum program efficiency
- Access to the complete system from one point



## Function

Multi-axes control is made easy by freely combining control axes. Up to 32 axes can be used, including 30 physical axes and two virtual axes, and each axis can be set individually. Position Control, synchronized control (electronic gear, electronic Cam, follow-up), speed control, and torque control are all supported, enabling a wide range of applications. By using the high-speed servo communications MECHATROLINK-II, motion programs, system parameters, system data, and servo drive parameters can be set and read from the software tool.

## System Configuration



## Specifications

## Motion Control Unit

|                                                                 |                                     |                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Model</b>                                                    |                                     | <b>CJ1W-MCH71</b>                                                                                                                                                                                                                                                                                                                  |
| Classification                                                  |                                     | CJ-series CPU Bus unit                                                                                                                                                                                                                                                                                                             |
| Applicable PLCs                                                 |                                     | CJ-series V. 2.0 or later                                                                                                                                                                                                                                                                                                          |
| Control Method                                                  |                                     | MECHATROLINK-II (Position, Speed and Torque control )                                                                                                                                                                                                                                                                              |
| Controlled devices                                              |                                     | Sigma-II series Servo Drives (ver. 38 or later) with MECHATROLINK-II Interface and various I/O Units.                                                                                                                                                                                                                              |
| Programming language                                            |                                     | BASIC type motion control language                                                                                                                                                                                                                                                                                                 |
| Controlled axes                                                 |                                     | 32 max, including 30 physical or virtual axes and 2 virtual axes                                                                                                                                                                                                                                                                   |
| Operating modes                                                 |                                     | RUN Mode, CPU Mode, Tool Mode/System (depending on Tool)                                                                                                                                                                                                                                                                           |
| Automatic/Manual Mode                                           |                                     | Automatic Mode: Mode for executing programs in the Unit<br>Manual Mode: Mode for executing commands from the CPU Unit (via allocated words)                                                                                                                                                                                        |
| Minimum setting unit                                            |                                     | 1, 0.1, 0.01, 0.001, 0.0001 (Unit: mm, inch, degree, pulse)                                                                                                                                                                                                                                                                        |
| Maximum command value                                           |                                     | -2,147,483,648 to 2,147,483,647 pulses (32 bits with sign); infinite axis feed mode supported.<br>Example: 16,384 pulses/rev after multiplication, a minimum setting unit of 0.001 mm and 1 mm/rev would result in -1,310,720,000 to 1,310,719,999 command units.                                                                  |
| Control functions by command from CPU Unit                      | Servo lock/unlock                   | Locks and unlocks the servo driver.                                                                                                                                                                                                                                                                                                |
|                                                                 | Jogging                             | Executes continuous feeding for each axis independently at the speed system parameter times the override.                                                                                                                                                                                                                          |
|                                                                 | Origin search                       | Determines the machine origin in the direction set in the system parameters. Can be executed with an absolute encoder.                                                                                                                                                                                                             |
|                                                                 | Absolute origin setting             | Sets the origin for when an absolute encoder is used. (Offset value: 32 bits [pulses] with sign)                                                                                                                                                                                                                                   |
|                                                                 | Machine lock                        | Stops the output of move commands to axes.                                                                                                                                                                                                                                                                                         |
| Control functions by motion program                             | Single block                        | Executes motion programs one block at a time.                                                                                                                                                                                                                                                                                      |
|                                                                 | Positioning (PTP)                   | Executes positioning independently for each axis at a specified speed or the speed system parameter. (Simultaneous specification: Up to eight axes/block, Simultaneous execution: Up to 32 blocks/Unit)                                                                                                                            |
|                                                                 | Linear interpolation                | Executes linear interpolation for up to eight axes at a time at the specified interpolation feed speed. (Simultaneous specification: Up to eight axes/block, Simultaneous execution: Up to 32 blocks/system)                                                                                                                       |
|                                                                 | Circular interpolation              | Executes circular interpolation for two axes in either clockwise or counterclockwise at the specified interpolation feed speed. Helical circular interpolation is also possible with single-axis linear interpolation added. (Simultaneous specification: Two or three axes/block, Simultaneous execution: Up to 16 blocks/system) |
|                                                                 | Other functions                     | Origin searches, interrupt feeding, timed positioning, traverse positioning, independent electronic CAM, synchronized electronic CAM, link operation, electronic gear, follow-up synchronization, speed reference, torque reference                                                                                                |
| Acceleration/deceleration curve, acceleration/deceleration time |                                     | Trapezoidal or S-curve, 60,000 ms max. (S-curve: Constant 30,000 ms max.)                                                                                                                                                                                                                                                          |
| External I/O                                                    |                                     | One port for MECHATROLINK-II Servo communications, one deceleration stop input, two general inputs, two general outputs                                                                                                                                                                                                            |
| Feed rate                                                       |                                     | Rapid, interpolation feed rate: 1 to 2,147,483,647 (command units/min)                                                                                                                                                                                                                                                             |
| Override                                                        |                                     | 0.00% to 327.67% (setting unit: 0.01%; Can be set for each axis or task.)                                                                                                                                                                                                                                                          |
| Motion programs                                                 | Number of tasks, number of programs | Up to 8 tasks and 256 programs/Unit (8 parallel branches per task max.)                                                                                                                                                                                                                                                            |
|                                                                 | Program numbers                     | 0000 to 0499 for main program; 0500 to 0999 for subroutine                                                                                                                                                                                                                                                                         |
|                                                                 | Program capacity                    | In motion program conversion, 8,000 blocks/Unit max. (2 Mbytes); number of blocks: 800                                                                                                                                                                                                                                             |
|                                                                 | Data capacity                       | Position data: 10,240 points/Unit; Cam data: 32 max.; 16,000 points/Unit                                                                                                                                                                                                                                                           |
|                                                                 | Subroutine nesting                  | Five levels max.                                                                                                                                                                                                                                                                                                                   |
|                                                                 | Start                               | Programs in other tasks can be started from a program.                                                                                                                                                                                                                                                                             |
|                                                                 | Deceleration stop                   | Decelerates to a stop regardless of the block.                                                                                                                                                                                                                                                                                     |
|                                                                 | Block stop                          | Decelerates to a stop after the block being executed is ended.                                                                                                                                                                                                                                                                     |
| Data exchange with CPU Unit                                     | Single block                        | Executes the program one block at a time.                                                                                                                                                                                                                                                                                          |
|                                                                 | Words allocated to Unit in CIO Area | Uses one unit number (25 words). Used for Unit and tasks: 11 to 25 words (depending on the number of tasks)                                                                                                                                                                                                                        |
|                                                                 | Words allocated to Unit in DM Area  | Uses one unit number (100 words). Used for Unit and tasks: 32 to 74 words (depending on the number of tasks)                                                                                                                                                                                                                       |
|                                                                 | Any area (bits)                     | Axes: 0 to 64 words (depending on the maximum axis number used)                                                                                                                                                                                                                                                                    |
|                                                                 | Any area (data)                     | Axes: 0 to 128 words (depending on the maximum axis number used)                                                                                                                                                                                                                                                                   |
| Saving programs and data                                        |                                     | General I/O: 0 to 1,280 words (depending on the settings)                                                                                                                                                                                                                                                                          |
| Self-diagnostic functions                                       |                                     | Memory Card backup (in CPU Unit, 100,000 times max.)                                                                                                                                                                                                                                                                               |
| Error detection functions                                       |                                     | Watchdog, RAM check, etc.                                                                                                                                                                                                                                                                                                          |
| Error log function                                              |                                     | Deceleration stop inputs, unit number errors, CPU errors, software limit errors, etc.                                                                                                                                                                                                                                              |
| Support Software                                                |                                     | Read by IORD instruction from CPU Unit.                                                                                                                                                                                                                                                                                            |
| External power supply voltage                                   |                                     | Microsoft Windows 2000 or NT 4.0 (Processor: Pentium, 100 MHz min., with at least 64 MB of memory)                                                                                                                                                                                                                                 |
| Internal current consumption                                    |                                     | 24 V DC (21.6 to 26.4 V DC)                                                                                                                                                                                                                                                                                                        |
| Weight (not including connectors)                               |                                     | 0.6 A or less for 5 V DC                                                                                                                                                                                                                                                                                                           |
|                                                                 |                                     | 300 g max.                                                                                                                                                                                                                                                                                                                         |

**Note:** 1. Take the following factors into account when mounting Motion Control Units under a single CPU Unit:

- The maximum number of CPU Bus Units that can be allocated words in the CPU Unit
- The capacity of the Power Supply Unit on each CPU Rack or Expansion I/O Rack and the current consumption of the Units mounted on the Rack (For details, refer to the Operation Manual for the CPU Unit.)

2. The required power supply must be provided by the user.

3. A Memory Card must be used to add system software functions to the CPU Unit in order to use IOWR and IORD.

CJ1W-NCF71 - MECHATROLINK-II

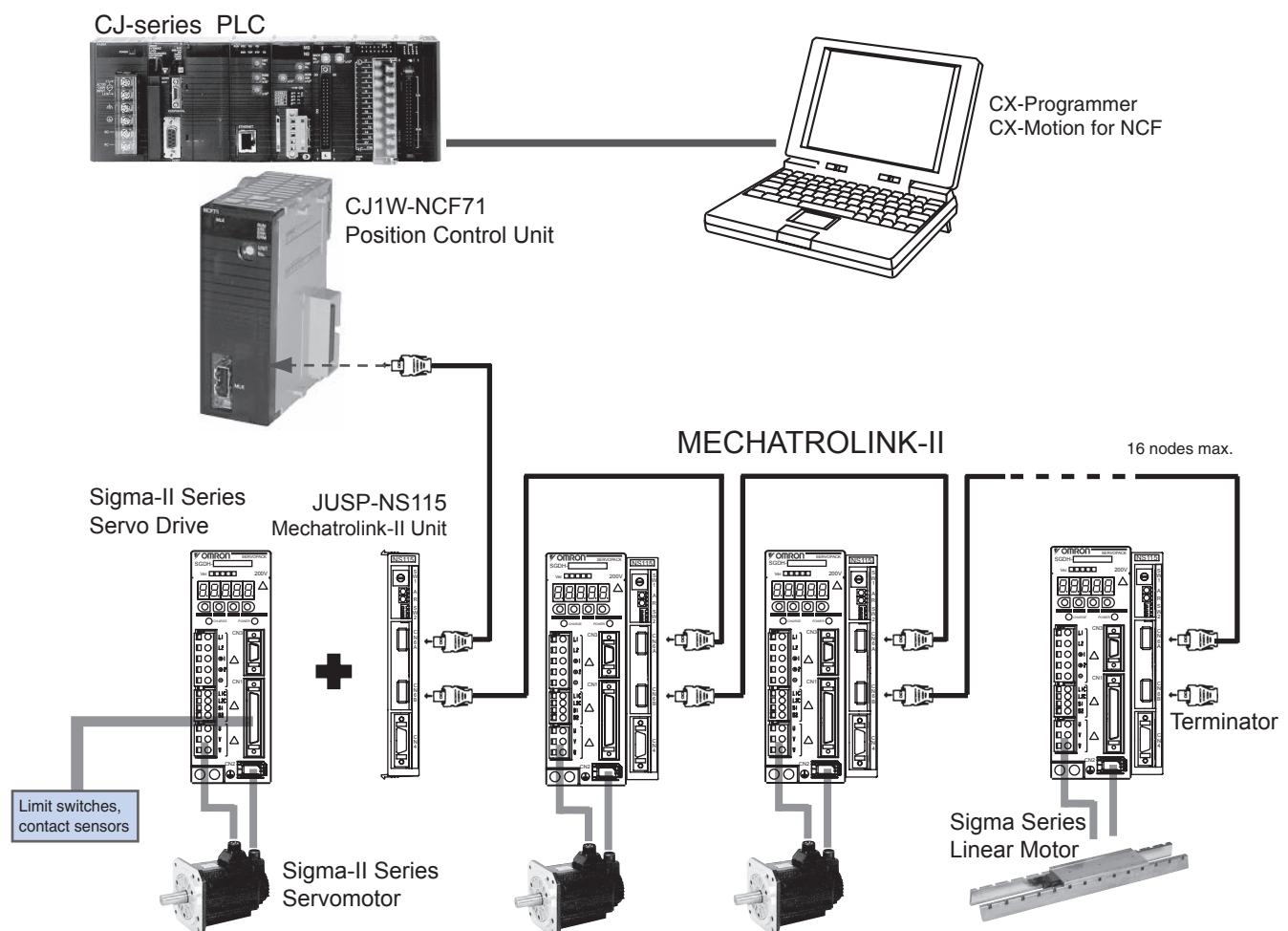
# Position Control Unit

## Multi-axes Position Controller over high-speed MECHATROLINK-II

- Up to 16 axes controlled with minimum wiring. Only one cable between devices is needed.
- High-speed bus MECHATROLINK-II is specially designed for Motion Control
- Supports Position, speed and Torque control
- Positioning can be done by direct Ladder commands.
- Access to Servo Drives parameters can be done through PLC operation
- Access to the complete system from one point. Network setup, Servo Drives configuring and monitoring, and PLC Programming.



## System Configuration



## Specifications

## Position Control Unit

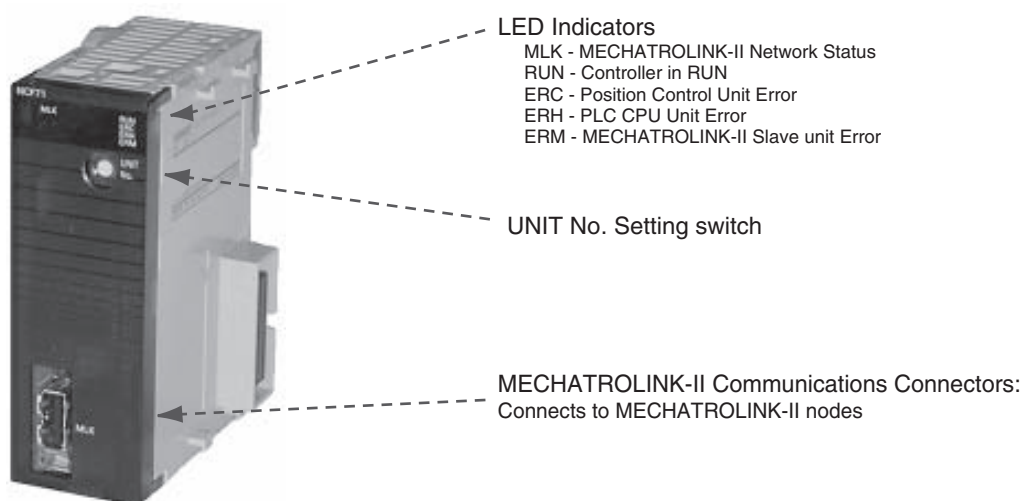
|                               |                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Model</b>                  |                                                       | <b>CJ1W-NCF71</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Classification                |                                                       | CJ-series CPU Bus unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Applicable PLCs               |                                                       | CJ-series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Possible unit number settings |                                                       | 0 to F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Control Method                |                                                       | MECHATROLINK-II (Position, Speed and Torque control )                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Controlled devices            |                                                       | Sigma-II series Servo Drives (ver. 38 or later) with MECHATROLINK-II Interface                                                                                                                                                                                                                                                                                                                                                                                                             |
| Controlled axes               |                                                       | 16 maximum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| I/O allocations               | Common Operating Memory Area                          | Words allocated in CPU Bus Unit Area: 25 words (15 output words, 10 input words)                                                                                                                                                                                                                                                                                                                                                                                                           |
|                               | Axis Operating Memory Area                            | Allocated in one of the following areas (user-specified): CIO, Work, Auxiliary, Holding, DM, or EM Area.<br>Number of words allocated: 50 words (25 output words, 25 input words) × Highest axis No. used                                                                                                                                                                                                                                                                                  |
| Control units                 | Position command unit                                 | Command unit: Depends on the Electronic Gear Setting in the Servo Parameters.<br>Default setting: Pulses                                                                                                                                                                                                                                                                                                                                                                                   |
|                               | Speed command unit for position control               | Command units/s                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                               | Acceleration/deceleration speeds for position control | 10,000 command units/s <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                               | Speed command unit for speed control                  | 0.001% of the motor's maximum speed                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                               | Torque command unit for torque control                | 0.001% of the motor's maximum torque                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Control command range         | Position command range                                | -2,147,483,648 to 2,147,483,647 (command units)                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                               | Speed command range for position control              | 0 to 2,147,483,647 (command units/s)                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                               | Acceleration/deceleration speeds for position control | 1 to 65,535 (10,000 command units/s <sup>2</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                               | Speed command range for speed control                 | -199.999% to 199.999%<br>The upper limit is restricted by the maximum speed of the Servomotor.                                                                                                                                                                                                                                                                                                                                                                                             |
|                               | Torque command range for torque control               | -199.999% to 199.999%<br>The upper limit is restricted by the maximum torque of the Servomotor.                                                                                                                                                                                                                                                                                                                                                                                            |
| Control functions             | Servo lock/unlock                                     | Locks and unlocks the Servo Driver.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                               | Position control                                      | Positions to an absolute position or relative position according to the specified target position and target speed specified from the ladder program.                                                                                                                                                                                                                                                                                                                                      |
|                               | Origin determination                                  | <ul style="list-style-type: none"> <li>• Origin search: Establishes the origin using the specified search method.</li> <li>• Present position preset: Changes the present position to a specified position to establish the origin.</li> <li>• Origin return: Returns the axis from any position to the established origin.</li> <li>• Absolute encoder origin: Establishes the origin using a Servomotor that has an absolute encoder, without having to use an origin search.</li> </ul> |
|                               | Jogging                                               | Outputs a fixed speed in the CW or CCW direction.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                               | Interrupt feeding                                     | Performs positioning by moving the axis a fixed amount when an external interrupt input is received while the axis is moving.                                                                                                                                                                                                                                                                                                                                                              |
|                               | Speed control                                         | Performs speed control by sending a command to the Servo Driver speed loop.                                                                                                                                                                                                                                                                                                                                                                                                                |
|                               | Torque control                                        | Performs torque control by sending a command to the Servo Driver current loop.                                                                                                                                                                                                                                                                                                                                                                                                             |
|                               | Stop functions                                        | <ul style="list-style-type: none"> <li>• Deceleration stop: Decelerates the moving axis to a stop.</li> <li>• Emergency stop: Positions the moving axis for the number of pulses remaining in the deviation counter and then stops the axis.</li> </ul>                                                                                                                                                                                                                                    |
|                               |                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Auxiliary functions           | Acceleration/deceleration curves                      | Sets either a trapezoidal (linear) curve, an exponential curve, or an S-curve (moving average).                                                                                                                                                                                                                                                                                                                                                                                            |
|                               | Torque limit                                          | Restricts the torque upper limit during position control.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Override                                              | Multiplies the axis command speed by a specified ratio. Override: 0.01% to 327.67%                                                                                                                                                                                                                                                                                                                                                                                                         |
|                               | Servo parameter transfer                              | Reads and writes the Servo Driver parameters from the ladder program in the CPU Unit.                                                                                                                                                                                                                                                                                                                                                                                                      |
|                               | Monitoring function                                   | Monitors the control status of the Servo Driver's command coordinate positions, feedback position, current speed, torque, etc.                                                                                                                                                                                                                                                                                                                                                             |
|                               | Software limits                                       | Limits software operation for controlling positioning.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| External I/O                  | Backlash compensation                                 | Compensates for the amount of play in the mechanical system according to a set value.                                                                                                                                                                                                                                                                                                                                                                                                      |
|                               | Position Control Unit                                 | One MECHATROLINK-II interface port                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                               | Servo Driver I/O                                      | CW/CCW limit inputs, origin proximity inputs, external interrupt inputs 1 to 3 (can be used as external origin inputs)                                                                                                                                                                                                                                                                                                                                                                     |
| Self-diagnostic functions     |                                                       | Watchdog, flash memory check, memory corruption check                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Error detection functions     |                                                       | Overtravel, Servo Driver alarm detection, CPU error, MECHATROLINK communications error, Unit setting error                                                                                                                                                                                                                                                                                                                                                                                 |
| Internal current consumption  |                                                       | 360 mA or less for 5 VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Weight                        |                                                       | 95 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## JUSP-NS115 - Mechatrolink-II Interface Unit

| Item                               |                                              | Details                                                                                                                                       |
|------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Type                               |                                              | JUSP-NS115                                                                                                                                    |
| Applicable Servo Drive             |                                              | SGDH-□□□E models (Version 38 or later)                                                                                                        |
| Installation Method                |                                              | Mounted on the SGDH Servo Drive side: CN10.                                                                                                   |
| Basic Specifications               | Power Supply Method                          | Supplied from the Servo Drive control power supply.                                                                                           |
|                                    | Power Consumption                            | 2 W                                                                                                                                           |
| MECHATROLINK -II Communications    | Baud Rate / Transmission Cycle               | 10 MHz / 500 ms or more. MECHATROLINK-II communications                                                                                       |
| Command Format                     | Operation Specification                      | Positioning using MECHATROLINK-I/II communications.                                                                                           |
|                                    | Reference Input                              | MECHATROLINK-I/II communications<br>Commands: Motion commands (position, speed), Interpolation commands, Parameter read/write, Monitor output |
| Position Control Functions         | Acceleration/Deceleration Method             | Linear first/second-step, asymmetric, exponential, S-curve                                                                                    |
|                                    | Fully Closed Control                         | Position control with fully closed feedback is possible.                                                                                      |
| Fully Closed System Specifications | Fully Closed Encoder Pulse Output            | 5 V differential line-driver output (complies with EIA Standard RS-422A)                                                                      |
|                                    | Fully Closed Encoder Pulse Signal            | 90° Phase difference 2-phase differential pulse (phase A, phase B)                                                                            |
|                                    | Maximum Receivable Frequency for Servo Drive | 1 Mpps                                                                                                                                        |
|                                    | Power Supply for Fully Closed Encoder        | To be prepared by customer.                                                                                                                   |
| Input Signals                      | Signal Allocation Changes Possible           | Forward/reverse run prohibited, Zero point return deceleration LS                                                                             |
|                                    |                                              | External latch signals 1, 2, 3<br>Forward/reverse torque control                                                                              |
| Internal Functions                 | Position Data Latch Function                 | Position data latching is possible using phase C, and external signals 1, 2, 3                                                                |
|                                    | Protection                                   | Parameters damage, Parameter setting errors, Communications errors, WDT errors, Fully closed encoder detecting disconnection                  |
|                                    | LED Indicators                               | A: Alarm, R: MECHATROLINK-I/II Communicating                                                                                                  |

## Nomenclature

### CJ1W-NCF71 - Position Control Unit



CJ1W-CT021

# High-speed Counter Unit

## High-speed, flexible control with a wide array of features

- Input frequencies to 500 kHz.
- 32-bit counting range.
- Variable digital noise filter provided.
- 5-/12-/24-V line driver inputs
- Supports simple, ring, and linear counting modes.
- Supports two external control inputs, and a total of 16 functions can be set: open gate, close gate, pre-set, reset, capture, stop/capture/reset combinations, reset enable, and more.
- One Unit supports two external outputs and 30 internal outputs with counter value zone comparisons, target comparisons, delays, holds, programmable outputs, and hysteresis settings.
- Pulse rate measurement function and data logging.
- Counter outputs and external control inputs can be used to trigger interrupt tasks in the CPU Unit.

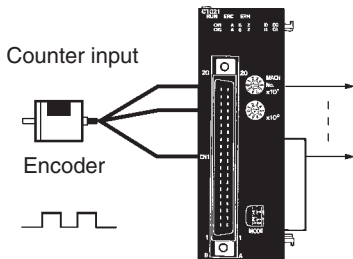


## Function

The High-speed Counter Unit counts pulse signal inputs that are too fast to be detected by normal Input Units. The Unit can be programmed

to produce outputs according to counter values for specified conditions, and many other functions are supported.

## System Configuration



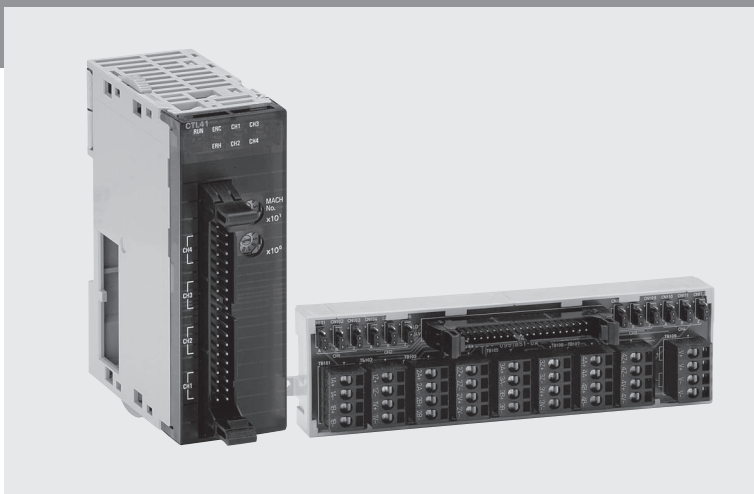
## Specifications

|                                           |                                                                                                      |                                                                                                                                      |                        |                            |
|-------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------|
| Unit name                                 | High-speed Counter Unit                                                                              |                                                                                                                                      |                        |                            |
| Classification                            | Special I/O Unit                                                                                     |                                                                                                                                      |                        |                            |
| Unit numbers                              | 0 to 92                                                                                              |                                                                                                                                      |                        |                            |
| Countable inputs                          | 2 channels                                                                                           |                                                                                                                                      |                        |                            |
| Counter modes                             | Simple counter                                                                                       | Linear or ring counter                                                                                                               |                        |                            |
| Input types                               | Differential phase inputs (x1)                                                                       | Differential phase inputs (x1, x2, x4)                                                                                               | Up/Down pulse inputs   | Pulse and direction inputs |
| Countable frequencies                     | 50 kHz                                                                                               | 10, 50, or 500 kHz                                                                                                                   |                        |                            |
| Counter values                            | 8000 0000 to 7FFF FFFF<br>(−2,147,483,648 to 2,147,483,647)                                          | Liner counter: 8000 0000 to 7FFF FFFF (−2,147,483,648 to 2,147,483,647)<br>Ring counter: 0000 0000 to FFFF FFFF (0 to 4,294,967,295) |                        |                            |
| Counter inputs                            |                                                                                                      |                                                                                                                                      |                        |                            |
| Input signals                             | Phases A, B, and Z                                                                                   |                                                                                                                                      |                        |                            |
| Input voltage<br>(selected via connector) | 24 V DC                                                                                              | 5 V DC (for ch1 only)                                                                                                                | 12 V DC (for ch2 only) | Line driver                |
| External inputs                           | Number of inputs: 2                                                                                  |                                                                                                                                      |                        |                            |
| Input voltage                             | 24 V DC                                                                                              |                                                                                                                                      |                        |                            |
| External outputs                          |                                                                                                      |                                                                                                                                      |                        |                            |
| External power supply                     | 10.2 to 26.4 V DC                                                                                    |                                                                                                                                      |                        |                            |
| Max. switching capacity                   | 46 mA at 10.2 V to 100 mA at 26.4 V                                                                  |                                                                                                                                      |                        |                            |
| Response time                             | 0.1 ms max.                                                                                          |                                                                                                                                      |                        |                            |
| Leakage current                           | 0.1 mA max.                                                                                          |                                                                                                                                      |                        |                            |
| Residual voltage                          | 1.5 V max.                                                                                           |                                                                                                                                      |                        |                            |
| Control methods                           | Simple counter: Forced ON/OFF, Linear counter: Forced ON/OFF, zone comparison, and target comparison |                                                                                                                                      |                        |                            |

CJ1W-CTL41-E

# 4-Channel Counter Unit

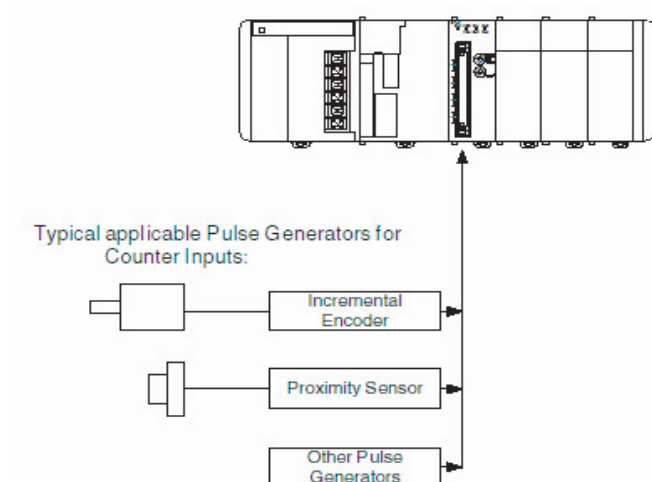
- 4 independent counter channels for encoder or pulse train inputs
- 4 Counter channels with 32-bit counter value
- Linear or circular counter mode selectable per channel.
- Max. input pulse frequency 100 kHz, or 400 k counts/second in quadrature mode
- 32 comparison values (8 per channel) can be used to trigger interrupts to the PLC CPU
- Counter channel settings can be reconfigured on-the-fly
- Input level: line driver (24 V inputs through dedicated terminal block).
- Easy connection (line driver or 24V) by using XW2G-40G7-E screwless terminal block



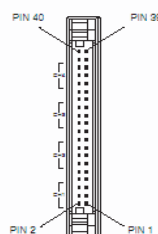
## Function

This Unit offers an economical way to acquire position information from up to four encoders, or to count fast pulse trains up to 100 kHz. Dynamically adjustable counter comparison values offers flexibility in triggering interrupts to the PLC with sub-millisecond response.

## System Configuration



## Terminal arrangement



| Pin No. | Signal        | Pin No. | Signal        |
|---------|---------------|---------|---------------|
| 40      | Not Connected | 39      | Not Connected |
| 38      |               | 37      |               |
| 36      | Z-            | 35      | Z+            |
| 34      | B-            | 33      | B+            |
| 32      | A-            | 31      | A+            |
| 30      | Not Connected | 29      | Not Connected |
| 28      |               | 27      |               |
| 26      | Z-            | 25      | Z+            |
| 24      | B-            | 23      | B+            |
| 22      | A-            | 21      | A+            |
| 20      | Not Connected | 19      | Not Connected |
| 18      |               | 17      |               |
| 16      | Z-            | 15      | Z+            |
| 14      | B-            | 13      | B+            |
| 12      | A-            | 11      | A+            |
| 10      | Not Connected | 9       | Not Connected |
| 8       |               | 7       |               |
| 6       | Z-            | 5       | Z+            |
| 4       | B-            | 3       | B+            |
| 2       | A-            | 1       | A+            |

## Specifications

| Item                 | Classification: Special I/O Unit                                                           |
|----------------------|--------------------------------------------------------------------------------------------|
|                      | <b>CJ1W-CTL41-E</b>                                                                        |
| Unit numbers         | 0 to 92                                                                                    |
| Counter Inputs       | 2 Channels                                                                                 |
| Counter Modes        | Linear, Circular                                                                           |
| Counter Values       | 8000 0000 to 7FFF FFFF<br>(-2,147,483,648 to 2,147,483,647)                                |
| Comparison values    | 8 values or 4 ranges per channel                                                           |
| Input Types          | Differential Phase Inputs (1x, 2x, 4x)<br>Pulse Up/Down Inputs<br>Pulse + Direction Inputs |
| Input Voltage        | RS422 Line Driver compatible level<br>24V via XW2G-40G7-E terminal block                   |
| Max. input Frequency | 100 kHz (A and B signals)                                                                  |

CJ1W-CTS21-E

# SSI Encoder Input Unit

## 2 independently configurable inputs for SSI-compatible sensors

- SSI (synchronous serial interface) is a standard communication protocol mainly used for absolute encoders or distance measurement systems.
- It provides more flexibility, easier connection and reduced wiring compared to parallel connection of absolute encoders.

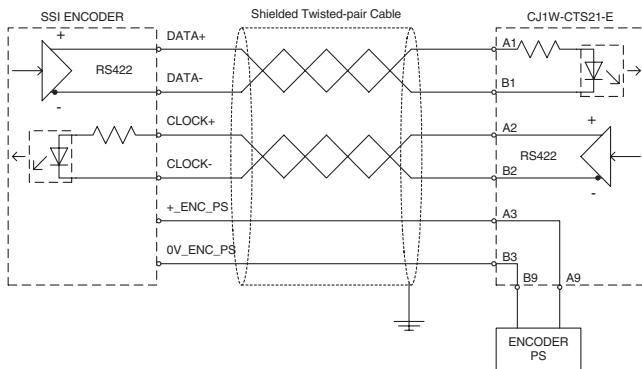


## Function

The Units sets up and maintains data communication with up to two SSI slave devices. Extensive setting options allow matching the coding, baud rate or data length of any SSI device.

## SSI Communication

| Item                | Specification                                                             |
|---------------------|---------------------------------------------------------------------------|
| CLK lines           | Non-isolated differential line driver, RS422 compliant                    |
| DATA lines          | Electrically isolated differential line receiver, RS422 compliant         |
| Number of data-bits | 9 to 31 (default: 24)                                                     |
| Value coding        | Gray / Binary / Tannenbaum / Raw (default: Gray)                          |
| Clock frequency     | 100 kHz to 1.5 MHz                                                        |
| Monoflop time       | 10 $\mu$ s to 99.990 $\mu$ s (default: 40 $\mu$ s)                        |
| Sample rate         | About 2,500 Samples/sec with 2 encoders connected (with default settings) |



## Terminal arrangement

| Item                       | Description Row B | Terminal no. | Description Row A |
|----------------------------|-------------------|--------------|-------------------|
| SSI DATA CH1               | DATA1-            | B1           | A1                |
| SSI Clock CH1              | CLOCK1-           | B2           | A2                |
| SSI Power Supply OUT CH1   | 0V_ENC_PS         | B3           | A3                |
|                            | N.C.              | B4           | A4                |
| SSI DATA CH2               | DATA2-            | B5           | A5                |
| SSI Clock CH2              | CLOCK2-           | B6           | A6                |
| SSI Power Supply OUT CH2   | 0V_ENC_PS         | B7           | A7                |
|                            | N.C.              | B8           | A8                |
| Encoder Power Supply Input | 0V_ENC_PS         | B9           | A9                |

## Specifications

| Item                                    | Classification: Special I/O Unit<br>CJ1W-CTS21-E                                                                                                                                  |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit numbers                            | 0 to 94                                                                                                                                                                           |
| SSI Inputs                              | 2 Channels                                                                                                                                                                        |
| SSI Configuration options (per channel) | Baud Rate, Value coding (see above)<br>Resolution (9-31 bits)<br>Leading/trailing bits (0-31 bits)<br>Encoder Status bits (0-8 bits)<br>Parity (Odd, Even, None)<br>Monoflop time |

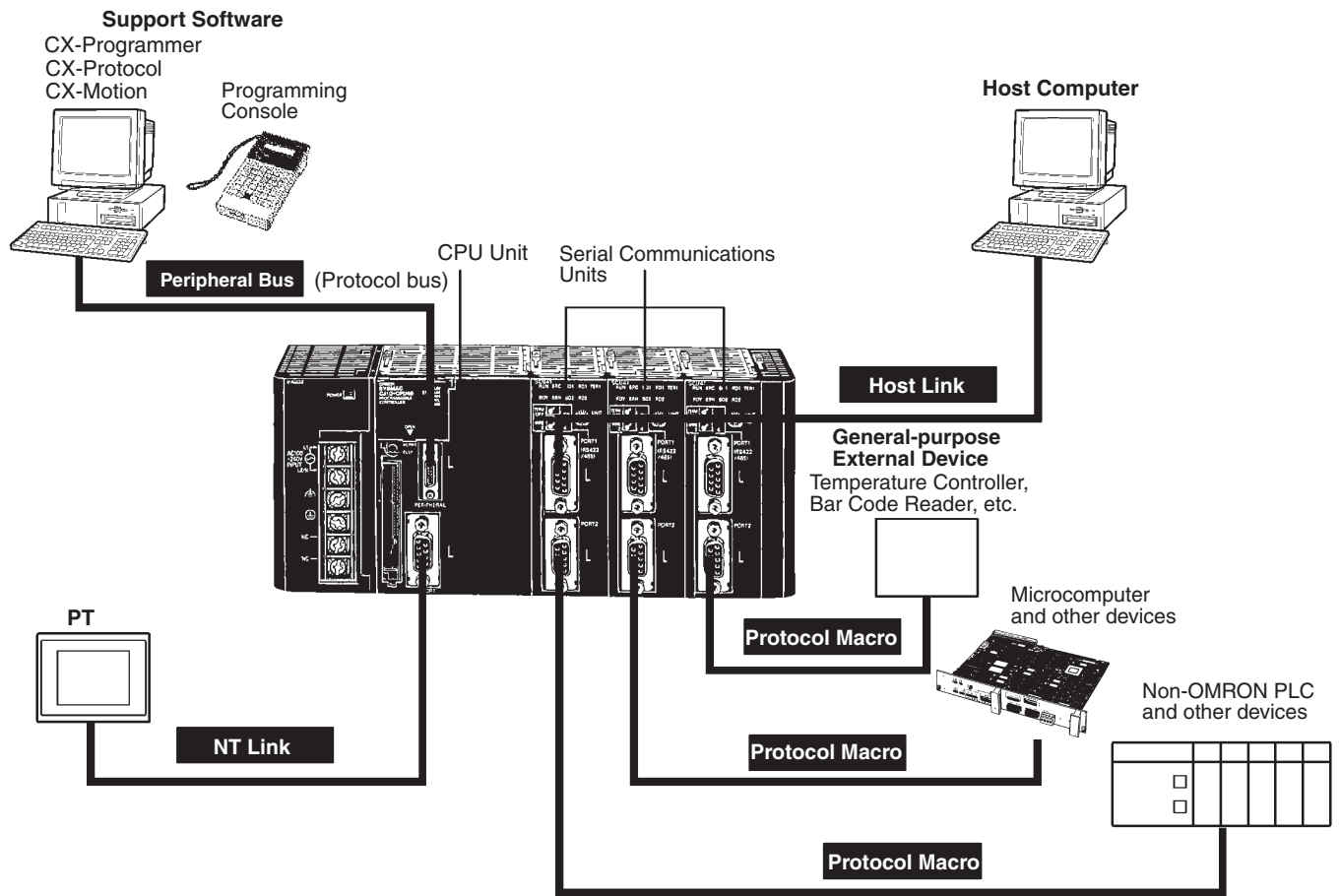
# Serial Communications

## Serial Communications Connections

| Unit                         | Model         | Ports              | Serial communications mode       |                |           |                                  |                 |                       |                           |                               |
|------------------------------|---------------|--------------------|----------------------------------|----------------|-----------|----------------------------------|-----------------|-----------------------|---------------------------|-------------------------------|
|                              |               |                    | Protocol macros                  | Host Link      | NT Links  | No-protocol                      | Serial PLC Link | Peripheral bus        | Program-ming Con-sole bus | Serial Gate-way (See note 1.) |
|                              |               |                    | General-purpose external devices | Host computers | OMRON PTs | General-purpose external devices | CJ1M            | Program-ming De-vices | Program-ming Console      | Compo-Way/F-compatible models |
| CPU Units                    | All models    | Port 1: Peripheral | No                               | Yes            | Yes       | No                               | No              | Yes<br>(CJ1M only)    | Yes                       | No                            |
|                              |               | Port 2: RS-232C    |                                  |                |           | Yes                              | Yes             |                       | No                        | Yes                           |
| Serial Com-munications Units | CJ1W-SCU41-V1 | Port 1: RS-422/485 | Yes                              | Yes            | Yes       | Yes<br>(See note 1.)             | No              | No                    | No                        | Yes (See note 2.)             |
|                              | CJ1W-SCU21-V1 | Port 1: RS-232C    | Yes                              | Yes            | Yes       | Yes<br>(see note 1.)             | No              | No                    | No                        | Yes (See note 2.)             |
|                              |               | Port 2: RS-232C    |                                  |                |           |                                  |                 |                       |                           |                               |

**Note:** 1. CPU Unit Ver. 3.0 and Serial Communications Unit Ver. 1.2 or later only.  
2. Gateway to Host Link FINS is also possible.

## Example Serial Communications Configuration



# Protocol Macros

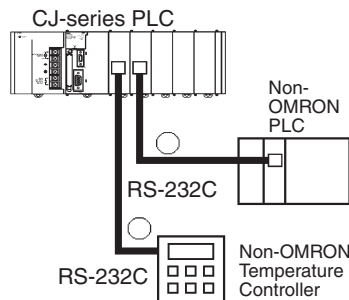
## Easily Create Protocols for Data Exchange with External Devices Using One Instruction

### Function

Data transfer protocol for serial communications vary with the manufacture and with devices. Differences in protocols can make communications between devices by different manufacturers very difficult, even when electrical standards are the same.

OMRON's protocol macros solve this problem by enabling easy creation of protocol macros designed to match the protocol of a connected device. Protocol macros will let you communicate with essentially any device with an RS-232C, RS-422, or RS-485 port without having to write a special communications program.

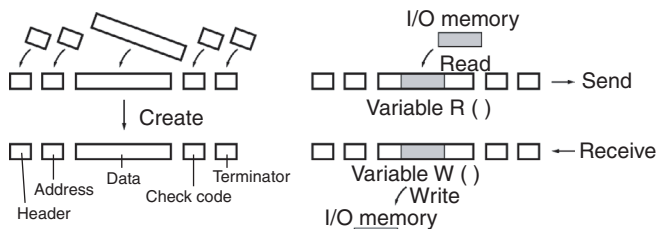
### PLCs with Protocol Macros



### The Two Main Functions of Protocol Macros

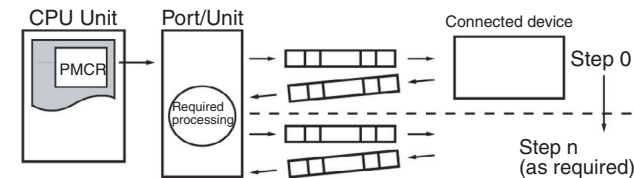
#### 1. Creating Communications Frames

The communications frames can be easily created according to the specifications required by the connected device. Data from I/O memory in the CPU Unit can be easily included as part of a communications frame to read from or write to I/O memory.



#### 2. Creating Frame Send/Receive Procedures

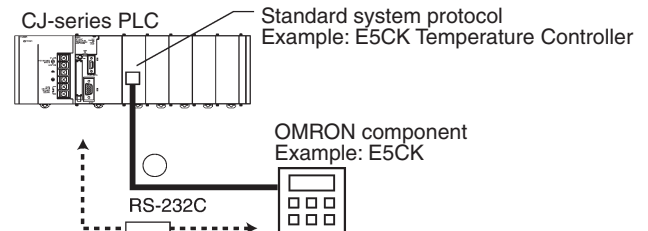
The required processing, including sending and receiving communications frames, can be performed one step at a time according to the results of the previous step, and then CX-Protocol can be used to trace send and receive data.



### Types of Protocol

#### Standard System Protocols

Data transfers with OMRON components can be easily performed using standard system protocols. There is no need to develop your own protocols in this case.

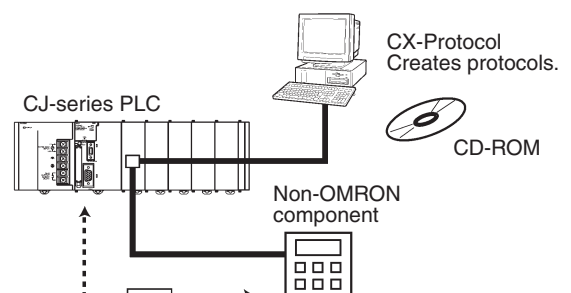


| Component                                                        | Model                                                                                                                |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| CompoWay/F-compatible components                                 | OMRON CompoWay/F slave components                                                                                    |
| Digital Controllers and Temperature Controllers                  | Small Digital Controller with Communications (53 x 53 mm) E5CK                                                       |
|                                                                  | Temperature Controllers with Digital Indications (Thermac J with communications) (96 x 96 mm or 48 x 96 mm) E5J-A2H0 |
|                                                                  | Digital Controllers with Communications (96 x 96 mm) ES100□                                                          |
|                                                                  | High-density Temperature Controller with communications (8 control points) E5ZE                                      |
| Intelligent Signal Processors                                    | K3T□                                                                                                                 |
| Bar Code Readers                                                 | Laser Scanner type V500                                                                                              |
|                                                                  | CCD type V520                                                                                                        |
| Laser Micrometer                                                 | 3Z4L                                                                                                                 |
| Visual Inspection Systems                                        | High speed, high precision, low cost F200                                                                            |
|                                                                  | High-precision inspection/positioning F300                                                                           |
|                                                                  | Character inspection software/positioning software F350                                                              |
| ID Controllers                                                   | Electromagnetic coupling (for short distances) V600                                                                  |
|                                                                  | Microwave (for short distances) V620                                                                                 |
| Hayes Modem AT Command                                           | ---                                                                                                                  |
| C-series PLCs (See note.)                                        | PLC with Host Link (C mode) protocol                                                                                 |
| CS/CJ-series PLCs (See note.)<br>CVM1/CV-series PLCs (See note.) | PLC with Host Link (FINS) protocol                                                                                   |
| Mitsubishi PLCs (Sequencer CPU Modules) (See note.)              | PLC with Computer Link (A-compatible, 1C frame, model 1) slave functions.                                            |

**Note:** Serial Communications Unit Ver. 1.2 or later only.

#### User-created Protocols

Data transfers with non-OMRON components can be easily created just by defining parameters using the CX-Protocol Windows tool.

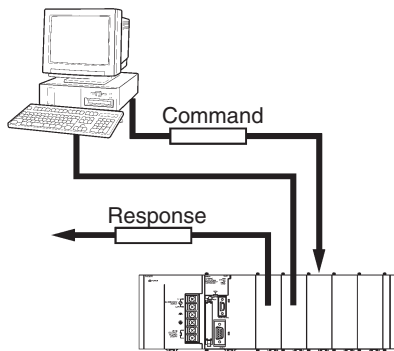


# Other Protocols

## Host Links

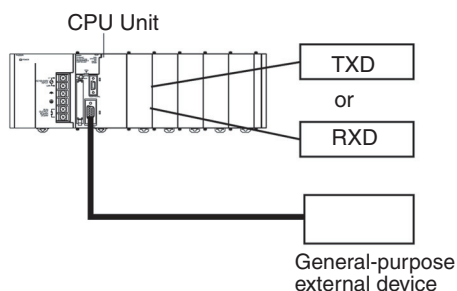
Host Link (C-mode) commands or FINS commands placed within host link headers and terminators can be sent to a host computer to read/write I/O memory, read/control the operating mode, and perform other operations for the PLC.

Unsolicited messages can also be sent from the PLC to the host computer by sending FINS commands from the ladder program using the SEND(090), RECV(098), and CMND(490) instructions.



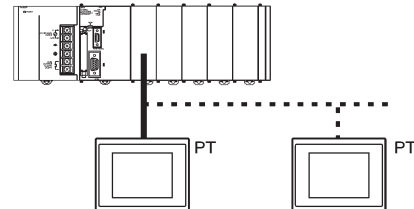
## Custom Protocols

I/O instructions for communications ports (TXD/TXDU, RXD/RXDU) can be used for simple data transfers (custom protocols), such as to input data from bar code readers or output data to a printer. Start/end codes can be specified, and RS, CS, and other control signals can be handled.



## 1:N NT Links with High-speed Links

The PLC can be connected to a Programmable Terminal (PT) via RS-232C or RS422A/485 ports, and I/O memory in the PLC can be allocated to various PT functions, including status control areas, status notifications areas, touch switches, lamps, memory tables, and other objects.

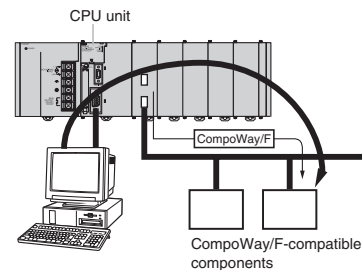


**Note:** Either one or up to eight PTs can be connected to a PLC in 1:N NT Links.

High-speed NT Links that are three times faster are possible with the NS Series and version 2 of the NT631 and NT31 Series. This speed is particularly important when connecting to more than one PT.

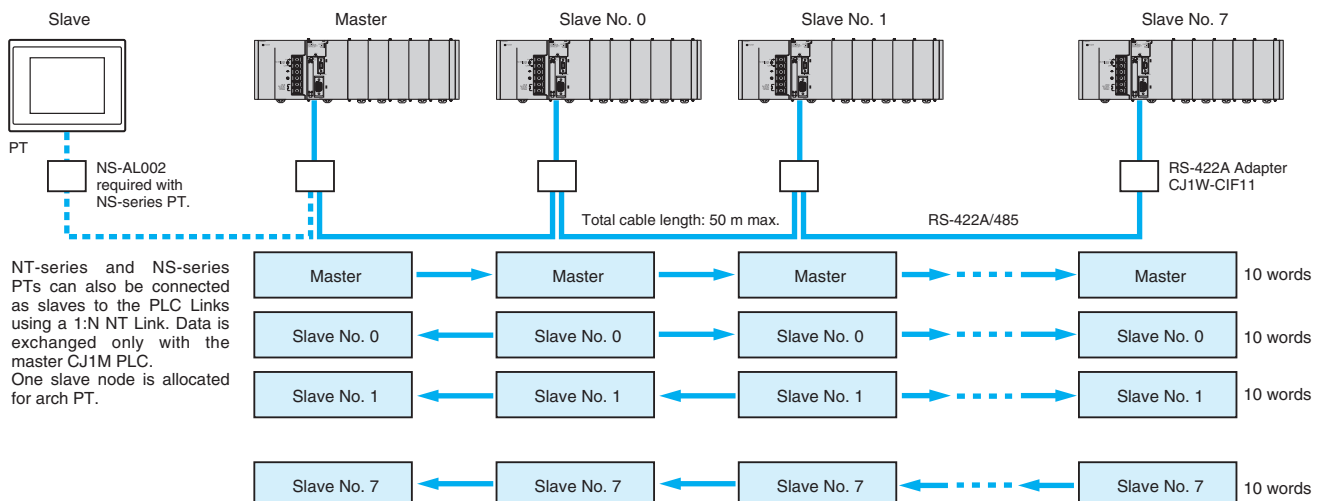
## Serial Gateway Function **NEW** (CPU Unit Ver. 3.0 or later, Serial Communications Unit Ver. 1.2 or later only)

When a FINS command containing a CompoWay/F command is received via network or serial communications, the command is automatically converted to a protocol suitable for the message and forwarded using serial communications. This enables access to CompoWay/F-compatible components from a personal computer, PT, or PLC via a network.



## Serial PLC Links (CJ1M CPU Unit's Built-in RS-232C Port)

Allows many applications to be easily achieved, such as exclusive control between PCB loaders and unloaders and temperature information and time management between conveyor ovens. Up to 9 CJ1M CPU Units can be connected, with up to 10 words of data between them managed by the built-in RS-232C port. The RS-232C can be converted to RS-422A simply by using a CJ1W-CIF11 RS-422A Conversion Adapter.



NT-series and NS-series PTs can also be connected as slaves to the PLC Links using a 1:N NT Link. Data is exchanged only with the master CJ1M PLC. One slave node is allocated for each PT.

CS1W-SCU□1-V1

# Serial Communication Unit

## Support Protocol Macros, Host Link Communications, and 1:N NT Links

- Mount up to 16 Units (including all other CPU Bus Units) on CPU or Expansion Racks. Ideal for systems that required many serial ports.

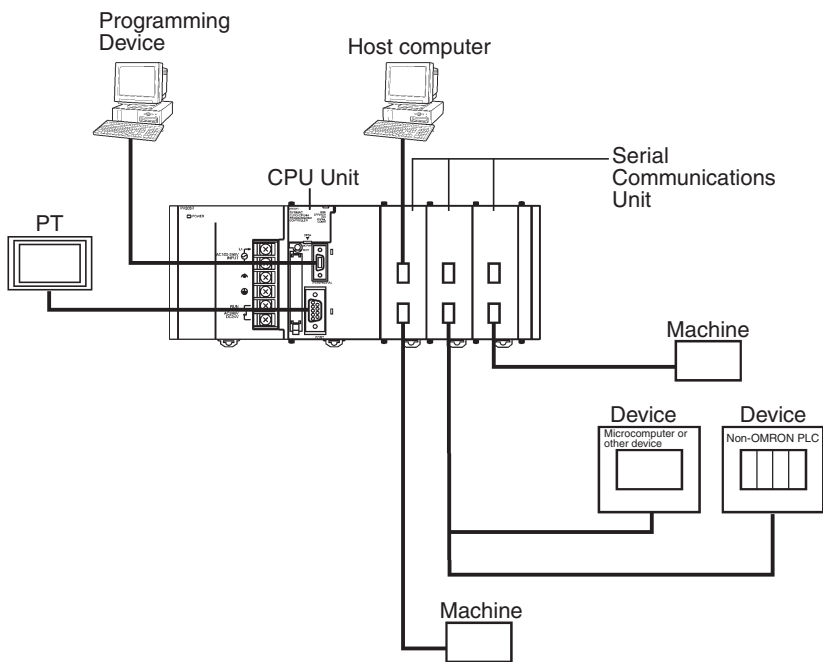


## Function

The SCU21 and SCU41 CPU Bus Unit can be used to increase the number of serial ports (RS-232C or RS-422A/485) two at a time. The SCU21 provides two RS232C ports, the SCU41 has one RS232C port and one RS422/RS485 port. Specify Serial Gateway, Protocol Macros,

Host Link Communications, or 1:N NT Links separately for each port. With the CJ Series, you can easily provide the right number of serial ports for your system.

## System Configuration



## Specifications

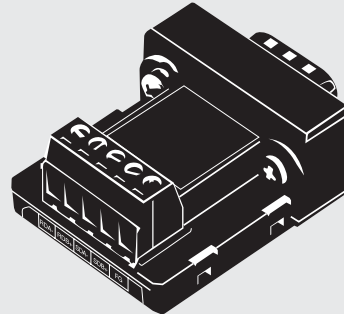
| Unit                       | Classification | Serial communications modes                                                            | Serial          | Unit numbers | Model         |
|----------------------------|----------------|----------------------------------------------------------------------------------------|-----------------|--------------|---------------|
| Serial Communications Unit | CPU Bus Unit   | Protocol Macro, Host Link, 1:N NT Link, Serial Gateway, or non-protocol communications | RS-232C x 1     | 0 to F       | CJ1W-SCU41-V1 |
|                            |                |                                                                                        | RS-422A/485 x 1 |              | CJ1W-SCU21-V1 |
|                            |                |                                                                                        | RS232C x 2      |              |               |

CJ1W-CIF11

# RS-422A Adapter

## Converts RS-232C to RS-422A/RS-485

- Use to convert RS-232C to RS-422A/RS-485.
- Simply connect this Adapter to the built-in RS-232C port or an RS-232C connector on a Serial Communications Unit (D-sub, 9-pin) to convert to RS-422A/RS-485).



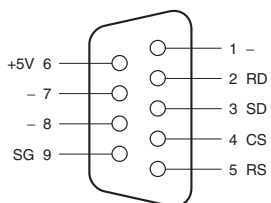
## Specifications

| Item                       | Specifications                    |                                               |
|----------------------------|-----------------------------------|-----------------------------------------------|
| Dimensions                 | 18.2 × 34.0 × 38.8 mm (W × H × D) |                                               |
| Weight                     | 20 g max.                         |                                               |
| Rated power supply voltage | +5 V                              | Supplied from pin 6 on the RS-232C connector. |
| Current consumption        | 40 mA max.                        |                                               |
| Isolation                  | No isolation                      |                                               |
| Transmission distance      | 50 m                              |                                               |

## Interface

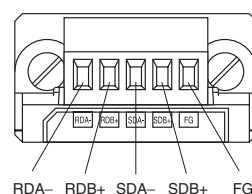
### RS-232C Connector

RS-232C Port Connector  
Pin Arrangement



| Pin  | Signal |
|------|--------|
| 1    | NC     |
| 2    | RD     |
| 3    | SD     |
| 4    | CS     |
| 5    | RS     |
| 6    | +5V    |
| 7, 8 | NC     |
| 9    | SG     |
| Hood | FG     |

### RS-422A/485 Terminal Block



| Signal |
|--------|
| RDA-   |
| RDB+   |
| SDA-   |
| SDB+   |
| FG     |

NT-AL001

# RS-232C/RS-422A Adapter Unit

- Long-distance transmissions are possible through an RS-422A interface. By converting from RS-232C to RS-422A and then back to RS-232C, a transmission distance of up to 500 m can be achieved.
- No power supply is required. If the 5-V terminal (150 mA max.) is connected from the RS-232C device, a separate power supply is not required to drive the Adapter Unit.
- Duct wiring can be used. The removable terminal block enables wiring not possible with D-sub connectors. (The RS-232C interface is 9-pin D-sub.)



## Function

The NT-AL001 is used to connect a PT or other device with an RS-232C terminal to a device with an RS-422A terminal, or an RS422A multi-drop network..

## Communications Specifications

### General Specifications

| Item                       | Specification                                            |
|----------------------------|----------------------------------------------------------|
| Rated power supply voltage | +5 V $\pm 10\%$<br>(Use pin 6 on the RS-232C connector.) |
| Rated current consumption  | 150 mA max.                                              |
| Rush current               | 0.8 A max.                                               |
| Weight                     | 200 g max.                                               |

### RS-232C Interface

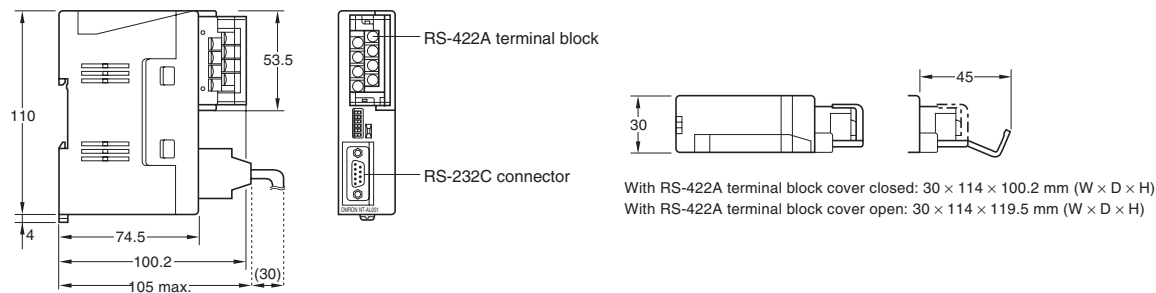
| Item                  | Specification                   |
|-----------------------|---------------------------------|
| Baud rate             | 64 Kbps max.                    |
| Transmission distance | 2 m max.                        |
| Connector             | 9-pin, D-sub connector (female) |

### RS-422A Interface

| Item                  | Specification                                  |
|-----------------------|------------------------------------------------|
| Baud rate             | 64 Kbps max.<br>(depends on RS-232C baud rate) |
| Transmission distance | 500 m max.                                     |
| Terminal block        | 8 terminals, M3.0; detachable                  |

## Dimensions

**Note:** Units are in mm unless specified otherwise.

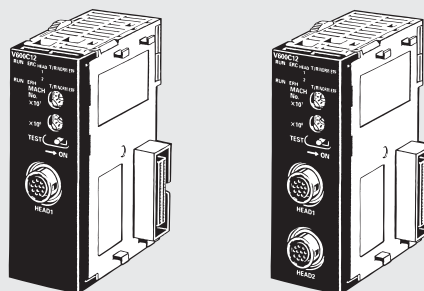


CJ1W-V600C1□

# RFID Sensor Units

## Process RFID tag data directly in the control system.

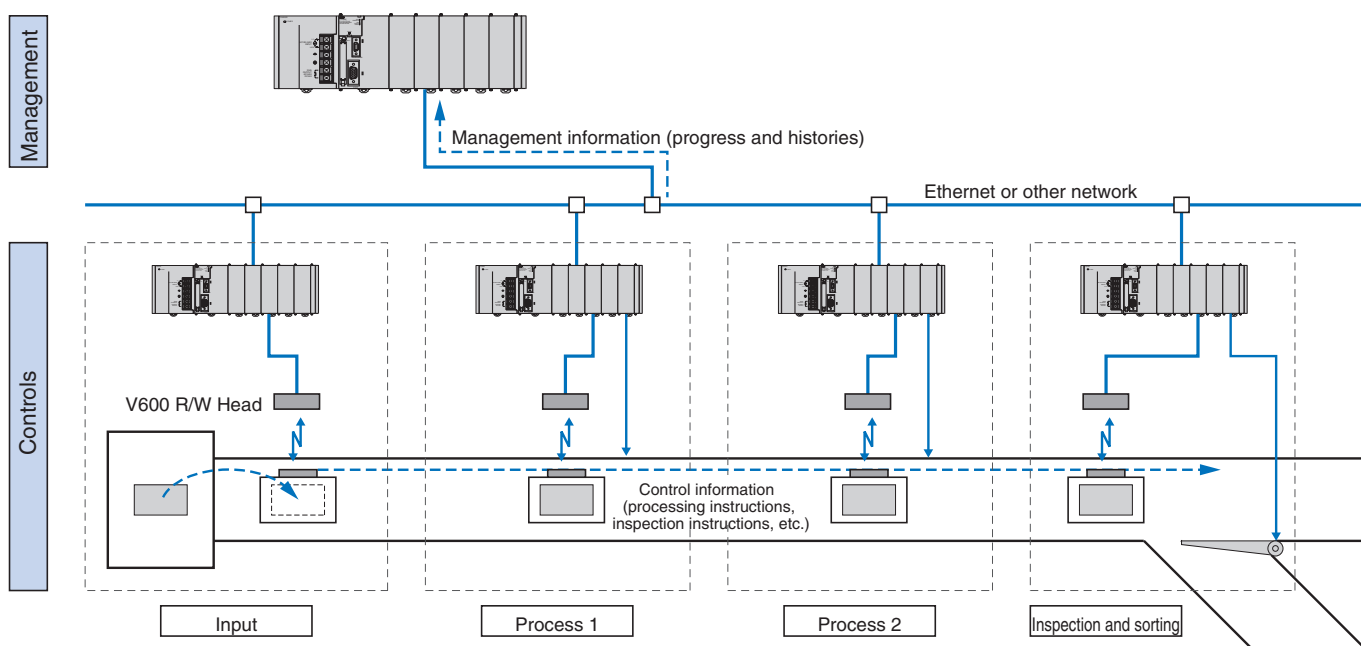
- Models available to connect to either one R/W Head or two R/W Heads.
- High-speed data communications with the CPU Unit (160 bytes/scan).
- Efficient programming with control bits and data located in different interface areas.
- Common operating methods for both Single-head and Double-head Units to effectively apply programming resources through modularization.
- Status confirmation function without CPU Unit program for faster system setup.
- Power supply error flags and processing provide debugging information (communications TAT and error codes) for easier maintenance.



## Function

The ID Sensor Unit interfaces to the V600-series RFID System's Amplifiers and Read/Write Heads and is used together with V600 Data Carriers.

## System Configuration



### Combine Products and Information

Data Carriers attached to the products being manufactured are used to handle the flow of control and management information on the production line. They can also be used to automatically collect and manage quality information.

### Autonomous Control

The information required for production is provided from the product itself, enabling the creation of an autonomous control system that does not need to rely on a host.

### Modularization of Control Processes

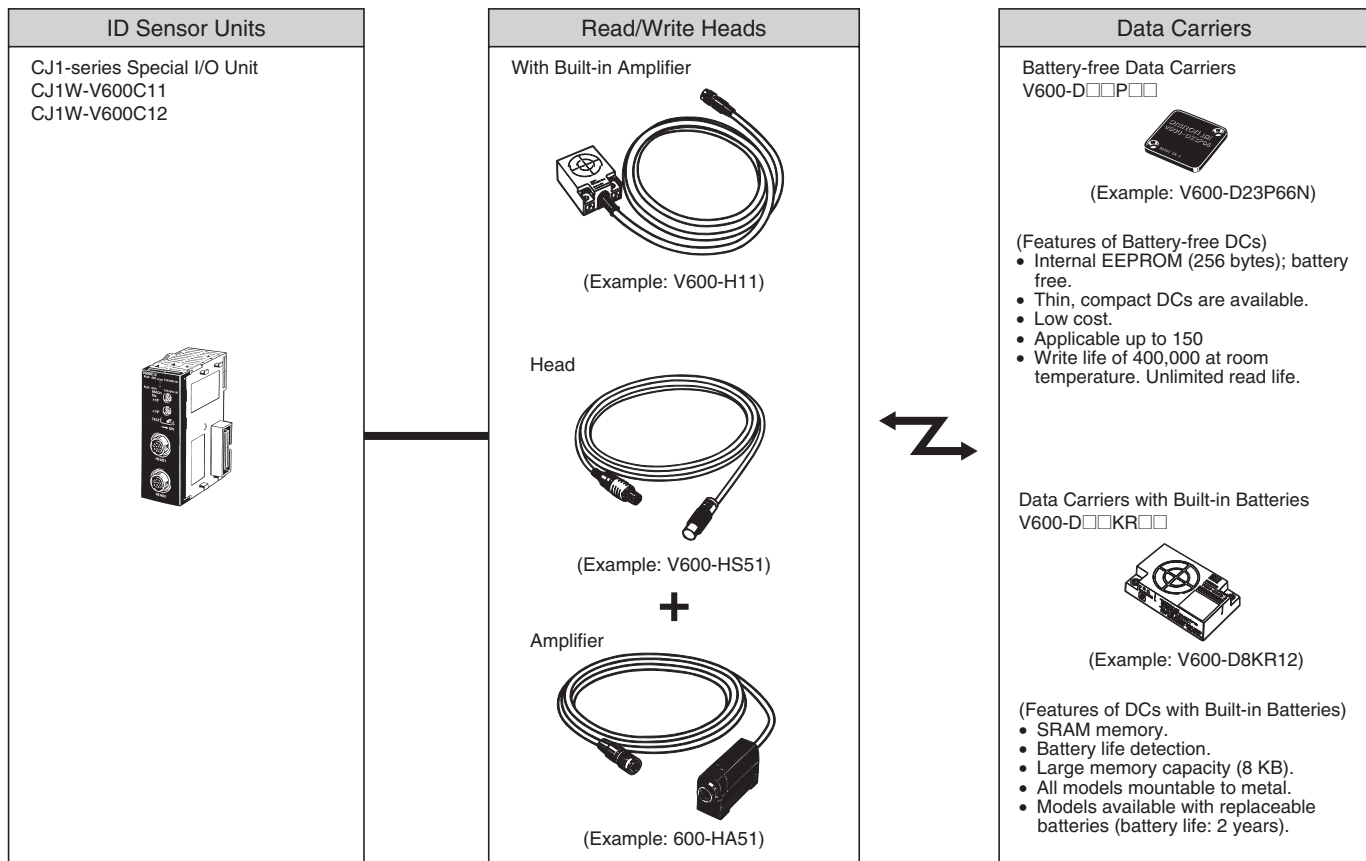
The required information is available when it is required, enabling simple separation of control processes into autonomous modules.

## Specifications

| Item                                                                       | CJ1W-V600C11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | CJ1W-V600C12                                     |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------|---------------------------------------|--------------------------------------------------|------|----------------------------------|----------------------------------|-------------------|----------------------------------|-----------------------------------|----------------------|----------------------------------|---------------------------------|
| Data transfer speed                                                        | 160 bytes/scan (between CPU Unit and ID Sensor Unit)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                  |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Applicable RFID system                                                     | V600 Series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                  |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Number of connectable R/W Heads                                            | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2                                                |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Commands (The number of bytes that can be specified is given in brackets.) | Read/Write [1 to 2,048]<br>Data Fill (Clear) [1 to 2,048 or through end address]<br>Copy (for Double-head Units only) [1 to 2,048]<br>Calculation Write [1 to 4]<br>Bit Set/Bit Clear [1 to 4]<br>Masked Bit Write [2]<br>Memory Check [2]<br>No. of Writes Control [2]                                                                                                                                                                                                                                                                                                                                                      |                                                  |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Communications processing time (See note.)                                 | <table><tr><th>Command</th><th>Data Carriers with built-in batteries</th><th>Battery-free Data Carriers in time priority mode</th></tr><tr><td>Read</td><td><math>1.8 \times N + 48.4 \text{ ms}</math></td><td><math>1.8 \times N + 79.0 \text{ ms}</math></td></tr><tr><td>Write with verify</td><td><math>4.2 \times N + 86.5 \text{ ms}</math></td><td><math>7.1 \times N + 180.4 \text{ ms}</math></td></tr><tr><td>Write without verify</td><td><math>2.2 \times N + 72.8 \text{ ms}</math></td><td><math>4.3 \times N + 132 \text{ ms}</math></td></tr></table> <p>N = The number of bytes being read or written.</p> |                                                  | Command | Data Carriers with built-in batteries | Battery-free Data Carriers in time priority mode | Read | $1.8 \times N + 48.4 \text{ ms}$ | $1.8 \times N + 79.0 \text{ ms}$ | Write with verify | $4.2 \times N + 86.5 \text{ ms}$ | $7.1 \times N + 180.4 \text{ ms}$ | Write without verify | $2.2 \times N + 72.8 \text{ ms}$ | $4.3 \times N + 132 \text{ ms}$ |
| Command                                                                    | Data Carriers with built-in batteries                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Battery-free Data Carriers in time priority mode |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Read                                                                       | $1.8 \times N + 48.4 \text{ ms}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | $1.8 \times N + 79.0 \text{ ms}$                 |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Write with verify                                                          | $4.2 \times N + 86.5 \text{ ms}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | $7.1 \times N + 180.4 \text{ ms}$                |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Write without verify                                                       | $2.2 \times N + 72.8 \text{ ms}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | $4.3 \times N + 132 \text{ ms}$                  |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Maintenance features                                                       | Communications test, processing results monitor data (communications TAT and error codes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                  |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |
| Error detection                                                            | CPU errors, communications errors with Data Carriers, R/W Head power supply check                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                  |         |                                       |                                                  |      |                                  |                                  |                   |                                  |                                   |                      |                                  |                                 |

**Note:** Add the data transfer time to the communications processing time for the command processing time

## System Configuration



**Note:** Refer to the *Auto-Identification Components Group Catalog* (Cat. No. Q132) for details on the V600 Series.

# Communications Networks

## Overview

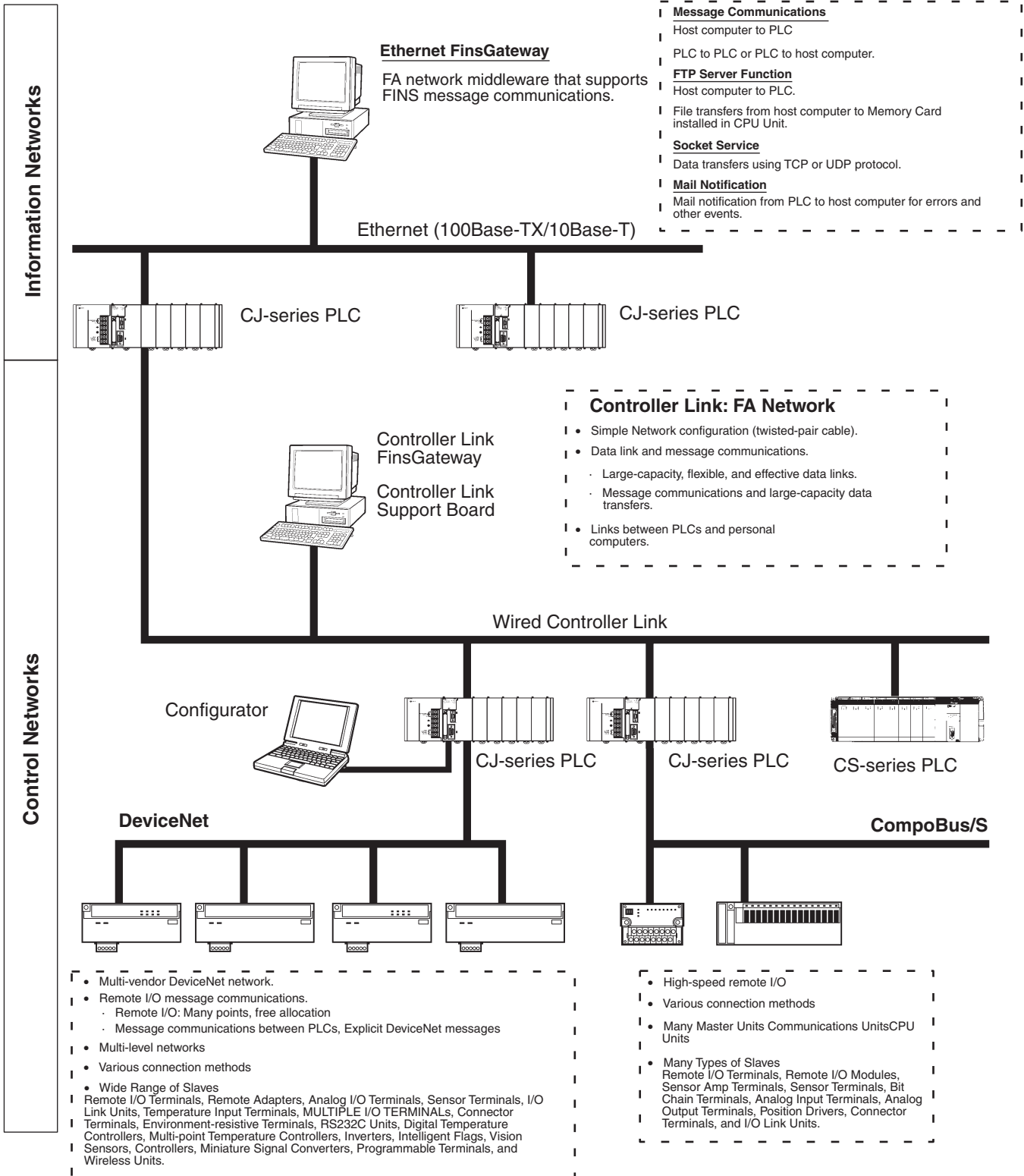
| Level                | Network         | Functions                                       | Communications                                                       | Unit/Board                             |
|----------------------|-----------------|-------------------------------------------------|----------------------------------------------------------------------|----------------------------------------|
| Information networks | Ethernet        | Host computer to PLC                            | FINS messages                                                        | Ethernet Unit                          |
|                      |                 | PLC to PLC                                      |                                                                      |                                        |
|                      |                 | Host computer to CPU Unit memory card           | FTP server                                                           |                                        |
|                      |                 | UNIX computer or other socket service to PLC    | Socket services                                                      |                                        |
|                      | Controller Link | Computers connected directly to network and PLC | FINS messages                                                        | Controller Link Support Board and Unit |
| Control networks     | Controller Link | PLC to PLC                                      | Data links (offsets and automatic setting)                           | Controller Link Unit                   |
|                      |                 |                                                 | FINS messages                                                        |                                        |
|                      | DeviceNet       | PLC to components (slaves)                      | Data links (offsets and automatic setting)                           | DeviceNet Unit and Configurator        |
|                      |                 |                                                 | FINS messages on open network                                        |                                        |
|                      | DeviceNet       |                                                 | High-capacity remote I/O on open network (fixed or user allocations) | DeviceNet Unit and Configurator        |
|                      | CompoBus/S      |                                                 | High-speed remote I/O (fixed allocation) on OMRON network.           | CompoBus/S Master Unit                 |
|                      | PROFIBUS-DP     |                                                 | High-capacity remote I/O on open network (fixed or user allocations) | PROFIBUS-DP Unit and Configurator      |

## Specifications

| Network                    | Ethernet                                                        | Controller Link                                                                        | PROFIBUS-DP                                                                          | DeviceNet                                                                                                                | CompoBus/S                                                                                                                                                                                   |
|----------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Messages                   | Yes                                                             | Yes                                                                                    | Limited (DPV1 devices)                                                               | Yes                                                                                                                      | ---                                                                                                                                                                                          |
| Data links                 | ---                                                             | Yes                                                                                    | Manually configurable                                                                | ---                                                                                                                      | ---                                                                                                                                                                                          |
| Remote I/O                 | ---                                                             | ---                                                                                    | Yes                                                                                  | Yes                                                                                                                      | Yes                                                                                                                                                                                          |
| Maximum speed              | 10/100 Mbps                                                     | 2 Mbps<br>Comm cycle: Approx. 34 ms<br>(Wired: 32 nodes, 2-Kbits + 2-Kword data links) | 12 Mbps,<br>Comm. cycle from 1 ms.                                                   | 500 Kbps<br>Comm cycle:<br>Approx. 5 ms (128 inputs and 128 outputs)                                                     | 750 Kbps (See note 1.)<br>Comm cycle:<br>Approx. 1 ms (128 inputs and 128 outputs)                                                                                                           |
| Total distance             | ---                                                             | Twisted-pair cable: 1 km<br>(at 500 bps)<br>Optical cable: 20 km                       | 1200 m up to 93.75 kbps,<br>100 m at 12 Mbps, extension by optical links if possible | 500 m<br>(at 125 kbps)                                                                                                   | Trunk line: 500 m (For the long-distance communications mode) (Total wiring length is 200 m when using the 4-conductor VCTF cable or special flat cable.)<br>Communications cycle: 6 ms max. |
| Maximum nodes              | ---                                                             | 32/62                                                                                  | 126                                                                                  | 63                                                                                                                       | 32                                                                                                                                                                                           |
| Communications media       | ---                                                             | Special twisted-pair cable or optical cable                                            | PROFIBUS cable                                                                       | DeviceNet cable                                                                                                          | 2-conductor VCTF cable<br>4-conductor VCTF cable<br>Special flat cable (Different cables cannot be used together.)                                                                           |
| Network data link capacity | ---                                                             | 32,000 or 62,000 words                                                                 | ---                                                                                  | ---                                                                                                                      | ---                                                                                                                                                                                          |
| Remote I/O capacity        | ---                                                             | ---                                                                                    | 7000 words (112000 points),<br>Configurator always required                          | 32,000 pts (with Configurator)<br>2,048 pts (without Configurator)                                                       | 256 pts                                                                                                                                                                                      |
| Supporting PLCs            | CJ Series,<br>CS Series,<br>CVM1,<br>CV Series,<br>C200HX/HG/HE | CJ Series, CS Series, CVM1,<br>CV Series,<br>C200HX/HG/HE, CQM1H                       | CJ Series, CS Series,<br>C200 HX/HG/HE, C200HS,<br>CQM1H, CPM1A/2A                   | CJ Series, CS Series,<br>CVM1, CV Series,<br>C200HX/HG/HE, C200HS,<br>CQM1/CQM1H (with I/O Link),<br>CPM1A/2A (I/O Link) | CJ Series, CS Series,<br>C200HX/HG/HE, C200HS,<br>CQM1/CQM1H,<br>CPM2C-S1□0c(-DRT),<br>CPM1A/2A (with I/O Link),<br>CPM2C (with I/O Link)                                                    |

- Note:**
1. For the baud rate of 500 kbps.
  2. For the baud rate of 125 kbps.
  3. For the high-speed communications mode (trunk length: 100 m) (30 m max. when using 4-conductor VCTF cable or special flat cable)

# Communications Networks

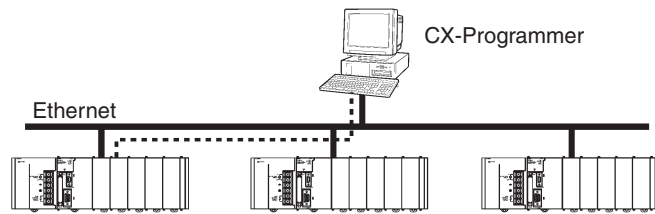


## Ethernet: Information Network

Use an Ethernet Network to organically link production management with the production site using various communications services.

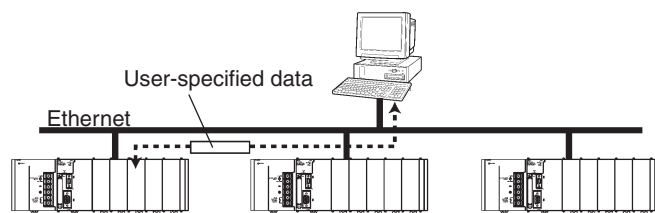
### Remote Programming and Monitoring

CX-Programmer running on a computer connected to the Ethernet Network can be used to program and monitoring all the PLCs connected to the Ethernet Network.



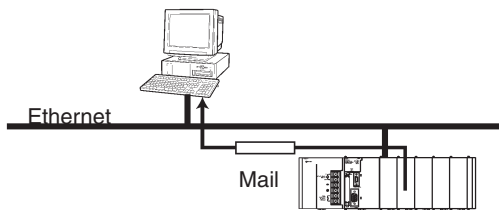
### Socket Service

Transfer data using either UDP or TCP protocol.



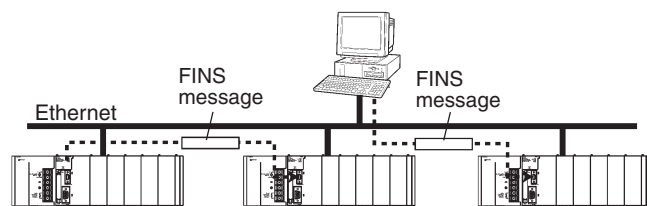
### Mail Service

Send electronic mail from the PLC to a host computer when a flag turns ON, when an error occurs, or at scheduled times.



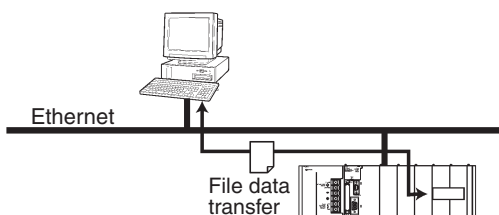
### FINS Message Service

Send FINS message between PLCs or between PLCs and host computers. The Ethernet FinsGateway can be used to handle messages from applications without having to program FINS commands directly.



### FTP Service

Use the FTP to transfer files between Memory Cards in the CPU Unit and computer memory.



## Controller Link: Control Network

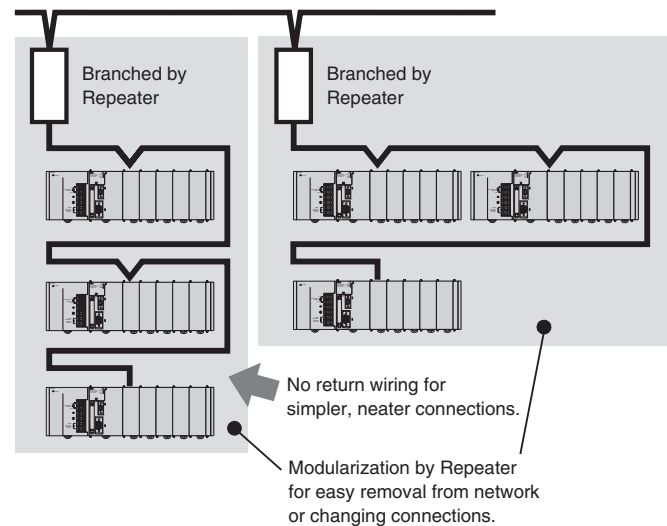
Controller Link can easily connect PLCs at the factory site in a fully functional FA network.

### Easy Network Construction with Twisted-pair Cables

### Repeater Units Enable T-branch Wiring, Extension, Expansion, or Optical Sections in Networks

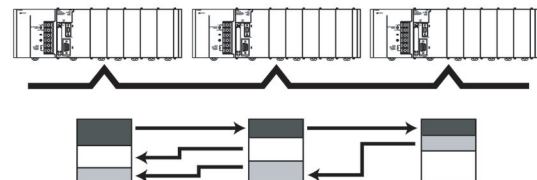
### More Flexibility in Wiring for Layout, Construction, and Expansion Using T-branches

Repeater Units can be used for branching, making complicated wiring paths unnecessary. This method reduces wiring labor, and modularization of equipment into Repeater Units.



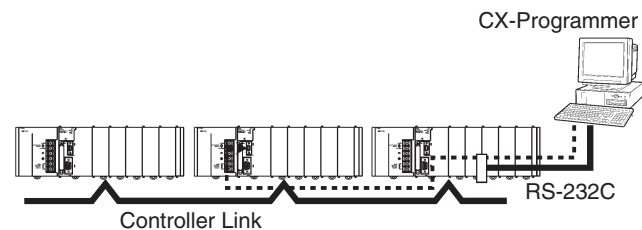
### Data Links

Efficient, large-capacity data links can be flexibly created between PLCs and between PLCs and host computers. The Controller Link FinsGateway can be used to handle data links from applications without having to program FINS commands directly.



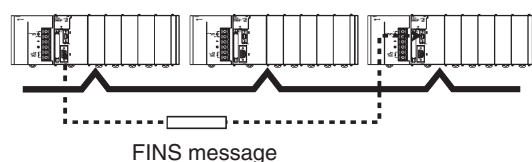
### Remote Programming and Monitoring

CX-Programmer connected via RS-232C can be used to program and monitor PLCs on the Controller Link Network.



### FINS Message Communications

Large volumes of data can be transferred between PLCs and host computers whenever necessary. The Controller Link FinsGateway can be used to handle messages from applications without having to program FINS commands directly.

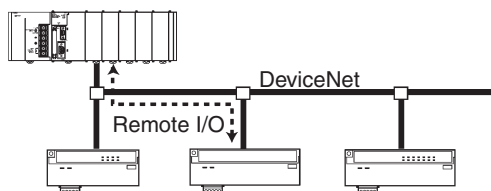


## DeviceNet: Component Network

Create a multi-vendor network for multibit communications for lower-level PLCs that need to handle both control signals and data.

### Remote I/O Communications

Large-capacity remote I/O can be freely allocated according to application needs.



### Select from a Wide Range of Slaves (Connection Possible to Data-intensive Devices)

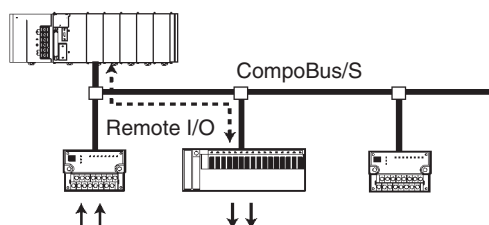
Connect contact I/O, analog I/O, temperature inputs, sensor (photoelectric or proximity) inputs, and small PLCs (e.g., CQM1).

## CompoBus/S: High-speed ON/OFF Bus

Construct a high-speed remote I/O system under the PLC to reduce wiring for sensors and actuators inside machines.

### High-speed Remote Communications at 1 ms or Less

In the High-speed Communication Mode, you can link up to 32 slaves (up to 128 input and 128 output points) with a high-speed communications cycle of 1 ms or less (0.5 ms with up to 16 slaves, 64 input and 64 output points).



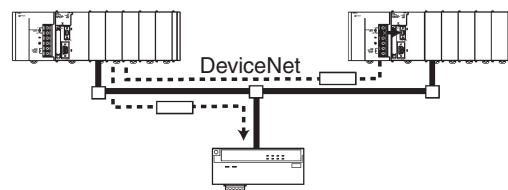
### High-speed and Long-distance Communications Modes

A switch enables switching between the previous High-speed and a new Long-distance Communications Mode.

- High-speed Mode: 100-m communications distance at 750 Kbits/s (with 2-conductor VCTF cable)
- Long-distance Mode: 500-m communications distance at 93.75 kbits/s (with 2-conductor VCTF cable)

## Message Communications

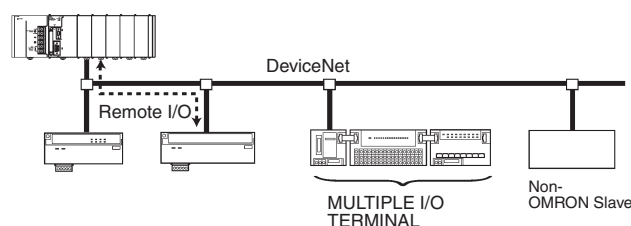
Send FINS messages between OMRON PLCs and Explicit message between OMRON PLCs and devices from other makers.



### Use MULTIPLE I/O TERMINALS as DeviceNet Slaves

I/O can be expanded through one-step connections. Special I/O and explicit messages are also supported.

### Connect to DeviceNet Products from Other Manufacturers



### Reduced Wiring with Special Cables

Connect with special Flat Cables or VCTF Cables.

### A Slave for Essential Any Application

Contact I/O, Contact I/O Modules, Photoelectric/Proximity Sensor Input Slaves are provided along with Analog Input and Analog Output Slaves.

### No-restriction Branching in Long-distance Communications Mode

With special Flat Cables or 4-conductor VCTF Cables, you can branch and wire in any required structure for up to a total distance of 200 m.

CJ1W-ETN21

# Ethernet Unit

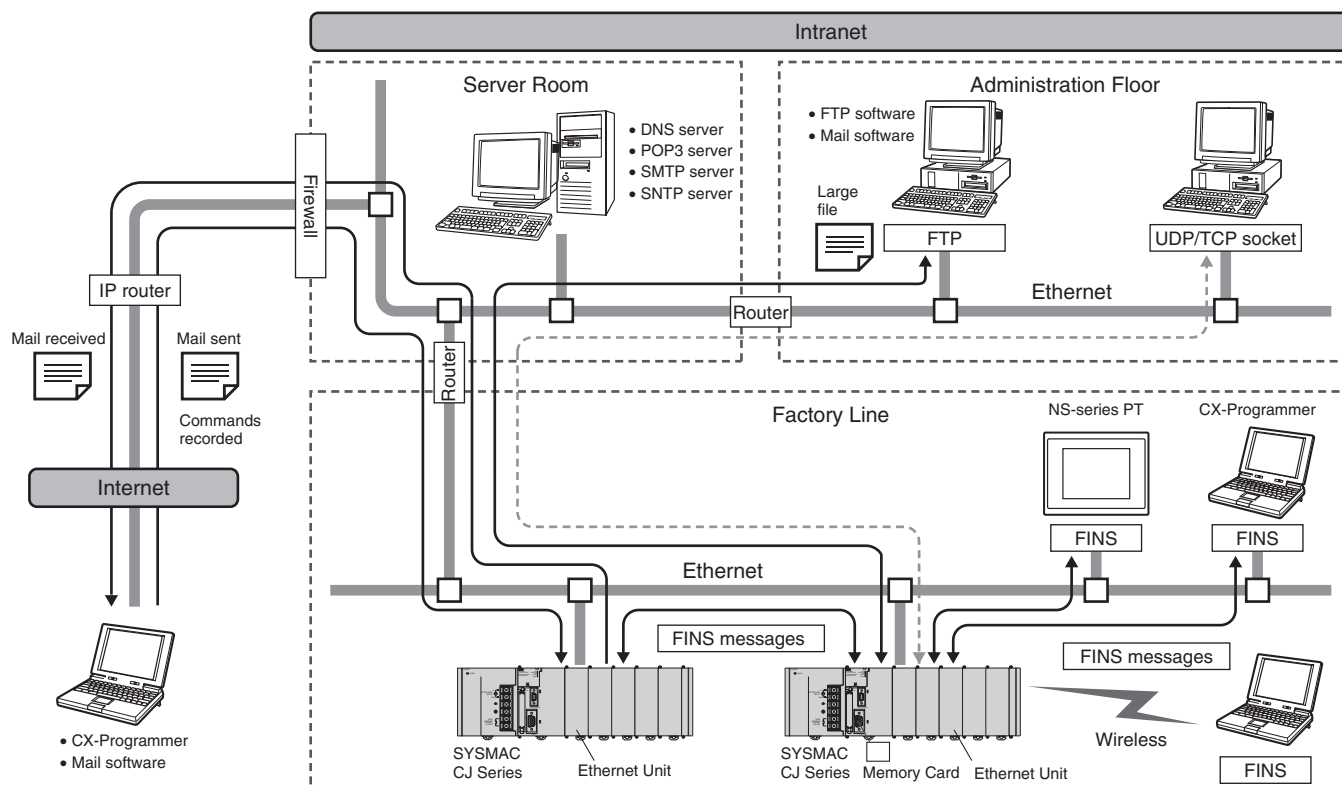
## Enables fast data transfer within Factory Automation systems, and easily links FA systems to plant management systems

- Use the standard Ethernet protocols, TCP/IP and UDP/IP, and OMRON's standard FINS message communications.
- FINS routing provides seamless communication with Controller Link, DeviceNet and other networks.
- Access data files in PLC memory or on Compact-Flash cards using the Unit's FTP server function.
- Freely configurable communications using socket services
- Send e-mails automatically upon preset conditions, including embedded data in the e-mail body, or with data file attachments.
- Receive e-mails (POP3), including commands to the PLC, with password protection.
- Automatic correction of the PLC clock using SNTP function.
- DNS Client function allows server access by host name.
- Set communications parameters with CX-One's setup menus or the HTML setup pages.



## Function

Achieve a wide range of communications from PLCs connected to an Ethernet network: Transfer data with TCP/IP or UDP/IP socket services, executed OMRON's standard FINS commands, transfer files with FTP, or send mail with SMTP. Select the communications services that are required and flexibly connect PLCs on an information level Ethernet network.



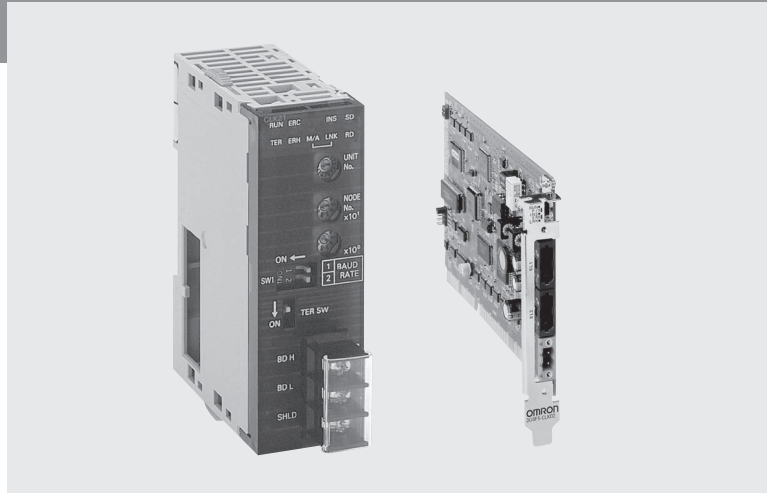
Specifications

| Classification | Communications services                                                                                                                                                                                                           | Unit numbers          | Connector                | Model      |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------|------------|
| CPU Bus Unit   | FINS communications service (TCP/IP, UDP/IP), FTP server functions, socket services, mail transmission service, mail receive, automatically adjusted PLC built-in clock (remote command receive), server/host name specification. | 0 to F (4 Units max.) | 100Base-TX<br>(10Base-T) | CJ1W-ETN21 |

CJ1W-CLK21-V1

# Controller Link Units

**Simpler Controller Link Wiring, Startup, and Construction Provides Larger-capacity Data Links, Greater Flexibility in Area Control, and Supports Multiple Sub-networks**



## Function

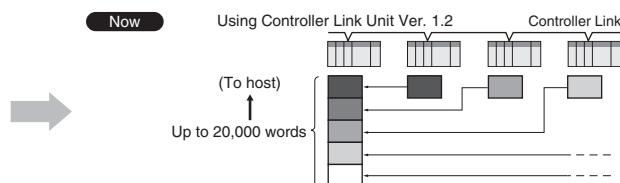
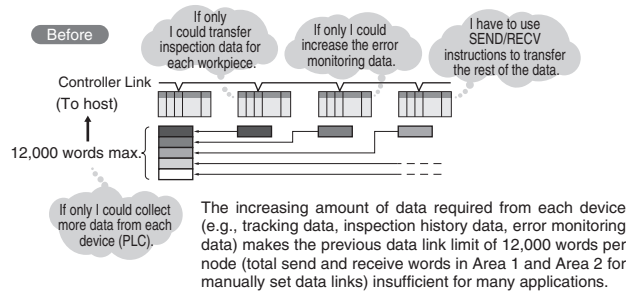
The data link capacity is 20,000 words per node. Allocate both Data Link Area 1 and Area 2 in the same area. Connect up to 8 Units under a single CPU Unit. (Unit Ver. 1.2 only)

Using Wired Controller Link Units together with Repeater Units allows network configurations for essentially any application, including T-branching, long-distance applications, applications with up to 62 nodes, or applications with optical sections in a wired network. Models are also

available that enable changes in configurations and automatic 1:N communications while data links are active.

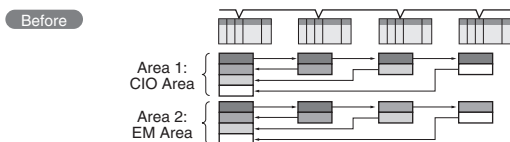
### Huge increase in amount of data that can be collected from devices.

Number of data link send/receive words (total of Area 1 and Area 2) for a single Controller Link Unit increased from 12,000 to 20,000 words.



New CS/CJ-series Controller Link Units (Wired/Optical Ring) can handle up to 20,000 send/receive data link words (total of Area 1 and Area 2) for a single node. This enables more data to be collected from each device.

### The same Memory Area can be used for the Data Link Areas. For example, Data Link Areas 1 and 2 can be both allocated and managed in EM Bank 0.



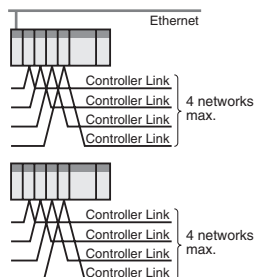
Area 1 and Area 2 had to be allocated in separate Memory Areas for user-set data links. Therefore, allocating all data links in the EM Area was not possible.



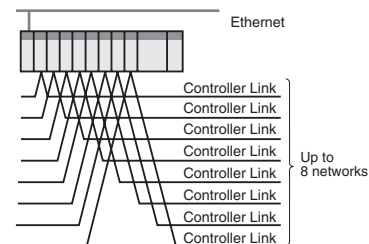
New CS/CJ-series Controller Link Units (Wired/Optical Ring Units) enable both Areas 1 and 2 to be allocated in the same Memory Area when using user-set data links. Provided addresses do not overlap, the same Memory Area can be used, making area control easier.

## Control up to 8 Controller Link sub-networks as a group from the host network.

Previous Units supported connection of up to four Controller Link Units to a single CPU Unit. Creating a gateway to the host network to control the Controller Links as a group of sub-networks required dividing the Units between two PLCs with a maximum of four networks for a single PLC.



New CS/CJ-series Controller Link Units (Wired/Optical Ring) enable connection of up to 8 Controller Link Units for each CPU Unit. This enables easy centralized control of a group of Controller Link sub-networks from the one PLC.

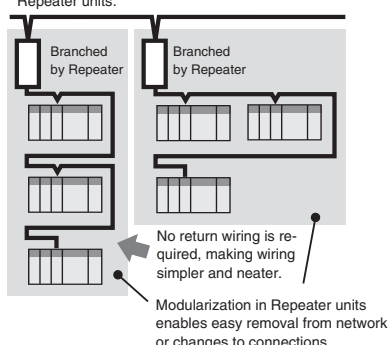


## System Configuration

### Use Repeater Units for T-branch Wiring, Extension, Expansion, and Optical Sections

#### T-branching Enables More Flexible Wiring Solutions for Layout, Building, and Expansion of Networks

Repeaters can be used for branching, so long lines are not required. As a result, wiring labor is reduced, and modularization is achieved in Repeater units.



#### Wired Types Support Long-distance Extension

The total extended length that was previously 500 m at 2 Mbps can be extended to up to 1.5 km by using two Repeater Units.

#### Connect up to 64 Nodes Using Wired Types

Networks can be constructed with up to 62 nodes when Controller Link Units/Support Boards with -V1 suffix are combined with Repeater Units.

#### Wiring with Optical Cables Increases Noise Immunity

Using two Repeater Units for optical ring enables wiring with optical cables in parts of the network subject to noise.

#### Simpler, More Flexible Data Links

#### Change Data Link Tables While Data Links Are Active

- When data link tables are changed due to additional nodes or other networking changes, data link tables can be transferred without stopping any data link communications.
- Flexible system configurations can be changed by combining node expansion using Repeater Units.

## Specifications

| Unit/Board                     | Classification                        | Compatible PLC     | Media                      | Model           | Connections                                                      |
|--------------------------------|---------------------------------------|--------------------|----------------------------|-----------------|------------------------------------------------------------------|
| Controller Link Units          | CPU Bus Unit                          | CJ Series          | Wired                      | CJ1W-CLK21-V1   | Can be mounted to previous Controller Link Units/Support Boards. |
| Controller Link Support Boards | Personal computer board (for PCI bus) | ---                |                            | 3G8F7-CLK21-EV1 |                                                                  |
| Controller Link Repeater Units | ---                                   | Not mounted to PLC | Twisted-pair cable         | CS1W-RPT01      | Unit mounted independently using either DIN Track or screws.     |
|                                |                                       |                    | Optical ring (H-PCF cable) | CS1W-RPT02      |                                                                  |
|                                |                                       |                    | Optical ring (GI cable)    | CS1W-RPT03      |                                                                  |

### Main Specifications Related to Version Upgrade for Unit Ver. 1.2

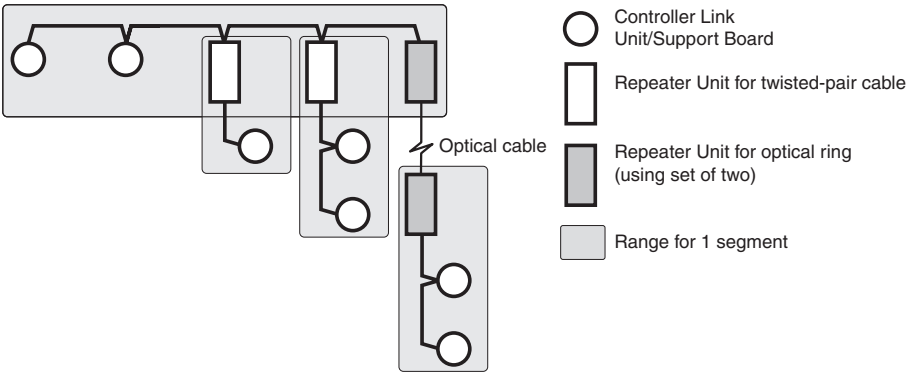
| Item                                                                   |                                     | Unit Ver. 1.2 or later                                                                                                                                                            | Pre-Ver. 1.2                                                                           |
|------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Number of data link words                                              |                                     | Number of send/receive words per Unit<br>Total of Area 1 and Area 2: 20,000 words max.<br>Number of send words per Unit Total of Area 1 and Area 2: 1,000 words max.              | Number of send/receive words per Unit<br>Total of Area 1 and Area 2: 12,000 words max. |
| Data Link Area allocations                                             | User-set allocations                | Areas 1 and 2: CIO Area (including data link words), DM Area, and EM Area<br>Both Area 1 and Area 2 can be allocated in the same area (provided there is no address duplication). | Both Area 1 and Area 2 cannot be allocated in the same area.                           |
|                                                                        | Automatically set equal allocations | Area 1: CIO Area (including data link words), Area 2: DM Area and EM Area                                                                                                         |                                                                                        |
|                                                                        | Automatically set 1:N allocations   | Areas 1 and 2: CIO Area (including data link words), DM Area, and EM Area                                                                                                         |                                                                                        |
| Maximum number of Controller Link Units connected to a single CPU Unit |                                     | 8 Units max.                                                                                                                                                                      | 4 Units max.                                                                           |

**Note:** CX-Programmer Ver. 5.0 or higher is required to set a data link area with a maximum number of send and receive words of 20,000 words per Controller Unit, or to allocate the same area for Area 1 and Area 2.

Specifications for Networks Using Repeaters

| Item                                                  | Segment (See note 1.)                                             | Total network                                                                        |
|-------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Transmission path configuration                       | Multi-drop                                                        | Tree (using Repeaters to connect each segment)                                       |
| Baud rate/maximum transmission distance (See note 2.) | 2 Mbps: 500 m<br>1 Mbps: 800 m<br>500 kbps: 1 km                  | 2 Mbps: 1.5 km<br>1 Mbps: 2.4 km<br>500 kbps: 3.0 km                                 |
| Maximum number of nodes                               | Controller Link Unit + Repeater Unit<br>Total number of nodes: 32 | Controller Link Unit: 62 nodes (using a Controller Link Unit that supports 62 nodes) |
| Maximum number of Repeater levels (See note 3.)       | ---                                                               | 2 levels                                                                             |

- Note:**
- 1. Specifications for each segment are the same as for Wired Controller Link networks.
  - 2. Maximum transmission distance: Total wired cable length between the two nodes separated by the longest total wired cable length.
  - 3. Maximum number of Repeater levels: Maximum number of Repeaters in a path linking any two nodes. For optical ring types, one set of two Units comprises one level.



CJ1W-DRM21

# DeviceNet Unit

## Multivendor, Multibit Network

- Control of up to 32,000 points (2,000 words) per master.
- Remote I/O communications can be allocated in any area using DM settings.
- 16 DeviceNet Units can be mounted for each CPU Unit (3 max. for fixed allocations).
- When using the Configurator (see note), remote I/O can be allocated in an order independent of node address.

**Note:** The Configurator is allocating a node-address if connected to DeviceNet using a DeviceNet communication card. It is not doing this if connected through the serial communications interface of the CPU.

- DeviceNet Units can be used as a master and a slave, and this functionality can be used simultaneously.
- DeviceNet Units allow DeviceNet networks to be treated exactly like Controller Link, Ethernet, or other networks for message communications or remote programming and monitoring by CX-Programmer.

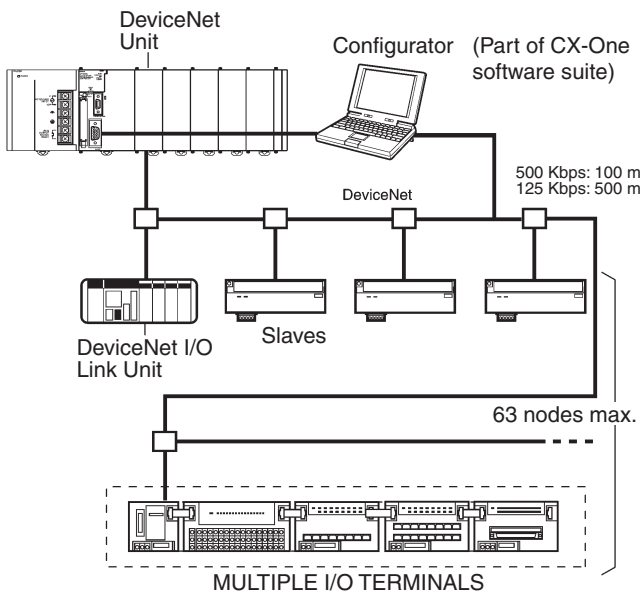


## Function

OMRON supports the DeviceNet open field network, a multivendor network for machine/line control and information. The following types of communications are possible.

1. Remote I/O communications for automatic data transfers between the CPU Unit and Slaves (with no programming in the CPU Unit).
2. Explicit message communications. This can be programmed from the CPU unit (IOWR and CMND instructions) and read from/write to other DeviceNet units.
3. With explicit message communication FINS commands can be send to other devices that support FINS messaging.

## System Configuration



## Specifications

### DeviceNet Unit

| Classification | Types of communications                                                                                                                                       | Specifications                                             | Unit numbers                                         | Model      |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------|------------|
| CPU Bus Unit   | Remote I/O communications master (fixed or user-set allocations)<br>Remote I/O communications slave (fixed or user-set allocations)<br>Message communications | Up to 16 Units can be mounted when a Configurator is used. | 0 to F<br>(Configurator required to mount 16 Units.) | CJ1W-DRM21 |

### DeviceNet Configurator

| Name                   | Model number    | Specifications                                  |
|------------------------|-----------------|-------------------------------------------------|
| DeviceNet Configurator | WS02-CFDC1-E    | Software only (Windows 95, 98, NT 4.0, or 2000) |
|                        | 3G8E2-DRM21-EV1 | PC card with software (Windows 95 or 98)        |

For all two products, refer to page 449 for more info.

CJ1W-CORT21

# CAN Unit

## Sending and Receiving 11- or 29-bit CAN messages

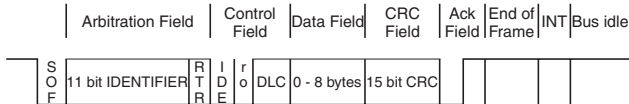
The CAN communication protocol is widely used in all kinds of applications. Benefits are its high reliability, low price and ease of implementation. But for two CAN devices to understand each other they must speak the same protocol (language). Many implementers of CAN communication have made their own protocol. The User Defined CAN Unit has the possibility to adapt to any protocol by configuration. This makes it possible to add a PLC and all its opennes, features and extensions to what was once a proprietary solution.



## Function

The Unit can send and receive 11- or 29-bit CAN messages. The identifier, datalength and data of the CAN message and the way the CAN message is send (On time, trigger or change) are set buy FINS commands

## 11-bit identifier CAN frame



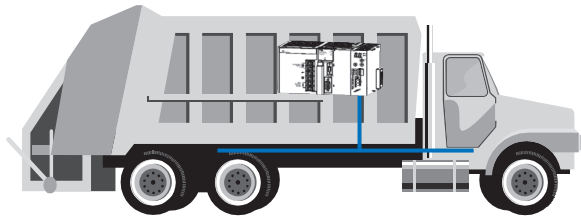
## ISO/OSI Reference Model

CAN communication describes only layers 1 and 2, the Physical and the Datalink Layer. Layer 7, the Application Layer is normally described in protocol standards like CANopen and DeviceNet.

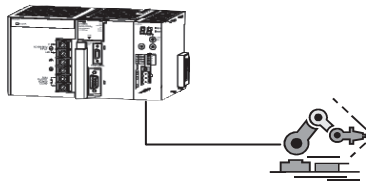
|           |                                                                                                                                                                                                                      |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Layer 7   | Application Layer                                                                                                                                                                                                    |
| Layer 3-6 |                                                                                                                                                                                                                      |
| Layer 2   | Data Link Layer                                                                                                                                                                                                      |
|           | Logical Link Control: LLC<br>Acceptance filtering,<br>overload notification,<br>recovery management                                                                                                                  |
|           | Medium Access Control: MAC<br>Data encapsulation and decapsulation<br>frame coding, stuffing<br>medium access management<br>error detection<br>error signalling<br>acknowledgement<br>serialization, deserialization |
| Layer 1   | Physical Layer                                                                                                                                                                                                       |
|           | bit encoding / decoding<br>bit timing<br>synchronization                                                                                                                                                             |

## Applications

Monitoring of diesel-engines and drivetrains in trucks and bus



Robot Control



## Specifications

|                   |                                                                                                                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Item              | Classification: Special CPU Unit                                                                                                                                                                                                                                            |
|                   | CJ1W-CORT21                                                                                                                                                                                                                                                                 |
| Unit number       | 0 to 15                                                                                                                                                                                                                                                                     |
| CAN communication | Any baud rate can be set<br>Transmit and receive 11- or 29-bit CAN messages<br>Transmit messages on time, trigger, or data change                                                                                                                                           |
| Configuration     | Status and control words provide straightforward operation.<br>All configuration data can can be changed on-line by FINS commands.<br>Up to 640 identifiers can be configured for message filtering.<br>Up to 640 different identifiers can be configured for transmission. |

CJ1W-PRM21

# PROFIBUS-DP Master unit

- PROFIBUS-DP master class one with support of DP-V1 data types.
- 7 kWord I/O
- Simple configuration through FDT/DTM based configurator
- Special CPU unit
- Handles data independent of the CPU unit, thus reducing CPU load



## Function

The CJ1W-PRM21 is a PROFIBUS-DP Master Class1 device (DPM1).

It exchanges I/O data and communication/status information with the CPU of the PLC and I/O data and diagnostics information with PROFIBUS-DP slave stations on the PROFIBUS network.

The CJ1W-PRM21 can be configured via any communication interface of the PLC system. Since the configuration software uses FINS communication, configuration data and diagnostic information can be routed over Controller Link, Ethernet or serial networks through up to 8 layers.

## Specifications

| Model      |                                                 |                                                                                                                                                                                                                                                                                            | Remarks                                                                   |
|------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| CJ1W-PRM21 | Main function                                   | Basic PROFIBUS-DP master Class 1 functions plus: DPV1 data types support                                                                                                                                                                                                                   |                                                                           |
|            | Unit No.                                        | 0-15                                                                                                                                                                                                                                                                                       | Special CPU unit                                                          |
|            | Maximum number of units mountable per PLC       | 16                                                                                                                                                                                                                                                                                         | Maximum depends on PLC CPU-type                                           |
|            | Configurator                                    | CX-PROFIBUS, FTD/DTM based configurator                                                                                                                                                                                                                                                    | Incorporates a Generic DTM to use with GSD-file based slaves              |
|            | Supported baud rate(s)                          | All baud rates as specified by the standard EN50170 Volume 2, the PROFIBUS extensions to EN50170, as well as the standard IEC61158:<br>9.6 kBit/s,<br>19.2 kBit/s,<br>45.45 kBit/s,<br>93.75 kBit/s,<br>187.5 kBit/s,<br>500 kBit/s,<br>1.5 MBit/s,<br>3 MBit/s,<br>6 MBit/s,<br>12 MBit/s | The baud rate value to be used must be selected through the Configurator. |
|            | Selectable PROFIBUS address                     | 0-125                                                                                                                                                                                                                                                                                      | Set through the configurator                                              |
|            | Maximum number of PROFIBUS slaves               | 125                                                                                                                                                                                                                                                                                        |                                                                           |
|            | Maximum number of I/O points                    | 7168 words                                                                                                                                                                                                                                                                                 |                                                                           |
|            | Maximum number of I/O points per PROFIBUS slave | 244 bytes In / 244 bytes Out                                                                                                                                                                                                                                                               |                                                                           |
|            | Control and status area size                    | 25 words                                                                                                                                                                                                                                                                                   |                                                                           |
|            | Supported Global_Control services               | - Sync<br>- Unsync<br>- Freeze<br>- Unfreeze<br>- Clear                                                                                                                                                                                                                                    | Through Control Area                                                      |
|            | Supported Master-Slave communication services   | - Data_Exchange<br>- Slave_Diag<br>- Set_PRM<br>- Chk_Cfg<br>- Global_Control                                                                                                                                                                                                              |                                                                           |
|            | Power consumption                               | 400 mA at 5 V                                                                                                                                                                                                                                                                              |                                                                           |
|            | Dimensions                                      | 90 x 65 x 31 mm                                                                                                                                                                                                                                                                            |                                                                           |
|            | Weight                                          | 100 gr                                                                                                                                                                                                                                                                                     |                                                                           |
|            | Ambient temperature                             | Operating: 0 °C to 50 °C                                                                                                                                                                                                                                                                   |                                                                           |

CJ1W-PRT21

# PROFIBUS-DP slave unit

## PROFIBUS-DP I/O link unit

- Data link to any PLC data area
- Simple configuration using max. data input 100 words and max. data output of 100 words. Max. total exchanged data 180 words.
- CJ1 special I/O unit
- Status information overview in host PLC, plus extensive diagnostics via PROFIBUS



## Specifications

|                |                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation   | Host PLC System                                 | CJ1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                | Maximum number of Units per PLC system          | 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                | Current consumption                             | 400 mA (maximum) at 5V DC from PLC power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                | Weight                                          | 90 g (typical)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Environment    | Storage temperature                             | -20°C to +70°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                | Operating temperature                           | 0°C to +55°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                | Operating humidity                              | 10 to 90% (non-condensing)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                | Conformance to EMC- and environmental standards | EN50081-2<br>EN61131-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| User Interface | Switch settings                                 | Special I/O Machine number (00-95) by 2 rotary switch<br>PROFIBUS-DP node address (00-99) by 2 rotary switches                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                | LED Indicators                                  | Unit status: RUN (green LED), ERC (red LED)<br>Network status: COMM (green LED), BF (red LED)<br>CPU status: ERH (red LED)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| PLC Interface  | No. of CIO words allocated                      | PLC →Unit: 1 word control data<br>Unit →PLC: 1 word status data                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                | No. of DM words allocated                       | Unit →PLC: 8 words of Unit setup information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                | Amount of I/O data per Unit                     | Fixed:<br>2 words CIO area (one in, one out) for Unit status + control bits.<br>2 words status information from the host PLC, containing operation status and error code (read from location A400). This information will be sent to the PROFIBUS master:<br>- as extended diagnostics, only at a change of data content.<br>- optionally, attached to the I/O data, each PROFIBUS cycle.<br>Variable:<br>2 user-defined areas for PROFIBUS I/O data, with the following restrictions:<br>- Up to 100 words input in one PLC area (CIO, H, D, EM).<br>- Up to 100 words output in one PLC area (CIO, H, D, EM).<br>- Inputs+outputs must be 180 words or less |

CJ1W-SRM21

# CompoBus/S Master Unit

## CompoBus/S is a high-speed I/O bus

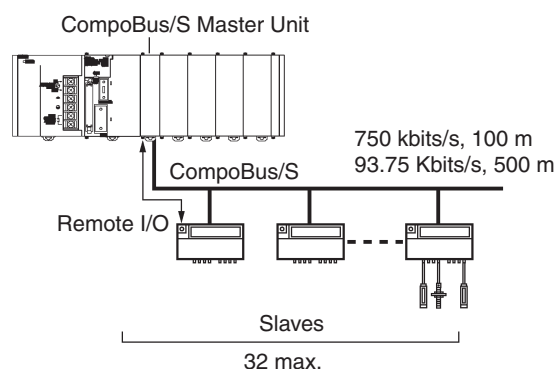
- Up to 256 I/O points per Master.
- Up to 32 Slaves per Master.
- Communications cycle time: 0.5 ms (at 750 kbps).
- Communications distance: Up to 500 m (at 93.75 kbps).
- Free wiring with any branching method for up to 200 m (in long-distance communications mode).



## Function

A high-speed ON/OFF bus that automatically transfers remote I/O status to the CPU Unit without any programming in the CPU Unit. High-speed remote I/O is supported by a communications cycle time of 1 ms maximum for 256 I/O points.

## System Configuration



## Specifications

### Master

|                               |                                                                                                                                        |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| I/O points                    | 256 (128 inputs and 128 outputs) or 128 (64 inputs and 64 outputs) (Switch-selectable)                                                 |
| Allocated words               | For 256 I/O: 20 words (8 for inputs, 8 for outputs, 4 for status)<br>For 128 I/O: 10 words (4 for inputs, 4 for outputs, 2 for status) |
| No. of mountable Master Units | 40                                                                                                                                     |
| Node address                  | 8 addresses per node                                                                                                                   |
| No. of connectable Slaves     | 32                                                                                                                                     |
| Status information            | Communications Error Flags, Participation Flags                                                                                        |

**Note:** Uses Special I/O Unit Area (in CIO Area).

## Communications

|                                 |                       |                                                                                                                                                                                                                                                                       |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|---------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|--------------|------|------|--------|--------------|-----------------------------|-------|-----|------|--------------------------------|-----------------------|-----|-------|
| Communications method           |                       | Special CompoBus/S protocol                                                                                                                                                                                                                                           |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Coding                          |                       | Manchester                                                                                                                                                                                                                                                            |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Connections                     |                       | Multidrop, T-branch (requires termination)                                                                                                                                                                                                                            |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Baud rate                       |                       | High-speed mode: 750 kbps<br>Long-distance mode: 93.75 kbps. Set via DIP switch. (Set via DM Area, Default: 750 kbps)                                                                                                                                                 |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Communications cycle time       | High-speed mode       | 0.5 ms (with 8 input and 8 output Slaves)                                                                                                                                                                                                                             |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       | 0.8 ms (with 16 input and 16 output Slaves)                                                                                                                                                                                                                           |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 | Long-distance mode    | 4.0 ms (with 8 input and 8 output Slaves)                                                                                                                                                                                                                             |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       | 6.0 ms (with 16 input and 16 output Slaves)                                                                                                                                                                                                                           |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Media                           |                       | 2-conductor cable (VCTF 0.75 x 2), 4-conductor cable (VCTF 0.75 x 4), or Special Flat Cable                                                                                                                                                                           |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Maximum communications distance |                       | With 2-conductor Cable                                                                                                                                                                                                                                                |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       | <table><tr><td>Mode</td><td>Main</td><td>Branch</td><td>Total branch</td></tr><tr><td>High-speed</td><td>100 m</td><td>3 m</td><td>50 m</td></tr><tr><td>Long-distance</td><td>500 m</td><td>6 m</td><td>120 m</td></tr></table>                                      |       |        |              | Mode | Main | Branch | Total branch | High-speed                  | 100 m | 3 m | 50 m | Long-distance                  | 500 m                 | 6 m | 120 m |
|                                 |                       | Mode                                                                                                                                                                                                                                                                  | Main  | Branch | Total branch |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       | High-speed                                                                                                                                                                                                                                                            | 100 m | 3 m    | 50 m         |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       | Long-distance                                                                                                                                                                                                                                                         | 500 m | 6 m    | 120 m        |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       |                                                                                                                                                                                                                                                                       |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       | With 2-conductor or Special Flat Cable                                                                                                                                                                                                                                |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       | <table><tr><td>Mode</td><td>Main</td><td>Branch</td><td>Total branch</td></tr><tr><td>High-speed<br/>(See note 1.)</td><td>30 m</td><td>3 m</td><td>30 m</td></tr><tr><td>Long-distance<br/>(See note 2.)</td><td colspan="3">Any up to 200 m total</td></tr></table> |       |        |              | Mode | Main | Branch | Total branch | High-speed<br>(See note 1.) | 30 m  | 3 m | 30 m | Long-distance<br>(See note 2.) | Any up to 200 m total |     |       |
|                                 |                       | Mode                                                                                                                                                                                                                                                                  | Main  | Branch | Total branch |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       | High-speed<br>(See note 1.)                                                                                                                                                                                                                                           | 30 m  | 3 m    | 30 m         |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Long-distance<br>(See note 2.)  | Any up to 200 m total |                                                                                                                                                                                                                                                                       |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       |                                                                                                                                                                                                                                                                       |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       |                                                                                                                                                                                                                                                                       |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       |                                                                                                                                                                                                                                                                       |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       |                                                                                                                                                                                                                                                                       |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
|                                 |                       |                                                                                                                                                                                                                                                                       |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Max. No. of nodes               |                       | 32                                                                                                                                                                                                                                                                    |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |
| Error control checks            |                       | Manchester code, frame length, and parity checks                                                                                                                                                                                                                      |       |        |              |      |      |        |              |                             |       |     |      |                                |                       |     |       |

**Note: 1.** For 16 Slaves or fewer: Main: 100 m, Total branch: 50 m.

**2.** No restrictions on branching method or individual line lengths. Connect terminating resistance to Slave farthest from Master.

## Performance

### CompoBus/S Master Unit

| Name                   | Classification   | Communications function   | Specifications      | Unit numbers                                                                                                           | Model number |
|------------------------|------------------|---------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------|--------------|
| CompoBus/S Master Unit | Special I/O Unit | Remote I/O communications | Mountable Units: 40 | 0 to 94 (when 2 unit numbers are allocated to each Master)<br>0 to 95 (when 1 unit number is allocated to each Master) | CJ1W-SRM21   |

# Ordering Information

## International Standards

The standards indicated in the „Standards“ column are those current for UL, CSA, cULus, cUL, NK, and Lloyd standards and EC Directives as of the end of September 2004. The standards are abbreviated as follows: U: UL, U1: UL Class 1 Division 2 Products for Hazardous Locations, C: CSA, UC: cULus, UC1: cULus Class 1 Division 2 Products for Hazardous Locations, CU: cUL, N: NK, L: Lloyd, and CE: EC Directives.

Ask your OMRON representative for the conditions under which the standards were met.

## Basic Configuration Units

| Name                                            |                             | Specifications                                                            |                        |                                                            |                                                          | Model                                                                               | Standards     |               |                |
|-------------------------------------------------|-----------------------------|---------------------------------------------------------------------------|------------------------|------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------|---------------|---------------|----------------|
| CPU Units                                       | CJ1 CPU Units               | I/O bits                                                                  | Program capacity       | Data memory capacity                                       | LD instruction execution time                            | Built-in Functions                                                                  | ---           | ---           |                |
|                                                 |                             | 2,560<br>(3 Expansion Racks)                                              | 250 kSteps             | 448 kWords<br>(DM: 32 kWords,<br>EM: 32 kWords x 13 banks) | 0.02 μs                                                  | None                                                                                | CJ1W-CPU67H   | UC1, CE, N, L |                |
|                                                 |                             |                                                                           | 120 kSteps             | 256 kWords<br>(DM: 32 kWords,<br>EM: 32 kWords × 7 banks)  |                                                          |                                                                                     | CJ1H-CPU66H   |               |                |
|                                                 |                             |                                                                           | 60 kSteps              | 128 kWords<br>(DM: 32 kWords,<br>EM: 32 kWords × 3 bank)   |                                                          |                                                                                     | CJ1H-CPU65H   |               |                |
|                                                 |                             | 1,280<br>(3 Expansion Racks)                                              |                        | 30 kSteps                                                  | 64 kWords<br>(DM: 32 kWords,<br>EM: 32 kWords × 1 banks) | 0.04 μs                                                                             |               | CJ1G-CPU45H   |                |
|                                                 |                             |                                                                           |                        |                                                            |                                                          |                                                                                     |               | CJ1G-CPU44H   |                |
|                                                 |                             |                                                                           | CJ1G-CPU43H            |                                                            |                                                          |                                                                                     |               |               |                |
|                                                 |                             | 960<br>(2 Expansion Racks)                                                | 10 kSteps              |                                                            |                                                          |                                                                                     | CJ1G-CPU42H   |               |                |
|                                                 |                             |                                                                           |                        |                                                            |                                                          |                                                                                     |               |               |                |
|                                                 |                             |                                                                           |                        |                                                            |                                                          |                                                                                     |               |               |                |
|                                                 | CJ1G Loop Control CPU Units | 1,280<br>(3 Expansion Racks)                                              | 60 kSteps              | 128 kWords<br>(DM: 32 kWords,<br>EM: 32 kWords x 3 bank)   | 0.04 μs                                                  | Loop Control Engine<br>(300 blocks)                                                 | CJ1G-CPU45P   | UC1, CE       |                |
|                                                 |                             |                                                                           | 30 kSteps              | 64 kWords<br>(DM: 32 kWords,<br>EM: 32 kWords x 1 banks)   |                                                          |                                                                                     | CJ1G-CPU44P   |               |                |
|                                                 |                             | 960<br>(2 Expansion Racks)                                                | 20 kSteps              |                                                            |                                                          | Loop Control Engine<br>(50 blocks)                                                  | CJ1G-CPU43P   |               |                |
|                                                 |                             |                                                                           | 10 kSteps              |                                                            |                                                          |                                                                                     | CJ1G-CPU42P   |               |                |
|                                                 | CJ1M CPU Units              | 640 (1 Expansion Rack)                                                    | 20 kSteps              | 32 kWords<br>(DM only, no EM)                              | 0.1 μs                                                   | 10 inputs and 6 outputs, with fast pulse- and interrupt functions.<br>(See note 1.) | CJ1M-CPU23    | UC1, CE, N, L |                |
|                                                 |                             |                                                                           | 10 kSteps              |                                                            |                                                          |                                                                                     | CJ1M-CPU22    |               |                |
|                                                 |                             |                                                                           | 5 kSteps               |                                                            |                                                          |                                                                                     | CJ1M-CPU21    |               |                |
|                                                 |                             |                                                                           | 20 kSteps              |                                                            |                                                          |                                                                                     | None          |               | CJ1M-CPU13     |
|                                                 |                             |                                                                           | 10 kSteps              |                                                            |                                                          |                                                                                     |               |               | CJ1M-CPU12     |
|                                                 |                             |                                                                           | 5 kSteps               |                                                            |                                                          |                                                                                     |               |               | CJ1M-CPU11     |
|                                                 |                             | CJ1M Ethernet CPUs                                                        | 640 (1 Expansion Rack) | 20 kSteps                                                  | 0.1 μs                                                   | 100 Base-TX Ethernet port                                                           |               |               | CJ1M-CPU13-ETN |
| 320 (no expansion)                              | 10 kSteps                   |                                                                           | CJ1M-CPU12-ETN         |                                                            |                                                          |                                                                                     |               |               |                |
| 160                                             | 5 kSteps                    |                                                                           | CJ1M-CPU11-ETN         |                                                            |                                                          |                                                                                     |               |               |                |
| Power Supply Units                              |                             | 100 to 240 V AC (with RUN output), Output capacity: 5 A, 5 V DC           |                        |                                                            |                                                          | CJ1W-PA205R                                                                         | UC1, CE, N, L |               |                |
| 100 to 240 V AC, Output capacity: 2.8 A, 5 V DC |                             |                                                                           |                        | CJ1W-PA202                                                 |                                                          |                                                                                     |               |               |                |
| 24 V DC, Output capacity: 5 A, 5 V DC           |                             |                                                                           |                        | CJ1W-PD025                                                 |                                                          |                                                                                     |               |               |                |
| 24 V DC, Output capacity: 2 A, 5 V DC           |                             |                                                                           |                        | CJ1W-PD022                                                 |                                                          |                                                                                     |               |               |                |
| RS-422A Adapter                                 |                             | Converts RS-232C to RS-422A/RS-485                                        |                        |                                                            |                                                          | CJ1W-CIF11                                                                          | UC1, CE, N, L |               |                |
| I/O Control Unit                                |                             | Mount 1 Unit on the CPU Rack when connecting an Expansion Rack.           |                        |                                                            |                                                          | CJ1W-IC101                                                                          |               |               |                |
| I/O Interface Unit                              |                             | 1 required on each Expansion Rack.                                        |                        |                                                            |                                                          | CJ1W-II101                                                                          |               |               |                |
| I/O Connecting Cable                            |                             | For connecting Expansion Racks to the CPU Rack or another Expansion Rack. | Cable length: 0.3 m    |                                                            |                                                          | CS1W-CN313                                                                          | L, CE         |               |                |
|                                                 |                             |                                                                           | Cable length: 0.7 m    |                                                            |                                                          | CS1W-CN713                                                                          |               |               |                |
|                                                 |                             |                                                                           | Cable length: 2 m      |                                                            |                                                          | CS1W-CN223                                                                          |               |               |                |
|                                                 |                             |                                                                           | Cable length: 3 m      |                                                            |                                                          | CS1W-CN323                                                                          |               |               |                |
|                                                 |                             |                                                                           | Cable length: 5 m      |                                                            |                                                          | CS1W-CN523                                                                          |               |               |                |
|                                                 |                             |                                                                           | Cable length: 10 m     |                                                            |                                                          | CS1W-CN133                                                                          |               |               |                |
|                                                 |                             |                                                                           | Cable length: 12 m     |                                                            |                                                          | CS1W-CN133-B2                                                                       |               |               |                |
| Memory Cards<br>(See note 2.)                   |                             | Flash memory, 30 MB                                                       |                        |                                                            |                                                          | HMC-EF372                                                                           | L, CE         |               |                |
|                                                 |                             | Flash memory, 64 MB                                                       |                        |                                                            |                                                          | HMC-EF672                                                                           |               |               |                |
|                                                 |                             | Memory Card Adapter (for computer PCMCIA slot)                            |                        |                                                            |                                                          | HMC-AP001                                                                           | CE            |               |                |

**Note:** 1. The connector for built-in I/O is not included. Purchase one of the connectors in the following table separately.

2. The HMC-EF372, and HMC-EF672 Memory Cards cannot be used with the following products.

The following CPU Units with lot numbers of 020108 or earlier (manufactured 8 January 2002 or earlier): CS1G-CPU□□H,

CS1H-CPU□□H, CJ1G-CPU□□H, and CJ1H-CPU□□H

NS7-series PTs with lot numbers of 0852 or earlier (manufactured 8 May 2002 or earlier)

| Name                          | Specifications                                            | Model               |
|-------------------------------|-----------------------------------------------------------|---------------------|
| Applicable Connector          | MIL Flat Cable Connectors (Pressure-fitted Connectors)    | XG4M-4030-T         |
| Terminal Blocks               | General-purpose type (M3 screw terminals, 40-pin)         | XW2D-40G6           |
|                               | Special Connecting Cables                                 | Cable length: 1 m   |
|                               |                                                           | Cable length: 1.5 m |
|                               |                                                           | Cable length: 2 m   |
|                               |                                                           | Cable length: 3 m   |
| Servo Relay Units (See note.) | Servo Relay Unit for 1 axis                               | XW2Z-100K           |
|                               |                                                           | XW2Z-150K           |
|                               | Servo Relay Unit for 2 axes                               | XW2Z-200K           |
|                               |                                                           | XW2Z-300K           |
|                               | SMARTSTEP Cable for CJ1M CPU Unit, cable length: 1 m      | XW2Z-500K           |
|                               | W-series Servo Cable for CJ1M CPU Unit, cable length: 1 m | XW2Z-100J-A27       |

**Note:** Refer to the catalogs or user manuals for the Servo Drivers.

## Programming Devices

| Name                                                       | Specifications                                                                                                                                                             | Model                        | Standards   |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------|
| Programming Consoles                                       | An English Keyboard Sheet (CS1W-KS001-E) is required.<br>(Connects on peripheral port on CPU Unit only.)                                                                   | CQM1H-PRO01-E                | U, C, CE    |
| Programming Console Key Sheet                              | For CQM1H-PRO01-E, CQM1-PRO01-E, and C200H-PRO27-E.                                                                                                                        | CS1W-KS001-E                 | U, C, N, CE |
| Programming Console Connecting Cables                      | Connects the CQM1-PRO01-E Programming Console. (Length: 0.05 m)                                                                                                            | CS1W-CN114                   | CE          |
|                                                            | Connects the C200H-PRO27-E Programming Console. (Length: 6.0 m)                                                                                                            | CS1W-CN624                   |             |
| Programming Device Connecting Cables (for peripheral port) | Connects DOS computers, D-Sub 9-pin receptacle (Length: 0.1 m) (Conversion cable to connect RS-232C cable to peripheral port)                                              | CS1W-CN118                   | CE          |
|                                                            | Connects DOS computers, D-Sub 9-pin (Length: 2.0 m)                                                                                                                        | CS1W-CN226                   |             |
|                                                            | Connects DOS computers, D-Sub 9-pin (Length: 6.0 m)                                                                                                                        | CS1W-CN626                   |             |
|                                                            | Used for Peripheral Bus or Host Link.                                                                                                                                      |                              |             |
| Programming Device Connecting Cables (for RS-232C port)    | Connects DOS computers, D-Sub 9-pin (Length: 2.0 m)                                                                                                                        | XW2Z-200S-CV                 | ---         |
|                                                            | Connects DOS computers, D-Sub 9-pin (Length: 5.0 m)                                                                                                                        | XW2Z-500S-CV                 |             |
|                                                            | Connects DOS computers, D-Sub 9-pin (Length: 2.0 m)                                                                                                                        | XW2Z-200S-V                  |             |
|                                                            | Connects DOS computers, D-Sub 9-pin (Length: 5.0 m)                                                                                                                        | XW2Z-500S-V                  |             |
| USB-serial conversion cable                                | USB-toRS-232C conversion cable (0.5 m) and driver CD-ROM (WIN98, ME, 2000, XP), USB version 1.1, USB plug: A-type, male. RS-232C plus: 9-pin D-sub, male                   | CS1W-CIF31                   | CE          |
| CX-One                                                     | Omron's integrated software for programming and configuration of all control system components, including PLCs, HMI, drives, temperature controllers and advanced sensors. | CX-ONE-AL□□C-E <sup>*1</sup> | ---         |

<sup>\*1</sup> □□ = Number of licences; 01, 03, 10

## Optional Products, Maintenance Products and DIN rail

| Name        | Specifications                                                                                                                                                            | Model       | Standards |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------|
| Battery Set | For CJ1G and CJ1H CPU Units (Use batteries within two years of manufacture.)                                                                                              | CPM2A-BAT01 | L, CE     |
|             | For CJ1M CPU Units (Use batteries within two years of manufacture.)                                                                                                       | CJ1M-BAT01  | CE        |
| End Cover   | Mounted to the right-hand side of CJ-series CPU Racks or Expansion Racks.<br>One End Cover is provided as a standard accessory with each CPU Unit and I/O Interface Unit. | CJ1W-TER01  | UC1       |
| DIN rail    | Length: 0.5 m; Height: 7.3 mm                                                                                                                                             | PFP-50N     | ---       |
|             | Length: 1 m; Height: 7.3 mm                                                                                                                                               | PFP-100N    |           |
|             | Length: 1 m; Height: 16 mm                                                                                                                                                | PFP-100N2   |           |
| End Plate   | There are 2 stoppers provided with CPU Units and I/O Interface Units as standard accessories to secure the Units on the DIN rail.                                         | PFP-M       |           |

## Basic I/O Units

| Name                             | Specifications                                                                                      | Connection type               | Model          | Standards     |
|----------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------|----------------|---------------|
| DC Input Units                   | 12 to 24 V DC, 10 mA, 8 inputs                                                                      | terminal block                | CJ1W-ID201     | UC1, CE, N, L |
|                                  | 24 V DC, 7 mA, 16 inputs                                                                            | terminal block                | CJ1W-ID211(SL) |               |
|                                  | 24 V DC, 4.1 mA, 32 inputs                                                                          | one 40-pin Fujitsu connector  | CJ1W-ID231     |               |
|                                  | 24 V DC, 4.1 mA, 32 inputs                                                                          | one 40-pin MIL connector      | CJ1W-ID232     |               |
|                                  | 24 V DC, 4.1 mA, 64 inputs                                                                          | two 40-pin Fujitsu connectors | CJ1W-ID261     |               |
|                                  | 24 V DC, 4.1 mA, 64 inputs                                                                          | two 40-pin MIL connectors     | CJ1W-ID262     |               |
| AC Input Units                   | 100 to 120 V AC, 7 mA (100 V, 50 Hz), 16 inputs                                                     | terminal block                | CJ1W-IA111     | UC1, CE, N, L |
|                                  | 200 to 240 V AC, 10 mA (200 V, 50 Hz), 8 inputs                                                     | terminal block                | CJ1W-IA201     |               |
| Interrupt Input Unit             | 24 V DC, 7 mA, 16 inputs                                                                            | terminal block                | CJ1W-INT01     |               |
| High-speed Input Unit            | 24 V DC, 7 mA, 16 inputs                                                                            | terminal block                | CJ1W-IDP01     |               |
| Relay Output Units               | 250 V AC/24 V DC, 2 A, independent contacts                                                         | 8 outputs max.                | CJ1W-OC201(SL) |               |
|                                  | 250 V AC/24 V DC, 2 A, independent contacts                                                         | 16 outputs max.               | CJ1W-OC211(SL) |               |
| Transistor Output Units          | 12 to 24 V DC, 2 A, 8 outputs, sinking                                                              | terminal block                | CJ1W-OD201     | UC1, CE, N, L |
|                                  | 24 V DC, 2 A, 8 outputs, sourcing, load short-circuit protection, alarm                             | terminal block                | CJ1W-OD202     |               |
|                                  | 12 to 24 V DC, 0.5 A, 8 outputs, sinking                                                            | terminal block                | CJ1W-OD203     |               |
|                                  | 24 V DC, 0.5 A, 8 outputs, sourcing, load short-circuit protection, alarm                           | terminal block                | CJ1W-OD204     |               |
|                                  | 12 to 24 V DC, 0.5 A, 16 outputs, sinking                                                           | terminal block                | CJ1W-OD211(SL) |               |
|                                  | 24 V DC, 0.5 A, 16 outputs, sourcing, load short-circuit protection, disconnection detection, alarm | terminal block                | CJ1W-OD212(SL) |               |
|                                  | 12 to 24 V DC, 0.5 A, 32 outputs, sinking                                                           | one 40-pin Fujitsu connector  | CJ1W-OD231     |               |
|                                  | 24 V DC, 0.5 A, 32 outputs, sourcing, load short-circuit protection, alarm                          | one 40-pin MIL connector      | CJ1W-OD232     |               |
|                                  | 12 to 24 V DC, 0.5 A, 32 outputs, sinking                                                           | one 40-pin MIL connector      | CJ1W-OD233     |               |
|                                  | 12 to 24 V DC, 0.3 A, 64 outputs, sinking                                                           | two 40-pin Fujitsu connectors | CJ1W-OD261     |               |
|                                  | 12 to 24 V DC, 0.3 A, 64 outputs, sourcing                                                          | two 40-pin MIL connectors     | CJ1W-OD262     |               |
|                                  | 12 to 24 V DC, 0.3 A, 64 outputs, sinking                                                           | two 40-pin MIL connectors     | CJ1W-OD263     |               |
| Triac Output Unit                | 250 V AC, 0.6 A, 8 outputs                                                                          | terminal block                | CJ1W-OA201     |               |
| DC Input/Transistor Output Units | 16 inputs, 24 V DC, 7 mA                                                                            | two 24-pin Fujitsu connectors | CJ1W-MD231     | UC1, CE, N    |
|                                  | 16 outputs, 12 to 24 V DC, 0.5 A, sinking outputs                                                   |                               |                |               |
|                                  | 16 inputs, 24 V DC, 7 mA                                                                            | two 20-pin MIL connectors     | CJ1W-MD232     |               |
|                                  | 16 outputs, 12 to 24 V DC, 0.5 A, sourcing, load short circuit protection, alarm                    |                               |                |               |
|                                  | 16 inputs, 24 V DC, 7 mA                                                                            | two 20-pin MIL connectors     | CJ1W-MD233     |               |
|                                  | 16 outputs, 12 to 24 V DC, 0.5 A, sinking outputs                                                   |                               |                |               |
| TTL I/O Unit                     | 32 inputs, 24 V DC, 4.1 mA                                                                          | two 40-pin Fujitsu connectors | CJ1W-MD261     | UC1, CE, L    |
|                                  | 32 outputs, 12 to 24 V DC, 0.3 A, sinking outputs                                                   |                               |                |               |
|                                  | 32 inputs, 24 V DC, 4.1 mA                                                                          | two 40-pin MIL connectors     | CJ1W-MD263     |               |
|                                  | 32 outputs, 12 to 24 V DC, 0.3 A, sinking outputs                                                   |                               |                |               |
| Temperature Input Units          | 32 inputs, 5 V DC, 35 mA                                                                            | two 40-pin MIL connectors     | CJ1W-MD563     | UC1, CE, L    |
|                                  | 32 outputs, 5 V DC, 35 mA/pt. 1.12 A/Unit                                                           |                               |                |               |
|                                  | 6 thermocouples, J-type/K-type, no isolation between channels                                       | terminal block                | CJ1W-TS561(SL) | UC1, CE, L    |
|                                  | 6 RTDs, Pt1000, no isolation between channels                                                       | terminal block                | CJ1W-TS562(SL) |               |

**Note:** 1. Units with terminal blocks are generally available with screw connection, or with screwless clamp connection.

For M3 screw connection, omit the "(SL)" from the model code.

2. Units with MIL/Fujitsu connectors are not provided with a plug counterpart. Either purchase the matching connector from the list below, or use OMRON XW2Z or G79 cables to connect I/O terminal blocks to the Unit (see „Wiring Systems“, page 384).

## Connectors for I/O Units

| Applicable Units                     | Name                              | Connection                    | Model         | Remarks                                                                         | Standards |
|--------------------------------------|-----------------------------------|-------------------------------|---------------|---------------------------------------------------------------------------------|-----------|
| I/O Units with terminal blocks       | 18-point screwless terminal block | Screwless Clamp/<br>card edge | CJ-WM01-18P-5 | Replacement terminal blocks for I/O Units,<br>pack of 5 pcs.                    | ---       |
| I/O Units with<br>Fujitsu connectors | 40-pin Connector                  | Soldered                      | C500-CE404    | Connector: FCN-361J040-AU<br>Connector Cover: FCN-360C040-J2                    | ---       |
|                                      |                                   | Crimped                       | C500-CE405    | Housing: FCN-363J040<br>Contact: FCN-363J-AU<br>Connector Cover: FCN-360C040-J2 |           |
|                                      |                                   | Pressure welded               | C500-CE403    | FCN-367J040-AU/F                                                                |           |
|                                      | 24-pin Connector                  | Soldered                      | C500-CE241    | Connector: FCN-361J024-AU<br>Connector Cover: FCN-360C024-J2                    | ---       |
|                                      |                                   | Crimped                       | C500-CE242    | Housing: FCN-363J024<br>Contact: FCN-363J-AU<br>Connector Cover: FCN-360C024-J2 |           |
|                                      |                                   | Pressure welded               | C500-CE243    | FCN-367J024-AU/F                                                                |           |
| I/O Units with<br>MIL connectors*    | 40-pin<br>Connector               | Pressure welded               | XG4M-4030-T   | FRC5-A040-3TOS                                                                  |           |
|                                      | 20-pin<br>Connector               |                               | XG4M-2030-T   | FRC5-A020-3TOS                                                                  |           |

**Note:** \* Connectors according to MIL-C-83503 , also compatible with commercially available connectors according to DIN 41651 or IEC 60603-1 specifications

## Special I/O Units

| Name                                          | Specifications                                                                                                                                                             | Model             | Standards     |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|
| Analog Input Units                            | 8 inputs (1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA)<br>Resolution: 1/8000, Conversion speed: 0.25 ms/point                                                   | CJ1W-AD081-V1(SL) | UC1, CE, N, L |
|                                               | 4 inputs (1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA)<br>Resolution: 1/8000, Conversion speed: 0.25 ms/point                                                   | CJ1W-AD041-V1(SL) | UC1, CE, N, L |
| Analog Output Units                           | 8 outputs (1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V)<br>Resolution: 1/4000, Conversion speed: 1 ms/point max. (Settable to 1/8000, 250 μs/point)                         | CJ1W-DA08V(SL)    | UC1, CE, N, L |
|                                               | 8 outputs (4 to 20 mA)<br>Resolution: 1/4000, Conversion speed: 1 ms/point max. (Settable to 1/8000, 250 μs/point)                                                         | CJ1W-DA08C(SL)    | UC1, CE, N, L |
|                                               | 4 outputs (1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA)<br>Resolution: 1/4,000, Conversion speed: 1 ms/point max.                                               | CJ1W-DA041(SL)    | UC1, CE, N, L |
|                                               | 2 outputs (1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA)<br>Resolution: 1/4000, Conversion speed: 1 ms/point max.                                                | CJ1W-DA021(SL)    | UC1, CE, N, L |
|                                               | 4 inputs, 2 outputs (1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA)<br>Resolution: 1/4000, Conversion speed: 1 ms/point max. (Settable to 1/8000, 250 μs/point)   | CJ1W-MAD42(SL)    | UC1, CE, N, L |
| Process Input Units                           | 2 isolated DC inputs, 16-bit resolution, conversion speed 10 ms/2 pts                                                                                                      | CJ1W-PDC15        | UC1, CE       |
|                                               | 2 isolated thermocouple inputs, 16-bit resolution, conversion speed 10 ms/2pts                                                                                             | CJ1W-PTS15        |               |
|                                               | 2 isolated Pt100 inputs, 16-bit resolution, conversion speed 10 ms/2pts                                                                                                    | CJ1W-PTS16        |               |
|                                               | 4 isolated inputs, thermocouple type R, S, K, J, T, L, B. Conversion speed 250 ms/4 pts                                                                                    | CJ1W-PTS51        |               |
|                                               | 4 isolated Pt100 inputs (JIS, IEC). Conversion speed 250 ms/4 pts                                                                                                          | CJ1W-PTS52        |               |
| Temperature Control Units                     | 4 loops, thermocouple input, NPN output                                                                                                                                    | CJ1W-TC001        | UC1, CE, N, L |
|                                               | 4 loops, thermocouple input, PNP output                                                                                                                                    | CJ1W-TC002        |               |
|                                               | 2 loops, thermocouple input, NPN output, heater burnout detection function                                                                                                 | CJ1W-TC003        |               |
|                                               | 2 loops, thermocouple input, PNP output, heater burnout detection function                                                                                                 | CJ1W-TC004        |               |
|                                               | 4 loops, platinum resistance thermometer input, NPN output                                                                                                                 | CJ1W-TC101        |               |
|                                               | 4 loops, platinum resistance thermometer input, PNP output                                                                                                                 | CJ1W-TC102        |               |
|                                               | 2 loops, platinum resistance thermometer input, NPN output, heater burnout detection function                                                                              | CJ1W-TC103        |               |
|                                               | 2 loops, platinum resistance thermometer input, PNP output, heater burnout detection function                                                                              | CJ1W-TC104        |               |
| High-speed Counter Unit                       | 2 inputs, max. input frequency: 500 kpps                                                                                                                                   | CJ1W-CT021        | UC1, CE, N, L |
| 4-Channel Counter Unit                        | 4 inputs, max. input frequency: 100 kpps                                                                                                                                   | CJ1W-CTL41-E      | UC1, CE, L    |
|                                               | Screwless Terminal Block for CJ1W-CTL41-E                                                                                                                                  | XW2G-40G7-E       | CE            |
| 2-SSI Encoder Input Unit                      | 2 Synchronous Serial Interface channels                                                                                                                                    | CJ1W-CTS21-E      | CE, L         |
| PROFIBUS-DP I/O Link Unit                     | Exchanges up to 180 words in any memory area with a PROFIBUS-DP Master Unit                                                                                                | CJ1W-PRT21        | UC1, CE       |
| CompoBus/S Master Unit                        | CompoBus/S remote I/O, 256 points max.                                                                                                                                     | CJ1W-SRM21        | UC1, CE, N, L |
| Position Control Units                        | Pulse train, open collector output, 1 axis                                                                                                                                 | CJ1W-NC113        | UC1, CE       |
|                                               | Pulse train, open collector output, 2 axes                                                                                                                                 | CJ1W-NC213        |               |
|                                               | Pulse train, open collector output, 4 axes (See note 1.)                                                                                                                   | CJ1W-NC413        |               |
|                                               | Pulse train, line driver output, 1 axis                                                                                                                                    | CJ1W-NC133        |               |
|                                               | Pulse train, line driver output, 2 axes                                                                                                                                    | CJ1W-NC233        |               |
|                                               | Pulse train, line driver output, 4 axes (See note 1.)                                                                                                                      | CJ1W-NC433        |               |
|                                               | Spacer Unit (See note 1.)                                                                                                                                                  | CJ1W-SP001        |               |
| Servo Relay Units<br>(See note 2.)            | For 1-Axis Position Control Unit (without communications support)<br>(CS1W-NC113/133, CJ1W-CN113/133, C200HW-NC113, C200H-NC112)                                           | XW2B-20J6-1B      |               |
|                                               | For 2- or 4-Axis Position Control Unit (without communications support)<br>(CS1W-NC213/233/413/433, CJ1W-CN213/233/413/433, C200HW-NC213/413, C500-NC213/211, C200H-NC211) | XW2B-40J6-2B      |               |
|                                               | For 2- or 4-Axis Position Control Unit (with communications support)<br>(CS1W-NC213/233/413/433, CJ1W-CN213/233/413/433, C200HW-NC213/413)                                 | XW2B-40J6-4A      |               |
| Position Control Unit Cables<br>(See note 2.) | Connects CJ1W-NC113 to W Series, Cable length: 0.5 m                                                                                                                       | XW2Z-050J-A14     |               |
|                                               | Connects CJ1W-NC113 to W Series, Cable length: 1 m                                                                                                                         | XW2Z-100J-A14     |               |
|                                               | Connects CJ1W-NC213/413 to W Series, Cable length: 0.5 m                                                                                                                   | XW2Z-050J-A15     |               |
|                                               | Connects CJ1W-NC213/413 to W Series, Cable length: 1 m                                                                                                                     | XW2Z-100J-A15     |               |
|                                               | Connects CJ1W-NC113 to SmartStep, Cable length: 0.5 m                                                                                                                      | XW2Z-050J-A16     |               |
|                                               | Connects CJ1W-NC113 to SmartStep, Cable length: 1 m                                                                                                                        | XW2Z-100J-A16     |               |
|                                               | Connects CJ1W-NC213/413 to SmartStep, Cable length: 0.5 m                                                                                                                  | XW2Z-050J-A17     |               |
|                                               | Connects CJ1W-NC213/413 to SmartStep, Cable length: 1 m                                                                                                                    | XW2Z-100J-A17     |               |
|                                               | Connects CJ1W-NC133 to W Series, Cable length: 0.5 m                                                                                                                       | XW2Z-050J-A18     |               |
|                                               | Connects CJ1W-NC133 to W Series, Cable length: 1 m                                                                                                                         | XW2Z-100J-A18     |               |
|                                               | Connects CJ1W-NC233/433 to W Series, Cable length: 0.5 m                                                                                                                   | XW2Z-050J-A19     |               |
|                                               | Connects CJ1W-NC233/433 to W Series, Cable length: 1 m                                                                                                                     | XW2Z-100J-A19     |               |
|                                               | Connects CJ1W-NC133 to SmartStep, Cable length: 0.5 m                                                                                                                      | XW2Z-050J-A20     |               |
|                                               | Connects CJ1W-NC133 to SmartStep, Cable length: 1 m                                                                                                                        | XW2Z-100J-A20     |               |
|                                               | Connects CJ1W-NC233/433 to SmartStep, Cable length: 0.5 m                                                                                                                  | XW2Z-050J-A21     |               |
|                                               | Connects CJ1W-NC233/433 to SmartStep, Cable length: 1 m                                                                                                                    | XW2Z-100J-A21     |               |
| ID Sensor Unit<br>(See note 3.)               | For V600 Series, 1 R/W Head                                                                                                                                                | CJ1W-V600C11      | ---           |
|                                               | For V600 Series, 2 R/W Heads                                                                                                                                               | CJ1W-V600C12      |               |

1. The ambient operating temperature for 4-Axis Position Control Units is 0 to 50 °C; mount a Spacer Unit to the Position Control Unit in case the ambient temperature may reach 55 °C. The allowable voltage fluctuation on the external 24- V DC power supply is 22.8 to 25.2 V DC (24 V ±5%).
2. Two Servo Relay Units and two cables for the Position Control Unit are required for a 4-Axis Position Control Unit.
3. Refer to the *Auto-Identification Components Group Catalog* (Cat. No. Q132) for details on the V600 Series RFID System

## CPU Bus Units

| Name                                  | Specifications                                                                    | Model           | Standards    |
|---------------------------------------|-----------------------------------------------------------------------------------|-----------------|--------------|
| Controller Link Units                 | Wired<br>(Shielded twisted-pair cable)                                            | CJ1W-CLK21-V1   | UC, CE, N, L |
| Controller Link Relay Terminal        | Wired<br>Set of 5 Terminals                                                       | CJ1W-TB101      | ---          |
| Controller Link Support Board         | Twisted pair, PCI bus, with Support Software                                      | 3G8F7-CLK21-EV1 | CE           |
| Controller Link Repeater Units        | Twisted-pair cable                                                                | CS1W-RPT01      | UC1, CE      |
|                                       | Optical Ring (H-PCF cable)                                                        | CS1W-RPT02      |              |
|                                       | Optical Ring (GI cable)                                                           | CS1W-RPT03      |              |
| Serial Communications Units           | 1 RS-232C port and 1 RS-422/485 port                                              | CJ1W-SCU41-V1   | UC, CE, N, L |
|                                       | 2 RS-232C ports                                                                   | CJ1W-SCU21-V1   |              |
| Ethernet Unit                         | 100Base-Tx                                                                        | CJ1W-ETN21      | UC, CE, N, L |
| DeviceNet Unit                        | Functions as master and/or slave; allows control of 32,000 points max. per master | CJ1W-DRM21      |              |
| CAN Unit                              | Freely configurable reception and transmission of CAN messages                    | CJ1W-CORT21     | UC1, CE      |
| PROFIBUS-DP Master Unit               | Controls up to 7000 words of remote I/O data over PROFIBUS-DP                     | CJ1W-PRM21      | UC, CE       |
| CX-PROFIBUS, PROFIBUS-DP Configurator | Software only (Windows 2000, XP)                                                  | CX-Profi-V1     | ---          |
| Motion Control Unit                   | Real axes: 30, Virtual Axes: 2, Communication by Mechatrolink-II                  | CJ1W-MCH71      | CE           |
| Position Control Unit                 | Mechatrolink-II connection to max. 16 axes                                        | CJ1W-NCF71      | UC1, CE      |

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.  
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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## Данный компонент на территории Российской Федерации

**Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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