Cat. No. W393-E1-18

SYSMAC CJ Series

CJ1H-CPU□□H-R,
CJ1G/H-CPU□□H, CJ1G-CPU□□P,
CJ1G-CPU□□, CJ1M-CPU□□

Programmable Controllers

OPERATION MANUAL

OMRON

NOTE

No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

Trademarks

- Microsoft, Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.
- ODVA, CIP, CompoNet, DeviceNet, and EtherNet/IP are trademarks of ODVA.

Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

Copyrights

Microsoft product screen shots reprinted with permission from Microsoft Corporation.

SYSMAC CJ Series
CJ1H-CPU□□H-R, CJ1G/H-CPU□□H, CJ1G-CPU□□P, CJ1G-CPU□□, CJ1M-CPU□□ Programmable Controllers

Operation Manual

Revised February 2020

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.

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

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

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PLC” means Programmable Controller. “PC” is used, however, in some Programming Device displays to mean Programmable Controller.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1,2,3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

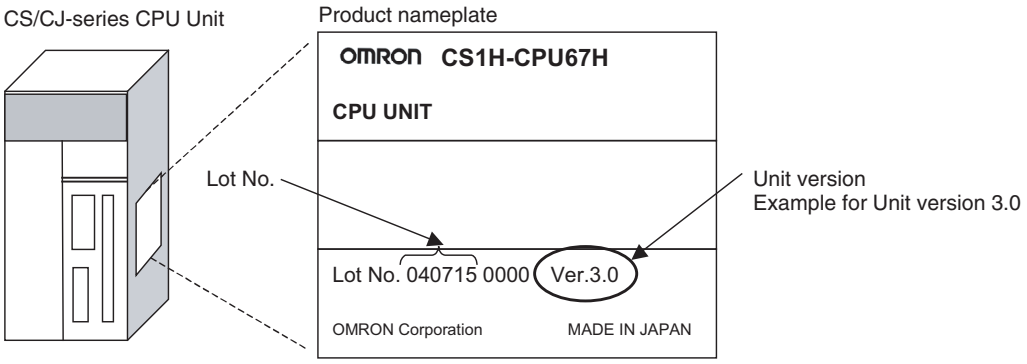
Unit Versions of CS/CJ-series CPU Units

Unit Versions

A “unit version” has been introduced to manage CPU Units in the CS/CJ Series according to differences in functionality accompanying Unit upgrades. This applies to the CS1-H, CJ1-H, CJ1M, and CS1D CPU Units.

Notation of Unit Versions on Products

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



- CS1-H, CJ1-H, and CJ1M CPU Units manufactured on or before November 4, 2003 do not have a unit version given on the CPU Unit (i.e., the location for the unit version shown above is blank).
- The unit version of the CJ1-H-R CPU Units begins at version 4.0.
- The unit version of the CS1-H, CJ1-H, and CJ1M CPU Units, as well as the CS1D CPU Units for Single-CPU Systems, begins at version 2.0.
- The unit version of the CS1D CPU Units for Duplex-CPU Systems, begins at version 1.1.
- CPU Units for which a unit version is not given are called *Pre-Ver. □.□ CPU Units, such as Pre-Ver. 2.0 CPU Units and Pre-Ver. 1.1 CPU Units*.

Confirming Unit Versions with Support Software

CX-Programmer version 4.0 can be used to confirm the unit version using one of the following two methods.

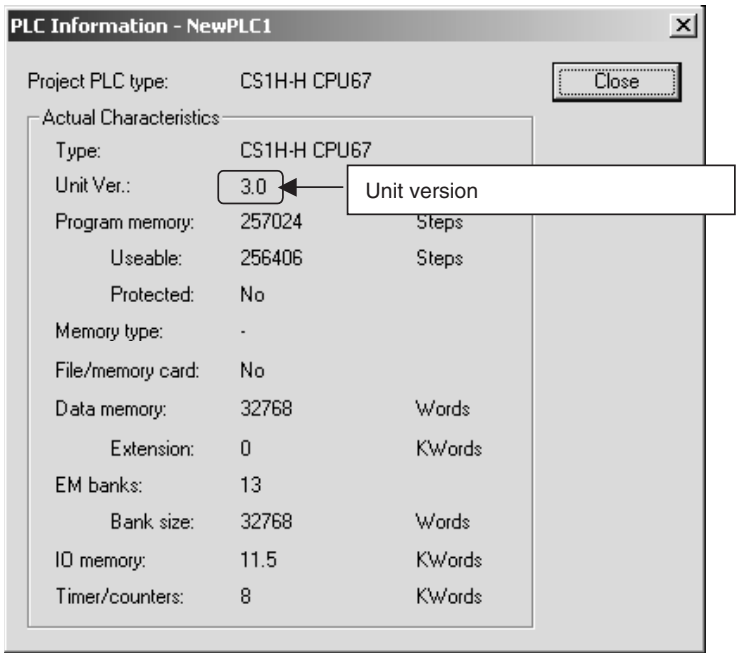
- Using the ***PLC Information***
- Using the ***Unit Manufacturing Information*** (This method can be used for Special I/O Units and CPU Bus Units as well.)

Note CX-Programmer version 3.3 or lower cannot be used to confirm unit versions.

PLC Information

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

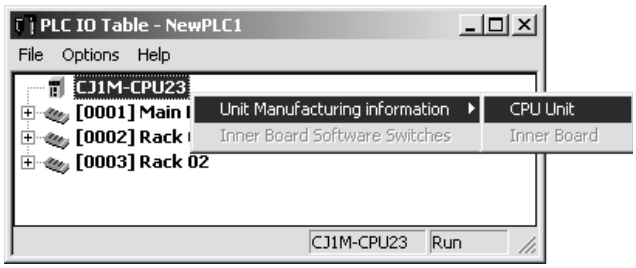
In either case, the following *PLC Information* Dialog Box will be displayed.



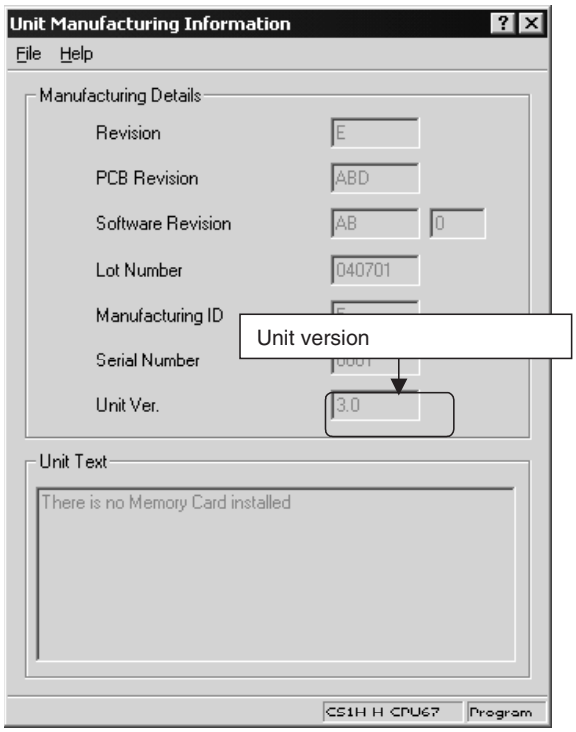
Use the above display to confirm the unit version of the CPU Unit.

Unit Manufacturing Information

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



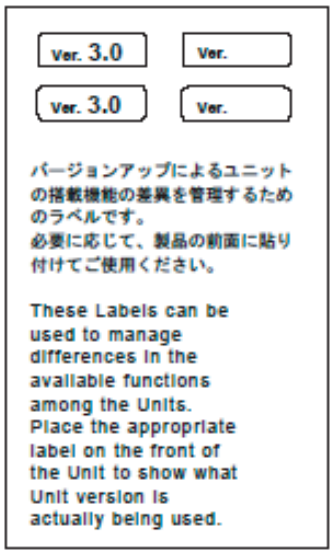
The following *Unit Manufacturing information* Dialog Box will be displayed.



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

Using the Unit Version Labels

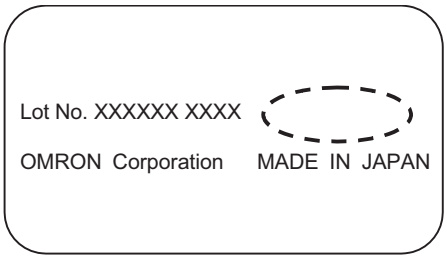
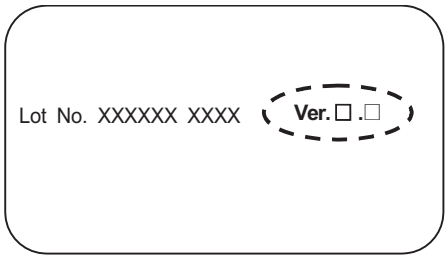
The following unit version labels are provided with the CPU Unit.



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

Unit Version Notation

In this manual, the unit version of a CPU Unit is given as shown in the following table.

Product nameplate Meaning	CPU Units on which no unit version is given 	Units on which a version is given (Ver. □.□) 
Designating individual CPU Units (e.g., the CS1H-CPU67H)	Pre-Ver. 2.0 CS1-H CPU Units	CS1H-CPU67H CPU Unit Ver. □.□
Designating groups of CPU Units (e.g., the CS1-H CPU Units)	Pre-Ver. 2.0 CS1-H CPU Units	CS1-H CPU Units Ver. □.□
Designating an entire series of CPU Units (e.g., the CS-series CPU Units)	Pre-Ver. 2.0 CS-series CPU Units	CS-series CPU Units Ver. □.□

Unit Versions

CJ Series

Units	Models	Unit version
CJ1-H CPU Units	CJ1H-CPU□□H-R	Unit version 4.2
		Unit version 4.1
		Unit version 4.0
	CJ1□-CPU□□H	Unit version 4.0
		Unit version 3.0
		Unit version 2.0
		Pre-Ver. 2.0
	CJ1G-CPU□□P	Unit version 4.1
		Unit version 4.0
		Unit version 3.0
CJ1 CPU Units	CJ1G-CPU44/45	No unit version.
CJ1M CPU Units	CJ1M-CPU12/13 CJ1M-CPU22/23	Unit version 4.0
		Unit version 3.0
		Unit version 2.0
		Pre-Ver. 2.0
	CJ1M-CPU11/21	Unit version 4.0
		Unit version 3.0
		Unit version 2.0

NSJ Series

Units	Unit version
NSJ□-TQ□□(B)-G5D NSJ□-TQ□□(B)-M3D	Unit version 3.0

Functions Supported for Different Unit Versions of CJ1-H CPU Units

Functions Supported for Unit Version 4.1 or Later

CPU Units	CJ1-H CPU Units	
Models	CJ1G-CPU□□P	
Unit version / Function	Unit version 4.1 or later	Other unit versions
Read protection using extended passwords	Supported (See note.)	---
Disabling password input after five consecutive incorrect passwords	Supported	---
Auxiliary Area notification of production lot number	Supported	---

Note CX-Programmer version 9.6 or higher must be used to enable using the functions added for unit version 4.1.

Function Support by Unit Version

• Functions Supported for Unit Version 4.0 or Later

CX-Programmer 7.0 or higher must be used to enable using the functions added for unit version 4.0.

Additional functions are supported if CX-Programmer version 7.2 or higher is used.

CJ1-H/CJ1M CPU Units

Function		CJ1H-CPU□□H-R, CJ1□-CPU□□H, CJ1G-CPU□□P, CJ1M-CPU□□	
		Unit version 4.0 or later	Other unit versions
Online editing of function blocks **Note** This function cannot be used for simulations on the CX-Simulator.		OK	---
Input-output variables in function blocks		OK	---
Text strings in function blocks		OK	---
New application instructions	Number-Text String Conversion Instructions: NUM4, NUM8, NUM16, STR4, STR8, and STR16	OK	---
	TEXT FILE WRITE (TWRIT)	OK	---
ST programming in task programs		OK with CX-Programmer version 7.2 or higher	---
SFC programming in task programs		OK with CX-Programmer version 7.2 or higher	---

User programs that contain functions supported only by CPU Units with unit version 4.0 or later cannot be used on CS/CJ-series CPU Units with unit version 3.0 or earlier. An error message will be displayed if an attempt is made to download programs containing unit version 4.0 functions to a CPU Unit with a unit version of 3.0 or earlier, and the download will not be possible.

If an object program file (.OBJ) using these functions is transferred to a CPU Unit with a unit version of 3.0 or earlier, a program error will occur when operation is started or when the unit version 4.0 function is executed, and CPU Unit operation will stop.

• **Functions Supported for Unit Version 3.0 or Later**

CX-Programmer 5.0 or higher must be used to enable using the functions added for unit version 3.0.

CJ1-H/CJ1M CPU Units

Function		CJ1H-CPU□□H-R CJ1□-CPU□□H, CJ1G-CPU□□P, CJ1M-CPU□□	
		Unit version 3.0 or later	Other unit versions
Function blocks		OK	---
Serial Gateway (converting FINS commands to CompoWay/F commands at the built-in serial port)		OK	---
Comment memory (in internal flash memory)		OK	---
Expanded simple backup data		OK	---
New application instructions	TXDU(256), RXDU(255) (support no-protocol communications with Serial Communications Units with unit version 1.2 or later)	OK	---
	Model conversion instructions: XFERC(565), DISTC(566), COLLC(567), MOVBC(568), BCNTC(621)	OK	---
	Special function block instructions: GETID(286)	OK	---
Additional instruction functions	PRV(881) and PRV2(883) instructions: Added high-frequency calculation methods for calculating pulse frequency. (CJ1M CPU Units only)	OK	---

User programs that contain functions supported only by CPU Units with unit version 3.0 or later cannot be used on CS/CJ-series CPU Units with unit version 2.0 or earlier. An error message will be displayed if an attempt is made to download programs containing unit version 3.0 functions to a CPU Unit with a unit version of 2.0 or earlier, and the download will not be possible.

If an object program file (.OBJ) using these functions is transferred to a CPU Unit with a unit version of 2.0 or earlier, a program error will occur when operation is started or when the unit version 3.0 function is executed, and CPU Unit operation will stop.

• **Functions Supported for Unit Version 2.0 or Later**

CX-Programmer 4.0 or higher must be used to enable using the functions added for unit version 2.0.

CJ1-H/CJ1M CPU Units

Function		CJ1-H CPU Units (CJ1H-CPU□□H-R) (CJ1□-CPU□□H) (CJ1G-CPU□□P)		CJ1M CPU Units CJ1M-CPU12/13/22/23		CJ1M-CPU11/21
		Unit version 2.0 or later	Other unit versions	Unit version 2.0 or later	Other unit versions	Other unit version 2.0 or later
Downloading and Uploading Individual Tasks		OK	---	OK	---	OK
Improved Read Protection Using Passwords		OK	---	OK	---	OK
Write Protection from FINS Commands Sent to CPU Units via Networks		OK	---	OK	---	OK
Online Network Connections without I/O Tables		OK	--- (Supported if I/O tables are automatically generated at startup.)	OK	--- (Supported if I/O tables are automatically generated at startup.)	OK
Communications through a Maximum of 8 Network Levels		OK	---	OK	---	OK
Connecting Online to PLCs via NS-series PTs		OK	OK from lot number 030201	OK	OK from lot number 030201	OK
Setting First Slot Words		OK for up to 64 groups	OK for up to 8 groups	OK for up to 64 groups	OK for up to 8 groups	OK for up to 64 groups
Automatic Transfers at Power ON without a Parameter File		OK	---	OK	---	OK
Automatic Detection of I/O Allocation Method for Automatic Transfer at Power ON		OK	---	OK	---	OK
Operation Start/End Times		OK	---	OK	---	OK
New Application Instructions	MILH, MILR, MILC	OK	---	OK	---	OK
	=DT, <>DT, <DT, <=DT, >DT, >=DT	OK	---	OK	---	OK
	BCMP2	OK	---	OK	OK	OK
	GRY	OK	OK from lot number 030201	OK	OK from lot number 030201	OK
	TPO	OK	---	OK	---	OK
	DSW, TKY, HKY, MTR, 7SEG	OK	---	OK	---	OK
	EXPLT, EGATR, ESATR, ECHRD, ECHWR	OK	---	OK	---	OK
	Reading/Writing CPU Bus Units with IORD/IOWR	OK	---	OK	---	OK
	PRV2	---	---	OK, but only for CPU Units with built-in I/O	---	OK, but only for CPU Units with built-in I/O

User programs that contain functions supported only by CPU Units with unit version 2.0 or later cannot be used on CS/CJ-series Pre-Ver. 2.0 CPU Units. An error message will be displayed if an attempt is made to download programs containing unit version s.0 functions to a Pre-Ver. 2.0 CPU Unit, and the download will not be possible.

If an object program file (.OBJ) using these functions is transferred to a Pre-Ver. 2.0 CPU Unit, a program error will occur when operation is started or when the unit version 2.0 function is executed, and CPU Unit operation will stop.

Unit Versions and Programming Devices

The following tables show the relationship between unit versions and CX-Programmer versions.

Unit Versions and Programming Devices

CPU Unit	Functions (See note 1.)		CX-Programmer					Programming Console
			Ver. 3.3 or lower	Ver. 4.0	Ver. 5.0 Ver. 6.0	Ver. 7.0 to 9.5	Ver. 9.6 or higher	
CS/CJ-series CPU Unit with unit version 4.1	Functions added for unit version 4.1	Using new functions	---	---	---	---	OK	No restrictions
		Not using new functions	OK	OK	OK	OK	OK	
CS/CJ-series unit version 4.0	Functions added for unit version 4.0	Using new functions	---	---	---	OK (See notes 2 and 3.)	OK	
		Not using new functions	OK	OK	OK	OK	OK	
CS/CJ-series unit version 3.0	Functions added for unit version 3.0	Using new functions	---	---	OK	OK	OK	
		Not using new functions	OK	OK	OK	OK	OK	
CS/CJ-series unit version 2.0	Functions added for unit version 2.0	Using new functions	---	OK	OK	OK	OK	
		Not using new functions	OK	OK	OK	OK	OK	

Note

1. As shown above, there is no need to upgrade to CX-Programmer version as long as the functions added for unit versions are not used.
2. CX-Programmer version 7.1 or higher is required to use the new functions added for unit version 4.0 of the CJ1-H-R CPU Units. CX-Programmer version 7.22 or higher is required to use unit version 4.1 of the CJ1-H-R CPU Units. CX-Programmer version 7.0 or higher is required to use unit version 4.2 of the CJ1-H-R CPU Units. You can check the CX-Programmer version using the ***About*** menu command to display version information.
3. CX-Programmer version 7.0 or higher is required to use the functional improvements made for unit version 4.0 of the CS/CJ-series CPU Units. With CX-Programmer version 7.2 or higher, you can use even more expanded functionality.

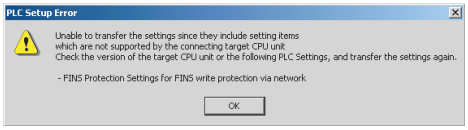
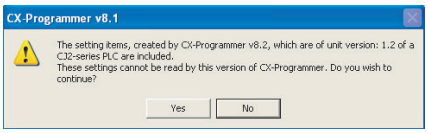
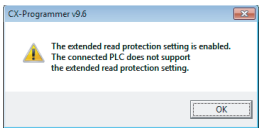
Device Type Setting

The unit version does not affect the setting made for the device type on the CX-Programmer. Select the device type as shown in the following table regardless of the unit version of the CPU Unit.

Series	CPU Unit group	CPU Unit model	Device type setting on CX-Programmer Ver. 4.0 or higher
CJ Series	CJ1-H CPU Units	CJ1G-CPU□□H CJ1G-CPU□□P	CJ1G-H
		CJ1H-CPU□□H-R (See note.) CJ1H-CPU□□H	CJ1H-H
	CJ1M CPU Units	CJ1M-CPU□□	CJ1M

Note Select one of the following CPU types: CPU67-R, CPU66-R, CPU65-R, or CPU64-R.

Troubleshooting Problems with Unit Versions on the CX-Programmer

Problem	Cause	Solution
 After the above message is displayed, a compiling error will be displayed on the *Compile* Tab Page in the Output Window.	An attempt was made to download a program containing instructions supported only by later unit versions or a CPU Unit to a previous unit version.	Check the program or change to a CPU Unit with a later unit version.
	An attempt was to download a PLC Setup containing settings supported only by later unit versions or a CPU Unit to a previous unit version.	Check the settings in the PLC Setup or change to a CPU Unit with a later unit version.
"????" is displayed in a program transferred from the PLC to the CX-Programmer.	An attempt was made to upload a program containing instructions supported only by higher versions of CX-Programmer to a lower version.	New instructions cannot be uploaded to lower versions of CX-Programmer. Use a higher version of CX-Programmer.
 The above error is displayed when a project file is read.	An attempt was made to read a project file for an unsupported unit version.	Click the **Yes** Button to initialize unsupported settings and read the file. Click the **No** Button to cancel reading the project file.
 The above warning is displayed when going online.	An attempt was made to go online with an earlier version of a CPU Unit for a project file that contains an extended read protection setting that is supported only by a newer version of the CPU Unit.	Change the protection setting in the PLC Properties Dialog Box. Or, replace the CPU Unit with which you need to go online with a higher version of CPU Unit.

CJ1-H-R CPU Units (High-speed)

Overview

The CJ1-H-R CPU Units (CJ1H-CPU□□H-R) are high-speed versions of unit version 4.0 of the CJ1-H CPU Units (CJ1H-CPU□□H).

Models

Model	Unit version	Specifications
CJ1H-CPU67H-R	Ver. 4.2	Equivalent to CJ1H-CPU67H (Program capacity: 250K steps)
CJ1H-CPU66H-R		Equivalent to CJ1H-CPU66H (Program capacity: 120K steps)
CJ1H-CPU65H-R		Equivalent to CJ1H-CPU65H (Program capacity: 60K steps)
CJ1H-CPU64H-R		Equivalent to CJ1H-CPU64H (Program capacity: 30K steps)

Note In the CX-Programmer, set the device type to CJ1H-H and the CPU type to CPU67-R, CPU66-R, CPU65-R, or CPU64-R.

Differences Compared to CJ1-H CPU Units

The CJ1-H-R CPU Units (CJ1H-CPU□□H-R) have the following differences in comparison to the CJ1-H CPU Units (CJ1H-CPU□□H).

Item		CJ1-H-R CPU Units (CJ1H-CPU□□H-R)	CJ1-H CPU Units (CJ1H-CPU□□H)
Instruction execution time	Basic instructions	0.016 μs min.	0.02 μs min.
	Special instructions	0.048 μs min.	0.06 μs min.
	Floating-point math calculations (e.g., FLOATING-POINT ADD (+F(454))	0.24 μs	8 μs
I/O refreshing	Basic I/O Units (e.g., 16-point Input Unit)	1.4 μs	3 μs
	Special I/O Units (e.g., Analog Input Unit)	50 μs	120 μs
New instructions	Timer instructions	• TENTH-MS TIMER (TIMU/TIMUX) • HUNDREDTH-MS TIMER (TIMUH/TMUHX)	Not supported.
	I/O Unit Instructions	• SPECIAL I/O UNIT I/O REFRESH (FIORF(225))	Not supported.
	Floating-point math and conversion instructions	• SINQ • COSQ • TANQ • MOVF	Not supported.
Overhead processing time		0.13 ms	0.3 ms
Unit for setting scheduled interrupt intervals		0.1, 1, or 10 ms	1 or 10 ms
Software interval response time		40 μs	124 μs
Function block startup time		3.3 μs	6.8 μs
Clock pulses		0.1 ms, 1 ms, 0.01 s (See note 2.), 0.02 s, 0.1 s, 0.2 s, 1 s, 1 min	0.02 s, 0.1 s, 0.2 s, 1 s, 1 min
Maximum number of relay networks that can be set in routing tables (See note 1.)		64	20

Note

1. Refer to the *CX-Integrator Operation Manual* (Cat. No. W445) and the Communication Unit operation manuals for details.
2. The 0.01 s Clock Pulse cannot be used with unit version 4.1 of the CJ1-HR CPU Units. The 0.01 s Clock Pulse can be used with all other unit versions.

CJ1H-CPU□□H-R Version 4.1 Specifications Change

The following specifications changes have been made for CJ1H-CPU□□H-R version 4.1.

The following specifications for unit version 4.2 and later are the same as the specifications for unit version 4.0.

Functionality Changes

CPU Unit version	CJ1-H Ver. 4.0	CJ1-H-R Ver. 4.0	CJ1-H-R Ver. 4.1
Timer numbers that can be used with ONE-MS TIMER instructions	0000 to 0015	0000 to 4095	0016 to 4095
0.01-s clock pulse	Not supported	Supported	Not supported

- If ONE-MS TIMER instructions (TMHH(540)/TMHHX(552)) with timer numbers 0 to 15 are used in existing programs with CJ1H-CPU□□H-R version 4.1, the timer numbers must be changed to timer numbers between 0016 and 4095.

Performance Changes

CPU Unit version	CJ1-H Ver. 4.0	CJ1-H-R Ver. 4.0	CJ1-H-R Ver. 4.1
Timing precision of HUNDRED-MS TIMER instructions (TIM/TIMX(550))	−10 to 0 ms	−10 to 0 ms	−100 to 0 ms
Timing precision of ONE-MS TIMER instructions (TMHH(540)/TMHHX(522))	−1 to 0 ms	−1 to 0 ms	−10 to 0 ms

Note

1. The timing precision of version 4.0 and version 4.1 are different. Be sure to check the effect on the application.
2. There have been no changes in the timing precision of TEN-MS TIMER instructions (TIMH(015)/TIMHX(551)) and TENTH-MS TIMER instructions (TIMU(541)/TIMUX(556)) since version 4.0. Use TEN-MS TIMER instructions and TENTH-MS TIMER instructions if accuracy is a problem when using HUNDRED-MS TIMER instructions and ONE-MS TIMER instructions.

■ Programming Devices

Use CX-Programmer version 7.1 or higher for the CJ1-H-R CPU Units. Set the device type to CJ1H-H and the CPU type to one of the CPU types ending in "-R." Use the following procedure.

1,2,3...

1. Select ***New*** from the File Menu.
2. Select *CJ1H-H* in the Change PLC Dialog Box.
3. Select one of the following for the CPU type: CPU67-R, CPU66-R, CPU65-R, or CPU64-R.

Model	Device type	CPU type
CJ1H-CPU67H-R	CJ1H-H	CPU67-R
CJ1H-CPU66H-R		CPU66-R
CJ1H-CPU65H-R		CPU65-R
CJ1H-CPU64H-R		CPU64-R

Note

1. If CX-Programmer version 7.0 or lower is used, the new features of the CJ1-H-R CPU Units will not be supported, i.e., functionality will be the same as the CJ1-H CPU Units.

2. CX-Programmer version 7.22 or higher is required to use unit version 4.1 of the CJ1-H-R CPU Units. CX-Programmer version 7.0 or higher is required to use unit version 4.2 of the CJ1-H-R CPU Units. CX-Programmer version 7.22 or higher has added functionality that will provide a warning when performing a program check or when transferring the program if a ONE-MS TIMER instruction ((TMHH(540)/TMHHX(552)) is set to timer numbers 0000 to 0015 or if a 0.01-second clock pulse is used. Version 7.22 or higher can be obtained using the auto-update function. If you are not sure how to obtain CX-Programmer version 7.22, contact your OMRON representative.

Loop-control CPU Units

Overview

Loop-control CPU Units are CPU Units with a pre-installed Loop Controller functional element.

Note The Loop Controller functional element is an inseparable part of the CPU Unit and cannot be removed.

Model Numbers, Functional Elements, and Versions

The CJ1G-CPU□□P Loop-control CPU Unit is comprised of a CPU Unit element with the same functionality as a CJ1G-CPU□□H CPU Unit with version 3.0 or later (see note) and a Loop Controller element. The following table lists the model numbers for CJ1G Loop-control CPU Units, the types of CPU Unit element, Loop Controller element, and the functional element version codes.

Product name	Product model number	Configuration			
		CPU Unit element		Loop Controller element	
		CPU Unit model with same functionality	Functional element unit version	Functional element name	Functional element version
Loop-control CPU Units	CJ1G-CPU45P	CJ1G-CPU45H	Ver. 3.0 or higher	LCB03	Ver. 2.0
	CJ1G-CPU44P	CJ1G-CPU44H	Ver. 3.0 or higher	LCB03	Ver. 2.0
	CJ1G-CPU43P	CJ1G-CPU43H	Ver. 3.0 or higher	LCB03	Ver. 2.0
	CJ1G-CPU42P	CJ1G-CPU42H	Ver. 3.0 or higher	LCB01	Ver. 2.0

Note A single unit version for the Loop-control CPU Unit as a whole is not provided. The unit versions for the CJ1-H CPU Unit with unit version 3.0 or later and the functional element version code.

Differences between CJ1G-CPU□□H and CPU Unit Elements

The differences between the CPU Unit element in the Loop-control CPU Unit and the CJ1G-CPU□□H CPU Unit are shown here. The two types of CPU Unit are otherwise the same.

Note The functions added in the version upgrade for unit version 3.0 and later are also the same.

Additional Auxiliary Area Flags and Bits

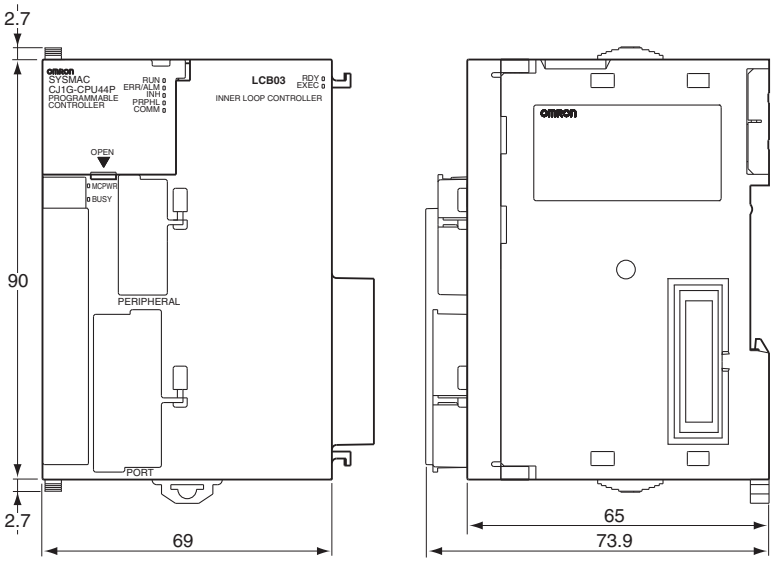
Loop-control CPU Units can use the following Auxiliary Area flags and bits, which are not supported for CJ1G-CPU□□H CPU Units.

Address		Name
Word	Bit	
A424	00	Inner Board WDT Error Flag (fatal error)
	01	Inner Board Bus Error Flag (fatal error)
	02	Cyclic Monitor Error Flag (fatal error)
	03	Flash Memory Data Error Flag (fatal error)
	04	Incompatible CPU Unit Error Flag (non-fatal error)
	08	Loop Controller High Load Flag (non-fatal error)
	11	Backup Data (Flash Memory) Error Flag
	12	Specified EM Bank Unusable Error Flag
A608	00	Inner Board Restart Bit
A609	01	Start Mode at Power ON: Hot Start
A609	02	Start Mode at Power ON: Cold Start

For details on the Auxiliary Area bits and flags, refer to the section on *SYSMAC CS/CJ Series Loop Control Boards, Process-control CPU Units, Loop-control CPU Units Operation Manual* (W406).

Loop-control CPU Unit Dimensions

Product name and model	W (mm)	H (mm)	D (mm)
CJ1G-CPU45P/44P/43P/42P Loop-control CPU Unit	69	90	65 (not including connector) 73.9 (including connector)
CJ1G-CPU45H/44H/43H/42H CJ1-H CPU Unit (reference)	62		



Indicators

Indicator	Name	Color	Status	Description
RDY	Ready	Green	Not lit	The Loop Control Board is not operating for one of the following reasons: • A Fatal Inner Board Error occurred (A40112 ON.) • Initialization is not completed yet. • A fatal error occurred. • The flash memory backup data is invalid. • The Loop Control Board is initializing. • A hardware failure occurred in the Loop Control Board. • Power is not being supplied from the Power Supply Unit. • A Loop Control Board WDT error occurred.
			Flashing	• A WDT error occurred in the CPU Unit.
			Lit	The Loop Control Board is ready for operation.

Indicator	Name	Color	Status	Description
EXEC	Running	Green	Not lit	The system is stopped for one of the following reasons: • The Loop Control Board is initializing. • A hardware failure occurred in the Loop Control Board. • Power is not being supplied from the Power Supply Unit. • A Loop Control Board WDT error occurred. • The Loop Control Board is not running. • Data is being written to flash memory.
			Flashing (at 0.5-s intervals)	Erasing flash memory.
			Flashing (0.2-s intervals)	Backup operation to function block flash memory in progress
			Lit	The Loop Control Board is not running.

Current Consumption and Weight

Product name and model	Current consumption	Weight
CJ1G-CPU45P/44P/43P/42P Loop-control CPU Unit	1.06 A	220 g max.
CJ1G-CPU45H/44H/43H/42H CJ1-H CPU Unit (reference)	0.91 A	190 g max.

Common Processing Time (Overhead Time)

Product name and model	Common processing time
CJ1G-CPU45P/44P/43P/42P Loop-control CPU Unit	0.8 ms max.
CJ1G-CPU45H/44H/43H/42H CJ1-H CPU Unit (reference)	0.3 ms

Battery Backup Time

At 25°C, the battery life (maximum service life) for batteries is five years whether or not power is supplied to the CPU Unit while the battery is installed. This is the same as for CJ1G-CPU□□H CPU Units. The following table shows the approximate minimum lifetimes and typical lifetimes for the backup battery (total time with power not supplied).

Model	Approx. maximum lifetime	Approx. minimum lifetime (See note.)	Typical lifetime (See note.)
CJ1G-CPU45P/44P/43P/42P Loop-control CPU Unit	5 years	5,600 hours (approximately 0.64 years)	43,000 hours (approximately 5 years)
CJ1G-CPU45H/44H/43H/42H CJ1-H CPU Unit (reference)	5 years	6,500 hours (approximately 0.75 years)	43,000 hours (approximately 5 years)

Note The minimum lifetime is the memory backup time at an ambient temperature of 55°C. The typical lifetime is the memory backup time at an ambient temperature of 25°C.

Programming Devices

Loop Controller Element

Using CX-Process Tool Ver. 4.0 or later, select the Loop-control CPU Unit/Process-control CPU Unit from the *LC Type* field in the LCB/LC001 Dialog Box. Then select either ***CJ1G-CPU42P***, ***CJ1G-CPU43P***, ***CJ1G-CPU44P***, or***CJ1G-CPU45P***, from the Number-Model pull-down list in the *Unit Information* field.

CPU Unit Element

Use CX-Programmer Ver. 5.0 or later. The CPU Unit functions are the same as the CJ1G-CPU□□H, except for the differences provided in the previous table. Therefore, select ***CJ1G-H*** as the device type when using CX-Programmer.

1,2,3...

1. Select ***New*** from the File Menu.
2. Select one of the following CPU Unit types in the Change PLC Dialog Box.

Loop-control CPU Unit	Device type	CPU Unit type
CJ1G-CPU45P	CJ1G-H	CPU45
CJ1G-CPU44P		CPU44
CJ1G-CPU43P		CPU43
CJ1G-CPU42P		CPU42

Reference Manuals

- The CPU Unit functions are the same as the CJ1G-CPU□□H, except for the differences provided in the previous table. Therefore, for details on the CPU Unit functions, refer to the *SYSMAC CJ Series Programmable Controllers Operation Manual* (W393), *SYSMAC CS/CJ Series Programmable Controllers Programming Manual* (W394), *SYSMAC CS/CJ Series Programmable Controllers Instructions Reference Manual* (W474), and *Communications Commands Reference Manual* (W342).
- For details on the Loop Controller functions (LCB□□ functional element) refer to the section on *SYSMAC CS/CJ Series Loop Control Boards, Process-control CPU Units, Loop-control CPU Units Operation Manual* (W406).

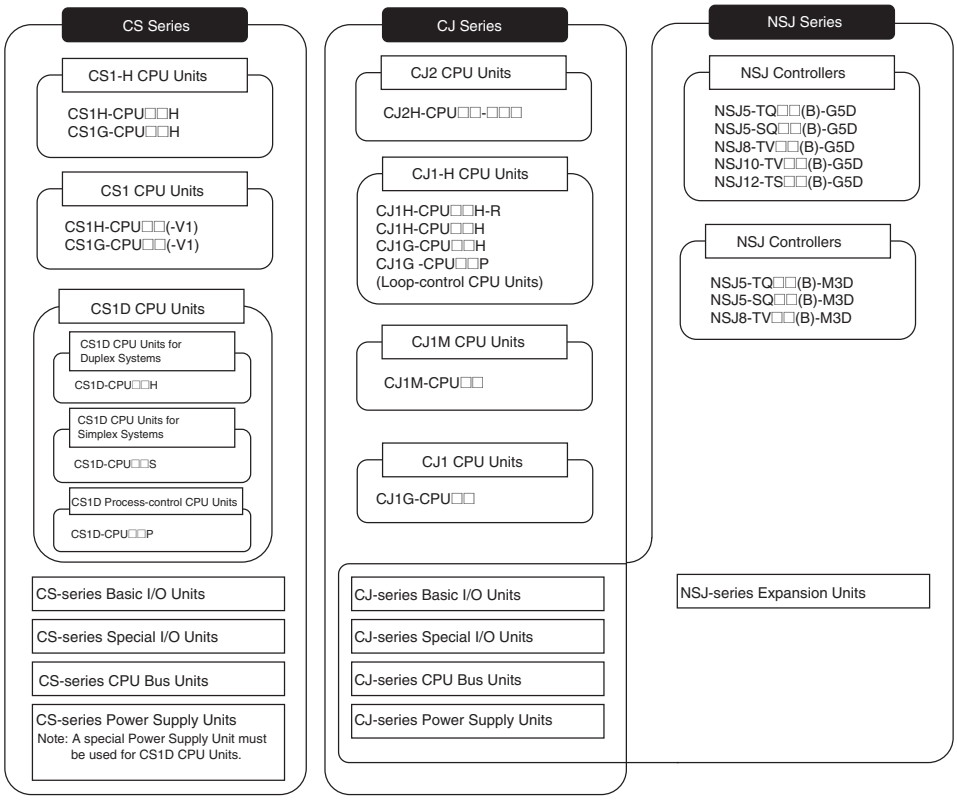
TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

About this Manual:

This manual describes the installation and operation of the CJ-series Programmable Controllers (PLCs) and includes the sections described on the following page. The CS Series, CJ Series and NSJ Series are subdivided as shown in the following figure.



NSJ-series Controller Notation

For information in this manual on the Controller Section of NSJ-series Controllers, refer to the information of the equivalent CJ-series PLC. The following models are equivalent.

NSJ-series Controllers	**Equivalent CJ-series CPU Unit**
NSJ□-TQ□□(B)-G5D	CJ1G-CPU45H CPU Unit with unit version 3.0
NSJ□-TQ□□(B)-M3D	CJ1G-CPU45H CPU Unit with unit version 3.0 (See note.)

Note: The following points differ between the NSJ□-□□□□(B)-M3D and the CJ1G-CPU45H.

Item		**CJ-series CPU Unit CJ1G-CPU45H**	**Controller Section in NSJ□-□□□□(B)-M3D**
I/O capacity		1280 points	640 points
Program capacity		60 Ksteps	20 Ksteps
No. of Expansion Racks		3 max.	1 max.
EM Area		32 Kwords x 3 banks E0_00000 to E2_32767	None
Function blocks	Max. No. of definitions	1024	128
	Max. No. of instances	2048	256
Capacity in built-in file memory	FB program memory	1024 KB	256 KB
	Variable tables	128 KB	64 KB

Please read this manual and all related manuals listed in the following table and be sure you understand information provided before attempting to install or use CJ-series CPU Units CPU Units in a PLC System.

Name	Cat. No.	Contents
SYSMAC CJ Series CJ1H-CPU□□H-R, CJ1G/H-CPU□□H, CJ1G-CPU□□P, CJ1G-CPU□□, CJ1M-CPU□□ Programmable Controllers Operation Manual	W393 (This manual)	Provides an outlines of and describes the design, installation, maintenance, and other basic operations for the CJ-series PLCs.
SYSMAC CS/CJ/NSJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1H-CPU□□H-R, CJ1G-CPU□□, CJ1G/H-CPU□□H, CJ1G-CPU□□P, CJ1M-CPU□□, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D Programmable Controllers Programming Manual	W394	This manual describes programming and other methods to use the functions of the CS/CJ-series and NSJ-series PLCs.
SYSMAC CJ Series CJ1M-CPU21/22/23 Built-in I/O Operation Manual	W395	Describes the functions of the built-in I/O for CJ1M CPU Units.
SYSMAC CS/CJ/NSJ Series CS1□-CPU-□□□-□□, CJ1□-CPU-□□□-□□□, CJ2H-CPU-□□□-□□□, NSJ□□-□□□□□-□□□ Programmable Controllers Instructions Reference Manual	W474	Describes the ladder diagram programming instructions supported by CS/CJ-series and NSJ-series PLCs.
SYSMAC CS/CJ/NSJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CS1D-CPU□□H, CS1D-CPU□□S, CJ1H-CPU□□H-R, CJ1G-CPU□□, CJ1M-CPU□□, CJ1G-CPU□□P, CJ1G/H-CPU□□H, CJ2H-CPU6□-EIP, CJ2H-CPU6□, CJ2M-CPU□□, CS1W-SCU□□-V1, CS1W-SCB□□-V1, CJ1W-SCU□□-V1, CP1H-X□□□□-□, CP1H-XA□□□□-□, CP1H-Y□□□□-□, CP1L-M/L□□□-□, CP1E-E□□D□-□, CP1E-N□□D□-□, NSJ□-□□□□(B)-G5D, NSJ□-□□□□(B)-M3D Communications Commands Reference Manual	W342	Describes the C-series (Host Link) and FINS communications commands used with CS/CJ-series PLCs.
NSJ5-TQ□□(B)-G5D, NSJ5-SQ□□(B)-G5D, NSJ8-TV□□(B)-G5D, NSJ10-TV□□(B)-G5D, NSJ12-TS□□(B)-G5D, NSJ5-TQ□□(B)-M3D, NSJ5-SQ□□(B)-M3D, NSJ8-TV□□(B)-M3D, NSJW-ETN21, NSJW-CLK21-V1, NSJW-IC101 NSJ Series Operation Manual	W452	Provides the following information about the NSJ-series NSJ Controllers: Overview and features Designing the system configuration Installation and wiring I/O memory allocations Troubleshooting and maintenance Use this manual in combination with the following manuals: SYSMAC CS Series Operation Manual (W339), SYSMAC CJ Series Operation Manual (W393), SYSMAC CS/CJ Series Programming Manual (W394), and NS-V1/-V2 Series Setup Manual (V083)
CXONE-AL□□D-V4 CX-Programmer Operation Manual	W446	Provides information on how to use the CX-Programmer for all functionality except for function blocks.

Name	Cat. No.	Contents
CXONE-AL□□D-V4 CX-Programmer Operation Manual Function Blocks/Structured Text	W447	Describes the functionality unique to the CX-Programmer and CP-series CPU Units or CS/CJ-series CPU Units with unit version 3.0 or later based on function blocks. Functionality that is the same as that of the CX-Programmer is described in W446 (enclosed).
SYSMAC CS/CJ Series CQM1H-PRO01-E, C200H-PRO27-E, CQM1-PRO01-E Programming Consoles Operation Manual	W341	Provides information on how to program and operate CS/CJ-series PLCs using a Programming Console.
SYSMAC CS/CJ Series CS1W-SCB□□-V1, CS1W-SCU□□-V1, CJ1W-SCU□□-V1, CJ1W-SCU□2 Serial Communications Boards/Units Operation Manual	W336	Describes the use of Serial Communications Unit and Boards to perform serial communications with external devices, including the usage of standard system protocols for OMRON products.
CXONE-AL□□D-V4 CX-Protocol Operation Manual	W344	Describes the use of the CX-Protocol to create protocol macros as communications sequences to communicate with external devices.
CXONE-AL□□D-V4 CX-Integrator Operation Manual	W464	Describes operating procedures for the CX-Integrator Network Configuration Tool for CS-, CJ-, CP-, and NSJ-series Controllers.
CXONE-AL□□D-V4/LT□□□-V4 CX-One FA Integrated Tool Package Setup Manual	W463	Installation and overview of CX-One FA Integrated Tool Package.

This manual contains the following sections.

Precautions provides general precautions for using the CJ-series Programmable Controllers (PLCs) and related devices.

Section 1 introduces the special features and functions of the CJ-series PLCs and describes the differences between these PLCs and the earlier C200HX/HG/HE PLCs.

Section 2 provides tables of standard models, Unit specifications, system configurations, and a comparison between different Units.

Section 3 provides the names of components and their functions for various Units. Unit dimensions are also provided.

Section 4 outlines the steps required to assemble and operate a CJ-series PLC System.

Section 5 describes how to install a PLC System, including mounting the various Units and wiring the System. Be sure to follow the instructions carefully. Improper installation can cause the PLC to malfunction, resulting in very dangerous situations.

Section 6 describes the initial hardware settings made on the CPU Unit's DIP switch.

Section 7 describes initial software settings made in the PLC Setup.

Section 8 describes I/O allocations to Basic I/O Units, Special I/O Units, and CPU Bus Units, and data exchange with CPU Bus Units.

Section 9 describes the structure and functions of the I/O Memory Areas and Parameter Areas.

Section 10 describes the internal operation of the CPU Unit and the cycle used to perform internal processing.

Section 11 provides information on hardware and software errors that occur during PLC operation.

Section 12 provides inspection and maintenance information.

The ***Appendices*** provide Unit specifications, current/power consumptions, Auxiliary Area words and bits, internal I/O addresses, and PLC Setup settings, and information on RS-232C ports,.

Terms and Conditions Agreement

Warranty, Limitations of Liability

Warranties

● **Exclusive Warranty**

Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

● **Limitations**

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right.

● **Buyer Remedy**

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

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

Limitation on Liability; Etc

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

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

Application Considerations

Suitability of Use

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

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

Programmable Products

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

Disclaimers

Performance Data

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

Change in Specifications

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

Errors and Omissions

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

PRECAUTIONS

This section provides general precautions for using the CJ-series Programmable Controllers (PLCs) and related devices.

The information contained in this section is important for the safe and reliable application of Programmable Controllers. You must read this section and understand the information contained before attempting to set up or operate a PLC system.

1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for programming and operating the Unit. Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during operation.

⚠ WARNING It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications.

3 Safety Precautions

⚠ WARNING The CPU Unit refreshes I/O even when the program is stopped (i.e., even in PROGRAM mode). Confirm safety thoroughly in advance before changing the status of any part of memory allocated to I/O Units, Special I/O Units, or CPU Bus Units. Any changes to the data allocated to any Unit may result in unexpected operation of the loads connected to the Unit. Any of the following operation may result in changes to memory status.

- Transferring I/O memory data to the CPU Unit from a Programming Device.
- Changing present values in memory from a Programming Device.
- Force-setting/-resetting bits from a Programming Device.
- Transferring I/O memory files from a Memory Card or EM file memory to the CPU Unit.
- Transferring I/O memory from a host computer or from another PLC on a network.

⚠ WARNING Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.

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

⚠**WARNING** Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.

⚠**WARNING** Do not touch the Power Supply Unit while power is being supplied or immediately after power has been turned OFF. Doing so may result in electric shock.

⚠**WARNING** Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. Unexpected operation, however, may still occur for errors in the I/O control section, errors in I/O memory, and other errors that cannot be detected by the self-diagnosis function. As a countermeasure for all such errors, external safety measures must be provided to ensure safety in the system.
- The PLC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-V DC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

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

⚠**Caution** Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes. Serious accidents may result from abnormal operation if proper measures are not provided.

⚠**Caution** Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

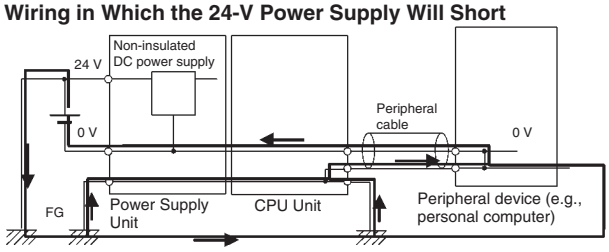
⚠**Caution** Confirm safety at the destination node before transferring a program to another node or changing contents of the I/O memory area. Doing either of these without confirming safety may result in injury.

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

⚠Caution A CJ1-H or CJ1M CPU Unit automatically back up the user program and parameter data to flash memory when these are written to the CPU Unit. I/O memory (including the DM, EM, and HR Areas), however, is not written to flash memory. The DM, EM, and HR Areas can be held during power interruptions with a battery. If there is a battery error, the contents of these areas may not be accurate after a power interruption. If the contents of the DM, EM, and HR Areas are used to control external outputs, prevent inappropriate outputs from being made whenever the Battery Error Flag (A40204) is ON. Areas such as the DM, EM, and HR Areas, the contents of which can be held during power interrupts, is backed up by a battery. If a battery error occurs, the contents of the areas that are set to be held may not be accurate even though a memory error will not occur to stop operation. If necessary for the safety of the system, take appropriate measures in the ladder program whenever the Battery Error Flag (A40204) turns ON, such as resetting the data in these areas.

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

Wiring in Which the 24-V Power Supply Will Short



4 Operating Environment Precautions

⚠Caution Do not operate the control system in the following locations:

- Locations subject to direct sunlight.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation as the result of severe changes in temperature.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to exposure to water, oil, or chemicals.
- Locations subject to shock or vibration.

⚠Caution Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power supplies.

⚠ **Caution** The operating environment of the PLC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PLC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the PLC System.

- You must use the CX-Programmer (programming software that runs on Windows) if you need to program more than one task. A Programming Console can be used to program only one cyclic task plus interrupt tasks. A Programming Console can, however, be used to edit multitask programs originally created with the CX-Programmer.

⚠ **WARNING** Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always connect to a ground of 100 Ω or less when installing the Units. Not connecting to a ground of 100 Ω or less may result in electric shock.
- A ground of 100 Ω or less must be installed when shorting the GR and LG terminals on the Power Supply Unit.
- Always turn OFF the power supply to the PLC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
  - Mounting or dismounting Power Supply Units, I/O Units, CPU Units, or any other Units.
  - Assembling the Units.
  - Setting DIP switches or rotary switches.
  - Connecting cables or wiring the system.
  - Connecting or disconnecting the connectors.

⚠ **Caution** Failure to abide by the following precautions could lead to faulty operation of the PLC or the system, or could damage the PLC or PLC Units. Always heed these precautions.

- The user program and parameter area data in CJ1-H/CJ1M CPU Units is backed up in the internal flash memory. The BKUP indicator will light on the front of the CPU Unit when the backup operation is in progress. Do not turn OFF the power supply to the CPU Unit when the BKUP indicator is lit. The data will not be backed up if power is turned OFF.

- If, when using a CJ-series CPU Unit, the PLC Setup is set to specify using the mode set on the Programming Console and a Programming Console is not connected, the CPU Unit will start in RUN mode. This is the default setting in the PLC Setup. (A CS1 CPU Unit will start in PROGRAM mode under the same conditions.)
- When creating an AUTOEXEC.IOM file from a Programming Device (a Programming Console or the CX-Programmer) to automatically transfer data at startup, set the first write address to D20000 and be sure that the size of data written does not exceed the size of the DM Area. When the data file is read from the Memory Card at startup, data will be written in the CPU Unit starting at D20000 even if another address was set when the AUTOEXEC.IOM file was created. Also, if the DM Area is exceeded (which is possible when the CX-Programmer is used), the remaining data will be written to the EM Area.
- Always turn ON power to the PLC before turning ON power to the control system. If the PLC power supply is turned ON after the control power supply, temporary errors may result in control system signals because the output terminals on DC Output Units and other Units will momentarily turn ON when power is turned ON to the PLC.
- Fail-safe measures must be taken by the customer to ensure safety in the event that outputs from Output Units remain ON as a result of internal circuit failures, which can occur in relays, transistors, and other elements.
- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e., not in the Programmable Controller) must be provided by the customer.
- Do not turn OFF the power supply to the PLC when data is being transferred. In particular, do not turn OFF the power supply when reading or writing a Memory Card. Also, do not remove the Memory Card when the BUSY indicator is lit. To remove a Memory Card, first press the memory card power supply switch and then wait for the BUSY indicator to go out before removing the Memory Card.
- If the I/O Hold Bit is turned ON, the outputs from the PLC will not be turned OFF and will maintain their previous status when the PLC is switched from RUN or MONITOR mode to PROGRAM mode. Make sure that the external loads will not produce dangerous conditions when this occurs. (When operation stops for a fatal error, including those produced with the FALS(007) instruction, all outputs from Output Unit will be turned OFF and only the internal output status will be maintained.)
- The contents of the DM, EM, and HR Areas in the CPU Unit are backed up by a Battery. If the Battery voltage drops, this data may be lost. Provide countermeasures in the program using the Battery Error Flag (A40204) to re-initialize data or take other actions if the Battery voltage drops.
- Always use the power supply voltages specified in the operation manuals. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.

- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Install Units as far as possible away from devices that generate strong, high-frequency noise.
- Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.
- Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- Separate the line ground terminal (LG) from the functional ground terminal (GR) on the Power Supply Unit before performing withstand voltage tests or insulation resistance tests. Not doing so may result in burning.
- Change the applied voltage gradually using the adjuster on the Tester. If full dielectric strength voltage is applied or turned OFF using the switch on the Tester, the generated impulse voltage may damage the Power Supply Unit.
- Install the Units properly as specified in the operation manuals. Improper installation of the Units may result in malfunction.
- Do not apply a force greater than 100 N on the terminal block when tightening the terminals.
- Do not drop the product or subject it to excessive vibration or shock.
- Be sure that all the terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction if foreign matter enters the Unit.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- Wire all connections correctly.
- Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring may result in burning.
- Mount Units only after checking terminal blocks and connectors completely.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Check switch settings, the contents of the DM Area, and other preparations before starting operation. Starting operation without the proper settings or data may result in an unexpected operation.
- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in an unexpected operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
    - Changing the operating mode of the PLC (including the setting of the startup operating mode).

  - Force-setting/force-resetting any bit in memory.
  - Changing the present value of any word or any set value in memory.
- Resume operation only after transferring to the new CPU Unit the contents of the DM Area, HR Area, and other data required for resuming operation. Not doing so may result in an unexpected operation.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables or other wiring lines. Doing so may break the cables.
- Do not use commercially available RS-232C personal computer cables. Always use the special cables listed in this manual or make cables according to manual specifications. Using commercially available cables may damage the external devices or CPU Unit.
- Do not connect pin 6 (+5 V power supply line) of the RS-232C port on the CPU Unit to any external device except the CJ1W-CIF11 RS-422A Adapter, NT-AL001 RS-232C/RS-422A Adapter, or NV3W-M□20L Programmable Terminal. Doing so may damage the external device or CPU Unit.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up. Not doing so may result in malfunction or damage.
- When transporting or storing circuit boards, cover them in antistatic material to protect them from static electricity and maintain the proper storage temperature.
- Do not touch circuit boards or the components mounted to them with your bare hands. There are sharp leads and other parts on the boards that may cause injury if handled improperly.
- Do not short the battery terminals or charge, disassemble, heat, or incinerate the battery. Do not subject the battery to strong shocks. Doing any of these may result in leakage, rupture, heat generation, or ignition of the battery. Dispose of any battery that has been dropped on the floor or otherwise subjected to excessive shock. Batteries that have been subjected to shock may leak if they are used.
- UL standards required that batteries be replaced only by experienced technicians. Do not allow unqualified persons to replace batteries.
- Dispose of the product and batteries according to local ordinances as they apply. Have qualified specialists properly dispose of used batteries as industrial waste.

廢電池請回收

- After connecting Power Supply Units, CPU Units, I/O Units, Special I/O Units, or CPU Bus Units together, secure the Units by sliding the sliders at the top and bottom of the Units until they click into place. Correct operation may not be possible if the Units are not securely properly. Be sure to attach the end cover provided with the CPU Unit to the rightmost Unit. CJ-series PLCs will not operate properly if the end cover is not attached.
- Unexpected operation may result if inappropriate data link tables or parameters are set. Even if appropriate data link tables and parameters have been set, confirm that the controlled system will not be adversely affected before starting or stopping data links.

- CPU Bus Units will be restarted when routing tables are transferred from a Programming Device to the CPU Unit. Restarting these Units is required to read and enable the new routing tables. Confirm that the system will not be adversely affected before allowing the CPU Bus Units to be reset.
- When wiring crossovers between terminals, the total current for both terminals will flow in the line. Check the current capacities of all wires before wiring crossovers.
- When wiring crossovers between terminals, the total current for both terminals will flow in the line. Check the current capacities of all wires before wiring crossovers.
- The following precautions apply to Power Supply Units with Replacement Notification.
  - When the LED display on the front of the Power Supply Unit starts to alternately display “0.0” and “A02” or the alarm output automatically turns OFF, replace the Power Supply Unit within 6 months.
  - Separate the alarm output cables from power lines and high-voltage lines.
  - Do not apply a voltage or connect a load to the alarm output that exceeds the rated voltage or load.
  - Maintain an ambient storage temperature of –20 to 30°C and humidity of 25% to 70% when storing the product for longer than 3 months to keep the replacement notification function in optimum working condition.
  - Always use the standard installation method. A nonstandard installation will decrease heat dissipation, delay the replacement notification signal, and may degrade or damage the internal elements.
- Design the system so that the power supply capacity of the Power Supply Unit is not exceeded.
- Do not touch the terminals on the Power Supply Unit immediately after turning OFF the power supply. Electric shock may occur due to the residual voltage.

6 Conformance to EC Directives

6-1 Applicable Directives

- EMC Directives
- Low Voltage Directive

6-2 Concepts

EMC Directives

OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards (see the following note). Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer.

EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

Note Applicable EMC (Electromagnetic Compatibility) standards are as follows:

EMS (Electromagnetic Susceptibility): EN61000-6-2
EMI (Electromagnetic Interference): EN61000-6-4
(Radiated emission: 10-m regulations)

Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 V AC and 75 to 1,500 V DC meet the required safety standards for the PLC (EN61131-2).

6-3 Conformance to EC Directives

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

1,2,3...

1. The CJ-series PLC must be installed within a control panel.
2. You must use reinforced insulation or double insulation for the DC power supplies used for the communications power supply and I/O power supplies.
3. CJ-series PLCs complying with EC Directives also conform to the Common Emission Standard (EN61000-6-4). Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment complies with EC Directives.

6-4 Relay Output Noise Reduction Methods

The CJ-series PLCs conforms to the Common Emission Standards (EN61000-6-4) of the EMC Directives. However, noise generated by relay output switching may not satisfy these Standards. In such a case, a noise filter must be connected to the load side or other appropriate countermeasures must be provided external to the PLC.

Countermeasures taken to satisfy the standards vary depending on the devices on the load side, wiring, configuration of machines, etc. Following are examples of countermeasures for reducing the generated noise.

Countermeasures

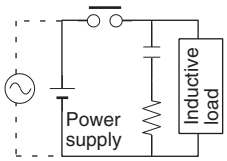
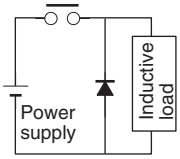
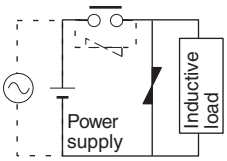
(Refer to EN61000-6-4 for more details.)

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

Countermeasures are required if the frequency of load switching for the whole system with the PLC included is more than 5 times per minute.

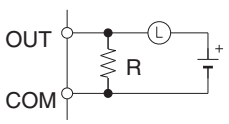
Countermeasure Examples

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

Circuit	Current		Characteristic	Required element
	AC	DC		
CR method 	Yes	Yes	If the load is a relay or solenoid, there is a time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 or 48 V, insert the surge protector in parallel with the load. If the supply voltage is 100 to 200 V, insert the surge protector between the contacts.	The capacitance of the capacitor must be 1 to 0.5 μF per contact current of 1 A and resistance of the resistor must be 0.5 to 1 Ω per contact voltage of 1 V. These values, however, vary with the load and the characteristics of the relay. Decide these values from experiments, and take into consideration that the capacitance suppresses spark discharge when the contacts are separated and the resistance limits the current that flows into the load when the circuit is closed again. The dielectric strength of the capacitor must be 200 to 300 V. If the circuit is an AC circuit, use a capacitor with no polarity.
Diode method 	No	Yes	The diode connected in parallel with the load changes energy accumulated by the coil into a current, which then flows into the coil so that the current will be converted into Joule heat by the resistance of the inductive load. This time lag, between the moment the circuit is opened and the moment the load is reset, caused by this method is longer than that caused by the CR method.	The reversed dielectric strength value of the diode must be at least 10 times as large as the circuit voltage value. The forward current of the diode must be the same as or larger than the load current. The reversed dielectric strength value of the diode may be two to three times larger than the supply voltage if the surge protector is applied to electronic circuits with low circuit voltages.
Varistor method 	Yes	Yes	The varistor method prevents the imposition of high voltage between the contacts by using the constant voltage characteristic of the varistor. There is time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 or 48 V, insert the varistor in parallel with the load. If the supply voltage is 100 to 200 V, insert the varistor between the contacts.	---

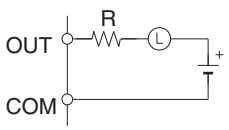
When switching a load with a high inrush current such as an incandescent lamp, suppress the inrush current as shown below.

Countermeasure 1



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

Countermeasure 2



Providing a limiting resistor

SECTION 1
Introduction

This section introduces the special features and functions of the CJ-series PLCs and describes the differences between these PLCs and the earlier C200HX/HG/HE PLCs.

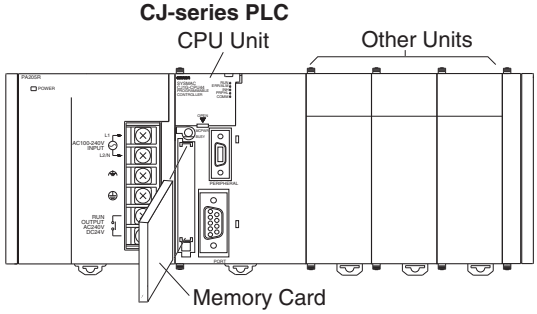
1-1 Overview

The CJ-series PLCs are very small-sized Programmable Controllers that feature high speed and advanced functions with the same architecture as the CS-series PLCs.

- Only 90 x 65 mm (H x D) for mounting in small spaces in machines and on the same DIN Track as components, contributing to machine downsizing, increased functionality, and modularization.
- Basic instructions executed at 0.016 μs min. and special instructions at 0.048 μs min (for the CJ1H-CPU□□H-R Units).
- Support the DeviceNet open network and protocol macros (for serial communications) to enable information sharing in machines. Machine-to-machine connections with Controller Link and host connections with Ethernet are also supported for even more advanced information sharing, including seamless message communications across Ethernet, Controller Link, and DeviceNet networks.

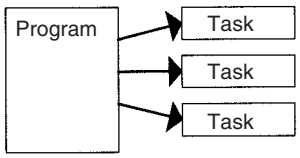
Same or Better Performance as CS-series PLCs

Basic instructions: 0.016 μs
Special instructions: 0.048 μs (using CJ1H-CPU□□H-R)
Same high-speed CPU bus as CS Series.
Large data memory: 256 Kwords
Program compatibility with CS-series PLCs



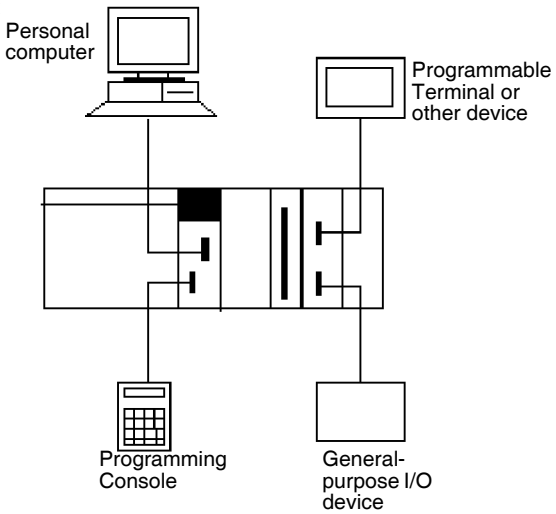
Structured Programming

The program is divided into tasks. Symbols can be used in programming.
The overall performance of the system is improved by executing only the required tasks.
Modification and debugging are simplified.
The program arrangement can be changed.
Step control and block programming instructions can be used.
Comments can be added to make the program easier to understand.



Protocol Macro Function Serves Multiple Ports

Up to 32 ports can be connected (Serial Communications Units).
Different Protocol Macros can be allocated to each port



Remote Programming, Monitoring and Seamless Links between Networks

FINS commands allow communications between nodes in different networks: Ethernet, Controller Link, and DeviceNet

Remote programming and monitoring can be performed.

Full Complement of Versatile Functions

Memory Card and file processing functions

Simplify programs with specialized instructions such as the table data and text string processing instructions

Troubleshooting functions

Data tracing function

Minimum (fixed) cycle time function

I/O refreshing method selection

PLC Setup functions

Use Windows tools to create multiple environments in a single personal computer.

The CJ-series PLCs support the same task-based programming structure, instructions, high-speed instruction execution, I/O memory, functionality, and message communications as the CS-series PLCs. The main differences of the CJ-series in comparison to the CS-series PLCs are as follows (refer to page 69 for details):

- No Backplanes are required.
- Screw mounting is not supported (only DIN Track mounting).
- Smaller size (30% to 35% in terms of volume).
- Inner Boards are not supported.
- I/O interrupt tasks and external interrupt tasks are not supported by CJ1 CPU Units. (They are supported by CJ1-H CPU Units.)
- C200H Special I/O Units are not supported (e.g., SYSMAC BUS Remote I/O Units).
- It is not necessary to create I/O tables unless desired, i.e., I/O tables can be created automatically when power is turned ON.
- The startup mode when a Programming Console is not connected is RUN mode (rather than PROGRAM mode, as it is for CS1 CPU Units).
- Only version 2.04 or higher versions of CX-Programmer can be connected for CJ1 CPU Units, version 2.1 or higher for CJ1-H CPU Units, and version 3.0 or higher for CJ1M CPU Units.

1-2 CJ-series Features

1-2-1 Special Features

Improvements in Basic Performance

The CJ Series provides high speed, high capacity, and more functions in micro-size PLCs.

Only 30% to 35% of the Volume of CS-series PLCs

At 90 x 65 mm (height x depth), the CJ-series Units have on 70% the height and half the depth of CS-series Units, contributing to machine downsizing.

Mount to DIN Track

The CJ-series PLCs can be mounted to DIN Track along with power supplies and other components when there is limited installation space in a machine (e.g., limited space between top and bottom ducts).

Faster Instruction Execution and Peripheral Servicing

Instructions	CJ1-H-R CPU Units	CJ1-H CPU Units		CJ1M CPU Units	CJ1 CPU Units
	CJ1H-CPU6□H-R	CJ1H-CPU6□H	CJ1H-CPU4□H	CJ1M-CPU□□	CJ1G-CPU□
Basic	0.016 μs	0.02 μs	0.04 μs	0.10 μs	0.08 μs
Special	0.048 μs	0.06 μs	0.08 μs	0.40 μs	0.29 μs
Floating-point calculations	0.24 μs	8.0 μs	9.2 μs	CPU11/21: 15.7 μs Other: 13.3 μs	10.2 μs

Processing for overhead, I/O refreshes, and peripheral servicing is also much faster.

Ample Programming Capacity

With up to 250 Ksteps of program capacity, 256 Kwords of DM Memory, and 2,560 I/O points, there is sufficient capacity for added-value programs including machine interfaces, communications, data processing, etc.

Program and PLC Setup Compatibility with CS-series CPU Units

There is almost 100% compatibility with CS-series CPU Units for programming and internal settings (PLC Setup).

Note Because of physical differences in the CJ-series PLCs, they do not support all of the features of the CS-series PLC.

No Backplanes for Greater Space Efficiency

A flexible system configuration that requires less space is made possible because Backplanes are not required for CJ-series PLCs.

Up to 3 Expansion Racks and 40 Units

By connecting an I/O Control Unit to the CPU Rack and I/O Interface Units to Expansion Racks, up to three Expansion Racks (but only one for CJ1M CPU Units) can be connected. The CPU Rack can contain up to 10 Units, as can each of the three Expansion Racks, enabling a total of up to 40 Units.

Two I/O Allocation Methods

The need for Backplanes was eliminated, enabling the following two methods for allocating I/O.

1. Automatic I/O Allocation at Startup
   I/O is allocated to the connected Units each time the power is turned ON (same as CQM1H PLCs).
2. User-set I/O Allocation
   If desired, the user can set I/O tables in the same way as for the CS-series PLCs.

The default setting is for automatic I/O allocation at startup, but the user can set the PLC to automatically use I/O tables to enable checking for Unit connection errors or to allocate unused words.

Allocate Unused Words

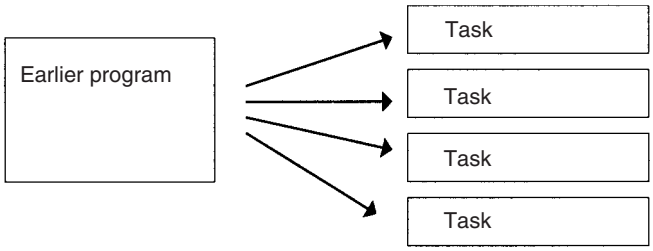
The CX-Programmer can be used to allocate unused words in I/O tables for transfer to the CPU Unit. This enables keeping words unallocated for future use or to enable system standardization/modularization.

Structured Programming

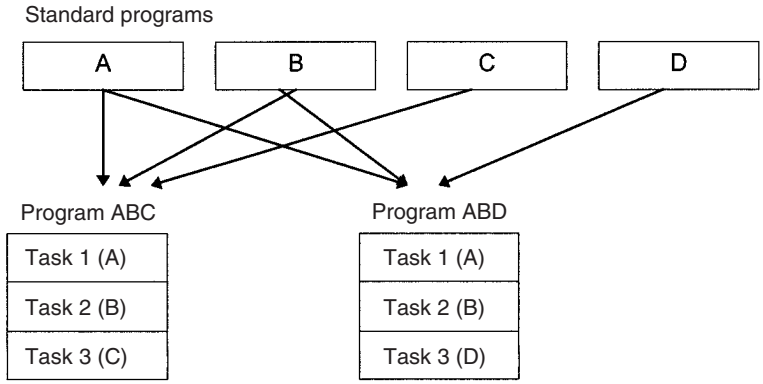
Division of the Program into Tasks

When the program is divided into tasks that handle separate functions, control systems, or processes, several programmers can develop these separate tasks simultaneously.

There can be up to 32 normal (cyclic) tasks and 256 interrupt tasks. There are four types of interrupts: the Power OFF Interrupt, Scheduled Interrupts, I/O Interrupts, and External Interrupts (interrupts from Special I/O Units or CPU Bus Units).

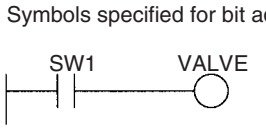


When a new program is being created, standard programs can be combined as tasks to create an entire program.



Using Symbols

Arbitrary symbols (names up to 32 characters) that are independent of I/O terminal allocations can be used in programming. Standard programs created with symbols are more general and easier to reuse as tasks in different programs.



Global and Local Symbols Supported

I/O names are handled as symbols which can be defined as global symbols, which apply to all of the programs in all tasks, or as local symbols, which apply to just the local task.

When the symbols are defined, you can choose to have the local symbols allocated to addresses automatically.

Improve Overall System Response Performance

The response performance of the system can be improved by dividing the program into a system-management task and tasks used for control, and executing only those control tasks that need to be executed.

Simplify Program Modification

- Debugging is more efficient when the job of modifying and debugging the tasks can be divided among several individuals.
- Program maintenance is easier because only the tasks affected by changes have to be modified when there are changes (such as changes in specifications).
- Several consecutive program lines can be modified with online editing.
- The amount the cycle time is extended during online editing has been reduced.

Change Program Arrangement Easily

When separate tasks have been programmed for different production models, the task control instructions can be used to switch the program quickly from production of one model to another.

Step Control and Block Programming

The step control and block programming instructions can be used to control repetitive processes that are difficult to program with ladder programming alone.

Comments

Several types of comments can be added to the program to make it easier to understand, including Rung comments, and I/O comments.

Section Function

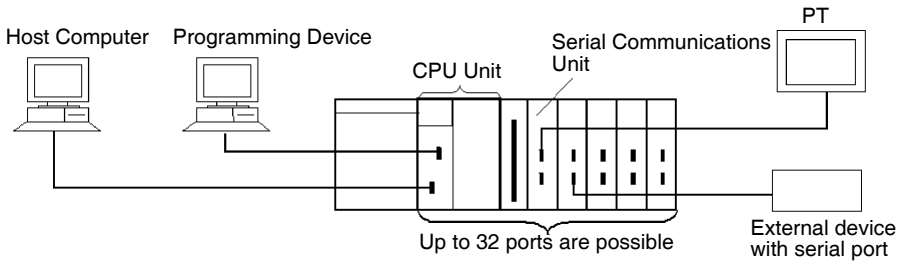
The section function can be used to make the program easier to visualize (CX-Programmer version 2.0 or higher).

Port-specific Protocol Macros

Create Protocol Macros for All Ports

Protocol macros can be used to create versatile communications functions for any of the PLC's communications ports. The communications functions can have host link, NT Link, or protocol macro configurations and can be directed to RS-232C and RS-422/485 ports on any of the Units.

All together, a CPU Unit can support a maximum of 32 ports.



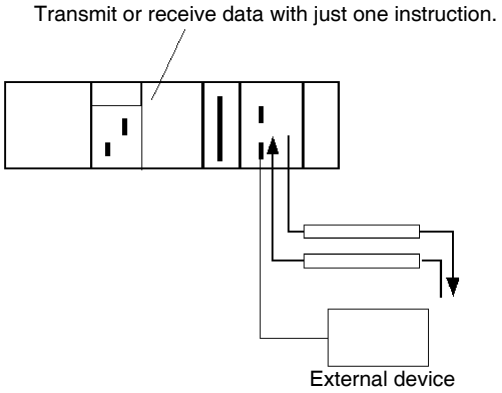
Standard Serial Communications with External Devices

Messages can be transferred to and from standard serial devices with the protocol macro function (according to preset parameter settings). The protocol macro function supports processing options such as retries, timeout monitoring, and error checks.

Symbols that read and write data to the CPU Unit can be included in the communications frames, so data can be exchanged with the CPU Unit very easily.

OMRON components (such as Temperature Controllers, ID System Devices, Bar Code Readers, and Modems) can be connected to a Serial Communications Unit with the standard system protocol. It is also possible to change the settings if necessary.

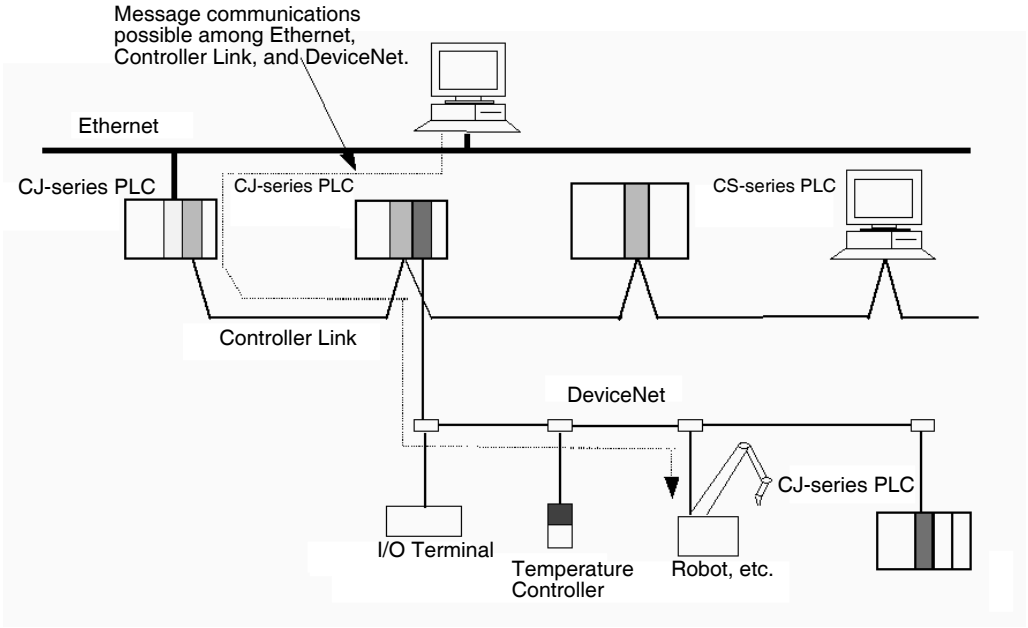
Note The Serial Communications Unit must be purchased separately to take advantage of this function.



Multilevel Network Configurations

Different network levels can be connected as shown in the following diagram. The multilevel configuration provides more flexibility in networking from the manufacturing site to production management.

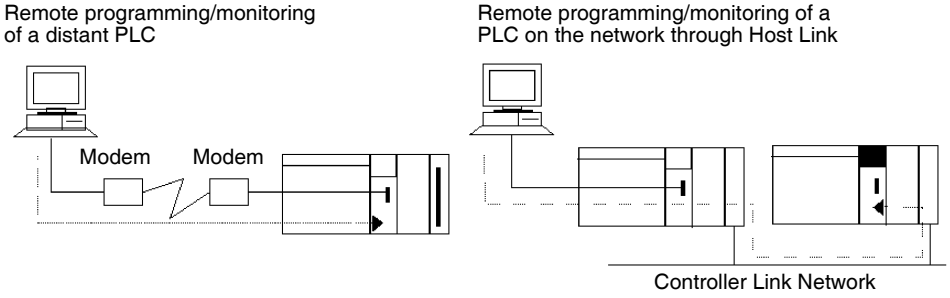
OA network:	Ethernet
FA network:	Controller Link
Open network:	DeviceNet

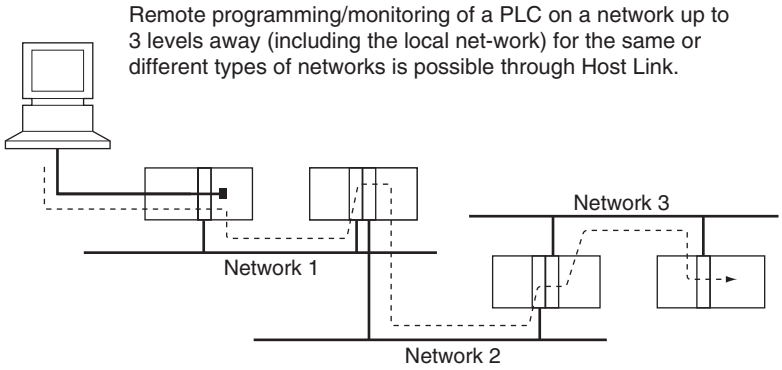


Remote Monitoring and Programming

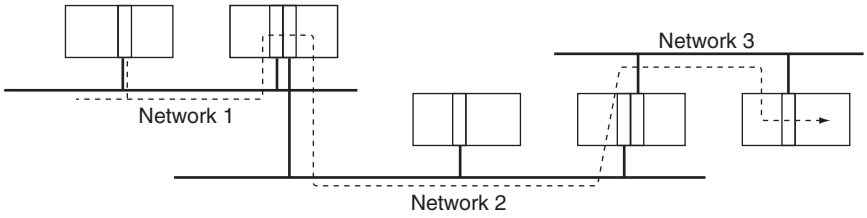
1,2,3...

1. The host link function can operate through a modem, which allows monitoring of a distant PLC's operation, data transfers, or even online editing of a distant PLC's program by phone.
2. PLCs in a network can be programmed and monitored through the Host Link.
3. It is possible to communicate through 3 network levels even with different types of networks.





Message transfer between PLCs on a network 3 levels away (including the local network) for the same or different types of networks.



Seamless message communications are possible across Ethernet, Controller Link, and DeviceNet networks, enabling easy information integration on machine, machine-to-machine, and machine-to-host levels.

Note

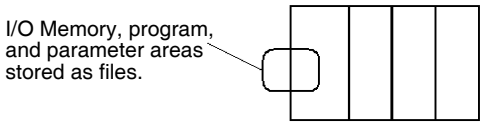
1. With CS/CJ-series CPU Units Ver. 2.0 or later, remote programming/monitoring is possible up to 8 levels away. Refer to *1-7-2 Improved Read Protection Using Passwords* for details.
2. NT Link communications between an NT31/NT631-V2 PT and a CJ-series PLC are now possible at high speed.

1-2-2 Versatile Functions

Memory Card and File Management Functions

Transfer Data to and from Memory Cards

Data area data, program data, and PLC Setup data can be transferred as files between the Memory Card (compact flash memory) and a Programming Device, program instructions, a host computer, or via FINS commands.



Convert EM Area Banks to File Memory (CJ1-H and CJ1 CPU Units Only)

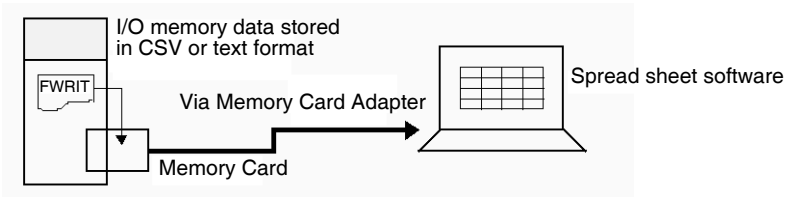
Part of the EM Area can be converted to file memory to provide file management capabilities without a Memory Card and with much faster access time than a Memory Card. (The EM Area can be very useful for storing data such as trend data as files.)

Automatic File Transfer at Start-up

The PLC can be set up to transfer the program and/or PLC Setup files from the Memory Card when the PLC is turned ON. With this function, the Memory Card provides a flash-ROM transfer. This function can also be used to store and change PLC configurations quickly and easily.

I/O Memory Files in CSV and Text Format

It is now possible to save production results and other data (hexadecimal) from the CPU Unit I/O memory in a Memory Card in CSV or text format. The data can then be read and edited using personal computer spreadsheet software by means of a Memory Card Adapter.

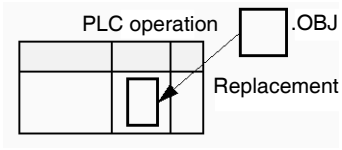


File Operations (Format, Delete, etc.) from Ladder Programs

It is possible to format files, delete, copy, change file names, create new directories, and perform similar operations on a Memory Card from the ladder program during PLC operation.

Program Replacement during Operation

It is now possible to replace the entire user program in the CPU Unit from the Memory Card during operation. In this way, it is possible to switch PLC operation without stopping the PLC.



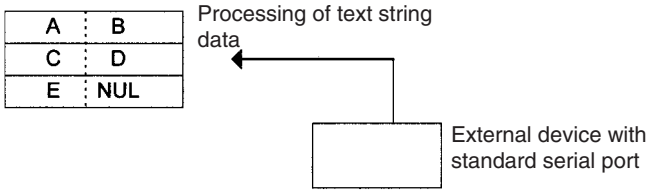
Easy Backups

It is now possible to back up all data (user programs, parameters, and I/O memory) to the Memory Card by pressing the Memory Card power supply switch. In this way, if a malfunction arises, it is possible to back up all data in the CPU Unit at the time without using a Programming Device.

Specialized Instructions Simplify Programming

Text String Instructions

The text string instructions allow text processing to be performed easily from the ladder program. These instructions simplify the processing required when creating messages for transmission or processing messages received from external devices with the protocol macro function.



Loop Instructions

The FOR(512), NEXT(513), and BREAK(514) instructions provide a very powerful programming tool that takes up little program capacity.

Index Registers

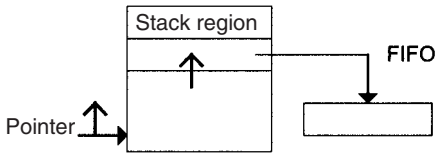
Sixteen Index Registers are provided for use as pointers in instructions. An Index Register can be used to indirectly address any word in I/O memory. The CJ-series PLCs also support the auto-increment, auto-decrement, and offset functions.

The Index Registers can be a powerful tool for repetitive processing (loops) when combined with the auto-increment, auto-decrement, and offset functions. Index Registers can also be useful for table processing operations such as changing the order of characters in text strings.

Table Data Processing Instructions

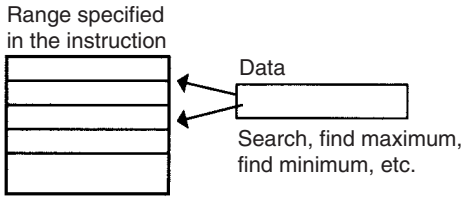
Stack Instructions

A region of I/O memory can be defined as a stack region. Words in the stack are specified by a stack pointer for easy FIFO (first-in first-out) or LIFO (last-in first-out) data processing.



Range Instructions

These instructions operate on a specified range of words to find the maximum value or minimum value, search for a particular value, calculate the sum or FCS, or swap the contents of the leftmost and rightmost bytes in the words.

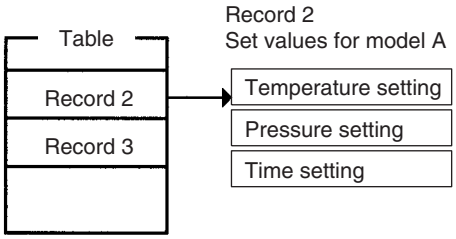


Record-table Instructions

Record-table instructions operate on specially defined data tables. The record table must be defined in advance with DIM(631), which declares the number of words in a record and the number of records in the table. Up to 16 record tables can be defined.

Record tables are useful when data is organized in records. As an example, if temperatures, pressures, or other set values for various models have been combined into a table, the record-table format makes it easy to store and read the set values for each model.

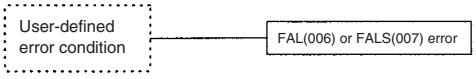
The SETR(635) can be used to store the first address of the desired record in an Index Register. Index Registers can then be used to simplify complicated processes such as changing the order of records in the record table, searching for data, or comparing data.



Troubleshooting Functions

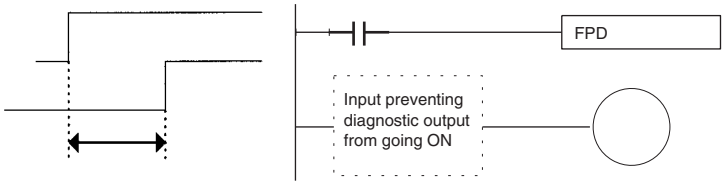
Failure Diagnosis: FAL(006) and FALS(007)

The FAL(006) and FALS(007) can be used to generate a non-fatal or fatal error when the user-defined conditions are met. Records of these errors are stored in the error log just like system-generated errors.



Failure Point Detection: FPD(269)

Diagnoses a failure in an instruction block by monitoring the time between execution of FPD(269) and execution of a diagnostic output and finding which input is preventing an output from being turned ON.



Error Log Functions

The error log contains the error code and time of occurrence for the most recent 20 errors (user-defined or system-generated errors).

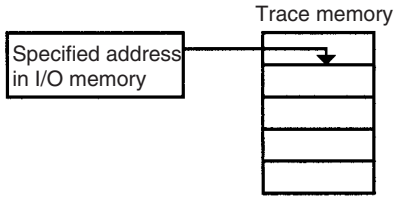
Maintenance Functions

The CJ-series PLCs record information useful for maintenance, such as the number of power interruptions and the total PLC ON time.

Other Functions

Data Trace Function

The content of the specified word or bit in I/O memory can be stored in trace memory by one of the following methods: scheduled sampling, cyclic sampling, or sampling at execution of TRSM(045).



Fixed Cycle Time Function

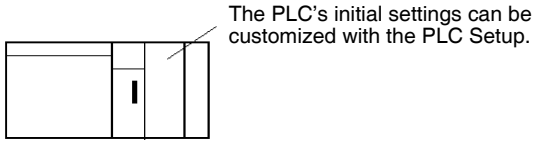
A fixed (minimum) cycle time can be set to minimize variations in I/O response times.

I/O Refreshing Methods

I/O refreshing can be performed cyclically and immediately by programming the immediate-refreshing variation of the instruction.

PLC Setup Functions

PLC operation can be customized with PLC Setup settings, such as the maximum cycle time setting (watch cycle time) and the instruction error operation setting, which determines whether instruction processing errors and access errors are treated as non-fatal or fatal errors.



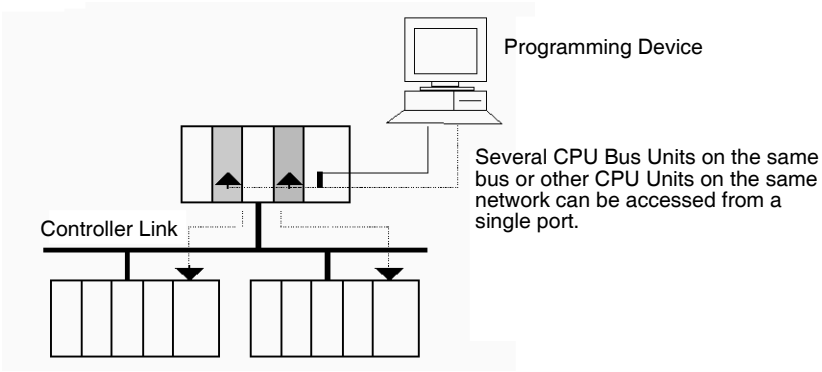
Binary Refreshing of Timer/Counter Instruction PVs

Present values of timer/counter instructions can now be refreshed in binary, in addition to the existing BCD capability. (Binary refreshing, however, can be specified with only CX-Programmer Ver. 3.0 and higher.) This allows the timer/counter setting time to be expanded to a range of 0 to 65535 (from the existing 0 to 9,999). Also, results calculated by other instructions can be used as is for timer/counter set values.

Windows-based Support Software

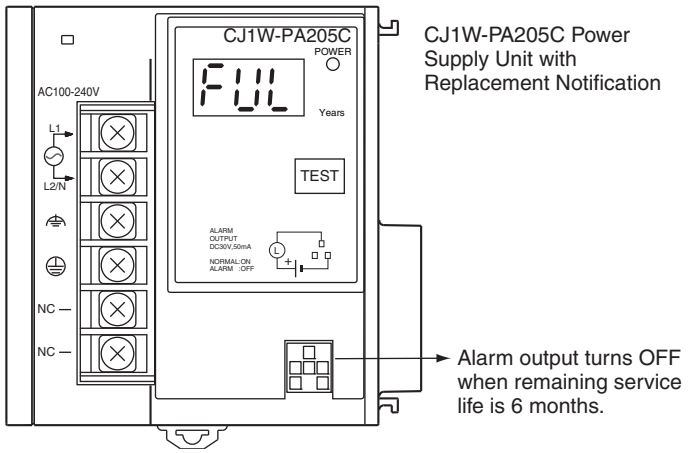
The single-port multiple-access (SPMA) function can be used to program and monitor other CPU Bus Units on the same bus (CPU Rack or Expansion

Racks) or other CPU Units on the same network from a serial port on the CPU Unit.



Power Supply Units with Replacement Notification

The CJ1W-PA205C Power Supply Units with Replacement Notification provide six display levels using a 7-segment display on the front panel of the Unit to indicate the remaining service life of the Power Supply Unit. An alarm output also notifies when the estimated remaining service life drops to 6 months or shorter. This function enables Power Supply Unit replacement before the power supply reaches the end of its service life resulting in a system failure.



1-3 CJ1-H and CJ1M CPU Unit Features

1-3-1 CJ1-H-R CPU Unit Features

The CJ1-H-R (high-speed) CPU Units (CJ1H-CPU□□H-R) have the following features.

The CJ1-H-R CPU Units are completely upwardly compatible from the CJ1H-CPU□□H Units, and yet they are much faster overall.

Example 1: A program consisting of 30K steps of only basic instructions with 128 inputs and 128 outputs executes in 0.7 ms, or 1.43 times faster (1 ms for a CJ1-H CPU Unit).

Example 2: A program consisting of 30K steps of basic and special instructions in a 7:3 ratio with 128 inputs and 128 outputs executes in 0.9 ms, or 1.33 times faster (1.2 ms for a CJ1-H CPU Unit).

Example 3: A program consisting of 30K steps of basic, special, and floating-point math instructions in a 6:3:1 ratio with 128 inputs, 128 outputs, two Analog Input Units, and Two Position Control Units (4 axes) executes in 1.5 ms, or 5.4 times faster (8.1 ms for a CJ1-H CPU Unit).

High-speed Overhead Processing (Less Than Half of Previous Models)

Overhead processing time has been reduced from 0.3 to 0.13 ms.

High-speed I/O Refreshing (Less Than Half of Previous Models)

On average, the refresh time for Basic I/O Units and Special I/O Units has been cut in half or more.

Examples:
16-point Input Unit: Reduced from 3 μs to 1.4 μs
Analog Input Unit: Reduced from 120 μs to 50 μs

High-speed Interrupts (Approximately Three Times Faster Than Previous Models)

The software interrupt response time has been reduced from 124 μs to 40 μs.

Scheduled Interrupts Set in Increments of 0.1 ms

A setting unit 0.1 ms has been added for scheduled interrupts.

High-speed Timer Instructions (Ten Times Faster Than Previous Models)

Although high precision was provided for the previous 1-ms timer instruction, 0.1-ms and 0.01-ms timer instructions have been added.

High-speed Clock Pulses (More Than Five Times Faster Than Previous Models)

Clock pulses of 0.1 ms, 1 ms, and 0.01 s (see note) have been added to the previous pulses of 0.02 s, 0.1 s, 0.2 s, 1 s, and 1 min.

Note The 0.01 s Clock Pulse cannot be used with unit version 4.1 of the CJ1-H-R CPU Units. The 0.01 s Clock Pulse can be used with all other unit versions.

High-speed Floating-point Math (Up to 70 Times Faster Than Previous Models

Floating-point calculations of sine, cosine, and tangent functions are up to 70 times faster than previous models.
Example: SIN: 42.0 μs reduced to 0.59 μs (71 times faster), COS: 31.5 μs reduced to 0.59 μs (53 times faster), TAN: 16.3 μs reduced to 1.18 μs (13.8 times faster).

New Instruction Added

The following instructions have been added.

- High-speed sine calculation: SINQ(475)
- High-speed cosine calculation: COSQ(476)
- High-speed tangent calculation: TANQ(462)
- Floating-point move: MOVF(469)
- High-speed Special I/O Unit refresh: FIORF(225)

More Relays in Relay Network Tables in Routing Tables

The number of relays that can be set in a relay network table has been increased from 20 to 64. Refer to the *CX-Integrator Operation Manual* (W445) and the Communication Unit operation manuals for details.

1-3-2 CJ1-H CPU Unit Features

Faster in Essentially Every Way

Ultra High-speed Cycle Time

The CJ1-H CPU Units provide a cycle time that is three to four times faster than that of the CJ1 CPU Units.

For example, a program consisting of 38 Ksteps of only basic instructions with 128 inputs and 128 outputs executes in 1 ms (4.9 ms for the CJ1 CPU Units); a program consisting of 20 Ksteps of basic and special instructions in a 1:1 ratio with 128 inputs and 128 outputs executes in 1 ms (2.7 ms for the CJ1 CPU Units); and a program consisting of 8 Ksteps of basic and special instructions in a 1:2 ratio with 64 inputs and 64 outputs executes in 0.5 ms (1.4 ms for the CJ1 CPU Units).

The following factors give the CJ1-H CPU Units their high speed.

1,2,3...

1. Instruction execution times: Only about 1/2 the time required for basic instructions, and only about 1/3 the time required for special instructions.
2. Better bus performance: Data transfers between the CPU Unit and Special I/O or Communications Units is about twice as fast, providing greater overall system performance.
3. Instruction execution is performed in parallel with peripheral servicing.
4. Other factors, including background execution of text string processing and table data processing instructions.

Faster Execution of Common Instructions

Extensive research on applications of CJ1 CPU Units was used to identify the 20 most commonly used instructions of the more than 400 supported instructions (see below), and execution speed for these instructions was increased by 10 to 20 times previous performance.

CPS (SIGNED BINARY COMPARE)
JMP (JUMP)
CPSL (DOUBLE SIGNED BINARY COMPARE)
CJP (CONDITIONAL JUMP)
XFER (BLOCK TRANSFER)
BCNT (BIT COUNTER)
MOVB (MOVE BIT)
MLPX (DATA DECODER)
MOVD (MOVE DIGITS)
BCD (BINARY-TO-BCD)
BSET (BLOCK SET)
SBS/RET (SUBROUTINE CALL/RETURN)

System Bus Speed Doubled

The speed of transferring data between the CPU Unit and CPU Bus Units has been doubled to increase overall system performance.

Parallel Processing of Instructions and Peripheral Servicing

A special mode is supported that enables parallel processing of instruction execution and peripheral device servicing to support the following types of application.

- Extensive data exchange with a host not restricted by the program capacity in the CJ1-H CPU Unit
- Consistently timed data exchange with SCADA software
- Eliminating the effects on cycle time of future system expansion or increases in communications

Less Cycle Time Fluctuation for Data Processing

Table data processing and text string processing, which often require time, can be separated over several cycles to minimize fluctuations in the cycle time and achieve stable I/O response.

Better Data Link and Remote I/O Refreshing

CPU Bus Unit refresh response has been increased both by reductions in the cycle time itself and by the addition of an immediate I/O refresh instruction for CPU Bus Units (DLNK(226)). This instruction will refresh data links, DeviceNet remote I/O, protocol macros, and other special data for CPU Bus Units.

The response of a CJ1-H CPU Unit is approximately 2.4 times that of a CJ1 CPU Unit. And, for a cycle time of approximately 100 ms or higher, the increase in the data link response is comparable to that for the cycle time.

Immediate Refreshing for CPU Bus Units

Although previously, I/O refreshing for CPU Bus Units was possible only after program executions, a CPU BUS I/O REFRESH instruction (DLNK(226)) has been added to enable immediate I/O refreshing for CPU Bus Units. Data links, DeviceNet remote I/O, an other unique CPU Bus Unit refreshing can be refreshed along with words allocated to the CPU Bus Unit in the CIO and DM Areas whenever DLNK(226) is executed. This is particularly effective for longer cycle times (e.g., 100 ms or longer). (Data exchange for data links, DeviceNet remote I/O, and other network communications are also affected by the communications cycle time, i.e., DLNK(226) refreshes data only between the CPU Bus Units and the CPU Unit, not the data on the individual networks.)

Function Block (FB)

When using a CPU Unit with unit version 3.0 or later, standard processes can be encapsulated as easily reusable function blocks as long as those processes only exchange I/O data externally. The function blocks can be written in ladder language or ST (structured text) language. Mathematical processing that is difficult to write in ladder language can be written easily in the ST language.

OMRON function blocks can be written in ladder language or ST (structured text) language, and conform to IEC 61131-3 standards (JIS B3503). The function blocks provide functions for more efficient design and debugging of the user equipment, as well as easier maintenance.

Smart FB Library

The Smart FB Library is a set of function blocks that improve interoperability between OMRON PLC Units and FA components. Since it isn't necessary to create a ladder program to use basic Unit and FA component functions, the user can concentrate on more important work, such as determining how to make the most of device functions.

Online Editing of FB Definitions

FB definitions can be changed during operation, so FB definitions can be edited quickly during debugging. In addition, FBs can be used with confidence even in equipment that must operate 24 hours/day. (Requires CPU Unit unit version 4.0 or later and CX-Programmer version 7.0 or higher.)

Nesting

Not only can programs be created with nested OMRON FBs, it is possible to make easy-to-understand, stress-free operations by switching displays under preset conditions and displaying structures in a directory-tree format. (Requires CX-Programmer version 6.0 or higher.)

Protecting FB Definitions

It is possible to prevent unauthorized manipulation, editing, or misappropriation of the program by setting passwords for the function block definitions allocated in the project file and protecting the definitions based on their purpose. (Requires CX-Programmer version 6.1 or higher.)

Offline Debugging with the Simulator

The Simulator enables checking the PLC program's operation on the desktop, so program quality can be improved and verified early on. Both the ladder and ST programming can be executed in the computer application.

Variable Support for String Operations (CPU Units with Unit Version 4.0 or Later)

The functions that perform string data operations in ST language not only support string variables, they also strengthen the functions used to communicate with string data I/O. This feature simplifies the creation of programs that send and receive communications commands. (Requires CPU Unit unit version 4.0 or later and CX-Programmer version 7.0 or higher.)

FB Generation Function

Existing PLC programming can be reused by easily converting it to FBs. (Requires CX-Programmer version 7.0 or higher.)

High-speed Structured Programming

To further aid standardized programming, program structuring functions have been improved, as has program execution speed.

Function Blocks

Required programming can be “encapsulated” in function blocks using either ladder diagrams or structure text. (Requires CPU Unit unit version 3.0 or later.)

More Cyclic Tasks

Tasks provide better efficiency by enabling programs to be separated by function or for development by different engineers. The CJ1-H CPU Units support up to 288 cyclic tasks, an incredible increase over the previous maximum of 32 tasks.

Common Processing from Multiple Tasks

Global subroutines that can be called by any task are now supported. These can be used for common processing from more than one task, for greater standardization.

Faster Subroutine Instructions

Subroutine instruction are executed approximately 9 or 17 times faster to enable greater program modularization without having to be concerned about increasing the cycle time.

Shared Index and Data Registers between Tasks

Although separate index and data registers can still be used in each task, they have been joined by shared index and data registers that can be used between tasks to reduce the time required to switch between tasks.

Download/Upload Tasks Individually (Unit Version 2.0 or Later)

The CX-Programmer can be used to upload or download only the required tasks. This enables the member of a development team to work separately and then upload/download tasks after debugging them, helping to eliminate the need for unification work by a manager as well as mistakes that can easily occur in such work.

Battery-free Operation with Flash Memory

Any user program or parameter area data transferred to the CPU Unit is automatically backed up in flash memory in the CPU Unit to enable battery-free operation without using a Memory Card.

Note Refer to information on flash memory in the *CS/CJ Series Programming Manual* (W394) for precautions on this function.

Store Comment/Section Data in CPU Unit's Flash Memory (Unit Version 3.0 or Later)

The CX-Programmer can be used to save I/O comments and other comment/section data in the comment memory contained in the CPU Unit's flash memory. When the simple backup operation is used, the comment/section data in flash memory can also be backed up.

Read Protection Using Extended Passwords (Unit Version 4.1 or Later)

With unit version 4.1 or later and CX-Programmer version 9.6 or higher, you can extend protection with UM read protection and task read protection to ensure better protection for your design assets. Also, if the password is incorrect five times in a row, a password cannot be entered for two hours.

Many Protection Functions

Improved Read Protection Using Passwords with CX-Programmer Version 4.0 or Higher

Read Protection for Specific Tasks

Passwords can be set to read-protect individual groups of tasks. This enables creating black boxes in the program.

Enabling/Disabling Creating File Memory Program Files

When read protection is set, an optional setting allows you to enable or disable creating program backup files (.OBJ). This setting can be used to prevent programs from being disclosed.

Program Write Protection

The user program can be protected without using the DIP switch setting. This helps prohibit unauthorized or accidental program changes.

Protection for CPU Units from FINS Write Commands Sent via Networks

Write operations to a CPU Unit using FINS commands across networks can be enabled for specific nodes and disabled for all other nodes. This can be used to enable monitoring data via networks while eliminating the possibility of accidental mistakes caused by careless writing operations.

More Instructions for Specific Applications

Very specific control can be easily programmed for a much wider range of applications with the many new special instructions added to the CJ1-H CPU Units.

High-speed Positioning for XY Tables

Double-precision floating-point calculations are supported for the CJ1-H CPU Units to provide even better precision for position control operations.

Convert between Floating Point and Text String Data

To display floating-point data on PTs, the CJ1-H CPU Units provide conversion instructions from floating-point data to text strings (ASCII). Conversion between ASCII and floating-point data is also possible so that ASCII data from serial communications with measurement devices can be used in calculations.

Accurate Line Approximations

Unsigned 16-bit binary/BCD data, signed 16/32-bit binary data, or floating-point data can be used for line data, enabling precise (high data resolution) conversions, such as from a level meter (mm) to tank capacity (l) based on the shape of the tank.

Realtime Workpiece Data Management

When loading and unloading workpieces from conveyor lines, stack instructions can be used to manage workpiece information in realtime in table format.

PID Autotuning

Autotuning is now supported for PID constants with the PID CONTROL instruction. The limit cycle method is used to ensure rapid autotuning. Very effective for multiloop PID control.

System Debugging through Error Simulation

A specified error status can be created with the FAL/FALS instructions. This can be used effectively when depending systems. For example, errors can be simulated to produce corresponding displays on a PT to confirm that the correct messages are being displayed.

Program Simplification with More Specific Basic Instructions

Programs that use a high quantity of basic instructions can be simplified though the use of differentiated forms of the LD NOT, AND NOT and OR NOT instructions, and through the use of OUT, SET, and RSET instructions that can manipulate individual bits in the DM or EM Area.

Delayed Power OFF Processing for Specified Program Areas

The DI and EI instructions can be used to disable interrupts during specific portions of the program, for example, to prevent the power OFF interrupt from being executed until a specific instruction has been executed.

Multiple Interlock Instructions (MILH(517), MILR(518), and MILC(519)) for Nested Interlocks

These instruction enable easy creation of nested interlocks. For example, create one interlock to control the entire program (e.g., for an emergency stop) and then nest other interlocks for separate portions of the program (e.g., conveyor operation, alarms, etc.).

TIME-PROPORTIONAL OUTPUT (TPO(685)) Instruction for Time-proportional Operation with Temperature Controllers or Variable-duty Lighting/ Power Control

This instruction is used in combination with PID instructions to create a time-proportional output based on the manipulated variable output by the PID instruction. This enables easily connecting an SSR to a Transistor Output Unit to achieve time-proportional operation of a Temperature Controller. Variable-duty pulse outputs can also be created for lighting or power control.

Symbol Time Comparison Instructions for Easy Calendar Timers

Two times/dates can be compared to continue operation to the next instruction in the ladder program rung when the results of comparison is true. Opposed to normal comparison instructions, comparisons are by byte and the bytes that are compared in the time/date data can be controlled. This enables comparing built-in clock data with set times/dates to easily create a calendar

timer, for example, on the hour (when the minutes is 0) or on a specific date each year).

GRAY CODE CONVERSION (GRY(474)) for Easy Conversion of Parallel Inputs from Absolute Encoders to Binary, BCD, or Angle Data

This instruction converts Gray binary codes to binary, BCD, or angle data. This enables easily handling position or angle data input as parallel signals (2^n) from an Absolute Encoder with a Gray code output using a DC Input Unit.

EXPANDED BLOCK COMPARE (BCMP2(502)) for Comparison Judgements for Up to 256 Ranges (Upper/Lower Limits) with One Instruction

This instruction determines if a value is within any of up to 256 ranges defined by upper and lower limits. When used with the GRAY CODE CONVERSION (GRY(474)) instruction, the same operation as a cam switch can be achieved by determining if an angle input from an Absolute Encoder is in a comparison table.

Easier Processing of I/O Devices with Special I/O Instructions

Previously many instructions were required to read or write data for external input devices such as digital switches and 7-segment displays connected to Basic I/O Units. Now, I/O processing for these devices can be achieved with a single instruction. These are sometimes call Combination Instructions.

These instructions are the same as those supported by the C200HX/HG/HE and CQM1H PLCs, with the exception that more than one of each of these instructions can be executed in a single user program.

TEN KEY INPUT (TKY(211))

Sequentially reads numbers input from a ten-key connected to an Input Unit.

HEXADECIMAL KEY INPUT (HKY(212))

Sequentially reads numbers input from a hexadecimal keypad connected to an Input Unit and an Output Unit for a maximum of 8 digits.

DIGITAL SWITCH INPUT (DSW(213))

Reads numbers input from a digital switch or thumbwheel switch connected to an Input Unit and an Output Unit. Either 4 or 8 digits are read.

MATRIX INPUT (MTR(210))

Sequentially reads 64 input points input from a 8 x 8 matrix connected to an Input Unit and an Output Unit.

7-SEGMENT DISPLAY OUTPUT (7SEG(214))

Converts 4-digit or 8-digit values to data for a 7-segment display and outputs the result.

Read/Write CPU Bus Unit Memory Areas with IORD(222)/IOWR(223)

Although INTELLIGENT I/O READ (IORD(222)) and INTELLIGENT I/O WRITE (IOWR(223)) could previously be used only for Special I/O Units, these instructions can now be used to read and write data for CPU Bus Units.

Easier Network Connections and More-advanced Seamless Network Communications

Online Connections via Networks without I/O Tables

Online connection is possible to any PLC in the local network from a Programming Device, such as the CX-Programmer, as soon as the network is connected. It's not necessary to create the I/O tables to enable connection; automatic I/O allocation at startup is used. This eliminates the need to use a serial connection to create I/O tables before the CX-Programmer can be connected via Ethernet. Only an Ethernet connection through a CJ1W-ETN21 Ethernet Unit is required to go online and create I/O tables.

Work Across Up to Eight Networks with CX-Net in CX-Programmer Version 4.0 or Higher

FINS commands can be sent across up to 8 network levels (including the local network). This enables a wider range of communications between devices on Ethernet and Controller Link Networks.

FINS commands can only be sent across up to 8 network levels when the destination is a CPU Unit. FINS commands can be sent to other destinations up to 3 network levels away.

Online Connections to PLCs via NS-series PTs

Downloading, uploading, and monitoring of ladder programs or other data is possible to a PLC connected serially to an NS-series PT from the CX-Programmer connected to the NS-series PT by Ethernet.

Easier Implementation of Explicit Messages with Explicit Message Instructions

Special Explicit Message Instructions are now supported to simplify using explicit messages. (Previously, CMND(490) had to be used to send a FINS command of 2801 hex to enable sending explicit messages.) The new instructions include the following: EXPLICIT MESSAGE SEND (EXPLT(720)), EXPLICIT GET ATTRIBUTE (EGATR(721)), EXPLICIT SET ATTRIBUTE (ESATR(722)), EXPLICIT WORD READ (ECHRD(723)), and EXPLICIT WORD WRITE (ECHWR(724)). Of these, EXPLICIT WORD READ (ECHRD(723)) and EXPLICIT WORD WRITE (ECHWR(724)) enable easily reading and writing data in CPU Units on networks with the same type of notation as used for SEND(290) and RECV(298). (Does not apply to C200HX/HG/HE and CV-series PLCs.)

Incorporate CompoWay/F-compatible OMRON Components into FINS Network Via Serial Gateway

Using the Serial Gateway mode for the CPU Unit's serial port enables flexible access to CompoWay/F-compatible OMRON components from devices on the network (e.g., PTs, PLC CPU Units, personal computers).

Use No-protocol Communications at Multiple Ports

No-protocol communications can be performed via the serial ports of Serial Communications Boards/Units with unit version 1.2 or later. This enables no-protocol communications at multiple ports.

Greater Flexibility in I/O Allocations

First Word Address Settings for Slots (Using CX-Programmer Version 3.1 or Higher)

When editing I/O tables for CJ1-H/CJ1M CPU Units, the first word address can be set for up to 64 slots. This can be used, for example, to create fixed starting addresses for Input Units and Output Unit to separate I/O allocations from the program and increase the efficiency of program maintenance.

Automatic Transfer at Power ON

Automatic Transfers at Power ON without a Parameter File (.STD)

The user program can be automatically transferred to the CPU Unit at power ON without a parameter file (.STD) if the name of the program file (.OBJ) is changed to REPLACE on the CX-Programmer and the file is stored on a Memory Card. This can be used, for example, to enable transferring a program to a CPU Unit by creating the program offline and sending it as an email attachment, without a local Programming Device.

Automatic Detection of I/O Allocation Method for Automatic Transfer at Power ON (CJ1-H and CJ1M CPU Units Ver. 2.0 or Later)

The method used to create the parameter file (AUTOEXEC.STD) for automatic transfer at power ON (automatic I/O allocation at startup or user-set I/O allocation) is recorded. When an automatic transfer at power ON is executed from the Memory Card, the recorded method is automatically detected and used to create the I/O tables.

For example, this method can be used to create files for automatic transfer at power ON in an office where Units are not mounted yet. The files can be

stored in a Memory Card, which can then be taken and installed in a CJ-series CPU Unit at the remote site. When automatic transfer at power ON is executed, the I/O will be allocated by the CPU Unit according to the method recorded in the Memory Card.

Operation Start/End Times

The times that operation is started and ended are automatically stored in memory in the Auxiliary Area (A515 to A517). This enables easier management of the operating times of the PLC System.

Free-running Timers

The system timers used after the power is turned ON are contained in the following Auxiliary Area words.

Name	Address	Function	Access
10-ms Incrementing Free Running Timer	A000	This word contains the system timer used after the power is turned ON. "A value of 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 10 ms. The value returns to 0000 hex after reaching FFFF hex (655,350 ms), and then continues to be automatically incremented by 1 every 10 ms. (Unit version 3.0 or later)	Read-only
100-ms Incrementing Free Running Timer	A001	This word contains the system timer used after the power is turned ON. A value of 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 100 ms. The value returns to A value of 0000 hex after reaching FFFF hex (6,553,500 ms), and then continues to be automatically incremented by 1 every 100 ms. (Unit version 3.0 or later)	Read-only
1-s Incrementing Free Running Timer	A002	This word contains the system timer used after the power is turned ON. A value of 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every second. The value returns to 0000 hex after reaching FFFF hex (65,535 s), and then continues to be automatically incremented by 1 every second. (Unit version 4.0 or later)	Read-only

Better Compatibility with Other SYSMAC PLCs

C200HE/HG/HX PLCs

The AREA RANGE COMPARE (ZCP) and DOUBLE AREA RANGE COMPARE (ZCPL) instructions are supported in the CJ1-H CPU Units to provide better compatibility with the C200HE/HG/HX PLCs.

CVM1/CV-series PLCs

The CONVERT ADDRESS FROM CV instruction allows real I/O memory addresses for the CVM1/CV-series PLCs to be converted to addresses for the CJ-series PLCs, enabling programs with CVM1/CV-series addresses to be quickly converted for use with a CJ-series CPU Unit.

Power Supply Units with Replacement Notification

The CJ1W-PA205C Power Supply Units with Replacement Notification provide six display levels using a 7-segment display on the front panel of the Unit to indicate the remaining service life of the Power Supply Unit. An alarm output also notifies when the estimated remaining service life drops to 6 months or shorter. This function enables Power Supply Unit replacement before the power supply reaches the end of its service life resulting in a system failure. It also enables planning Power Supply Unit replacement. For details refer to *Power Supply Units with Replacement Notification on page 13*.

1-3-3 CJ1M CPU Unit Features

Built-in I/O

The CJ1M CPU Units are high-speed, advanced, micro-sized PLCs equipped with built-in I/O. The built-in I/O have the following features.

General-purpose I/O

Immediate Refreshing

The CPU Unit's built-in inputs and outputs can be used as general-purpose inputs and outputs. In particular, immediate I/O refreshing can be performed on the I/O in the middle of a PLC cycle when a relevant instruction is executed.

Stabilizing Input Filter Function

The input time constant for the CPU Unit's 10 built-in inputs can be set to 0 ms (no filter), 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms. Chattering and the effects of external noise can be reduced by increasing the input time constant.

Interrupt Inputs

High-speed Interrupt Input Processing

The CPU Unit's 4 built-in inputs can be used for high-speed processing as regular interrupt inputs in direct mode or interrupt inputs in counter mode. An interrupt task can be started at the interrupt input's rising or falling edge (up or down differentiation.) In counter mode, the interrupt task can be started when the input count reaches the set value (up-differentiated or down-differentiated transitions.)

High-speed Counters

High-speed Counter Function

A rotary encoder can be connected to a built-in input to accept high-speed counter inputs.

Trigger Interrupts at a Target Value or in a Specified Range

Interrupts can be triggered when the high-speed counter's PV matches a target value or is within a specified range.

Measure the Frequency of High-speed Counter Inputs

The PRV(881) instruction can be used to measure the input pulse frequency (one input only.)

Maintain or Refresh (Selectable) High-speed Counter PVs

The High-speed Counter Gate Bit can be turned ON/OFF from the ladder program to select whether the high-speed counter PVs will be maintained or refreshed.

Pulse Outputs

Fixed duty ratio pulses can be output from the CPU Unit's built-in outputs to perform positioning or speed control with a servo driver that accepts pulse inputs.

CW/CCW Pulse Outputs or Pulse + Direction Outputs

The pulse output mode can be set to match the motor driver's pulse input specifications.

Automatic Direction Selection for Easy Positioning with Absolute Coordinates

When operating in absolute coordinates (origin defined or PV changed with the INI(880) instruction), the CW/CCW direction will be selected automatically when the pulse output instruction is executed. (The CW/CCW direction is selected by determining whether the number of pulses specified in the instruction is greater than or less than the pulse output PV.)

Triangular Control

Triangular control (trapezoidal control without a constant-speed plateau) will be performed during positioning executed by an ACC(888) instruction (independent) or PLS2(887) instruction if the number of output pulses required for acceleration/deceleration exceeds the specified target pulse Output Amount. Previously, an error would have occurred under these conditions and the instruction would not have been executed.

Change Target Position during Positioning (Multiple Start)

When positioning was started with a PULSE OUTPUT (PLS2(887)) instruction and the positioning operation is still in progress, another PLS2(887) instruction can be executed to change the target position, target speed, acceleration rate, and deceleration rate.

Switch from Speed Control to Positioning (Fixed Distance Feed Interrupt)

A PLS2(887) instruction can be executed during a speed control operation to change to positioning mode. This feature allows a fixed distance feed interrupt (moving a specified amount) to be executed when specific conditions occur.

Change Target Speed and Acceleration/Deceleration Rate during Acceleration or Deceleration

When trapezoidal acceleration/deceleration is being executed according to a pulse output instruction (speed control or positioning), the target speed and acceleration/deceleration rate can be changed during acceleration or deceleration.

Use Variable Duty Ratio Pulse Outputs for Lighting, Power Control, Etc.

The PULSE WITH VARIABLE DUTY RATIO instruction (PWM(891)) can be used to output variable duty ratio pulses from the CPU Unit's built-in outputs for applications such as lighting and power control.

Origin Search

Use a Single Instruction for Origin Search and Origin Return Operations

A precise origin search can be executed with one instruction that uses various I/O signals, such as the Origin Proximity Input Signal, Origin Input Signal, Positioning Completed Signal, and Error Counter Reset Output.

Also, an origin return operation can be performed to move directly to the established origin.

Quick-response Inputs

Receive Input Signals Shorter than the Cycle Time

With quick-response inputs, inputs to the CPU Unit's built-in inputs (4 inputs max.) with an input signal width as short as 30 μs can be received reliably regardless of the cycle time.

Improved Functions for PRV(881) and PRV2(883) (CJ1M Only)

High-frequency calculation methods have been added to the pulse frequency calculation methods for PRV(881) (HIGH-SPEED COUNTER PV READ) and PRV2(883) (PULSE FREQUENCY CONVERT) instructions (minimizes the error in high frequencies of 1 kHz or higher). PRV(881) can also be used to read the pulse output frequency.

Pulse Frequency Conversions

The pulse frequency input to high-speed counter 0 can be converted to a rotational speed (r/min.) or the PV of the counter can be converted to the total number of rotations.

Serial PLC Link Function

Data links (9 max.) can be set up between PLCs using the CPU Unit's RS-232C port. NT Link (1:N connection) can also be incorporated in a Serial PLC Link network, allowing the existing NT Link (1:N mode) and the Serial PLC Link to be used together.

Note 1: PTs are included in the number of links.

Note 2: The Serial PLC Link cannot be used for PT data links.

Scheduled Interrupt Function Used as High-precision Timer

Scheduled interrupts in units of 0.1 ms have been added for CJ1M CPU Units. An internal PV reset start function for scheduled interrupts has also been added, so it is possible to standardize the time to the first interrupt without using the CLI instruction. It is also possible to read the elapsed time from either a scheduled interrupt start or from the previous interrupt. This allows the interval timer (STIM instruction) in the CQM1H Series to be easily used for the CJ Series.

1-4 CJ1-H CPU Unit Ver. 4.1 Upgrades

This section summarizes the upgrades made for CJ1-H CPU Units with unit version 4.1.

Functional Upgrades for Unit Version 4.1

Function	Outline of function
Read protection using extended passwords (See note.)	With unit version 4.1 or later and CX-Programmer version 9.6 or higher, you can extend protection with UM read protection and task read protection to ensure better protection for your design assets.
Disabling password input after five consecutive incorrect passwords	Also, if the password is incorrect five times in a row when reading a ladder program from the CX-Programmer, a password cannot be entered for two hours.
Program operation protection using production lot numbers	The program can be protected against operation by using the production lot number stored in words A310 and A311 of the Auxiliary Area. The production lot number cannot be changed by the user.

Note CX-Programmer version 9.6 or higher must be used to enable using the functions added for unit version 4.1.

1-5 CJ1-H/CJ1M CPU Unit Ver. 4.0 Upgrades

This section summarizes the upgrades made for CJ1-H/CJ1M CPU Units with unit version 4.0. CX-Programmer version 7.0 or higher must be used to enable using the following functions.

Functional Upgrades for Unit Version 4.0

Function	Section
Online Editing of Function Blocks	*1-5-1 Online Editing of Function Blocks*
Input-Output Variables in Function Blocks	*1-5-2 Input-Output Variables in Function Blocks*
Text String Support in Function Blocks	*1-5-3 Text String Support in Function Blocks*

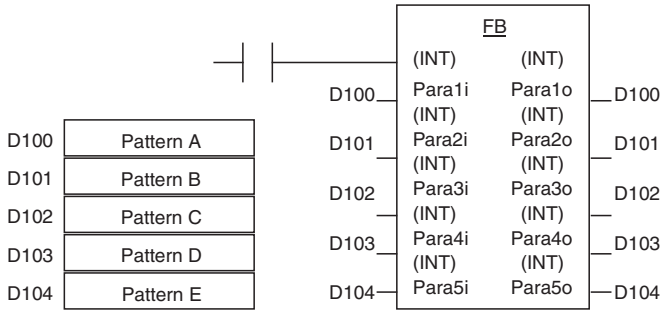
1-5-1 Online Editing of Function Blocks

Unit Version 3.0 or Earlier Function block definitions could not be changed during operation.

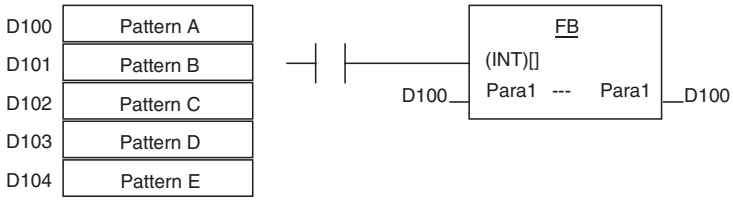
Unit Version 4.0 or Later Function block definitions can be changed during operation. This allows function block definitions to be quickly corrected during debugging. It also allows function blocks to be used more easily in systems that operate 24 hours a day.

1-5-2 Input-Output Variables in Function Blocks

Unit Version 3.0 or Earlier The data size of parameters that could be passed to and from function blocks was limited to four words maximum. It was thus necessary to separate elements with large data sizes, such as data tables.



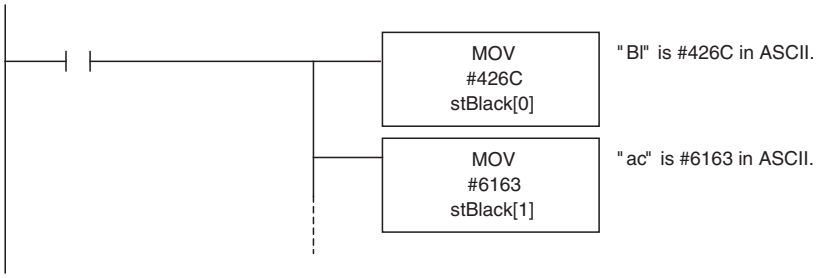
Unit Version 4.0 or Later Input-output variables can be used to passed large quantities of data, such as table data.



1-5-3 Text String Support in Function Blocks

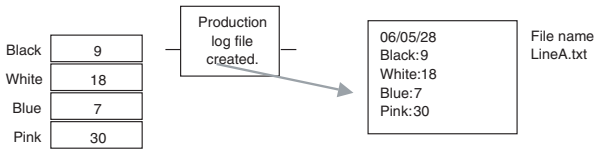
Unit Version 3.0 or Earlier

To program text string processing for communications commands and display data in ladder diagrams, it was necessary to know the ladder string instructions and ASCII codes. Also, several instructions had to be combined to converted from numbers to text strings or text strings to numbers.



Unit Version 4.0 or Later

Text strings can be used in ST programming to easily create text string processing programs.



FB to Create Production Log File

```
stBlack := INT_TO_STRING(Data[0]);      (* Convert black quantity to string *)
stWhite := INT_TO_STRING(Data[1]);      (* Convert white quantity to string *)
stBlue := INT_TO_STRING(Data[2]);       (* Convert blue quantity to string *)
stPink := INT_TO_STRING(Data[3]);       (* Convert pink quantity to string *)

GetDate(stDay)                          (* Get date text *)

stMessage := stDay  + '$N' + 'Black : '+ stBlack + '$N' + 'White : '+ stWhite + '$N' + 'Blue : '+ stBlue + '$N' + 'Pink : '+ stPink + '$N';

WRITE_TEXT(stMessage, '¥LineA', '', 0);     (* Create production log LineA.txt *)
```

FB to Create Date Text

```
(* ================================================================
     Name: Generate Date Text
     Function: To create text data for yy/mm/dd

     (C)Copyright OMRON Corporation 2006 All Rights Reserved.
================================================================ *)


stYYMM := WORD_TO_STRING(YYMM);    (* Create yymm text *)
stDDHH := WORD_TO_STRING(DDHH);    (* Create ddhh text *)

stDay := insert(stYYMM,'/',2) + '/' + left(stDDHH,2);
                    (* Insert / between yy and mm; extract only dd and combine *)
```

1-6 CJ1-H/CJ1M CPU Unit Ver. 3.0 Upgrades

The following table shows the functional upgrades for CJ1-H/CJ1M CPU Unit Ver. 3.0.

Functional Upgrades for CJ1-H/CJ1M CPU Unit Ver. 3.0

Function	Section
Function blocks (when using CX-Programmer Ver. 5.0 or higher)	1-6-1
Serial Gateway (converting FINS commands to CompoWay/F commands at the built-in serial port)	1-6-2
Comment memory (in internal flash memory)	1-6-3
Expanded simple backup data	1-6-4

Function		Section
Free running timer (system timer after power is turned ON)		1-6-5
New instructions added	TXDU(256) and RXDU(255) instructions (support no-protocol communications with Serial Communications Units with unit version 1.2 or later)	1-6-6
	Model conversion instructions: XFERC(565), DISTC(566), COLLC(567), MOVBC(568), and BCNTC(621)	
	Special function block instruction: GETID(286)	
Additional instruction functions	TXD(236) and RXD(235) instructions (support no-protocol communications with Serial Communications Boards with unit version 1.2 or later)	

1-6-1 Function Blocks (FB)

Unit Ver. 2.0 or Earlier

Earlier Units did not support function blocks (FB).

Unit Ver. 3.0 or Later

Function blocks (FB) conforming to IEC 61131-3 are supported. Use of function blocks is determined by the user.

Note IEC 61131-3 is an international standard for programmable logic controllers (PLC) established by the International Electro-technical Commission (IEC). This standard is divided into seven parts, of which Part 3 *Programming Languages* (IEC 61131-3) provides regulations for programming PLCs.

Function blocks can be created with CX-Programmer Ver. 5.0 or higher by the user and pasted into normal programs. The standard function blocks provided by OMRON in the OMRON FB Library can also be pasted into normal programs. Function blocks enable standard processing to be simply inserted into a program as a single unit. Function blocks provide the following features.

- Function block algorithms can be written using ladder programming or structured text (see note).

  Note Structured text is a high level textual language designed for industrial control (primarily PLCs) stipulated in IEC 61131-3. The structured text supported by CX-Programmer Ver. 5.0 conforms to IEC 61131-1.

- A single function block that has been created can be stored in a library for easy reuse of standard processing.
- Programs that contain function blocks (ladder programming or structured text), can also be uploaded or downloaded in the same way as normal programs that do not contain function blocks. Tasks that include function blocks, however, cannot be downloaded in task units (although they can be uploaded).
- Array (one-dimensional) variables are supported, making it easier to handle data specific to an application.

1-6-2 Serial Gateway (Converting FINS to CompoWay/F Via Serial Port)

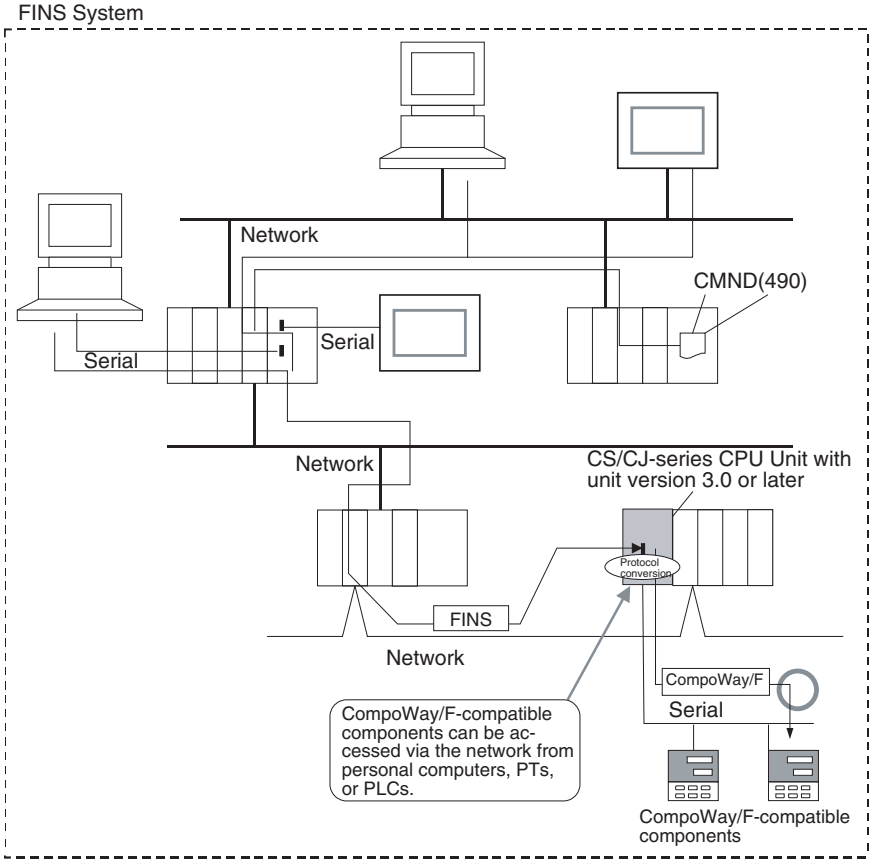
Unit Ver. 2.0 or Earlier

Temperature Controllers, Digital Panel Meters, and other CompoWay/F-compatible OMRON Components previously could be accessed by sending user-specified CompoWay/F commands from the PLC. This required, however, the use of a Serial Communications Board/Unit protocol macro, execution of the PMCR(260) instruction in the ladder program of the CPU Unit on the same PLC, and implementation of the standard system protocol (CompoWay/F Master). The use of protocol macros prevented access across networks.

Note Specific data could be shared without communications instructions if user-specified CompoWay/F commands were not required, however, by using the CJ1W-CIF21 Basic Communications Unit.

Unit Ver. 3.0 or Later

FINS commands (CompoWay/F commands encapsulated in FINS frames) received by the CPU Unit at the built-in serial port (RS-232C port or peripheral port) are converted automatically into CompoWay/F command frames and transmitted on the serial line. This enables access to CompoWay/F-compatible OMRON components that are connected to the CPU Unit's built-in serial port via either an NS-series Programmable Terminal (PT) or by using the CMND(490) instruction.



1-6-3 Comment Memory (in Internal Flash Memory)

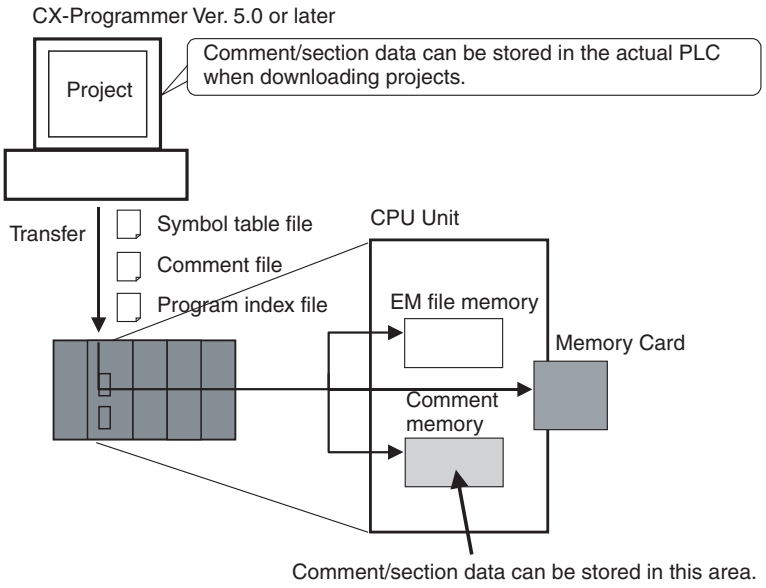
Unit Ver. 2.0 or Earlier

Comment data and section data could not be stored in the actual PLC when a project was downloaded from the CX-Programmer to the CPU Unit unless both a Memory Card and EM file memory were available.

Unit Ver. 3.0 or Later

A comment memory is provided within the CPU Unit's internal flash memory. Therefore, the following comment/section data can be stored in and read from comment memory even if neither Memory Card nor EM file memory are available.

- Symbol table files (including CX-Programmer symbol names and I/O comments)
- Comment files (CX-Programmer rung comments and other comments)
- Program index files (CX-Programmer section names, section comments, and program comments)



CX-Programmer Ver. 5.0

When downloading projects using the CX-Programmer Ver. 5.0, either of the following storage locations can be selected as the transfer destination for comment data and section data.

- Memory Card
- EM file memory
- Comment memory (in CPU Unit's internal flash memory)

CX-Programmer Ver. 4.0 or Earlier

When using CX-Programmer Ver. 4.0 or earlier, data is stored in either the Memory Card or EM file memory, whichever is available. If neither the Memory Card nor EM file memory is available, the comment/section data is stored in comment memory (in CPU Unit's internal flash memory).

1-6-4 Simple Backup Data Expanded

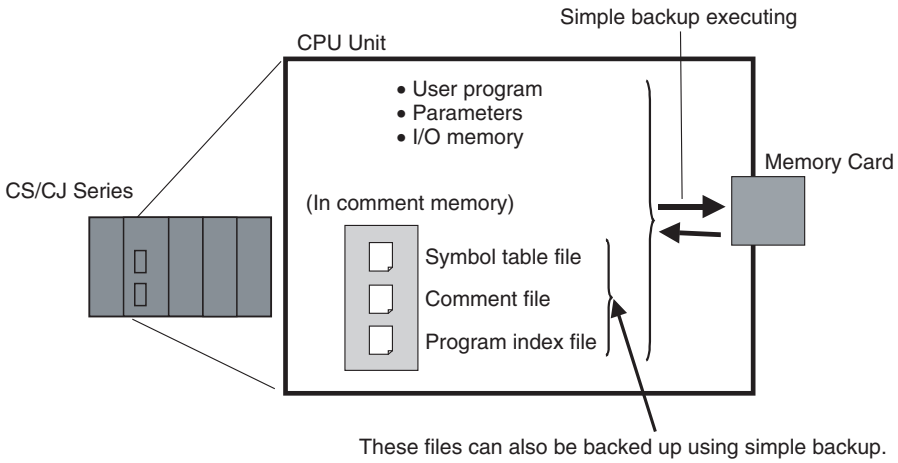
Unit Ver. 2.0 or Earlier

The simple backup function could not be used to back up comment data or section data.

Unit Ver. 3.0 or Later

The following files stored in comment memory can be backed up to a Memory Card when a simple backup operation is executed, or the files can be restored to comment memory from the Memory Card.

- Symbol table files (including CX-Programmer symbol names and I/O comments)
- Comment files (CX-Programmer rung comments and other comments)
- Program index files (CX-Programmer section names, section comments, and program comments)



This enables backup/restoration of all data in the CPU Unit including I/O comments if an error occurs or when adding a CPU Unit with the same specifications without requiring a Programming Device.

1-6-5 Free-running Timers

The system timers used after the power is turned ON are contained in the following Auxiliary Area words.

Name	Address	Function	Access
10-ms Incrementing Free Running Timer	A000	This word contains the system timer used after the power is turned ON. A value of 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 10 ms. The value returns to 0000 hex after reaching FFFF hex (655,350 ms), and then continues to be automatically incremented by 1 every 10 ms. (Unit version 3.0 or later)	Read-only
100-ms Incrementing Free Running Timer	A001	This word contains the system timer used after the power is turned ON. A value of 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 100 ms. The value returns to 0000 hex after reaching FFFF hex (6,553,500 ms), and then continues to be automatically incremented by 1 every 100 ms. (Unit version 3.0 or later)	Read-only
1-s Incrementing Free Running Timer	A002	This word contains the system timer used after the power is turned ON. A value of 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every second. The value returns to 0000 hex after reaching FFFF hex (65,535 s), and then continues to be automatically incremented by 1 every second. (Unit version 4.0 or later)	Read-only

Note The timer will continue to be incremented when the operating mode is switched to RUN mode.

Example: The interval can be counted between processing A and processing B without requiring timer instructions. This is achieved by calculating the difference between the value in A000 for processing A and the value in A000 for processing B. The interval is counted in 10 ms units.
CPU Units with unit version 4.0 and later also have a 1-s timer in A002, which is incremented by 1 every 1 s.

1-6-6 New Special Instructions and Functions

The following new instructions and instruction functions have been added. For details, refer to the *CS/CJ Series Instructions Reference Manual* (W474). These new instructions are supported by the CX-Programmer Ver. 5.0 or higher only.

- Serial Communications Instructions:
  Supporting no-protocol communications with Serial Communications Units with unit version 1.2 or later:
  TXDU(256): TRANSMIT VIA SERIAL COMMUNICATIONS UNIT
  RXDU(255): RECEIVE VIA SERIAL COMMUNICATIONS UNIT
  Supporting no-protocol communications with Serial Communications Boards with unit version 1.2 or later:
  TXD(236): TRANSMIT
  RXD(235): RECEIVE
- Model Conversion Instructions:
  When using CX-Programmer Ver. 5.0 or higher to convert a C-series ladder program for use in a CS/CJ-series CPU Unit, the C-series XFER(070), DIST(080), COLL(081), MOVB(082), and BCNT(067) instructions will be automatically converted to the following instructions. The operands do not require editing.
  XFERC(565) BLOCK TRANSFER
  DISTC(566) SINGLE WORD DISTRIBUTE
  COLLC(567) DATA COLLECT
  MOVBC(568) MOVE BIT
  BCNTC(621) BIT COUNTER
- High-speed Counter/Pulse Output Instructions (CJ1M Only):
  High-frequency calculation methods have been added to the pulse frequency calculation methods for PRV(881) (HIGH-SPEED COUNTER PV READ) and PRV2(883) (PULSE FREQUENCY CONVERT) instructions. PRV(881) can also be used to read the pulse output frequency.

1-7 CJ1-H/CJ1M CPU Unit Ver. 2.0 Upgrades

The following table shows the functional upgrades for CJ1-H/CJ1M CPU Unit Ver. 2.0.

Functional Upgrades for CJ1-H/CJ1M CPU Unit Ver. 2.0

Function	Reference
Downloading and Uploading Individual Tasks	Page 34
Improved Read Protection Using Passwords	Page 35
Write Protection from FINS Commands Sent to CPU Units via Networks	Page 40
Online Network Connections without I/O Tables	Page 45
Communications through a Maximum of 8 Network Levels	Page 47

Function	Reference
Connecting Online to PLCs via NS-series PTs	Page 49
Setting First Slot Words	Page 50
Automatic Transfers at Power ON without a Parameter File	Page 52
Operation Start/End Times	Page 53
Automatic Detection of I/O Allocation Method for Automatic Transfer at Power ON	Page 54
New Application Instructions	Page 55

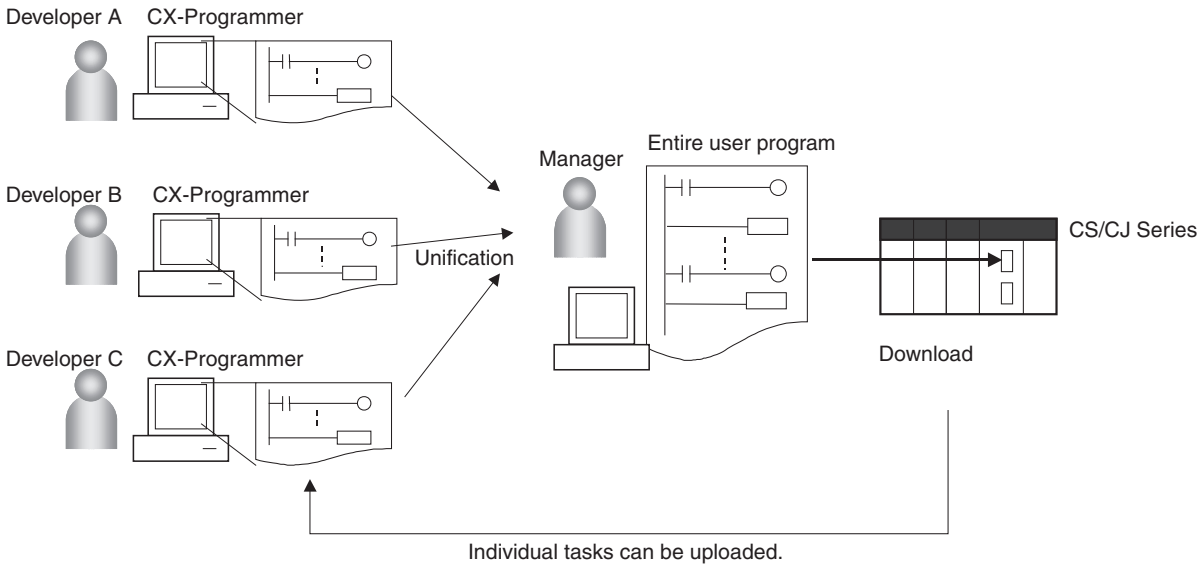
1-7-1 Downloading and Uploading Individual Tasks

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

With the Pre-Ver. 2.0 CPU Units, individual program tasks could not be downloaded from the CX-Programmer. It was only possible to download the entire user program.

For example, if several programmers were developing the program, the project manager had to unify each program after debugging and then download the entire user program. Furthermore, the entire user program had to be downloaded even if just a few changes were made.

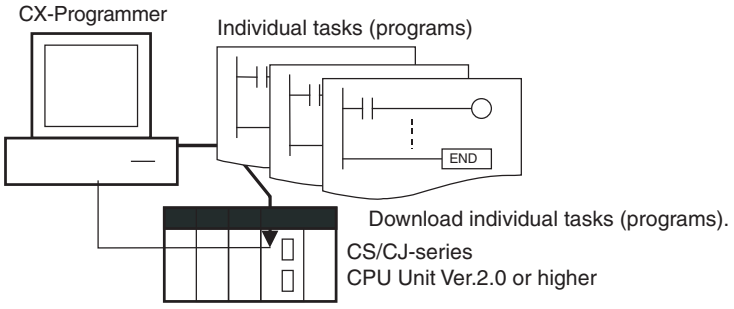
Note It was possible to upload individual program tasks with CS/CJ-series PLCs.



CPU Unit Ver. 2.0

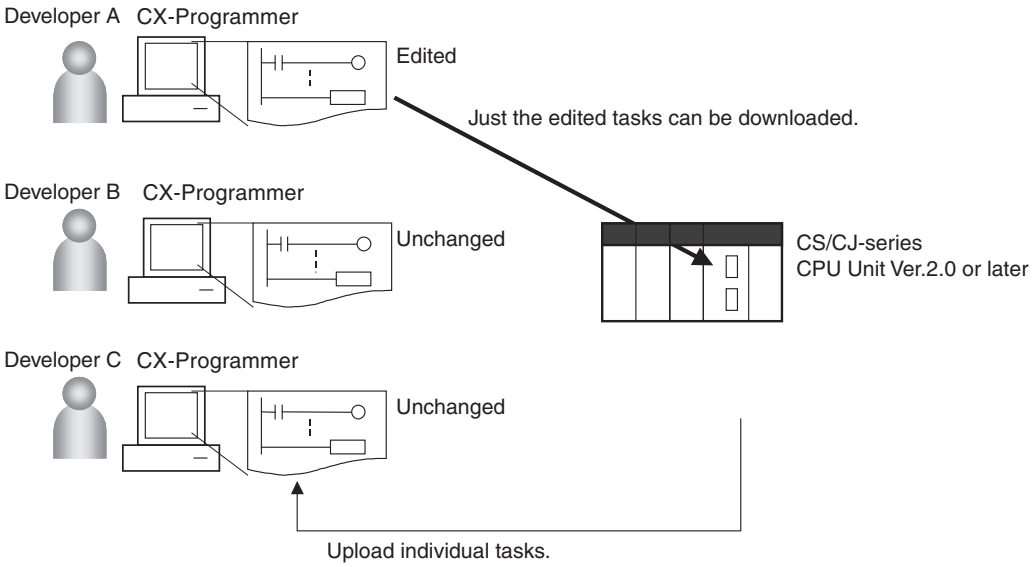
Overview

With CPU Unit Ver. 2.0 or later CPU Units, individual program tasks can be uploaded and downloaded from the CX-Programmer.



Usage

When several programmers are developing a program, it isn't necessary for a project manager to unify the data because just the debugged tasks can be downloaded/uploaded. Also, transferring individual tasks can help avoid mistakes.



Restrictions to Function Block Use

Individual tasks cannot be downloaded for programs containing function blocks (unit version 3.0 or later only) (uploading is possible).

1-7-2 Improved Read Protection Using Passwords

Read Protection for Individual Tasks Using Passwords

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

With the pre-Ver. 2.0 CS/CJ-series CPU Units, it was possible to read-protect the entire PLC with a password (referred to as “UM read protection” below), but it was not possible to protect individual tasks.

UM read protection prevented anyone from displaying, editing, or uploading the entire user program from CX-Programmer without inputting the correct password.

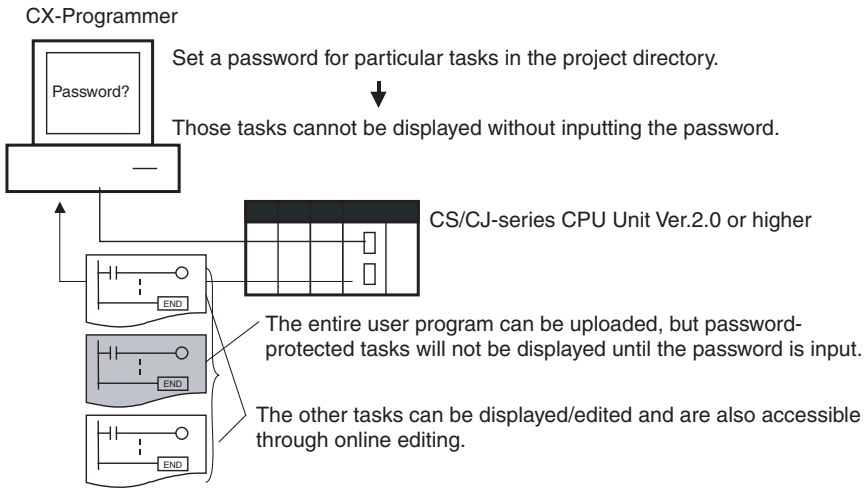
CPU Unit Ver. 2.0 or Later and CX-Programmer Ver. 4.0 or Higher

Overview

With the CPU Unit Ver. 2.0 or later CPU Units, it is possible to read-protect individual program tasks (referred to as “task read protection” below) or the entire PLC. same password controls access to all of the read-protected tasks.

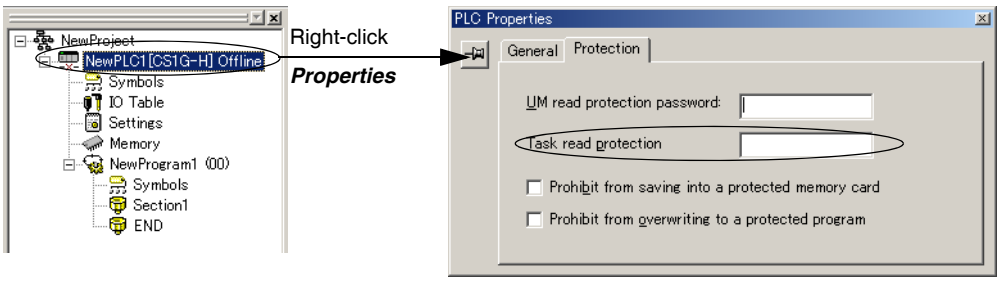
Task read protection prevents anyone from displaying, editing, or uploading the read-protected set of tasks from CX-Programmer without inputting the correct password. In this case, the entire program can be uploaded, but the read-protected tasks cannot be displayed or edited without inputting the correct password. Tasks that are not read-protected can be displayed, edited, or modified with online editing.

Note Task read protection cannot be set if UM read protection is already set. However, it is possible to set UM read protection after task read protection has been set.

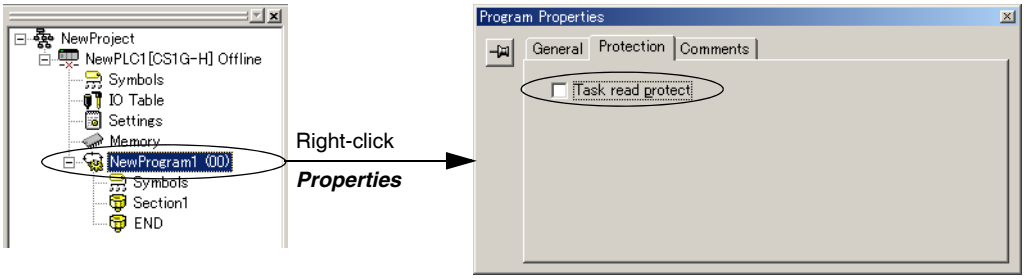


Operating Procedure

1,2,3... 1. Display the *Protection* Tab of the PLC Properties Window and register a password in the *Task read protection* Box.



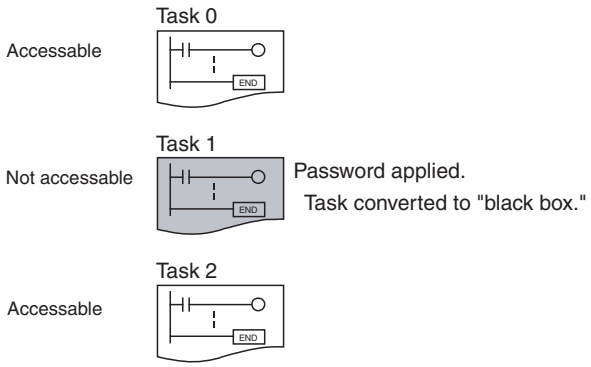
2. Select the tasks that will be password-protected and select the *Task read protect* Option in the *Program Properties* Tab.



3. Connect online and execute either step a or b below.
   a) Transferring the Program and Setting Password Protection:
   Select ***PLC - Transfer - To PLC*** to transfer the program. The tasks registered in step 2 will be password-protected.
   b) Setting Password Protection without Transferring the Program:
   Select ***PLC - Protection - Set Password*** and click the **OK** button. The tasks registered in step 2 will be password-protected.

Usage

Apply read protection to tasks when you want to convert those tasks (programs) to “black box” programs.



Note

1. If CX-Programmer Ver. 3.2 or a lower version is used to read a task with task read protection applied, an error will occur and the task will not be read. Likewise, if a Programming Console or the PT Ladder Monitor function is used to read a password protected task, an error will occur and the task will not be read.
2. The entire program can be transferred to another CPU Unit even if individual tasks in the program are read-protected. It is also possible to connect online and create a program file (.OBJ file) with file memory operations. In both cases, the task read protection remains effective for the password-protected tasks.
3. When the CX-Programmer is used to compare a user program in the computer's memory with a user program in the CPU Unit, password-protected tasks will be compared too.

Restrictions to Function Block Use

Function block definitions can be read even if the entire program or individual tasks in a program containing function blocks (CPU Unit Ver. 3.0 or later only) are read-protected.

Enabling/Disabling Creating File Memory Program Files

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

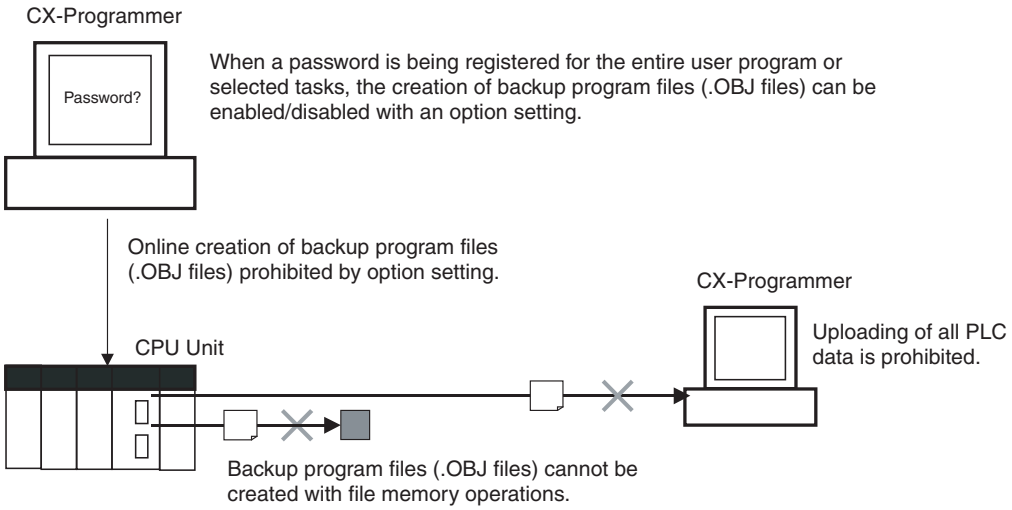
With the pre-Ver. 2.0 CS/CJ-series CPU Units, it was possible use file memory operations to transfer a program file (.OBJ file) to a Memory Card even if the program was protected with UM read protection. (Consequently, illegal copies could be made.)

CPU Unit Ver. 2.0 or Later and CX-Programmer Ver. 4.0 or Higher

Overview

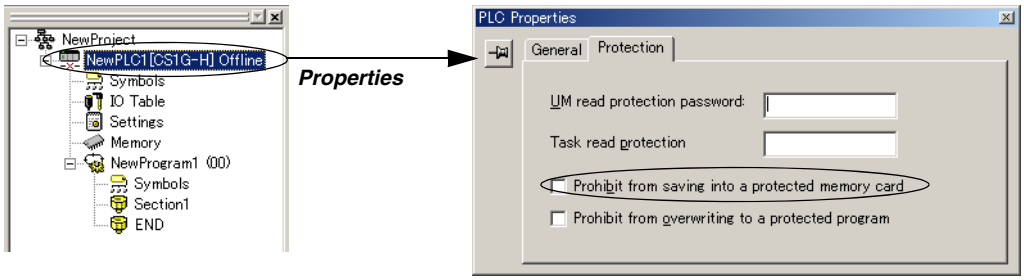
When the entire program or individual tasks in a CPU Unit Ver. 2.0 or later are read-protected from the CX-Programmer, an option can be set to enable or disable the creation/backup of .OBJ program files. It will not be possible to create program files (.OBJ files) with file memory operations if the creation/backup of program files is prohibited with this setting. (This setting prohibits both online transfers to a Memory Card/EM file memory as well as offline storage of PLC data that was uploaded to the CX-Programmer.)

Disabling the creation of file memory program files can help prevent illegal copying of the user program.



Operating Procedure

1,2,3... 1. When registering a password in the *UM read protection password* Box or *Task read protection* Box, select the *Prohibit from saving into a protected memory card* Option.



2. Either select ***PLC - Transfer - To PLC*** to transfer the program or select ***PLC - Protection - Set Password*** and click the **OK** button.

Usage

This option can be used to prevent the program from being transferred out of the PLC using the password.

Note

1. The simple backup operation can still be performed when the creation of program files is prohibited, but the backup program file (BACKUP.OBJ) will not be created.
2. The program can be copied when program read protection is not enabled.
3. The setting to enable/disable creating file memory program files will not take effect unless the program is transferred to the CPU Unit. Always transfer the program after changing this setting.

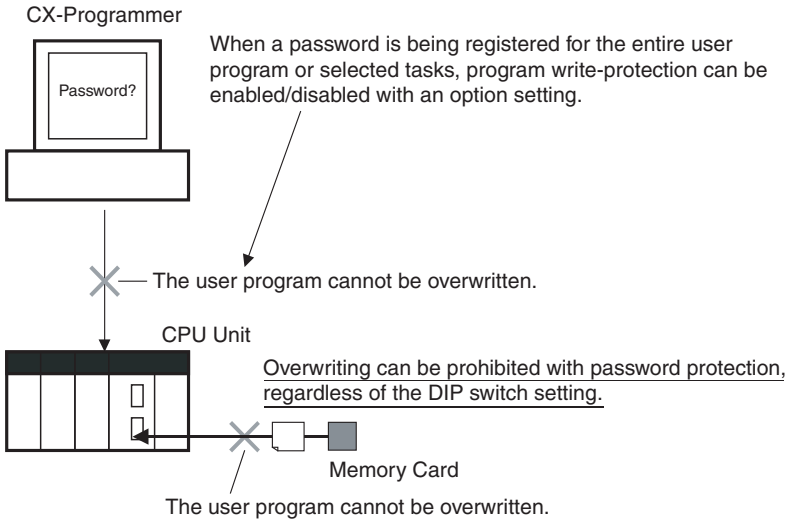
Enabling/Disabling Write Protection for Individual Tasks Using Passwords

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

With the pre-Ver. 2.0 CS/CJ-series CPU Units, the CPU Unit's user program memory (UM) can be write-protected by turning ON pin 1 of the CPU Unit's DIP switch. In this case, it is possible to overwrite the user program memory by turning OFF pin 1.

CPU Unit Ver. 2.0 or Later and CX-Programmer Ver. 4.0 or Higher

With the CPU Unit Ver. 2.0 and later CPU Units, the CPU Unit's UM area can be write protected by turning ON pin 1 of the CPU Unit's DIP switch. The program (or selected tasks) can also be write-protected if the write protection option is selected from the CX-Programmer when a password is being registered for the entire program or those selected tasks. The write protection setting can prevent unauthorized or accidental overwriting of the program.



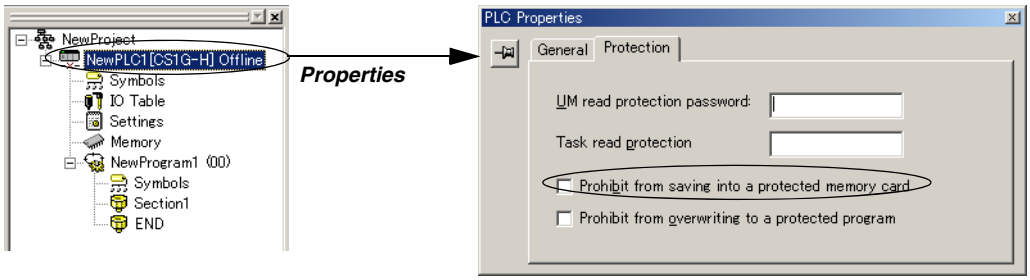
Note

1. If the selected tasks or program are write-protected by selecting this option when registering a password, only the tasks (program) that are password-protected will be protected from overwriting. It will still be possible to overwrite other tasks or programs with operations such as online editing and task downloading.
2. All tasks (programs) can be overwritten when program read protection is not enabled.
3. The setting to enable/disable creating file memory program files will not take effect unless the program is transferred to the CPU Unit. Always transfer the program after changing this setting.

Operating Procedure

1,2,3...

1. When registering a password in the *UM read protection password* Box or *Task read protection* Box, select the *Prohibit from overwriting to a protected program* Option.



2. Either select ***PLC - Transfer - To PLC*** to transfer the program or select ***PLC - Protection - Set Password*** and click the **OK** button.

Auxiliary Area Flags and Bits related to Password Protection

Name	Bit address	Description
UM Read Protection Flag	A09900	Indicates whether or not the PLC (the entire user program) is read-protected. 0: UM read protection is not set. 1: UM read protection is set.
Task Read Protection Flag	A09901	Indicates whether or not selected program tasks are read-protected. 0: Task read protection is not set. 1: Task read protection is set.
Program Write Protection for Read Protection	A09902	Indicates whether or not the write protection option has been selected to prevent overwriting of password-protected tasks or programs. 0: Overwriting allowed 1: Overwriting prohibited (write-protected)
Enable/Disable Bit for Program Backup	A09903	Indicates whether or not a backup program file (.OBJ file) can be created when UM read protection or task read protection is set. 0: Creation of backup program file allowed 1: Creation of backup program file prohibited

1-7-3 Write Protection from FINS Commands Sent to CPU Units via Networks

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

With the pre-Ver. 2.0 CS/CJ-series CPU Units, there was no way to prohibit write operations and other editing operations sent to the PLC's CPU Unit as FINS commands through a network such as Ethernet, i.e., connections other than direct serial connections.

CPU Unit Ver. 2.0 or Later

Summary

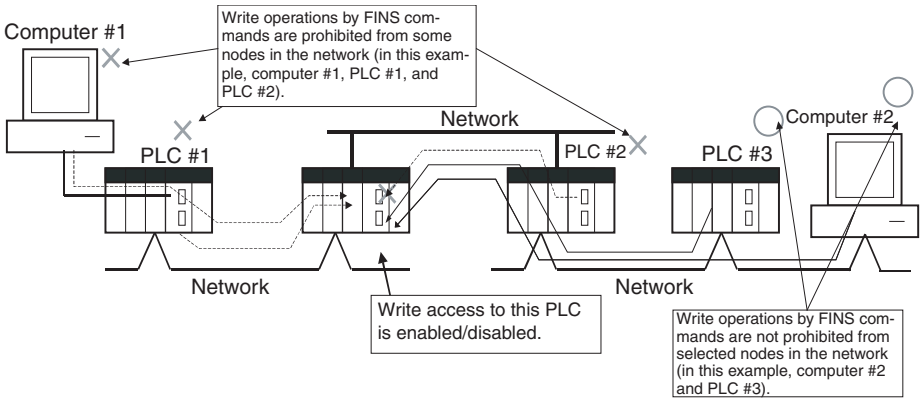
With the CPU Unit Ver. 2.0 and later CS/CJ-series CPU Units, it is possible to prohibit write operations and other editing operations sent to the PLC's CPU Unit as FINS commands through a network (including write operations from CX-Programmer, CX-Protocol, CX-Process, and other applications using FinsGateway). Read processes are not prohibited.

FINS write protection can disable write processes such as downloading the user program, PLC Setup, or I/O memory, changing the operating mode, and performing online editing.

It is possible to exclude selected nodes from write protection so that data can be written from those nodes.

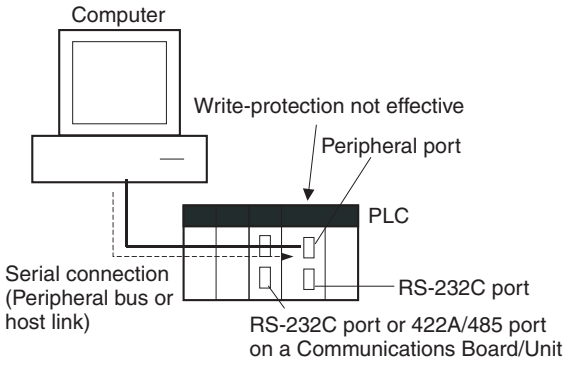
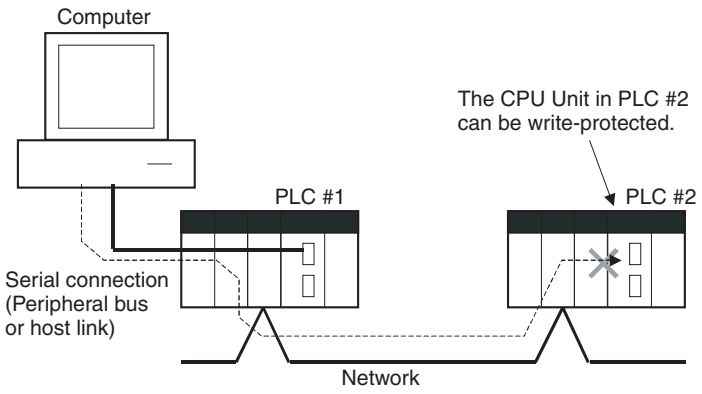
An event log in the CPU Unit automatically records all write processes sent through the network and that log can be read with a FINS command.

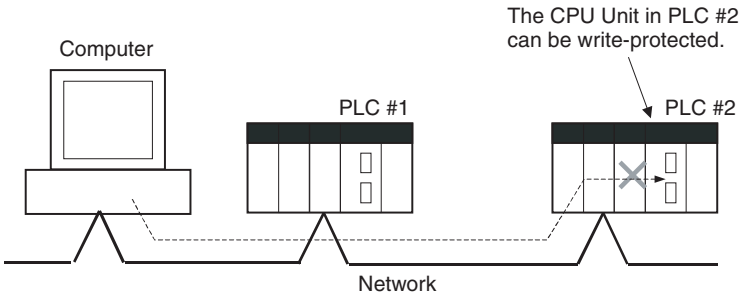
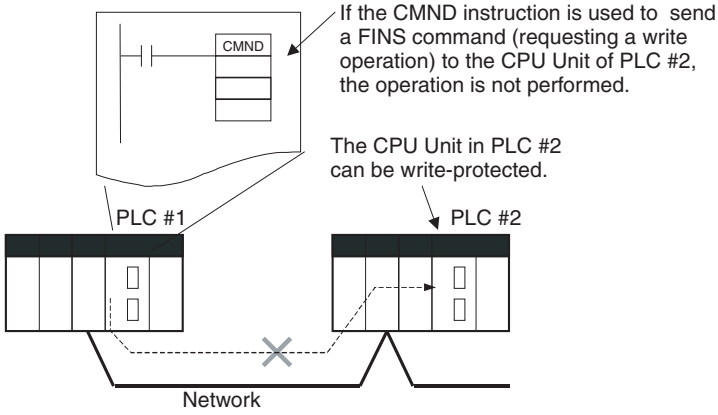
Example:



Note This function prohibits writing by FINS commands only, so it has no effect on write operations by functions other than FINS commands, such as data links.

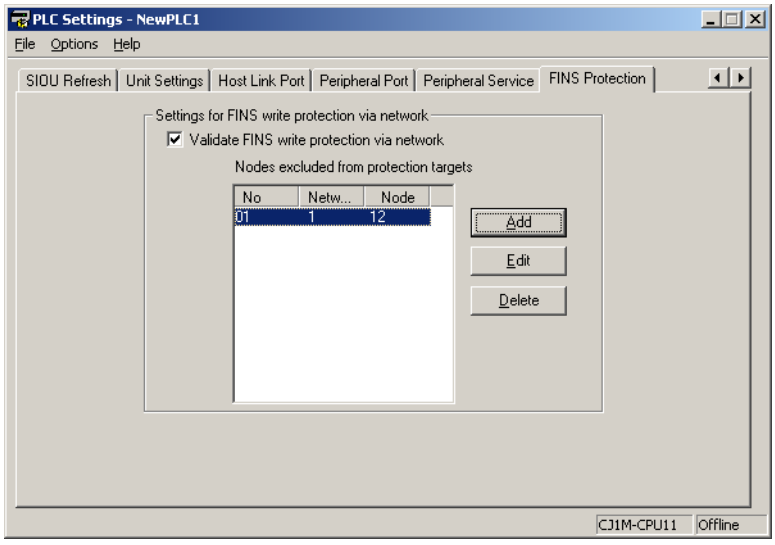
Example Write Protection Patterns

Connection pattern		Diagram (example)	Write protection
From a computer through a direct serial connection	Direct connection to PLC		Cannot be applied.
	Gateway connection (Serial-to-network) to PLC		Can be applied.

Connection pattern	Diagram (example)	Write protection
From a computer through a direct network connection		Can be applied.
From another PLC in the network		Can be applied.

Operation

With the CX-Programmer, open the PLC Setup's *FINS Protection* Tab and select the *Use FINS Write Protection* Option. When this option is selected, it will not be possible to execute write operations for that CPU Unit with FINS commands sent through a network. To permit write operations from particular nodes, enter network addresses and node addresses for the node under *Protection Releasing Addresses*. (Up to 32 nodes can be excluded from FINS Write Protection).



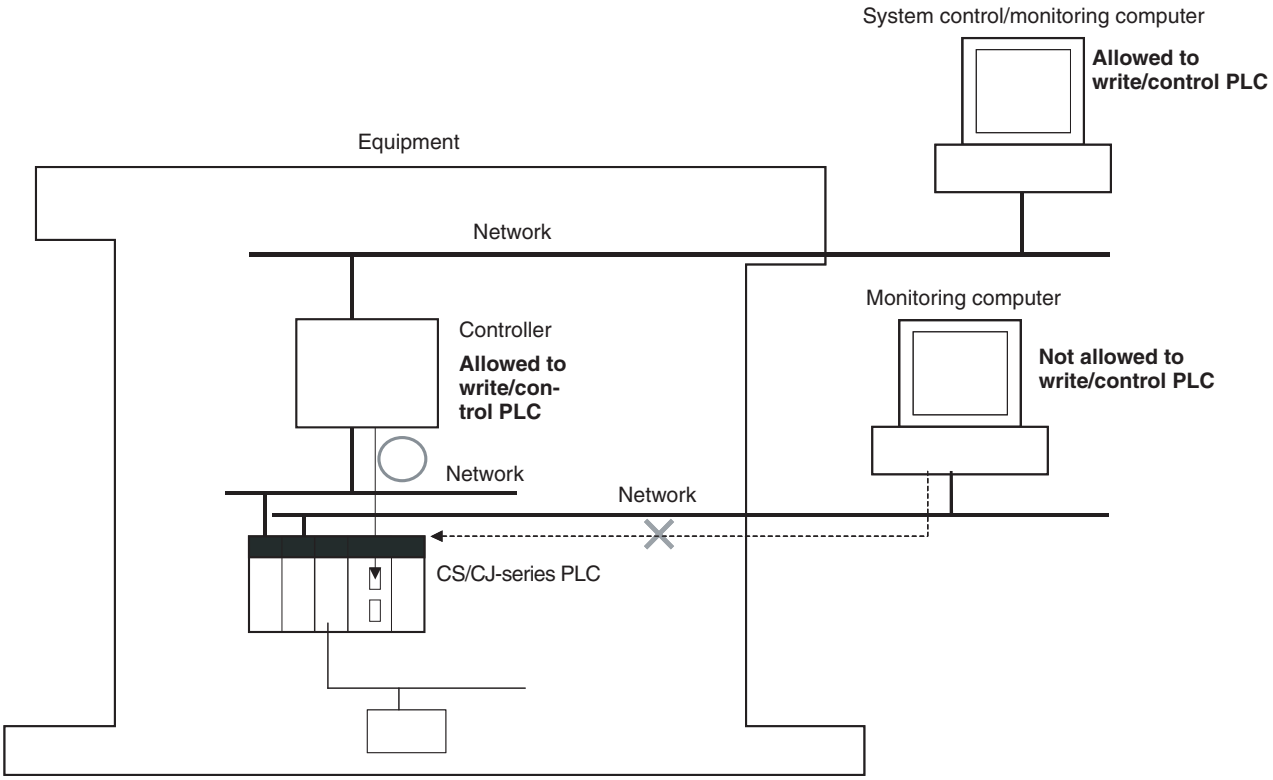
PLC Setup

Item	Address in Programming Console	Description	Settings	Default setting
Use FINS Write Protection	Word 448, bit 15	Sets whether the CPU Unit is write-protected from FINS commands sent through the network. (Does not prohibit FINS commands sent through a direct serial connection).	0: Write protection disabled 1: Write protection enabled	0: Write protection disabled
Nodes Excluded from Write Protection (Protection Releasing Addresses)	Words 449 to 480	This area lists the nodes in the network that are not restricted by FINS write protection. Up to 32 nodes can be specified. **Note** These settings are effective only when FINS write protection is enabled.		
	Bits 08 to 15	Network address: Network address of the FINS command source	00 to 7F hex	
	Bits 00 to 07	Node address: Node address of the FINS command source	01 to FE hex, or FF hex (FF hex: node address unspecified)	
Number of Nodes Excluded from FINS Write Protection (Do not set this value. It is automatically calculated by the CX-Programmer.)	Word 448, bits 00 to 07	Contains the number of nodes that are not subject to the FINS write protection. If 0 is specified (no nodes excluded from write protection), FINS write commands are prohibited from all nodes other than the local node. **Note** This setting is effective only when FINS write protection is enabled.	0 to 32 (00 to 20 hex) (A value of 0 indicates that all nodes are subject to write protection.)	0 (All nodes subject to write protection.)

Usage

The system can be configured so that a PLC can be written only from authorized nodes in the network. (For example, use this function when the system's control/monitoring computer is the only node allowed to write to a Controller within a piece of equipment.)

By limiting the number of nodes that can write to the PLC, it is possible to prevent system problems caused by unintentional overwrites during data monitoring.



Operations Restricted by Network FINS Write Protection

FINS Write Commands

The following FINS commands are restricted by FINS write protection when sent to the CPU Unit through the network.

Code	Command name
0102 hex	MEMORY AREA WRITE
0103 hex	MEMORY AREA FILL
0105 hex	MEMORY AREA TRANSFER
0202 hex	PARAMETER AREA WRITE
0203 hex	PARAMETER AREA FILL (CLEAR)
0307 hex	PROGRAM AREA WRITE
0308 hex	PROGRAM AREA CLEAR
0401 hex	RUN
0402 hex	STOP
0702 hex	CLOCK WRITE
0C01 hex	ACCESS RIGHT ACQUIRE

Code	Command name
2101 hex	ERROR CLEAR
2103 hex	ERROR LOG POINTER CLEAR
2203 hex	SINGLE FILE WRITE
2204 hex	FILE MEMORY FORMAT
2205 hex	FILE DELETE
2207 hex	FILE COPY
2208 hex	FILE NAME CHANGE
220A hex	MEMORY AREA-FILE TRANSFER
220B hex	PARAMETER AREA-FILE TRANSFER
220C hex	PROGRAM AREA-FILE TRANSFER
2215 hex	CREATE/DELETE DIRECTORY
2301 hex	FORCED SET/RESET
2302 hex	FORCED SET/RESET CANCEL

Operations from CX-Programmer (including CX-Net) through the Network

The following CX-Programmer (including CX-Net) operations are restricted by FINS write protection when performed on the CPU Unit through the network.

Operations not allowed through the network when FINS write protection is enabled.	• Changing the Operating Mode • Transferring the ladder program to the CPU Unit • Transferring parameter area data (PLC Setup, I/O table, and CPU Bus Unit Setup) to the CPU Unit • Transferring memory area data (I/O memory data) to the CPU Unit • Transferring the variable table, comments, or program index to the CPU Unit • Forced Set/Reset • Changing timer/counter set values • Online editing • Writing file memory • Clearing the error log • Setting the clock • Releasing the access right • Transferring the routing table • Transferring the data link table

Note

1. FINS write protection does not prevent CX-Programmer operations from a computer connected through a direct serial connection.
2. FINS write protection does not prevent the following file memory write operations.
   - Automatic transfer from the Memory Card at startup
   - Simple backup function (including backup operations to selected Units/Boards)
   - Writing files with the FWRIT (WRITE DATA FILE) instruction

Operations from Other Support Software

FINS write protection also prevents the following operations performed through the network by the CX-Protocol and CX-Process.

- Changing the CPU Unit's operating mode, writing memory areas, transferring PLC Setup settings, transferring the I/O table, forced set/reset, and clearing the CPU Unit's error log

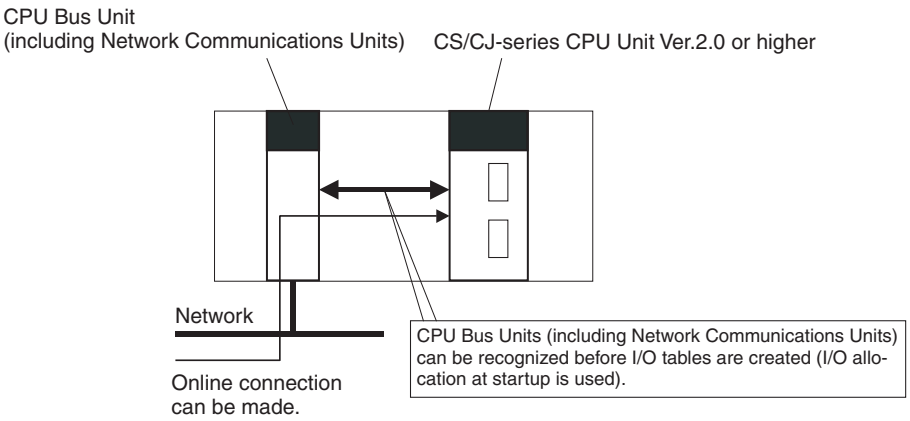
Operations from Applications That Use FinsGateway

FINS write protection prevents all write operations addressed to the CPU Unit from applications that use FinsGateway, such as PLC Reporter and Compolet.

1-7-4 Online Network Connections without I/O Tables

Summary

With CJ-series CPU Units, the CPU Unit can recognize a CPU Bus Unit (such as a Network Communications Unit, see note) even if the I/O tables have not been created and there is no registered I/O tables as a result of using automatic I/O allocation at startup.



Note Network Communications Units include Ethernet Units, Controller Link Units, SYSMAC Link Units, and DeviceNet Units.

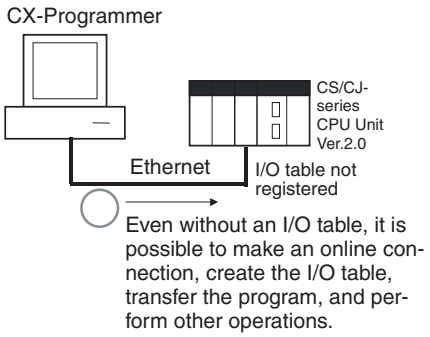
Usage

If the nodes are connected to the network, this function allows a computer-based Programming Device (such as the CX-Programmer) to connect online to PLCs in the network even if the I/O tables have not been created. Since a network connection is established with the PLCs, setup operations can be performed such as creating the I/O tables (or editing and transferring I/O tables), transferring the user program, transferring the PLC Setup, and transferring the CPU Bus Unit Setup.

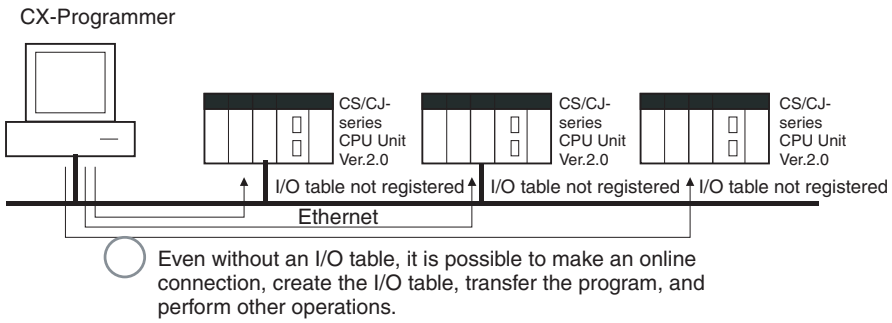
This function is particularly useful when connecting the CX-Programmer via Ethernet (using a CS1W-ETN21), because the I/O tables can be created through Ethernet so a serial cable isn't required and it isn't necessary to spend extra time establishing a serial connection.

Details

1:1 Computer-to-PLC connection



1:N Computer-to-PLC connection



- Applicable Units: All CS/CJ-series CPU Bus Units
- Applicable computer-based Programming Devices: CX-Programmer and CX-Protocol only
- Applicable functions: Online connections from CX-Programmer and CX-Protocol, and online functions of the applicable CPU Units and CPU Bus Units

Note When a CS1W-ETN21 or CJ1W-ETN21 Ethernet Unit is being used, the Ethernet Unit's IP address is automatically set to the default value of 192.168.250.xx, where xx is the FINS node address. After connecting the ethernet cable between the CX-Programmer and PLC (without making a direct

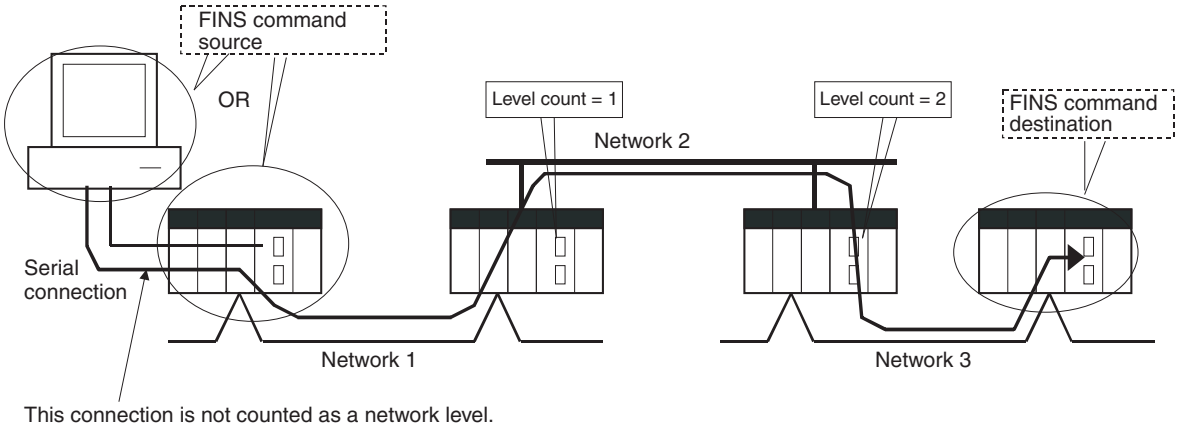
serial connection and creating the I/O tables), manually set the computer's IP address in the Windows Local Area Connection Properties (example: 192.168.250.55). An online connection can be established just by setting the Ethernet Unit's IP address (192.168.250.xx) and node in the CX-Programmer.

1-7-5 Communications through a Maximum of 8 Network Levels

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

With the pre-Ver. 2.0 CPU Units, it was possible to communicate through 3 network levels max. (see note), including the local network. It was not possible to communicate through 4 or more levels.

Note A Gateway to the network via serial communications was not counted as a level.



CPU Unit Ver. 2.0 or Later

Summary With the CPU Unit Ver. 2.0 and later CS/CJ-series CPU Units, it is possible to communicate through 8 network levels max. (see note), including the local network.

Note
1. FINS commands can only be sent across up to 8 network levels when the destination is a CPU Unit. FINS commands can be sent to other destinations up to 3 network levels away.
2. This functionality is enabled only after setting routing tables with the CX-Net in CX-Programmer version 4.0 or higher.
3. A Gateway to the network via serial communications was not counted as a level.

Compatible Networks

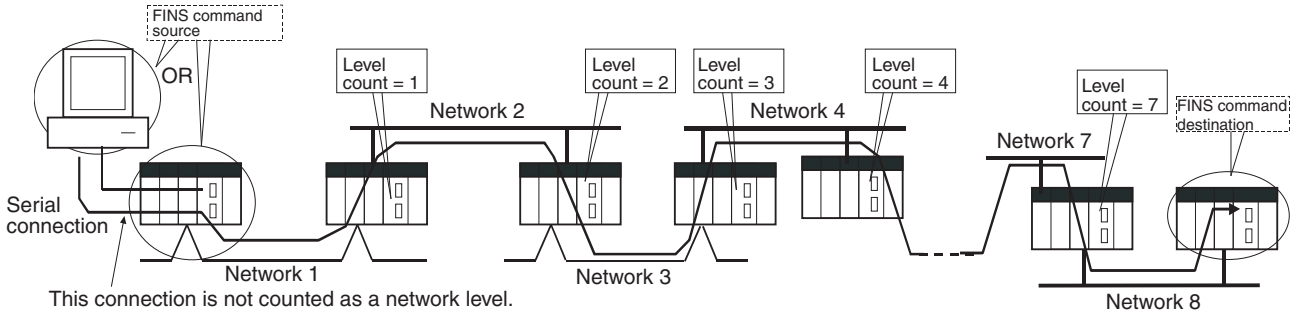
Only the following 2 kinds of networks can be used when communicating through a maximum of 8 networks. The network levels can be combined in any order.

- Controller Link
- Ethernet

Note Communications are restricted to a maximum of 3 networks through DeviceNet and SYSMAC Link networks.

Configuration of Compatible Models

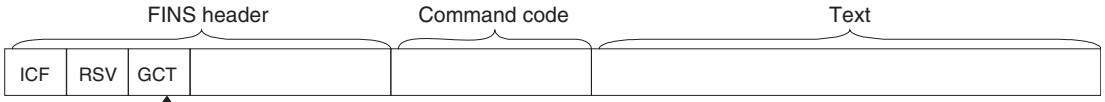
All of the CPU Units must be CPU Unit Ver. 2.0 and later CS/CJ-series CPU Units. Also, the Gateway Counter Setting must be made with the CX-Net.



Internal Structure

The Gateway Counter (GCT) is in the FINS header of the FINS command/response frame. This counter value is decremented (−1) each time a network level is crossed.

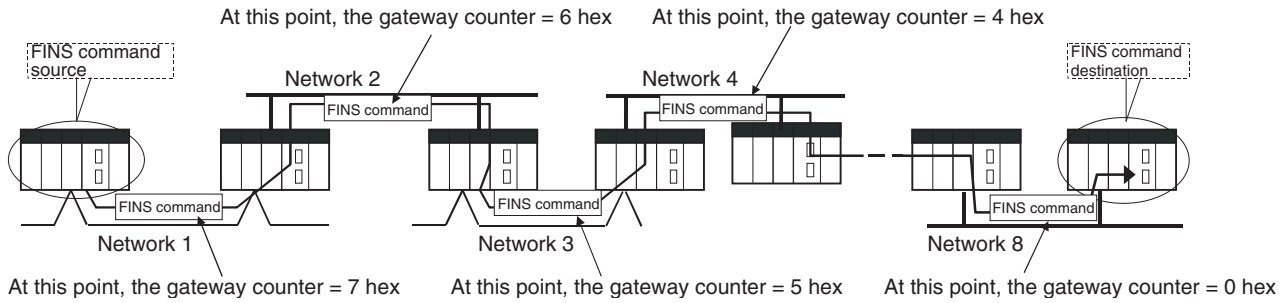
FINS Command Frame



GCT (Gateway counter: Number of allowed bridge passages)

The standard setting is 02 hex when sending, but this value can be user-set from 07 hex.
The count is decremented by one each time a network level is passed.

Example:



Operating Procedure

There is no special procedure that must be performed for CS/CJ-series CPU Units Ver. 2.0 or later. Just set normal routing tables to enable communicating across up to 8 network levels.

Note

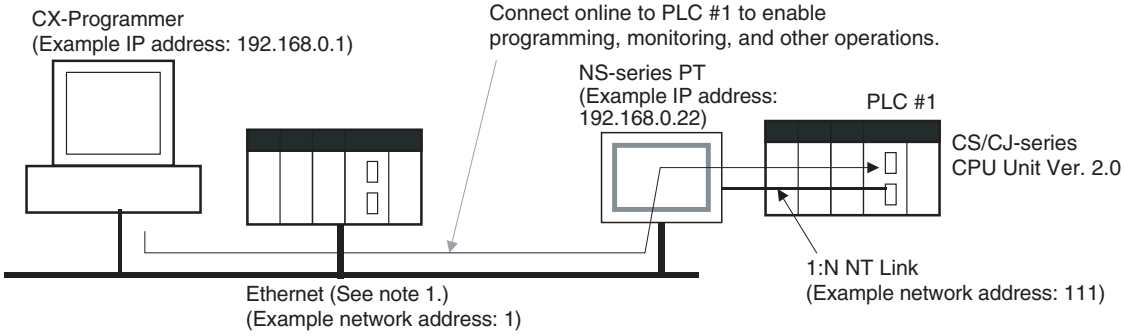
1. When using communications only for up to 3 network levels, the CS/CJ-series CPU Units Ver. 2.0 or later can be used together with other CPU Units. When using communications for to 4 to 8 network levels, use only CS/CJ-series CPU Units Ver. 2.0 or later. Other CPU Units cannot be used. Routing errors (error codes 0501 to 0504 hex) may occur in the relaying PLCs, preventing a FINS response from being returned.
2. With CS/CJ-series CPU Units with unit version 2.0 or later, the Gateway Counter (GCT: Number of allowed bridge passes) for FINS command/response frames is the value decremented from 07 hex (variable). (In earlier versions, the value was decremented from 02 hex.) With unit version 3.0 or later, the default GCT for FINS command/response frames is the value decremented from 02 hex. CX-Net can be used to select 07 hex as the value from which to decrement.
3. Do not use the Gateway Counter (GCT: Number of allowed bridge passes) enclosed in the FINS header of the FINS command/response frame in ver-

ification checks performed by user applications in host computers. The GCT in the FINS header is used by the system, and a verification error may occur if it is used to perform verification checks in user applications, particularly when using CS/CJ-series CPU Units with unit version 2.0 or later.

1-7-6 Connecting Online to PLCs via NS-series PTs

Summary

The CX-Programmer can be connected online to a PLC connected via a serial line to an NS-series PT that is connected to the CX-Programmer via Ethernet (see note 2). This enables uploading, downloading, and monitoring the ladder program and other data.



Note

1. The NS-series PT must be version 3.0 or higher and the CX-Programmer must be version 3.1 or higher.
2. Connection is not possible through an NS-series PT connected serially to the CX-Programmer.

Connection Method

In CX-Programmer, open the *Change PLC* Window and set the *Network Type* to *Ethernet*. Click the **Settings** Button and set the IP address of the NS-series PT on the *Driver* Tab Page. Also make the following settings on the Network Tab Page.

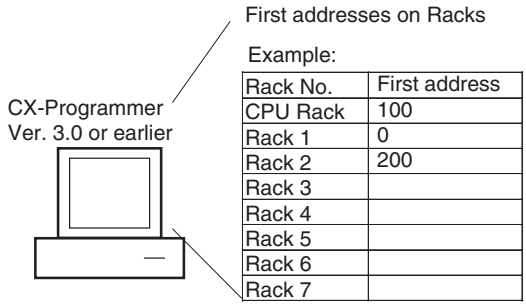
- FINS Source Address
  Set the local network address of the NS-series PT for the *Network* (example network address: 1).
- FINS Destination Address
  Network: Set the address to 111 if the PLC is connected to serial port A on the NS-series PT and to 112 if it is connected to serial port B.
  Node: Always set to 1
- Frame Length: 1,000 (See note.)
- Response Timeout: 2

Note Do not set the frame length higher than 1,000. If any higher value is used, the program transfer will fail and a memory error will occur.

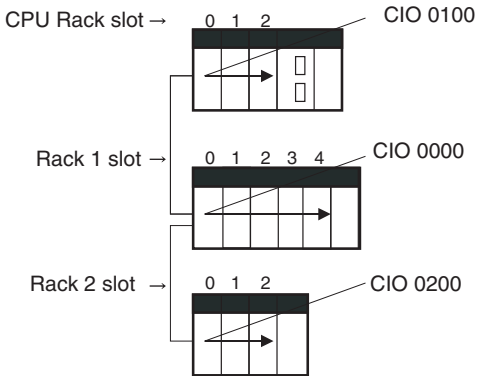
1-7-7 Setting First Slot Words

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

With CX-Programmer Ver. 3.0 or lower, only the first addresses on Racks could be set. The first address for a slot could not be set.



Rack No.	First address
CPU Rack	100
Rack 1	0
Rack 2	200
Rack 3	
Rack 4	
Rack 5	
Rack 6	
Rack 7	

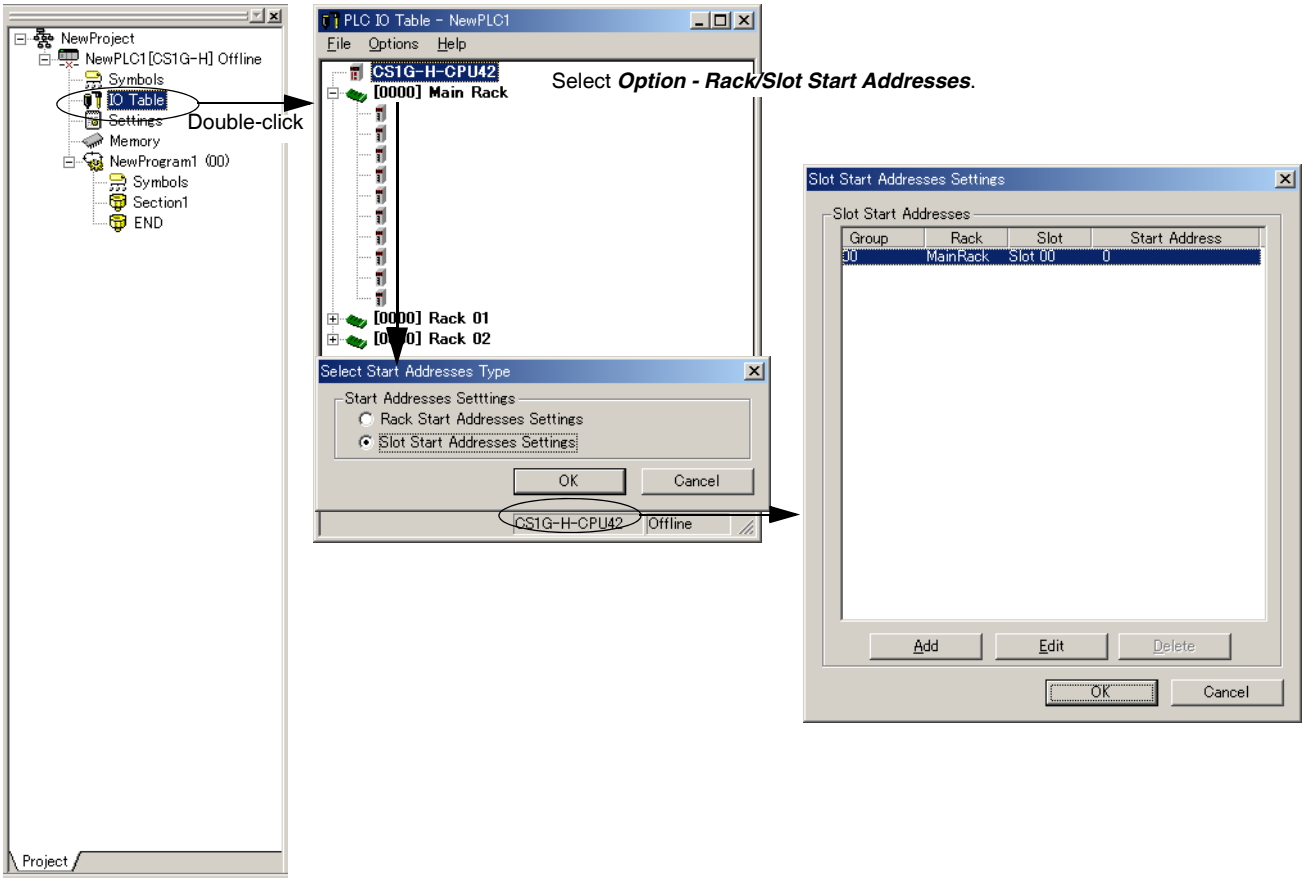


CX-Programmer Ver. 3.1 or Higher

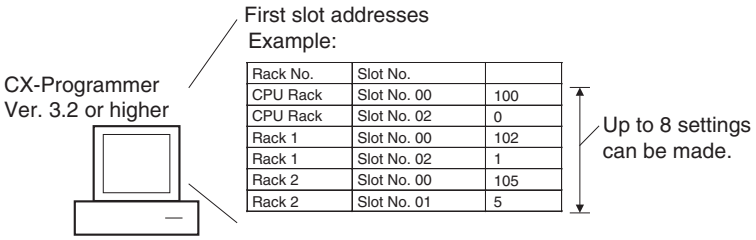
Summary Starting with CX-Programmer Ver. 3.1, the first addresses for slots can be set when editing the I/O tables for CS/CJ-series CPU Units (CS1D CPU Units for Single-CPU Systems, and CS1-H, CJ1-H, and CJ1M CPU Units). The first address can be set for up to eight slots. (See note.)

Note This function is supported only for CS1-H/CJ1-H CPU Units manufactured on June 1, 2002 or later (lot number 020601□□□□ or later). It is supported for all CJ1M CPU Units regardless of lot number. It is not supported for CS1D CPU Units for Duplex CPU Systems.

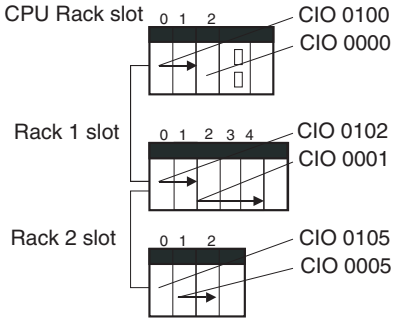
Operating Procedure Select ***Option - Rack/Slot Start Addresses*** in the *PLC IO Table - Traffic Controller* Window. This command will enable setting both the first Rack addresses and the first slot addresses.



This function can be used, for example to allocate fixed addresses to Input Units and Output Units. (With CQM1H PLCs, input bits are from IR 000 to IR 015 and output bits are from IR 100 to IR 115. First slot addresses can be set when replacing CQM1H PLCs with CS/CJ-series PLCs to reduce conversion work.)



Rack No.	Slot No.	
CPU Rack	Slot No. 00	100
CPU Rack	Slot No. 02	0
Rack 1	Slot No. 00	102
Rack 1	Slot No. 02	1
Rack 2	Slot No. 00	105
Rack 2	Slot No. 01	5

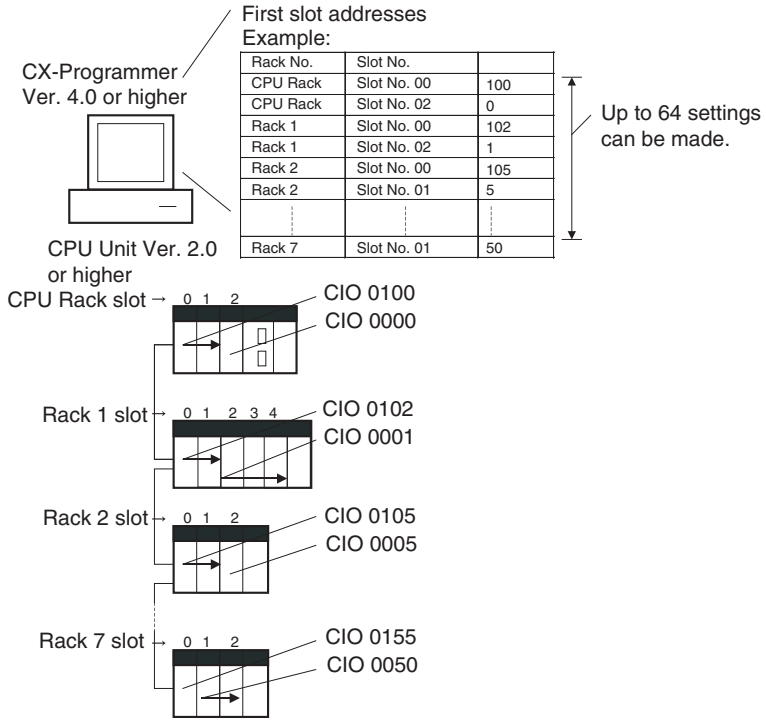


Note The first address settings for Racks and slots can be uploaded/downloaded from/to the CPU Unit.

CPU Unit Ver. 2.0 or Later and CX-Programmer Ver. 4.0 or Higher

Summary When using CX-Programmer Ver.4.0 or higher with CPU Unit Ver. 2.0 or later, the first address can be set for up to 64 slots.

Note This function is supported only for CS1-H, CJ1-H, and CJ1M CPU Units Ver. 2.0 or later. It is not supported for CS1D CPU Units for Duplex-CPU Systems.

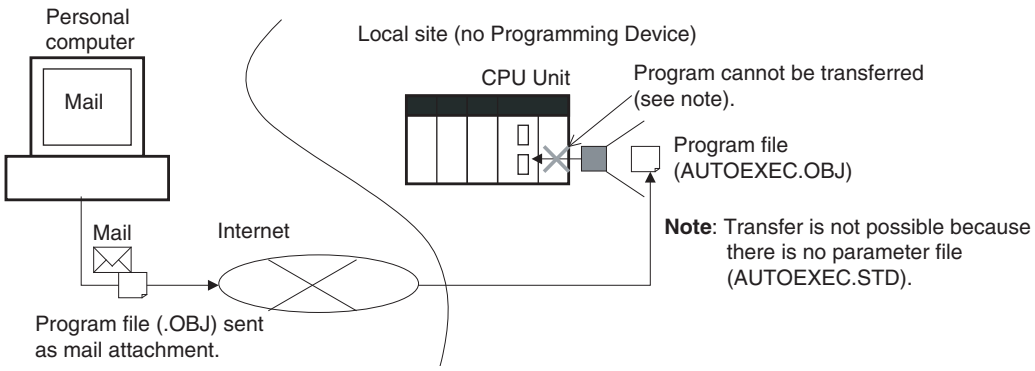


1-7-8 Automatic Transfers at Power ON without a Parameter File

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

Previously with the CS/CJ-series CPU Units, both the program file for automatic transfer at power ON (AUTOEXEC.OBJ) and the parameter file for automatic transfer at power ON (AUTOEXEC.STD) had to be stored on the Memory Card to enable automatic transfers to the CPU Unit at power ON. Also, the parameter file for automatic transfer at power ON (AUTOEXEC.STD) could not be created without the actual PLC (regardless of whether it was made in online operations from the CX-Programmer or a Programming Console or by using the easy backup operation).

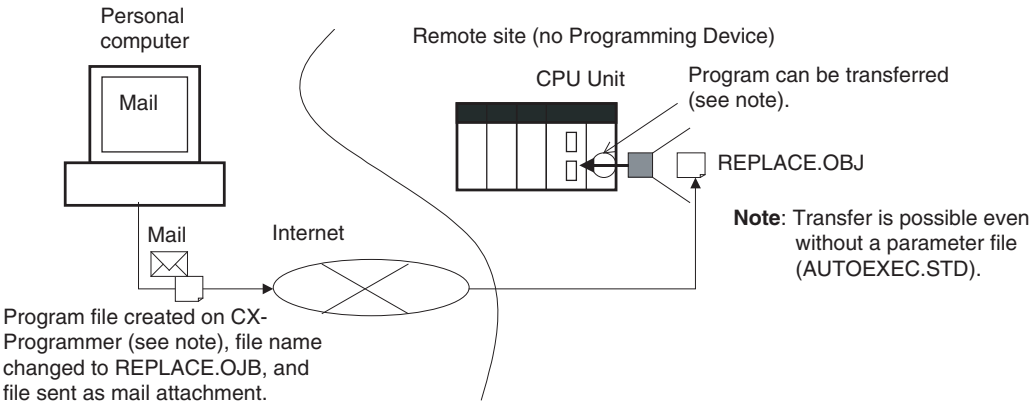
Even if a program file (.OBJ) was created offline without the actual PLC and then sent to a remote PLC as an email attachment, the program file could not be transferred to the CPU Unit without a Programming Device.



CPU Unit Ver. 2.0 or Later

Summary With CS/CJ-series CPU Unit Ver. 2.0, the user program can be automatically transferred to the CPU Unit at power ON without a parameter file (.STD) if the name of the program file (.OBJ) is changed to REPLACE.OBJ on the CX-Programmer and the file is stored on a Memory Card. If data files are included with the program file using this function, the following data file names are used: REPLACE.IOM, REPLCDM.IOM, REPLCE□.IOM.

Note
1. If the Memory Card contains a REPLACE.OBJ file, any parameter file on the Memory Card will not be transferred.
2. If the Memory Card contains both a REPLACE.OBJ file and a AUTOEXEC.OBJ file, neither will be transferred.



Note With CX-Programmer Ver. 3.0 or higher, a program file (.OBJ) can be created offline and saved on a computer storage media. Select ***Transfer - To File*** from the *PLC* Menu. This enable creating a program file offline without a PLC so that the name can be changed to enable sending the program file.

1-7-9 Operation Start/End Times

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

The time that operation started and the time operation ended were not stored in the CPU Unit.

CPU Unit Ver. 2.0 or Later

The times that operation started and ended are automatically stored in the Auxiliary Area.

- The time that operation started as a result of changing the operating mode to RUN or MONITOR mode is stored in A515 to A517 of the Auxiliary Area. The year, month, day, hour, minutes, and seconds are stored.
- The time that operation stopped as a result of changing the operating mode to PROGRAM mode or due to a fatal error is stored in A518 to A520 of the Auxiliary Area. The year, month, day, hour, minutes, and seconds are stored.

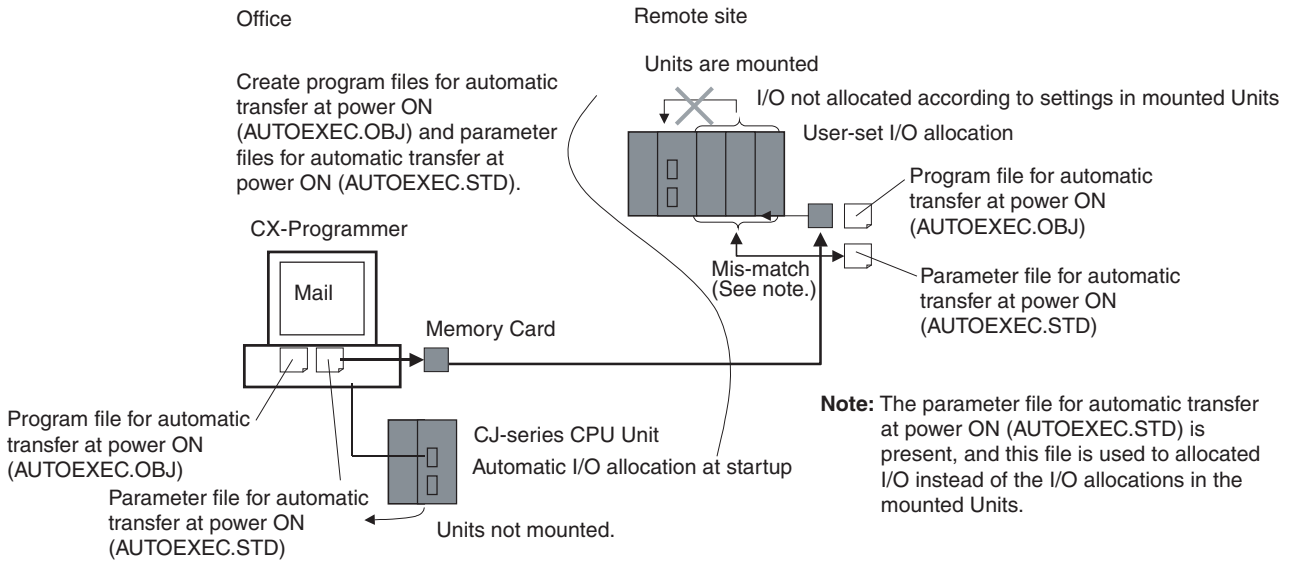
This information simplifies managing PLC System operating times.

1-7-10 Automatic Detection of I/O Allocation Method for Automatic Transfer at Power ON

Previous CPU Units (Pre-Ver. 2.0 CPU Units)

Previously with the CJ-series CPU Units, when a parameter file for automatic transfer at power ON (AUTOEXEC.STD) was recorded in a Memory Card, the user-set I/O allocation method was automatically used when an automatic transfer at power ON was executed from the Memory Card, and I/O was allocated according to the parameter file for automatic transfer at power ON. As a result, the following case occurred:

1,2,3... 1. In an office where Units were not mounted, the CX-Programmer was connected online to just the CPU Unit, and files for automatic transfer at power ON were created (without creating/transferring I/O tables).
2. These files for automatic transfer at power ON were then saved in the Memory Card, which was then taken to the remote site where automatic transfer at power ON was executed.
3. When automatic transfer at power ON was executed, I/O tables were created based on the parameter file for automatic transfer at power ON saved in the Memory Card (i.e., the file created when Units were not mounted to the PLC). As a result, the registered I/O tables did not match the Units actually mounted in the CPU Unit, causing an I/O setting error.

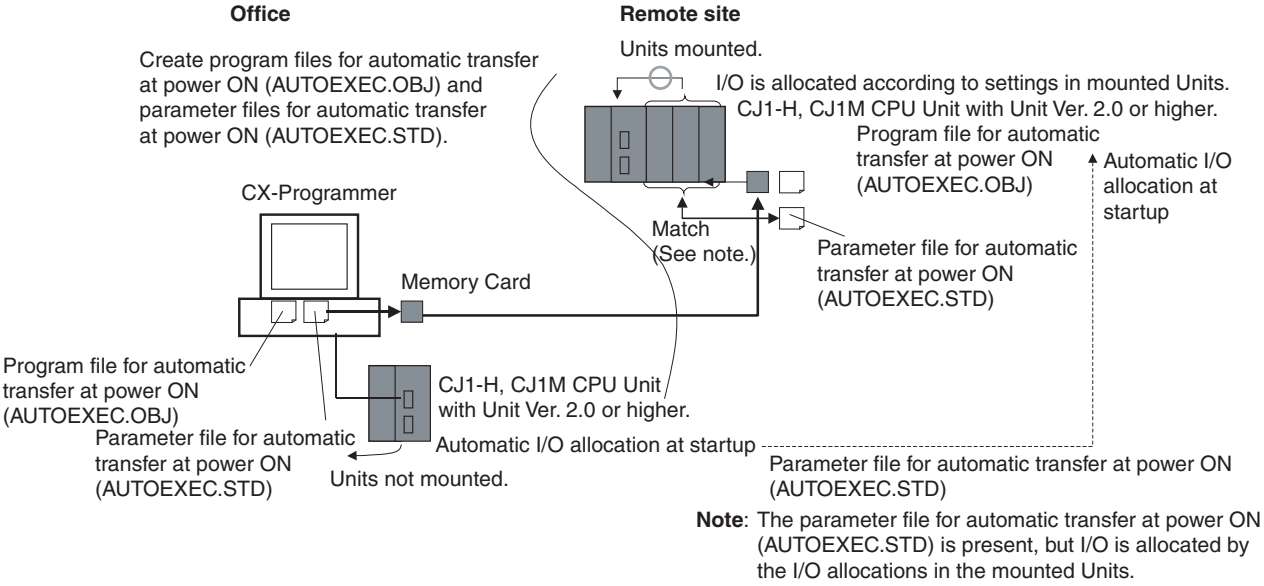


CPU Unit Ver. 2.0 or Later

Overview

With CJ-series CPU Unit Ver. 2.0 or later, the I/O allocation method that was used (automatic I/O allocation at startup or user-set I/O allocation) is recorded in the parameter file for automatic transfers at power ON (AUTOEXEC.STD), and when automatic transfer at power ON is executed from the Memory Card, the recorded method is automatically detected and used to create the I/O tables.

- When the parameter file for automatic transfer at power ON is created using automatic I/O allocation at startup, the I/O tables in the parameter file for automatic transfer at power ON in the Memory Card are disabled, and I/O is allocated using automatic I/O allocation at startup from the actual mounted Units.
- When the parameter file for automatic transfer at power ON is created using user-set I/O allocation, the I/O tables in the parameter file for automatic transfer at power ON in the Memory Card is enabled, and the registered I/O tables are transferred to the CPU Unit.



As a result, in the above diagram for example, files for automatic transfer at power ON are created in an office where the Units are not mounted. The files are then saved in a Memory Card, which is taken and installed in a CJ-series CPU Unit at the remote site, where automatic transfer at power ON is executed and I/O is allocated according to the I/O allocations in the mounted Unit using the method recorded in the Memory Card.

1-7-11 New Application Instructions

The following instructions have been added. Refer to the *Programming Manual* (W474) for details.

- Multiple Interlock Instructions:
  MULTI-INTERLOCK DIFFERENTIATION HOLD (MILH(517)), MULTI-INTERLOCK DIFFERENTIATION RELEASE (MILR(518)), and MULTI-INTERLOCK CLEAR (MILC(519))
- TIME-PROPORTIONAL OUTPUT (TPO(685))
- GRAY CODE CONVERSION (GRY(474))
- COUNTER FREQUENCY CONVERT (PRV2(883)) (CJ1M CPU Unit only)

- Combination Instructions:
  TEN KEY INPUT (TKY(211)), HEXADECIMAL KEY INPUT (HKY(212)), DIGITAL SWITCH INPUT (DSW(213)), MATRIX INPUT (MTR(210)), and 7-SEGMENT DISPLAY OUTPUT (7SEG(214))
- Time Comparison Instructions: =DT, <>DT, <DT, <=DT, >DT, >=DT
- Explicit Message Instructions:
  EXPLICIT MESSAGE SEND (EXPLT(720)), EXPLICIT GET ATTRIBUTE (EGATR(721)), EXPLICIT SET ATTRIBUTE (ESATR(722)), EXPLICIT WORD READ (ECHRD(723)), and EXPLICIT WORD WRITE (ECHWR(724))
- EXPANDED BLOCK COMPARE (BCMP2(502)) (This instruction, previously supported by only the CJ1M PLCs, is now supported by the CS1-H and CJ1-H.)
- INTELLIGENT I/O READ (IORD(222)) and INTELLIGENT I/O WRITE (IOWR(223)) (These instructions could previously be used only for Special I/O Units, but they can now be used to read and write data for CPU Bus Units.)

1-8 CJ1-H-R, CJ1-H, CJ1M, and CJ1 CPU Unit Comparison

Item			CJ1-H-R CPU Unit	CJ1-H CPU Unit		CJ1M CPU Unit	CJ1 CPU Unit
			CJ1H-CPU6□H-R	CJ1H-CPU6□H	CJ1G-CPU4□H	CJ1M-CPU2□/1□	CJ1G-CPU4□
Instruction execution times	Basic instructions	LD	0.016 μs	0.02 μs	0.04 μs	0.10 μs	0.08 μs
		OUT	0.016 μs	0.02 μs	0.04 μs	0.35 μs	0.21 μs
	Special instructions	Examples					
		XFER	240.1 μs (for 1,000 words)	300.1 μs (for 1,000 words)	380.1 μs (for 1,000 words)	650.2 μs (for 1,000 words)	633.5 μs (for 1,000 words)
		BSET	140.2 μs (for 1,000 words)	200.1 μs (for 1,000 words)	220.1 μs (for 1,000 words)	400.2 μs (for 1,000 words)	278.3 μs (for 1,000 words)
		BCD arithmetic	7.6 μs min.	8.2 μs min.	8.4 μs min.	• CPU11/21 21.5 μs min. • Other CPU Units 18.9 μs min.	14.0 μs min.
		Binary arithmetic	0.18 μs min.	0.18 μs min.	0.20 μs min.	0.30 μs min.	0.37 μs min.
		Floating-point math	0.24 μs min.	8.0 μs min.	9.2 μs min.	• CPU11/21 15.7 μs min. • Other CPU Units 13.3 μs min.	10.2 μs min.
		SBS/RET	1.33 μs	2.12 μs	3.56 μs	3.84 μs	37.6 μs
Overhead time			Normal mode: 0.13 ms Parallel mode: 0.28 ms	Normal mode: 0.3 ms Parallel mode: 0.3 ms	0.5 ms	• CPU11/21 0.7 ms • Other CPU Units 0.5 ms	0.5 ms

Item			CJ1-H-R CPU Unit	CJ1-H CPU Unit		CJ1M CPU Unit	CJ1 CPU Unit
			CJ1H-CPU6□H-R	CJ1H-CPU6□H	CJ1G-CPU4□H	CJ1M-CPU2□/1□	CJ1G-CPU4□
Execution timing	CPU execution processing modes		Any of the following four modes: 1. Normal (instructions and peripheral servicing performed consecutively) 2. Peripheral Servicing Priority Mode (instruction execution interrupted to service peripherals at a specific cycle and time; consecutive refreshing also performed) 3. Parallel Processing Mode with Synchronous Memory Access (instruction executed and peripheral services in parallel while synchronizing access to I/O memory) 4. Parallel Processing Mode with Asynchronous Memory Access (instruction executed and peripheral services in parallel without synchronizing access to I/O memory)			Either of following two modes: 1. Either of following two modes: Normal (instructions and peripheral servicing performed consecutively) 2. Peripheral Servicing Priority Mode (instruction execution interrupted to service peripherals at a specific cycle and time; consecutive refreshing also performed)	
	CPU Bus Unit special refreshing	Data links	During I/O refresh period or via special CPU BUS UNIT I/O REFRESH instruction (DLNK(226))				During I/O refresh period
		DeviceNet remote I/O					
		Protocol macro send/ receive data					
	Refreshing of CIO and DM Areas words allocated to CPU Bus Unit						
Tasks	Cyclic execution of interrupt tasks via TKON instruction (called “extra cyclic tasks”)		Supported. (Up to 256 extra cyclic tasks, increasing the total number of cyclic tasks to 288 max.)				Not supported. (No extra cyclic tasks; 32 cyclic tasks max.)
	Independent/shared specifications for index and data registers		Supported. The time to switch between tasks can be reduced if shared registers are used.				Not supported. (Only independent registers for each task.)
	Initialization when tasks are started		Supported. Task Startup Flags supported.				Only Task Flag for first execution.
	Starting subroutines from multiple tasks		Global subroutines can be defined that can be called from more than one task.				Not supported.
	Scheduled interrupt interval for scheduled interrupt tasks		0.2 ms to 999.9 ms (in increments of 0.1 ms), 1 ms to 9,999 ms (in increments of 1 ms), or 10 ms to 99,990 ms (in increments of 10 ms)	1 ms to 9,999 ms (in increments of 1 ms) or 10 ms to 99,990 ms (in increments of 10 ms)		0.5 ms to 999.9 ms (in increments of 0.1 ms), 1 ms to 9,999 ms (in increments of 1 ms), or 10 ms to 99,990 ms (in increments of 10 ms)	1 ms to 9,999 ms (in increments of 1 ms) or 10 ms to 99,990 ms (in increments of 10 ms)
	Interrupt task execution timing during instruction execution	For instructions other than the following ones	Any instruction that is being executed is interrupted when interrupt task conditions are met to start the interrupt task. If the cyclic task (including extra cyclic tasks) accesses the same data area words as the instruction that was interrupted, data may not be concurrent. To ensure data concurrency, the DI and EI instructions must be used to disable and enable interrupts during a specific part of the program.				
		For BIT COUNTER (BCNT) or BLOCK TRANSFER (XFER) instructions	Interrupt tasks are started only after execution of the instruction has been completed, ensuring data concurrency even when the same data area words are accessed from the instruction and the interrupt task.				
Debugging	Backup to Memory Cards (simple backup function)		In addition to the data listed at the right, data from Units mounted to the CPU Rack or Expansion Racks can also be backed up to the Memory Card (via push-button on front panel). This is very effective when replacing Units. Backup data includes scan lists for DeviceNet Units, protocol macros for Serial Communications Units, etc.				Only the user program, parameters, and I/O memory in the CPU Unit.
	Automatic user program and parameter area backup to flash memory		Supported (enabling battery-free operation without a Memory Card) The user program and parameter area data are automatically backed up the flash memory whenever they are transferred to the CPU Unit from the CX-Programmer, file memory, etc.				Not supported.

Item		CJ1-H-R CPU Unit	CJ1-H CPU Unit		CJ1M CPU Unit	CJ1 CPU Unit
		CJ1H-CPU6□H-R	CJ1H-CPU6□H	CJ1G-CPU4□H	CJ1M-CPU2□/1□	CJ1G-CPU4□
I/O tables	Detailed information on I/O table creation errors	Detailed I/O table error information is stored in A261 whenever the I/O tables cannot be created for any reason.				Not supported.
	Displaying presence of first rack word setting on Programming Console	It's possible to confirm if the first rack word has been specified for the system on the Programming Console display. The first rack word is specified from the CX-Programmer, making it previously impossible to confirm the setting from the Programming Console.				Not supported.
Built-in I/O		Not supported.			CJ1M-CPU2□	Not supported.
Serial PLC Link		Not supported.			Supported.	Not supported.
Scheduled interrupts set in increments of 0.1 ms		Supported.	Not supported.		Supported.	Not supported.
Battery		CPM2A-BAT01			CJ1W-BAT01	CPM2A-BAT01
Operation when Unit doesn't complete startup process	CPU Unit startup	Starting or not starting (standby) the CPU Unit in MONITOR or RUN mode even if a Unit has not completed startup processing can be specified in the PLC Setup.				CPU Unit standby (fixed)
Sequence instructions	Differentiated LD NOT, AND NOT, and OR NOT instructions	Supported.				Not supported. (The same results can be achieved by combining differentiated LD, AND, and OR instructions with the NOT instruction.)
	OUTB, SETB, and RSTB instructions to manipulate individual bits in DM and EM Area words	Supported.				Not supported.
Timer/ counter instructions	TIMU (0.1-ms, BCD), TIMUX (0.1-ms, binary), TMUH (0.01-ms, BCD), TMUHX (0.01-ms, binary)	Supported. Either BCD or binary can be selected (with CX-Programmer Ver. 7.1 or higher).	Not supported.			
	Format for updating PVs for TIM, TIMH, TMHH, TTIM, TIML, MTIM, CNT, CNTR, CNR, TIMW, TMHW, CNTW instructions	Supported. Either BCD or binary can be selected (with CX-Programmer Ver. 3.0 or higher).				BCD only
Special math instructions	32-bit signed data line coordinates and X axis starting point specification for APR instruction	Supported.				Not supported.
Floating-point decimal instructions	High-speed trigonometric functions: SINQ, COSQ, and TANQ instructions	Supported (with CX-Programmer Ver. 7.1 or higher).	Not supported.			
	Single-precision calculations and conversions	Supported (enabling standard deviation calculations).				Not supported.
	Conversions between single-precision floating point and ASCII	Supported. Floating point can be converted to ASCII for display on PTs. ASCII text strings from measurement devices can be converted to floating-point decimal for use in calculations.				Not supported.
	Double-precision calculations and conversions	Supported (enabling high-precision positioning).				Not supported.
Text string, table data, and data shift instructions	Text string and table data processing instruction execution	Data processing can be performed normally or in the background (specified for each instruction). (Using time slices to process instruction over several cycles reduces the effect of these instructions on the cycle time.).				Normal processing only.
	Stack insertions/deletions/replacements and stack counts with table processing instructions	Supported. Effective for tracking workpieces on conveyor lines.				Not supported.

Item		CJ1-H-R CPU Unit	CJ1-H CPU Unit		CJ1M CPU Unit	CJ1 CPU Unit
		CJ1H-CPU6□H-R	CJ1H-CPU6□H	CJ1G-CPU4□H	CJ1M-CPU2□/1□	CJ1G-CPU4□
Data control instructions	PID with autotuning	Supported (eliminating the need to adjust PID constants).				Not supported.
Subroutine instructions	Global subroutines	Supported (GSBS, GSBN, and GRET instructions) Enables easier structuring of subroutines.				Not supported.
Failure diagnosis instructions	Error log storage for FAL	Supported. FAL can be executed without placing an entry in the error log. (Only system FAL errors will be placed in the error log.)				Not supported.
	Error simulation with FAL/FALS	Supported. Fatal and nonfatal errors can be simulated in the system to aid in debugging.				Not supported.
Data comparison instructions	AREA RANGE COMPARE (ZCP) and DOUBLE RANGE COMPARE (ZCPL)	Supported.				Not supported.
Index register real I/O address conversion for CVM1/CV	Program and real I/O memory address compatibility with CVM1/CV-series PLCs	CVM1/CV-series real I/O memory addresses can be converted to CJ-series addresses and placed in index registers or CJ-series real I/O memory addresses in index registers can be converted to CVM1/CV-series addresses.				Not supported.
Condition Flag saving and loading	Compatibility with CVM1/CV-series PLCs	Condition Flag status can be saved or loading using the SAVE CONDITION FLAGS (CCS) and LOAD CONDITION FLAGS (CCL) instructions, enabling applications where Condition Flag status must be passed between different program locations, tasks, or cycles.				Not supported.
Disabling power interruptions in program sections		Supported. Instructions between DI and EI are executed without performing power OFF processing even if a power interruption has been detected and confirmed.				Not supported.
Condition Flag operation		The statuses of the Equals, Negative, and Error Flags are maintained for execution of the following instructions. TIM, TIMH, TMHH, CNT, IL, ILC, JMP0, JME0, XCHG, XCGL, MOVR, symbol comparison instructions, CMP, CMPL, CPS, CPSL, TST, TSTN, STC, and CLC.				The Equals, Negative, and Error Flags are turned OFF after executing the following instructions. TIM, TIMH, TMHH, CNT, IL, ILC, JMP0, JME0, XCHG, XCGL, MOVR, symbol comparison instructions, CMP, CMPL, CPS, CPSL, TST, and TSTN.

1-9 Function Tables

The following tables list functions for the CJ-series CPU Units (including the CJ1, CJ1M, and CJ1-H CPU Units).

1-9-1 Functions Arranged by Purpose

Purpose		Function	Manual	Reference
Basic Operation and System Design	Studying system configuration	→ ---	*Operation Manual*	*SECTION 2 Specifications and System Configuration*
	Studying I/O allocations	→ ---		*SECTION 8 I/O Allocations*
	Installation size	→ ---		*5-2-3 Assembled Appearance and Dimensions*
	Installation methods	→ ---		*5-2 Installation*
	Setting DIP switches	→ ---		*3-1-2 Components*
	Setting the PLC Setup	→ ---		*7-1 PLC Setup*
	Using Auxiliary Bits	→ ---		*Appendix B CJ1M CPU Unit Built-in I/O Specifications* and *9-11 Auxiliary Area*
	Studying the cycle time	→ ---		*Parallel Processing Mode (CJ-H CPU Units Only)*
	Troubleshooting	→ ---		*11-2-5 Error Messages*
Structured Programming	Standardizing programs as modules. Developing a program with several programmers working in parallel. Making the program easier to understand.	→ Program with tasks to divide the program, use function blocks (FBs), specify symbols, and define local and global symbols. Use ST (Structured Text) language.	*Programming Manual* (W394)	*4-1 Tasks*
	Creating step programs.	→ Use the step instructions.	*Instructions Reference Manual* (W474)	Step Programming Instructions
	Using BASIC-like mnemonic instructions to program processes that are difficult to enter in the ladder diagram format (such as conditional branches and loops).	→ Use the block programming instructions. Use ST (Structured Text) language.		Block Programming Instructions

Purpose		Function	Manual	Reference
Simplifying the Program	Creating looped program sections. →	Use FOR(512) and NEXT(513) or JMP(004) and JME(005).	*Instructions Reference Manual* (W474)	Sequence Control Instructions
	Indirectly addressing DM words. →	All words in the DM and EM Areas can be indirectly addressed.	*Programming Manual* (W394)	*6-2 Index Registers*
	Simplifying the program by switching to PLC memory address specification. →	Use Index Registers as pointers to indirectly address data area addresses. The Index Registers are very useful in combination with loops, increment instructions, and table data processing instructions. The auto-increment, auto-decrement, and offset functions are also supported.		
	Consolidating instruction blocks with the same pattern but different addresses into a single instruction block. →	Use function blocks (FBs).	CX-Programmer Operation Manual Function Blocks (W438)	
		Use MCRO(099).	*Instructions Reference Manual* (W474)	MCRO(099) in the Subroutine Instructions

Purpose		Function	Manual	Reference
Managing the Cycle Time	Reducing the cycle time. →	• Use tasks to put parts of the program that don't need to be executed into "standby" status. • Use JMP(004) and JME(005) to jump parts of the task that don't need to be executed. • Convert parts of the task to subroutines if they are executed only under particular conditions. • Disable a Unit's Special I/O Unit refreshing in the PLC Setup if it isn't necessary to exchange data with that Special I/O Unit every cycle. • Setting index and data registers to be shared by all tasks when these registers are not being used.	*Programming Manual* (W394)	*6-1 Cycle Time/High-speed Processing*
	Setting a fixed (minimum) cycle time. • Variations in I/O response times can be eliminated by suppressing processing variations. →	Set a minimum cycle time in the PLC Setup.		
	Setting a maximum cycle time. (Generating an error for a cycle time exceeding the maximum.) →	Set a maximum cycle time (watch cycle time) in the PLC Setup. If the cycle time exceeds this value, the Cycle Time Too Long Flag (A40108) will be turned ON and PLC operation will be stopped.	*Operation Manual*	*7-1 PLC Setup*
	Reducing the I/O response time for particular I/O points. →	Use immediate refreshing or IORF(097).	*Programming Manual* (W394)	*6-1 Cycle Time/High-speed Processing*
	Finding I/O refresh times for individual Units →	---	*Operation Manual*	*Parallel Processing Mode (CJ-H CPU Units Only)*
	Studying the I/O response time →	---		*10-4-6 I/O Response Time*
	Finding the increase in the cycle time for online editing →	---		*10-4-5 Online Editing Cycle Time Extension*

	Purpose		Function	Manual	Reference
Using Interrupt Tasks	Monitoring operating status at regular intervals. • Monitoring operating status at regular intervals.	→	Use a scheduled interrupt task.	*Programming Manual* (W394)	*4-3 Interrupt Tasks*
	Issuing an interrupt to the CPU when data is received through serial communications.	→	Use a Serial Communications Units and external interrupt task.		
	Performing interrupt processing when an input goes ON. • Executing processing immediately with an input.	→	Use an I/O interrupt task.		
	Executing an emergency interrupt program when the power supply fails.	→	Use a power OFF interrupt task. Enable the power OFF interrupt task in the PLC Setup.		
	Studying the interrupt response time	→	---	*Operation Manual*	*10-4-7 Interrupt Response Times*
	Knowing the priority of interrupt tasks	→	---	*Programming Manual* (W394)	*4-3-2 Interrupt Task Priority*
Data Processing	Operating a FIFO or LIFO stack.	→	Use the stack instructions (FIFO(633) and LIFO(634)).	*Instructions Reference Manual* (W474)	Table Processing Instructions
	Performing basic operations on tables made up of 1-word records.	→	Use range instructions such as MAX(182), MIN(183), and SRCH(181).		
	Performing complex operations on tables made up of 1-word records.	→	Use Index Registers as pointers in special instructions.		
	Performing operations on tables made up of records longer than 1 word. (For example, the temperature, pressure, and other manufacturing settings for different models of a product could be stored in separate records.)	→	Use Index Registers and the record-table instructions.	*Programming Manual (W394)*	*6-2 Index Registers*
System Configuration and Serial Communications	Monitoring several different kinds of devices through the RS-232C port.	→	Multiple serial ports can be installed with Serial Communications Units (protocol macros).	*Operation Manual*	*2-5 Expanded System Configuration*
	Changing protocol during operation (from a modem connection to host link, for example).	→	Use STUP(237), the CHANGE SERIAL PORT SETUP instruction.	*Instructions Reference Manual* (W474)	Serial Communications Instructions

Purpose		Function	Manual	Reference
Connecting Programming Devices	Connecting a Programming Console.	Connect to the peripheral port with pin 4 of the CPU Unit's DIP switch OFF.	*Operation Manual*	*3-3 Programming Devices*
	Connecting a Programming Device (e.g., the CX-Programmer).	Connect to the peripheral port with pin 4 of the CPU Unit's DIP switch OFF or with pin 4 ON and the communications mode set to "peripheral bus" under Peripheral Port settings in the PLC Setup. Connect to the RS-232C port with pin 5 of the CPU Unit's DIP switch ON or with pin 5 OFF and the communications mode set to "peripheral bus" under RS-232C Port settings in the PLC Setup.		
	Connecting a host computer.	Connect to the RS-232C port or peripheral port. (Set the communications mode to "host link" in the PLC Setup.)		*2-5 Expanded System Configuration*
	Connecting a PT.	Connect to the RS-232C port or peripheral port. (Set the communications mode to "NT Link" in the PLC Setup.) Set the PT communications settings for a 1:N NT Link.		
	Connecting a standard serial device to the CPU Unit (no-protocol mode).	Connect to the RS-232C port. (Set the communications mode to "no-protocol" in the PLC Setup.)		
Controlling Outputs	Turning OFF all outputs on basic Output Units and High-density Output Units (a type of Special I/O Unit).	Turn ON the Output OFF Bit (A50015).	*Programming Manual* (W394)	*6-4-2 Load OFF Functions*
	Maintaining the status of all outputs on Output Units when PLC operation stops (hot start).	Turn ON the IOM Hold BIt (A50012).		*6-4-1 Hot Start/Hot Stop Functions*
Controlling I/O Memory	Maintaining the previous contents of all I/O Memory at the start of PLC operation (hot start).	Turn ON the IOM Hold BIt (A50012).	*Programming Manual* (W394)	*6-4-1 Hot Start/Hot Stop Functions*
	Maintaining the previous contents of all I/O Memory when the PLC is turned on.	Turn ON the IOM Hold BIt (A50012) and set the PLC Setup to maintain the status of the IOM Hold Bit at start-up. (IOM Hold Bit Status at Startup)		

	Purpose		Function	Manual	Reference
File Memory	Automatically transferring the program, I/O Memory, and PLC Setup from the Memory Card when the PLC is turned on. • Easily replacing the program onsite. • Operating without a battery.	→	Enable the "automatic transfer at start-up" function by turning ON pin 2 of the CPU Unit's DIP switch and create an AUTOEXEC file.	*Programming Manual* (W394)	*SECTION 5 File Memory Functions*
	Creating a library of programs for different program arrangements.	→	Memory Card functions (Program Files)		
	Creating a library of parameter settings for various PLC Racks and models.	→	Memory Card functions (Parameter Files)		
	Creating a library of data files with settings for various PLC Racks and CPU Bus Units.	→	Memory Card functions (Data Files)		
	Storing I/O Comment data within the Memory Card.	→	Memory Card functions (Symbol Table Files)		
	Storing operating data (trend and quality data) within the CPU Unit during program execution.	→	EM File Memory Functions and the FREAD(700)/FWRIT(701) instructions		
	Replacing the program without stopping operation.	→	Memory Card functions (Program Replacement during PLC Operation)		
	Reading and writing I/O memory data with a spreadsheet.	→	Read/write data files using instructions in CSV or text format.	Instructions Reference Manual (W474)	File Memory Instructions
	Creating data that can be read with a text editor.	→	Use the WRITE TEXT FILE instruction (TWRIT(704)).	Instructions Reference Manual (W474)	File Memory Instructions
Text string processing	Performing string processing at the PLC which was performed at the host computer previously and reducing the program load at the host computer (operations such as read, insert, search, replace, and exchange).	→	• Easily replacing the program onsite. • Operating without a battery. Combine the Host Link function with the text string processing instructions.	*Instructions Reference Manual* (W474)	Text String Processing Instructions
	Performing string processing operations such as rearranging text strings.	→	Replacing the program without stopping operation. Use the string comparison instructions and index registers.		
	Receiving data from external devices (such as bar code readers) through serial communications, storing the data in DM, and reading just the required string when it is needed.	→	Use the WRITE TEXT FILE instruction (TWRIT(704)). Combine the protocol macro function with the text string processing instructions.		

	Purpose	Function	Manual	Reference
Maintenance and Debugging	Changing the program while it is being executed.	Use the online editing function from a Programming Device. (Several instruction blocks can be changed with CX-Programmer.)	*Programming Manual* (W394)	*7-2-3 Online Editing*
	Sampling I/O Memory data. • Periodic sampling • Sampling once each cycle • Sampling at specified times	 → Data trace at regular intervals → Data trace at the end of each cycle → Data trace each time that TRSM(045) is executed		*7-2-4 Data Tracing*
	Confirming there are no errors in instruction execution.	→ Set the PLC Setup to specify the desired operating mode at start-up. (Startup Mode)		*6-4 Startup Settings and Maintenance*
	Recording the time that power was turned on, the last time that power was interrupted, the number of power interruptions, and the total PLC ON time.	→ Read the Auxiliary Area words containing power supply information. Startup Time: A510 and A511 Power Interruption Time: A512 and A513 Number of Power Interruptions: A514		*6-4-5 Clock Functions*
	Replacing the program without stopping operation. Reading the time/date when the user program was changed. Reading the time/date when the parameter area was changed.	→ Set the PLC Setup so that instruction errors are treated as fatal errors. (Instruction Error Operation)		*2-3-3 Checking Programs*
	Programming/monitoring the PLC remotely. • Programming or monitoring a PLC on the network through Host Link. • Programming or monitoring a PLC through modems.	 → Host Link → Network Gateway function → Host Link through modems	*Operation Manual*	*2-5 Expanded System Configuration*
	Programming/monitoring PLCs in other networks	→ Communicate with PLCs up to two network levels away through Controller Link or Ethernet.		
Error Processing and Troubleshooting	Generating a non-fatal or fatal error for user-defined conditions. • Non-fatal errors (PLC operation continues.) • Fatal errors (PLC operation stops.) • Not recording user-defined alarms and errors in the error log.	 → FAILURE ALARM: FAL(006) → SEVERE FAILURE ALARM: FALS(007) Set the PLC Setup so that user-defined FAL errors are not recorded in the error log.	*Programming Manual* (W394)	*6-5 Diagnostic and Debugging Functions*
	Analyzing time and logic in execution of an instruction block.	→ FAILURE POINT DETECTION: FPD(269)		
	Recording the time/date of errors and error details. Reading recorded error details.	→ Use the error log function. Up to 20 error records can be stored.		

Purpose		Function	Manual	Reference
Other Functions	Allocating words in the I/O Area by specifying the first word allocated to a Rack.	Set the first word allocated to a Rack by registering the I/O table from the CX-Programmer. (Words must be allocated to Racks in the order that the Racks are connected.)	*Programming Manual* (W394)	*6-7 Other Functions*
	Allocating words in the I/O Area freely by specifying the word allocated to a slot.	Set the first word allocated to a slot by registering the I/O tables from the CX-Programmer.	*Operation Manual*	*8-5 Allocating First Words to Slots*
	Reducing input chattering and the effects of noise.	Specify the input response times for Basic I/O Units in the PLC Setup. (Basic I/O Unit Input Response Time)	*Programming Manual* (W394)	*6-7 Other Functions*

1-9-2 Communications Functions (Serial/Network)

Purpose			Protocol: Required Equipment	Reference
Monitoring from the Host Computer	RS-232C or RS-422/485		Host Link: Port in the CPU Unit or Serial Communications Unit	*2-5 Expanded System Configuration*
	Host Link communications from the PLC		Enclose a FINS command with a Host Link header and terminator and issue it from the PLC as a network communications instruction.	
	Network communications through RS-232C or RS-422/485		Controller Link and Ethernet communications are possible through the Host Link. (Enclose a FINS command with a Host Link header and terminator and issue it from the PLC as a network communications instruction.)	
	Network	Control system	Controller Link: Controller Link Unit	
		Information system	Ethernet: Ethernet Unit	
Connecting to a Standard Serial Device	Creating a simple protocol		Protocol Macros: Serial Communications Unit	
	High-speed data exchange			
	No protocol		No protocol: CPU Unit's RS-232C port, or Protocol Macro	
Communicating with a PT	Direct access		NT Link: Port in the CPU Unit or Serial Communications Unit	
Data Link between PLCs	High capacity or free word allocation		Controller Link: Controller Link Unit	
Data Link between PLC and computer			Controller Link: Controller Link Unit	
Message communications between PLCs	Normal or high capacity		Controller Link: Controller Link Unit	
	Information system		Ethernet: Ethernet Unit	
Message communications between PLC and computer	Control system		Controller Link: Controller Link Unit	
	Information system		Ethernet: Ethernet Unit	

Purpose			Protocol: Required Equipment	Reference
Remote I/O between PLC and Slaves	High-density I/O	→	DeviceNet: DeviceNet Master Unit and required Slave Units	*2-5-3 Communications Network System*
	Free word allocation	→		
	Multi-vendor capability	→		
	Analog I/O capability	→		
	Multi-level architecture	→		
	High-speed Remote I/O	→	CompoBus/S: CompoBus/S Master Unit and required Slave Units	

1-10 CJ1M Functions Arranged by Purpose

In general, CJ1M CPU Units have basically the same functions as CJ1-H CPU Units. The functions described in the following tables are unique to the CJ1M.

1-10-1 High-speed Processing

Purpose	I/O used	Function		Description
Execute a special process very quickly when the corresponding input goes ON (up differentiation) or OFF (down differentiation). (For example, operating a cutter when an interrupt input is received from a Proximity Sensor or Photoelectric Sensor.)	Built-in Inputs	Interrupt inputs 0 to 3	Interrupt inputs (Direct mode)	Executes an interrupt task at the rising or falling edge of the corresponding built-in input (CIO 2960 bits 00 to 03). Use the MSKS(690) instruction to specify up or down differentiation and unmask the interrupt.
Count the input signals and execute a special process very quickly when the count reaches the preset value. (For example, stopping the supply feed when a preset number of workpieces have passed through the system.)	Built-in Inputs	Interrupt inputs 0 to 3	Interrupt inputs (Counter mode)	Decrements the PV for each rising or falling edge signal at the built-in input (CIO 2960 bits 00 to 03) and executes the corresponding interrupt task when the count reaches 0. (The counter can also be set to increment up to a preset SV.) Use the MSKS(690) instruction to refresh the counter mode SV and unmask the interrupt.
Execute a special process at a preset count value. (For example, cutting material very precisely at a given length.)	Built-in Inputs	High-speed counters 0 and 1	High-speed counter interrupt (Target value comparison)	Executes an interrupt task when the high-speed counter's PV matches a target value in the registered table. Use the CTBL(882) or INI(880) instruction to start target value comparison.
Execute a special process when the count is within a preset range. (For example, sorting material very quickly when it is within a given length range.)	Built-in Inputs	High-speed counters 0 and 1	High-speed counter interrupt (Range comparison)	Executes an interrupt task when the high-speed counter's PV is within a certain range in the registered table. Use the CTBL(882) or INI(880) instruction to start range comparison.
Reliably read pulses with an ON time shorter than the cycle time, such as inputs from a photomicrosensor.	Built-in Inputs	Quick-response inputs 0 to 3	Quick-response inputs	Reads pulses with an ON time shorter than the cycle time (as short as 30 μs) and keeps the corresponding bit in I/O memory ON for one cycle. Use the PLC Setup to enable the quick-response function for a built-in input (CIO 2960 bits 0 to 3).

1-10-2 Controlling Pulse Outputs

Purpose	I/O used	Function		Description
Perform simple positioning by outputting pulses to a motor driver that accepts pulse-train inputs.	Built-in Outputs	Pulse outputs 0 and 1	Pulse output functions • Single-phase pulse output without acceleration/deceleration Controlled by SPED. • Single-phase pulse output with acceleration/deceleration (equal acceleration and deceleration rates for trapezoidal form) Controlled by ACC. • Single-phase pulse output with trapezoidal for (Supports a startup frequency and different acceleration /deceleration rates.) Controlled by PLS2(887).	The built-in outputs (bits 00 to 03 of CIO 2961) can be used as pulse outputs 0 and 1. Target frequency: 0 Hz to 100 kHz Duty ratio: 50% The pulse output mode can be set to CW/CCW pulse control or Pulse plus direction control, but the same output mode must be used for pulse outputs 0 and 1. **Note** The PV for pulse output 0 is stored in A276 and A277. The PV for pulse output 1 is stored in A278 and A279.
Perform origin search and origin return operations.	Built-in Outputs	Pulse outputs 0 and 1	Origin functions (Origin search and origin return)	Origin search and origin return operations can be executed through pulse outputs. • Origin search: To start the origin search, set the PLC Setup to enable the origin search operation, set the various origin search parameters, and execute the ORIGIN SEARCH instruction (ORG(889)). The Unit will determine the location of the origin based on the Origin Proximity Input Signal and Origin Input Signal. The coordinates of the pulse output's PV will automatically be set as the absolute coordinates. • Origin return: To return to the predetermined origin, set the various origin return parameters and execute the ORIGIN SEARCH instruction (ORG(889)).
Change the target position during positioning. (For example, perform an emergency avoid operation with the Multiple Start feature.)	Built-in Outputs	Pulse outputs 0 and 1	Positioning with the PLS2(887) instruction	When a positioning operation started with the PULSE OUTPUT (PLS2(887)) instruction is in progress, another PLS2(887) instruction can be executed to change the target position, target speed, acceleration rate, and deceleration rate.
Change speed in steps (polyline approximation) during speed control.	Built-in Outputs	Pulse outputs 0 and 1	Use the ACC(888) instruction (continuous) to change the acceleration rate or deceleration rate.	When a speed control operation started with the ACC(888) instruction (continuous) is in progress, another ACC(888) instruction (continuous) can be executed to change the acceleration rate or deceleration rate.
Change speed in steps (polyline approximation) during positioning.	Built-in Outputs	Pulse outputs 0 and 1	Use the ACC(888) instruction (independent) or PLS2(887) to change the acceleration rate or deceleration rate.	When a positioning operation started with the ACC(888) instruction (independent) or PLS2(887) instruction is in progress, another ACC(888) (independent) or PLS2(887) instruction can be executed to change the acceleration rate or deceleration rate.

Purpose	I/O used	Function		Description
Perform fixed distance feed interrupt.	Built-in Outputs	Pulse outputs 0 and 1	Execute positioning with the PLS2(887) instruction during an operation started with SPED(885) (continuous) or ACC(888) (continuous).	When a speed control operation started with the SPED(885) instruction (continuous) or ACC(888) instruction (continuous) is in progress, the PLS2(887) instruction can be executed to switch to positioning, output a fixed number of pulses, and stop.
After determining the origin, perform positioning simply in absolute coordinates without regard to the direction of the current position or target position.	Built-in Outputs	Pulse outputs 0 and 1	The positioning direction is selected automatically in the absolute coordinate system.	When operating in absolute coordinates (with the origin determined or INI(880) instruction executed to change the PV), the CW or CCW direction is selected automatically based on the relationship between the pulse output PV and the pulse Output Amount specified when the pulse output instruction is executed.
Perform triangular control.	Built-in Outputs	Pulse outputs 0 and 1	Positioning with the ACC(888) instruction (independent) or PLS2(887) instruction.	When a positioning operation started with the ACC(888) instruction (independent) or PLS2(887) instruction is in progress, triangular control (trapezoidal control without the constant-speed plateau) will be performed if the number of output pulses required for acceleration/deceleration exceeds the specified target pulse Output Amount. (The number of pulses required for acceleration/deceleration equals the time required to reach the target frequency x the target frequency.)
Use variable duty ratio outputs for time-proportional temperature control.	Built-in Outputs	PWM(891) outputs 0 and 1 (CPU21: PWM output 0 only)	Control with analog inputs and the variable duty ratio pulse output function (PWM(891))	Two of the built-in outputs (bits 04 and 05 of CIO 2961) can be used as PWM(891) outputs 0 and 1 by executing the PWM(891) instruction. (CPU21: bits 04 of CIO 2961 only)

1-10-3 Receiving Pulse Inputs

Purpose	I/O used	Function		Description
Receive incremental rotary encoder inputs to calculate length or position.				
• Counting at low-speed frequencies (1 kHz max.)	Built-in Inputs	Interrupt inputs 0 to 3	Interrupt inputs (Counter mode) Max. count frequency of 1 kHz (single-phase pulses only) in increment mode or decrement mode	Built-in inputs (bits 00 to 03 of CIO 2960) can be used as counter inputs. The interrupt inputs must be set to counter mode. The PVs for interrupt inputs 0 through 3 are stored in A536 through A539, respectively.
• Counting at high-speed frequencies (30 kHz or 60 kHz max.)	Built-in Inputs	High-speed counters 0 and 1	High-speed counter functions • Differential phase input (4x multiplication) 30 kHz (50 kHz) • Pulse + direction input 60 kHz (100 kHz) • Up/down pulse input 60 kHz (100 kHz) • Increment input 60 kHz (100 kHz) **Note** The figures in parentheses are for line driver inputs.	Built-in inputs (bits 02, 03, and 06 to 09 of CIO 2960) can be used as high-speed counter inputs. The PV for high-speed counter 0 is stored in A270 and A271. The PV for high-speed counter 1 is stored in A272 and A273. The counters can be operated in ring mode or linear mode.
Measure a workpiece's length or position. (Start counting when a certain condition is established or pause counting when a certain condition is established.)	Built-in Inputs	High-speed counters 0 and 1	High-speed Counter Gate Bits (bits A53108 and A53109)	The high-speed counter can be started or stopped (PV held) from the Unit's program by turning ON/OFF the High-speed Counter Gate Bits (bits A53108 and A53109) when the desired conditions are met.
Measure a workpiece's speed from its position data (frequency measurement.)	Built-in Inputs	High-speed counter 0	PRV(881) (HIGH-SPEED COUNTER PV READ) instruction	The PRV(881) instruction can be used to measure the pulse frequency. • Range with differential phase inputs: 0 to 50 kHz • Range with all other input modes: 0 to 100 kHz
			PRV2(883) (COUNTER FREQUENCY CONVERT) instruction	The PRV2(883) instruction can be used to measure pulse frequency, and convert the frequency to a rotational speed (r/min.) or convert the counter PV to the total number of revolutions (for high-speed counters only). The result is calculated from the number of pulses per revolution.

1-10-4 Serial PLC Link

Purpose	I/O used	Function	Description
Share alarm information among multiple CJ1M CPU Units.	None.	Serial PLC Links	Use the PLC Setup to set the serial communications mode for the RS-232C communications port to Serial PLC Link Polling Unit or Polled Unit. Connect a CJ1W-CIF11 Converter to the built-in RS-232C port to connect multiple CPU Units via RS-422A/485. (RS-232C can also be used for a 1:1 connection.) In this way, up to 10 words of data can be exchanged per CPU Unit.
When an OMRON PT is connected to a CJ1M CPU Unit by NT Link (1:N mode), share the connection for the above Serial PLC Link.			The PT can be connected via RS-422A/485 at the Serial PLC Link, and made to communicate with the CPU Unit through a 1:N NT Link.

Note The CJ1W-CIF11 is not insulated, so the total transmission distance for the whole transmission path is 50 m max. If the total transmission distance is greater than 50 m, use the insulated NT-AL001, and do not use the CJ1W-CIF11. If only the NT-AL001 is used, the total transmission distance for the whole transmission path is 500 m max.

1-10-5 Comparison with the CJ1W-NC Pulse Outputs

Item	CJ1M	CJ1W-NC Position Control Unit
Control method	Controlled with the ladder program's Pulse Output instructions (SPED(885), ACC(888), and PLS2(887)).	Controlled with the Start Command Bit (Relative Movement Command Bit or Absolute Movement Command Bit).
Changing the speed during positioning	When the SPED(885) instruction (independent), ACC(888) instruction (independent), or PLS2(887) instruction is in progress, each instruction can be executed again to change the speed.	Override
Changing the speed during speed control	When the SPED(885) instruction (continuous) or ACC(888) instruction (continuous) is in progress, each instruction can be executed again to change the speed.	Override
Jog operation	External inputs can be used in the ladder program to start and stop operation with the ACC(888) instruction (continuous) and SPED(885) instruction (continuous).	Controlled with the Jog Start Bit, Jog Stop Bit, and Direction Specification Bit.
Origin search	Controlled with the ladder program's ORG(889) instruction.	Performed with the Origin Search Bit.
Origin return	Controlled with the ladder program's ORG(889) instruction.	Performed with the Origin Return Bit.
Teaching	Not supported.	Performed with the Teaching Start Bit.
Fixed distance feed interrupt (Continuous output with positioning)	Execute positioning with the PLS2(887) instruction during a speed control operation started with SPED(885) (continuous) or ACC(888) (continuous).	Performed with the Fixed Distance Feed Interrupt Start Bit.
Change the target position during positioning. (Multiple Start)	When a PLS2(887) instruction is being executed, another PLS2(887) instruction can be started.	Performed with the Start Command Bit (Relative Movement Command Bit or Absolute Movement Command Bit) during direct operation.
Decelerate to a stop during positioning.	Execute an ACC(888) (independent) instruction during a positioning operation started with ACC(888) (independent) or PLS2(887).	Performed with the Decelerate to Stop Bit.

Item		CJ1M	CJ1W-NC Position Control Unit
Decelerate to a stop during speed control.		Execute an ACC(888) (continuous) instruction during a speed control operation started with SPED(885) (continuous) or ACC(888) (continuous).	Performed with the Decelerate to Stop Bit.
External I/O	Origin Input Signal	A built-in input is used.	Input through the Position Control Unit's input terminal.
	Origin Proximity Input Signal	A built-in input is used.	Input through the Position Control Unit's input terminal.
	Positioning Completed Signal	A built-in input is used.	Input through the Position Control Unit's input terminal.
	Error Counter Reset Output	A built-in output is used.	Output through the Position Control Unit's output terminal.
	CW/CCW Limit Input	A separate Input Unit is used and an Auxiliary Area bit is controlled from the program.	Input through the Position Control Unit's input terminal.

1-11 Comparison to CS-series PLCs

The CS-series and CJ-series PLCs use the same architecture and are basically the same in terms of program structure (tasks), instruction system, I/O memory, and other functionality. They do differ, however in that the CJ-series PLCs have a different Unit structure, support different Units, do not support Inner Boards, have different Expansion Racks, have a different I/O allocation method, etc. These differences are outlined in the following table.

Item		CJ-series		CS-series
		CJ1-H-R CPU Unit (High-speed)	CJ1-H CPU Unit	CS1-H CPU Unit
Dimensions: Height × width		90 × 65 mm		130 × 123 mm
Unit connections		Connected to each other via connectors without Backplane. End Cover connected to right end to indicate end of Rack.		Mounted to Backplanes.
Maximum I/O capacity		2,560 I/O points		5,120 I/O points
Maximum program capacity		Same		
Maximum data memory (DM and EM Areas combined)		Same		
Instructions system		Same		
I/O memory		Same		
PLC Setup		Same		
Cyclic task functionality		Same		
Interrupt tasks		Same (Power OFF interrupt task, schedule interrupt tasks, I/O interrupt, and external interrupt tasks)		
Programming Devices		CX-Programmer (versions 2.1 or higher) (See note 1.) and Programming Consoles		
Instruction execution time	Basic instructions	0.016 μs min.	0.02 μs min.	
	Special instructions	0.048 μs min	0.06 μs min.	
Overhead time		Normal mode: 0.13 ms	Normal mode: 0.3 ms	
		Parallel processing mode: 0.28 ms	Parallel processing mode: 0.3 ms	
Mounting		DIN Track (not mountable with screws)		DIN Track or screws
Inner Boards		Not supported.		Supported.
Special I/O Units and CPU Bus Units		Structure of allocations is the same. Special I/O Units: 96 Units max. (restrictions on mounting positions) CPU Bus Units: 16 Units max.		
CPU Rack mounting positions		10 Units max. (11 Units or more will cause an error)		3, 5, 8, or 10 slots
Expansion Rack mounting positions		10 Units max. (11 Units or more will cause an error)		2, 3, 5, 8, or 10 slots
Expansion Racks		One I/O Control Unit required on CPU Rack and one I/O Interface Unit required on each Expansion Rack.		Either C200H or CS-series Expansion Racks can be connected without an I/O Control Unit or I/O Interface Units.
Maximum number of Expansion Racks		3		7
Maximum total cable length to Expansion Racks		12 m		
Maximum number of Units		40		80
SYSMAC BUS Remote I/O		Not supported.		Supported.
File Memory (Memory Cards or EM Area)		Same		
Trace Memory		Same		

Item		CJ-series		CS-series
		CJ1-H-R CPU Unit (High-speed)	CJ1-H CPU Unit	CS1-H CPU Unit
I/O allocation		Automatic allocation from right to left starting at Unit closest to CPU Unit and then right to left on Expansion Racks.		Automatic allocation from right to left starting at Unit closest to CPU Unit and then right to left on Expansion Racks.
Registered I/O tables	Support	Supported (but operation is possible without creating I/O tables from a Programming Device).		Supported (must be created from Programming Device).
	Modes	Either user-set I/O tables or automatic I/O allocation at startup (no I/O table verification). The default setting is for Automatic I/O Allocation at Startup. User-set I/O tables can be automatically used by setting and transferring I/O tables (or parameter file). If the I/O tables are deleted from a CPU Unit from the CX-Programmer, Automatic I/O Allocation at Startup will be used again.		Only user-specified I/O tables (I/O tables can be verified against actual I/O).
	Allocating unused words	Possible only by using user-set I/O tables (set by editing I/O tables on the CX-Programmer and transferring them to the CPU Unit).		Always possible. (Set by editing I/O tables on the CX-Programmer and transferring them to the CPU Unit.)
Discrepancies between registered I/O tables and actual I/O		I/O setting error occurs (fatal error). (Without Backplanes and due to the physical connection method, it is essentially impossible for a Unit to fall off or for an empty position to be created. Discrepancies between the registered I/O tables and actual I/O are thus considered to be far more serious.)		I/O verify error occurs (non-fatal error).
Setting first word on each Rack		Supported.		
Startup Mode when a Programming Console is not mounted and the PLC Setup is set to use operating mode specified on the Programming Console		RUN mode		
Serial communications ports		Same: One peripheral port and one RS-232C port.		
Serial communications modes	Peripheral port	Same: Peripheral bus, Programming Console, Host Link, 1:N NT Link		
	RS-232C port	Same: Peripheral bus, Host Link, 1:N NT Link, no protocol		
Communications commands		FINS commands, Host Link commands		
Index registers		Same		
Diagnostic functions		Same		
Error log function		Same		
Debugging functions		Same (Force-set/reset, differential monitor, data traces, instruction error traces)		
I/O response time setting functions		Same		
Battery		CPM2A-BAT01 (See note 2.)		CS1W-BAT01

Note
1. CX-Programmer version 7.1 or higher is required to use the new functionality of CJ1-H-R CPU Units.
2. Use a CJ1W-BAT01 Battery for the CJ1M CPU Unit.

SECTION 2
Specifications and System Configuration

This section provides tables of standard models, Unit specifications, system configurations, and a comparison between different Units.

2-1 Specifications

2-1-1 Performance Specifications

CJ1-H CPU Units

CPU		CJ1H-CPU67H-R (See note 1.), CPU67H	CJ1H-CPU66H-R (See note 1.), CPU66H	CJ1H-CPU65H-R (See note 1.), CPU65H	CJ1H-CPU64H-R (See note 1.)	CJ1G-CPU45H	CJ1G-CPU44H	CJ1G-CPU43H	CJ1G-CPU42H
I/O bits		2,560				1,280		960	
User program memory		250 Ksteps	120 Ksteps	60 Ksteps	30 Ksteps	60 Ksteps	30 Ksteps	20 Ksteps	10 Ksteps
Data Memory		32 Kwords							
Extended Data Memory		32 Kwords × 13 banks E0_00000 to EC_32767	32 Kwords × 7 banks E0_00000 to E6_32767	32 Kwords × 3 banks E0_00000 to E2_32767	32 Kwords × 1 bank E0_00000 to E0_32767	32 Kwords × 3 banks E0_00000 to E2_32767	32 Kwords × 1 bank E0_00000 to E0_32767		
Function blocks	**Maximum No. of definitions**	1024				1024		128	
	Maximum No. of instances	2048				2048		256	
Flash memory (unit version 4 or later, see note 2.)	**Total (Kbytes) for FB program memory, comment files, program index files, and symbol tables**	2048		1280		1280	704		
Current consumption		0.99 A at 5 V DC				0.91 A at 5 V DC			

Note
1. CX-Programmer version 7.1 or higher is required to use the new functionality of CJ1-H-R CPU Units.
2. The values displayed in the table are valid when a CPU Unit with unit version 4 or later is combined with CX-Programmer 7.0 or higher.

The following table shows the flash memory capacities for CPU Units with unit version 3.

CPU		CJ1H-CPU67H-R, CPU67H	CJ1H-CPU66H-R, CPU66H	CJ1H-CPU65H-R, CPU65H	CJ1H-CPU64H-R	CJ1G-CPU45H	CJ1G-CPU44H	CJ1G-CPU43H	CJ1G-CPU42H
Flash memory (unit version 3)	**FB program memory (Kbytes)**	1664	1664	1024	512	1024	512	512	512
	Comment files (Kbytes)	128	128	64	64	64	64	64	64
	Program index files (Kbytes)	128	128	64	64	64	64	64	64
	Symbol tables (Kbytes)	128	128	128	64	128	64	64	64

Earlier CPU Units (unit version 2 or earlier) are not equipped with the function that stores data such as comment files in flash memory.

CJ1M CPU Units

Item		Specification					
		CPU Units with Built-in I/O			CPU Units without Built-in I/O		
Model		CJ1M-CPU23	CJ1M-CPU22	CJ1M-CPU21	CJ1M-CPU13	CJ1M-CPU12	CJ1M-CPU11
I/O points		640	320	160	640	320	160
User program memory		20 Ksteps	10 Ksteps	5 Ksteps	20 Ksteps	10 Ksteps	5 Ksteps
Maximum number of Expansion Racks		1 max.	Not supported.		1 max.	Not supported.	
Data Memory		32 Kwords					
Extended Data Memory		Not supported.					
Pulse output startup time		• 46 μs (without acceleration/ deceleration) • 70 μs (with acceleration/ deceleration)		• 63 μs (without acceleration/ deceleration) • 100 μs (with acceleration/ deceleration)	---		
Interrupt inputs		2		1	2		1
PWM output points		2		1	None		
Maximum subroutine number		1,024		256	1,024		256
Maximum jump number for JMP instruction		1,024		256	1,024		256
Built-in inputs		10 • Interrupt inputs (quick-response): 4 inputs • High-speed counter: 2 inputs (differential-phase at 50 kHz or single-phase at 100 kHz)			---		
Built-in outputs		6 • Pulse outputs: 2 at 100 kHz • PWM outputs: 2		6 • Pulse outputs: 2 at 100 kHz • PWM outputs: 1	---		
Function blocks	**Maximum No. of definitions**	128					
	Maximum No. of instances	256					
Flash memory (Unit version 4 or later, see note)	**Total (Kbytes) for FB program memory, comment files, program index files, and symbol tables**	704					

Item	Specification	
	CPU Units with Built-in I/O	CPU Units without Built-in I/O
Current consumption (supplied by Power Supply Units)	0.64 A at 5 V DC	0.58 A at 5 V DC

Note The values displayed in the table above are valid when a CPU Unit with unit version 4 or later is combined with CX-Programmer 7.0 or higher.

The following table shows the flash memory capacities for CPU Units with unit version 3.

Item		Specification					
		CPU Units with Built-in I/O			CPU Units without Built-in I/O		
Model		CJ1M-CPU23	CJ1M-CPU22	CJ1M-CPU21	CJ1M-CPU13	CJ1M-CPU12	CJ1M-CPU11
Flash memory	**FB program memory (Kbytes)**	256					
	Comment files (Kbytes)	64					
	Program index files (Kbytes)	64					
	Symbol tables (Kbytes)	64					

Earlier CPU Units (unit version 2 or earlier) are not equipped with the function that stores data such as comment files in flash memory.

CJ1 CPU Units

CPU	CJ1G-CPU45	CJ1G-CPU44
I/O bits	1,280	
User program memory (See note.)	60 Ksteps	30 Ksteps
Data Memory	32 Kwords	
Extended Data Memory	32 Kwords x 3 banks E0_00000 to E2_32767	32 Kwords x 1 bank E0_00000 to E0_32767
Current consumption	0.91 A at 5 V DC	

Note The number of steps in a program is not the same as the number of instructions. For example, LD and OUT require 1 step each, but MOV(021) requires 3 steps. The program capacity indicates the total number of steps for all instructions in the program. Refer to 10-5 Instruction Execution Times and Number of Steps for the number of steps required for each instruction.

Common Specifications

Item	Specifications	Reference
Control method	Stored program	---
I/O control method	Cyclic scan and immediate processing are both possible.	---
Programming	• Ladder diagrams • SFC (sequential function charts) • ST (structured text) • Mnemonics	---
CPU processing mode	CJ1-H CPU Units: Normal Mode, Parallel Processing Mode with Asynchronous Memory Access, Parallel Processing Mode with Synchronous Memory Access, or Peripheral Servicing Priority Mode CJ1M CPU Units: Normal Mode or Peripheral Servicing Priority Mode CJ1 CPU Units: Normal Mode or Peripheral Servicing Priority Mode	---
Instruction length	1 to 7 steps per instruction	10-5 Instruction Execution Times and Number of Steps
Ladder instructions	Approx. 400 (3-digit function codes)	---
Execution time	CJ1-H-R CPU Units: Basic instructions: 0.016 μs min. Special instructions: 0.048 μs min. CJ1-H CPU Units: Basic instructions: 0.02 μs min. Special instructions: 0.06 μs min. CJ1M CPU Units (CPU12/13/22/23): Basic instructions: 0.10 μs min. Special instructions: 0.15 μs min. CJ1M CPU Units (CPU11/12): Basic instructions: 0.1 μs min. Special instructions: 0.15 μs min. CJ1 CPU Units: Basic instructions: 0.08 μs min. Special instructions: 0.12 μs min.	10-5 Instruction Execution Times and Number of Steps
Overhead time	CJ1-H-R CPU Units: Normal mode: 0.13 ms min. Parallel processing: 0.28 ms min. CJ1-H CPU Units: Normal mode: 0.3 ms min. Parallel processing: 0.3 ms min. CJ1M CPU Units (CPU12/13/22/23): 0.5 ms min. CJ1M CPU Units (CPU11/12): 0.7 ms min. CJ1 CPU Units: 0.5 ms min.	---
Unit connection method	No Backplane: Units connected directly to each other.	---
Mounting method	DIN Track (screw mounting not possible)	*5-2-6 DIN Track Installation*
Maximum number of connectable Units	• CJ1-H and CJ1 CPU Units: Per CPU or Expansion Rack: 10 Units including Basic I/O Units, Special I/O Units, and CPU Bus Units. Total per PLC: 10 Units on CPU Rack and 10 Units each on 3 Expansion Racks = 40 Units total • CJ1M CPU Units: Total of 20 Units in the System, including 10 Units on CPU Rack and 10 Units on one Expansion Rack.	---

Item	Specifications	Reference
Maximum number of Expansion Racks	• CJ1-H and CJ1 CPU Units: 3 max. (An I/O Control Unit is required on the CPU Rack and an I/O Interface Unit is required on each Expansion Rack.) • CJ1M CPU Units (CPU 13/23 only): 1 max. (An I/O Control Unit is required on the CPU Rack and an I/O Interface Unit is required on the Expansion Rack.) • CJ1M CPU Units (CPU11/12/21/22): Expansion is not possible.	2-3-3 CJ-series Expansion Racks
Number of tasks	288 (cyclic tasks: 32, interrupt tasks: 256) With CJ1-H or CJ1M CPU Units, interrupt tasks can be defined as cyclic tasks called “extra cyclic tasks.” Including these, up to 288 cyclic tasks can be used. **Note 1** Cyclic tasks are executed each cycle and are controlled with TKON(820) and TKOF(821) instructions. **Note 2** The following 4 types of interrupt tasks are supported. Power OFF interrupt tasks: 1 max. Scheduled interrupt tasks: 2 max. I/O interrupt tasks: 32 max. External interrupt tasks: 256 max.	*Programming Manual: 1-3 Programs and Tasks* *Programming Manual: SECTION 4: Tasks*
Interrupt types	Scheduled Interrupts: Interrupts generated at a time scheduled by the CPU Unit’s built-in timer. (See note. 1) I/O Interrupts: Interrupts from Interrupt Input Units. Power OFF Interrupts (See note 2.): Interrupts executed when the CPU Unit’s power is turned OFF. External I/O Interrupts: Interrupts from the Special I/O Units or CPU Bus Units. **Note 1** CJ1-H and CJ1 CPU Units: Scheduled interrupt time interval is either 1 ms to 9,999 ms (in increments of 1 ms) or 10 ms to 99,990 ms (in increments of 10 ms) CJ1-H-R CPU Units: Scheduled interrupt time interval is 0.2 ms to 999.9 ms (in increments of 0.1 ms), 1 ms to 9,999 ms (in increments of 1 ms), or 10 ms to 99,990 ms (in increments of 10 ms) CJ1M CPU Units: Scheduled interrupt time interval is 0.5 ms to 999.9 ms (in increments of 0.1 ms), 1 ms to 9,999 ms (in increments of 1 ms), or 10 ms to 99,990 ms (in increments of 10 ms) **Note 2** Not supported when the CJ1W-PD022 Power Supply Unit is mounted.	*Programming Manual: 4-3 Interrupt Tasks*
Calling subroutines from more than one task	CJ1-H CPU Units: Supported (called “global subroutines”). CJ1 CPU Units: Not supported.	Tasks: *Programming Manual* (W394)
Function blocks (CPU Unit with unit version 3.0 or later only)	Languages in function block definitions: ladder programming, structured text	*Refer to the CX-Programmer Operation Manual Function Blocks* (W438).

<table>
<tr><th colspan="2">Item</th><th colspan="2">Specifications</th><th>Reference</th></tr>
<tr><td rowspan="6">CIO (Core I/O) Area</td><td>I/O Area</td><td>1,280: CIO 000000 to CIO 007915 (80 words from CIO 0000 to CIO 0079)
The setting of the first word can be changed from the default (CIO 0000) so that CIO 0000 to CIO 0999 can be used.
I/O bits are allocated to Basic I/O Units.</td><td rowspan="5">The CIO Area can be used as work bits if the bits are not used as shown here.</td><td>9-3 I/O Area</td></tr>
<tr><td>Link Area</td><td>3,200 (200 words): CIO 10000 to CIO 119915 (words CIO 1000 to CIO 1199)
Link bits are used for data links and are allocated to Units in Controller Link Systems.</td><td>9-4 Data Link Area
2-5-3 Communications Network System
Controller Link Unit Operation Manual (W309)</td></tr>
<tr><td>CPU Bus Unit Area</td><td>6,400 (400 words): CIO 150000 to CIO 189915 (words CIO 1500 to CIO 1899)
CPU Bus Unit bits store the operating status of CPU Bus Units.
(25 words per Unit, 16 Units max.)</td><td>9-5 CPU Bus Unit Area
Operation Manual for each CPU Bus Unit</td></tr>
<tr><td>Special I/O Unit Area</td><td>15,360 (960 words): CIO 200000 to CIO 295915 (words CIO 2000 to CIO 2959)
Special I/O Unit bits are allocated to Special I/O Units.
(10 words per Unit, 96 Units max.)
Note Special I/O Units are I/O Units that belong to a special group called “Special I/O Units.” Example: CJ1W-AD081 Analog Input Unit</td><td>9-6 Special I/O Unit Area
Operation Manual for each Special I/O Unit</td></tr>
<tr><td>Serial PLC Link Area (CJ1M CPU Units only)</td><td>1,440 (90 words): CIO 310000 to CIO 318915 (words CIO 3100 to CIO 3189)</td><td>9-7 Serial PLC Link Area</td></tr>
<tr><td>DeviceNet Area</td><td>9,600 (600 words): CIO 320000 to CIO 379915 (words CIO 3200 to CIO 3799)
DeviceNet bits are allocated to Slaves for DeviceNet Unit remote I/O communications when the Master function is used with fixed allocations.
<table><tr><td>Fixed allocation setting 1</td><td>Outputs: CIO 3200 to CIO 3263
Inputs: CIO 3300 to CIO 3363</td></tr><tr><td>Fixed allocation setting 2</td><td>Outputs: CIO 3400 to CIO 3463
Inputs: CIO 3500 to CIO 3563</td></tr><tr><td>Fixed allocation setting 3</td><td>Outputs: CIO 3600 to CIO 3663
Inputs: CIO 3700 to CIO 3763</td></tr></table>The following words are allocated to the Master function even when the DeviceNet Unit is used as a Slave.
<table><tr><td>Fixed allocation setting 1</td><td>Outputs: CIO 3370 (Slave to Master)
Inputs: CIO 3270 (Master to Slave)</td></tr><tr><td>Fixed allocation setting 2</td><td>Outputs: CIO 3570 (Slave to Master)
Inputs: CIO 3470 (Master to Slave)</td></tr><tr><td>Fixed allocation setting 3</td><td>Outputs: CIO 3770 (Slave to Master)
Inputs: CIO 3670 (Master to Slave)</td></tr></table></td><td>DeviceNet Unit Operation Manual (W380)</td></tr>
<tr><td>Internal I/O Area</td><td colspan="2">4,800 (300 words): CIO 120000 to CIO 149915 (words CIO 1200 to CIO 1499)
37,504 (2,344 words): CIO 380000 to CIO 614315 (words CIO 3800 to CIO 6143)
These bits in the CIO Area are used as work bits in programming to control program execution. They cannot be used for external I/O.</td><td>9-2-2 Overview of the Data Areas</td></tr>
</table>

Item	Specifications	Reference
Work Area	8,192 bits (512 words): W00000 to W51115 (W000 to W511) Controls the programs only. (I/O from external I/O terminals is not possible.) **Note** When using work bits in programming, use the bits in the Work Area first before using bits from other areas.	9-2-2 Overview of the Data Areas 9-7 Serial PLC Link Area
Holding Area	8,192 bits (512 words): H00000 to H51115 (H000 to H511) Holding bits are used to control the execution of the program, and maintain their ON/OFF status when the PLC is turned OFF or the operating mode is changed. **Note** The Function Block Holding Area words are allocated from H512 to H1535. These words can be used only for the function block instance area (internally allocated variable area).	9-2-2 Overview of the Data Areas 9-10 Holding Area
Auxiliary Area	Read only: 7,168 bits (448 words): A00000 to A44715 (words A000 to A447) Read/write: 8,192 bits (512 words): A44800 to A95915 (words A448 to A959) Auxiliary bits are allocated specific functions.	9-2-2 Overview of the Data Areas 9-11 Auxiliary Area
Temporary Area	16 bits (TR0 to TR15) Temporary bits are used to temporarily store the ON/OFF execution conditions at program branches.	9-2-2 Overview of the Data Areas 9-12 TR (Temporary Relay) Area
Timer Area	4,096: T0000 to T4095 (used for timers only)	9-2-2 Overview of the Data Areas 9-13 Timer Area
Counter Area	4,096: C0000 to C4095 (used for counters only)	9-2-2 Overview of the Data Areas 9-14 Counter Area
DM Area	32 Kwords: D00000 to D32767 Used as a general-purpose data area for reading and writing data in word units (16 bits). Words in the DM Area maintain their status when the PLC is turned OFF or the operating mode is changed. Internal Special I/O Unit DM Area: D20000 to D29599 (100 words × 96 Units) Used to set parameters for Special I/O Units. CPU Bus Unit DM Area: D30000 to D31599 (100 words × 16 Units) Used to set parameters for CPU Bus Units.	9-2-2 Overview of the Data Areas 9-15 Data Memory (DM) Area
EM Area (CJ1-H and CJ1 CPU Units only)	32 Kwords per bank, 13 banks max.: E0_00000 to EC_32767 max. (depending on model of CPU Unit) Used as a general-purpose data area for reading and writing data in word units (16 bits). Words in the EM Area maintain their status when the PLC is turned OFF or the operating mode is changed. The EM Area is divided into banks, and the addresses can be set by either of the following methods. Changing the current bank using the EMBC(281) instruction and setting addresses for the current bank. Setting bank numbers and addresses directly. EM data can be stored in files by specifying the number of the first bank.	9-2-2 Overview of the Data Areas 9-16 Extended Data Memory (EM) Area
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). CJ1-H and CJ1M CPU Units: Setting to use index registers either independently in each task or to share them between tasks. CJ1 CPU Units: Index registers used independently in each task.	9-17 Index Registers *Programming Manual: 6-2 Index Registers*

Item	Specifications	Reference
Task Flag Area	32 (TK0000 to TK0031) Task Flags are read-only flags that are ON when the corresponding cyclic task is executable and OFF when the corresponding task is not executable or in standby status.	9-19 Task Flags *Programming Manual: 4-2-3 Flags Related to Cyclic Tasks*
Trace Memory	4,000 words (trace data: 31 bits, 6 words)	*Programming Manual: 7-2-4 Tracing Data*
File Memory	Memory Cards: Compact flash memory cards can be used (MS-DOS format). EM file memory (CJ1-H and CJ1 CPU Units only): Part of the EM Area can be converted to file memory (MS-DOS format). OMRON Memory Cards can be used.	*Programming Manual: SECTION 5: File Memory Functions*

Function Specifications

Item	Specifications	Reference
Constant cycle time	1 to 32,000 ms (Unit: 1 ms) When a Parallel Processing Mode is used for a CJ1-H CPU Unit, the cycle time for executing instructions is constant.	10-4 Computing the Cycle Time *Programming Manual: 6-1-1 Minimum Cycle Time*
Cycle time monitoring	Possible (Unit stops operating if the cycle is too long): 10 to 40,000 ms (Unit: 10 ms) When a Parallel Processing Mode is used for a CJ1-H CPU Unit, the instruction execution cycle is monitored. CPU Unit operation will stop if the peripheral servicing cycle time exceeds 2 s (fixed).	10-4 Computing the Cycle Time *Programming Manual: 6-1-2* Maximum Cycle Time (Watch Cycle Time) and *6-1-3 Cycle Time Monitoring*
I/O refreshing	Cyclic refreshing, immediate refreshing, refreshing by IORF(097). IORF(097) refreshes I/O bits allocated to Basic I/O Units and Special I/O Units. With CJ1-H-R CPU Units the SPECIAL I/O UNIT I/O REFRESH instruction (FIORF(225)) can be used to refresh Special I/O Units whenever required (including allocated DM Area words). With the CJ1-H and CJ1M CPU Units, the CPU BUS UNIT I/O REFRESH (DLNK(226)) instruction can be used to refresh bits allocated to CPU Bus Units in the CIO and DM Areas whenever required.	10-4 Computing the Cycle Time *Programming Manual: 6-1-6 I/O Refresh Methods*
Timing of special refreshing for CPU Bus Units	Data links for Controller Link Units and SYSMAC LINK Units, remote I/O for DeviceNet Units, and other special refreshing for CPU Bus Units is performed at the following times: CJ1 CPU Units: I/O refresh period CJ1-H and CJ1M CPU Units: I/O refresh period and when the CPU BUS UNIT I/O REFRESH (DLNK(226)) instruction is executed.	10-4 Computing the Cycle Time
I/O memory holding when changing operating modes	Depends on the ON/OFF status of the IOM Hold Bit in the Auxiliary Area.	SECTION 9 Memory Areas 9-2-3 Data Area Properties *Programming Manual: 6-4-1 Hot Start/Cold Start Function*
Load OFF	All outputs on Output Units can be turned OFF when the CPU Unit is operating in RUN, MONITOR, or PROGRAM mode.	*Programming Manual: 6-5-2 Load OFF Function* and *7-2-3 Online Editing*

Item	Specifications		Reference
Timer/Counter PV refresh method	CJ1-H and CJ1M CPU Units: BCD or binary (CX-Programmer Ver. 3.0 or higher). CJ1 CPU Units: BCD only.		*Programming Manual: 6-4 Changing the Timer/Counter PV Refresh Mode*
Input response time setting	Time constants can be set for inputs from Basic I/O Units. The time constant can be increased to reduce the influence of noise and chattering or it can be decreased to detect shorter pulses on the inputs.		10-4-6 I/O Response Time *Programming Manual: 6-6-1 I/O Response Time Settings*
Mode setting at power-up	Possible (By default, the CPU Unit will start in RUN mode if a Programming Console is not connected.)		7-1-2 PLC Setup Settings *Programming Manual: 1-2 Operating Modes* and *1-2-3 Startup Mode*
Flash memory (CJ1-H and CJ1M CPU Units only)	The user program and parameter area data (e.g., PLC Setup) are always backed up automatically in flash memory. (automatic backup and restore.) CPU Units with unit version 3.0 or later only: When downloading projects from CX-Programmer Ver. 5.0 or higher, symbol table files (including CX-Programmer symbol names, I/O comments), comment files (CX-Programmer rung comments, other comments), and program index files (CX-Programmer section names, section comments, or program comments) are stored in comment memory within the flash memory.		---
Memory Card functions	Automatically reading programs (autoboot) from the Memory Card when the power is turned ON.	Possible	3-2 File Memory *Programming Manual: SECTION 5 File Memory Functions, 5-1-3 Files*, and *5-2-2 CMND Instruction*
	Program replacement during PLC operation	Possible	*Programming Manual: 5-2-3 Using Instruction in User Program*
	Format in which data is stored in Memory Card	User program: Program file format PLC Setup and other parameters: Data file format I/O memory: Data file format (binary format), text format, or CSV format	*Programming Manual: 5-1 File Memory*
	Functions for which Memory Card read/write is supported	User program instructions, Programming Devices (including CX-Programmer and Programming Consoles), Host Link computers, AR Area control bits, easy backup operation	*Programming Manual:* 5-2 File Memory Operations
Filing	Memory Card data and the EM (Extended Data Memory) Area can be handled as files.		*Programming Manual: SECTION 5 File Memory Functions*
Debugging	Control set/reset, differential monitoring, data tracing (scheduled, each cycle, or when instruction is executed), instruction error tracing, storing location generating error when a program error occurs.		*Programming Manual: 7-2 Trial Operation and Debugging*

Item	Specifications	Reference
Online editing	When the CPU Unit is in MONITOR or PROGRAM mode, multiple program sections ("circuits") of the user program can be edited together. This function is not supported for block programming areas. (With the CX-Programmer is used, multiple program sections of the user program can be edited together. When a Programming Console is used, the program can be edited in mnemonics only.)	*Programming Manual: 1-2 Operating Modes* and *7-2-3 Online Editing*
Program protection	Overwrite protection: Set using DIP switch. Copy protection: Password set using CX-Programmer or Programming Consoles.	*Programming Manual: 6-4-6 Program Protection*
Error check	User-defined errors (i.e., user can define fatal errors and non-fatal errors) The FPD(269) instruction can be used to check the execution time and logic of each programming block. FAL and FALS instructions can be used with the CJ1-H and CJ1M CPU Units to simulate errors.	11-2-5 Error Messages *Programming Manual: 6-5 Diagnostic Functions* and *6-5-3 Failure Alarm Functions*
Error log	Up to 20 errors are stored in the error log. Information includes the error code, error details, and the time the error occurred. A CJ1-H or CJ1M CPU Unit can be set so that user-defined FAL errors are not stored in the error log.	*Programming Manual: 6-4-1 Error Log*
Serial communications	Built-in peripheral port: Programming Device (including Programming Console) connections, Host Links, NT Links Built-in RS-232C port: Programming Device (excluding Programming Console) connections, Host Links, no-protocol communications, NT Links, Serial Gateway (CompoWay/F master)	2-5-1 Serial Communications System *Programming Manual: 6-3 Serial Communications Functions*
	Serial Communications Unit (sold separately): Protocol macros, Host Links, NT Links, Modbus-RTU slave, No-Protocol, Serial Gateway (CompoWay/F master or Modbus master)	
Clock	Provided on all models. Accuracy: Ambient temperature / Monthly error 55°C: −3.5 min to +0.5 min 25°C: −1.5 min to +1.5 min 0°C: −3 min to +1 min **Note** Used to store the time when power is turned ON and when errors occur.	*Programming Manual: 6-4-5 Clock Functions*
Power OFF detection time	AC Power Supply Unit: 10 to 25 ms (not fixed) DC Power Supply Unit PD025: 2 to 5 ms; PD022: 2 to 10 ms	10-3 Power OFF Operation
Power OFF detection delay time	0 to 10 ms (user-defined, default: 0 ms) **Note** Not supported when the CJ1W-PD022 Power Supply Unit is mounted.	*Programming Manual: 6-4-4 Power OFF Detection Delay Time*
Memory protection	Held Areas: Holding bits, contents of Data Memory and Extended Data Memory, and status of the counter Completion Flags and present values. **Note** If the IOM Hold Bit in the Auxiliary Area is turned ON, and the PLC Setup is set to maintain the IOM Hold Bit status when power to the PLC is turned ON, the contents of the CIO Area, the Work Area, part of the Auxiliary Area, timer Completion Flag and PVs, Index Registers, and the Data Registers will be saved for up to 20 days.	9-2-3 Data Area Properties
Sending commands to a Host Link computer	FINS commands can be sent to a computer connected via the Host Link System by executing Network Communications Instructions from the PLC.	2-5-2 Systems

Item	Specifications	Reference
Remote programming and monitoring	Remote programming and remote monitoring are possible for PLCs on Controller Link, Ethernet, DeviceNet or SYSMAC LINK networks.	2-5-3 Communications Network System *Programming Manual: 6-4-7 Remote Programming and Monitoring*
Communicating across network levels	Remote programming and monitoring from Support Software and FINS message communications can be performed across different network levels, even for different types of network. Pre-Ver. 2.0: Three levels Version 2.0 or later: Eight levels for Controller Link and Ethernet networks (See note.), three levels for other networks. **Note** To communicate across eight levels, the CX-Integrator or the CX-Net in CX-Programmer version 4.0 or higher must be used to set the routing tables.	2-5-2 Systems
Storing comments in CPU Unit	I/O comments can be stored as symbol table files in the Memory Card, EM file memory, or comment memory (see note). **Note** Comment memory is supported for CX-Programmer version 5.0 or higher and CS/CJ-series CPU Units with unit version 3.0 or later only.	I/O comments: *CX-Programmer Ver. 5.0 Operation Manual* (W437) Storing comments in CPU Unit: *Programming Manual* (W394)
Program check	Program checks are performed at the beginning of operation for items such as no END instruction and instruction errors. CX-Programmer can also be used to check programs.	*Programming Manual: 2-3 Checking Programs*
Control output signals	RUN output: The internal contacts will turn ON (close) while the CPU Unit is operating (CJ1W-PA205R).	*Programming Manual: 6-4-3 RUN Output*
Battery life	Refer to 12-2 Replacing User-serviceable Parts. Battery Set for CJ1-H and CJ1 CPU Units: CPM2A-BAT01 Battery Set for CJ1M CPU Units: CJ1W-BAT01	*12-1-2 Unit Replacement Precautions*
Self-diagnostics	CPU errors (watchdog timer), I/O bus errors, memory errors, and battery errors.	11-2-5 Error Messages
Other functions	Storage of number of times power has been interrupted. (Stored in A514.)	10-3 Power OFF Operation

Functions Provided by CJ1M CPU Units Only

Item			Specifications	Reference
Built-in I/O	Built-in inputs	General-purpose inputs	As with Input Units, ordinary input signals are handled according to the I/O refresh timing, and are reflected in I/O memory.	*Built-in I/O Operation Manual: 5-1-2 General-purpose Inputs*
		Interrupt inputs	Interrupt inputs (Direct mode): Interrupt task numbers 140 to 143 are started at the rising or falling edge of bits 00 to 03 of CIO 2960. Response time: 0.3 ms Interrupt inputs (Counter mode): Interrupt task numbers 140 to 143 are started by incrementing or decrementing counters for bits 00 to 03 of CIO 2960). Response frequency: 1 kHz	*Built-in I/O Operation Manual: 5-1-3 Interrupt Inputs*
		High-speed counters	The signal inputs to the built-in input terminals are counted. The following four types of high-speed counter inputs can be used: Phase-differential pulse inputs: 30 kHz (for open collector) and 50 kHz (for line driver) Pulse + direction inputs: 60 kHz (for open collector) and 100 kHz (for line driver) Up/down pulse inputs: 60 kHz (for open collector) and 100 kHz (for line driver) Increment pulse inputs: 60 kHz (for open collector) and 100 kHz (for line driver) The interrupt task can be started when the comparison condition for the count of the high-speed counter is met. There are two methods of comparison with the PV of the high-speed counter: 1) Target value comparison 2) Range comparison It is also possible to prohibit counting input signals (gate function).	*Built-in I/O Operation Manual: 5-1-4High-speed Counter Inputs*
		Quick-response inputs	Read, as input signals, pulse signals shorter than the cycle time (minimum pulse width: 50 μs).	*Built-in I/O Operation Manual: 5-1-5 Quick-response Inputs*
	Built-in outputs	General-purpose outputs	As with Output Units, the contents of I/O memory are output according to the I/O refresh timing.	*Built-in I/O Operation Manual: 5-2-2 General-purpose Outputs*
		Pulse outputs	Fixed duty ratio pulse signals (duty ratio: 50%) are output from the built-in output terminal. Speed control (continuous output of pulses at a specified frequency) and positioning (output of a specified number of pulses at a specified frequency, and then stopping) are possible.	*Built-in I/O Operation Manual: 5-2-3 Pulse Outputs*
		Variable duty pulse outputs (PWM(891) outputs)	Execute pulse outputs with a set duty ratio (the ratio of ON time and OFF time in one pulse cycle).	*Built-in I/O Operation Manual: 5-2-4 Variable Duty Ratio Pulse Outputs (PWM(891) Outputs)*
	Establishing the origin	Origin search	Establishes the mechanical origin by pulse outputs based on a pattern specified in the origin search parameters.	*Built-in I/O Operation Manual: 5-3-2 Origin Search*
		Origin return	Moves to the origin from any position.	*Built-in I/O Operation Manual: 5-3-5 Origin Return*
Serial PLC Link			Uses the built-in RS-232C port to exchange data among CPU Units with no need for a program. The Serial PLC Link can also include PTs set for NT Links (1:N mode) combined with CPU Units.	*Programming Manual: 6-4-3 Serial PLC Links*

Item		Specifications	Reference
Scheduled interrupts	Scheduled interrupts in units of 0.1 ms	Starts scheduled interrupt tasks with a minimum interval of 0.5 ms, at a precision of 0.1 ms. (Set in the PLC Setup.)	*Programming Manual: 6-5 Using a Scheduled Interrupt as a High-speed Timer*
	Reset start by MSKS instruction	When MSKS is executed, reset starts the internal timer and standardizes the time to first interrupt.	
	Internal timer PV reading by MSKS instruction	When MSKS is executed, reads the time elapsed from the start of the scheduled interrupt or the previous scheduled interrupt.	

2-1-2 General Specifications

Item	Specifications				
Power Supply Unit	CJ1W-PA205R	CJ1W-PA205C	CJ1W-PA202	CJ1W-PD025	CJ1W-PD022
Supply voltage	100 to 240 V AC (wide-range), 50/60 Hz			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 to 26.4 V DC
Power consumption	100 VA max.		50 VA max.	50 W max.	35 W max.
Inrush current (See note 3.)	At 100 to 120 V AC: 15 A/8 ms max. for cold start At 200 to 240 V AC: 30 A/8 ms max. for cold start		At 100 to 120 V AC: 20 A/8 ms max. for cold start At 200 to 240 V AC: 40 A/8 ms max. for cold start	At 24 V DC: 30 A/20 ms max. for cold start	At 24 V DC: 30 A/20 ms max. for cold start
Output capacity (See note 7.)	5.0 A, 5 V DC (including supply to CPU Unit)		2.8 A, 5 V DC (including supply to CPU Unit)	5.0 A, 5 V DC (including supply to CPU Unit)	2.0 A, 5 V DC (including supply to CPU Unit)
	0.8 A, 24 V DC Total: 25 W max.		0.4 A, 24 V DC Total: 14 W max.	0.8 A, 24 V DC Total: 25 W max.	0.4 A, 24 V DC Total: 19.6 W max.
Output terminal (service supply)	Not provided				
RUN output (See note 2.)	Contact configuration: SPST-NO Switch capacity: 250 V AC, 2 A (resistive load) 120 V AC, 0.5 A (inductive load), 24 V DC, 2A (resistive load) 24 V DC, 2 A (inductive load)	Not provided.			
Replacement notification function	Not provided.	With Alarm output (open-collector output) 30 VDC max., 50 mA max.	Not provided.		
Insulation resistance	20 MΩ min. (at 500 V DC) between AC external and GR terminals (See note 1.)	20 MΩ min. (at 500 V DC) between all external terminals and GR terminal (See note 1.), and between all alarm output terminals. 20 MΩ min. (at 250 V DC) between all alarm output terminals and GR terminal (See note 1.)	20 MΩ min. (at 500 V DC) between AC external and GR terminals (See note 1.)	20 MΩ min. (at 500 V DC) between DC external and GR terminals (See note 1.)	--- (See note 6.)

Item	Specifications				
Power Supply Unit	CJ1W-PA205R	CJ1W-PA205C	CJ1W-PA202	CJ1W-PD025	CJ1W-PD022
Dielectric strength	2,300 V AC 50/60 Hz for 1 min between AC external and GR terminals (See notes 1 and 5.) Leakage current: 10 mA max.	2,300 V AC, 50/60 Hz for 1 minute between all external terminals and GR terminal (See note 1 and 5.) and between all alarm output terminals with a leakage current of 10 mA max.	2,300 V AC 50/60 Hz for 1 min between AC external and GR terminals (See note 1 and 5.) Leakage current: 10 mA max.		--- (See note 6.)
	1,000 V AC 50/60 Hz for 1 min between AC external and GR terminals (See notes 1 and 5.) Leakage current: 10 mA max.	1,000 V AC, 50/60 Hz for 1 minute between all alarm output terminals and GR terminal (See note 1 and 5.) with a leakage current of 10 mA max.	1,000 V AC 50/60 Hz for 1 min between AC external and GR terminals (See note 1 and 5.) Leakage current: 10 mA max.		
Withstand voltage category	Category II: Conforms to JIS B3502 and IEC 61131-2.				
Noise immunity	2 kV on power supply line (conforming to IEC61000-4-4)				
Vibration resistance	5 to 8.4 Hz, Single amplitude: 3.5 mm 8.4 to 150 Hz, Acceleration: 9.8 m/s^2 100 minutes in X, Y and Z directions (10 minutes per sweep × 10 sweeps = 100 minutes in total) (Conforming to IEC 60068-2-6)				
Shock resistance	147m/s^2 in X, Y, and Z directions, 3 times each. (Relay Output Unit:100 m/s^2) (Conforming to IEC 60068-2-27)				
Ambient operating temperature	0 to 55°C				
Ambient operating humidity	10% to 90% (with no condensation)	10% to 90% (with no condensation) (See note 4.)	10% to 90% (with no condensation)		
Atmosphere	Must be free from corrosive gases.				
Ambient storage temperature	–20 to 70°C (excluding battery)	–20 to 70°C (excluding battery) (See note 4.)	–20 to 70°C (excluding battery)		
Grounding	Less than 100 Ω				
Enclosure	Mounted in a panel.				
Weight	All models are each 5 kg max.				
CPU Rack dimensions	90.7 to 466.7 × 90 × 65 mm (W x H x D) (not including cables) Note: W = a + b +20 x n + 31 x m + 14.7 a: Power Supply Unit: PA205R and PA205C = 80; PA202 = 45; PD025 = 60; PD022=27 b: CPU Unit: CJ1-H or CJ1 = 62; CJ1M-CPU1□ = 31; CJ1M-CPU2□ = 49 The total width is given by the following: W = 156.7 + n × 20 + m × 31, where n is the number of 32-point I/O Units or I/O Control Units and m is the number of other Units.				
Safety measures	Conforms to cULus and EC Directives.				

Note

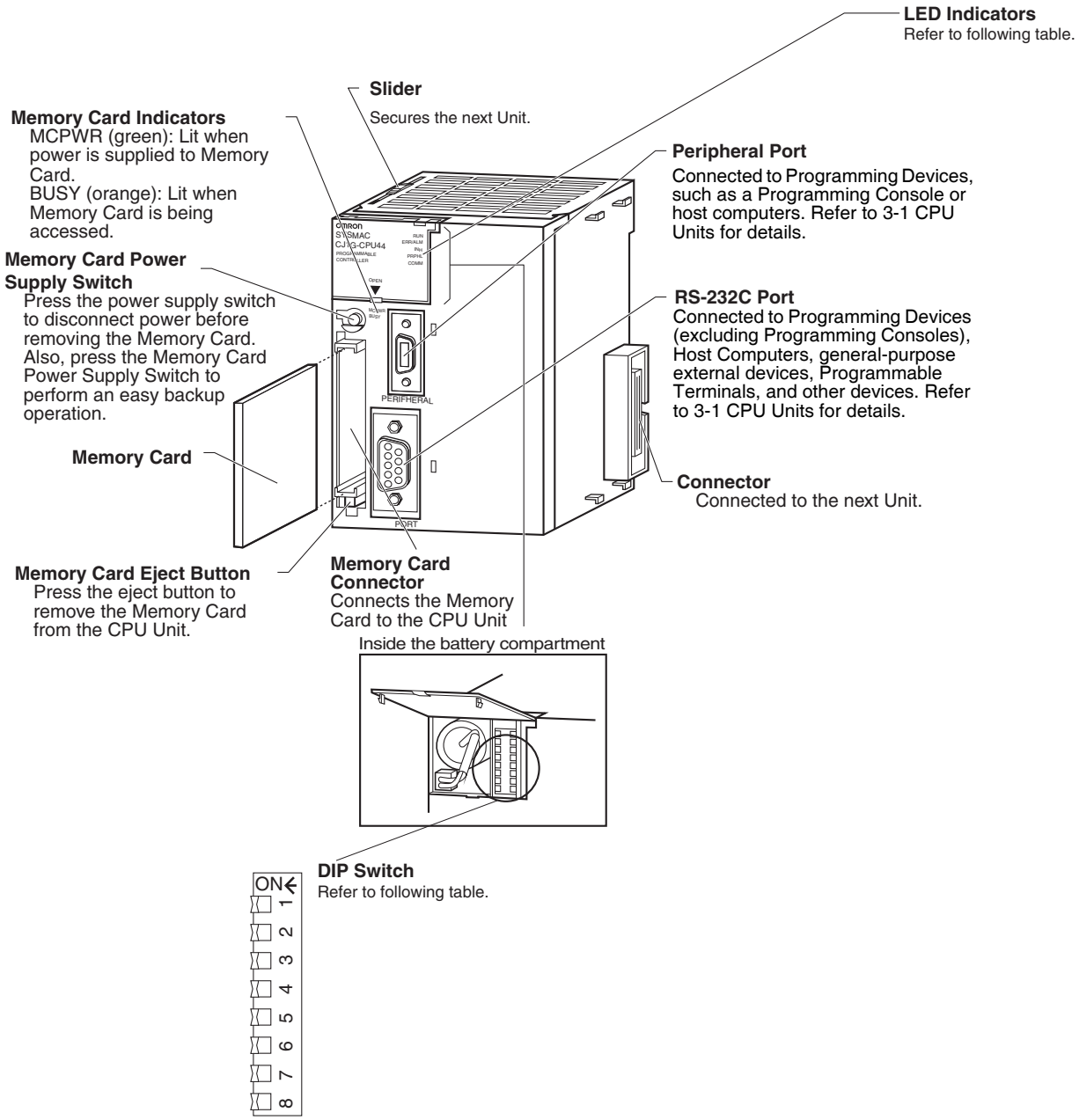
1. Disconnect the Power Supply Unit's LG terminal from the GR terminal when testing insulation and dielectric strength. Testing the insulation and dielectric strength with the LG terminal and the GR terminals connected will damage internal circuits in the CPU Unit.
2. Supported only when mounted to CPU Rack.
3. The inrush current is given for a cold start at room temperature. The inrush control circuit uses a thermistor element with a low-temperature current control characteristic. If the ambient temperature is high or the PLC is hot-started, the thermistor will not be sufficiently cool, and the inrush 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.
4. Maintain an ambient storage temperature of –25 to 30°C and relative humidity of 25% to 70% when storing the Unit for longer than 3 months to keep the replacement notification function in optimum working condition.
5. Change the applied voltage gradually using the adjuster on the Tester. If the full dielectric strength voltage is applied or turned OFF using the switch

on the Tester, the generated impulse voltage may damage the Power Supply Unit.

6. CJ1W-PD022 is not insulated between the primary DC power and secondary DC power.
7. Internal components in the Power Supply Unit will deteriorate or be damaged if the Power Supply Unit is used for an extended period of time exceeding the power supply output capacity or if the outputs are shorted.

2-2 CPU Unit Components and Functions

2-2-1 CPU Unit Components



Indicators

The following table describes the LED indicators on the front panel of the CPU Unit.

Indicator	Meaning
RUN (green)	Lights when the PLC is operating normally in MONITOR or RUN mode.
ERR/ALM (red)	Flashes if a non-fatal error occurs that does not stop the CPU Unit. If a non-fatal error occurs, the CPU Unit will continue operating. Lights if a fatal error occurs that stops the CPU Unit or if a hardware error occurs. If a fatal or hardware error occurs, the CPU Unit will stop operating, and the outputs from all Output Units will turn OFF.
INH (orange)	Lights when the Output OFF Bit (A50015) turns ON. If the Output OFF Bit is turned ON, the outputs from all Output Units will turn OFF.
PRPHL (orange)	Flashes when the CPU Unit is communicating via the peripheral port.
BKUP (orange; CJ1-H and CJ1M CPU Units only)	Lights when data is being backed up from RAM to the flash memory. Do not turn OFF the CPU Unit when this indicator is lit.
COMM (orange)	Flashes when the CPU Unit is communicating via the RS-232C port.
MCPWR (green)	Lit while power is supplied to the Memory Card.
BUSY	Lit while the Memory Card is being accessed.

DIP Switch

The CJ-series CPU Unit has an 8-pin DIP switch that is used to set basic operational parameters for the CPU Unit. The DIP switch is located under the cover of the battery compartment. The DIP switch pin settings are described in the following table.

Pin	Setting	Function
1	ON	Writing disabled for user program memory.
	OFF	Writing enabled for user program memory.
2	ON	User program automatically transferred when power is turned ON.
	OFF	User program not automatically transferred when power is turned ON.
3	ON	Not used.
4	ON	Use peripheral port parameters set in the PLC Setup.
	OFF	Auto-detect Programming Console or CX-Programmer parameters at the peripheral port.
5	ON	Auto-detect CX-Programmer parameters at the RS-232C port.
	OFF	Use RS-232C port parameters set in the PLC Setup.
6	ON	User-defined pin. Turns OFF the User DIP Switch Pin Flag (A39512).
	OFF	User-defined pin. Turns ON the User DIP Switch Pin Flag (A39512).
7	ON	Easy backup: Read/write to Memory Card.
	OFF	Easy backup: Verify contents of Memory Card.
8	OFF	Always OFF.

2-2-2 CPU Unit Capabilities

CJ1-H CPU Units

Model	I/O bits	Program capacity	Data Memory capacity (See note.)	Ladder instruction processing speed	Internal communications ports	Optional products
CJ1H-CPU67H-R	2,560 bits (Up to 3 Expansion Racks)	250 Ksteps	448 Kwords	0.016 μs	Peripheral port and RS-232C port	Memory Cards
CJ1H-CPU66H-R		120 Ksteps	256 Kwords			
CJ1H-CPU65H-R		60 Ksteps	128 Kwords			
CJ1G-CPU64H-R		30 Ksteps	64 Kwords			
CJ1H-CPU67H		250 Ksteps	448 Kwords	0.02 μs		
CJ1H-CPU66H		120 Ksteps	256 Kwords			
CJ1H-CPU65H		60 Ksteps	128 Kwords			
CJ1G-CPU45H	1280 bits (Up to 3 Expansion Racks)	60 Ksteps	128 Kwords	0.04 μs		
CJ1G-CPU44H		30 Ksteps	64 Kwords			
CJ1G-CPU43H	960 bits (Up to 2 Expansion Racks)	20 Ksteps	64 Kwords			
CJ1G-CPU42H		1 0Ksteps	64 Kwords			

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

CJ1M CPU Units

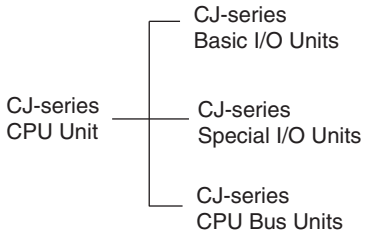
Model	I/O bits	Program capacity	Data Memory capacity (See Note.)	Ladder instruction processing speed	Internal communications ports	Optional products	Pulse I/O
CJ1M-CPU23	640 bits (1 Expansion Rack)	20 Ksteps	32 Kwords (No EM)	0.1 μs	Peripheral port and RS-232C port	Memory Cards	Supported.
CJ1M-CPU22	320 bits (No Expansion Racks)	10 Ksteps					
CJ1M-CPU21	160 bits (No Expansion Racks)	5 Ksteps					
CJ1M-CPU13	640 bits (1 Expansion Rack)	20 Ksteps					Not supported.
CJ1M-CPU12	320 bits (No Expansion Racks)	10 Ksteps					
CJ1M-CPU11	160 bits (No Expansion Racks)	5 Ksteps					

CJ1 CPU Units

Model	I/O bits	Program capacity	Data Memory capacity (See Note.)	Ladder instruction processing speed	Internal communications ports	Optional products
CJ1G-CPU45	1,280 bits (Up to 3 Expansion Racks)	60 Ksteps	128 Kwords	0.08 μs	Peripheral port and RS-232C port (one each)	Memory Cards
CJ1G-CPU44		30 Ksteps	64 Kwords			

2-2-3 Units Classifications

The CJ-series CPU Units can exchange data with CJ-series Basic I/O Units, CJ-series Special I/O Units, and CJ-series CPU Bus Units, as shown in the following diagram.



2-2-4 Data Communications

CPU Unit Data Communications

Unit	Data exchange during cyclic servicing (allocations)		Event service data communications (IORD/IOWR instruction)	I/O refreshing using IORF instruction	I/O refreshing using FIORF (See note 4.)	I/O refreshing using DLNK
CJ-series Basic I/O Units	According to I/O allocations (Words are allocated in order according to the position the Unit is mounted.)	I/O refreshing	Not provided.	Yes	No	No
CJ-series Special I/O Units	Unit No. allocations	Special I/O Unit Area (CIO): 10 words/Unit Special I/O Unit Area (DM): 100 words/Unit	Yes (Not supported for some Units.)	Yes (Not supported for some Units.)	Yes (Not supported for some Units.)	No
CJ-series CPU Bus Units		CJ-series CPU Bus Unit Area (CIO): 25 words/ Unit CJ-series CPU Bus Unit Area (DM): 100 words/Unit	Not provided.	No	No	Yes

CPU Unit Connections

Unit	Maximum number of Units on CPU Racks and Expansion Racks	Racks to which Unit can be mounted	
		CJ-series CPU Rack	CJ-series Expansion Racks
CJ-series Basic I/O Units	40 (20 for CJ1M CPU Units) (See note 1.)	Yes	Yes
CJ-series Special I/O Units	40 (20 for CJ1M CPU Units) (See note 2.)	Yes	Yes
CJ-series CPU Bus Units	16	Yes	Yes (See note 3.)

Note
1. The maximum number of Units on CPU Rack and Expansion Racks is 40. There are other restrictions for the number of I/O points.
2. The maximum number of Units that can be connected is 40.
3. Some CPU Bus Units cannot be mounted to an Expansion Rack.
4. CJ1-H-R CPU Units only.

2-3 Basic System Configuration

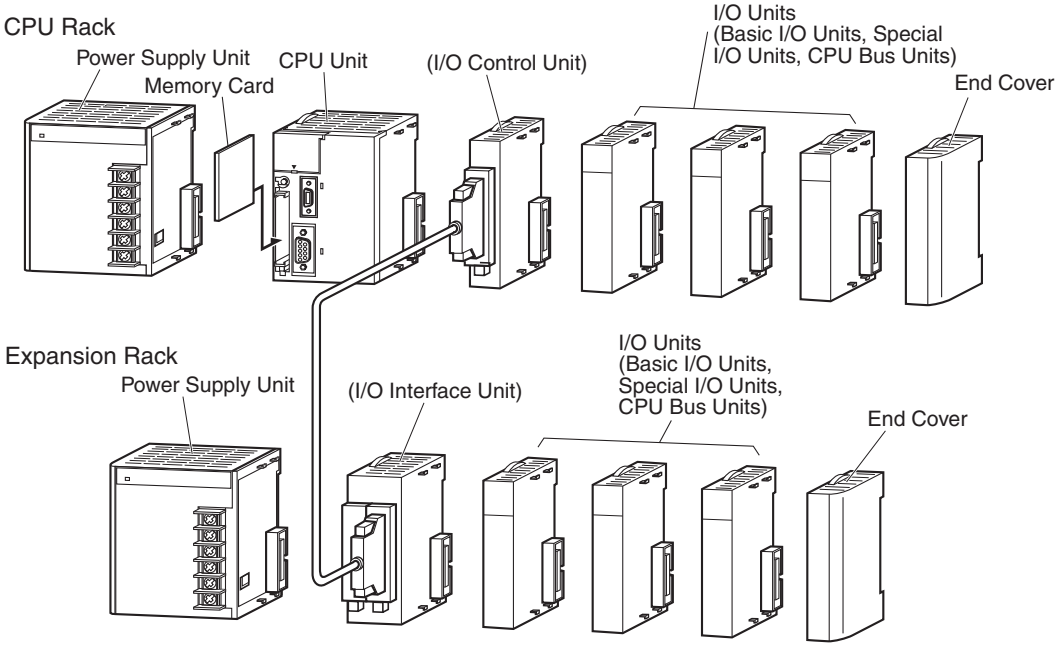
2-3-1 Overview

CJ-series CPU Rack

A CJ-series CPU Rack can consist of a CPU Unit, a Power Supply Unit, Basic I/O Units, Special I/O Units, CPU Bus Units, and an End Cover. A Memory Card is optional. An I/O Control Unit is required to connect an Expansion Rack.

CJ-series Expansion Racks

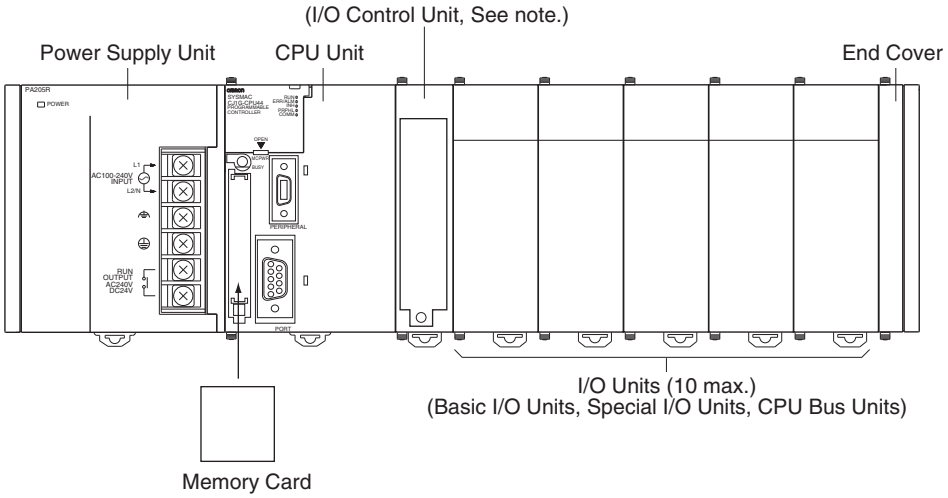
A CJ-series Expansion Rack can be connected to the CPU Rack or other CJ-series Expansion Racks. An Expansion Rack can consist of an I/O Interface Unit, a Power Supply Unit, Basic I/O Units, Special I/O Units, and CPU Bus Units, and an End Cover.



Note Although the CJ-series PLCs do not require Backplanes, the term “slot” is still used to refer to the relative position of a Unit in the Racks. The slot number immediately to the right of the CPU Unit is slot 1, and slot numbers increase toward the right side of the Rack.

2-3-2 CJ-series CPU Rack

A CJ-series CPU Rack consists of a CPU Unit, a Power Supply Unit, various I/O Units, and an End Cover. Up to 10 I/O Units can be connected.



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

Name	Configuration	Remarks
CJ-series CPU Rack	CJ-series CPU Unit	One of each Unit required for every CPU Rack. Refer to the following table for details on applicable models.
	CJ-series Power Supply Unit	
	CJ-series Basic I/O Units	A total of up to 10 Units can be connected. (An error will occur if 11 or more Units are connected.)
	CJ-series Special I/O Units	
	CJ-series CPU Bus Units	
	End Cover (CJ1W-TER01)	Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit. A fatal error will occur if the End Cover is not connected.
	Memory Card	Install as required. Refer to the following table for details on applicable models.
	I/O Control Unit (CJ1W-IC101)	Required to connect an Expansion Rack. Must be connected next to the CPU Unit.

Units

Name	Model	Specifications
CJ1-H-R CPU Units	CJ1H-CPU67H-R	I/O bits: 2,560, Program capacity: 250 Ksteps Data Memory: 448 Kwords (DM: 32 Kwords, EM: 32 Kwords × 13 banks)
	CJ1H-CPU66H-R	I/O bits: 2,560, Program capacity: 120 Ksteps Data Memory: 256 Kwords (DM: 32 Kwords, EM: 32 Kwords × 7 banks)
	CJ1H-CPU65H-R	I/O bits: 2,560, Program capacity: 60 Ksteps Data Memory: 128 Kwords (DM: 32 Kwords, EM: 32 Kwords × 3 banks)
	CJ1G-CPU64H-R	I/O bits: 2,560, Program capacity: 30 Ksteps Data Memory: 64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)
CJ1-H CPU Units	CJ1H-CPU67H	I/O bits: 2,560, Program capacity: 250 Ksteps Data Memory: 448 Kwords (DM: 32 Kwords, EM: 32 Kwords × 13 banks)
	CJ1H-CPU66H	I/O bits: 2,560, Program capacity: 120 Ksteps Data Memory: 256 Kwords (DM: 32 Kwords, EM: 32 Kwords × 7 banks)
	CJ1H-CPU65H	I/O bits: 2,560, Program capacity: 60 Ksteps Data Memory: 128 Kwords (DM: 32 Kwords, EM: 32 Kwords × 3 banks)
	CJ1G-CPU45H	I/O bits: 1,280, Program capacity: 60 Ksteps Data Memory: 128 Kwords (DM: 32 Kwords, EM: 32 Kwords × 3 banks)
	CJ1G-CPU44H	I/O bits: 1,280, Program capacity: 30 Ksteps Data Memory: 64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)
	CJ1G-CPU43H	I/O bits: 960, Program capacity: 20 Ksteps Data Memory: 64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)
	CJ1G-CPU42H	I/O bits: 960, Program capacity: 10 Ksteps Data Memory: 64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)

Name	Model	Specifications
CJ1M CPU Units	CJ1M-CPU23	I/O bits: 640, Program capacity: 20 Ksteps Data Memory: 32 Kwords (DM: 32 Kwords, EM: None), built-in pulse I/O
	CJ1M-CPU22	I/O bits: 320, Program capacity: 10 Ksteps Data Memory: 32 Kwords (DM: 32 Kwords, EM: None), built-in pulse I/O
	CJ1M-CPU21	I/O bits: 160, Program capacity: 5 Ksteps Data Memory: 32 Kwords (DM: 32 Kwords, EM: None), built-in pulse I/O
	CJ1M-CPU13(-ETN)	I/O bits: 640, Program capacity: 20 Ksteps Data Memory: 32 Kwords (DM: 32 Kwords, EM: None)
	CJ1M-CPU12(-ETN)	I/O bits: 320, Program capacity: 10 Ksteps Data Memory: 32 Kwords (DM: 32 Kwords, EM: None)
	CJ1M-CPU11(-ETN)	I/O bits: 160, Program capacity: 5 Ksteps Data Memory: 32 Kwords (DM: 32 Kwords, EM: None)
CJ1 CPU Units	CJ1G-CPU45	I/O bits: 1,280, Program capacity: 60 Ksteps Data Memory: 128 Kwords (DM: 32 Kwords, EM: 32 Kwords × 3 banks)
	CJ1G-CPU44	I/O bits: 1,280, Program capacity: 30 Ksteps Data Memory: 64 Kwords (DM: 32 Kwords, EM: 32 Kwords × 1 bank)
CJ-series Power Supply Units	CJ1W-PA205R	100 to 240 V AC (with RUN output), Output capacity: 5 A at 5 V DC
	CJ1W-PA205C	100 to 240 V AC (with replacement notification), Output capacity: 5 A at 5 V DC, 0.8 A at 24 V DC
	CJ1W-PA202	100 to 240 V AC, Output capacity: 2.8A at 5 V DC
	CJ1W-PD025	24 V DC, Output capacity: 5 A at 5 V DC
	CJ1W-PD022	24 V DC (non-insulated type), Output capacity: 2.0 A at 5 V DC, 0.4 A at 24 V DC
Memory Cards	HMC-EF372	Flash memory, 30 MB
	HMC-EF672	Flash memory, 64 MB
	HMC-EF183	Flash memory, 128 MB (See note.)
	HMC-AP001	Memory Card Adapter

Note The HMC-EF183 cannot be used with some CPU Units. Before ordering the HMC-EF183, confirm applicability using the information in *Precautions on Applicable Units on page 152*.

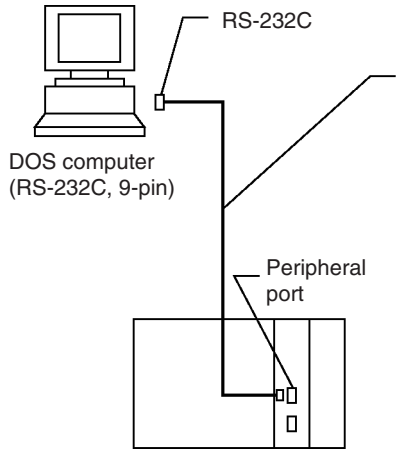
Name	Model	Specifications
I/O Control Unit	CJ1W-IC101	Required to connect an Expansion Rack. Must be connected next to the CPU Unit. Connect to the I/O Interface Unit (CJ1W-II101) on the first Expansion Rack with a CS/CJ-series I/O Connecting Cable.
End Cover	CJ1W-TER01	Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit and with an I/O Interface Unit. A fatal error will occur if the End Cover is not connected.
DIN Track	PFP-50N	Track length: 50 cm, height: 7.3 mm
	PFP-100N	Track length: 1 m, height: 7.3 mm
	PFP-100N2	Track length: 1 m, height: 16 mm
	PFP-M	Stopper to prevent Units from moving on the track. Two each are provided with the CPU Unit and with an I/O Interface Unit.
Programming Consoles	CQM1H-PRO01-E	An English Keyboard Sheet (CS1W-KS001-E) is required.
	CQM1-PRO01-E	
	C200H-PRO27-E	
Programming Console Keyboard Sheet	CS1W-KS001-E	For CQM1H-PRO01-E, CQM1-PRO01-E, or C200H-PRO27-E.
Programming Console Connecting Cables	CS1W-CN114	Connects the CQM1-PRO01-E Programming Console. (Length: 0.05 m)
	CS1W-CN224	Connects the CQM1-PRO27-E Programming Console. (Length: 2.0 m)
	CS1W-CN624	Connects the CQM1-PRO27-E Programming Console. (Length: 6.0 m)
Programming Device Connecting Cables (for peripheral port)	CS1W-CN118	Connects DOS computers D-Sub 9-pin receptacle (For converting between RS-232C cable and peripherals) (Length: 0.1 m)
	CS1W-CN226	Connects DOS computers D-Sub 9-pin (Length: 2.0 m)
	CS1W-CN626	Connects DOS computers D-Sub 9-pin (Length: 6.0 m)
Programming Device Connecting Cables (for RS-232C port)	XW2Z-200S-CV	Connects DOS computers D-Sub 9-pin (Length: 2.0 m), Static-resistant connector used.
	XW2Z-500S-CV	Connects DOS computers D-Sub 9-pin (Length: 5.0 m), Static-resistant connector used.
	XW2Z-200S-V	Connects DOS computers D-Sub 9-pin (Length: 2.0 m) (see note)
	XW2Z-500S-V	Connects DOS computers D-Sub 9-pin (Length: 5.0 m) (see note)
USB-Serial Conversion Cable	CS1W-CIF31	Converts USB connector to a D-Sub 9-pin connector (Length: 0.5 m)
Battery Set	CPM2A-BAT01	Used for CJ1-H and CJ1 CPU Units, and also for CPM2A and CQM1H. (Cannot be used with CS-series CPU Units.)
	CJ1W-BAT01	Used for CJ1M CPU Units. (Cannot be used with CJ1-H and CJ1 CPU Units.)

Note A peripheral bus connection is not possible when connecting the CX-Programmer via an RS-232C Connecting Cable. Use the Host Link (SYSMAC WAY) connection.

Connecting Programming Devices

Connecting Personal Computers Running Support Software

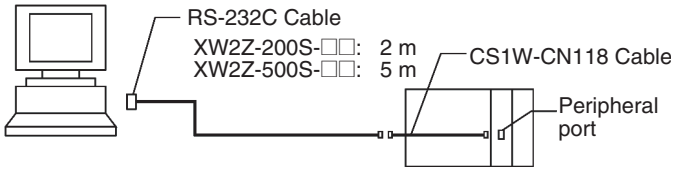
Connecting to Peripheral Port



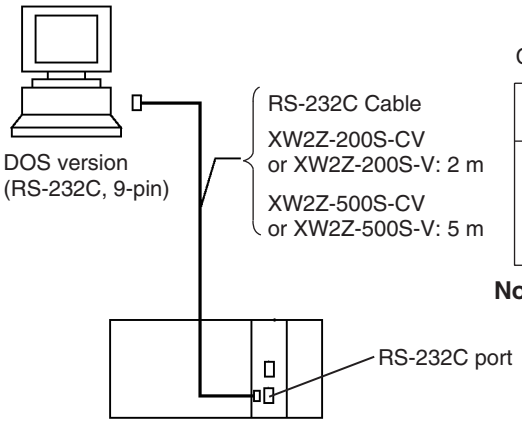
Connecting Cables for Peripheral Port

Computer	Cable	Length	Computer connector
DOS	CS1W-CN118	0.1 m	D-Sub, 9-pin
	CS1W-CN226	2.0 m	
	CS1W-CN626	6.0 m	

Note The CS1W-CN118 Cable is used with an RS-232C cable to connect to the peripheral port on the CPU Unit as shown below. The CS1W-CN118 Cable cannot be used with an RS-232C cable whose model number ends in -V for a peripheral bus connection and must be used for a Host Link (SYSMAC WAY) connection.



Connecting to RS-232C Port



Connecting Cables for RS-232C Port

Computer	Cable	Length	Computer connector
DOS	XW2Z-200S-CV or XW2Z-200S-V	2.0 m	D-Sub, 9-pin
	XW2Z-500S-CV or XW2Z-500S-V	5.0 m	

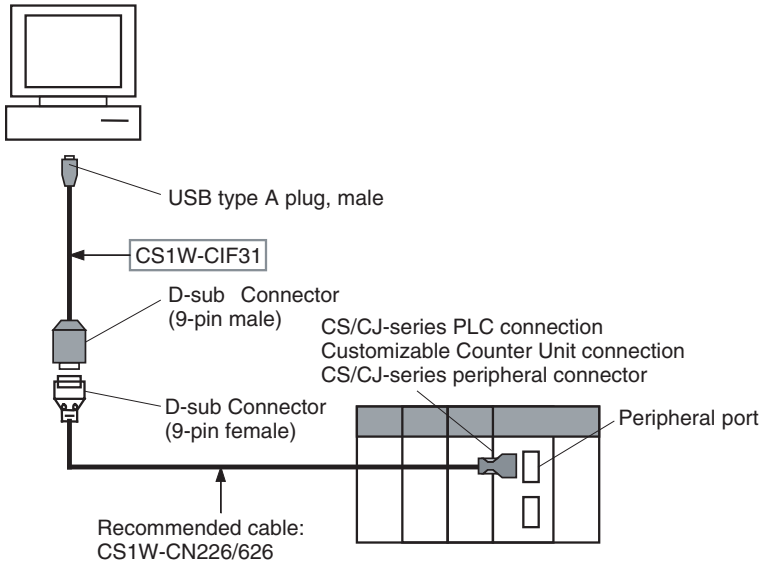
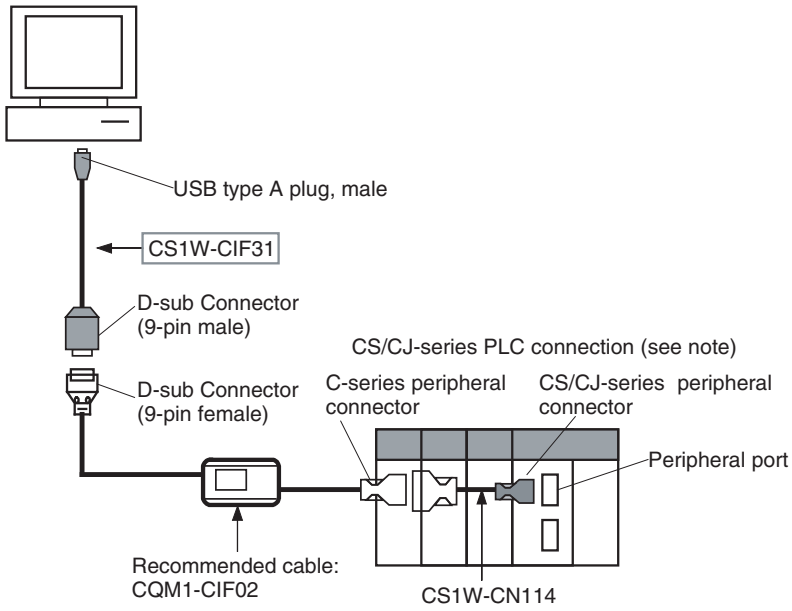
Note The XW2Z-200S-CV and XW2Z-500S-CV use static-resistant connectors and can be connected to the peripheral bus or the Host Link. The XW2Z-200S-V and XW2Z-500S-V, however, can only be connected to the Host Link, not the peripheral bus.

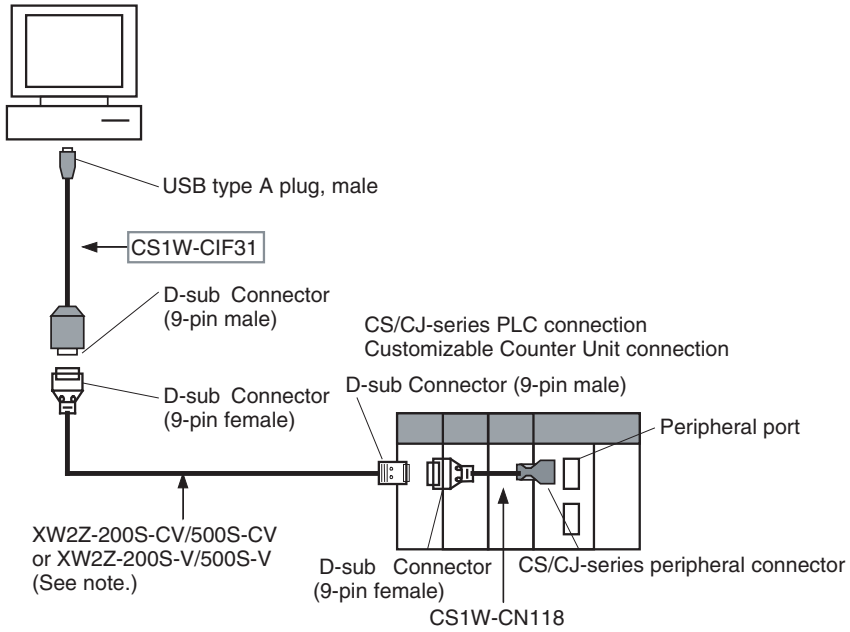
Programming Software

OS	Name	
Windows	CX-Programmer CJ1 CPU Units: Version 2.04 or higher CJ1-H CPU Units: Version 2.1 or higher CJ1M CPU Units: Version 3.0 or higher	CD-ROM

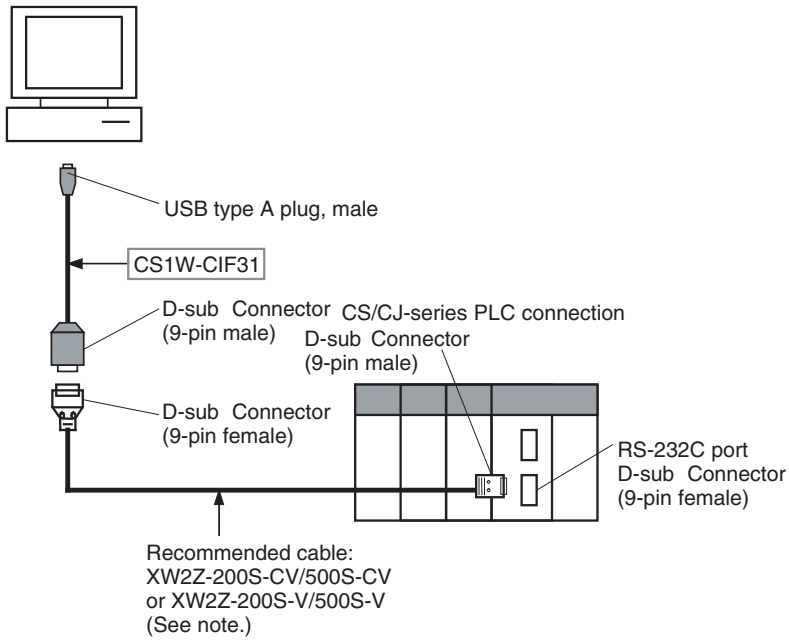
Connecting Personal Computers Running Programming Devices (Using USB-Serial Conversion Cable)

Connecting to the Peripheral Port

Cable	Connection Diagram
Using a CS1W-CN226/626 cable	
Using a CQM1-CIF02 cable	 **Note** With a CS/CJ-series PLC, the connection must be a host link connection.

Cable	Connection Diagram
Using a XW2Z-200S-CV/500S-CV or XW2Z-200S-V/500S-V cable for an RS-232C connection	 **Note** With a CS/CJ-series PLC, the connection must be a host link connection.

Connecting to the RS-232C Port

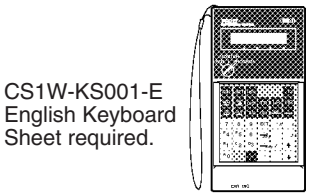
Cable	Connection Diagram
Using a XW2Z-200S-CV/500S-CV or XW2Z-200S-V/500S-V cable for an RS-232C connection	 **Note** With a CS/CJ-series PLC, the connection must be a host link connection.

Programming Console

When using a Programming Console, connect the Programming Console to the peripheral port of the CPU Unit and set pin 4 of the DIP switch on the front panel of the Unit to OFF (automatically uses default communications parameters for the peripheral port).

CQM1H-PRO01-E/CQM1-PRO01-E

The Programming Console can be connected only to the peripheral port.



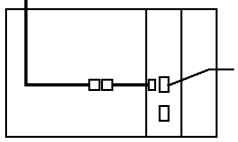
CS1W-KS001-E
English Keyboard
Sheet required.

CQM1H-PRO01-E,
CQM1-PRO01-E
Programming
Console

The following cable is included with the CQM1-PRO01-E Programming Console

Programming Console	Cable	Length
CQM1-PRO01-E	CS1W-CN114	0.05 m
CQM1H-PRO01-E	Not required.	---

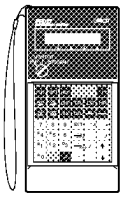
Note Set pin 4 of the DIP switch on the front panel of the CPU Unit to OFF.



Peripheral port

C200H-PRO27-E

The Programming Console can be connected only to the peripheral port.

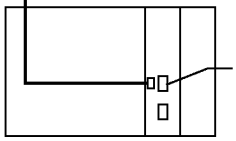


CS1W-KS001-E
English Keyboard
Sheet required.

C200H-PRO27-E
Programming Console

Programming Console	Cable	Length
CQM1-PRO27-E	CS1W-CN224	2.0 m
	CS1W-CN624	6.0 m

Note Set pin 4 of the DIP switch on the front panel of the CPU Unit to OFF.

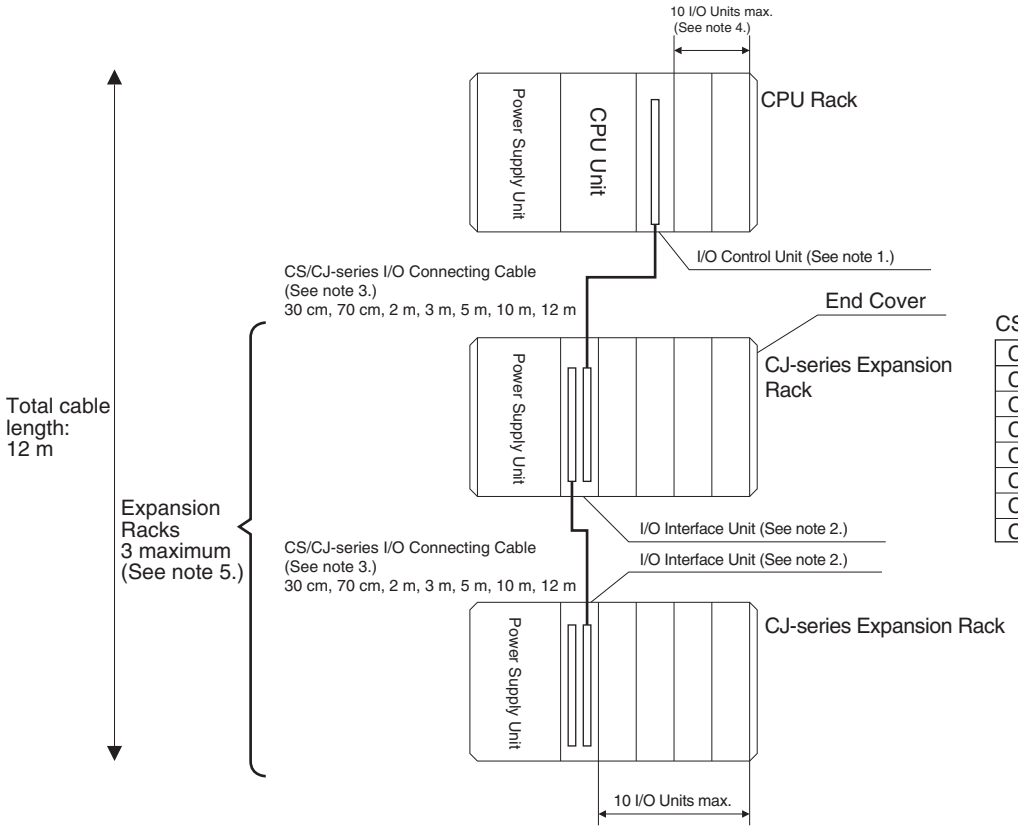


Peripheral port

Note When an OMRON Programmable Terminal (PT) is connected to the RS-232C port and Programming Console functions are being used, do not connect the Programming Console at the same time.

2-3-3 CJ-series Expansion Racks

To expand the number of Units in the system, CJ-series Expansion Racks can be connected to CPU Racks.



CS/CJ I/O Connecting Cables

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

Note

1. Connect the I/O Control Unit directly to the CPU Unit. Proper operation may not be possible if it is connected any other location.
2. Connect the I/O Interface Unit directly to the Power Supply Unit. Proper operation may not be possible if it is connected any other location.
3. The total length of CS/CJ-series I/O Connecting cable between all Racks must be 12 m or less.
4. A maximum of 9 Units can be connected to a CPU Rack that uses a CJ1M-CPU1□-ETN CPU Unit. (The built-in Ethernet port on the CPU Unit is allocated slot 0 and is counted as one Unit, making the total 9 Units instead of 10.)
5. A maximum of one Expansion Rack can be used with a CJ1M CPU Unit. (No Expansion Racks can be connected to some CJ1M CPU Unit models.)

Maximum Expansion Racks

Expansion pattern	Rack	Maximum No. of Racks	Remarks
CJ-series CPU Rack with CJ-series Expansion Racks	CJ-series Expansion Racks	3 Racks (1 Rack for CJ1M CPU Units)	The total cable length must be 12 m or less.

Rack Configurations

Rack	Configuration	Remarks
CJ-series Expansion Racks	CJ-series Power Supply Unit	One of each Unit required for every Expansion Rack. Refer to the following table for details on applicable models.
	I/O Interface Unit (one End Cover included.)	
	CJ-series Basic I/O Units	A total of up to 10 Units can be connected. (An error will occur if 11 or more Units are connected.)
	CJ-series Special I/O Units	
	CJ-series CPU Bus Units	
	End Cover (CJ1W-TER01)	Must be connected to the right end of the Expansion Rack. One End Cover is provided with the I/O Interface Unit. A fatal error will occur if the End Cover is not connected.
	CS/CJ-series I/O Connecting Cable	Required to connect the I/O Interface Unit to the I/O Control Unit or previous I/O Interface Unit. Proper operation may not be possible if the total length of I/O Connecting Cable between all Racks is more than 12 m.

Configuration Device List

Name	Model	Specifications	Cable length
CJ-series Power Supply Unit	CJ1W-PA205R	100 to 240 V AC (with RUN output), Output capacity: 5 A at 5 V DC	---
	CJ1W-PA205C	100 to 240 VAC (with replacement notification), Output capacity: 5 A at 5 VDC, 0.8 A at 24 VDC	
	CJ1W-PA202	100 to 240 V AC, Output capacity: 2.8A at 5 V DC	
	CJ1W-PD025	24 V DC, Output capacity: 5 A at 5 V DC	
	CJ1W-PD022	24 VDC (non-insulated type), Output capacity: 2.0 A at 5 VDC, 0.4 A at 24 VDC	
I/O Interface Unit	CJ1W-II101	One Interface Unit is required for each CJ-series Expansion Rack. One End Cover is provided with each Unit. (Connect to an I/O Control Unit mounted on a CJ-series CPU Rack or an Interface Unit mounted on an Expansion Rack using an I/O connecting cable.)	
End Cover	CJ1W-TER01	Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit and with an I/O Interface Unit. A fatal error will occur if the End Cover is not connected.	
CS/CJ-series I/O Connecting Cables	CS1W-CN313	Connects Expansion Racks to CPU Racks or other Expansion Racks.	0.3 m
	CS1W-CN713		0.7 m
	CS1W-CN223		2 m
	CS1W-CN323		3 m
	CS1W-CN523		5 m
	CS1W-CN133		10 m
	CS1W-CN133B2		12 m

2-3-4 Connectable Units

Each Unit can be connected to the CPU Rack or an Expansion Rack, except for Interrupt Input Units, which must be mounted on the CPU Rack. Refer to *2-4 I/O Units* for details on the limitations on each Unit.

2-3-5 Maximum Number of Units

The maximum number of Units that can be connected in a PLC is calculated as follows: Max. No. of Units on CPU Rack (a) + (Max. No. of Units on one Expansion Rack (b) x Max. No. of Expansion Racks).

Do not connect any more than the maximum number of Units to any one PLC.

CPU Unit model	Max. No. of Units on CPU Rack (a)	Max. No. of Units on one Expansion Rack (b)	Max. No. of Expansion Racks	Max. No. of Units
CJ1H-CPU□□H(-R) CJ1G-CPU45H/44H CJ1G-CPU45/44	10	10	3	40
CJ1G-CPU43H/42H	10	10	2	30
CJ1M-CPU23/13	10	10	1	20
CJ1M-CPU22/21/12/11	10	---	---	10
CJ1M-CPU13-ETN	9	10	1	19
CJ1M-CPU12-ETN CJ1M-CPU11-ETN	9	---	---	9

The total number of each type of Unit is not limited according to connection locations.

Note A fatal error will occur and the CPU Unit will not operate more than the maximum number of Units given above are connected to the CPU Rack or any Expansion Rack.

2-4 I/O Units

2-4-1 CJ-series Basic I/O Units

Basic Input Units

Name	Specifications	Model	Number of bits allocated	Mountable Racks	
				CJ-series CPU Rack	CJ-series Expansion Racks
DC Input Units	Terminal block 12 to 24 V DC, 8 inputs	CJ1W-ID201	16 (See note 2.)	Yes	Yes
	Terminal block 24 V DC, 16 inputs	CJ1W-ID211	16	Yes	Yes
	Fujitsu-compatible connector 24 V DC, 32 inputs (See note 1.)	CJ1W-ID231	32	Yes	Yes
	MIL connector 24 V DC, 32 inputs (See note 1.)	CJ1W-ID232	32	Yes	Yes
	Fujitsu-compatible connector 24 V DC, 64 inputs (See note 1.)	CJ1W-ID261	64	Yes	Yes
	MIL connector 24 V DC, 64 inputs (See note 1.)	CJ1W-ID262	64	Yes	Yes
AC Input Units	200 to 240 V AC, 8 inputs	CJ1W-IA201	16 (See note 2.)	Yes	Yes
	100 to 120 V AC, 16 inputs	CJ1W-IA111	16	Yes	Yes
Interrupt Input Units	24 V DC, 16 inputs	CJ1W-INT01	16	Yes (See note 3.)	No
Quick-response Input Units	24 V DC, 16 inputs	CJ1W-IDP01	16	Yes	Yes
B7A Interface Units	64 inputs	CJ1W-B7A14	64	Yes	Yes

Basic Output Units

Name		Specifications	Model	Number of bits allocated	Mountable Racks	
					CJ-series CPU Rack	CJ-series Expansion Racks
Relay Output Units		Terminal block, 250 V AC/24 V DC, 2 A; 8 points, independent contacts	CJ1W-OC201	16 (See note 2.)	Yes	Yes
		Terminal block, 250 V AC, 0.6 A; 8 points	CJ1W-OC211	16	Yes	Yes
Triac Output Unit		Terminal block, 250 V AC, 0.6 A/24 V DC, 2 A; 8 points, independent contacts	CJ1W-OA201	16 (See note 2.)	Yes	Yes
Transistor Output Units	Sinking outputs	Terminal block, 12 to 24 V DC, 2 A, 8 outputs	CJ1W-OD201	16 (See note 2.)	Yes	Yes
		Terminal block, 12 to 24 V DC, 0.5 A, 8 outputs	CJ1W-OD203	16 (See note 2.)	Yes	Yes
		Terminal block, 12 to 24 V DC, 0.5 A, 16 outputs	CJ1W-OD211	16	Yes	Yes
		Fujitsu-compatible connector, 12 to 24 V DC, 0.5 A, 32 outputs (See note 1.)	CJ1W-OD231	32	Yes	Yes
		MIL connector, 12 to 24 V DC, 0.5 A, 32 outputs (See note 1.)	CJ1W-OD233	32	Yes	Yes
		Fujitsu-compatible connector, 12 to 24 V DC, 0.3 A, 64 outputs (See note 1.)	CJ1W-OD261	64	Yes	Yes
		MIL connector, 12 to 24 V DC, 0.3 A, 64 outputs (See note 1.)	CJ1W-OD263	64	Yes	Yes
	Sourcing outputs	Terminal block, 24 V DC, 2 A, 8 outputs, load short-circuit protection and disconnected line detection	CJ1W-OD202	16 (See note 2.)	Yes	Yes
		Terminal block, 24 V DC, 0.5 A, 8 outputs, load short-circuit protection	CJ1W-OD204	16 (See note 2.)	Yes	Yes
		Terminal block, 24 V DC, 0.5 A, 16 outputs, load short-circuit protection	CJ1W-OD212	16	Yes	Yes
		MIL connector, 24 V DC, 0.5 A, 32 outputs, load short-circuit protection (See note 1.)	CJ1W-OD232	32	Yes	Yes
		MIL connector, 12 to 24 V DC, 0.3 A, 64 outputs (See note 1.)	CJ1W-OD262	64	Yes	Yes
B7A Interface Units		64 outputs	CJ1W-B7A04	64	Yes	Yes

Mixed I/O Units

Name		Specifications	Model	Number of bits allocated	Mountable Racks	
					CJ-series CPU Rack	CJ-series Expansion Racks
24-V DC Input/ Transistor Output Units	Sinking	Fujitsu-compatible connector Inputs: 24 V DC,16 inputs Outputs: 12 to 24 V DC, 0.5 A, 16 outputs (See note 1.)	CJ1W-MD231 (See note 1.)	32	Yes	Yes
		Fujitsu-compatible connector Inputs: 24 V DC, 32 inputs Outputs: 12 to 24 V DC, 0.3 A, 32 outputs (See note 1.)	CJ1W-MD261 (See note 1.)	64	Yes	Yes
		MIL connector Inputs: 24 V DC,16 inputs Outputs: 12 to 24 V DC, 0.5 A, 16 outputs (See note 1.)	CJ1W-MD233 (See note 1.)	32	Yes	Yes
		MIL connector Inputs: 24 V DC, 32 inputs Outputs: 12 to 24 V DC, 0.3 A, 32 outputs (See note 1.)	CJ1W-MD263 (See note 1.)	64	Yes	Yes
	Sourcing	MIL connector Inputs: 24 V DC, 16 inputs Outputs: 24 V DC, 0.5 A, 16 outputs, load-short circuit protection (See note 1.)	CJ1W-MD232 (See note 1.)	32	Yes	Yes
TTL I/O Units		MIL connector Inputs: TTL (5 V DC), 32 inputs Outputs: TTL (5 V DC, 35 mA), 32 outputs	CJ1W-MD563 (See note 1.)	64	Yes	Yes
B7A Interface Units		32 inputs, 32 outputs	CJ1W-B7A22	64	Yes	Yes

Note

1. The cable-side connector is not provided with Units equipped with cables. Purchase the cable separately (page 266), or use an OMRON Connector-Terminal Block Conversion Unit or I/O Terminal (page 269).
2. Although 16 I/O bits are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.
3. The Unit must be connected in one of the five positions (for CJ1-H CPU Units) or three positions (for CJ1M CPU Units) next to the CPU Unit on the CPU Rack. An I/O setting error will occur if the Unit is connected to other positions on the CPU Rack or to any position on an Expansion Rack.

2-4-2 CJ-series Special I/O Units

Name	Specifications	Model	Number of words allocated (CIO 2000 to CIO 2959)	Number of words allocated (D20000 to D29599)	Mountable Racks		Unit No.
					CJ-series CPU Rack	CJ-series Expansion Racks	
Analog Input Unit	8 inputs (4 to 20 mA, 1 to 5 V, etc.)	CJ1W-AD081 (-V)	10 words	100 words	Yes	Yes	0 to 95
	4 inputs (4 to 20 mA, 1 to 5 V, etc.)	CJ1W-AD041	10 words	100 words	Yes	Yes	0 to 95
Analog Output Unit	4 outputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-DA041	10 words	100 words	Yes	Yes	0 to 95
	2 outputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-DA021	10 words	100 words	Yes	Yes	0 to 95
	8 outputs (1 to 5 V, 0 to 10 V, etc.)	CJ1W-DA08V	10 words	100 words	Yes	Yes	0 to 95
	8 outputs (4 to 20 mA)	CJ1W-DA08C	10 words	100 words	Yes	Yes	0 to 95
Analog I/O Units	4 inputs (1 to 5 V, 4 to 20 mA, etc.) 2 outputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-MAD42	10 words	100 words	Yes	Yes	0 to 95
Isolated-type Thermocouple Input Unit	Thermocouple 4 inputs	CJ1W-PTS51	10 words	100 words	Yes	Yes	0 to 95
	Thermocouple 2 inputs	CJ1W-PTS15	10 words	100 words	Yes	Yes	0 to 95
Isolated-type Resistance Thermometer Input Unit	Resistance 4 inputs	CJ1W-PTS52	10 words	100 words	Yes	Yes	0 to 95
	Resistance 2 inputs	CJ1W-PTS16	10 words	100 words	Yes	Yes	0 to 95
Direct Current Input Unit	DC voltage or DC current, 2 inputs	CJ1W-PDC15	10 words	100 words	Yes	Yes	0 to 95

Name	Specifications	Model	Number of words allocated (CIO 2000 to CIO 2959)	Number of words allocated (D20000 to D29599)	Mountable Racks		Unit No.
					CJ-series CPU Rack	CJ-series Expansion Racks	
Temperature Control Units	4 control loops, thermocouple inputs, NPN outputs	CJ1W-TC001	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	4 control loops, thermocouple inputs, PNP outputs	CJ1W-TC002	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	2 control loops, thermocouple inputs, NPN outputs, heater burnout detection	CJ1W-TC003	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	2 control loops, thermocouple inputs, NPN outputs, heater burnout detection	CJ1W-TC004	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	4 control loops, temperature-resistance thermometer inputs, NPN outputs	CJ1W-TC101	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	4 control loops, temperature-resistance thermometer inputs, PNP outputs	CJ1W-TC102	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	2 control loops, temperature-resistance thermometer inputs, NPN outputs, heater burnout detection	CJ1W-TC103	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	2 control loops, temperature-resistance thermometer inputs, PNP outputs, heater burnout detection	CJ1W-TC104	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
Position Control Units	1 axis, pulse output; open collector output	CJ1W-NC113	10 words	100 words	Yes	Yes	0 to 95
	2 axes, pulse outputs; open collector outputs	CJ1W-NC213	10 words	100 words	Yes	Yes	0 to 95
	4 axes, pulse outputs; open collector outputs	CJ1W-NC413	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	1 axis, pulse output; line driver output	CJ1W-NC133	10 words	100 words	Yes	Yes	0 to 95
	2 axes, pulse outputs; line driver outputs	CJ1W-NC233	10 words	100 words	Yes	Yes	0 to 95
	4 axes, pulse outputs; line driver outputs	CJ1W-NC433	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	Space Unit (See note.)	CJ1W-SP001	None	None	Yes	Yes	---
ID Sensor Units	V600-series single-head type	CJ1W-V600C11	10 words	100 words	Yes	Yes	0 to 95
	V600-series two-head type	CJ1W-V600C12	20 words	200 words	Yes	Yes	0 to 94 (uses words for 2 unit numbers)

Name	Specifications	Model	Number of words allocated (CIO 2000 to CIO 2959)	Number of words allocated (D20000 to D29599)	Mountable Racks		Unit No.
					CJ-series CPU Rack	CJ-series Expansion Racks	
High-speed Counter Unit	Two-axis pulse input, counting rate: 500 kcps max., line driver compatible	CJ1W-CT021	40 words	400 words	Yes	Yes	0 to 92 (uses words for 4 unit numbers)
CompoBus/S Master Units	CompoBus/S remote I/O, 256 bits max.	CJ1W-SRM21	10 words or 20 words	None	Yes	Yes	0 to 95 or 0 to 94
CompoNet Master Unit	CompoNet remote I/O	CJ1W-CRM21		None	Yes	Yes	
	Communications mode No. 0: 128 inputs/128 outputs for Word Slaves		20 words	None	Yes	Yes	0 to 94 (uses words for 2 unit numbers)
	Communications mode No. 1: 256 inputs/256 outputs for Word Slaves		40 words	None	Yes	Yes	0 to 92 (uses words for 4 unit numbers)
	Communications mode No. 2: 512 inputs/512 outputs for Word Slaves		80 words	None	Yes	Yes	0 to 88 (uses words for 8 unit numbers)
	Communications mode No. 3: 256 inputs/256 outputs for Word Slaves and 128 inputs/128 outputs for Bit Slaves		80 words	None	Yes	Yes	0 to 88 (uses words for 8 unit numbers)
	Communications mode No. 8: 1,024 inputs/1,024 outputs for Word Slaves and 256 inputs/256 outputs for Bit Slaves maximum		10 words	Depends on setting	Yes	Yes	0 to 95 (uses words for 1 unit number)

Note The Space Unit is for Position Control Units.

2-4-3 CJ-series CPU Bus Units

Name	Specifications	Model	Number of words allocated (CIO 1500 to CIO 1899)	Mountable Racks		Unit No.
				CJ-series CPU Rack	CJ-series Expansion Racks	
Controller Link Units	Wired	CJ1W-CLK21-V1	25 words	Yes	Yes	0 to F (4 Units max.)
Serial Communications Unit	One RS-232C port and one RS-422A/485 port	CJ1W-SCU41-V1	25 words	Yes	Yes	0 to F
	Two RS-232C ports	CJ1W-SCU21-V1				
	Two RS-422A/485 ports	CJ1W-SCU31-V1				
Ethernet Unit	10Base-T, FINS communications, socket service, FTP server, and mail communications	CJ1W-ETN11	25 words	Yes	Yes	0 to F (4 Units max.)
	100Base-TX	CJ1W-ETN21				
EtherNet/IP Unit	Tag data links, FINS communications, CIP message communications, FTP server, etc.	CJ1W-EIP21	25 words	Yes	Yes	0 to F (8 Units max.)
FL-net Unit	100Base-TX cyclic transmissions and message transmissions	CJ1W-FLN22	25 words	Yes	Yes	0 to F (4 Units max.)
DeviceNet Unit	DeviceNet remote I/O, 2,048 points; Both Master and Slave functions, Automatic allocation possible without Configurator	CJ1W-DRM21	25 words (See note 1.)	Yes	Yes	0 to F
Position Control Units supporting MECHATROLINK-II communications	MECHATROLINK-II, 16 axes max.	CJ1W-NCF71	25 words	Yes	Yes	0 to F
Motion Control Units supporting MECHATROLINK-II communications	MECHATROLINK-II, Real axes: 30 max., Virtual axes: 2 max., Special motion control language	CJ1W-MCH71	25 words	Yes Each Unit uses three slots on the Rack.	Yes Each Unit uses three slots on the Rack.	0 to F
SYSMAC SPU Unit (High-speed Storage and Processing Unit)	One CF card type I/II slot (used with OMRON HMC-EF□□□ Memory Card), one Ethernet port	CJ1W-SPU01	Not used.	Yes	Yes	0 to F

Note 1. Slave I/O are allocated in DeviceNet Area (CIO 3200 to CIO 3799).

2. Some CJ-series CPU Bus Units are allocated words in the CPU Bus Unit Setting Area. The system must be designed so that the number of words allocated in the CPU Bus Unit Setting Area does not exceed its capacity. Refer to 2-7 CPU Bus Unit Setting Area Capacity for details.

2-5 Expanded System Configuration

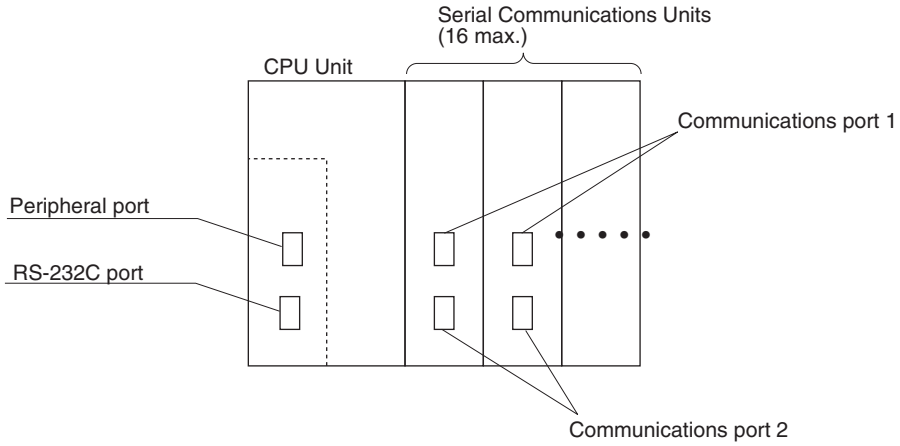
2-5-1 Serial Communications System

The CJ-series system configuration can be expanded by using the following serial communications ports.

- CPU Unit built-in ports × 2 (peripheral port and RS-232C port)
- Serial Communications Unit ports × 2 (RS-232C and RS-422A/485)

1,2,3...

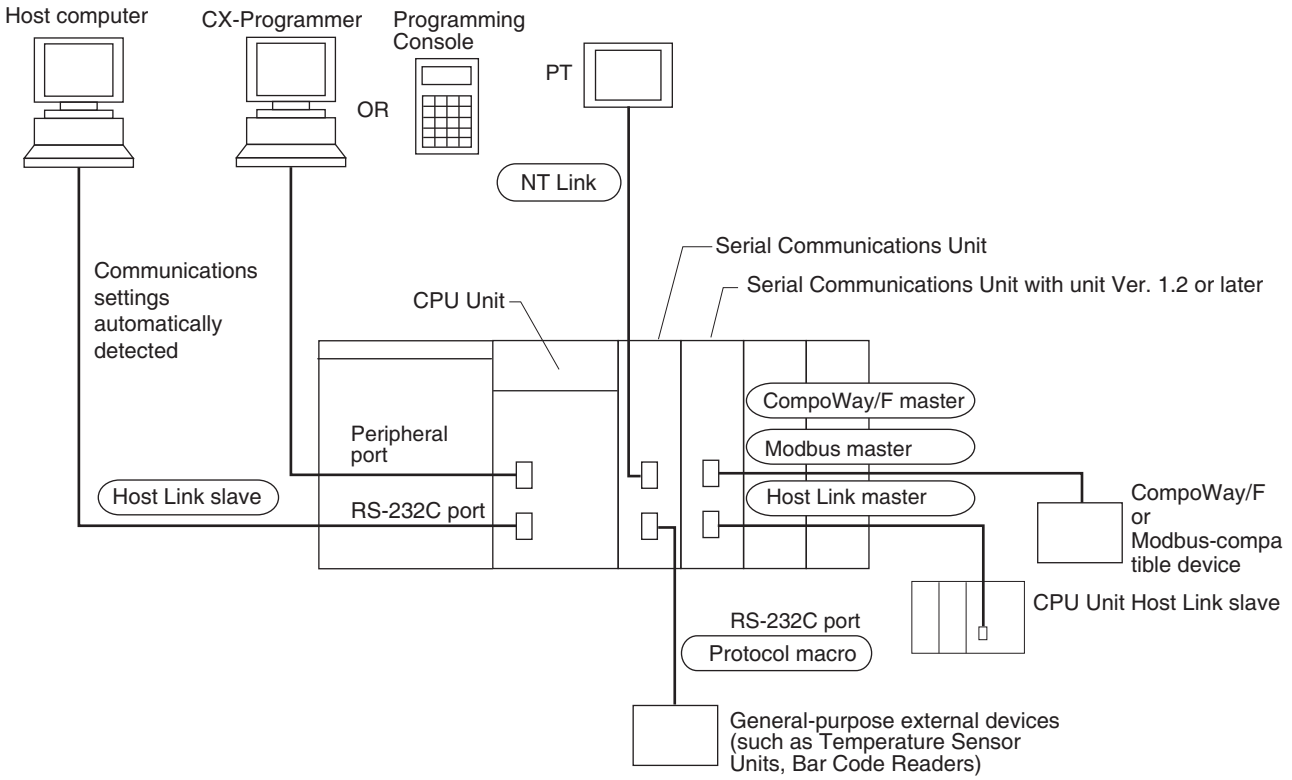
1. If the CPU Unit built-in ports or Serial Communications Unit ports are used, various protocols can be allocated, such as Host Link and protocol macros.
2. Up to 16 Serial Communications Units can be connected for one CPU Unit. The system configuration can then be expanded by connecting devices with RS-232C or RS-422/485 ports, such as Temperature Sensor Units, Bar Code Readers, ID Systems, personal computers, Board Computers, Racks, and other companies' PLCs.



Expanding the system configuration as shown above allows a greater number of serial communications ports, and greater flexible and simpler support for different protocols.

3. The Serial Gateway is supported for CPU Units with unit version 3.0 or later and Serial Communications Boards/Units with unit version 1.2 or later.
   - CPU Units with unit version 3.0 or later: Gateway from FINS network to serial communications (CompoWay/F only) is possible through the peripheral port and RS-232C port.
   - Serial Communications Boards/Units with unit version 1.2 or later: Gateway from FINS network to serial network (CompoWay/F, Modbus, or Host Link) is possible. Using a Gateway to Host Link enables Host Links with the PLC as master.

System Configuration Example



Refer to page 122 for a table showing which communications protocols are supported by each Unit.

2-5-2 Systems

The serial communications port mode (protocol) can be switched in the CPU Unit's PLC Setup. Depending on the protocol selected, the following systems can be configured.

Protocols

The following protocols support serial communications.

Protocol	Main connection	Use	Applicable commands, communications instructions
Host Link (SYSMAC WAY) slave	Personal computer OMRON Programmable Terminals	Communications between the Host computer and the PLC. Commands can be sent to a computer from the PLC.	Host Link commands/ FINS commands. Commands can be sent to a computer from the PLC.
No-protocol (customer) communications	General-purpose external devices	No-protocol communications with general-purpose devices.	TXD(236) instruction, RXD(235) instruction, TXDU(256) instruction, RXDU(255) instruction
Protocol macro	General-purpose external devices	Sending and receiving messages (communications frames) according to the communications specifications of external devices. (SYSMAC-PST is used to create protocols by setting various parameters.)	PMCR(260) instruction

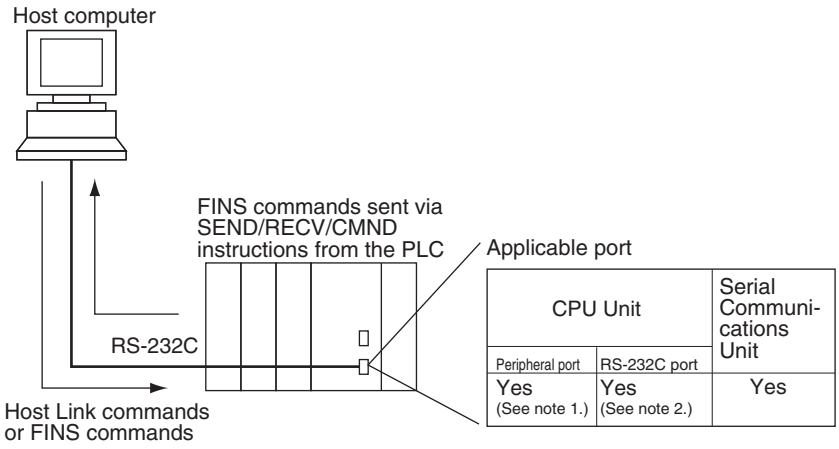
Protocol	Main connection	Use	Applicable commands, communications instructions
NT Links (1: N)	OMRON Programmable Terminals	High-speed communications with Programmable Terminals via direct access.	None
Peripheral bus (See note 1.)	Programming Devices CX-Programmer	Communications between Programming Devices and the PLC from the computer.	None
Serial Gateway	OMRON Component PLC	Converts FINS commands that are received into CompoWay/F, Modbus, or Host Link protocols, and then transmits the converted command to the serial line.	---
CompoWay/F Master (See note 2.)	CompoWay/F slave	Converts FINS commands (encapsulated CompoWay/F commands) received at the serial port into CompoWay/F commands.	FINS command 2803 hex received (including sending FINS command using CMND(490))
Modbus Master (See note 3.)	Modbus slave	Converts FINS commands (encapsulated Modbus commands) received at the serial port into Modbus commands.	FINS command 2804 hex or 2805 hex received (including sending FINS command using CMND(490))
Host Link FINS (SYSWAY) Master (See note 3.)	Host Link FINS (SYSWAY) slave (PLC)	Converts FINS commands into FINS commands encapsulated in Host Link	Any FINS command received except those sent to serial port (including sending FINS command using CMND(490))

Note

1. The Peripheral Bus Mode is used for Programming Devices excluding Programming Console. If Programming Console is to be used, set pin 4 of the DIP switch on the front panel of the Unit to OFF so that the default peripheral port communications parameters are used instead of those specified in the PLC Setup.
2. CPU Unit with version 3.0 or later (peripheral port and RS-232C port) and Serial Communications Board/Unit with unit version 1.2 or later only.
3. Serial Communications Board/Unit with unit version 1.2 or later only.

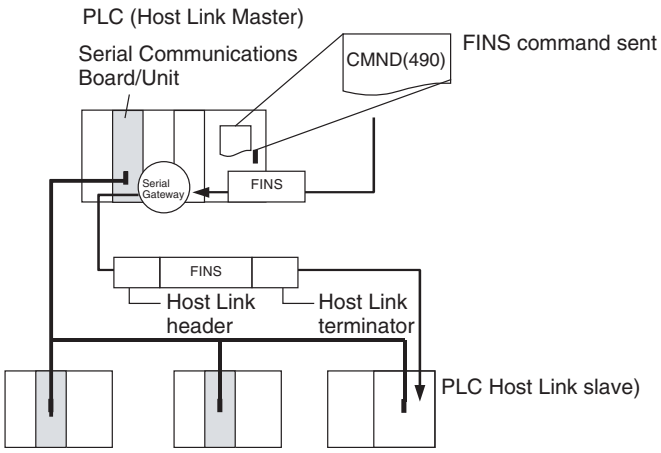
Host Link System (SYSMAC WAY Mode 1:N)

The Host Link System allows the I/O memory of the PLC to be read/written, and the operating mode to be changed from a Host computer (personal computer or Programmable Terminal) by executing Host Link commands or FINS commands that are preceded by a header and followed by a terminator. Alternatively, FINS commands (preceded by a header and followed by a terminator) can be sent to a computer connected via the Host Link System by executing Network Communications Instructions (SEND(090)/RECV(098)/CMND(490)) from the PLC.



Note

1. Set pin 4 of the DIP switch on the front panel of the CPU Unit to ON, and set the serial communications mode in the PLC Setup to Host Link.
2. Set pin 5 of the DIP switch on the front panel of the CPU Unit to OFF, and set the serial communications mode in the PLC Setup to Host Link.
3. Host Link master functions can be performed by sending the CMND(490) instruction via the Serial Gateway when using Serial Communications Boards/Units with unit version 1.2 or later.

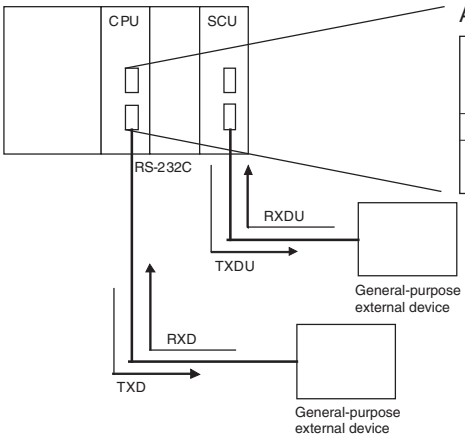


No-protocol (Custom) Communications System

No-protocol communications allow simple data transmissions, such as inputting bar code data and outputting printer data using communications port I/O instructions. The start and completion codes can be set, and RS and CS signal control is also possible with no-protocol communications.

The following table shows the usage of each communications port I/O instruction, based on the communications port being used and the direction of the data transfer (sending or receiving).

Communications port	CPU Unit's built-in RS-232C port	Serial port on a Serial Communications Unit (unit version 1.2 or later)
Send	TXD(236)	TXDU(256)
Receive	RXD(235)	RXDU(255)



Applicable port

CPU Unit		Serial Communications Unit
Peripheral port	RS-232C port	
No	Yes (See note 1.)	Yes (See note 2.)

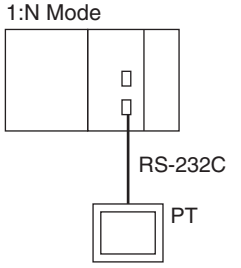
Note

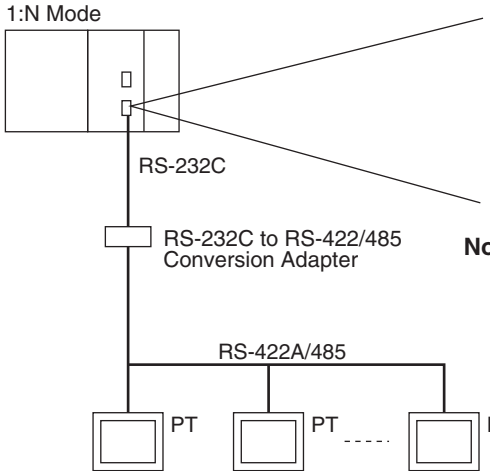
1. Set pin 5 of the DIP switch on the front panel of the CPU Unit to OFF, and set the serial communications mode in the PLC Setup to no-protocol communications.
2. No-protocol communications are supported for Serial Communications Units with unit version 1.2 or later only.

NT Link System (1:N Mode)

If the PLC and Programmable Terminal (PT) are connected together using RS-232C ports, the allocations for the PT's status control area, status notify area, objects such as touch switches, indicators, and memory maps can be allocated in the I/O memory of the PLC. The NT Link System allows the PT to be controlled by the PLC, and the PT can periodically read data from the status control area of the PLC, and perform necessary operations if there are any changes in the area. The PT can communicate with the PLC by writing data to the status notify area of the PLC from the PT. The NT Link system allows the PT status to be controlled and monitored without using PLC ladder programs. The ratio of PLCs to PTs is 1: n ($n \geq 1$).

Set the PT communications settings for a 1:N NT Link. Either one or up to eight PTs can be connected to each PLC.





Applicable port

CPU Unit		Serial Communications Unit
Peripheral port	RS-232C	
Yes (See note 1.)	Yes (See note 2.)	Yes

Note 1. Turn ON pin 4 on the DIP switch on the front of the CPU Unit and set the serial communications mode in the PLC Setup for an NT Link.
2. Turn OFF pin 5 on the DIP switch on the front of the CPU Unit and set the serial communications mode in the PLC Setup for an NT Link.

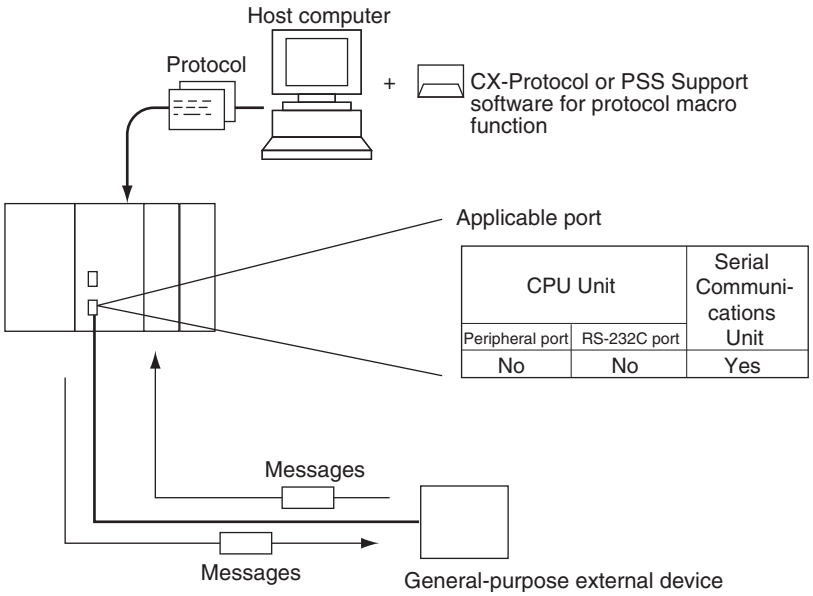
Note

1. The PLC can be connected to any PT port that supports 1:N NT Links. It cannot be connected to the RS-232C ports on the NT30 or NT30C, because these ports support only 1:1 NT Links.
2. The NT20S, NT600S, NT30, NT30C, NT620S, NT620C, and NT625C cannot be used if the CPU Unit's cycle time is 800 ms or longer (even if only one of these PTs is connected).
3. The Programming Console functionality of a PT (Expansion Function) can be used only when the PT is connected to the RS-232C or peripheral port on the CPU Unit. It cannot be used when connected to an RS-232C or RS-422A/485 port on a Serial Communications Unit.
4. A PT implementing Programming Console functionality and a PT implementing normal PT functionality cannot be used at the same time.
5. When more than one PT is connected to the same PLC, be sure that each PT is assigned a unique unit number. Malfunctions will occur if the same unit number is set on more than one PT.
6. The 1:1 and 1:N NT Link protocols are not compatible with each other, i.e., they are separate serial communications protocols.

Protocol Macros

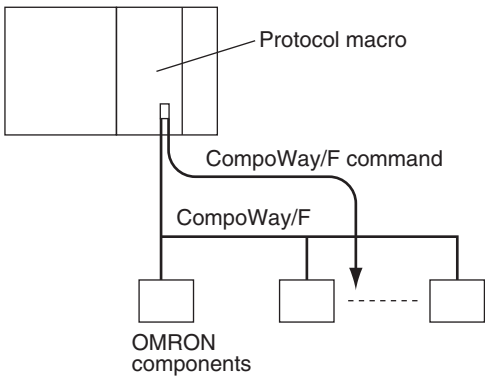
The CX-Protocol is used to create data transmission procedures (protocols) for general-purpose external devices according to the communications specifications (half-duplex or full-duplex, asynchronous) of the general-purpose external devices. The protocols that have been created are then recorded in a Serial Communications Unit, enabling data to be sent to and received from the external devices by simply executing the PMCR(260) instruction in the CPU Unit. Protocols for data communications with OMRON devices, such as Temperature Controller, Intelligent Signal Processors, Bar Code Readers, and Modems, are supported as standard protocols. (See note.)

Note The standard protocols are provided with the CX-Protocol and Serial Communications Unit.



CompoWay/F (Host Function)

The CJ-series CPU Unit can operate as a host to send CompoWay/F commands to OMRON components connected in the system. CompoWay/F commands are executed by using the CompoWay/F send/receive sequences in the standard protocols of the protocol macro function.

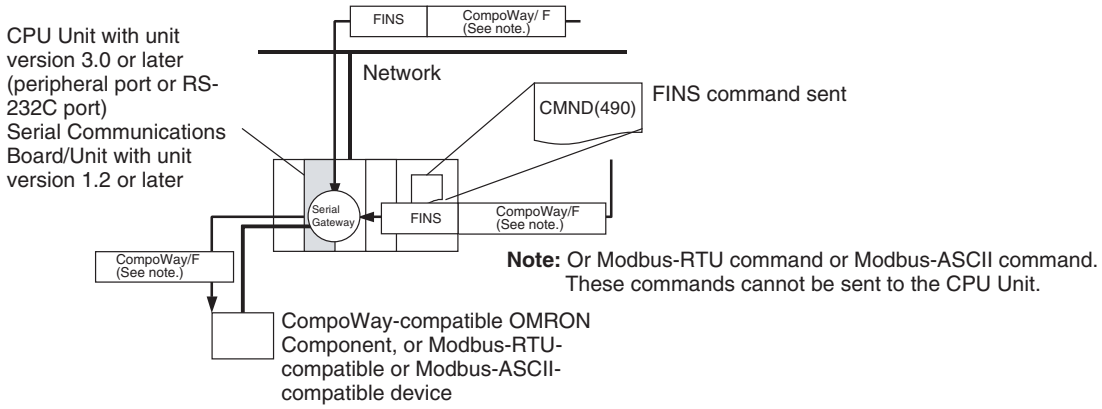


Serial Gateway Mode

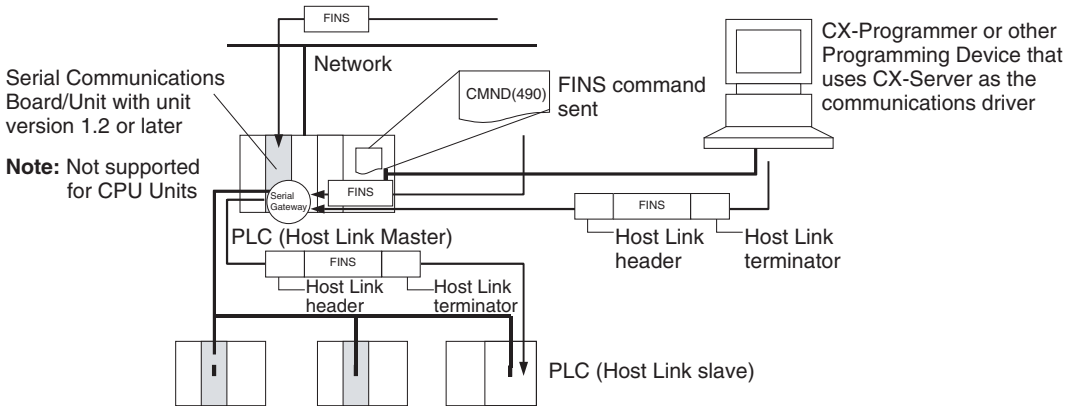
When using CPU Units with unit version 3.0 or later (peripheral port and RS-232C port), the received FINS message is automatically converted into CompoWay/F according to the message (see note). When Serial Communications Boards/Units with unit version 1.2 or later are used, the received FINS message is automatically converted into either CompoWay/F, Modbus-RTU, Modbus-ASCII, or Host Link FINS according to the message.

Note CPU Units with unit version 3.0 or later (peripheral port and RS-232C port) support automatic conversion into CompoWay/F only (automatic conversion into Modbus-RTU, Modbus-ASCII, and Host Link FINS is not possible).

CompoWay/F, Modbus-RTU, Modbus-ASCII



Host Link FINS



Unit/Protocol Compatibility

Unit	Model	Port	Peripheral bus (See note.)	Host Link	No-protocol (customer) communications	Protocol macro	NT Link (1:N Mode)	Serial Gateway (See note 2.)
CPU Units	CJ1H-CPU□□H-R CJ1G/H-CPU□□H CJ1M-CPU□□ CJ1G-CPU□□	Peripheral	Yes	Yes	---	---	Yes	Yes
		RS-232C	Yes	Yes	Yes	---	Yes	Yes
Serial Communications Unit	CJ1W-SCU41-V1 CJ1W-SCU31-V1 CJ1W-SCU21-V1	RS-422A/485	---	Yes	Yes (See note 2.)	Yes	Yes	Yes
		RS-232C	---	Yes	Yes (See note 2.)	Yes	Yes	Yes

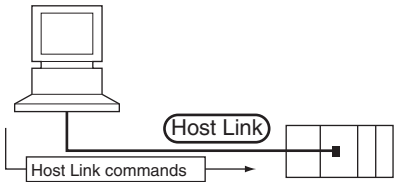
Note 1. The Peripheral Bus Mode is used for Programming Devices excluding Programming Consoles. If Programming Console is to be used, set pin 4 of the DIP switch on the front panel of the Unit to OFF so that the communications settings are automatically detected instead of using those specified in the PLC Setup.

2. Supported for CPU Units with unit version 3.0 or later and Serial Communications Boards/Units with unit version 1.2 or later only. For CPU Units, however, only automatic CompoWay/F connection is possible.

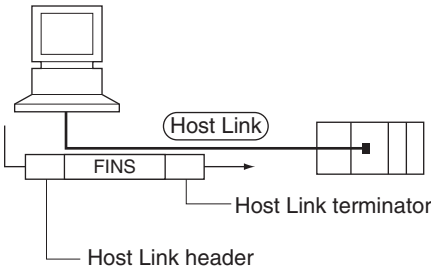
Host Link System Slave

The following system configurations are possible for a Host Link System.

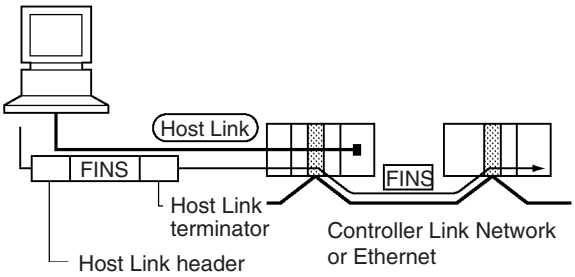
C-mode Commands

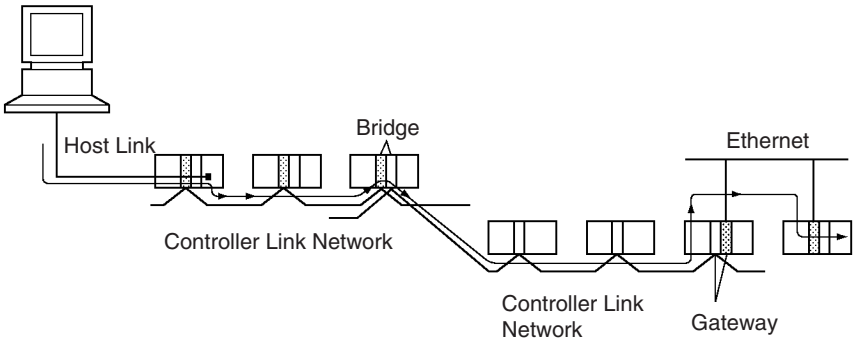


FINS Commands

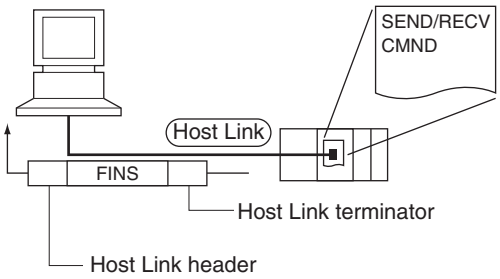


Note In Host Link mode, FINS commands contained between a header and terminator can be sent from the host computer to any PLC on the Network. Communications are possible with PLCs on the same or different types of interconnected Networks up to two levels away (three levels including the local level but not including the Host Link connection).



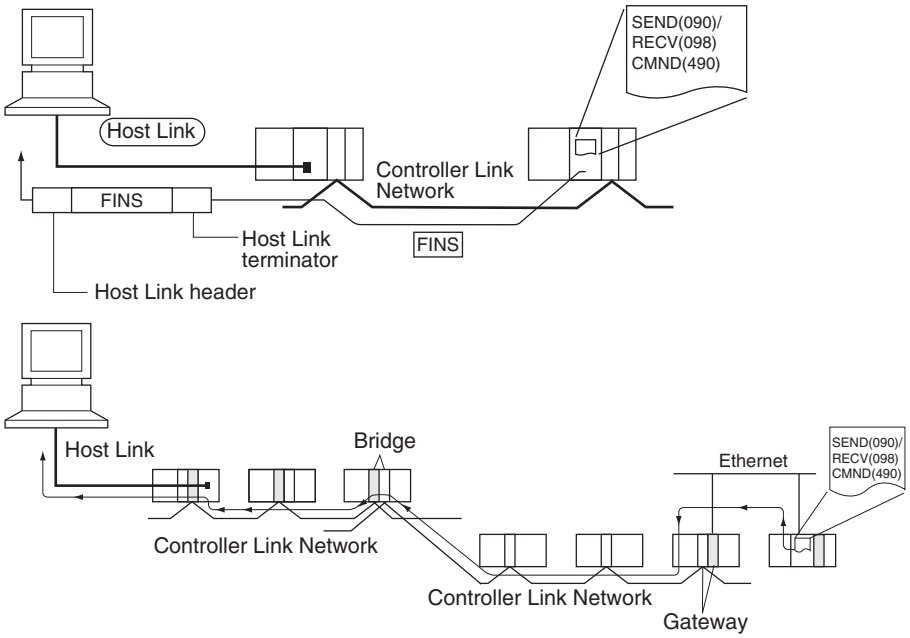


Communications from Host Computer



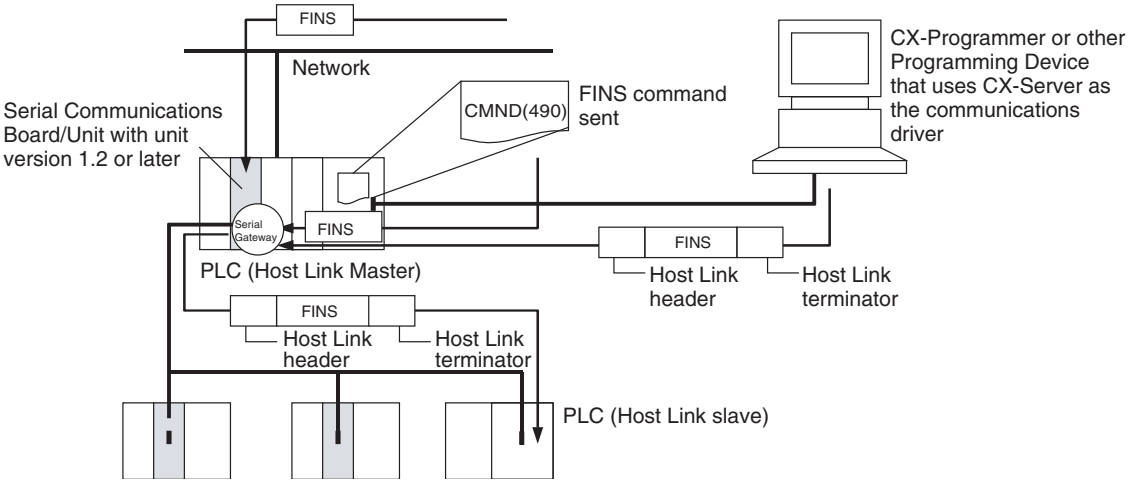
SEND(090): Sends data to the Host computer.
RECV(098): Receives data from the Host computer.
CMND(490): Executes a specified FINS command.

Note In Host Link mode, FINS commands contained between a header and terminator can be sent from the host computer to any PLC on the Network. Communications are possible with PLCs on the same or different types of interconnected Networks up to two levels away (three levels including the local level but not including the Host Link connection).



Host Link Master

Using a Serial Communications Board/Unit with unit version 1.2 or later and Serial Gateway mode enables received FINS commands to be enclosed in a Host Link header and terminator and transmitted to the PLC on the serial line (Host Link slave).

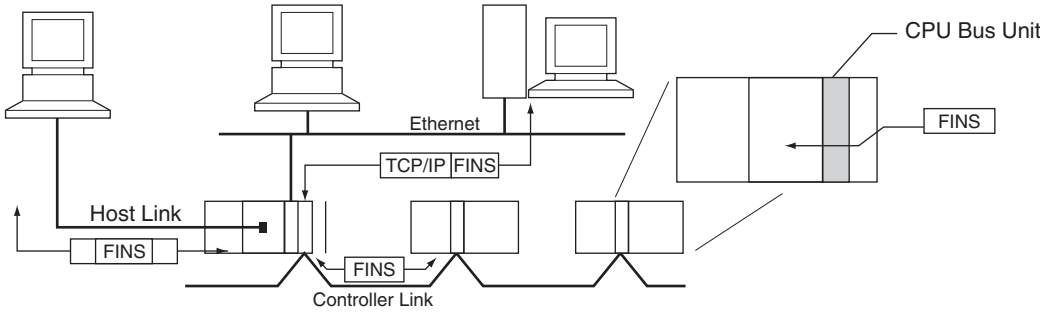


FINS Messages

FINS (Factory Interface Network Service) messages are commands and responses that are used as a message service in an OMRON Network. FINS messages enable the user to control operations such as sending and receiving data and changing operating modes when necessary. The features of FINS messages are as follows:

Flexible Communications

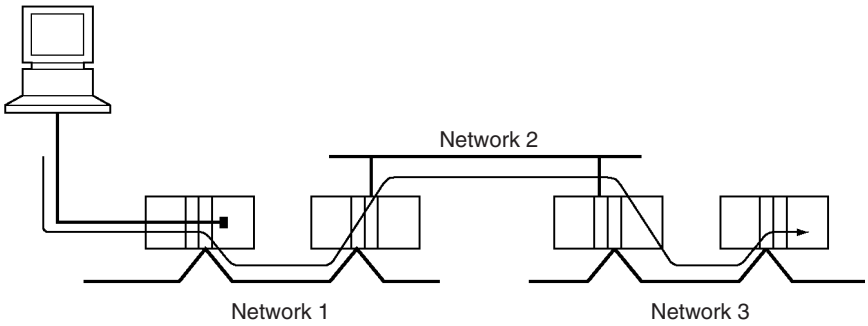
FINS messages are defined in the application layer and do not rely on the physical layer, data link layer, or other lower-level layers. This enables flexible communications on the CPU bus and different types of networks. Basically, communications with Ethernet, Controller Link, or Host Link Networks, and between the CPU Unit and CPU Bus Units is possible via the CPU bus.



Note A TCP/IP header must be attached to the FINS command for an Ethernet Network, and a Host Link header must be attached to the FINS command for a Host Link Network

Supports Network Relay

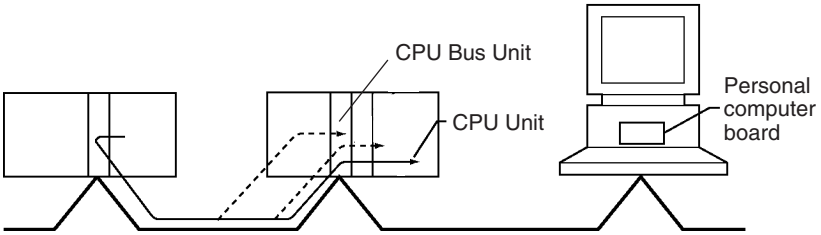
Up to three network levels (eight levels for unit version 2.0 or later), including the local network, can be bypassed to access other Racks.



Note With CS/CJ-series CPU Units Ver. 2.0 or later, remote programming/monitoring is possible up to 8 levels away. Refer to *1-7-2 Improved Read Protection Using Passwords* for details.

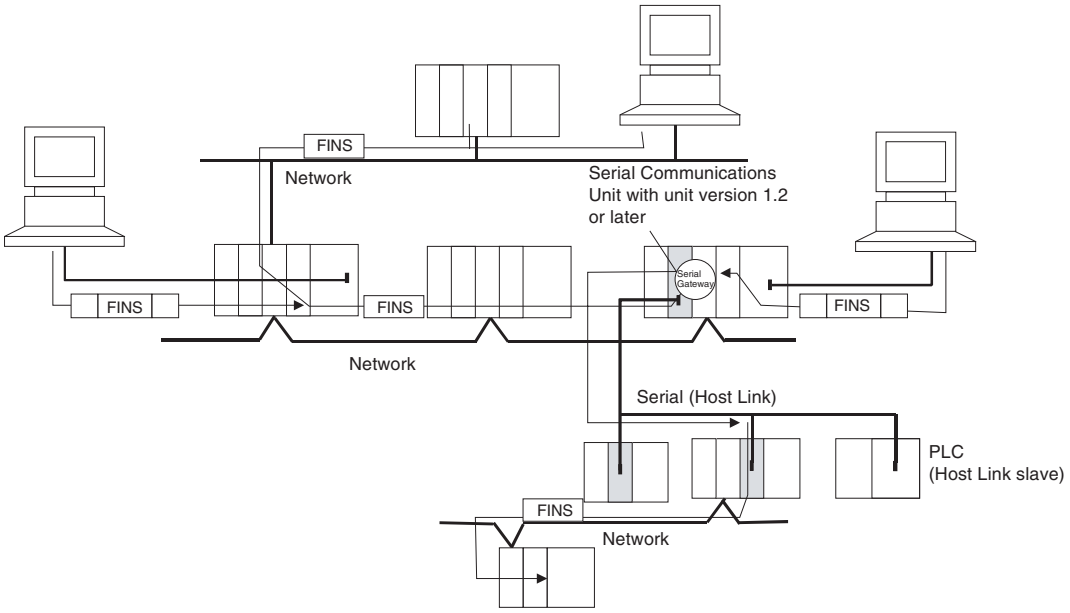
Access to CPU Unit Plus Other Devices on Racks

The CPU Unit, CPU Bus Units, personal computers (boards), and other devices can be identified and specified using unit addresses.



Network-to-Serial Conversion or Network-to-Serial-to-Network Conversion

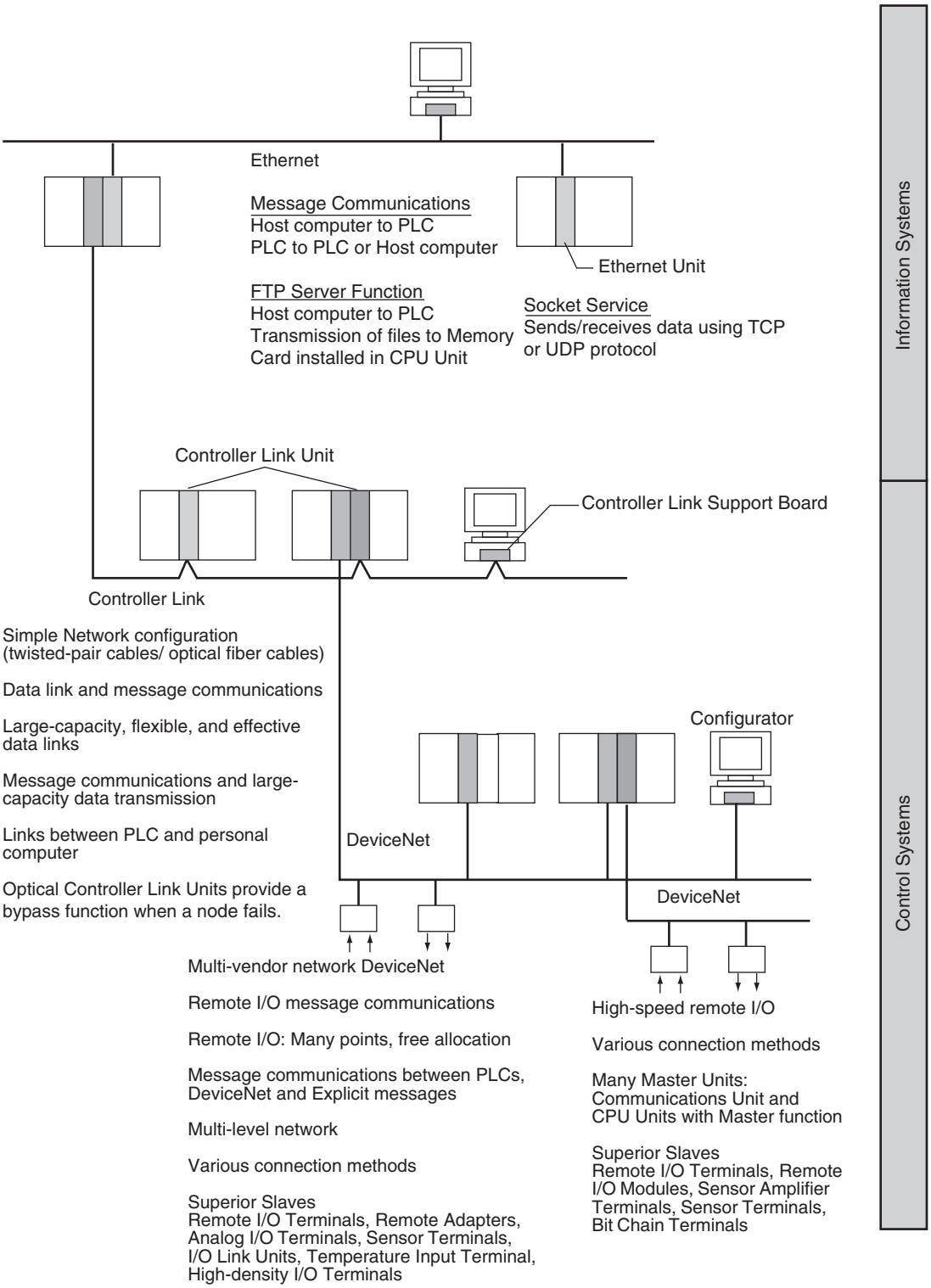
Using a Serial Communications Board/Unit with unit version 1.2 or later and Serial Gateway mode enables received FINS commands to be automatically converted into CompoWay/F, Modbus-RTU, Modbus-ASCII, or Host Link FINS commands according to the FINS message. FINS commands that have been converted into Host Link FINS commands can also be converted back into Host Link FINS commands.



2-5-3 Communications Network System

Communications Networks

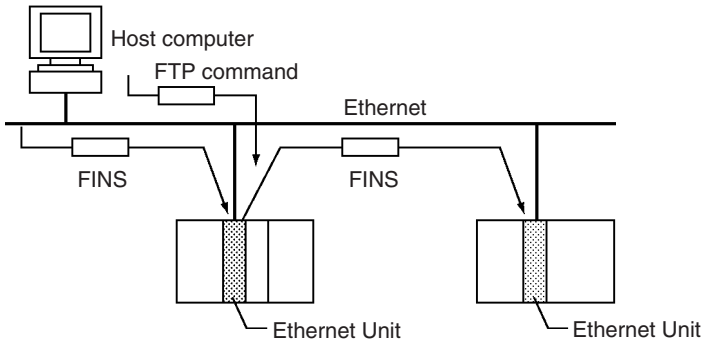
The following network systems can be configured when using CJ-series Units.



Ethernet

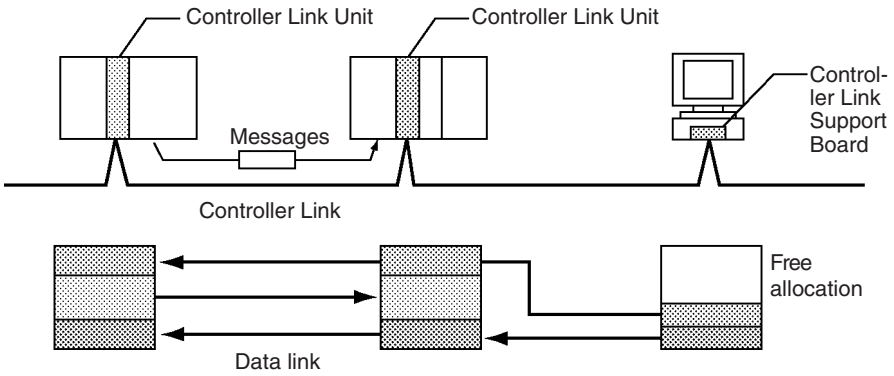
If an Ethernet Unit is connected to the system, FINS messages can be used to communicate between the Host computer connected to the Ethernet and

the PLC, or between PLCs. By executing FTP commands for the PLC from the Host computer connected to the Ethernet, the contents of the files on the Memory Card installed in the CPU Unit can be read or written (transferred). Data can be sent and received using UDP and TCP protocols. These functions enable a greater compatibility with information networks.



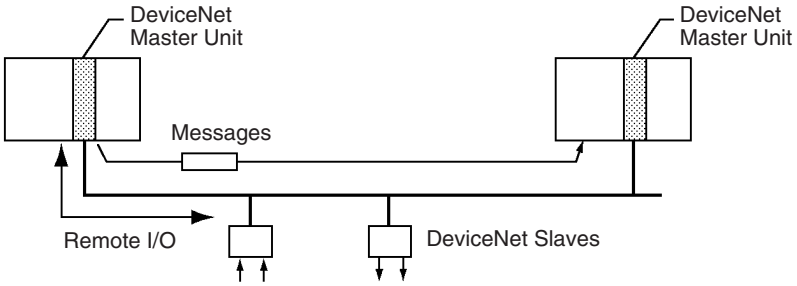
Controller Link

The Controller Link Network is the basic framework of the OMRON PLC FA Network. Connecting a Controller Link Unit to the network enables data links between PLCs, so that data can be shared without programming, and FINS message communications between PLCs, which enable separate control and data transfer when required. The Controller Link Network connections use either twisted-pair cables or optical fiber cables. Data links and message communications are also possible between the PLC and personal computer. Data links enable large-capacity and free allocations. FINS message communications also allow large-capacity data transfer.



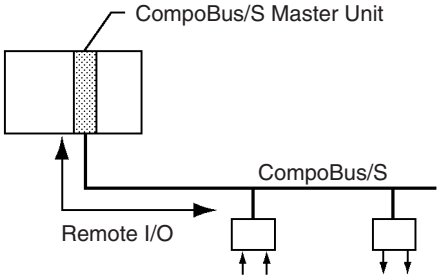
DeviceNet

DeviceNet is a multi-vendor network consisting of multi-bit control and information systems and conforms to the Open Field DeviceNet specification. Connecting a DeviceNet Master Unit to the network enables remote I/O communications between the PLC and the Slaves on the network. Remote I/O communications enable large-capacity I/O and user-set allocations. Analog I/O Terminals are used for the Slaves. Message communications are possible between PLCs and between the PLC and DeviceNet devices manufactured by other companies.



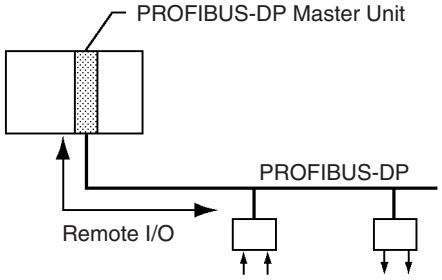
CompoBus/S

CompoBus/S is a high-speed ON/OFF bus for remote I/O communications. Connecting a CompoBus/S Master Unit to the network allows remote I/O communications between the PLC and Slaves. High-speed communications are performed with 256 points in a cycle time of 1 ms max.



PROFIBUS-DP

PROFIBUS (PROcess FIeldBUS) is an open fieldbus standard for a wide range of applications in manufacturing, processing, and building automation. The Standard, EN 50170 (the Euronorm for field communications), to which PROFIBUS adheres, ensures vendor independence and transparency of operation. It enables devices from various manufacturers to intercommunicate without having to make any special interface adaptations.



Communications Network Overview

System	Network	Function	Communications	Communications Device
Information networks	Ethernet	Between Host computer and PLC.	FINS message communications	Ethernet Unit
		Between PLCs.		
		Between Host computer and Memory Card installed in CPU Unit.	FTP server	
		Between PLC and nodes with socket service, such as UNIX computers.	Socket service	
	Controller Link	Between PLC and personal computer directly connected to the Network.	FINS message communications	Controller Link Unit
			Data link (offset, simple settings)	
	RS-232C → Controller Link	Between Host Link computer and PLC on the Network.	Host Link commands and gateway.	RS-232C cables and Controller Link Unit
Control networks	Controller Link	Between PLCs.	FINS message communications	Controller Link Unit
	DeviceNet		FINS message communications in an open network.	DeviceNet Master Unit and Configurator
	DeviceNet	PLC and Network devices (Slaves).	Large-capacity remote I/O (fixed or free allocation) in an open network	
	CompoBus/S		High-speed remote I/O in a network with OMRON devices only (fixed allocations).	CompoBus/S Master Unit
	PROFIBUS-DP		Large-capacity remote I/O (user-set allocation) in an open network	PROFIBUS-DP Master Unit and Configurator

Communications Specifications

Network	Communications			Max. baud rate	Communications distance	Max. No. of Units	Communications medium	Data link capacity (per network)	Max. remote I/O points	Connectable devices
	Messages	Data link	Remote I/O							
Ethernet	Yes	---	---	10 Mbps	2.5 km	---	Twisted-pair	---	---	Host computer-to-PLC, PLC-to-PLC
				100 Mbps	100 m	---		---	---	
Controller Link	Yes	Yes	---	2 Mbps	Twisted-pair cables: 500 m	32	Special (twisted-pair) cables	32,000 words	---	PLC-to-PLC, personal computer-to-PLC
DeviceNet	Yes	---	Yes	500 Kbps Communications cycle: Approx. 5 ms (128 inputs, 128 outputs)	100 m	63	Special cables	---	2,048	PLC-to-Slave (Slaves: Remote I/O Terminals, Remote Adapters. Sensor Terminals, CQM1 I/O Link Units, Analog Output Terminals, Analog Input Terminals)
CompoBus/S	---	---	Yes	750 Kbps Communications cycle: Approx. 1 ms max. (128 inputs, 128 outputs)	100 m	32	Two-core wires, special flat cables	---	256	PLC-to-Slave (Slaves: Remote I/O Terminals, Remote I/O Modules, Sensor Terminals, Sensor Amp Terminals, Bit Chain Terminals)
PROFIBUS-DP	---	---	Yes	12 Mbps Communications cycle: Approx. 3.5 ms max. (128 inputs, 128 outputs)	100 m	125	Special cables	---	7,168 words	PLC-to-Slave (Slaves: All PROFIBUS-DP slaves)

2-6 Unit Current Consumption

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

2-6-1 CJ-series CPU Racks and Expansion Racks

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

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

Power Supply Unit	Max. current consumption			Max. total power consumption
	5-V group (Internal logic)	24-V group (Relays)	24-V group (Service)	
CJ1W-PA205R	5.0 A	0.8 A	None	25 W
CJ1W-PA205C	5.0 A	0.8 A	None	25 W
CJ1W-PA202	2.8 A	0.4 A	None	14 W

Power Supply Unit	Max. current consumption			Max. total power consumption
	5-V group (Internal logic)	24-V group (Relays)	24-V group (Service)	
CJ1W-PD025	5.0 A	0.8 A	None	25 W
CJ1W-PD022	2.0 A	0.4 A	None	19.6 W

2-6-2 Example Calculations

Example 1: CPU Rack

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

Unit	Model	Quantity	Voltage group	
			5-V 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

Group	Current consumption
5 V DC	0.910 A + 0.020 A + 0.080 × 2 + 0.090 A × 2 + 0.090 A × 2 + 0.120 A + 0.350 A = 1.92 A (≤5.0 A)
24 V DC	0.048 A x 2 = 0.096 (≤0.8 A)

Power Consumption

1.92 A × 5 V + 0.096 A × 24 V
= 9.60 W + 2.304 W
= 11.904 W (≤25 W)

Example 2: Expansion Rack

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

Unit	Model	Quantity	Voltage group	
			5-V DC	24-V DC
I/O Interface Unit	CJ1W-II101	1	0.130 A	---
Input Units	CJ1W-ID211	2	0.080 A	---
Output Units	CJ1W-OD231	8	0.140 A	---

Current Consumption

Group	Current consumption
5 V DC	0.130 A + 0.080 A × 2 + 0.140 A × 8 = 1.41 A (≤5.0 A)
24 V DC	---

Power Consumption

1.41 A × 5 V = 7.05 W (≤25 W)

2-6-3 Current Consumption Tables

5-V DC Voltage Group

Name	Model	Current consumption (A)
CPU Units (including power supplied to Programming Console)	CJ1H-CPU67H-R	0.99 (See note.)
	CJ1H-CPU66H-R	0.99 (See note.)
	CJ1H-CPU65H-R	0.99 (See note.)
	CJ1G-CPU64H-R	0.99 (See note.)
	CJ1H-CPU67H	0.99 (See note.)
	CJ1H-CPU66H	0.99 (See note.)
	CJ1H-CPU65H	0.99 (See note.)
	CJ1G-CPU45H	0.91 (See note.)
	CJ1G-CPU44H	0.91 (See note.)
	CJ1G-CPU43H	0.91 (See note.)
	CJ1G-CPU42H	0.91 (See note.)
	CJ1M-CPU23	0.64 (See note.)
	CJ1M-CPU22	0.64 (See note.)
	CJ1M-CPU21	0.64 (See note.)
	CJ1M-CPU13	0.58 (See note.)
	CJ1M-CPU12	0.58 (See note.)
	CJ1M-CPU11	0.58 (See note.)
	CJ1G-CPU45	0.91 (See note.)
	CJ1G-CPU44	0.91 (See note.)
I/O Control Unit	CJ1W-IC101	0.02
I/O Interface Unit	CJ1W-II101	0.13
End Cover	CJ1W-TER01	Included with CPU Unit or I/O Interface Unit power supply.

Note The NT-AL001 Link Adapter consumes 0.15 A/Unit when used.
Add 0.04 A for each CJ1W-CIF11 RS-422A Adapter that is used.
Add 0.20 A for each NV3W-M□20L Programmable Terminal that is used.

CJ-series Basic I/O Units

Category	Name	Model	Current consumption (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
	Interrupt Input Unit	CJ1W-INT01	0.08
	Quick-response Input Unit	CJ1W-IDP01	0.08
	B7A Interface Unit	CJ1W-B7A14	0.07

Category	Name	Model	Current consumption (A)
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
		CJ1W-OC211	0.11
	Triac Output Units	CJ1W-OA201	0.22
	B7A Interface Unit	CJ1W-B7A04	0.07
Basic Mixed I/O Units	24-V DC Input/ Transistor Output Units	CJ1W-MD231	0.13
		CJ1W-MD232	0.13
		CJ1W-MD233	0.13
		CJ1W-MD261	0.14
		CJ1W-MD263	0.14
	TTL I/O Unit	CJ1W-MD563	0.19
	B7A Interface Unit	CJ1W-B7A22	0.07

CJ-series Special I/O Units

Category	Name	Model	Current consumption (A)
Special I/O Units	Analog Input Units	CJ1W-AD081/ AD081-V1	0.42
		CJ1W-AD041-V1	0.42
	Analog Output Units	CJ1W-DA041	0.12
		CJ1W-DA021	0.12
		CJ1W-DA08V	0.14
		CJ1W-DA08C	0.14
	Analog I/O Units	CJ1W-MAD42	0.58
	Isolated-type Thermocouple Input Units	CJ1W-PTS51	0.25
		CJ1W-PTS15	0.18
	Isolated-type Temperature Resistance Input Units	CJ1W-PTS52	0.25
		CJ1W-PTS16	0.18
	DC Input Unit	CJ1W-PDC15	0.18
	Temperature Control Units	CJ1W-TC□□□	0.25
	Position Control Units	CJ1W-NC113/NC133/ NC213/NC233	0.25
		CJ1W-NC413/NC433	0.36
	High-speed Counter Unit	CJ1W-CT021	0.28
	ID Sensor Units	CJ1W-V600C11	0.26
		CJ1W-V600C12	0.32

Category	Name	Model	Current consumption (A)
Special I/O Units	CompoBus/S Master Unit	CJ1W-SRM21	0.15
	CompoNet Master Unit	CJ1W-CRM21	0.40

CJ-series CPU Bus Units

Category	Name	Model	Current consumption (A)
CPU Bus Units	Controller Link Unit	CJ1W-CLK21-V1	0.35
	Serial Communications Unit	CJ1W-SCU41-V1	0.38 (See note.)
		CJ1W-SCU21-V1	0.28 (See note.)
		CJ1W-SCU31-V1	0.38
	Ethernet Unit	CJ1W-ETN11	0.38
		CJ1W-ETN21	0.37
	EtherNet/IP Unit	CJ1W-EIP21	0.41
	FL-net Unit	CJ1W-FLN22	0.37
	DeviceNet Unit	CJ1W-DRM21	0.29
	Position Control Units supporting MECHATROLINK-II communications	CJ1W-NCF71	0.36
	Motion Control Units supporting MECHATROLINK-II communications	CJ1W-MCH71	0.6
	SYSMAC SPU Unit (High-speed Storage and Processing Unit)	CJ1W-SPU01	0.56

Note The NT-AL001 Link Adapter consumes 0.15 A/Unit when used.
Add 0.04 A for each CJ1W-CIF11 RS-422A Adapter that is used.
Add 0.20 A for each NV3W-M□20L Programmable Terminal that is used.

CJ-series Communications Adapters

Category	Name	Model	Current consumption (A)
Communications Adapters	RS-422A Converter	CJ1W-CIF11	0.04

Current Consumptions for 24-V Supply

Category	Name	Model	Current consumption (A)
Basic Output Units	Relay Contact Output Units	CJ1W-OC201	0.048 (0.006 x number of ON points)
		CJ1W-OC211	0.096 (0.006 x number of ON points)
Special I/O Units	ID Sensor Units	CJ1W-V600C11	0.12
		CJ1W-V600C12	0.24
	Advanced Motion Control Unit	CJ1W-MCH71	0.3

2-7 CPU Bus Unit Setting Area Capacity

Settings for most CPU Bus Units are stored in the CPU Bus Unit Setting Area in the CPU Unit. Refer to 9-22 Parameter Areas for details. The CPU Bus Units are allocated the required number of works for settings from this area.

There is a limit to the capacity of the CPU Bus Unit Setting Area of 10,752 bytes (10 Kbytes). The system must be designed so that the number of words used in the CPU Bus Unit Setting Area by all of the CPU Bus Units not exceed this capacity. If the wrong combination of Units is used, the capacity will be exceeded and either Units will operate from default settings only or will not operate at all.

The following table shows the number of bytes required in the CPU Bus Unit Setting Area by each Unit. Any Unit with a usage of “0” does not use the CPU Bus Unit Setting Area at all.

Name	Model number	Capacity in bytes
Controller Link Unit	CJ1W-CLK21-V1	512
Serial Communications Unit	CJ1W-SCU21/31/41-V1	0
Ethernet Unit	CJ1W-ETN11	412
	CJ1W-ETN21	994
FL-net Unit	CJ1W-FLN21	998
DeviceNet Unit	CJ1W-DRM21	0
Position Control Unit	CJ1W-NCF71	0
Motion Control Unit	CJ1W-MCH71	0
Storage and Processing Unit	CJ1W-SPU01	0

2-8 I/O Table Settings List

The following settings are used in the I/O tables on the CX-Programmer.

2-8-1 CJ-series Basic I/O Units

Name	Model	Unit type setting	Addresses per Unit	Input Words	Output Words
DC Input Units	CJ1W-ID201	8pt Unit – 8pt Input	---	1	0
	CJ1W-ID211	16pt Unit – 16pt Input	---	1	0
	CJ1W-ID231	32pt Unit – 32pt Input	---	2	0
	CJ1W-ID232	32pt Unit – 32pt Input	---	2	0
	CJ1W-ID261	64pt Unit – 64pt Input	---	4	0
	CJ1W-ID262	64pt Unit – 64pt Input	---	4	0
AC Input Units	CJ1W-IA111	16pt Unit – 16pt Input	---	1	0
	CJ1W-IA201	16pt Unit – 16pt Input	---	1	0
24-V DC Input/Transistor Output Units	CJ1W-MD231	32pt Unit – 32pt Mixed	---	1	1
	CJ1W-MD232		---	1	1
	CJ1W-MD233		---	1	1
	CJ1W-MD261	64pt Unit – 64pt Mixed	---	2	2
	CJ1W-MD263		---	2	2
TTL I/O Unit	CJ1W-MD563	64pt Unit – 64pt Mixed	---	2	2
B7A Interface Unit	CJ1W-B7A14	64pt Unit – 64pt Input	---	4	0
	CJ1W-B7A04	64pt Unit – 64pt Output	---	0	4
	CJ1W-B7A22	64pt Unit – 64pt Mixed	---	2	2
Interrupt Input Unit	CJ1W-INT01	Interrupt Unit (16 Bit)	---	1	0
High-speed Input Units	CJ1W-IDP01	16pt Unit – 16pt Input	---	1	0
Relay Output Units	CJ1W-OC201	8pt Unit – 8pt Output	---	0	1
	CJ1W-OC211	16pt Unit – 16pt Output	---	0	1
Triac Output Unit	CJ1W-OA201	8pt Unit – 8pt Output	---	0	1
Transistor Output Units with sinking outputs	CJ1W-OD201	8pt Unit – 8pt Output	---	0	1
	CJ1W-OD203	8pt Unit – 8pt Output	---	0	1
	CJ1W-OD211	16pt Unit – 16pt Output	---	0	1
	CJ1W-OD231	32pt Unit – 32pt Output	---	0	2
	CJ1W-OD233	32pt Unit – 32pt Output	---	0	2
	CJ1W-OD261	64pt Unit – 64pt Output	---	0	4
	CJ1W-OD263	64pt Unit – 64pt Output	---	0	4
Transistor Output Units with sourcing outputs	CJ1W-OD202	8pt Unit – 8pt Output	---	0	1
	CJ1W-OD204	8pt Unit – 8pt Output	---	0	1
	CJ1W-OD212	16pt Unit – 16pt Output	---	0	1
	CJ1W-OD232	32pt Unit – 32pt Output	---	0	2
	CJ1W-OD262	64pt Unit – 64pt Output	---	0	4

Note If the selected Unit is incorrect, an I/O Table Setting error will be generated.

2-8-2 CJ-series Special I/O Units

Name	Model	Unit type setting		Addresses per Unit	Input Words	Output Words
Analog Input Unit	CJ1W-AD041	CS/CJ SIO Unit – Analog Input Unit		1	9	1
	CJ1W-AD081(-V1)			1	9	1
Analog Output Unit	CJ1W-DA021	CS/CJ SIO Unit – Analog Output Unit		1	1	9
	CJ1W-DA041			1	1	9
	CJ1W-DA08V			1	1	9
Analog I/O Units	CJ1W-MAD42	CS/CJ SIO Unit – Analog Input/Output Unit		1	5	5
Temperature Control Units	CJ1W-TC001	CS/CJ SIO Unit – Temperature Control Unit		2	14	6
	CJ1W-TC002			2	14	6
	CJ1W-TC003			2	14	6
	CJ1W-TC004			2	14	6
	CJ1W-TC101			2	14	6
	CJ1W-TC102			2	14	6
	CJ1W-TC103			2	14	6
	CJ1W-TC104			2	14	6
Position Control Units	CJ1W-NC113	CS/CJ SIO Unit – Numerical Control Unit		1	3	2
	CJ1W-NC213			1	6	4
	CJ1W-NC413			2	12	8
	CJ1W-NC133			1	3	2
	CJ1W-NC233			1	6	4
	CJ1W-NC433			2	12	8
PROFIBUS-DP Slave Unit	CJ1W-PRT21	CS/CJ SIO Unit – Other SIO Unit		4	26	14
ID Sensor Units	CJ1W-V600C11	CS/CJ SIO Unit – Other SIO Unit		1	10	---
	CJ1W-V600C12			2	20	---
High-speed Counter Unit	CJ1W-CT021	CS/CJ SIO Unit – High Speed Counter Unit		4	26	14
CompoBus/S Master Unit	CJ1W-SRM21	CS/CJ SIO Unit – CompoBus/S Master Unit		1	6	4
				2	12	8
CompoNet Master Unit	CJ1W-CRM21	CS/CJ SIO Unit – CompoNet Master Unit	Comm. Mode No. 0	2	11	9
			No. 1	4	21	17
			No. 2	8	41	33
			No. 3	8	45	25
			No. 8	1	Variable	Variable

Note If the selected Unit, the number of input words, or the number of output words is incorrect, a Special I/O Unit Setup error will be generated.

2-8-3 CJ-series CPU Bus Units

Unit type setting	Name	Model
Communications	Controller Link Unit	CJ1W-CLK21-V1 CJ1W-CLK21
	Serial Communications Unit	CJ1W-SCU41-V1 CJ1W-SCU31-V1 CJ1W-SCU21-V1 CJ1W-SCU41 CJ1W-SCU21
	Ethernet Unit	CJ1W-ETN11 CJ1W-ETN21
	FL-net Unit	CJ1W-FLN22
	DeviceNet Unit	CJ1W-DRM21
Position Control Unit	Position Control Unit	CJ1W-NCF71
Motion Controllers	Motion Control Unit	CJ1W-MCH71
General-purpose Devices	Storage and Processing Unit	CJ1W-SPU01

Note The DeviceNet Unit is not support by CX-Programmer version 2.0 or earlier, and I/O tables containing the DeviceNet Unit cannot be created with these versions. Create the tables online.

SECTION 3
Nomenclature, Functions, and Dimensions

This section provides the names of components and their functions for various Units. Unit dimensions are also provided.

3-1 CPU Units

3-1-1 Models

CJ1-H CPU Units

I/O points	Expansion Racks	Program capacity	Data Memory (DM + EM)	LD instruction processing time	Model	Weight
2,560	3 max.	250 Ksteps	448 Kwords	0.016 μs	CJ1H-CPU67H-R	200 g max.
		120 Ksteps	256 Kwords		CJ1H-CPU66H-R	
		60 Ksteps	128 Kwords		CJ1H-CPU65H-R	
		30 Ksteps	64 Kwords		CJ1G-CPU64H-R	
		250 Ksteps	448 Kwords	0.02 μs	CJ1H-CPU67H	
		120 Ksteps	256 Kwords		CJ1H-CPU66H	
		60 Ksteps	128 Kwords		CJ1H-CPU65H	
		60 Ksteps	128 Kwords	0.04 μs	CJ1G-CPU45H	190 g max.
1,280	3 max.	30 Ksteps	64 Kwords		CJ1G-CPU44H	
960	2 max.	20 Ksteps	64 Kwords		CJ1G-CPU43H	
		10 Ksteps	64 Kwords		CJ1G-CPU42H	

CJ1M CPU Units

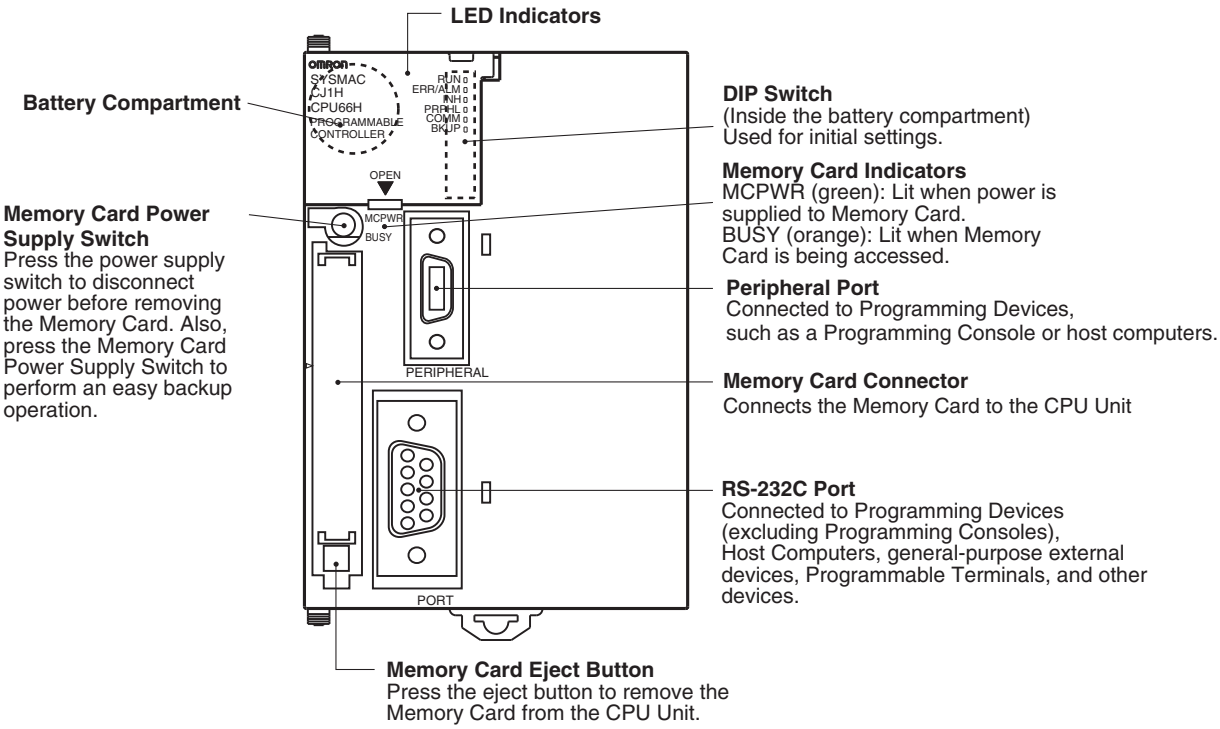
I/O points	Expansion Racks	Program capacity	Data Memory (DM + EM)	LD instruction processing time	Pulse I/O	Model	Weight
640	1	20 Ksteps	32 Kwords	0.1 μs	Yes	CJ1M-CPU23	170 g max.
320	None	10 Ksteps				CJ1M-CPU22	
160		5 Ksteps				CJ1M-CPU21	
640	1	20 Ksteps			No	CJ1M-CPU13	120 g max.
320	None	10 Ksteps				CJ1M-CPU12	
160		5 Ksteps				CJ1M-CPU1	

CJ1 CPU Units

I/O points	Expansion Racks	Program capacity	Data Memory (DM + EM)	LD instruction processing time	Model	Weight
1,280	3 max.	60 Ksteps	128 Kwords	0.08 μs	CJ1G-CPU45	200 g max.
		30 Ksteps	64 Kwords		CJ1G-CPU44	

3-1-2 Components

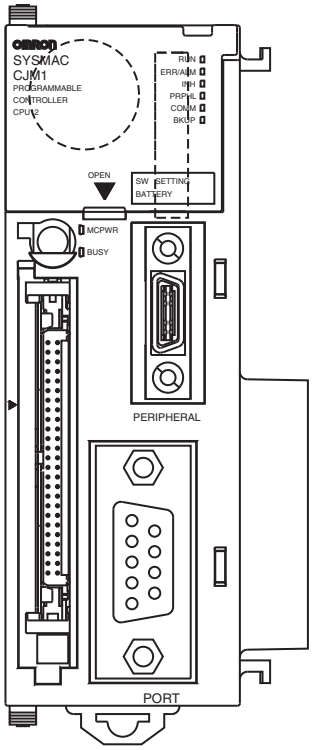
CJ1-H and CJ1 CPU Units



Note Always connect the connector covers to protect them from dust when not using the peripheral or RS-232C port.

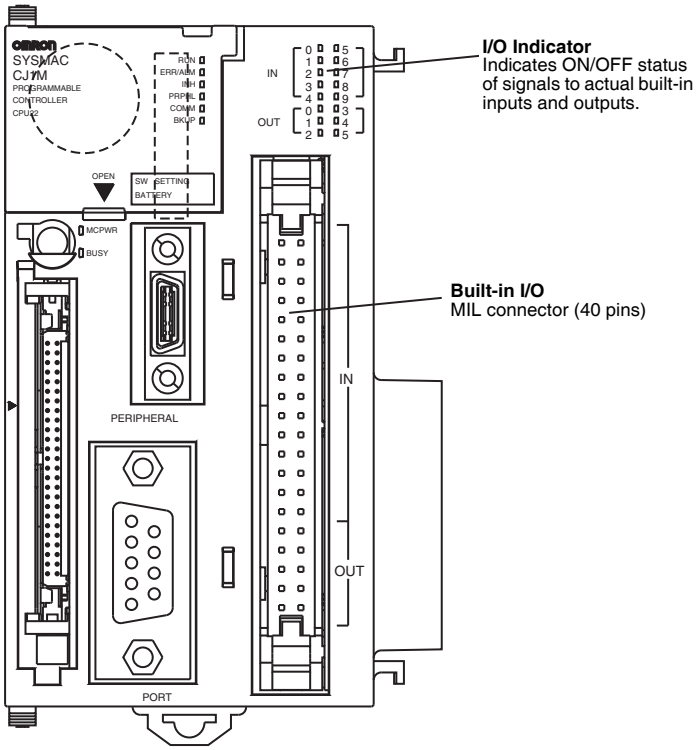
CJ1M CPU Units

Models without Built-in I/O (CJ1M-CPU1□)



Note The nomenclature and functions are the same as for the CJ1 and CJ1-H CPU Units above.

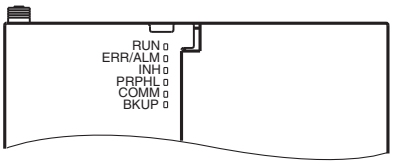
Models with Built-in I/O (CJ1M-CPU2□)



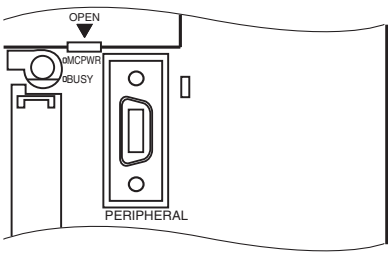
Note All nomenclature and functions other than those shown in the above diagram are the same as for CJ1 and CJ1-H CPU Units.

Indicators The following table describes the LED indicators located on the front panel of the CPU Units.

Indicator	Color	Status	Meaning
RUN	Green	ON	PLC is operating normally in MONITOR or RUN mode.
		Flashing	System download mode error or DIP switch settings error.
		OFF	PLC has stopped operating while in PROGRAM mode, or has stopped operating due to a fatal error, or is downloading data from the system.
ERR/ALM	Red	ON	A fatal error has occurred (including FALS instruction execution), or a hardware error (watchdog timer error) has occurred. The CPU Unit will stop operating, and the outputs from all Output Units will turn OFF.
		Flashing	A non-fatal error has occurred (including FAL instruction execution) The CPU Unit will continue operating.
		OFF	CPU Unit is operating normally.
INH	Orange	ON	Output OFF Bit (A50015) has been turned ON. The outputs from all Output Units will turn OFF.
		OFF	Output OFF Bit (A50015) has been turned OFF.
PRPHL	Orange	Flashing	CPU Unit is communicating (sending or receiving) via the peripheral port.
		OFF	CPU Unit is not communicating via the peripheral port.
COMM	Orange	Flashing	CPU Unit is communicating (sending or receiving) via the RS-232C port.
		OFF	CPU Unit is not communicating via the RS-232C port.
BKUP (CJ1H and CJ1M CPU Units only)	Orange	ON	User program and parameter area data is being backed up to flash memory in the CPU Unit or being restored from flash memory. **Note** Do not turn OFF the power supply to the PLC while this indicator is lit.
		OFF	Data is not being written to flash memory.



Indicator	Color	Status	Meaning
MCPWR	Green	ON	Power is being supplied to the Memory Card.
		Flashing	Flashes once: Easy backup read, write, or verify normal Flashes five times: Easy backup write malfunction Flashes three times: Easy backup write warning Flashes continuously: Easy backup read or verify malfunction
		OFF	Power is not being supplied to the Memory Card.
BUSY	Orange	Flashing	Memory Card is being accessed.
		OFF	Memory Card is not being accessed.



DIP Switch

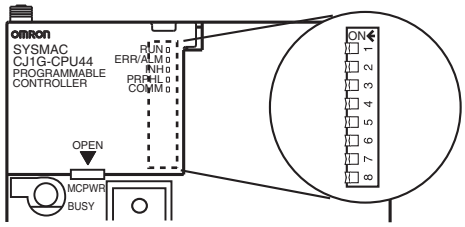
The CJ-series CPU Unit has an 8-pin DIP switch that is used to set basic operational parameters for the CPU Unit. The DIP switch is located under the cover of the battery compartment. The DIP switch pin settings are described in the following table.

Pin no.	Setting	Function	Usage	Default
1	ON	Writing disabled for user program memory. (See note.)	Used to prevent programs from being accidentally overwritten from Programming Devices (including Programming Console).	OFF
	OFF	Writing enabled for user program memory.		
2	ON	The user program is automatically transferred from the Memory Card when power is turned ON.	Used to store the programs in the Memory Card to switch operations, or to automatically transfer programs at power-up (Memory Card ROM operation). **Note** When pin 7 is ON, easy backup reading from the Memory Card is given priority, so even if pin 2 is ON, the user program is not automatically transferred from the Memory Card when power is turned ON.	OFF
	OFF	The user program is not automatically transferred from the Memory Card when power is turned ON.		
3	---	Not used.	---	OFF
4	ON	Peripheral port communications parameters set in the PLC Setup are used.	Turn ON to use the peripheral port for a device other than Programming Console or CX-Programmer (Peripheral bus only).	OFF
	OFF	Peripheral port communications parameters set using Programming Console or CX-Programmer (Peripheral bus only) are used.		
5	ON	RS-232C port communications parameters set using a CX-Programmer (Peripheral bus only) are used.	Turn ON to use the RS-232C port for a Programming Device.	OFF
	OFF	RS-232C port communications parameters set in the PLC Setup are used.		
6	ON	User-defined pin. Turns OFF the User DIP Switch Pin Flag (A39512).	Set pin 6 to ON or OFF and use A39512 in the program to create a user-defined condition without using an I/O Unit.	OFF
	OFF	User-defined pin. Turns ON the User DIP Switch Pin Flag (A39512).		
7	ON	Writing from the CPU Unit to the Memory Card.	Press and hold the Memory Card Power Supply Switch for three seconds.	OFF
		Restoring from the Memory Card to the CPU Unit.	To read from the Memory Card to the CPU Unit, turn ON the PLC power. This operation is given priority over automatic transfer (pin 2 is ON) when power is ON.	
	OFF	Verifying contents of Memory Card.	Press and hold the Memory Card Power Supply Switch for three seconds.	
8	OFF	Always OFF.		OFF

Note

1. The following data cannot be overwritten when pin 1 is ON:
   - All parts of the user program (programs in all tasks)
   - All data in the parameter area (such as the PLC Setup and I/O table)

   When pin 1 is ON, the user program and parameter area will not be cleared when the memory clear operation is performed from a Programming Device.
2. After a simple backup operation has been used to read the data from a Memory Card to the CPU Unit, the operating mode will remain in PROGRAM mode and cannot be changed to MONITOR or RUN mode until the PLC power is turned OFF. After reading out the data, turn OFF the power supply, turn OFF pin 7 on the DIP switch, and then turn the power supply back ON.



Note The language displayed for the CJ-series CPU Units is not set on the DIP switch, but rather is set using Programming Console keys.

3-1-3 CPU Unit Memory Block Map

The memory of CJ-series CPU Units is configured in the following blocks.

- I/O Memory: The data areas accessible from the user program
- User Memory: The user program and parameter areas (See note 1.)

CPU Unit memory is backed up as shown in the following table.

Area	CJ1-H CPU Units	CJ1M CPU Units	CJ1 CPU Units
User memory	Flash memory	Flash memory	Battery
I/O memory	Battery	Battery	Battery

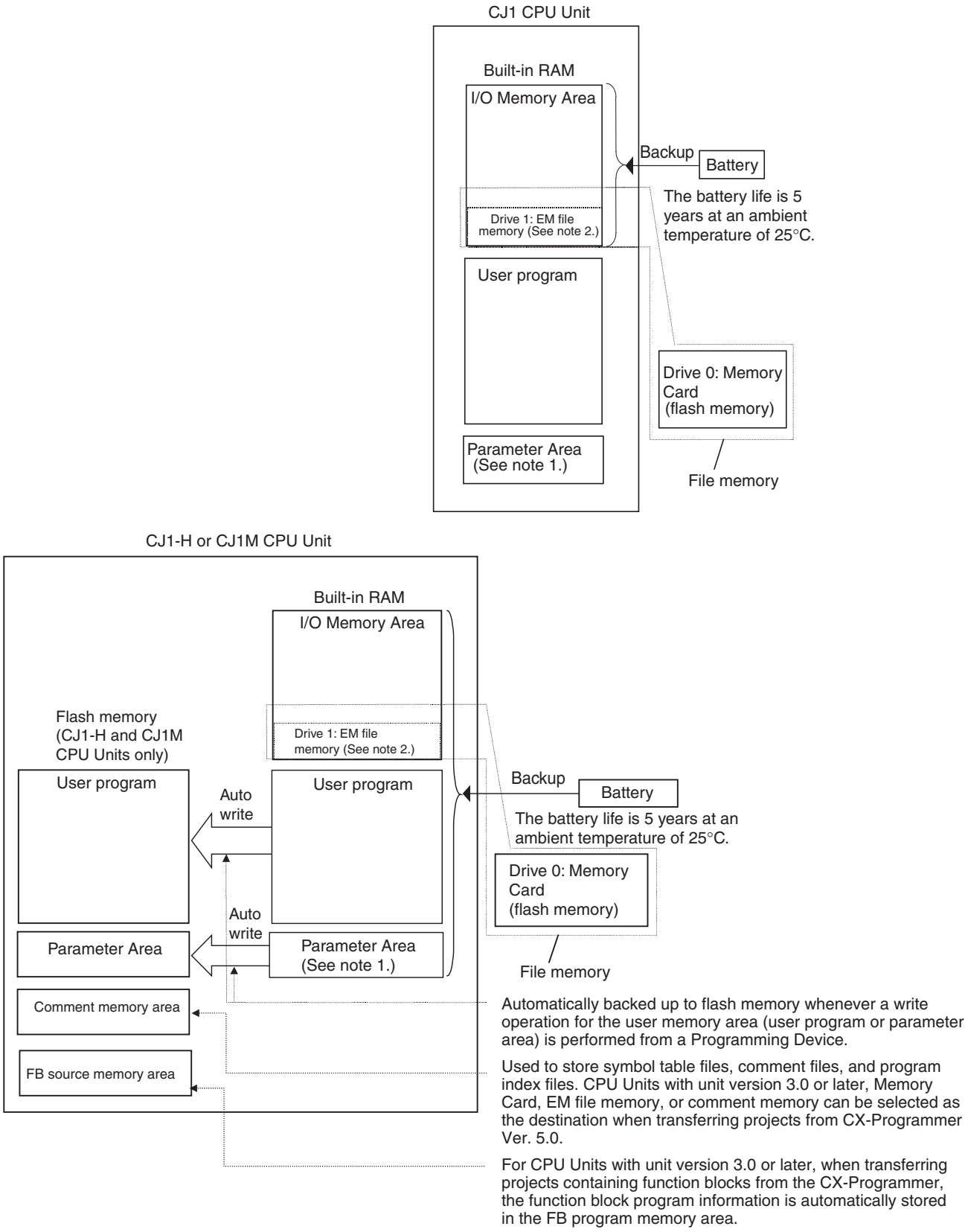
Areas Backed Up by Battery

If the battery voltage is low, the data in these areas will not be stable. The CPM2A-BAT01 Battery is used for CJ1-H and CJ1 CPU Units and the CJ1W-BAT01 Battery is used for CJ1M CPU Units.

Areas Backed Up by Flash Memory

The data in these areas will be held even if the battery voltage is low. The CJ1-H and CJ1M CPU Units have an internal flash memory to which the user program and parameter area data are backed up whenever the user memory is written to, including data transfers and online editing from a Programming Device (CX-Programmer or Programming Console), data transfers from a Memory Card, etc. The user program and the parameter area data will be held when using a CJ1-H or CJ1M CPU Unit.

The internal flash memory of CJ1-H and CJ1M CPU Units with unit version 3.0 also contains a comment memory and FB source memory area. The comment memory is used to store symbol table files, comment files, and program index files (if comment memory is selected as the transfer destination when transferring projects from a CX-Programmer Ver. 5.0). The FB program memory area is used to store function block program data.

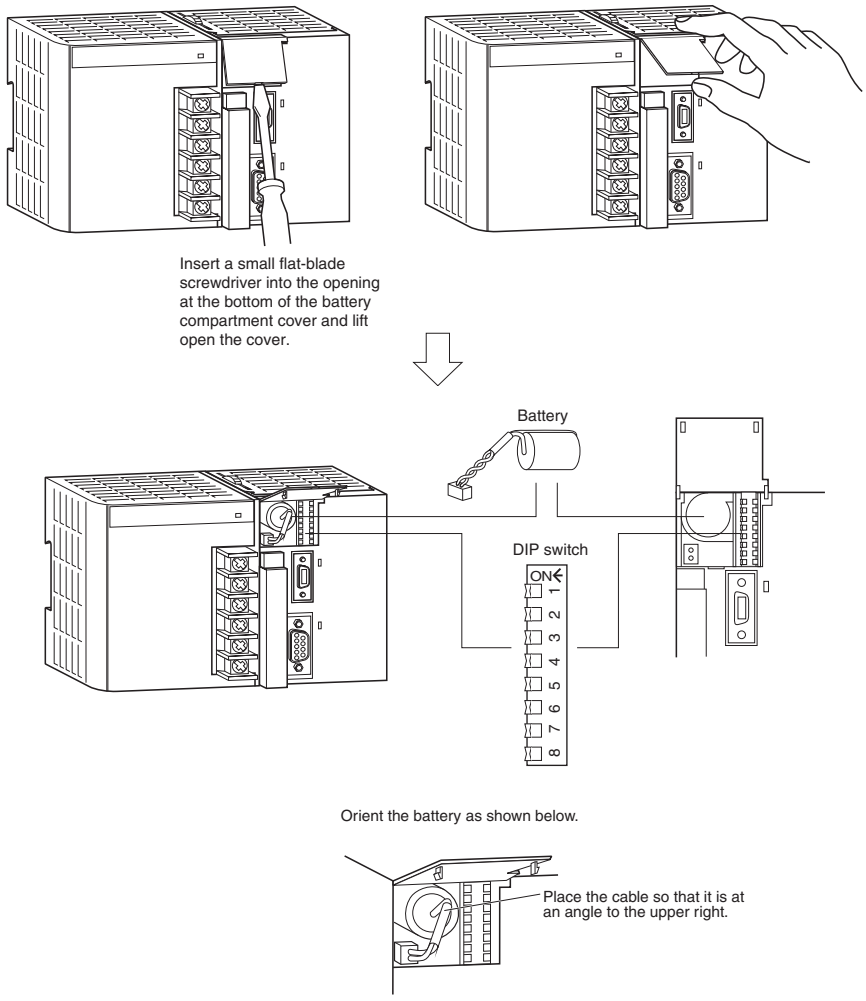


Note 1. The Parameter Area stores system information for the CPU Unit, such as the PLC Setup. An attempt to access the Parameter Area by an instruction will generate an illegal access error.

2. Part of the EM (Extended Data Memory) Area can be converted to file memory to handle data files and program files in RAM memory format, which has the same format as Memory Cards. Both EM file memory or memory cards can be treated as file memory (i.e., can be used to store files).

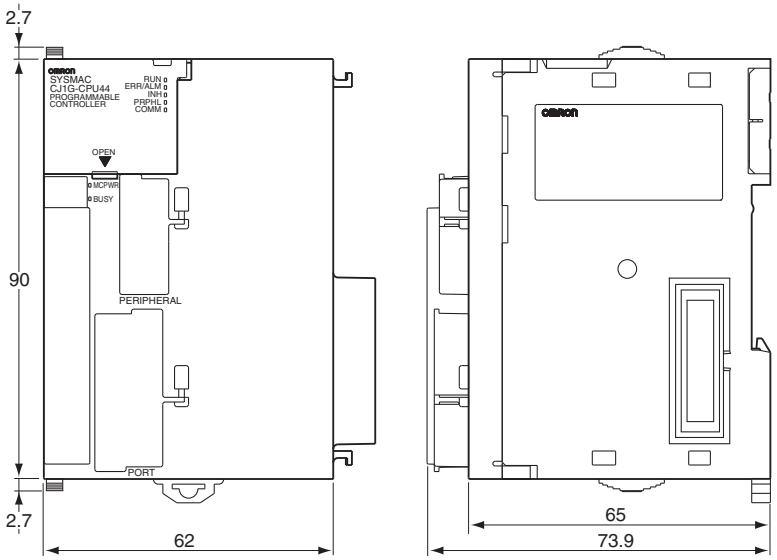
Opening the Battery Compartment Cover

Insert a small flat-blade screwdriver into the opening at the bottom of the battery compartment cover and lift open the cover.



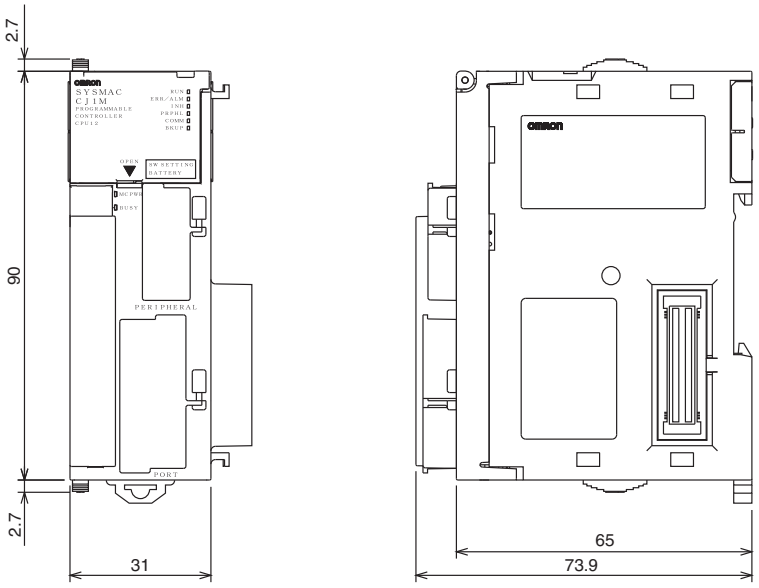
3-1-4 Dimensions

CJ1-H and CJ1 CPU Units

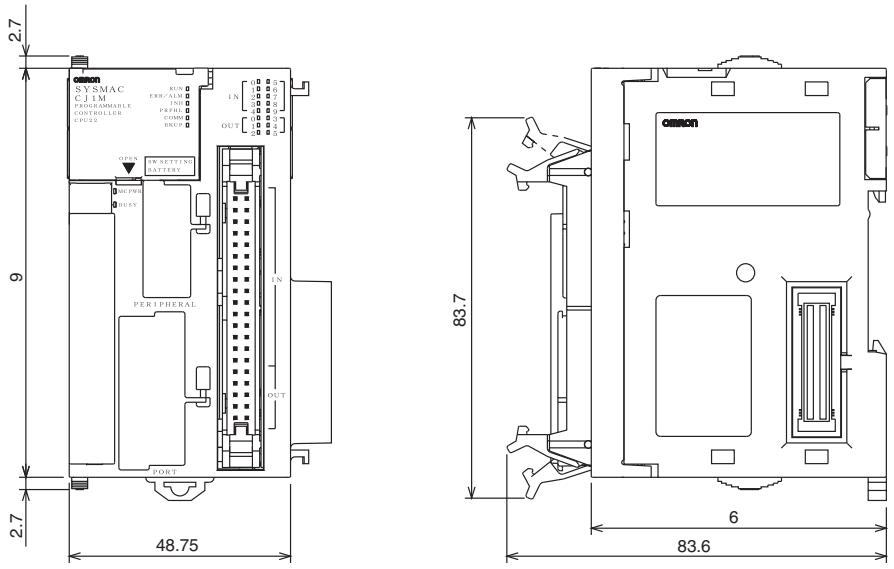


CJ1M CPU Units

CPU Units without Built-in I/O (CJ1M-CPU1□)

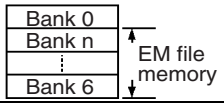


CPU Units with Built-in I/O (CJ1M-CPU2□)



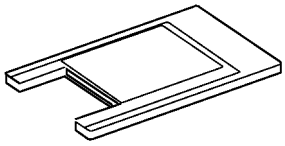
3-2 File Memory

For CJ-series CPU Units, the Memory Card and a specified part of the EM Area can be used to store files. All user programs, the I/O Memory Area, and the Parameter Area can be stored as files.

File memory	Memory type	Memory capacity	Model
Memory Card 	Flash memory	30 Mbytes	HMC-EF372
		64 Mbytes	HMC-EF7672
		128 Mbytes	HMC-EF7183 (See note 3.)
(CJ1 and CJ1-H CPU Units only.) EM file memory 	RAM	The maximum capacity of the CPU Unit's EM Area (e.g., the maximum capacity for a CPU66 is 448 Kbytes)	The specified bank (set in the PLC Setup) to the last bank of the EM Area in the I/O Memory.
Comment memory (CS/CJ-series CPU Units with unit version 3.0 or later only)	CPU Unit's internal flash memory	Comment files CPU66H/67H: 128 Kbytes Other CPU Units: 64 Kbytes	CX-Programmer rung comments and other comments
		Program index files CPU66H/67H: 128 Kbytes Other CPU Units: 64 Kbytes	CX-Programmer section names, section comments, and program comments
		Symbol table files CPU45H/65H66H/67H: 128 Kbytes Other CPU Units: 64 Kbytes	CX-Programmer global symbol tables, local symbol tables, and settings for automatically allocated areas.

Note

1. A Memory Card can be written up to approximately 100,000 times.
2. The HMC-AP001 Memory Card Adapter is shown below.



3. The HMC-EF183 cannot be used with some CPU Units. Before ordering the HMC-EF183, confirm applicability using the information in *Precautions on Applicable Units on page 152*.

3-2-1 Memory Card

Basic Specifications

Item		Previous products		
Model number		HMC-EF183	HMC-EF672	HMC-EF372
Memory Card capacity		128 Mbytes	64 Mbytes	30 Mbytes
Common specifications	Dimensions	42.8 × 36.4 × 3.3 mm (W × H × T)		
	Weight	15 g max.		
	Current consumption	Approx. 30 mA (when used with PLC)		
	Environmental specifications	Same a general specifications of PLC		
	No. of writes	100,000 (guaranteed value)		
Factory specifications	No. of files writable to root directory	511		
	File system	FAT16		

Precautions on Applicable Units

The HMC-EF183 Memory Card cannot be used with the following CPU Units and PTs. Confirm applicability when ordering.

1. CS-series CPU Units
   - All CS1G-CPU□□H and CS1H-CPU□□H CPU Units manufactured before January 9, 2002 (lot number 020108 and earlier)
   - All CS1G-CPU□□, CS1G-CPU□□-V1, CS1H-CPU□□, and CS1H-CPU□□-V1 CPU Units (i.e., those without an H in the model number suffix: CPU□□H)
2. CJ-series CPU Units
   - All CJ1G-CPU□□H and CJ1H-CPU□□H CPU Units manufactured before January 9, 2002 (lot number 020108 and earlier)
   - All CJ1G-CPU□□ CPU Units (i.e., those without an H in the model number suffix: CPU□□H)
3. NS7-series PTs
   All NS7-SV0□ PTs manufactured before May 9, 2002 (lot number 0852 and earlier)

Memory Card Recognition Time

Several seconds is normally required for the CPU Unit to recognize the Memory Card after it is inserted. The required time depends on the PLC's cycle time, the Memory Card Capacity, the number of files stored on the Memory Card, and other factors.

The recognition times given in the following table are guidelines for a CS1H-CPU□□H CPU Unit with a PLC cycle time of 0.4 ms and all PLC Setup parameters set to the default values.

Model	HMC-EF183	HMC-EF672	HMC-EF372
Recognition time	8 s	5 s	3 s

3-2-2 Files Handled by CPU Unit

Files are ordered and stored in the Memory Card or EM file memory according to the file name and the extension attached to it.

General-use Files

File type	Contents		File name	Extension
Data files	Specified range in I/O memory	Binary	******** (See note 1.)	.IOM
		Text		.TXT
		CSV		.CSV
Program files	All user programs			.OBJ
Parameter files	PLC Setup, registered I/O tables, routing tables, CPU Bus Unit settings, and Controller Link data link tables			.STD

Files Transferred Automatically at Startup

Including Parameter File

File type	Contents	File name	Extension
Data files	DM area data (stores data for specified number of words starting from D20000)	AUTOEXEC	.IOM
	DM area data (stores data for specified number of words starting from D00000)	ATEXECDM	.IOM
	EM area for bank No. □ (stores data for specified number of words starting from E□_00000)	ATEXECE□	.IOM
Program file	All user programs	AUTOEXEC	.OBJ
Parameter file	PLC Setup, registered I/O tables, routing tables, CPU Bus Unit settings, and Controller Link data link tables	AUTOEXEC	.STD

Excluding Parameter File (CPU Unit Ver. 2.0 or Later)

File type	Contents	File name	Extension
Data files	DM area data (stores data for specified number of words starting from D20000)	REPLACE (CPU Unit Ver. 2.0 or later only)	.IOM
	DM area data (stores data for specified number of words starting from D00000)	REPLCDM (CPU Unit Ver. 2.0 or later only)	.IOM
	EM area for bank No. □ (stores data for specified number of words starting from E□_00000)	REPLCE□ (CPU Unit Ver. 2.0 or later only)	.IOM
Program file	All user programs	REPLACE (CPU Unit Ver. 2.0 or later only)	.OBJ
Parameter file	---	Not needed	---

Easy Backup Files

File type	Contents	File name	Extension
Data files	Words allocated to Special I/O Units, and CPU Bus Units in the DM area	BACKUP	.IOM
	CIO area	BACKUPIO	.IOR
	General-purpose DM area	BACKUPDM	.IOM
	General-purpose EM area	BACKUPE□	.IOM
Program files	All user programs	BACKUP	.OBJ
Parameter files	PLC Setup, registered I/O tables, routing tables, CJ-series CPU Bus Unit settings, and Controller Link data link tables		.STD
Unit backup files (CJ1-H CPU Units only)	Data from specific Units (e.g., protocol macro data for a Serial Communications Unit)	BACKUP□□	.PRM
Symbol table files (See note 4.)	CX-Programmer global symbol tables, local symbol tables, settings for automatically allocated areas	BKUPSYM	.SYM
Comment files (See note 4.)	CX-Programmer rung comments and comments	BKUPCMT	.CMT
Program index files (See note 4.)	CX-Programmer section names, section comments, and program comments	CKUPPRG	.IDX

Note
1. Specify 8 ASCII characters. For a file name with less than 8 characters, add spaces (20 hex).
2. Always specify the name of files to be transferred automatically at power-up as AUTOEXEC.
3. Easy backup file names must be named BACKUP□□.
4. Supported for CS/CJ-series CPU Units with unit version 3.0 or later only.

3-2-3 Initializing File Memory

File memory	Initializing procedure	Data capacity after initialization
Memory Card	1.Install Memory Card into CPU Unit. 2.Initialize the Memory Card using a Programming Device (including the CX-Programmer and Programming Consoles).	Essentially the specific capacity of the Memory Card
EM file memory	1.Convert the part of the EM Area from the specified bank No. to the last bank No. to file memory in the PLC Setup. 2.Initialize the EM file memory using a Programming Device (including the CX-Programmer and Programming Consoles).	1 bank: Approx. 61 KB 7 banks: Approx. 445 KB

3-2-4 Using File Memory

Note For details on using file memory, refer to the *CS/CJ Series Programming Manual*.

Memory Card

Reading/Writing Files Using Programming Device (CX-Programmer or Programming Console)

File	File name and extension	Data transfer direction
Program files	********.OBJ	Between CPU Unit and Memory Card,
Data files	********.IOM	
Parameter files	********.STD	

1,2,3...

1. Install the Memory Card into the CPU Unit.
2. Initialize the Memory Card if necessary.
3. Name the file containing the data in the CPU Unit and save the contents in the Memory Card.
4. Read the file that is saved in the Memory Card to the CPU Unit.

Automatically Transferring Memory Card Files to the CPU Unit at Power-up

Including Parameter File

File	File name and extension	Data transfer direction
Program files	AUTOEXEC.OBJ	From Memory Card to CPU Unit
Data files	AUTOEXEC.IOM ATEXECDM.IOM ATEXECE□.IOM	
Parameter files	AUTOEXEC.STD	

1,2,3...

1. Install the Memory Card into the CPU Unit.
2. Set pin 2 of the DIP switch to ON.
3. Turn ON the power to the PLC. The files will be read automatically when the power is turned ON.

Excluding Parameter File

File	File name and extension	Data transfer direction
Program file	REPLACE.OBJ	From Memory Card to CPU Unit
I/O memory files	REPLACE.IOM REPLCDM.IOM REPLCE□.IOM	
Parameter file	Not needed	

1,2,3...

1. Install the Memory Card into the CPU Unit.
2. Set pin 2 of the DIP switch to ON.
3. The files are read automatically when the power is turned ON.

Reading/Writing Data Files Using FREAD(700)and FWRIT(701)

File	File name and extension	Data transfer direction
Data files	********.IOM ********.TXT ********.CSV	Between CPU Unit and Memory Card

1,2,3...

1. Install the Memory Card into the CPU Unit.
2. Initialize the Memory Card using a Programming Device.
3. Using the FWRIT(701) instruction, name the file of the specified I/O memory area, and save to the Memory Card.

4. Using the FREAD(700) instruction, read the I/O memory files from the Memory Card to the I/O memory in the CPU Unit.

Note When using spreadsheet software to read data that has been written to the Memory Card in CSV or text format, it is now possible to read the data using Windows applications by mounting a Memory Card in the personal computer card slot using a HMC-AP001 Memory Card Adapter.

Reading and Replacing Program Files during Operation

File	File name and extension	Data transfer direction
Program files	********.OBJ	Memory Card to CPU Unit

1,2,3...

1. Install a Memory Card into the CPU Unit.
2. Set the following information: Program File Name (A654 to A657) and Program Password (A651).
3. Next, from the program, turn ON the Replacement Start Bit (A65015).

Backing Up or Restoring CPU Unit Data and (for CJ1-H and CJ1M CPU Units only) Special Data for CPU Bus Units

File	File name and extension	Data transfer direction
Program files	BACKUP.OBJ	CPU Unit to Memory Card (when backing up) Memory Card to CPU Unit (when restoring)
Data files	BACKUP.IOM	
	BACKUPIO.IOR	
	BACKUPDM.IOM	
	BACKUPE□.IOM	
Parameter files	BACKUP.STD	
Unit backup files (CJ1-H CPU Units only)	BACKUP□□.PRM	
Symbol table files	BKUPSYM.SYM	(Unit version 3.0 or later only)
Comment files	BKUPCMT.CMT	(Unit version 3.0 or later only)
Program index files	BKUPPRG.IDX	(Unit version 3.0 or later only)

1,2,3...

1. Install a Memory Card into the CPU Unit.
2. Turn ON pin 7 on the DIP switch.
3. To back up data, press and hold the Memory Card Power Supply Switch for three seconds. To restore data, turn ON the PLC power.

Transferring Files between Memory Cards and the CX-Programmer

The following files can be transferred between a Memory Card and the CX-Programmer.

File	File name and extension	Data transfer direction
Symbols file	SYMBOLS.SYM	Between CX-Programmer and Memory Card
Comment file	COMMENTS.CNT	
Program Index file	PROGRAM.IDX	

1,2,3...

1. Insert a formatted Memory Card into the CPU Unit.
2. Place the CX-Programmer online and use the file transfer operations to transfer the above files from the personal computer to the PLC or from the PLC to the personal computer.

Reading/Writing EM File Memory Files Using Programming Device (CJ1 and CJ1-H CPU Units Only) (CX-Programmer or Programming Console)

File	File name and extension	Data transfer direction
Program files	********.OBJ	Between CPU Unit and EM file memory
Data files	********.IOM	
Parameter files	********.STD	

1,2,3... 1. Convert the part of the EM Area specified by the first bank number into file memory in the PLC Setup.
2. Initialize the EM file memory using a Programming Device.
3. Name the data in the CPU Unit and save in the EM file memory using the Programming Device.
4. Read the EM file memory files to the CPU Unit using the Programming Device.

Reading/Writing Data Files in EM File Memory Using FREAD(700)and FWRIT(701)

File	File name and extension	Data transfer direction
Data files	********.IOM	Between CPU Unit and EM file memory

1,2,3... 1. Convert the part of the EM Area specified by the first bank number into file memory in the PLC Setup.
2. Initialize the EM file memory using a Programming Device.
3. Using the FWRIT(701) instruction, name the specified area in I/O memory with a file name and save in the EM file memory.
4. Using the FREAD(700) instruction, read the I/O memory files from the EM file memory to the I/O memory in the CPU Unit.

Note The following files can be transferred between EM file memory and the CX-Programmer.

File	File name and extension	Data transfer direction
Symbols file	SYMBOLS.SYM	Between CX-Programmer and EM file memory
Comment file	COMMENTS.CNT	
Program Index file	PROGRAM.IDX	

1,2,3... 1. Format the EM Area in the CPU Units as file memory.
2. Place the CX-Programmer online and use the file transfer operations to transfer the above files from the personal computer to the PLC or from the PLC to the personal computer.

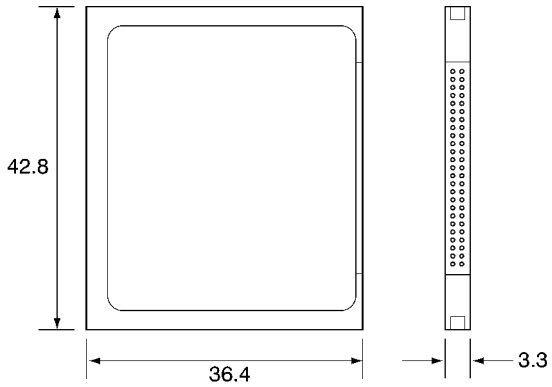
Comment Memory (Unit Version 3.0 or Later Only)

The internal flash memory in CS/CJ-series CPU Units with unit version 3.0 or later contains a comment memory area. If neither a Memory Card nor EM file memory are available, the comment data and section data (symbol table files, comment files, and program index files) can be stored in or read from the comment memory.

Note When using CX-Programmer version 5.0 to download projects, either of the following locations can be selected as the transfer destination for comment data and section data.

- Memory Card
- EM file memory
- Comment memory (in CPU Unit's internal flash memory)

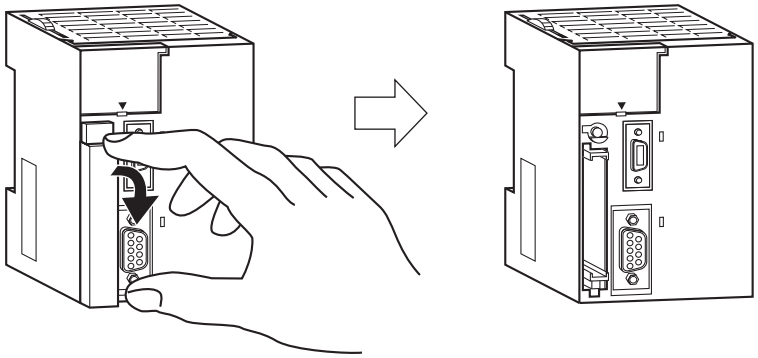
3-2-5 Memory Card Dimensions



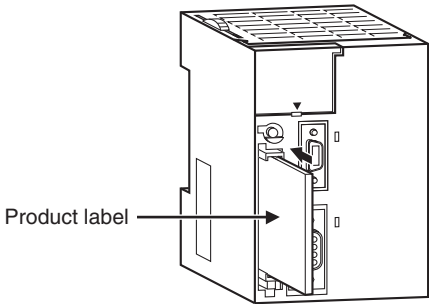
3-2-6 Installing and Removing the Memory Card

Installing the Memory Card

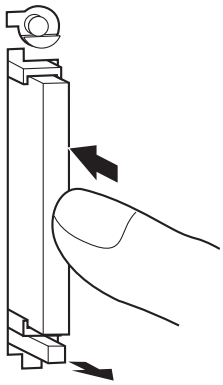
1,2,3... 1. Pull the top end of the Memory Card cover forward and remove from the Unit.



2. Insert the Memory Card with the label facing to the left. (Insert with the Δ on the Memory Card label and the Δ on the CPU Unit facing each other.)

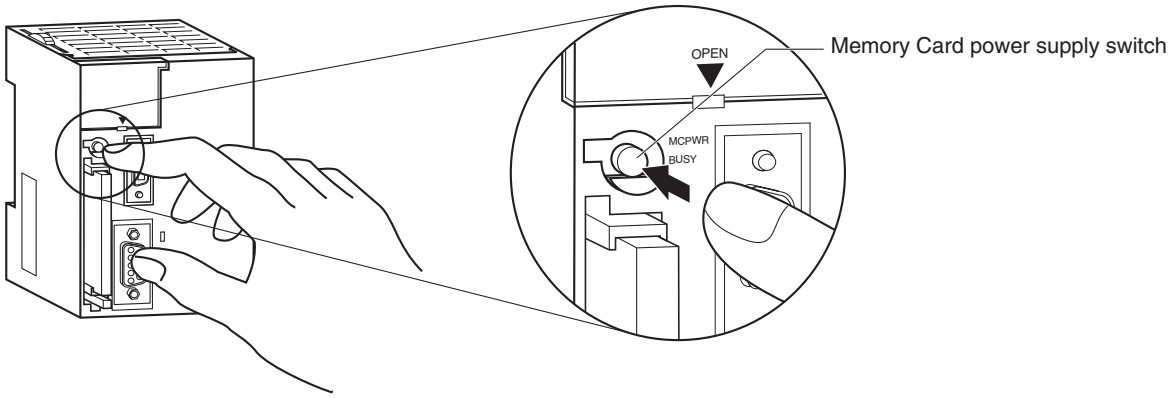


3. Push the Memory Card securely into the compartment. If the Memory Card is inserted correctly, the Memory Card eject button will be pushed out.

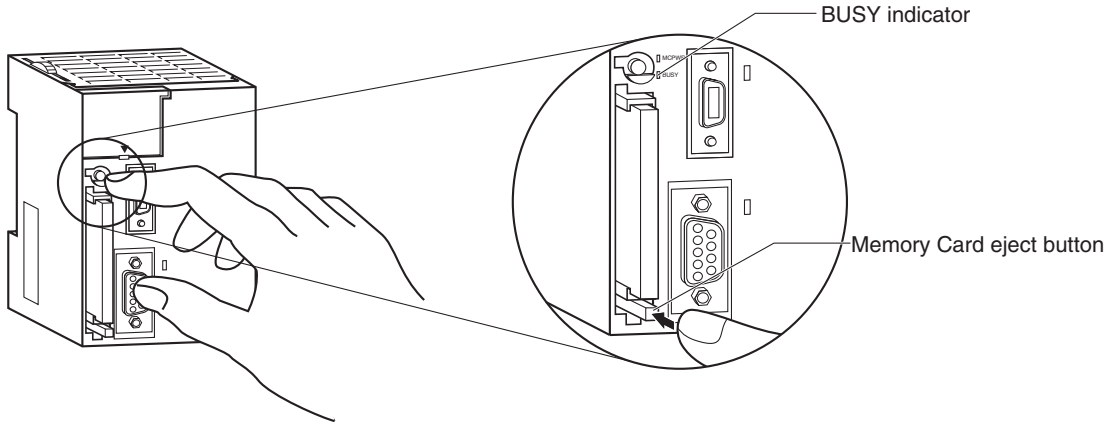


Removing the Memory Card

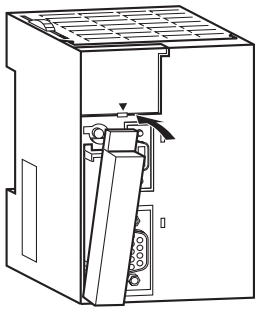
1,2,3... 1. Press the Memory Card power supply switch.



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

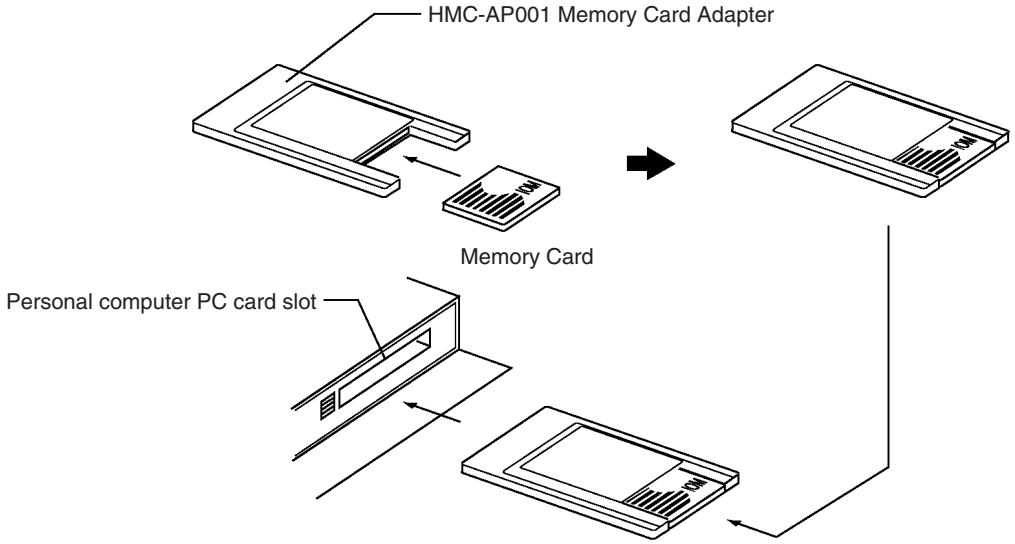


3. The Memory Card will eject from the compartment.
4. Install the Memory Card cover when a Memory Card is not being used.



Note
1. Never turn OFF the PLC while the CPU is accessing the Memory Card.
2. Never remove the Memory Card while the CPU is accessing the Memory Card. Press the Memory Card power supply switch and wait for the BUSY indicator to go OFF before removing the Memory Card. In the worst case, the Memory Card may become unusable if the PLC is turned OFF or the Memory Card is removed while the Card is being accessed by the CPU.
3. Never insert the Memory Card facing the wrong way. If the Memory Card is inserted forcibly, it may become unusable.

Installing the Memory Card into a Personal Computer



Note
1. When a Memory Card is inserted into a computer using a Memory Card Adapter, it can be used as a standard storage device, like a floppy disk or hard disk.
2. When deleting all of the data in a Memory Card or formatting it in any way, always place it in the CPU Unit and perform the operation from the CX-Programmer or a Programming Console.

3-3 Programming Devices

3-3-1 Overview

There are 2 types of Programming Devices that can be used: Any of three models of Hand-held Programming Consoles or the CX-Programmer, which is operated on a Windows computer. The CX-Programmer is usually used to write the programs, and a Programming Console is then used to change the operating modes, edit the programs, and monitor a limited number of points.

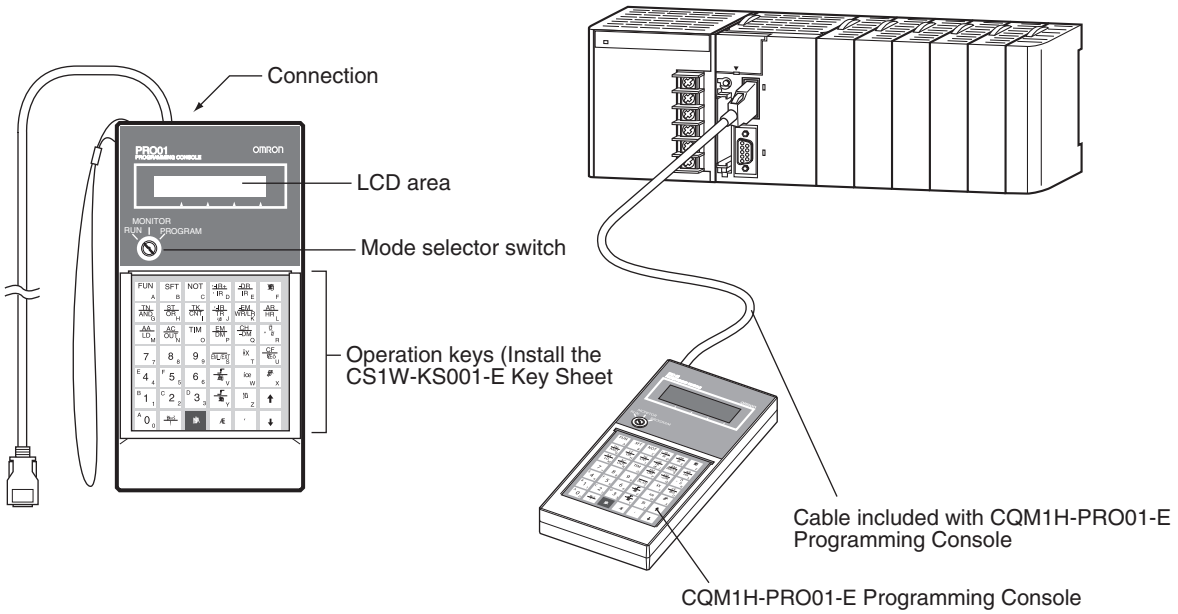
The following table provides a comparison between the CX-Programmer functions and the Programming Console functions.

Function		Programming Console	CX-Programmer
Editing and referencing I/O tables		Yes	Yes
Deleting I/O tables		No	Yes
Selecting tasks		Yes	Yes
Writing programs	Inputting instructions	Writes instructions one at a time using mnemonics	Writes multiple blocks using mnemonics or ladder programs
	Inputting addresses	Addresses only	Addresses or symbols
	I/O comment, rung comment	No	Yes
	Setting global/local symbols	No	Yes (Automatic allocation of local symbols)
Editing programs		Inserts instructions and searches for program addresses	Yes (Cutting, pasting, inserting within programs; searching/exchanging instructions, addresses, and symbols; displaying cross-references)
Checking programs		No	Yes
Monitoring programs		Monitors in program address units	Monitors multiple blocks
Monitoring I/O memory		Simultaneous, 2 points max.	Monitors multiple points
Changing I/O memory present values		Changes 1 point at a time	Yes
Online editing		Edits in instruction units	Edits multiple adjacent blocks
Debugging	Changing timer and counter settings	Yes	Yes
	Control set/ reset	Executes 1 point at a time (or resets all at once)	Yes
	Differentiation monitoring	Yes	Yes
	Reading cycle time	Yes	Yes
	Data tracing	No	Yes
	Time chart monitoring	No	Yes
Reading error information		Yes (error message display)	Yes
Reading error log		No	Yes
Reading/setting timer information		Yes	Yes
Reading/setting PLC parameters		Yes	Yes
Setting CPU Bus Unit parameters		No	Yes
File memory operations	Initializing Memory Card	Yes	Yes
	Initializing EM file memory	Yes	Yes
	Transferring files between CPU Unit and file memory	Yes	Yes
Remote programming and monitoring	Between Host Link and Network PLC	No	Yes
	Via modem	No	Yes
Setting password protection		No	Yes
Managing files		No	Manages files by project.
Printing		No	Yes

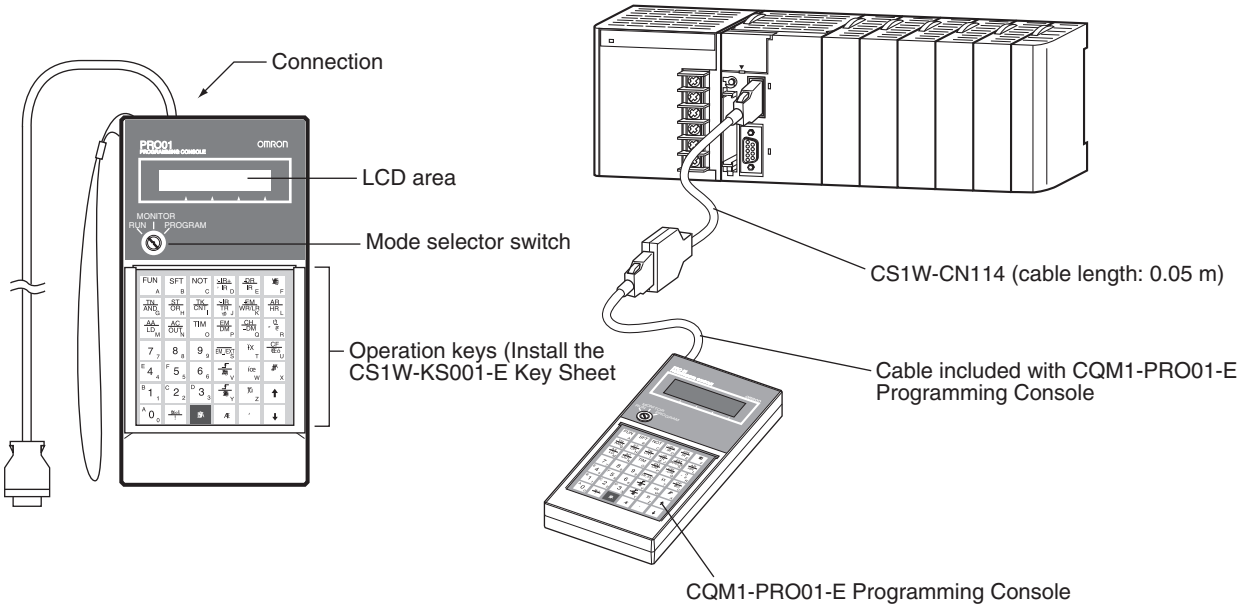
3-3-2 Programming Consoles

There are three Programming Consoles that can be used with the CJ-series CPU Units: The CQM1H-PRO01-E, CQM1-PRO01-E, and C200H-PRO27-E. These Programming Consoles are shown here.

CQM1H-PRO01-E Programming Console

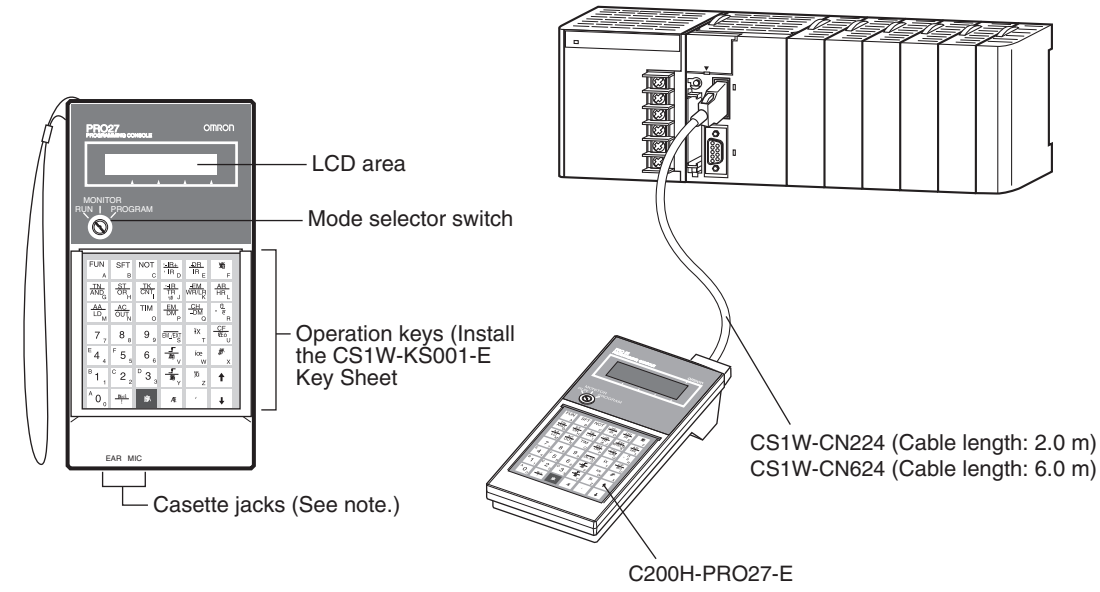


CQM1-PRO01-E Programming Console

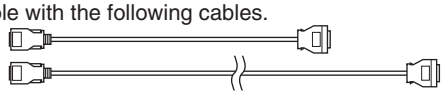


Connect the CPU Unit to the Programming Console with the following cables.
CS1W-CN114 (Cable length: 0.05 m)

C200H-PRO27-E Programming Console



Connect the CPU Unit to the Programming Console with the following cables.
CS1W-CN224 (Cable length: 2.0 m)
CS1W-CN624 (Cable length: 6.0 m)



Note The cassette jacks are not used with CJ-series CPU Units.

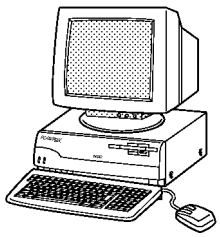
3-3-3 CX-Programmer

Item	Details
Applicable PLC	CS/CJ-series (See note 1.), CP-series, NSJ-series, CV-series, C200HX/HG/HE (-Z), C200HS, CQM1, CPM1, CPM1A, SRM1, C1000H/2000H
Operating system	Microsoft Windows 95 (See note 2.), 98, Me, 2000, XP, or NT 4.0
Personal computer	DOS version, IBM PC/AT or compatible
Connection method	CPU Unit's peripheral port or built-in RS-232C port
Communications protocol with PLC	Peripheral bus or Host Link
Offline operation	Programming, I/O memory editing, creating I/O tables, setting PLC parameters, printing, program changing
Online operation	Transmitting, referencing, monitoring, creating I/O tables, setting PLC parameters
Basic functions	1.Programming: Creates and edits ladder programs and mnemonic programs for the applicable PLC. 2.Creating and referencing I/O tables. 3.Changing the CPU Unit operating mode. 4.Transferring: Transfers programs, I/O memory data, I/O tables, PLC Setup, and I/O comments between the personal computer and the CPU Unit. 5.Program execution monitoring: Monitors I/O status/present values on ladder displays, I/O status/present values on mnemonic displays, and present values on I/O memory displays

Note 1. The following versions of CX-Programmer are required for the different CPU Units

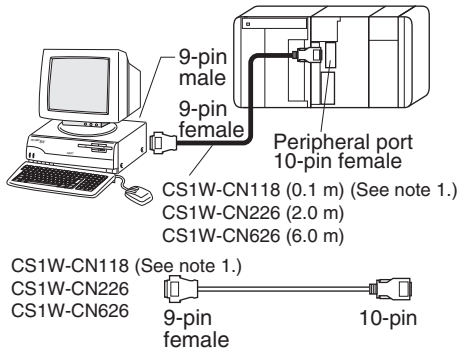
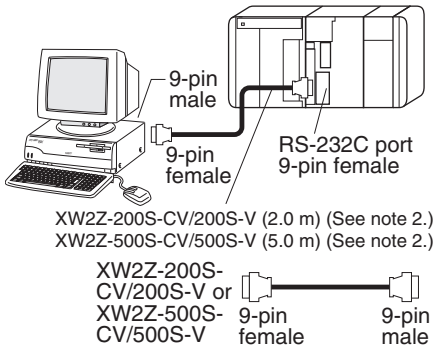
CPU Unit	CX-Programmer version
CS1 CPU Units	Version 1.0 or higher
CJ1 CPU Units	Version 2.04 or higher
CS1-H CPU Units	Version 2.10 or higher
CJ1-H CPU Units	Version 2.10 or higher (See note 3.)
CJ1M CPU Units excluding CPU11/CPU21	Version 3.0 or higher
CJ1M CPU Units CPU11/CPU21	Version 3.3 or higher

2. Windows 95 cannot be used when the CX-Programmer is connected via a Controller Link or SYSMAC LINK Support Board (PCI Bus).

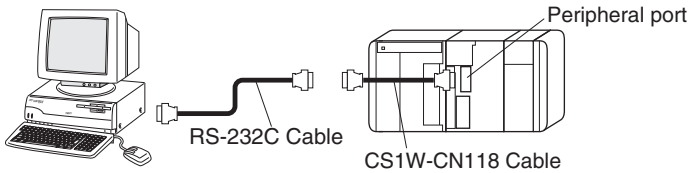


3. CX-Programmer version 7.1 or higher is required to use the new functionality of CJ1-H-R CPU Units.

Connections

Personal computer	Peripheral port connection	RS-232C port connection
IBM PC/AT or compatible		

Note 1. The CJ1W-CN118 Cable is used with one of the RS-232C Cables shown on the right (XW2Z-□□□□-□□) to connect to the peripheral port on the CPU Unit.



2. If cables with model numbers ending in -V instead of -CV are used to connect the computer running the CX-Programmer to the RS-232C port (including when using a CJ1W-CN118 Cable), a peripheral bus connection cannot be used. Use a Host Link (SYSMAC WAY) connection. To connect to the port using a peripheral bus connection, prepare an RS-232C cable as described in *3-3-5 RS-232C Port Specifications.*

CX-Programmer Connecting Cables

Unit	Unit port	Computer	Computer port	Serial communications mode	Model	Length	Cable notes
CPU Units	Built-in peripheral port	DOS	D-Sub, 9-pin, male	Peripheral Bus or Host Link	CJ1W-CN226	2.0 m	---
					CJ1W-CN626	6.0 m	
	Built-in RS-232C port D-Sub, 9-pin, female	DOS	D-Sub, 9-pin, male	Peripheral Bus or Host Link	XW2Z-200S-CV	2 m	Use a static-resistant connector.
					XW2Z-500S-CV	5 m	
					XW2Z-200S-V	2 m	
					XW2Z-500S-V	5 m	
Serial Communications Units	RS-232C Port D-Sub, 9-pin, female	DOS	D-Sub, 9-pin, male	Host Link	XW2Z-200S-CV	2 m	Use a static-resistant connector.
					XW2Z-500S-CV	5 m	

Note Before connecting a connector from the above table to the RS-232C port, touch a grounded metal object to discharge static electricity from your body.

The XW2Z-□□□S-CV Cables have been strengthened against static because they use a static-resistant connector hood (XM2S-0911-E). Even so, always discharge static electricity before touching the connectors.

Do not use commercially available RS-232C personal computer cables. Always use the special cables listed in this manual or make cables according to manual specifications. Using commercially available cables may damage the external devices or CPU Unit.

RS-232C Cables for a Peripheral Port

Unit	Unit port	Computer	Computer port	Serial communications mode	Model	Length	Cable notes
CPU Units	Built-in peripheral port	DOS	D-Sub, 9-pin, male	Peripheral Bus or Host Link	CJ1W-CN118 + XW2Z-200S-CV/ 500S-CV	0.1 m+ (2 m or 5 m)	XW2Z-□□□S-CV models use a static -resistant connector

Using a CQM1-CIF01/02 Cable for a Peripheral Port

Unit	Unit port	Computer	Computer port	Serial communications mode	Model	Length	Cable notes
CPU Units	Built-in peripheral port	DOS	D-Sub, 9-pin, male	Host Link	CJ1W-CN114 + CQM1-CIF02	0.05 m + 3.3 m	---

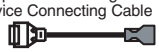
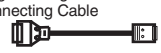
Using a RS-232C Cable for a IBM PC/AT or Compatible

Unit	Unit port	Computer	Computer port	Serial communications mode	Model	Length	Cable notes
CPU Units	Built-in RS-232C port D-Sub, 9-pin, female	DOS	D-Sub, 9-pin, male	Host Link	XW2Z-200S-V	2 m	---
					XW2Z-500S-V	5 m	
Serial Communications Units	RS-232C port D-Sub, 9-pin, female	DOS	D-Sub, 9-pin, male	Host Link	XW2Z-200S-V	2 m	
					XW2Z-500S-V	5 m	

Communications Modes when Connecting a CX-Programmer to a CS-series CPU Unit

Serial communications mode	Characteristics
Peripheral Bus	High-speed communications are possible. Consequently, connecting via a peripheral bus is recommended when using a CX-Programmer. Only 1:1 connection is possible. When using a CS-series CPU Unit, the baud rate of the communications devices can be automatically recognized for connection.
Host Link	This is a communications protocol with a general-purpose host computer. Either 1:1 or 1:N connections are possible. Host Link communications are slow compared with the Peripheral Bus communications. The following connections are possible: Via a modem or optical fiber adapter, over long distance using a RS-422A/485, and 1:N.

Connection Method for USB-Serial Conversion Cable

Computer	CS1W-CIF31		Cable 1		Cable 2	PLC
	CS1W-CIF31 USB Connecting Cable 	+	CS1W-CN226/626 CS/CJ-series Peripheral Port Programming Device Connecting Cable  OR CQM1-CIF02 C-series Peripheral Port Programming Device Connecting Cable  OR XW2Z-□□□ RS-232C Programming Device Connecting Cable 	+	CS1W-CN114 C-series Peripheral-CS/CJ-series Peripheral Conversion Cable  CS1W-CN118 RS-232C-CS/CJ-series Peripheral Conversion Cable 	

CX-Programmer Connecting Cables

Cables Connecting to CPU Units

USB Connecting Cable Model	Cable 1			Cable 2			Unit port	Serial communications mode (network)
	Connector	Cable model	Connector	Connector	Cable model	Connector		
CS1W-CIF31	D-sub, 9-pin female	CS1W-CN226/626 (length: 2 m/6 m)	CS/CJ-series peripheral	Not required.			CS/CJ-series peripheral	Peripheral Bus (Toolbus) or Host Link (SYSWAY)
		CQM1-CIF02 (length: 3.3 m)	C-series peripheral	C-series peripheral	CS1W-CN114 (length: 5 cm)	CS/CJ-series peripheral		Host Link (SYSWAY)
		XW2Z-200S-V/ 500S-V (length: 2 m/ 5 m)	D-sub, 9-pin male	D-sub, 9-pin female	CS1W-CN118 (length: 0.1 m)	CS/CJ-series peripheral		Peripheral Bus (Toolbus) or Host Link (SYSWAY)
		XW2Z-200S-V/ 500S-V (length: 2 m/ 5 m)	D-sub, 9-pin male	D-sub, 9-pin female	CS1W-CN118 (length: 0.1 m)	CS/CJ-series peripheral		Host Link (SYSWAY)
		XW2Z-200S-CV/ 500S-CV (length: 2 m/5 m)	RS-232C D-sub, 9-pin male	Not required.			RS-232C D-sub, 9-pin female	Peripheral Bus (Toolbus) or Host Link (SYSWAY)
		XW2Z-200S-V/ 500S-V (length: 2 m/ 5 m)	RS-232C D-sub, 9-pin male	Not required.				Host Link (SYSWAY)

Cables Connecting to Serial Communications Boards/Units

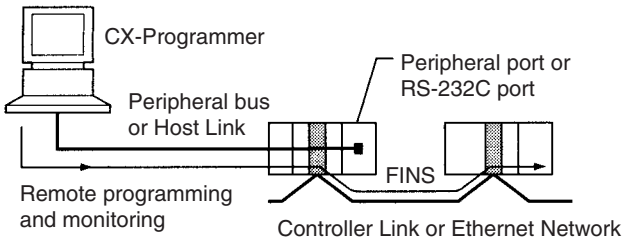
USB Connecting Cable Model	Cable 1			Cable 2	Unit port	Serial communications mode (network)
	Connector	Cable model	Connector			
CS1W-CIF31	D-sub, 9-pin female	XW2Z-200S-CV/ 500S-CV (length: 2 m/5 m)	RS-232C D-sub, 9-pin male	Not required.	RS-232C D-sub, 9-pin female	Host Link (SYSWAY)
CS1W-CIF31	D-sub, 9-pin female	XW2Z-200S-V/ 500S-V (length: 2 m/ 5 m)	RS-232C D-sub, 9-pin male	Not required.		

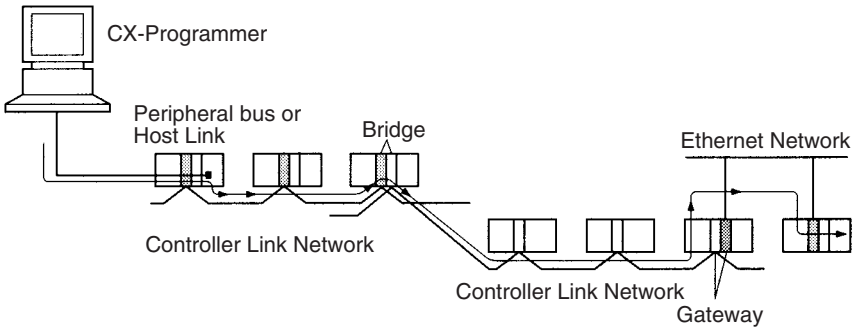
Note The CX-Programmer can be used for remote programming and monitoring. It can be used to program and monitor not only the PLC to which it is directly connected, but also to program and monitor any PLC connected through a Controller Link or Ethernet network to which the PLC that the CX-Programmer is connected to is a part of. All programming and monitoring functionality for the directly connected PLC is supported for remote programming and monitoring, the PLC can be connected though either the peripheral or an RS-232C port, and either the peripheral bus or Host Link bus can be used. Remote programming is possible for up to three levels of networks (counting the local network but not counting the peripheral bus or Host Link connection between the CX-Programmer and the local PLC).

Communications Modes when Connecting a CX-Programmer to a CJ-series CPU Unit

Serial communications mode	Characteristics
Peripheral Bus	High-speed communications are possible. Consequently, connecting via a peripheral bus is recommended when using a CX-Programmer. Only 1:1 connection is possible. When using a CJ-series CPU Unit, the baud rate of the communications devices can be automatically recognized for connection.
Host Link	This is a communications protocol with a general-purpose host computer. Either 1:1 or 1:N connections are possible. Host Link communications are slow compared with the Peripheral Bus communications. The following connections are possible: Via a modem or optical fiber adapter, over long distance using a RS-422A/485, and 1:N.

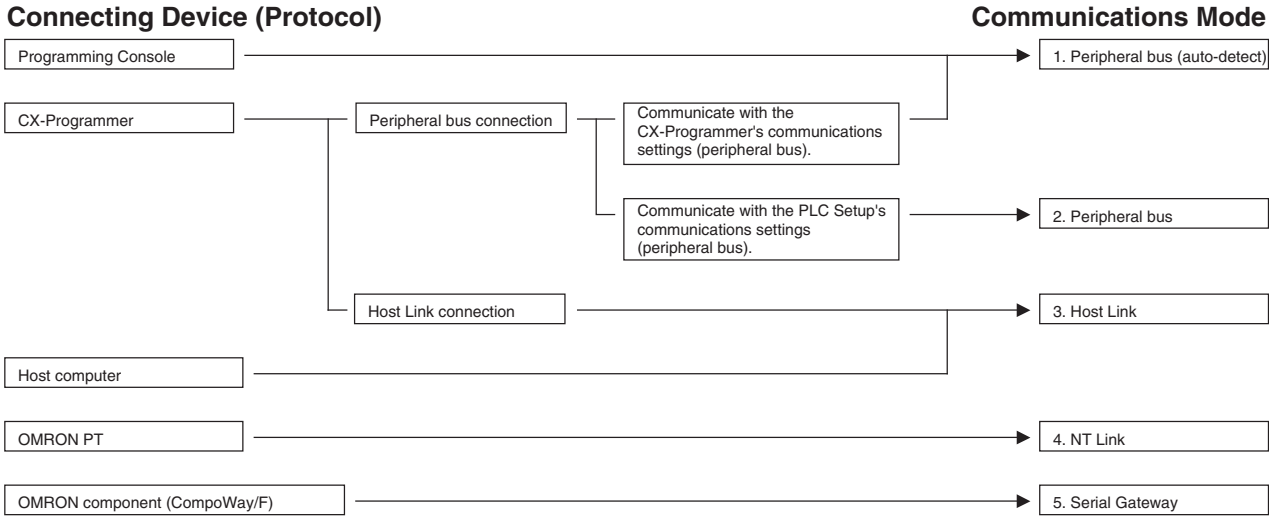
Note The CX-Programmer can be used for remote programming and monitoring. It can be used to program and monitor not only the PLC to which it is directly connected, but also to program and monitor any PLC connected through a Controller Link or Ethernet network to which the PLC that the CX-Programmer is connected to is a part of. All programming and monitoring functionality for the directly connected PLC is supported for remote programming and monitoring, the PLC can be connected though either the peripheral or an RS-232C port, and either the peripheral bus or Host Link bus can be used. Remote programming is possible for up to three levels of networks (counting the local network but not counting the peripheral bus or Host Link connection between the CX-Programmer and the local PLC).





3-3-4 Peripheral Port Specifications

Communications Mode Selection Flowchart



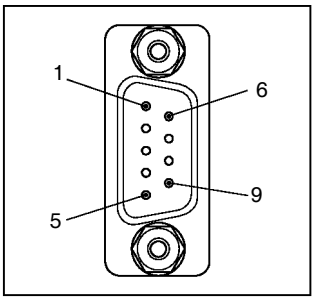
Peripheral Port Communications Settings

Connection	Communications Settings	
	Pin 4 of Front-panel DIP Switch	PLC Setup peripheral port setting (See note.)
1. Peripheral bus (auto-detect)	OFF (factory setting)	---
2. Peripheral bus	ON	Peripheral bus
3. Host Link	ON	Host Link (default setting)
4. NT Link	ON	NT Link
5. Serial Gateway	ON	Serial Gateway

Note Set from the CX-Programmer or Programming Console.

3-3-5 RS-232C Port Specifications

Connector Pin Arrangement



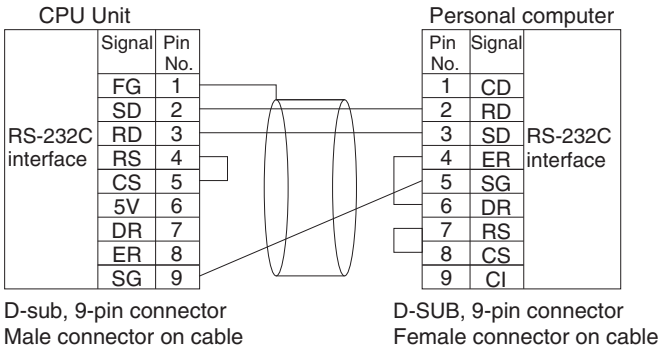
Pin No.	Signal	Name	Direction
1	FG	Protection earth	---
2	SD (TXD)	Send data	Output
3	RD (RXD)	Receive data	Input
4	RS (RTS)	Request to send	Output
5	CS (CTS)	Clear to send	Input
6	5 V	Power supply	---
7	DR (DSR)	Data set ready	Input
8	ER (DTR)	Data terminal ready	Output

Pin No.	Signal	Name	Direction
9	SG (0 V)	Signal ground	---
Connector hood	FG	Protection earth	---

Note Do not use the 5-V power from pin 6 of the RS-232C port for anything other than an NT-AL001, CJ1W-CIF11 Link Adapter, or NV3W-M□20L Programmable Terminal. Using this power supply for any other external device may damage the CPU Unit or the external device.

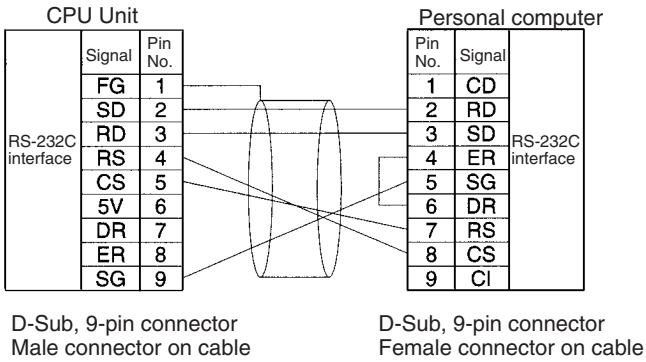
Connection between CJ-series CPU Unit and Personal Computer

The following connections are in Host Link serial communications mode.



Note Refer to *Connection Examples on page 659* when converting between RS-232C and RS-422A/485 to connect multiple nodes. Refer to *Recommended Wiring Methods on page 664* when making your own RS-232C cable.

The following connections are in Peripheral Bus serial communications mode.



Use the connectors and cables described below when making an RS-232C cable to connect to the RS-232C port.

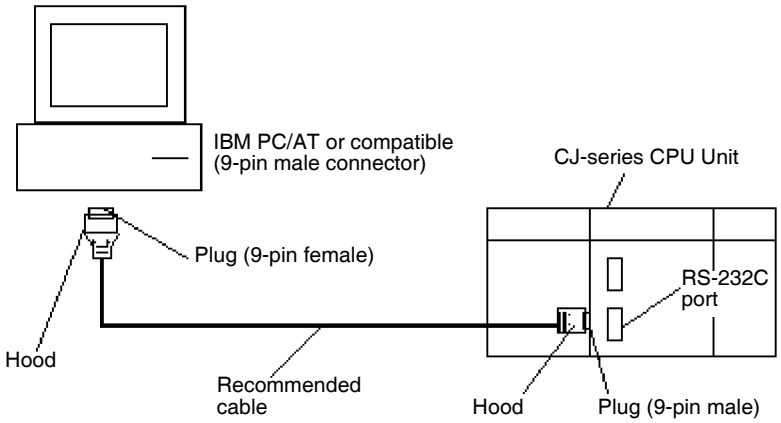
Applicable Connectors

CPU Unit Connector

Item	Model	Specifications	
Plug	XM3A-0921 or equivalent	9-pin male	Used together
Hood	XM2S-0911-E or equivalent	9-pin, millimeter screws, static-resistant	

Personal Computer Connector

Item	Model	Specifications	
Plug	XM3D-0921 or equivalent	9-pin female	Used together
Hood	XM2S-0913-E or equivalent	9-pin, inch screws	



Note Use the special cables provided from OMRON for all connections whenever possible. If cables are produced in-house, be sure they are wired correctly. External devices and the CPU Unit may be damaged if general purpose (e.g., computer to modem) cables are used or if wiring is not correct.

Recommended Cables

Fujikura Ltd.: UL2464 AWG28 × 5P IFS-RVV-SB (UL product)
AWG 28 × 5P IFVV-SB (non-UL product)

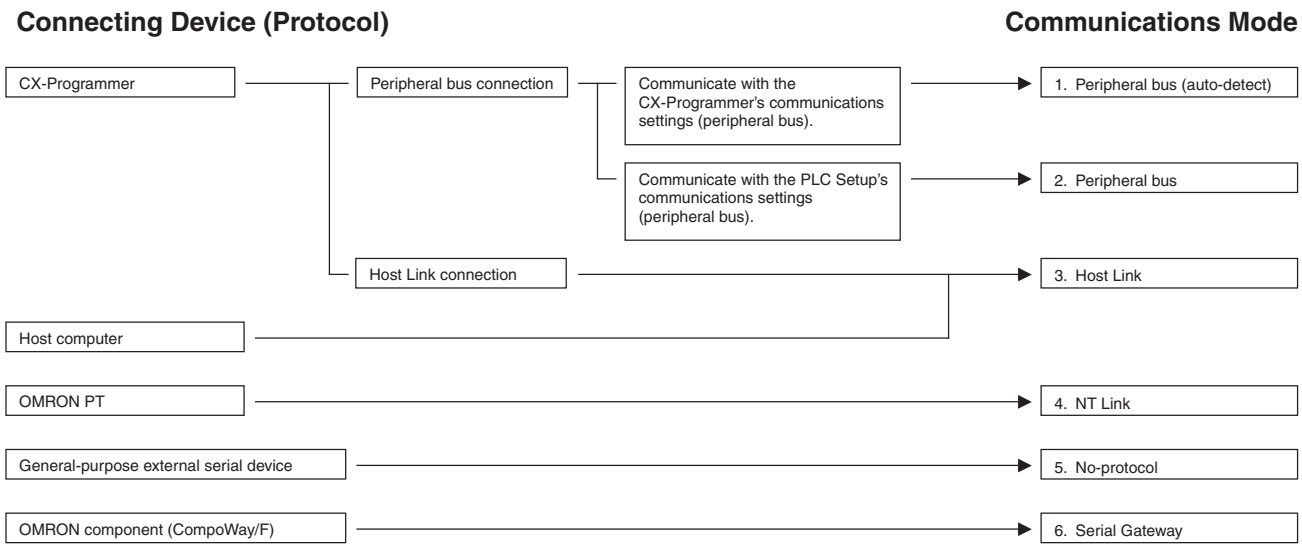
Hitachi Cable, Ltd.: UL2464-SB(MA) 5P × 28AWG (7/0.127) (UL product)
CO-MA-VV-SB 5P × 28AWG (7/0.127) (non-UL product)

RS-232C Port Specifications

Item	Specification
Communications method	Half duplex
Synchronization	Start-stop
Baud rate	0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4/57.6/115.2 kbps (See note.)
Transmission distance	15 m max.
Interface	EIA RS-232C
Protocol	Host Link, NT Link, 1:N, No-protocol, or Peripheral Bus

Note Baud rates for the RS-232C are specified only up to 19.2 kbps. The CJ Series supports serial communications from 38.4 kbps to 115.2 kbps, but some computers cannot support these speeds. Lower the baud rate if necessary.

Communications Mode Selection Flowchart



RS-232C Port Communications Settings

Connection	Communications Settings	
	Pin 5 of Front-panel DIP Switch	PLC Setup RS-232C port setting (See note.)
1. Peripheral bus (auto-detect)	ON	---
2. Peripheral bus	OFF (factory setting)	Peripheral bus
3. Host Link	OFF (factory setting)	Host Link (default setting)
4. NT Link	OFF (factory setting)	NT Link
5. No-protocol	OFF (factory setting)	No-protocol
6. Serial Gateway	OFF (factory setting)	Serial Gateway

Note Set from the CX-Programmer or Programming Console.

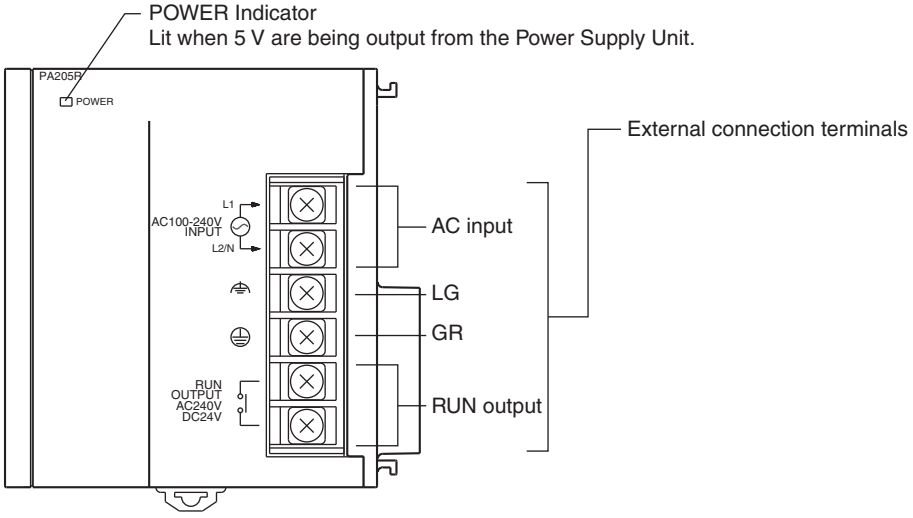
3-4 Power Supply Units

3-4-1 Power Supply Units Models

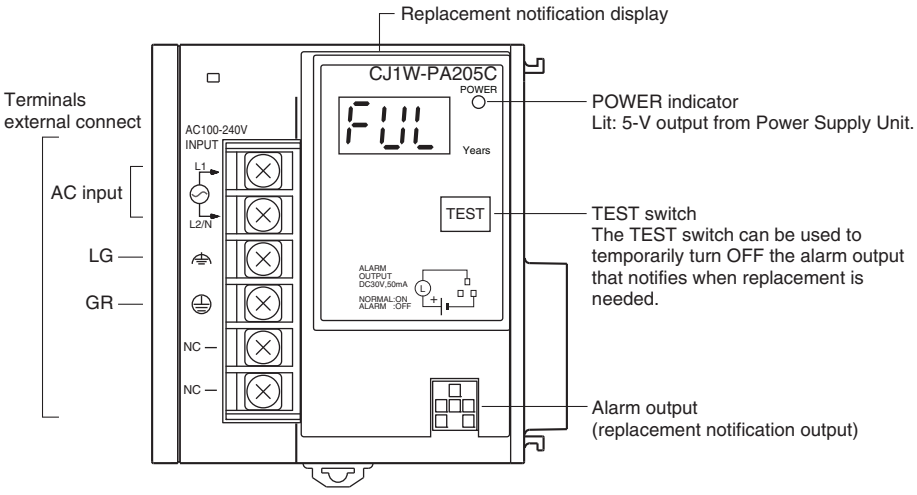
Power supply voltage	Output	Power output terminals	RUN output	Replacement notification function	Model	Weight
100 to 240 V AC (allowable: 85 to 264 V AC) 50/60 Hz (allowable: 47 to 63 Hz)	5 A at 5 V DC 0.8 A at 24 V DC Total: 25 W	No	Yes	Without	CJ1W-PA205R	350 g max.
	5 V DC, 5.0 A 24 V DC, 0.8 A Total 25 W	No	No	Display: Supported Output: Supported	CJ1W-PA205C	400 g max.
	2.8 A at 5 V DC 0.4 A at 24 V DC Total: 14 W	No	No	Without	CJ1W-PA202	200 g max.

Power supply voltage	Output	Power output terminals	RUN output	Replacement notification function	Model	Weight
24 V DC (allowable:19.2 to 28.8 V DC)	5 A at 5 V DC 0.8 A at 24 V DC Total: 25 W	No	No	Without	CJ1W-PD025	300 g max.
24 V DC (allowable: 21.6 to 26.4 VDC) (non-insulated)	5 V DC, 2.0 A 24 V DC, 0.4 A Total 25 W	No	No	Without	CJ1W-PD022	130 g max.

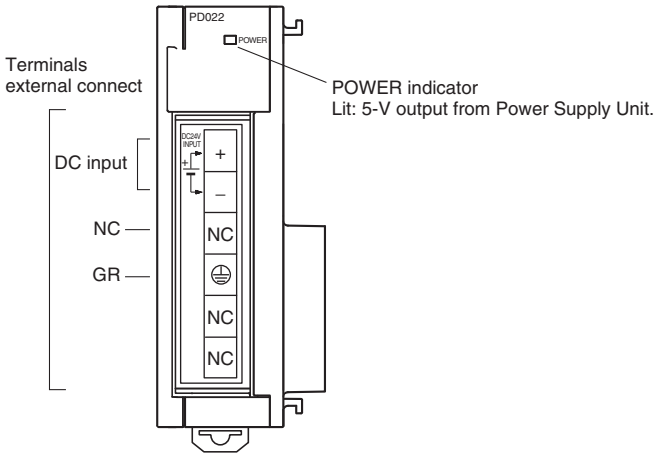
3-4-2 Components



(Example: CJ1W-PA205C)



(Example: CJ1W-PD022)



AC Input

Supply 100 to 240 V AC (allowable: 85 to 264 V AC). (Voltage selection is not required.)

DC Input

Supply 24 V DC.

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

LG

Ground to a resistance of 100 Ω or less to increase noise resistance and avoid electric shock.

GR

Ground to a resistance of 100 Ω or less to avoid electric shock.

RUN Output (CJ1W-PA205R Only)

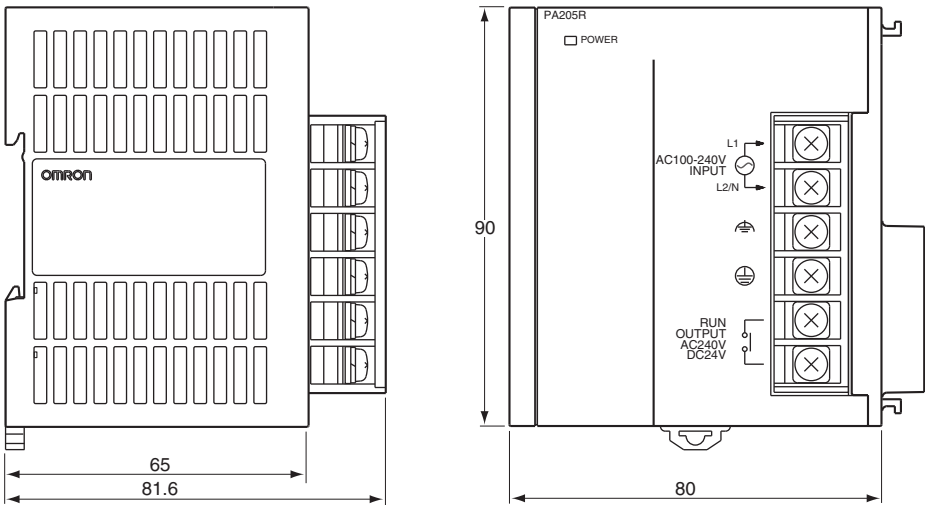
The internal contact turns ON when the CPU Unit is operating (RUN or MONITOR mode). The Power Supply Unit must be in the CPU Rack to use this output.

Alarm Output (CJ1W-PA205C Only)

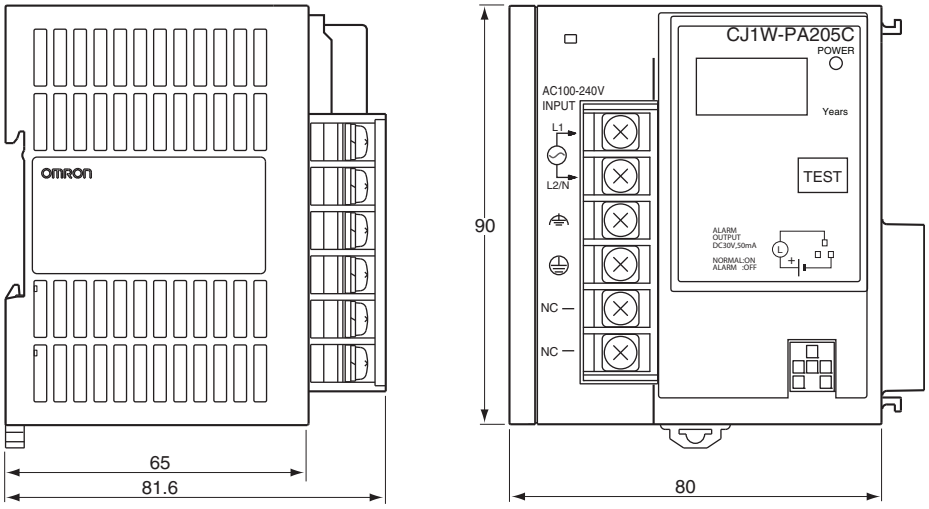
The alarm output is used to notify when Power Supply Unit replacement is required. The output is normally ON. The output turns OFF when the time until replacement is 6 months or less.

3-4-3 Dimensions

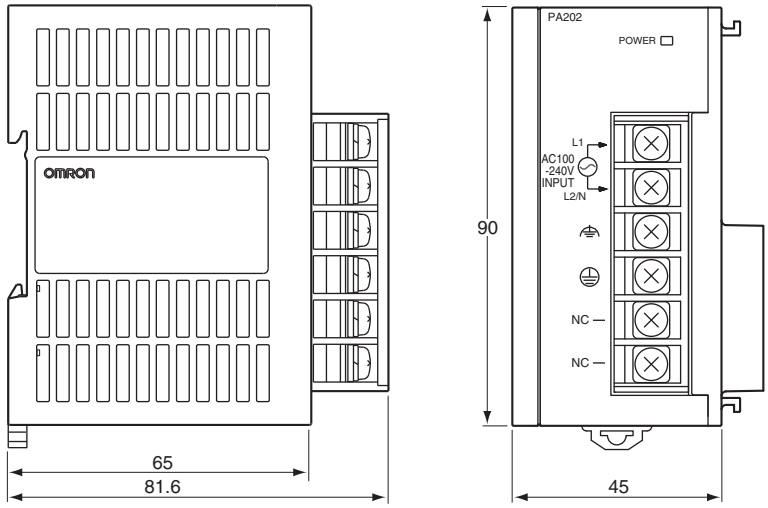
CJ1W-PA205R



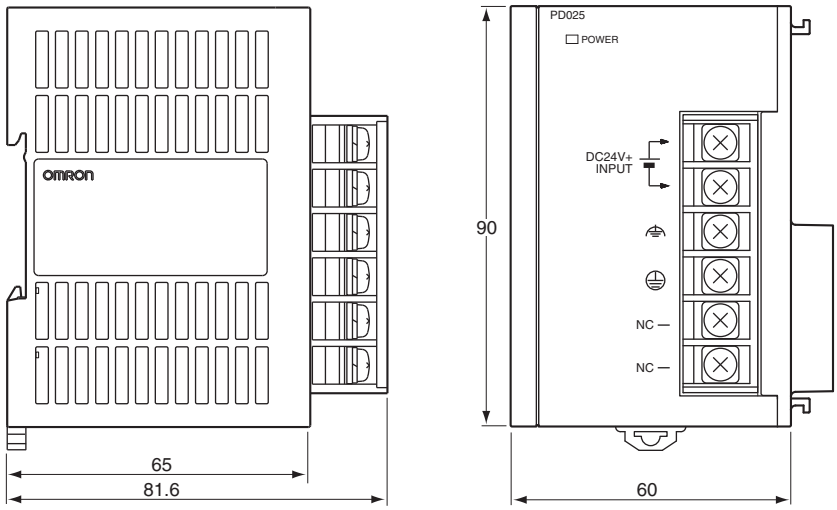
CJ1W-PA205C



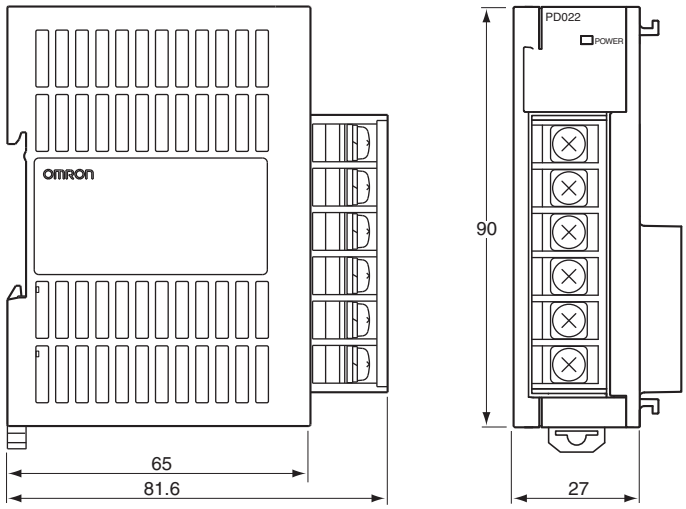
CJ1W-PA202



CJ1W-PD025



CJ1W-PD022



3-4-4 Power Supply Confirmation

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

Condition 1: Current Requirements

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

Current Consumption at 5 V DC (Internal Logic Power Supply)

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

Power Supply Unit	Maximum current at 5 V DC
CJ1W-PA205R/PA205C	5.0 A
CJ1W-PA202	2.8 A
CJ1W-PA025	5.0 A
CJ1W-PA022	2.0 A

Current Consumption at 24 V DC (Relay Driving Power Supply)

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

Power Supply Unit	Maximum current at 24 V DC
CJ1W-PA205R/PA205C	0.8 A
CJ1W-PA202	0.4 A
CJ1W-PA025	0.8 A
CJ1W-PA022	0.4 A

Condition 2: Power Requirements

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

Power Supply Unit	Maximum total power output
CJ1W-PA205R/PA205C	25 W
CJ1W-PA202	14 W
CJ1W-PA025	25 W
CJ1W-PA022	19.6 W

Refer to *2-6 Unit Current Consumption* for tables showing the current consumed by each particular Unit as well as example calculations.

3-4-5 Replacement Notification

Principle of Replacement Notification

The Power Supply Unit has a built-in electrolytic capacitor. The electrolytic capacitor is impregnated with electrolytic solution that starts to penetrate the sealing rubber from the time of manufacture. As time elapses, the internal electrolytic solution continues to evaporate, resulting in decreased electrostatic capacity and deterioration in other characteristics. Over time, the characteristic deterioration of the electrolytic capacitor prevents the Power Supply Unit from being utilized to its full capacity. In particular, the speed at which the electrolytic capacitor deteriorates fluctuates greatly with the ambient temperature (generally, a temperature rise of 10°C will double the rate of a reaction, as stated by Arrhenius' law).

The CJ1W-PA205C Power Supply Unit with Replacement Notification monitors the internal temperature of the Power Supply Unit while the power is

turned ON, and calculates the level of deterioration of the electrolytic capacitor from the operating time and internal temperature. The replacement notification function displays the approximate time until the Power Supply Unit will stop functioning at its full capacity due to the characteristic deterioration of the electrolytic capacitor, based on the calculated level of deterioration. When 6 months are remaining until replacement is required, the alarm output will turn OFF.

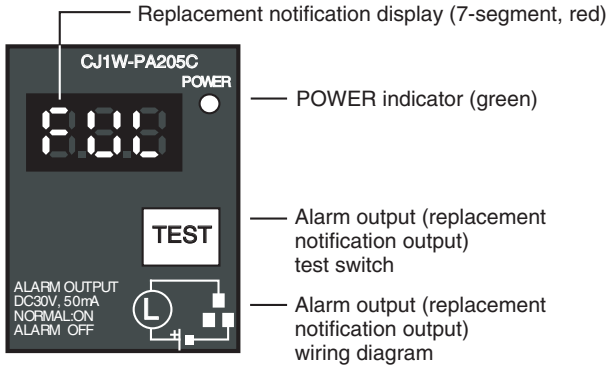
Note The replacement notification function provides an indication of when the deterioration of the electrolytic capacitor will prevent the power supply functioning at its full capacity. It does not provide information on failures occurring due to other causes.

Power Supply Unit with Replacement Notification

Model	Specifications
CJ1W-PA205C	Output capacity: 5 A at 5 VDC, 0.8 A at 24 VDC, total of 30 W With replacement notification

Power Supply Unit Replacement Notification Module

CJ1W-PA205C

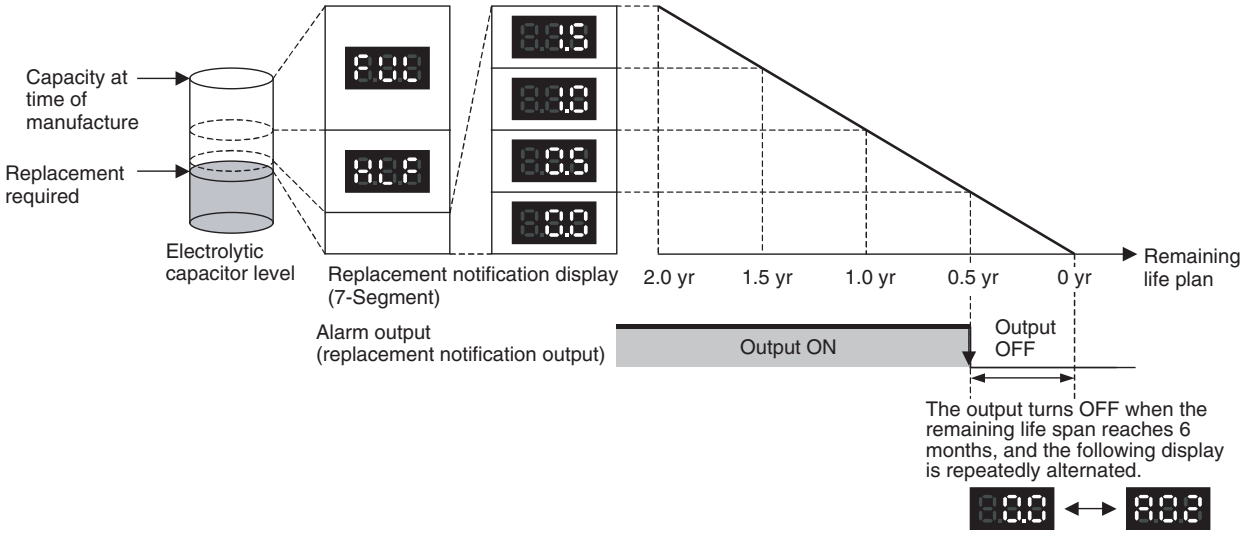


Function

Replacement Notification Function Displays

The replacement notification for of the Power Supply Unit is shown using three 7-segment LED displays.

- At time of purchase “FUL” is displayed. The display changes to “HLF” as the electrolytic capacitor deteriorates (“HLF” may not be displayed, depending on the operating environment).
- When the time until replacement is required drops below 2 years, the display will change corresponding to the operating time from “1.5” to “1.0” to “0.5” to “0.0”/”A02.” When the remaining service life reaches 6 months or less, the display will alternate between “0.0” and “A02” in 2-second intervals.



Note

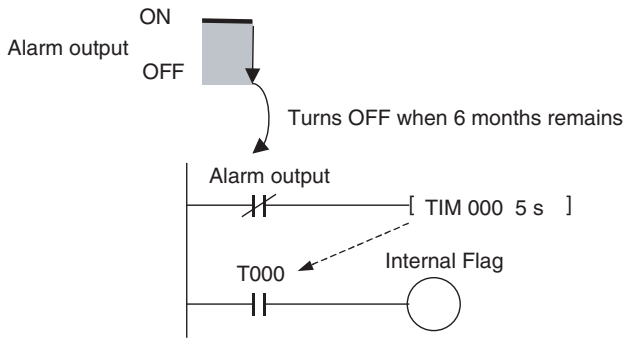
1. The time remaining until replacement does not include periods when the power is turned OFF.
2. Until approximately one month of operating time has accumulated, the display will always be “FUL” and the alarm output will remain ON (conducting) due to the estimated deterioration speed.
3. The time remaining until replacement will vary the operating and storage conditions, so periodically check the display.
4. Fluctuation in the time remaining until replacement may result in the alarm output repeatedly turning ON and OFF.
5. The precision of the replacement notification function will be adversely affected by applications in which the power is frequently turned ON and OFF.
6. Due to the service life of the electronic components, replace the Power Supply Unit approximately 15 years after purchase, even if the replacement notification display or output has not indicated that replacement is required.

Alarm Output (Replacement Notification Output)

The output remains ON until the remaining service life drops below 6 months and then turns OFF.

Note

1. The alarm output will also turn OFF under the following conditions.
   - The AC input to the Power Supply Unit is turned OFF.
   - An error is detected by the self-diagnostic function.
   - The TEST switch is pressed for at least 3 seconds.
2. Example of Using the Alarm Output:
   Monitoring Power Supply Replacement Notification in the System (6 Months or Less Until Replacement Is Required)



The Flag is programmed to allow for the delay in the alarm output at system startup. The Flag does not turn ON when the alarm output is ON (normal operation). When the alarm output turns OFF (replacement required), the Flag turns ON, and the replacement notification can be monitored from the system.

Maintenance Function Using the TEST Switch

- Press the TEST switch for at least 3 seconds to display "A02" and force the alarm output OFF. Release the switch to return to normal operating status.
  The TEST switch is used initially or periodically to check the connection status between the alarm output and external devices.
- Press the TEST switch for less than 3 seconds to display the unit version information for the Power Supply Unit.

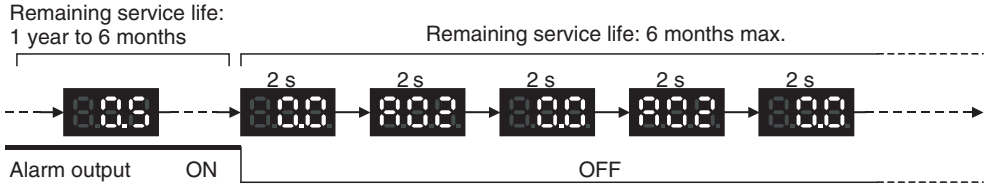
Note

1. Replace the Power Supply Unit within 6 months when the display on the front panel of the Power Supply Unit alternates between 0.0 and A02 or the alarm output automatically turns OFF.
2. Maintain an ambient storage temperature of –20 to 30°C and humidity of 25% to 70% when storing the product (with the power turned OFF) for longer than 3 months to keep the replacement notification function in optimum working condition. The replacement time is calculated from when the power is turned ON only. The precision of the replacement period will decline if the electrolytic capacitor deteriorates during storage.

Display and Alarm Output Operation

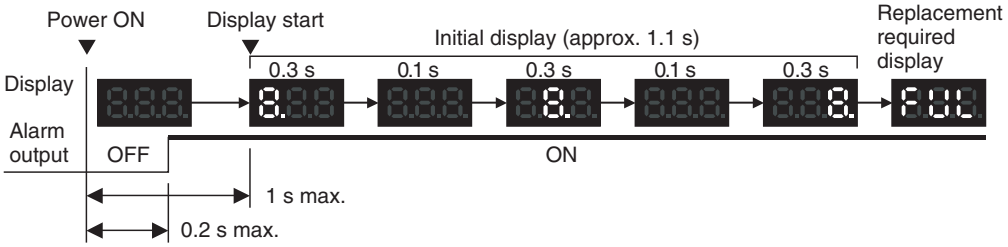
Normal Display: Replacement Notification Display

When 6 months or less are remaining until replacement is required, the display will alternate between "0.0" and "A02" (in 2 second intervals), and the alarm output will turn OFF.

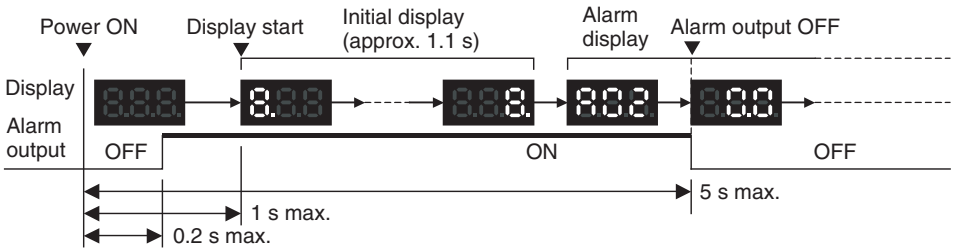


Operation at Powerup

The following initial display is shown when the power is turned ON, after which the replacement notification is displayed. The alarm output turns ON approximately 0.2 seconds after the power is turned ON.

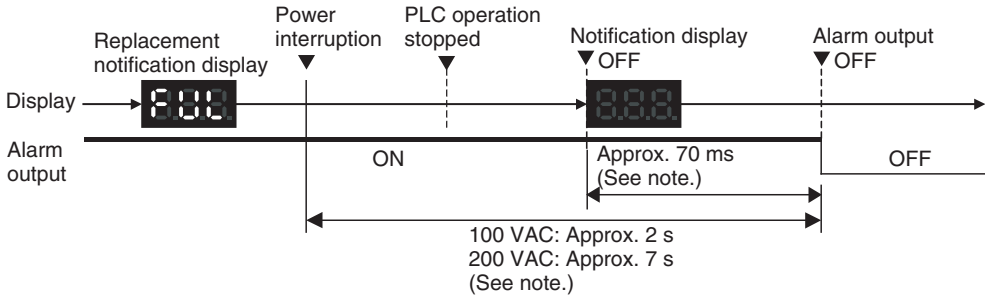


When replacement is already required, the alarm display will follow the initial display. The alarm output will turn ON approximately 0.2 seconds after the power is turned ON, and then turn OFF after approximately 5 seconds.

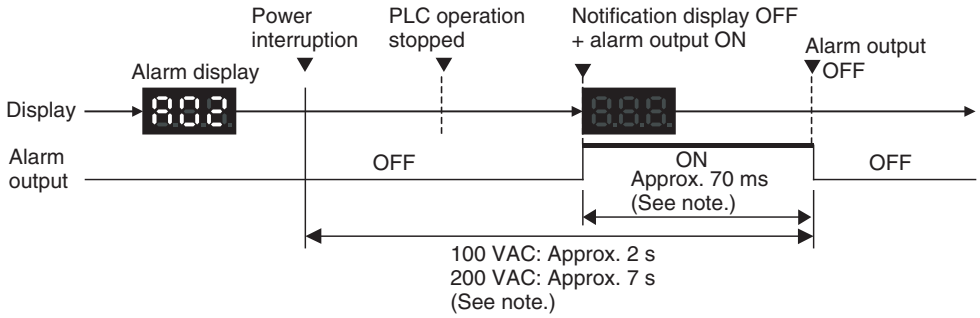


Operation at Power OFF

When the power is turned OFF, the display will turn OFF after the PC operation stops. The alarm output will turn OFF after the display turns OFF.



If replacement is already required, the display will turn OFF after the PC operation stops. When the display turns OFF, the alarm output will turn ON momentarily and then turn OFF again.

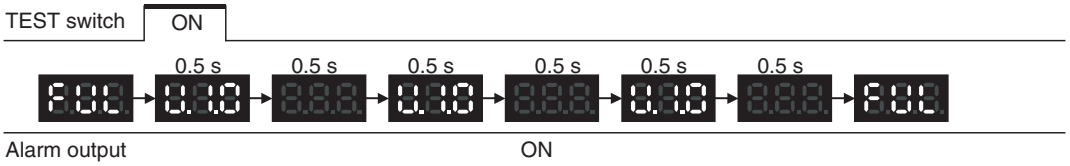


Note The values shown are reference values (calculated for a no-load status on the Power Supply Unit's output).

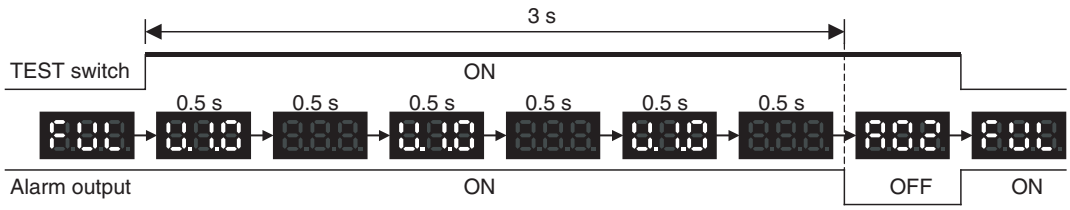
Operation When TEST Switch Is Pressed

The following operation will be performed when the TEST switch on the replacement notification function module is pressed. When the switch is pressed for less than 3 seconds, the unit version will be displayed 3 times at 0.5-second intervals. When the switch is pressed for at least 3 seconds, the alarm output will momentarily turn OFF, and the alarm display A02 will be shown. The operation will return to the normal display and output when the switch is released. Use the TEST switch to check the connection between the replacement notification output and devices.

1. Operation when TEST switch is pressed for less than 3 seconds.



2. Operation when TEST switch is pressed for less than 3 seconds.



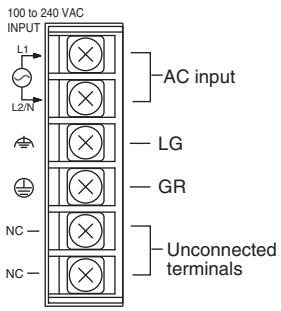
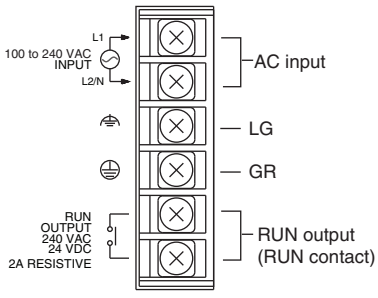
Note Under normal application conditions, the replacement notification function will operate after several years or even tens of years. When using a Power Supply Unit for an extended period of time, periodically check operation with the TEST switch as described above and be sure the alarm output functions properly.

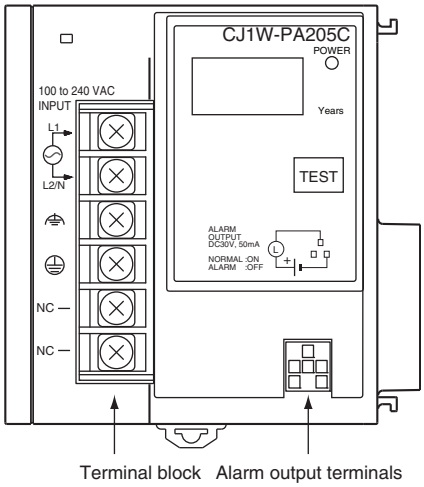
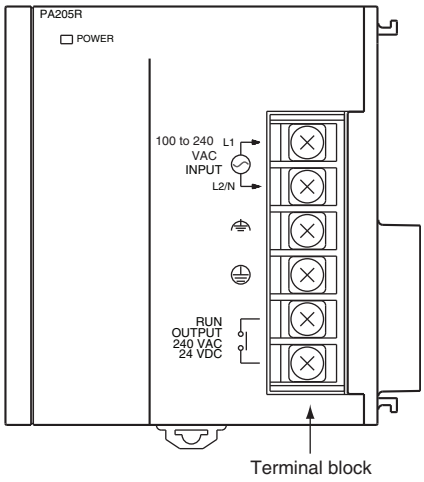
Self-diagnostic Function

Error name	Display	Alarm output status	Error details (cause)	Recovery method
Unit overheated error	Hot	OFF	Internal overheating has occurred in the Power Supply Unit as a result of usage under conditions that exceed the specified values, insufficient ventilation, or incorrect installation. (See note.)	Remove the cause of the overheating error.
Unit error	E03	OFF	System error from external noise or hardware malfunction.	Turn ON the input's power supply again. If the Unit does not recover, the error may be caused by a Unit malfunction. Consult with your OMRON representative.

Note If the error continues for 3 hours or longer, the replacement notification function will be disabled. Even if the cause of the overheating is removed, the display will continue as “Hot,” and the notification output will remain OFF. In this state, the internal parts may deteriorate even if the PC operation is normal, so replace the Power Supply Unit.

Comparison between the CJ1W-PA205C and CJ1W-PA205R

Item	CJ1W-PA205C	CJ1W-PA205R (for comparison)
RUN contact output	Not supported	Supported
Terminal block arrangement	**CJ1W-PA205C** 	**CJ1W-PA205R** 

Item	CJ1W-PA205C	CJ1W-PA205R (for comparison)
Terminal block position	Located on the left side of the Unit. 	Located on the right side of the Unit. 
POWER indicator	On replacement notification module	On hood of Power Supply Unit
Replacement notification	Supported (7-segment display + transistor outputs)	Not supported

3-5 I/O Control Units and I/O Interface Units

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

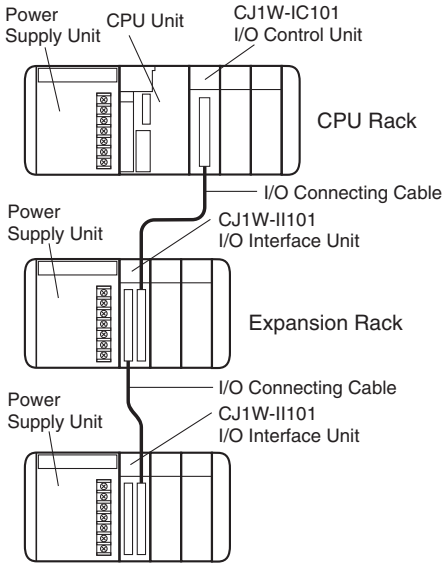
3-5-1 Models

Name	Model number	Number required	Weight
I/O Control Unit	CJ1W-IC101	1 on the CPU Rack	70 g max.
I/O Interface Unit	CJ1W-II101	1 on each Expansion Rack	130 g max. (including End Cover)

3-5-2 System Configuration

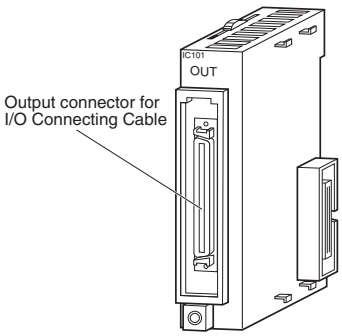
The I/O Control Unit is connected directly to the CPU Unit. If it is not immediately to the right of the CPU Unit, correct operation may not be possible.

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

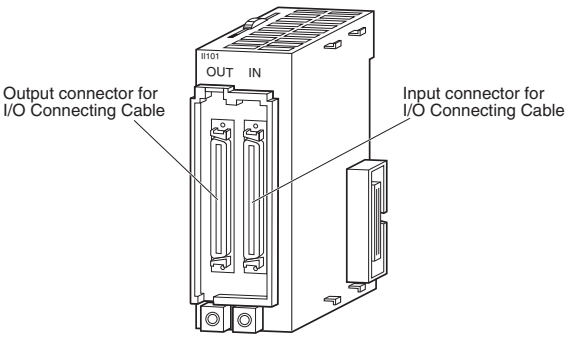


3-5-3 Component Names

CJ1W-IC101 I/O Control Unit

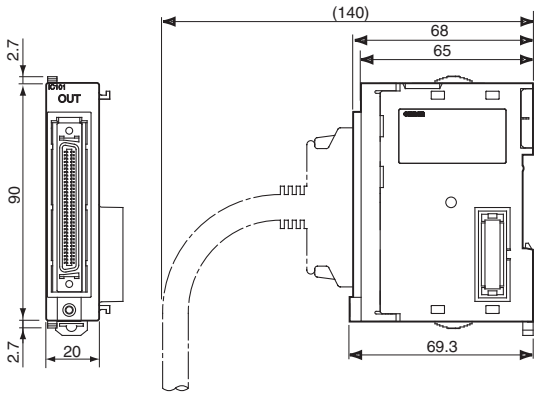


CJ1W-II101 I/O Interface Unit

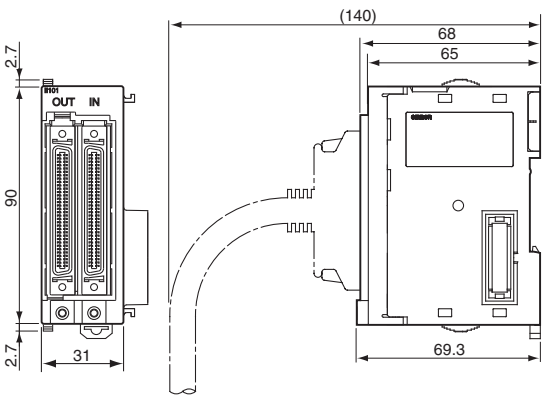


3-5-4 Dimensions

CJ1W-IC101 I/O Control Unit



CJ1W-II101 I/O Interface Unit



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

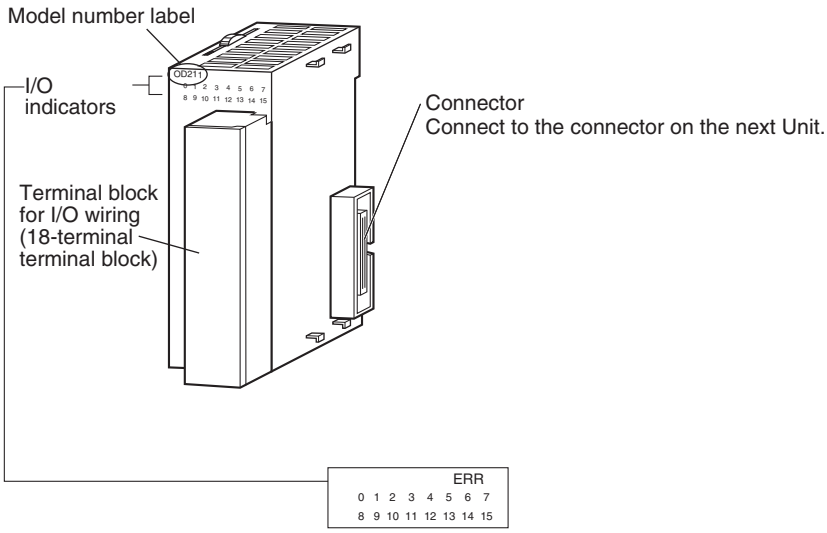
3-6 CJ-series Basic I/O Units

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

Classification	Name		Specifications	Number of bits allocated	Model	Page
Basic Input Unit with Terminal Block	DC Input Units		24 V DC	16	CJ1W-ID211	542
			12 to 24 V DC	8	CJ1W-ID201	541
	AC Input Units		200 to 240 V AC	8	CJ1W-IA201	550
			100 to 120 V AC	16	CJ1W-IA111	551
	Quick-response Units		24 V DC	16	CJ1W-IDP01	553
	Interrupt Input Unit		24 V DC	16	CJ1W-INT01	552
Basic Output Units with Terminal Blocks	Relay Output Units		250 V AC/24 V DC, 2 A; 8 independent contacts	8	CJ1W-OC201	567
			250 V AC/24 V DC, 2 A; 16 outputs	16	CJ1W-OC211	568
	Triac Output Unit		250 V AC, 0.5 A	8	CJ1W-OA201	569
	Transistor Output Unit	Sink	12 to 24 V DC, 2.0 A	8	CJ1W-OD201	570
			12 to 24 V DC, 0.5 A	8	CJ1W-OD203	571
			12 to 24 V DC, 0.5 A	16	CJ1W-OD211	572
		Source	24 V DC, 2 A, load short-circuit protection and line disconnection detection	8	CJ1W-OD202	580
			24 V DC, 0.5 A, load short-circuit protection	8	CJ1W-OD204	581
			24 V DC, 0.5 A, load short-circuit protection	16	CJ1W-OD212	582

Part Names

8-point/16-point Units (with 18-terminal Terminal Block)

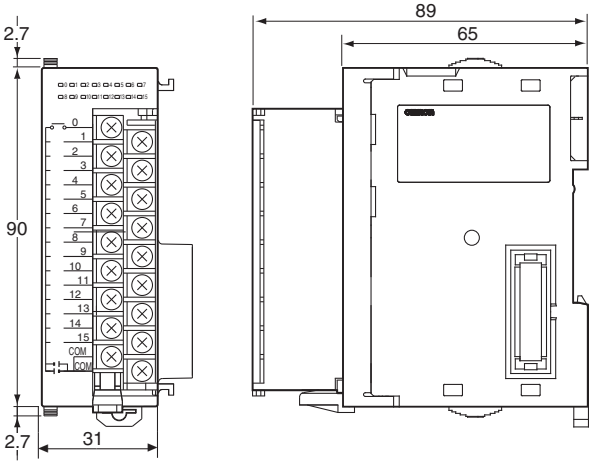


Note The CJ1W-OD202, CJ1W-OD204, and CJ1W-OD212 also have an ERR indicator for the load short-circuit alarm.

Dimensions

8-point/16-point Units (with 18-terminal Terminal Block)

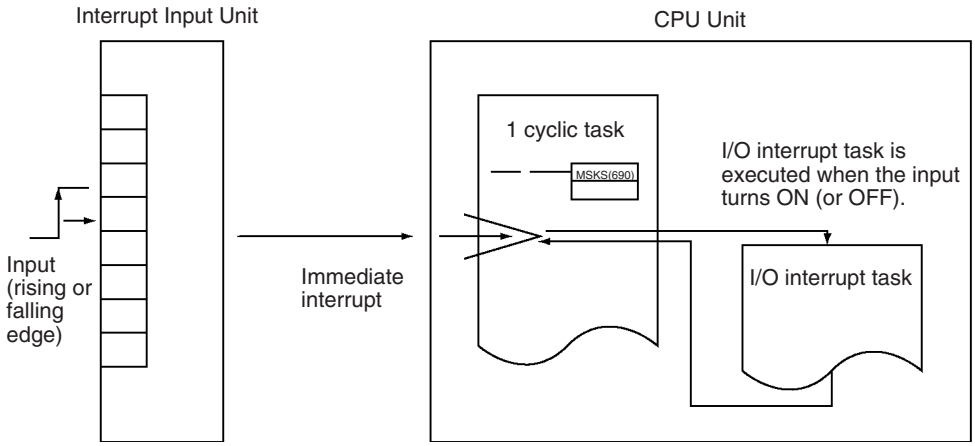
CJ1W-ID211
CJ1W-ID201
CJ1W-IA201
CJ1W-IA111
CJ1W-INT01
CJ1W-IDP01
CJ1W-OC201
CJ1W-OC211
CJ1W-OA201
CJ1W-OD201
CJ1W-OD202
CJ1W-OD203
CJ1W-OD204
CJ1W-OD211
CJ1W-OD212



Interrupt Input Units

Functions

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



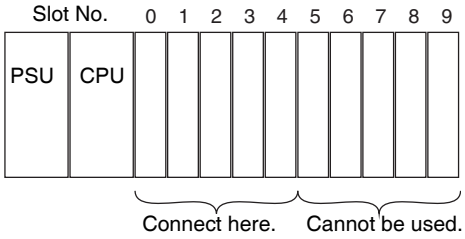
Applicable Units

Either of the following Interrupt Input Units can be used with a CJ1-H or CJ1M CPU Unit. (Interrupt Input Units cannot be mounted to CJ1 CPU Units.)

Model	Specifications	No. of Units mountable to CPU Rack	Page
CJ1W-INT01	24 V DC, 16 inputs	2 max.	552

Application Precautions

1. Interrupt Input Units must be mounted in the locations described below.
   - CJ1-H CPU Units
     All Interrupt Input Units must be connected in the CPU Rack and must be connected in any of the five positions immediately to the right of the CPU Unit. The interrupt input function will not be supported if an Interrupt Input Unit is mounted to an Expansion Rack. If connected in any other position or to an Expansion Rack, and I/O setting error (fatal) will occur.



   - CJ1M CPU Units
     All Interrupt Input Units must be connected in the CPU Rack and must be connected in any of the three positions immediately to the right of the CPU Unit. The interrupt input function will not be supported if an Interrupt Input Unit is mounted to an Expansion Rack. If connected in any other position or to an Expansion Rack, and I/O setting error (fatal) will occur.
2. If the Interrupt Input Units are not connected in the correct positions, an error will occur when the I/O tables are generated from the CX-Programmer. A40110 will turn ON to indicate an I/O setting error and A40508 will turn ON to indicate that an Interrupt Input Unit is in the wrong position.

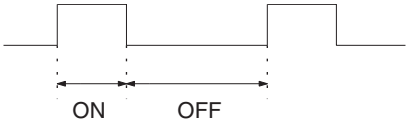
Note Even if a Unit is physically in one of the correct positions, a Dummy Unit can be registered in the I/O table, causing a Unit to be defined in a position different from its physical position.

There are limits to the number of Interrupt Input Units that can be mounted. (See table, above.)

The input response time cannot be changed for the CJ1W-INT01, and the related portions of the Basic I/O Unit input time constants in the PLC Setup, and the setting status in A220 to A259 will not be valid.

Input Signal Width

Input signals must meet the following conditions.



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

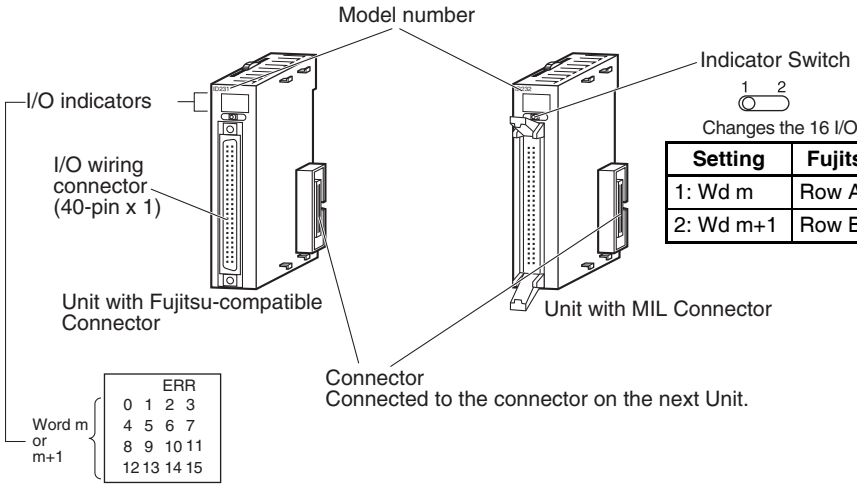
3-6-2 CJ-series 32/64-point Basic I/O Units with Connectors

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

Name		Specifications	Model	Number of bits allocated	Page
DC Input Units		Fujitsu-compatible connector 24 V DC, 32 inputs	CJ1W-ID231	32	544
		Fujitsu-compatible connector 24 V DC, 64 inputs	CJ1W-ID261	64	547
		MIL connector 24 V DC, 32 inputs	CJ1W-ID232	32	545
		MIL connector 24 V DC, 64 inputs	CJ1W-ID262	64	549
Transistor Output Units	With Sinking Outputs	Fujitsu-compatible connector 12 to 24 V DC, 0.5 A, 32 outputs	CJ1W-OD231	32	573
		Fujitsu-compatible connector 12 to 24 V DC, 0.3 A, 64 outputs	CJ1W-OD261	64	577
		MIL connector 12 to 24 V DC, 0.5 A, 32 outputs	CJ1W-OD233	32	576
		MIL connector 12 to 24 V DC, 0.3 A, 64 outputs	CJ1W-OD263	64	579
	With Sourcing Outputs	MIL connector 24 V DC, 0.5 A, 32 outputs, load short-circuit protection	CJ1W-OD232	32	583
		MIL connector 12 to 24 V DC, 0.3 A, 64 outputs	CJ1W-OD262	64	586
24-V DC Input/ Transistor Output Units	With Sinking Outputs	Fujitsu-compatible connector 24 V DC, 16 inputs 12 to 24 V DC, 0.5 A, 16 outputs	CJ1W-MD231	32	555
		Fujitsu-compatible connector 24 V DC, 32 inputs 12 to 24 V DC, 0.3 A, 32 outputs	CJ1W-MD261	64	561
		MIL connector 24 V DC, 16 inputs 12 to 24 V DC, 0.5 A, 16 outputs	CJ1W-MD233	32	557
		MIL connector 24 V DC, 32 inputs 12 to 24 V DC, 0.3 A, 32 outputs	CJ1W-MD263	64	563
	With Sourcing Outputs	MIL connector 24 V DC, 16 inputs 24 V DC, 0.5 A, 16 outputs, load short-circuit protection	CJ1W-MD232	32	559
TTL I/O Units		MIL connector Inputs: TTL (5 V DC), 32 inputs Outputs: TTL (5 V DC, 35 mA), 32 outputs	CJ1W-MD563	64	565

Part Names

32-point Units with 40-pin Fujitsu-compatible Connector or 40-pin MIL Connector

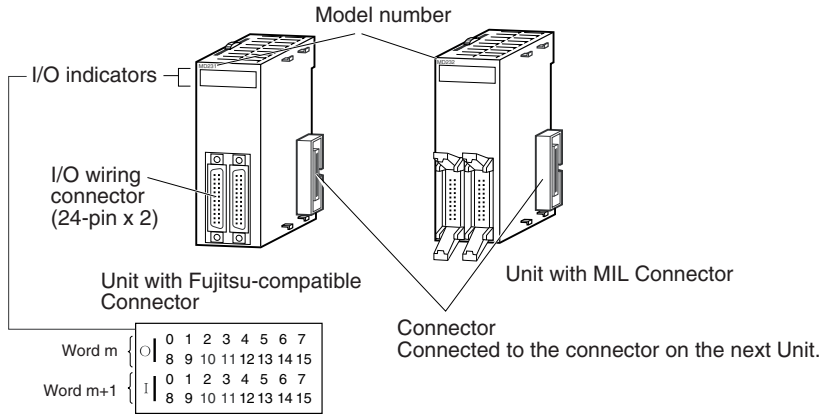


Changes the 16 I/O displayed on the I/O indicators.

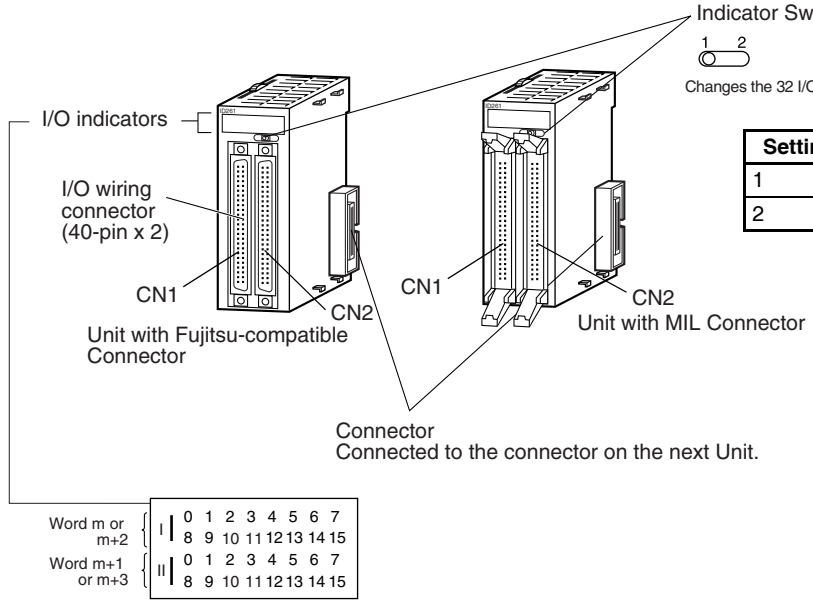
Setting	Fujitsu connector	MIL connector
1: Wd m	Row A on connector	Bottom of connector
2: Wd m+1	Row B on connector	Top of connector

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

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



64-point Units (2 × 40-pin Fujitsu-compatible Connectors or 2 × 40-pin MIL Connectors)



Changes the 32 I/O displayed on the I/O indicators.

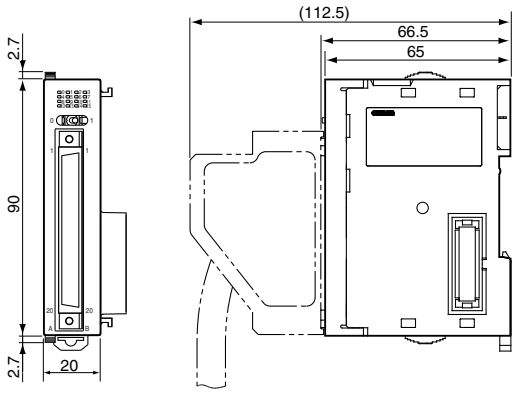
Setting	Fujitsu connector
1	Wd m and m+1: CN1
2	Wd m+2 and m+3: CN2

Dimensions

Input Units and Output Units

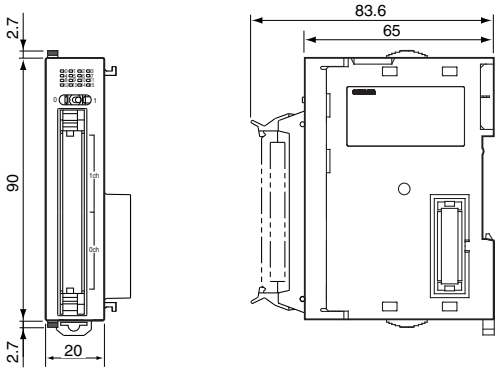
■ **32-point Units with 40-pin Fujitsu-compatible Connector**

CJ1W-ID231
CJ1W-OD231



■ **32-point Units with 40-pin MIL Connector**

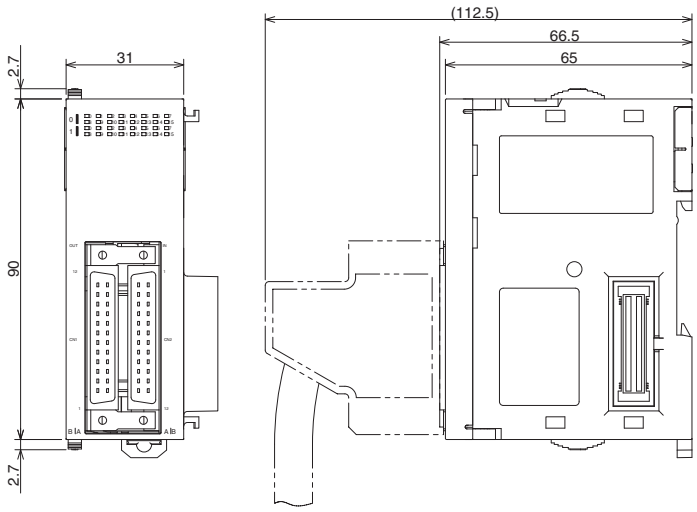
CJ1W-ID232
CJ1W-OD232
CJ1W-OD233



24-V DC Input/Transistor Output Units

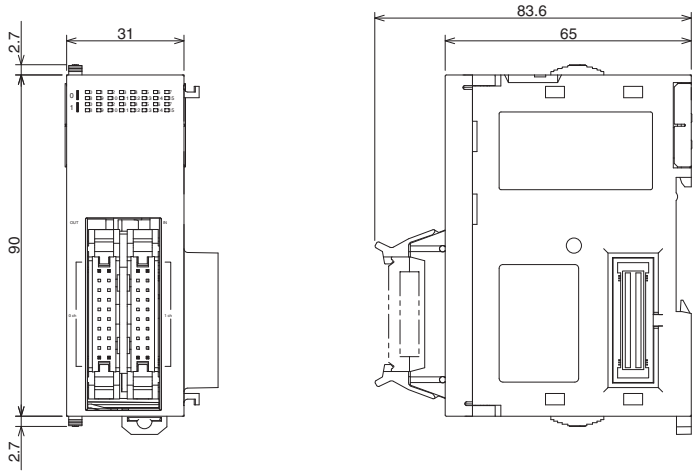
■ 32-point Units with 2 × 24-pin Fujitsu-compatible Connectors

CJ1W-MD231



■ 32-point Units with 2 × 20-pin MIL Connectors

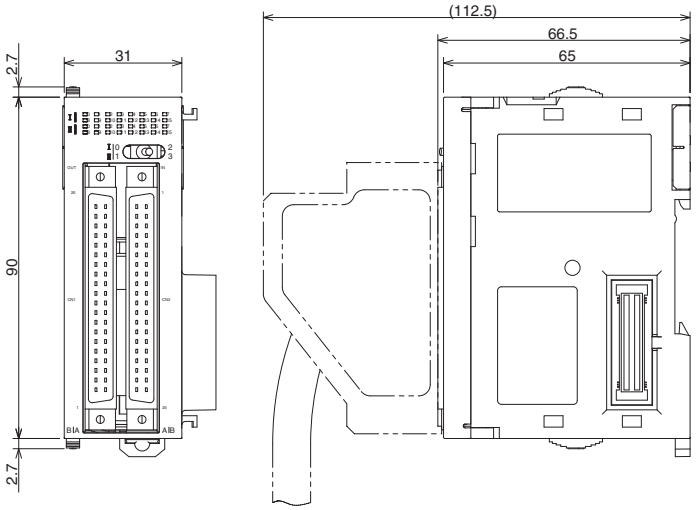
CJ1W-MD232
CJ1W-MD233



Input Units, Output Units, 24-V DC Input/Transistor Output Units, TTL I/O Units

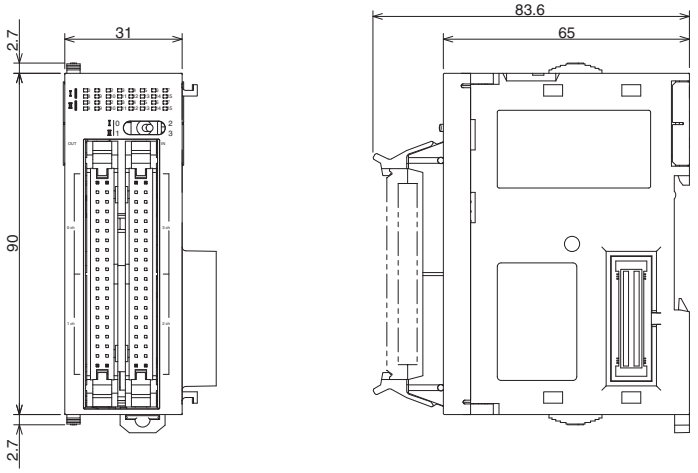
■ **64-point Units with 2 × 40-pin Fujitsu-compatible Connectors**

CJ1W-ID261
CJ1W-OD261
CJ1W-MD261



■ **64-point Units with 2 × 40-pin MIL Connectors**

CJ1W-ID262
CJ1W-OD262
CJ1W-OD263
CJ1W-MD263
CJ1W-MD563



Connecting to Connector-Terminal Block Units

The CJ-series 32/64-point Basic I/O Units can be connected to Connector-Terminal Block Conversion Units as shown in the following table.

Units with Fujitsu-compatible Connectors

Basic I/O Unit		Connecting Cable	Connector-Terminal Block Conversion Unit		Required for connection
Model number	Specifications		Model number	Specifications	
CJ1W-ID231	32-point 24-V DC Input Unit	XW2Z-□□□B	XW2B-40G5	Standard, M3.5 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
			XW2D-40G6-RF	Slim, M3 screw terminal block, built-in bleeder resistor	
		XW2Z-□□□D	XW2C-20G5-IN16	16-point input common, M3.5 screw terminal block	1 Connecting Cable and 2 Conversion Units
CJ1W-ID261	64-point 24-V DC Input Unit	XW2Z-□□□B	XW2B-40G5	Standard, M3.5 screw terminal block	2 Connecting Cables and 2 Conversion Units
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
			XW2D-40G6-RF	Slim, M3 screw terminal block, built-in bleeder resistor	
		XW2Z-□□□D	XW2C-20G5-IN16	16-point input common, M3.5 screw terminal block	2 Connecting Cables and 4 Conversion Units
CJ1W-OD231	32-point Transistor Output Unit with Sinking Outputs	XW2Z-□□□B	XW2B-40G5	Standard, M3.5 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
CJ1W-OD261	64-point Transistor Output Unit with Sinking Outputs	XW2Z-□□□B	XW2B-40G5	Standard, M3.5 screw terminal block	2 Connecting Cables and 2 Conversion Units
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
CJ1W-MD231	16-point 24-V DC Input/ 16-point Transistor Output Unit with Sinking Outputs	Inputs: XW2Z-□□□A	XW2B-20G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-20G5	Standard, M3.5 screw terminal block	
			XW2D-20G6	Slim, M3 screw terminal block	
			XW2C-20G5-IN16	2-tier, M3.5 screw terminal block	
		Outputs: XW2Z□□□A	XW2B-20G4	Standard, M3 screw terminal block	
			XW2B-20G5	Standard, M3.5 screw terminal block	
			XW2D-20G6	Slim, M3 screw terminal block	
CJ1W-MD261	32-point 24-V DC Input/ 32-point Transistor Output Unit with Sinking Outputs	Inputs: XW2Z-□□□B	XW2B-40G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G5	Standard, M3.5 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
			XW2D-40G6-RF	Slim, M3 screw terminal block, built-in bleeder resistor	
		Inputs: XW2Z-□□□D	XW2C-20G5-IN16	2-tier, M3.5 screw terminal block	1 Connecting Cable and 2 Conversion Units
		Outputs: XW2Z-□□□B	XW2B-40G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G5	Standard, M3.5 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	

Units with MIL Connectors

Basic I/O Unit		Connecting Cable	Connector-Terminal Block Conversion Unit		Required for connection
Model number	Specifications		Model number	Specifications	
CJ1W-ID232	32-point 24-V DC Input Unit	XW2Z-□□□K	XW2B-40G5	Standard, M3.5 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
			XW2D-40G6-RM	Slim, M3 screw terminal block, built-in bleeder resistor	
		XW2Z-□□□N	XW2C-20G5-IN16	16-point input common, M3.5 screw terminal block	1 Connecting Cable and 2 Conversion Units
			XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	
CJ1W-ID262	64-point 24-V DC Input Unit	XW2Z-□□□K	XW2B-40G5	Standard, M3.5 screw terminal block	2 Connecting Cables and 2 Conversion Units
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
			XW2D-40G6-RM	Slim, M3 screw terminal block, built-in bleeder resistor	
		XW2Z-□□□N	XW2C-20G5-IN16	16-point input common, M3.5 screw terminal block	2 Connecting Cables and 4 Conversion Units
			XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	
CJ1W-OD232	32-point Transistor Output Unit with Sourcing Outputs	XW2Z-□□□K	XW2B-40G5	Standard, M3.5 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
		XW2Z-□□□N	XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	1 Connecting Cable and 2 Conversion Units
CJ1W-OD233	32-point Transistor Output Unit with Sinking Outputs	XW2Z-□□□K	XW2B-40G5	Standard, M3.5 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
		XW2Z-□□□N	XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	1 Connecting Cable and 2 Conversion Units
CJ1W-OD262	64-point Transistor Output Unit with Sourcing Output	XW2Z-□□□K	XW2B-40G4	Standard, M3 screw terminal block	2 Connecting Cables and 2 Conversion Units
			XW2B-40G5	Standard, M3.5 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
		XW2Z-□□□N	XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	2 Connecting Cables and 4 Conversion Units
CJ1W-OD263	64-point Transistor Output Unit with Sinking Outputs	XW2Z-□□□K	XW2B-40G5	Standard, M3.5 screw terminal block	2 Connecting Cable and 2 Conversion Unit
			XW2B-40G4	Standard, M3 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
		XW2Z-□□□N	XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	2 Connecting Cables and 4 Conversion Units
CJ1W-MD232	16-point 24-V DC Input/16-point Transistor Output Unit with Sourcing Outputs	Inputs: XW2Z-RO□□C	XW2B-20G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-20G5	Standard, M3.5 screw terminal block	
			XW2D-20G6	Slim, M3 screw terminal block	
		Outputs: XW2Z-RO□□C	XW2B-20G4	Standard, M3 screw terminal block	
			XW2B-20G5	Standard, M3.5 screw terminal block	
			XW2D-20G6	Slim, M3 screw terminal block	
CJ1W-MD233	16-point 24-V DC Input/16-point Transistor Output Unit with Sinking Outputs	Inputs: XW2Z-RO□□C	XW2B-20G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-20G5	Standard, M3.5 screw terminal block	
			XW2D-20G6	Slim, M3 screw terminal block	
		Outputs: XW2Z-RO□□C	XW2B-20G4	Standard, M3 screw terminal block	
			XW2B-20G5	Standard, M3.5 screw terminal block	
			XW2D-20G6	Slim, M3 screw terminal block	

Basic I/O Unit		Connecting Cable	Connector-Terminal Block Conversion Unit		Required for connection
Model number	Specifications		Model number	Specifications	
CJ1W-MD263	32-point 24-V DC Input/32-point Transistor Output Unit with Sinking Outputs	Inputs: XW2Z-□□□K	XW2B-40G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G5	Standard, M3.5 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
			XW2D-40G6-RM	Slim, M3 screw terminal block, built-in bleeder resistor	
		Inputs: XW2Z-□□□N	XW2C-20G5-IN16	16-point input common, M3.5 screw terminal block	1 Connecting Cable and 2 Conversion Units
			XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	
		Outputs: XW2Z-□□□K	XW2B-40G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G5	Standard, M3.5 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
		Outputs: XW2Z-□□□N	XW2C-20G6-IO16	16-point I/O common, M3 screw terminal block	1 Connecting Cable and 2 Conversion Units
CJ1W-MD563	32-point TTL Input/ 32-point TTL Output Unit	Inputs: XW2Z-□□□K	XW2B-40G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G5	Standard, M3.5 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
		Inputs: XW2Z-□□□N	XW2C-20G5-IN16	16-point input common, M3.5 screw terminal block	1 Connecting Cable and 2 Conversion Units
			XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	
		Outputs: XW2Z-□□□K	XW2B-40G4	Standard, M3 screw terminal block	1 Connecting Cable and 1 Conversion Unit
			XW2B-40G5	Standard, M3.5 screw terminal block	
			XW2D-40G6	Slim, M3 screw terminal block	
		Outputs: XW2Z-□□□N	XW2C-20G6-IO16	16-point I/O common, M3.5 screw terminal block	1 Connecting Cable and 2 Conversion Units

Connecting to I/O Terminals

The CJ-series 32/64-point Basic I/O Units can be connected to I/O Terminals as shown in the following table.

Units with Fujitsu-compatible Connectors

Basic I/O Unit		Connecting Cable	I/O Terminal			Required for connection
Model number	Specifications		Model number	Type	Input voltage/ output type	
CJ1W-ID231	32-point 24-V DC Input Unit	XW2Z-RI□□□C-□□□	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G7TC-IA16		Input: 100/200 V AC Output: Relay	
CJ1W-ID261	64-point 24-V DC Input Unit	XW2Z-RI□□□C-□□□	G7TC-ID16		Input: 24 V DC Output: Relay	2 Connecting Cables and 4 I/O Terminals
			G7TC-IA16		Input: 100/200 V AC Output: Relay	
CJ1W-OD231	32-point Transistor Output Unit with Sinking Outputs	XW2Z-RO□□□C-□□□	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16	Output Terminal (Slim)	Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3 + Relays	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	

Basic I/O Unit		Connecting Cable	I/O Terminal			Required for connection
Model number	Specifications		Model number	Type	Input voltage/ output type	
CJ1W-OD261	64-point Transistor Output Unit with Sinking Outputs	XW2Z-RO□□□C-□□□	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	2 Connecting Cables and 4 I/O Terminals
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16	Output Terminal (Slim)	Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3 + Relays	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	
CJ1W-MD231	16-point 24-V DC Input/16-point Transistor Output Unit	Inputs: XW2Z-R□□□C	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 1 I/O Terminal
			G7TC-IA16		Input: 100/200 V AC Output: Relay	
		Outputs: XW2Z-R□□□C	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 1 I/O Terminal
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16	Output Terminal (Slim)	Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	
CJ1W-MD261	32-point 24-V DC Input/32-point Transistor Output Unit	Inputs: XW2Z-RI□□□C-□□□	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G7TC-IA16		Input: 100/200 V AC Output: Relay	
		Outputs: XW2Z-RO□□□C-□□□	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16	Output Terminal (Slim)	Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	

Units with MIL Connectors

Basic I/O Unit		Connecting Cable	I/O Terminal			Required for connection
Model number	Specifications		Model number	Type	Input voltage/ output type	
CJ1W-ID232	32-point 24-V DC Input Unit	XW2Z-RO□□-□□-D1	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G7TC-IA16		Input: 100/ 200 V AC Output: Relay	
CJ1W-ID262	64-point 24-V DC Input Unit	XW2Z-RO□□-□□-D1	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	2 Connecting Cables and 4 I/O Terminals
			G7TC-IA16		Input: 100/ 200 V AC Output: Relay	
CJ1W-OD232	32-point Transistor Output Unit with Sourcing Outputs	XW2Z-RO□□-□□-D1	G70D-SOC16-1	Output Terminal (Slim)	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G70D-FOM16-1		Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-4 + Relays	Relay Terminal Socket (PNP) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	
CJ1W-OD233	32-point Transistor Output Unit with Sinking Outputs	XW2Z-RO□□-□□-D1	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16		Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3 + Relays	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	
CJ1W-OD262	64-point Transistor Output Unit with Sourcing Outputs	XW2Z-RO□□-□□-D1	G70D-SOC16-1	Output Terminal (Slim)	Input: 24 V DC Output: Relay	2 Connecting Cables and 4 I/O Terminal
			G70D-FOM16-1		Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-4 + Relays	Relay Terminal Socket (PNP) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	
CJ1W-OD263	64-point Transistor Output Unit with Sinking Outputs	XW2Z-RO□□-□□-D1	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	2 Connecting Cables and 4 I/O Terminals
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16		Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3 + Relays	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	

Basic I/O Unit		Connecting Cable	I/O Terminal			Required for connection
Model number	Specifications		Model number	Type	Input voltage/ output type	
CJ1W-MD232	16-point 24-V DC Input/16-point Transistor Output Unit with Sourcing Outputs	Inputs: XW2Z-RO□□□C	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 1 I/O Terminal
			G7TC-IA16		Input: 100/ 200 V AC Output: Relay	
		Outputs: XW2Z-RO□□□C	G7TC-OC16-1	Output Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 1 I/O Terminal
		Outputs: XW2Z-RI□□□C	G70D-SOC16-1	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16-1		Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-4	Relay Terminal Socket (PNP) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	
CJ1W-MD233	16-point 24-V DC Input/16-point Transistor Output Unit with Sinking Outputs	Inputs: XW2Z-RO□□□C	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 1 I/O Terminal
			G7TC-IA16		Input: 100/ 200 V AC Output: Relay	
		Outputs: XW2Z-RO□□□C	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 1 I/O Terminal
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16	Output Terminal (Slim)	Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	
CJ1W-MD263	32-point 24-V DC Input/32-point Transistor Output Unit with Sinking Outputs	Inputs: XW2Z-RO□□-□□-D1	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G7TC-IA16		Input: 24 V DC Output: Relay	
		Outputs: XW2Z-RO□□-□□-D1	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16	Output Terminal (Slim)	Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	
CJ1W-MD563	32-point TTL Input/ 32-point TTL Output Unit	Inputs: XW2Z-RO□□-□□-D1	G7TC-ID16	Input Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G7TC-IA16		Input: 100/ 200 V AC Output: Relay	
		Outputs: XW2Z-RO□□-□□-D1	G7TC-OC16	Output Block	Input: 24 V DC Output: Relay	1 Connecting Cable and 2 I/O Terminals
			G70D-SOC16/ VSOC16	Output Terminal (Slim)	Input: 24 V DC Output: Relay	
			G70D-FOM16/ VFOM16	Output Terminal (Slim)	Input: 24 V DC Output: MOS FET	
			G70A-ZOC16-3	Relay Terminal Socket (NPN) + Relays	Input: 24 V DC Output: Mechanical relay, SSR, MOS FET (via relay)	

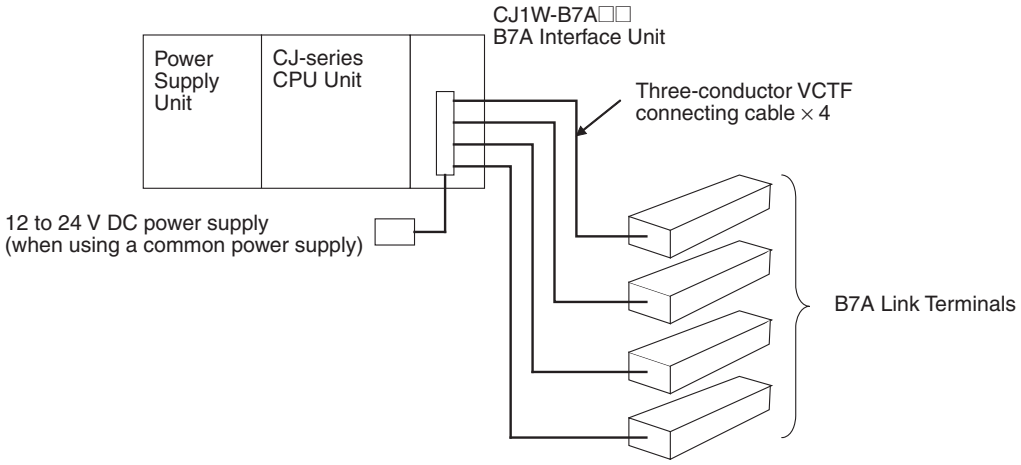
3-7 B7A Interface Unit

3-7-1 Overview

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

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

3-7-2 System Configuration



3-7-3 Models

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

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

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

3-7-4 B7A Communications Specifications

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

Note

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

3-7-5 Common Specifications

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

3-7-6 I/O Memory Allocations

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

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

3-7-7 Transmission Error Processing

Input Ports

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

Indicators

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

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

Transmission Error Flag

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

Example: Rack 0, Slot 0

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

Example: Rack 0, Slot 1

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

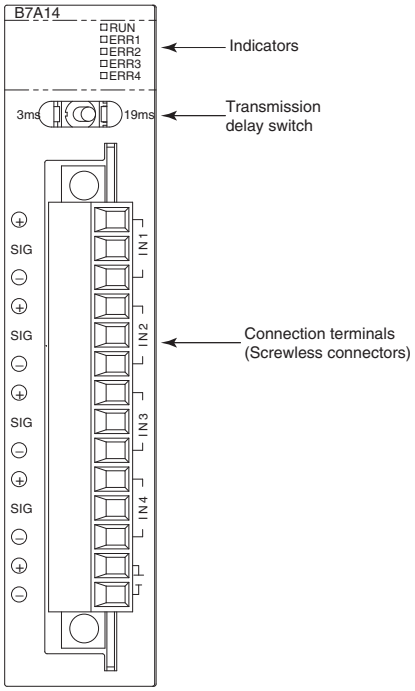
Transmission Error Input Status Processing

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

Output Ports

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

3-7-8 Parts and Names



Indicators

CJ1W-B7A14

Display	Name	Color	Status	Condition
RUN	B7A operating status	Green	ON	The B7A Unit is operating.
			OFF	The B7A Unit is stopped.
ERR1	Port 1 transmission error	Red	ON	A transmission error has occurred at port 1 of the B7A Unit.
			OFF	The Unit is operating normally.
ERR2	Port 2 transmission error	Red	ON	A transmission error has occurred at port 2 of the B7A Unit.
			OFF	The Unit is operating normally.
ERR3	Port 3 transmission error	Red	ON	A transmission error has occurred at port 3 of the B7A Unit.
			OFF	The Unit is operating normally.
ERR4	Port 4 transmission error	Red	ON	A transmission error has occurred at port 4 of the B7A Unit.
			OFF	The Unit is operating normally.

CJ1W-B7A04

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

CJ1W-B7A22

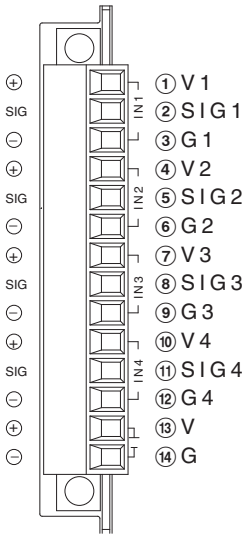
Display	Name	Color	Status	Condition
RUN	B7A operating status	Green	ON	The B7A Unit is operating.
			OFF	The B7A Unit is stopped.
ERR1	Port 3 transmission error	Red	ON	A transmission error has occurred at port 3 of the B7A Unit.
			OFF	The Unit is operating normally.
ERR2	Port 4 transmission error	Red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

Transmission Delay Switch

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

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

Terminal Arrangement

Terminal	Name	Function	Word	Appearance
①	Port 1 power supply: V1	Connect to the + terminal of the B7A Link Terminal to be connected to port 1 (only when using a common power supply).	n	Connector with clamps 
②	Port 1 signal: SIG1	Connect to the SIG terminal of the B7A Link Terminal to be connected to port 1.		
③	Port 1 ground: G1	Connect to the – terminal of the B7A Link Terminal to be connected to port 1.		
④	Port 2 power supply: V2	Connect to the + terminal of the B7A Link Terminal to be connected to port 2 (only when using a common power supply).	n+1	
⑤	Port 2 signal: SIG2	Connect to the SIG terminal of the B7A Link Terminal to be connected to port 2.		
⑥	Port 2 ground: G2	Connect to the – terminal of the B7A Link Terminal to be connected to port 2.		
⑦	Port 3 power supply: V3	Connect to the + terminal of the B7A Link Terminal to be connected to port 3 (only when using a common power supply).	n+2	
⑧	Port 3 signal: SIG3	Connect to the SIG terminal of the B7A Link Terminal to be connected to port 3.		
⑨	Port 3 ground: G3	Connect to the – terminal of the B7A Link Terminal to be connected to port 3.		
⑩	Port 4 power supply: V4	Connect to the + terminal of the B7A Link Terminal to be connected to port 4 (only when using a common power supply).	n+3	
⑪	Port 4 signal: SIG4	Connect to the SIG terminal of the B7A Link Terminal to be connected to port 4.		
⑫	Port 4 ground: G4	Connect to the – terminal of the B7A Link Terminal to be connected to port 4.		
⑬	+ power supply: V	Connect to the + terminal of the external power supply.	---	
⑭	– power supply: G	Connect to the – terminal of the external power supply.		

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

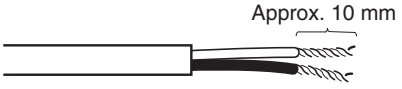
3-7-9 Preparing and Connecting Cables

Use the following procedure to prepare and connect the cables.

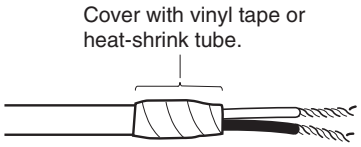
Note Always turn OFF the Unit's power supply and communications power supply before attaching or removing connectors.

1) Preparing the Covering First, use the following procedure to prepare the cable.

1,2,3... 1. Strip approximately 10 mm of the sheath covering the signal lines to match the crimp terminals. Next, twist together the wires of each signal line firmly.



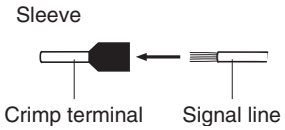
2. Use vinyl tape or a heat-shrink tube to cover the end of the VCTF cable sheath, as shown in the following diagram.



2) Preparing Cable Signal Lines

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

1,2,3... 1. Attaching Crimp Terminals
Insert the end of the cable into the terminal and crimp.



Recommended Crimp Terminals for Cables

Model	Manufacturer
AI-series AI0.75-8GY (Product code: 3200519)	PHOENIX CONTACT
H0.75/14 (Product code: 046290)	Nihon Weidmuller Co., Ltd.
TE-0.75	NICHIFU Co., Ltd.

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

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

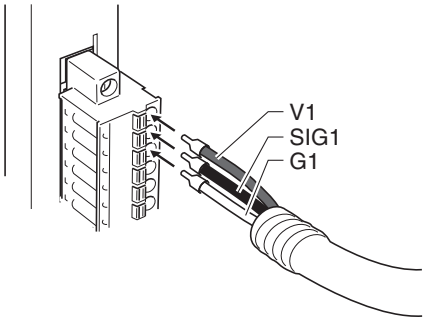
2. Insulate the stripped end of each signal line with vinyl tape or heat-shrink tubing.

3) Connecting Cables

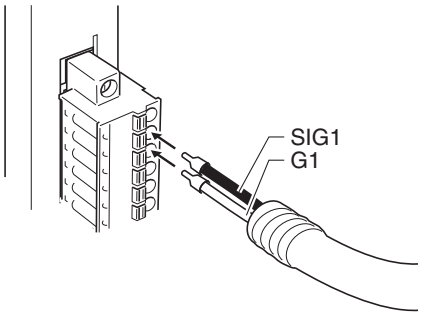
Use the following procedure to connect cables to the connection terminals.

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

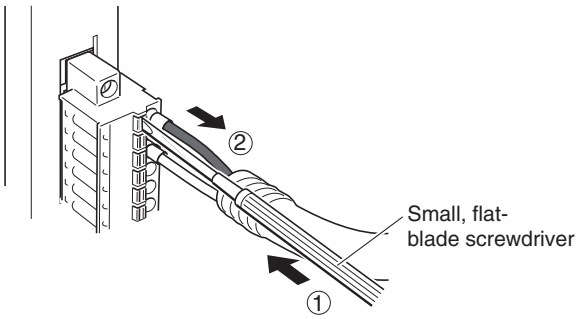
• Power Supply on One Side (Common Power Supply)



• Power Supply on Both Sides (Separate Power Supplies)



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



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

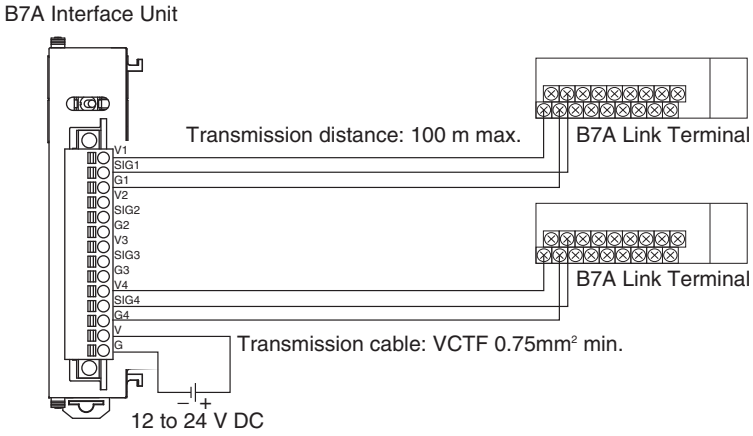
3-7-10 Connection Diagrams

Note

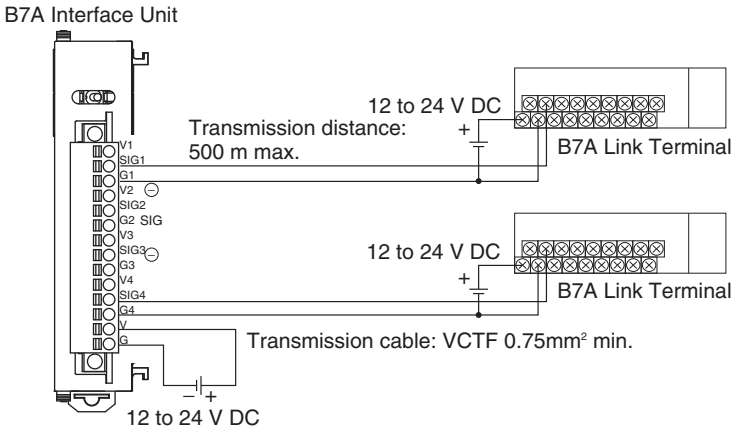
1. Confirm that terminals are connected correctly. If connections are incorrect, the internal components of the B7A Interface Unit and B7A Link Terminal may be damaged.
2. Route the signal lines in separate ducts both inside and outside the control panel to isolate them from power lines.
3. Connect cables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

Standard Mode

Power Supply on One Side (Common Power Supply)



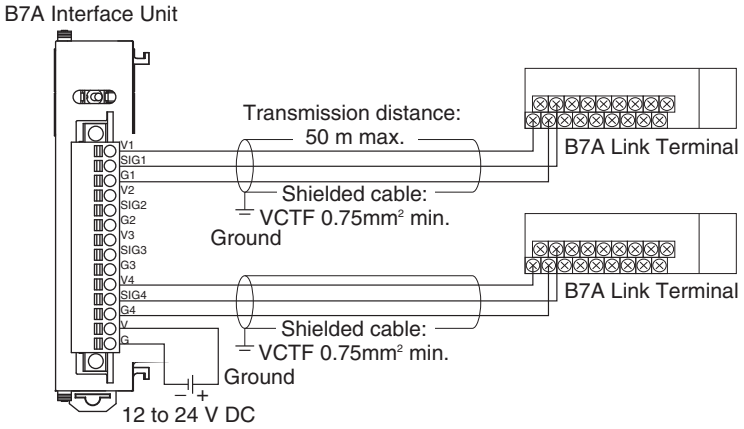
Power Supply on Both Sides (Separate Power Supplies)



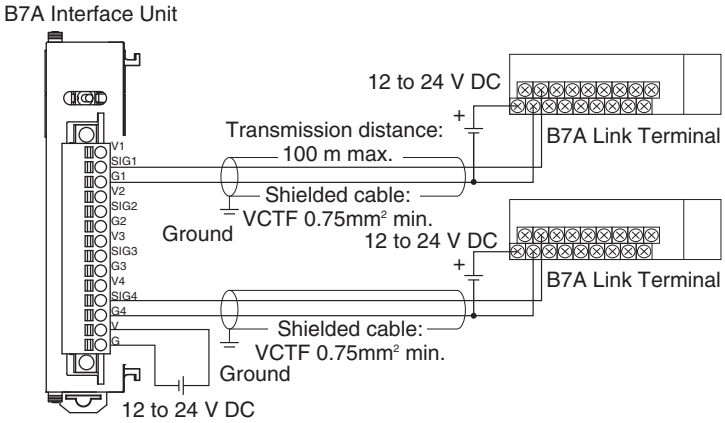
High-speed Mode

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

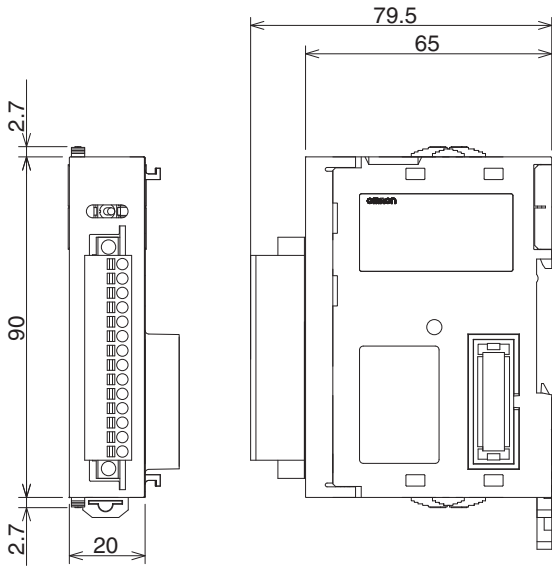
Power Supply on One Side (Common Power Supply)



Power Supply on Both Sides (Separate Power Supplies)



3-7-11 Dimensions (Unit: mm)



SECTION 4
Operating Procedures

This section outlines the steps required to assemble and operate a CJ-series PLC System.

4-1 Introduction

The following procedure outlines the recommended steps to follow when preparing CJ-series PLCs for operation.

1,2,3...

1. Installation

   Set the DIP switches on the front of each Unit as required.
   Connect the CPU Unit, Power Supply Unit, I/O Units, and End Cover. Install a Memory Card if required.

   See *5-2 Installation* for details.

2. Wiring

   Connect the power supply wiring, I/O wiring, and Programming Device (CX-Programmer or Programming Console). Connect communications wiring as required.

   See *5-3 Wiring* for details on power supply and I/O wiring.

3. Initial Settings (Hardware)

   Set the DIP switches and Rotary switches on the CPU Unit and other Units.

4. Confirming Programming Device Connection

   a) Connect a Programming Device (i.e., the CX-Programmer or a Programming Console).

   b) Check the power supply wiring and voltage, turn ON the power supply, and check to be sure the Programming Device will connect to the CPU Unit.

   See *3-3 Programming Devices* for details.

5. Registering the I/O Tables (If Required.)

   Check the Units to verify that they are installed in the right slots. With the PLC in PROGRAM mode, register the I/O tables from the CX-Programmer (online) or Programming Console. (Another method is to create the I/O tables in CX-Programmer (offline) and transfer them to the CPU Unit.)

   See *8-1 I/O Allocations* for details.

6. Built-in Clock Setting

   The first time you use a CJ-series CPU Unit, use the CX-Programmer online or a Programming Console to set the built-in clock. Refer to *Chapter 9 PLC Clock Tool* in *Part 2 CX-Server PLC Tools* of the *CX-Programmer Operation Manual*.

7. PLC Setup Settings

   With the PLC in PROGRAM mode, change the settings in the PLC Setup as necessary from the CX-Programmer (online) or Programming Console. (Another method is to change the PLC Setup in CX-Programmer (offline) and transfer it to the CPU Unit.)

8. DM Area Settings

   a) Use a Programming Device (CX-Programmer or Programming Console) to make any necessary settings in the parts of the DM Area that are allocated to Special I/O Units and CPU Bus Units.

   b) Reset the power (ON → OFF → ON) or toggle the Restart Bit for each Unit. See the Unit's operation manual for details.

9. Writing the Program

   Write the program with a Programming Device (CX-Programmer or Programming Console).

10. Transferring the Program (CX-Programmer Only)

    With the PLC in PROGRAM mode, transfer the program from CX-Programmer to the CPU Unit.

11. Testing Operation

    a) Checking I/O Wiring

Output wiring	With the PLC in PROGRAM mode, force-set output bits and check the status of the corresponding outputs.
Input wiring	Activate sensors and switches and either check the status of the indicators on the Input Unit or check the status of the corresponding input bits with the Programming Device's Bit/Word Monitor operation.

    b) Auxiliary Area Settings (As Required)
    Check operation of special Auxiliary Area Settings such as the following:

Output OFF Bit	When necessary, turn ON the Output OFF Bit (A50015) from the program and test operation with the outputs forced OFF.
Hot Start Settings	When you want to start operation (switch to RUN mode) without changing the contents of I/O memory, turn ON the IOM Hold Bit (A50012).

    c) Trial Operation
    Test PLC operation by switching the PLC to MONITOR mode.

    d) Monitoring and Debugging
    Monitor operation from the Programming Device. Use functions such as force-setting/force-resetting bits, tracing, and online editing to debug the program.

12. Saving and Printing the Program

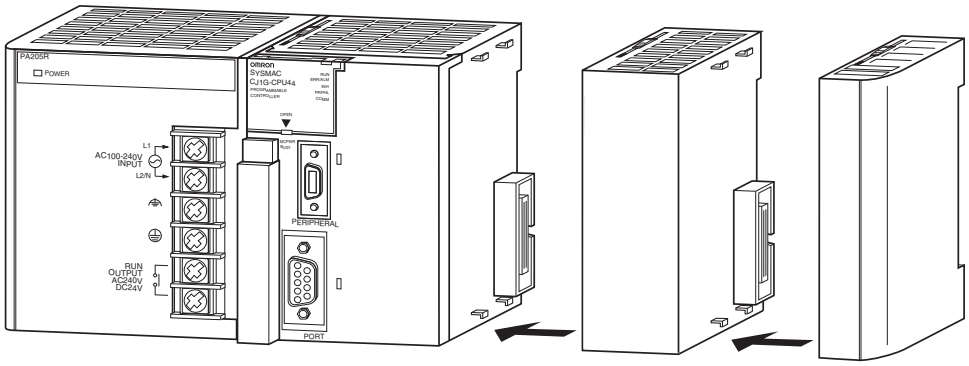
13. Running the Program

    Switch the PLC to RUN mode to run the program.

4-2 Examples

1. Installation

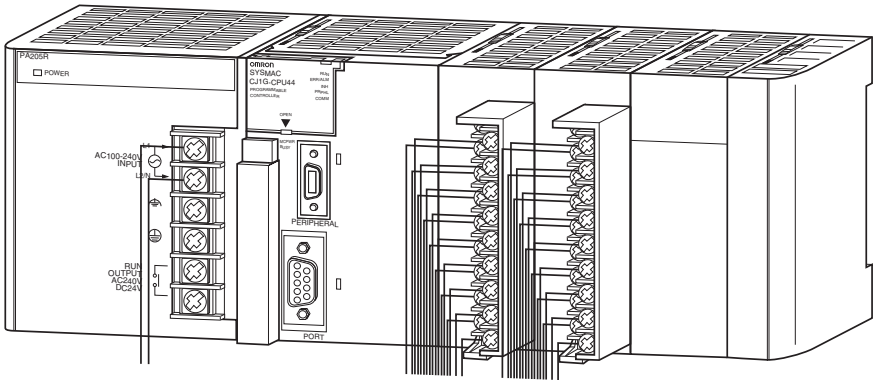
Connect the Units. When necessary, install a Memory Card.



Make sure that the total power consumption of the Units is less than the maximum capacity of the Power Supply Unit.

2. Wiring

Connect the power supply and I/O wiring.

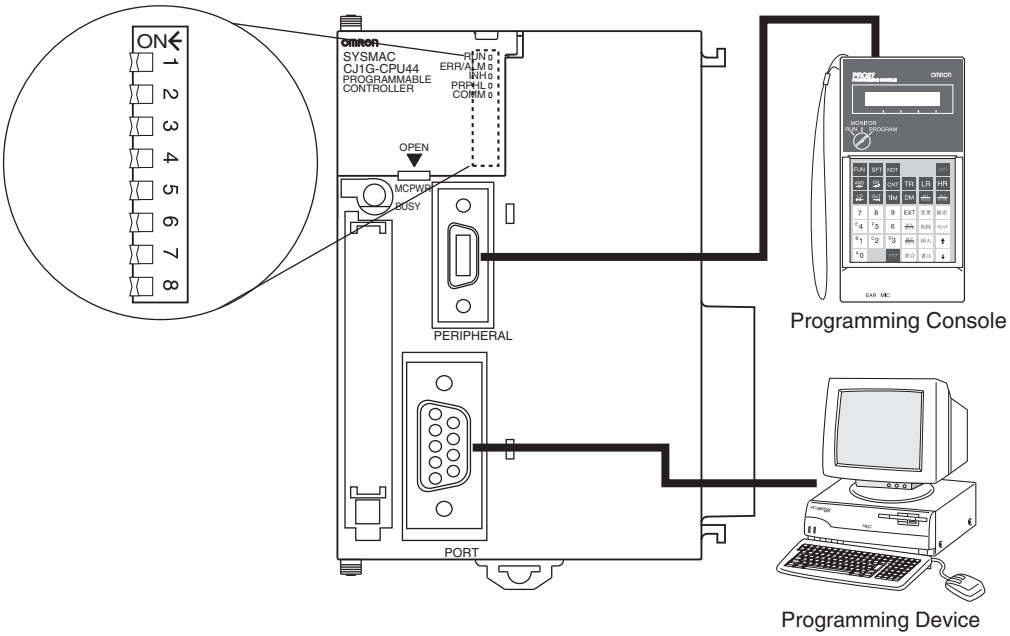


3. Initial Settings (Hardware)

Make necessary hardware settings such as the DIP switch settings on the CPU Unit. Be sure that the communications settings for the peripheral port and RS-232C port are correct, especially when connecting a Programming Device (CX-Programmer or Programming Console).

When connecting to the peripheral port, turn OFF pin 4. When connecting the CX-Programmer to the RS-232C port, turn ON pin 5.

Note When devices other than a Programming Console and Programming Device are connected to the peripheral port and RS-232C port, turn ON pin 4 and turn OFF pin 5.

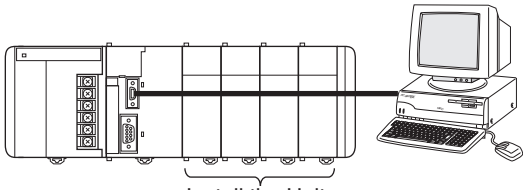


4. Verifying the Programming Device Connection

Connecting to the CX-Programmer

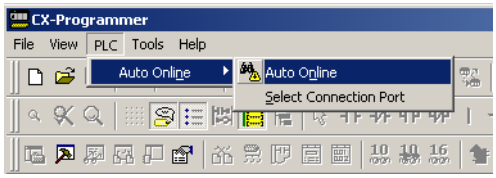
1,2,3... 1. Connect the CX-Programmer's connecting cable to the peripheral port or RS-232C port.

Note When connecting to the RS-232C port, pin 5 of the CPU Unit's DIP switch must be ON.

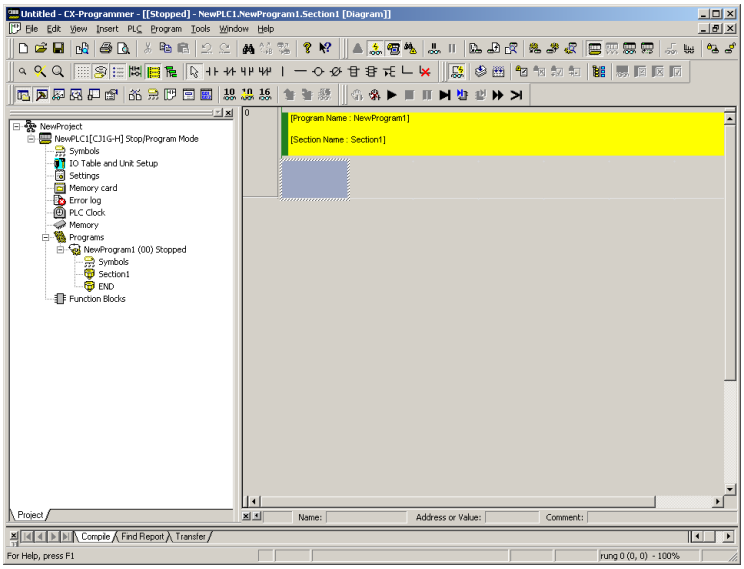


2. After checking the power supply wiring and voltage, turn ON the power and verify the Power Supply Unit's POWER Indicator is lit.
3. Start the CX-Programmer and automatically connect online to the PLC.

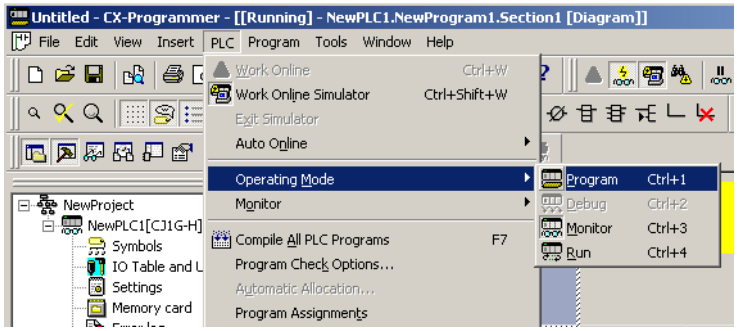
Note When connecting online automatically, the CPU Unit is connected in RUN mode.



4. Verify that the CX-Programmer has connected online with the PLC.

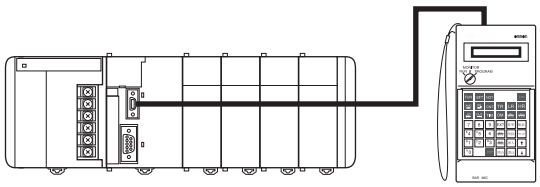


5. Change the operating mode from RUN mode to PROGRAM mode.



Connecting to the Programming Console

1. Connect the Programming Console to the CPU Unit's peripheral port (the upper port).



2. Verify that the Programming Console's mode is PROGRAM mode.
3. After checking the power supply wiring and voltage, turn ON the power and verify the Power Supply Unit's POWER Indicator is lit.
4. Verify that the Programming Console has the following display.

5. Input the password (the Clear and Monitor Keys) and verify that the Programming Console has the following display.

Note If the PLC Setup's Startup Mode Setting is set to PRCN (Startup Mode determined by the Programming Console's mode switch, the default setting), but a Programming Console isn't connected when the power is turned ON, the CPU Unit will enter RUN Mode and start operating.

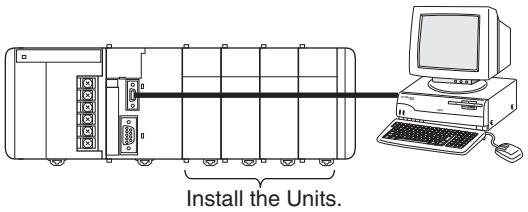
5. Registering the I/O Tables (If Required)

Registering the I/O tables allocates I/O memory to the Units actually installed in the PLC. It is not necessary to create I/O tables with CJ-series CPU Units because by default they will be automatically generated when the CPU Unit is started. I/O tables can be created by the user to detect mistakes in connected Units or to enable allocating unused words (such as is possible with CS-series CPU Units).

Note The user program and parameter area data in CJ1-H and CJ1M CPU Units is backed up in the internal flash memory. The BKUP indicator will light on the front of the CPU Unit when the backup operation is in progress. Do not turn OFF the power supply to the CPU Unit when the BKUP indicator is lit. The data will not be backed up if power is turned OFF.

Using the CX-Programmer Online

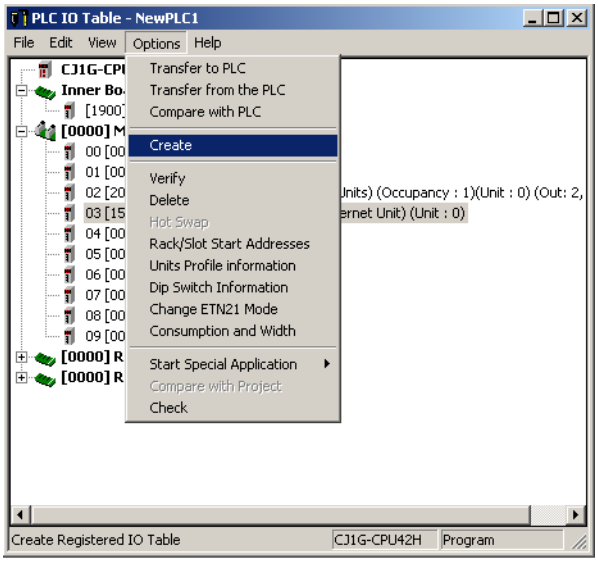
Use the following procedure to register the I/O table with the CX-Programmer that is connected to the PLC.



1,2,3...

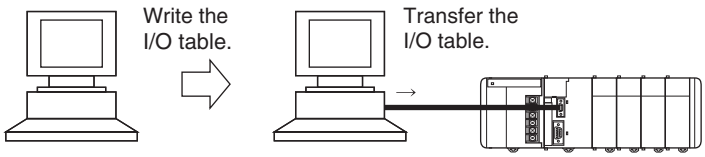
1. Install all of the Units in the PLC.
2. With the power supply OFF, connect the CX-Programmer's connecting cable to the peripheral port or RS-232C port.

   Note When connecting to the RS-232C port, pin 5 of the CPU Unit's DIP switch must be ON.
3. Start the CX-Programmer and connect online to the PLC.
4. Double-click ***IO Table and Unit Setup*** on the project tree in the main window. The I/O Table Window will be displayed.
5. Select ***Options*** and then ***Create***. The models and positions of Units mounted to the Racks will be written to the Registered I/O Table in the CPU Unit.

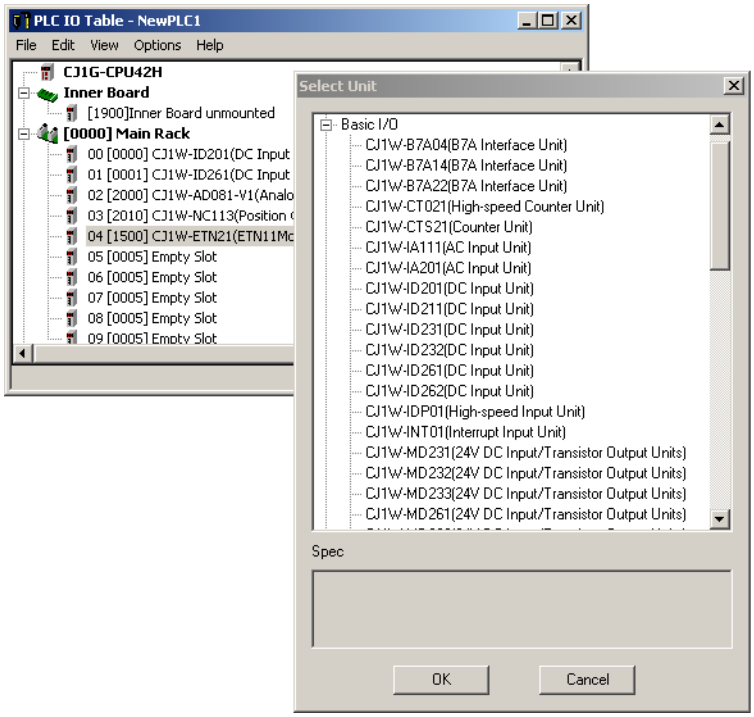


Using the CX-Programmer Offline

Use the following procedure to create the I/O table offline with the CX-Programmer and later transfer the I/O table from to the CPU Unit.



1,2,3... 1. Double-click ***I/O Table*** on the project tree in the main window. The I/O Table Window will be displayed.



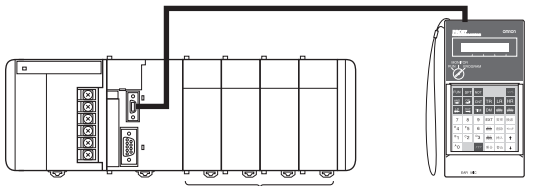
2. Double-click the Rack to be edited. The slots for that Rack will be displayed.

3. Right-click the slots to be edited and select the desired Units from the pull-down menu.
4. Select ***Options*** and then ***Transfer to PLC*** to transfer the I/O table to the CPU Unit.

Note The first word allocated to each Rack can be set from the Programming Device.

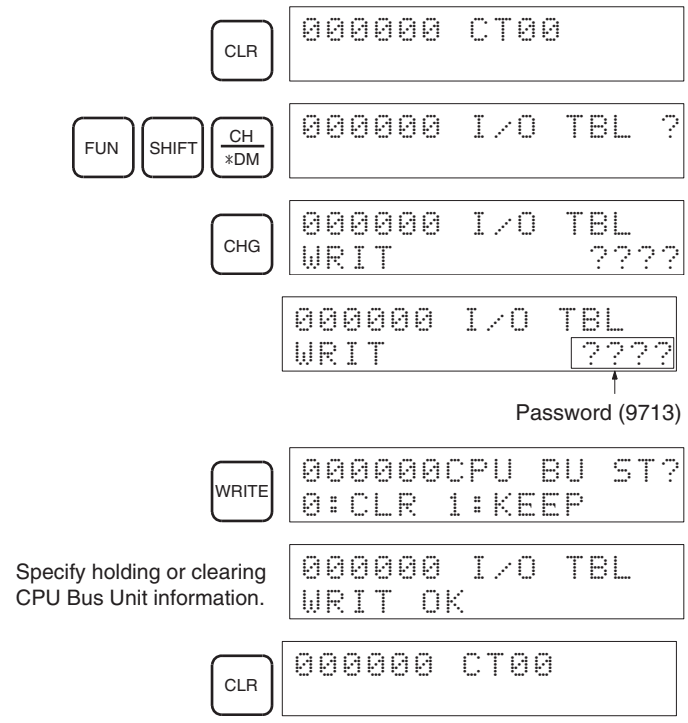
Using a Programming Console

Use the following procedure to register the I/O table with a Programming Console.



1,2,3...

1. Install all of the Units in the PLC.
2. Connect the Programming Console to the peripheral port. (It can be connected with the power ON.)
3. Perform the following Programming Console operation.

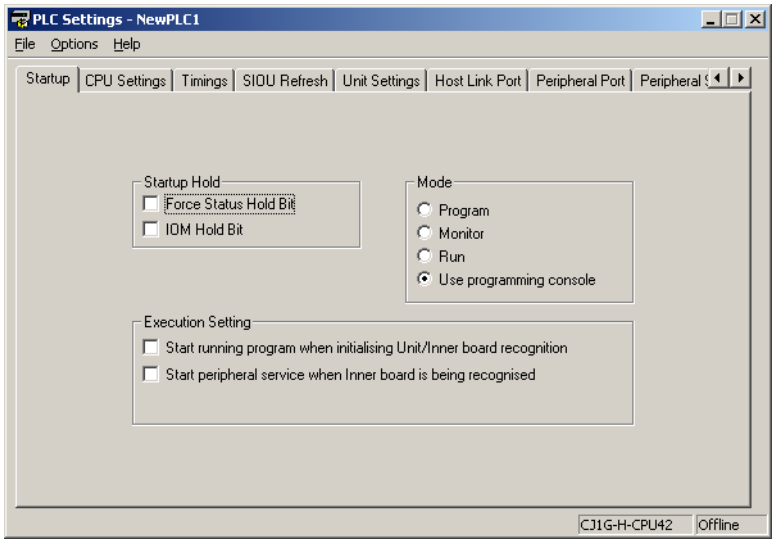


6. Setting the PLC Setup

These settings are the CPU Unit's software configuration.

Making the Settings with the CX-Programmer

1. Double-click the Settings Icon in the main window's project directory tree. The PLC Settings Dialog Box will be displayed.

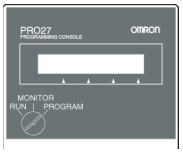


2. Make the required settings.
3. After completing the settings, transfer the PLC Setup to the PLC.

Making the Settings with the Programming Console

When a Programming Console is used to set the PLC Setup, the PLC Setup settings are arranged by word addresses. Refer to the provided Programming Console settings sheet for details.

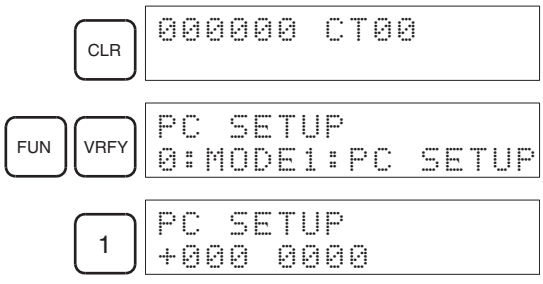
Setting with a Programming Console



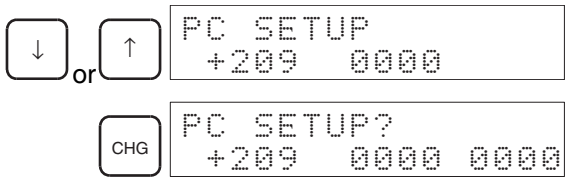
In this example, the Programming Console is used to set the Watch Cycle Time (maximum cycle time) in 10-ms units.

The following diagram shows the required Programming Console operations.

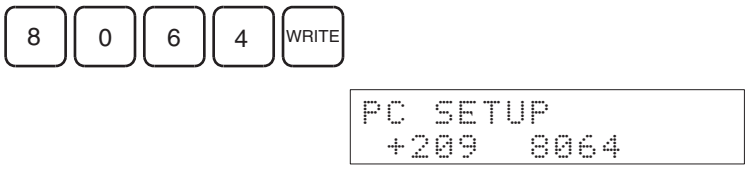
Address	Bits	Setting	Setting range
209	15	Enable for Watch Cycle Time setting	0: Use default 1: Use setting in bits 0 to 14.
	0 to 14	Watch Cycle Time setting	0001 to 0FA0



Specifying a word address in the PLC Setup.
(Example: 209)



Example: Input 8064.

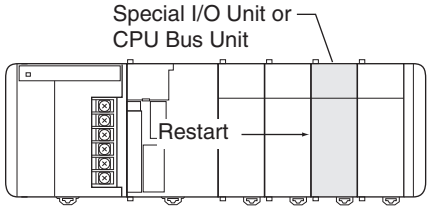


7. DM Area Settings

The following table shows the parts of the DM Area are allocated to Special I/O Units and CPU Bus Units for initial settings. The actual settings depend on the model of Unit being used.

Unit	Allocated words
Special I/O Units	D20000 to D29599 (100 words × 96 Units)
CPU Bus Units	D30000 to D31599 (100 words × 16 Units)

After writing the initial settings to the DM Area, be sure to restart the Units by turning the PLC OFF and then ON again or toggling the Restart Bits for the affected Units.



8. Writing the Program

Write the program with a Programming Device (CX-Programmer or Programming Console).

The CJ-series PLC's program can be divided into independently executable tasks. A single cyclic task can be written for program execution like earlier PLCs or several cyclic tasks can be written for a more flexible and efficient program. The following table shows the differences when programming with CX-Programmer or a Programming Console.

Programming Device	Relationship between Tasks and Program	Writing a new program		Editing an existing program	
		Cyclic tasks	Interrupt tasks	Cyclic tasks	Interrupt tasks
CX-Programmer	Specify the type of task and task number for each program.	All can be written. (Cyclic tasks 0 to 31)	All can be written. (Interrupt tasks 0 to 255)	All can be edited.	All can be edited.
Programming Console	Task = program (Cyclic task 0 is the main program)	Only one can be written. (Cyclic task 0)	Several can be written. (Interrupt tasks 1 to 3, 100 to 131) (See note.)	All can be edited.	All can be edited.

Note When writing the program with a Programming Console, specify whether there are interrupt tasks during the memory clear operation.

9. Transferring the Program

When the program has been created in the CX-Programmer, it must be transferred to the PLC's CPU Unit.

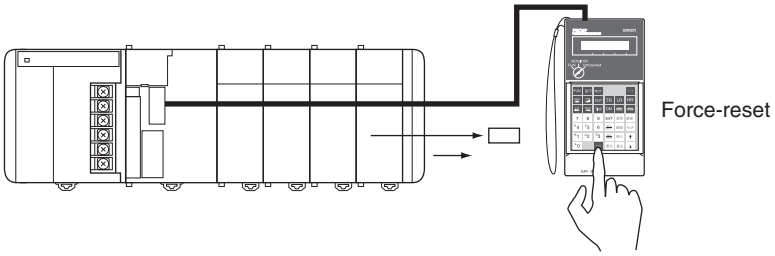
10. Testing Operation

Before performing a Trial Operation in MONITOR mode, check the I/O wiring.

10-a) I/O Wiring Checks

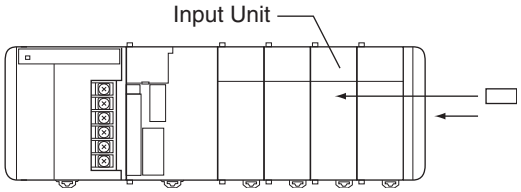
Check Output Wiring

With the PLC in PROGRAM mode, force-set and force-reset output bits and verify that the corresponding outputs operate properly.



Check Input Wiring

Activate input devices such as sensors and switches and verify that the corresponding indicators on the Input Units light. Also, use the Bit/Word Monitor operation in the Programming Device to verify the operation of the corresponding input bits.

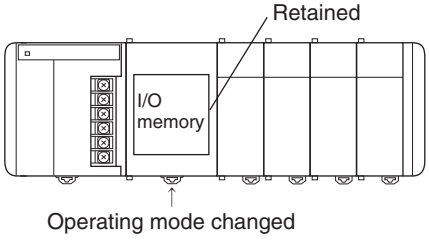


10-b) Auxiliary Area Settings

Make any required Auxiliary Area settings, such as the ones shown below. These settings can be made from a Programming Device (including a Programming Console or the CX-Programmer) or instructions in the program.

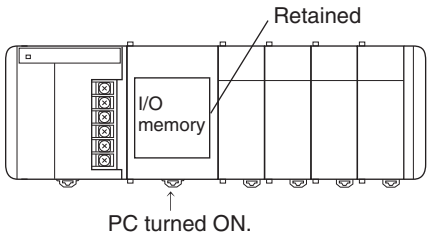
IOM Hold Bit (A50012)

Turning ON the IOM Hold Bit protects the contents of I/O memory (the CIO Area, Work Area, Timer Completion Flags and PVs, Index Registers, and Data Registers) that would otherwise be cleared when the operating mode is switched from PROGRAM mode to RUN/MONITOR mode or vice-versa.



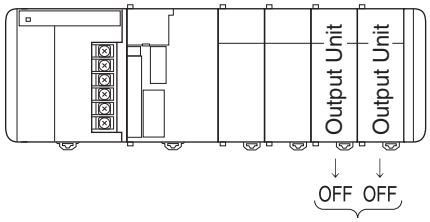
IOM Hold Bit Status at Startup

When the IOM Hold Bit has been turned ON and the PLC Setup is set to protect the status of the IOM Hold BIt at startup (PLC Setup address 80 bit 15 turned ON), the contents of I/O memory that would otherwise be cleared will be retained when the PLC is turned on.



Output OFF Bit (A50015)

Turning ON the Output OFF Bit causes all outputs on Basic I/O Units and Special I/O Units to be turned OFF. The outputs will be turned OFF regardless of the PLC's operating mode.

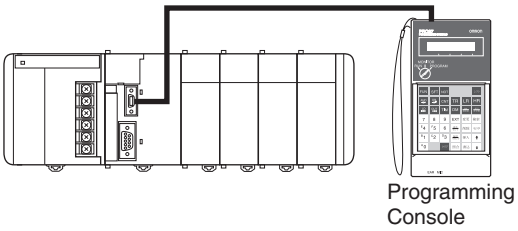


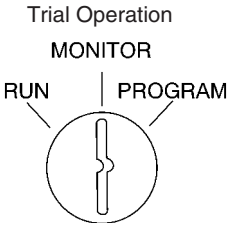
10-c) Trial Operation

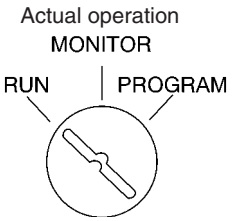
Use the Programming Console or Programming Device (CX-Programmer) to switch the CPU Unit to MONITOR mode.

Using a Programming Console

Turn the Mode Switch to MONITOR for the Trial Operation. (Turn the switch to RUN for full-scale PLC operation.)

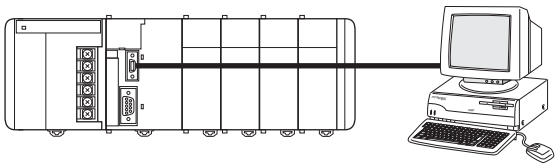






Using a Programming Console

The PLC can be put into MONITOR mode with a host computer running CX-Programmer.



CX-Programmer

Trial Operation

Select ***PC, Mode, MONITOR.***

Actual operation

Select ***PC, Mode, RUN.***

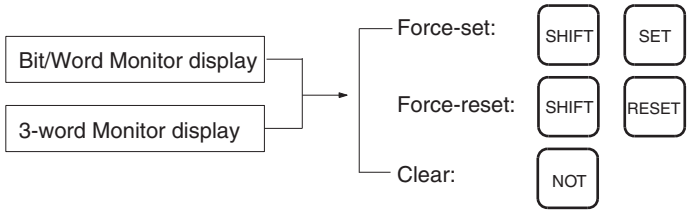
10-d) Monitoring and Debugging

There are several ways to monitor and debug PLC operation, including the force-set and force-reset operations, differentiation monitoring, time chart monitoring, data tracing, and online editing.

Force-Set and Force-Reset

When necessary, the force-set and force-reset operations can be used to force the status of bits and check program execution.

When a Programming Console is being used, monitor the bits with Bit/Word Monitor or 3-word Monitor. Press the SHIFT+SET Keys to force-set a bit or press the SHIFT+RESET Keys to force-reset a bit. The forced status can be cleared by pressing the NOT Key.

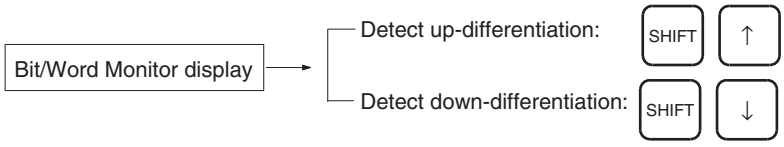


When CX-Programmer is being used, click the bit to be force-set or force-reset and then select ***Force On*** or ***Off*** from the PLC menu.

Differentiation Monitor

The differentiation monitor operation can be used to monitor the up or down differentiation of particular bits.

When a Programming Console is being used, monitor the bit with Bit/Word Monitor. Press the SHIFT+Up Arrow Keys to specify up differentiation or press the SHIFT+Down Arrow Keys to specify down differentiation.



When CX-Programmer is being used, follow the procedure shown below.

1,2,3...

1. Click the bit for differential monitoring.
2. Click ***Differential Monitor*** from the PLC Menu. The Differential Monitor Dialog Box will be displayed.
3. Click ***Rising*** or ***Falling.***
4. Click the **Start** button. The buzzer will sound when the specified change is detected and the count will be incremented.
5. Click the **Stop** button. Differential monitoring will stop.

Time Chart Monitoring

The CX-Programmer's time chart monitor operation can be used to check and debug program execution.

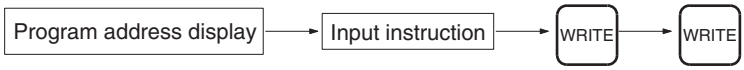
Data Tracing

The CX-Programmer's data trace operation can be used to check and debug program execution.

Online Editing

When a few lines of the program in the CPU Unit have to be modified, they can be edited online with the PLC in MONITOR mode or PROGRAM mode from a Programming Console. When more extensive modifications are needed, upload the program from the CPU Unit to the CX-Programmer, make the necessary changes, and transfer the edited program back to the CPU Unit.

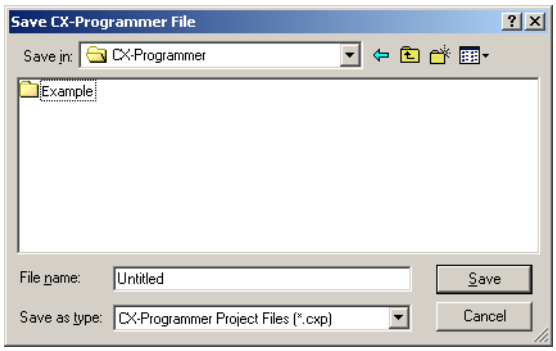
When a Programming Console is being used, display the desired program address, input the new instruction, and press the WRITE Key twice. A single program address (instruction) can be edited.



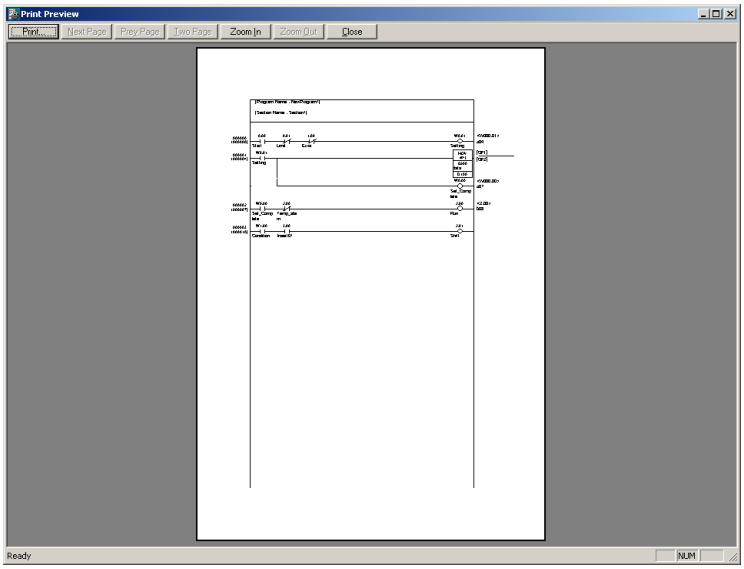
When CX-Programmer is being used, several instruction blocks can be edited.

11. Save and Print the Program

To save a created program, select File - Save or File - Save As from the CX-Programmer menus.



To print a created program, first preview the print output by selecting the desired section in the CX-Programmer's project workspace and selecting ***File - Print Preview*** from the CX-Programmer menu. If the preview is acceptable, select ***File - Print*** to print.



12. Run the Program

Switch the PLC to RUN mode to run the program.

SECTION 5
Installation and Wiring

This section describes how to install a PLC System, including mounting the various Units and wiring the System. Be sure to follow the instructions carefully. Improper installation can cause the PLC to malfunction, resulting in very dangerous situations.

5-1 Fail-safe Circuits

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

Supply Power to the PLC before Outputs

If the PLC's power supply is turned on after the controlled system's power supply, outputs in Units such as DC Output Units may malfunction momentarily. To prevent any malfunction, add an external circuit that prevents the power supply to the controlled system from going on before the power supply to the PLC itself.

Managing PLC Errors

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

- Operation of the Power Supply Unit's overcurrent protection circuit
- A CPU error (watchdog timer error) or CPU on standby
- A fatal error* (memory error, I/O bus error, duplicate number error, too many I/O points error, program error, cycle time too long error, or FALS(007) error)

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

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

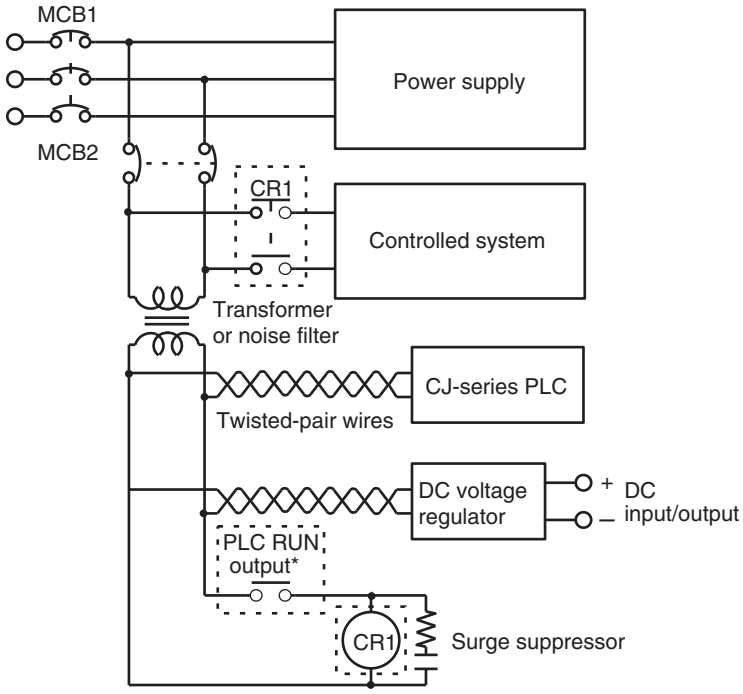
Managing Output Malfunctions

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

Emergency Stop Circuit

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

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

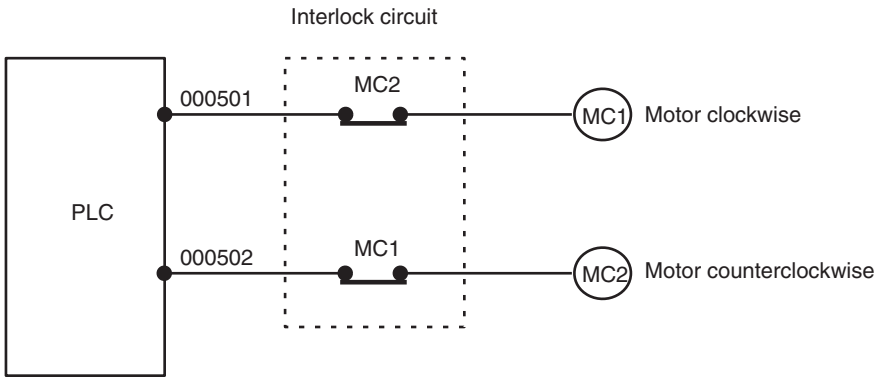


Note

1. When a Power Supply Unit without a RUN output is used, program the Always ON Flag (A1) as the execution condition for an output point from an Output Unit.
2. Do not latch the RUN output and use it in a circuit to stop a controlled object. Chattering of the relay contacts used in the output may cause incorrect operation.

Interlock Circuits

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



This circuit prevents outputs MC1 and MC2 from both being ON at the same time even if both CIO 000500 and CIO 000501 are both ON, so the motor is protected even if the PLC is programmed improperly or malfunctions.

5-2 Installation

5-2-1 Installation and Wiring Precautions

Be sure to consider the following factors when installing and wiring the PLC to improve the reliability of the system and make the most of the PLC's functions.

Ambient Conditions

Do not install the PLC in any of the following locations.

- Locations subject to ambient temperatures lower than 0°C or higher than 55°C.
- Locations subject to drastic temperature changes or condensation.
- Locations subject to ambient humidity lower than 10% or higher than 90%.
- Locations subject to corrosive or flammable gases.
- Locations subject to excessive dust, salt, or metal filings.
- Locations that would subject the PLC to direct shock or vibration.
- Locations exposed to direct sunlight.
- Locations that would subject the PLC to water, oil, or chemical reagents.

Be sure to enclose or protect the PLC sufficiently in the following locations.

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power lines.

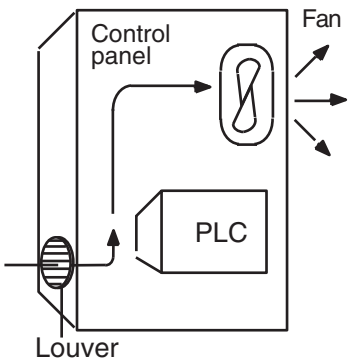
Installation in Cabinets or Control Panels

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

Temperature Control

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

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



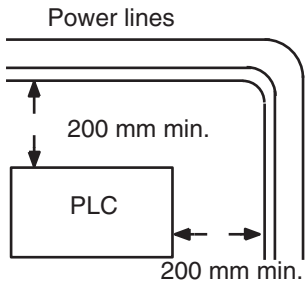
- If a Programming Console will be left on the PLC, the ambient temperature must be within the Programming Console's operating range of 0°C to 45°C.

Accessibility for Operation and Maintenance

- To ensure safe access for operation and maintenance, separate the PLC as much as possible from high-voltage equipment and moving machinery.
- The PLC will be easiest to install and operate if it is mounted at a height of about 1.3 m (4 feet).

Improving Noise Resistance

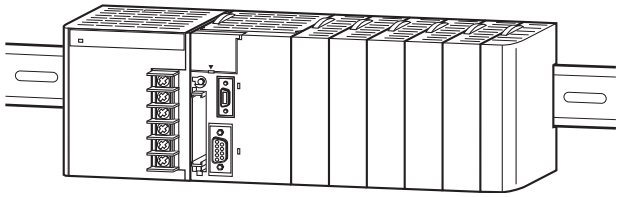
- Do not mount the PLC in a control panel containing high-voltage equipment.
- Install the PLC at least 200 mm (6.5 feet) from power lines.



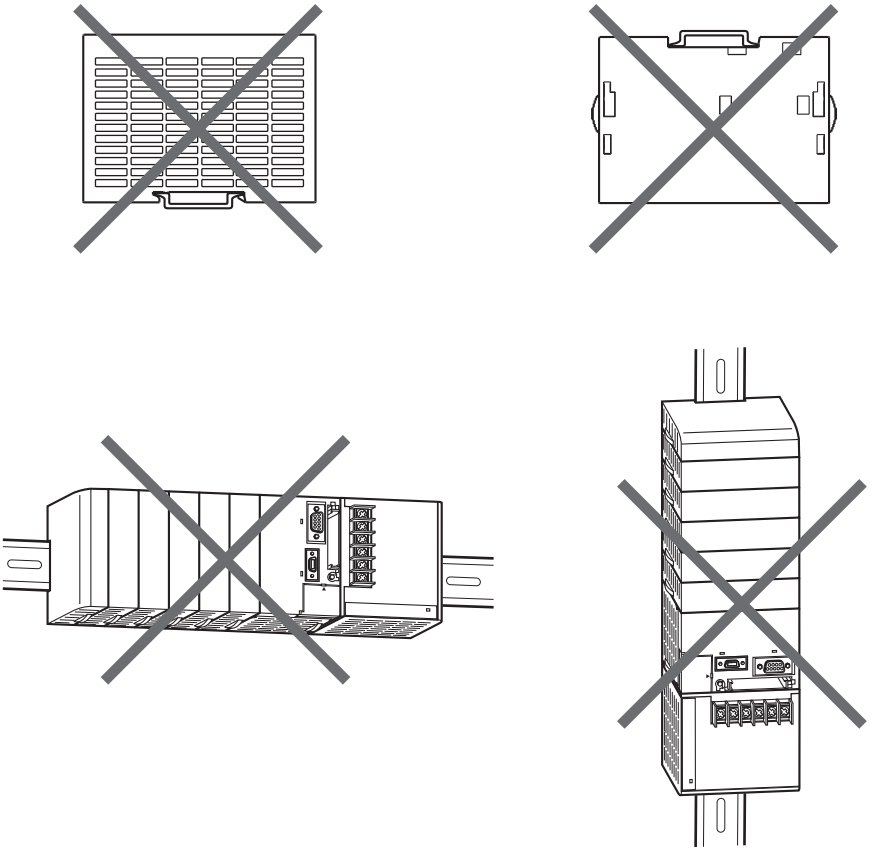
- Ground the mounting plate between the PLC and the mounting surface.
- When I/O Connecting Cables are 10 m or longer, connect the control panels in which Racks are mounted with heavier power wires (3 wires at least 2 mm^2 in cross-sectional area).

PLC Orientation

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



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

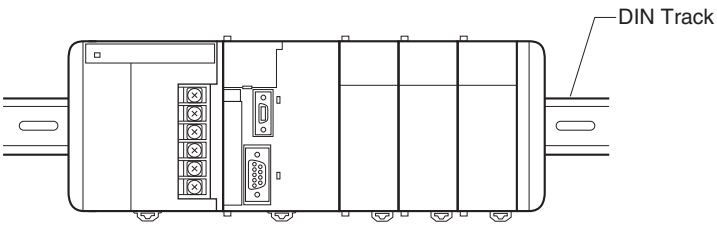


Note Always use the standard installation method. A nonstandard installation will decrease heat dissipation, and may delay the replacement notification signal (in particular for Power Supply Units with Replacement Notification), or degrade or damage the internal elements.

5-2-2 Installation in a Control Panel

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

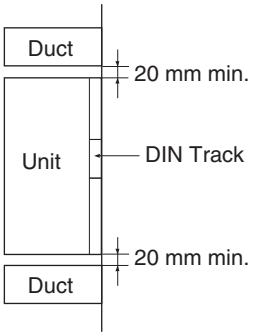
Note ACJ-series PLC must be mounted on DIN Track. It cannot be mounted with screws.



- Consider the width of wiring ducts, wiring, ventilation, and Unit replacement when determining the space between Racks.
  If the PLC is installed vertically, allow at least 66 mm of clearance.
- Up to three Expansion Racks can be connected (but only one can be connected for CP1M CPU Units).
  Each I/O Connecting Cable can be up to 12 m long, but the sum total of

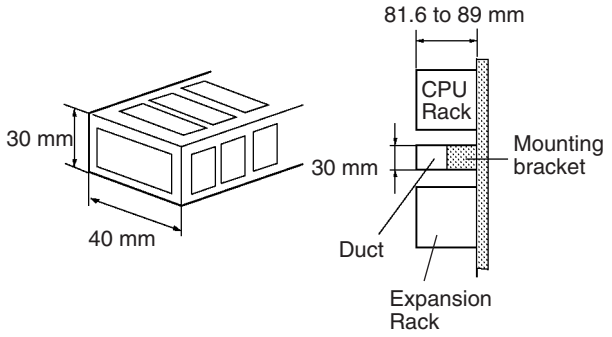
all cables between the CPU Rack and Expansion Racks must be 12 m or less.

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



Wiring Ducts

The following example shows the proper installation of wiring duct.



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

Terminal Screws

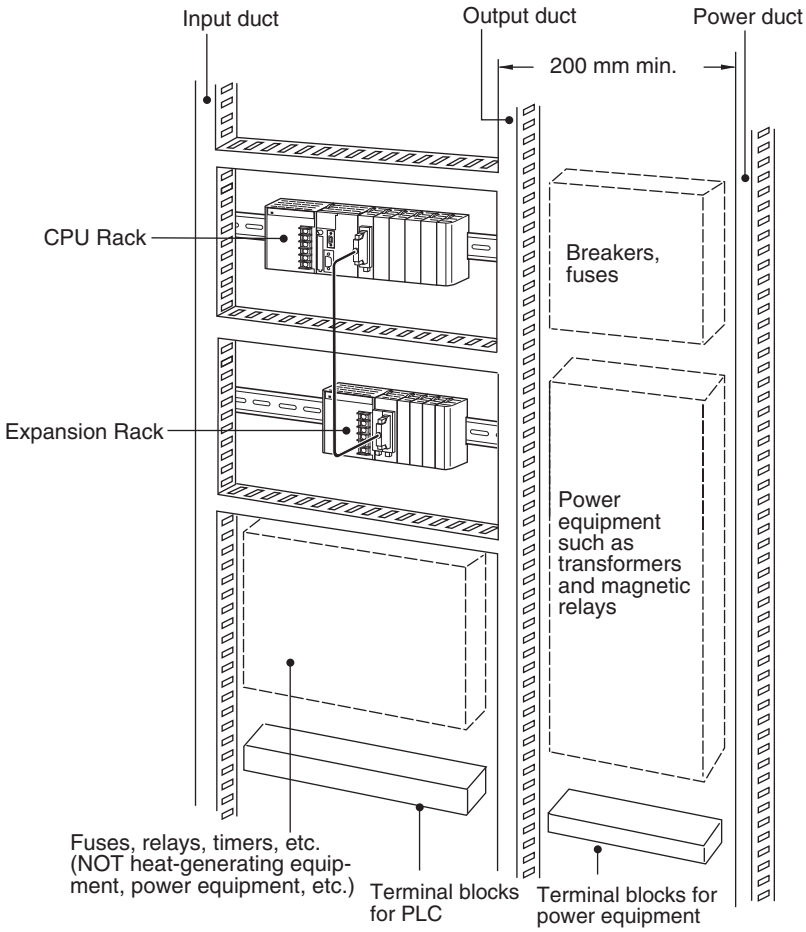
M3.5: 0.8 N·m
M3: 0.5 N·m

Cable Connector Screws

M2.6: 0.2 N·m

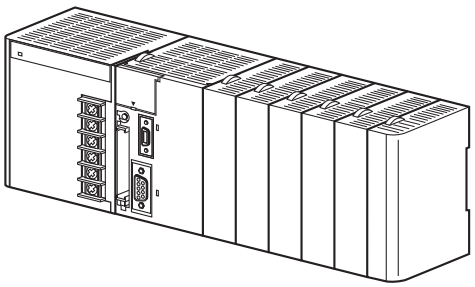
Routing Wiring Ducts

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

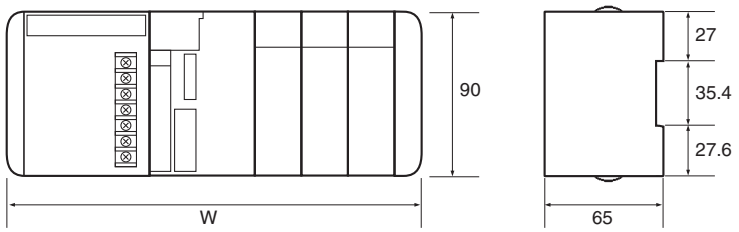


5-2-3 Assembled Appearance and Dimensions

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



Dimensions (Unit: mm)



The width the CJ-series Power Supply Unit depends on the model. The width of the Power Supply Unit when computing the width of a Rack, is “a.”

Name	Model number	Specifications	Unit width
Power Supply Unit	CJ1W-PA205R	100 to 240 V AC, 25 W	80 mm
	CJ1W-PA205C	100 to 240 V AC, 25 W	80 mm
	CJ1W-PA202	100 to 240 V AC, 14 W	45 mm
	CJ1W-PD025	24 V DC, 25 W	60 mm
	CJ1W-PD02C	24 V DC, 19.6 W	27 mm

CPU Unit width: b

Name	Model number	Specifications	Unit width
CPU Unit	CJ1H-CPU67H	I/O points: 2,560 Program capacity: 250 Ksteps	62 mm
	CJ1H-CPU66H	I/O points: 2,560 Program capacity: 120 Ksteps	
	CJ1H-CPU65H	I/O points: 2,560 Program capacity: 60 Ksteps	
	CJ1G-CPU45H	I/O points: 1,280 Program capacity: 60 Ksteps	

Name	Model number	Specifications	Unit width
CPU Unit	CJ1H-CPU67H-R	I/O points: 2,560 Program capacity: 250 Ksteps	62 mm
	CJ1H-CPU66H-R	I/O points: 2,560 Program capacity: 120 Ksteps	
	CJ1H-CPU65H-R	I/O points: 2,560 Program capacity: 60 Ksteps	
	CJ1H-CPU64H-R	I/O points: 2,560 Program capacity: 30 Ksteps	
	CJ1G-CPU44H	I/O points: 1,280 Program capacity: 30 Ksteps	
	CJ1G-CPU43H	I/O points: 960 Program capacity: 20 Ksteps	
	CJ1G-CPU42H	I/O points: 960 Program capacity: 10 Ksteps	
	CJ1G-CPU45	I/O points: 1,280 Program capacity: 60 Ksteps	
	CJ1G-CPU44	I/O points: 1,280 Program capacity: 30 Ksteps	
	CJ1M-CPU23	I/O points: 640 Program capacity: 20 Ksteps Built-in pulse I/O	49 mm
	CJ1M-CPU22	I/O points: 320 Program capacity: 10 Ksteps Built-in pulse I/O	
	CJ1M-CPU21	I/O points: 160 Program capacity: 5 Ksteps Built-in pulse I/O	
	CJ1M-CPU13	I/O points: 640 Program capacity: 20 Ksteps	31 mm
	CJ1M-CPU12	I/O points: 320 Program capacity: 10 Ksteps	
	CJ1M-CPU11	I/O points: 160 Program capacity: 5 Ksteps	

Other than the CPU Units and Power Supply Units, CJ-series Units come in two widths: 20 mm and 31 mm. When computing the width of a Rack, the number of 20-mm Units is “n.”

Name	Model number	Unit width
I/O Control Unit	CJ1W-IC101	20 mm
32-point Basic I/O Units	CJ1W-ID231/ID232 CJ1W-OD231/OD232	
B7A Interface Units	CJ1W-B7A14/04/22	
CompoBus/S Master Unit	CJ1W-SRM21	

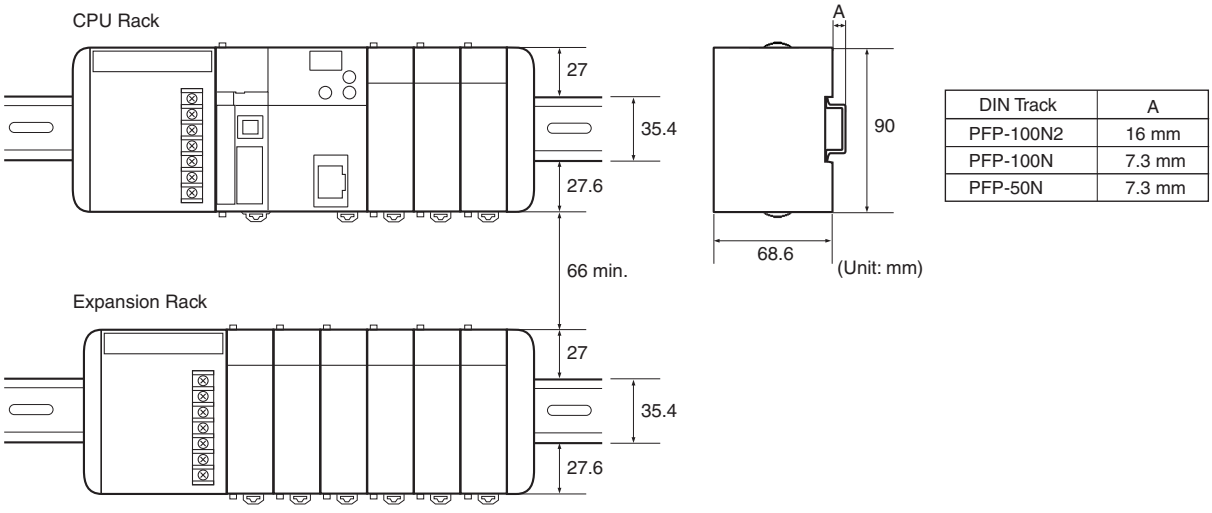
When computing the width of a Rack, the number of 31-mm Units is "m."

Name	Model number	Unit width
I/O Interface Unit	CJ1W-II101	31 mm
16-point Basic I/O Units	CJ1W-ID201 CJ1W-ID211 CJ1W-IA111/201 CJ1W-INT01 CJ1W-OD201/202/203/204/211/212 CJ1W-OC201/211 CJ1W-OA201 CJ1W-IDP01	
32-point Basic Mixed I/O Units	CJ1W-MD231/232/233	
64-point Basic I/O Units and 64-point Basic Mixed I/O Units	CJ1W-ID261/262 CJ1W-OD261/262/263 CJ1W-MD261/263/563	
Analog Input Units Analog Output Units Analog I/O Units	CJ1W-AD041/081(-V1) CJ1W-DA021/041/08V CJ1W-MAD42	
Temperature Control Units	CJ1W-TC□□□	
Position Control Units	CJ1W-NC□□□	
High-speed Counter Unit	CJ1W-CT021	
DeviceNet Unit	CJ1W-DRM21	
Controller Link Unit	CJ1W-CLK21	
Serial Communications Unit	CJ1W-SCU41 CJ1W-SCU21	
Ethernet Unit	CJ1W-ETN11	

W = a (Power Supply Unit) + b (CPU Unit) + 20 x n + 31 x m + 14.7 (End Cover) mm

Example: CJ1W-PA205R Power Supply Unit, CJ1H-CPU66H CPU Unit, two 32-point Basic I/O Units and eight 31-mm Units.
W = 80 + 62 + 20 x 2 + 31 x 8 +14.7 = 444.7 mm

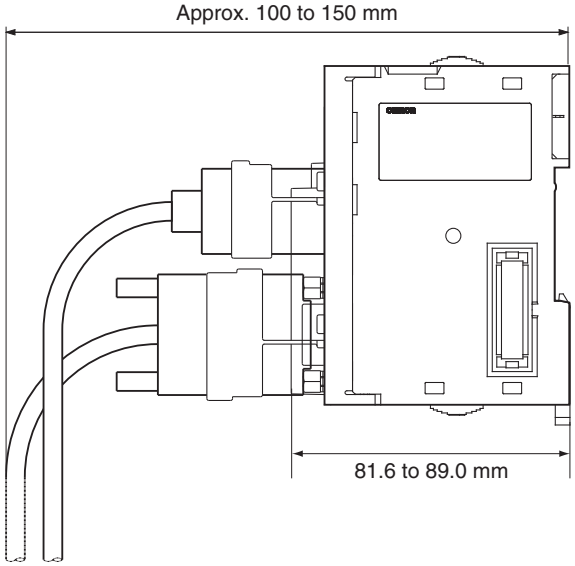
Installation Dimensions (Unit: mm)



DIN Track	A
PFP-100N2	16 mm
PFP-100N	7.3 mm
PFP-50N	7.3 mm

Installation Height

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

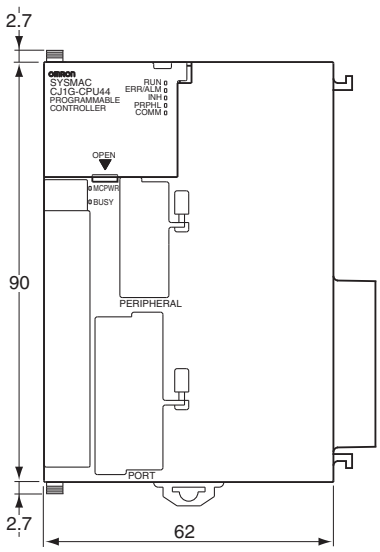


Unit Dimensions

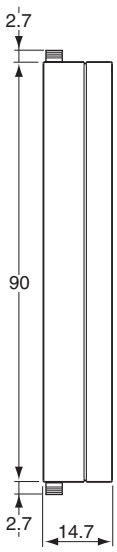
CJ-series CPU Unit

CJ1H-CPU□□H-R
CJ1G/H-CPU□□H
CJ1G-CPU□□

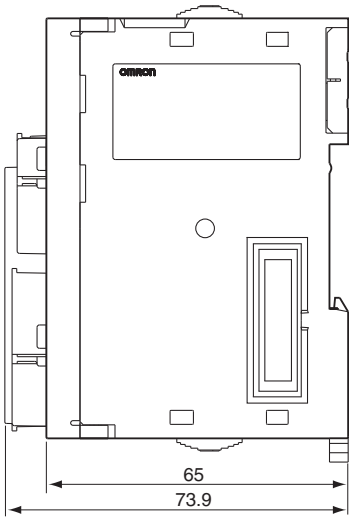
CPU Unit



End Cover

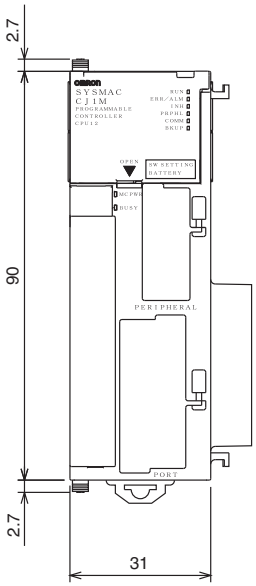


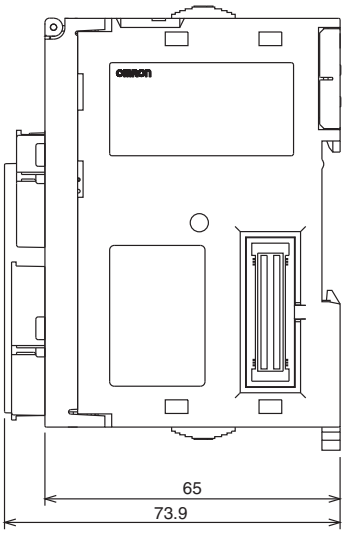
Unit Depth



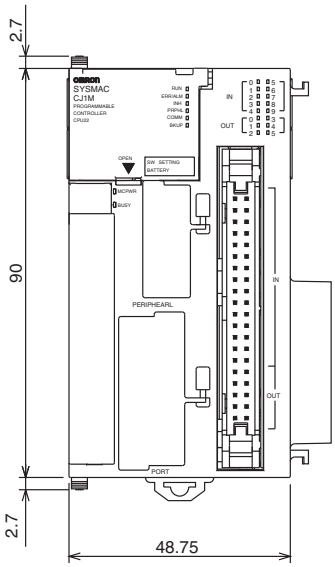
The depth is the same for all Units.

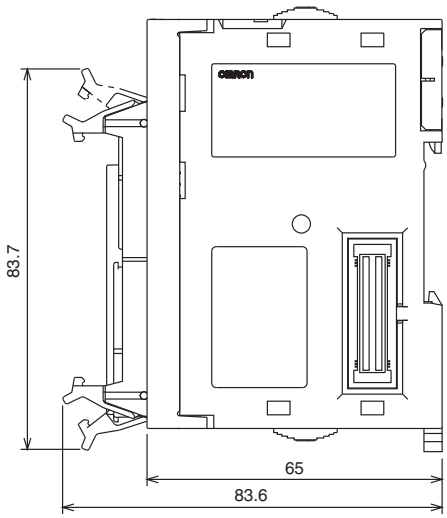
CJ1M-CPU1□





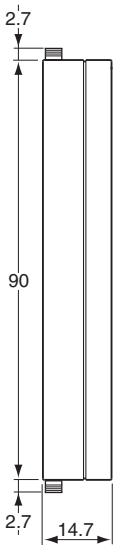
CJ1M-CPU2□





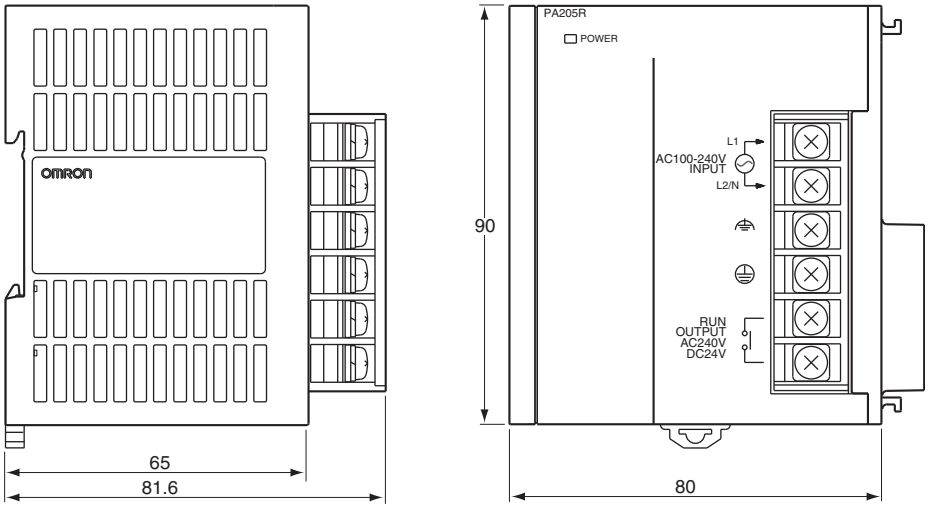
End Cover

CJ1W-TER01

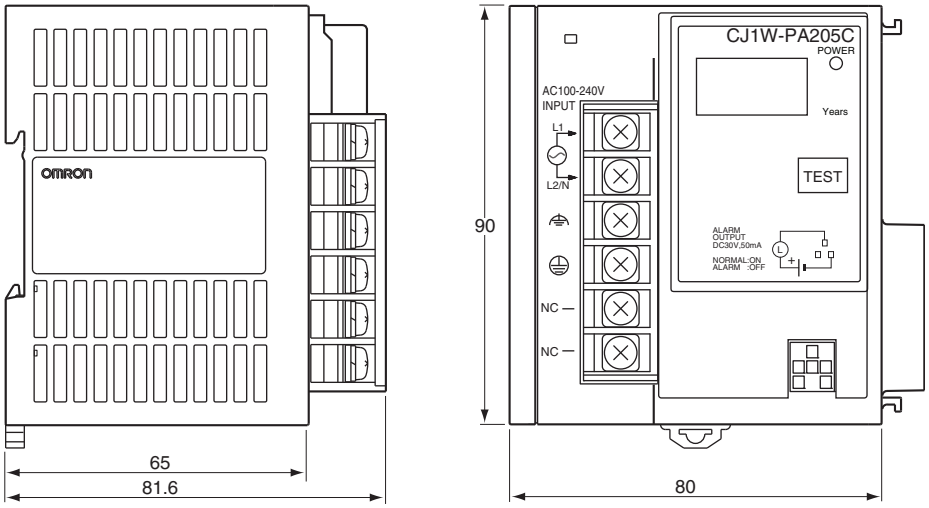


CJ-series Power Supply Units

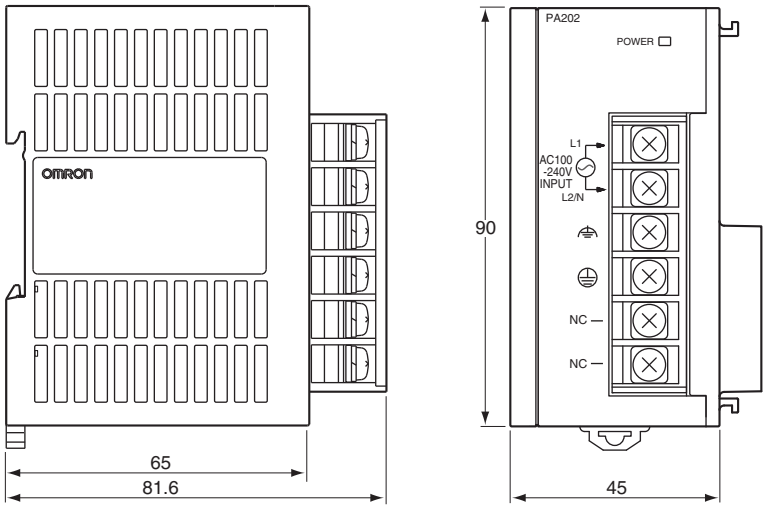
CJ1W-PA205R



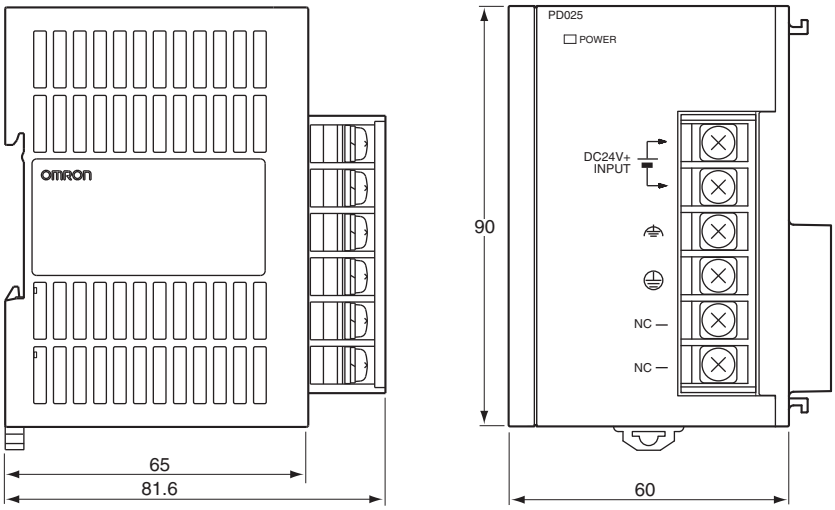
CJ1W-PA205C



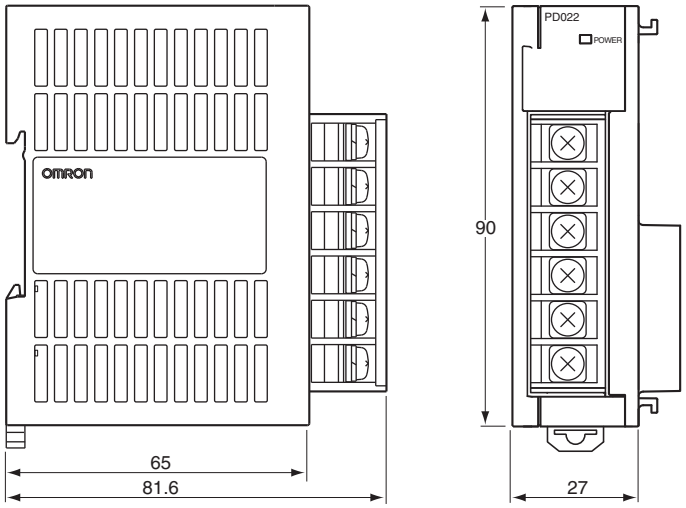
CJ1W-PA202



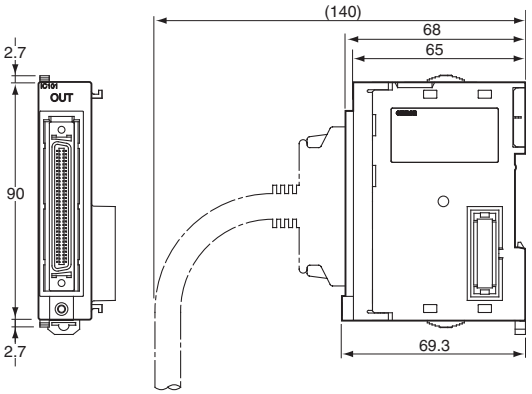
CJ1W-PD025



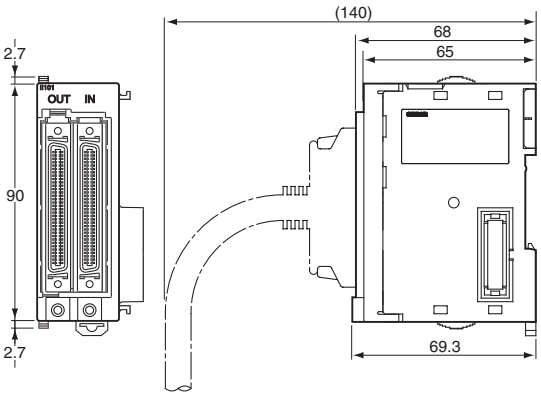
CJ1W-PD022



CJ1W-IC101 I/O Control Unit



CJ1W-II101 I/O Interface Unit

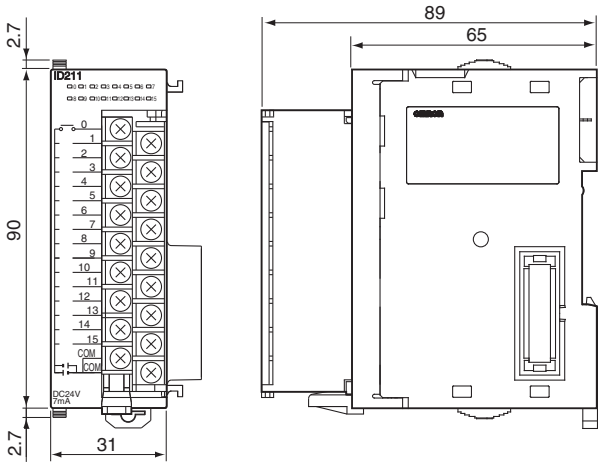


CJ-series Basic I/O Units

Note Refer to individual Unit operation manuals for the dimensions of CJ-series Special I/O Units and CJ-series CPU Bus Units.

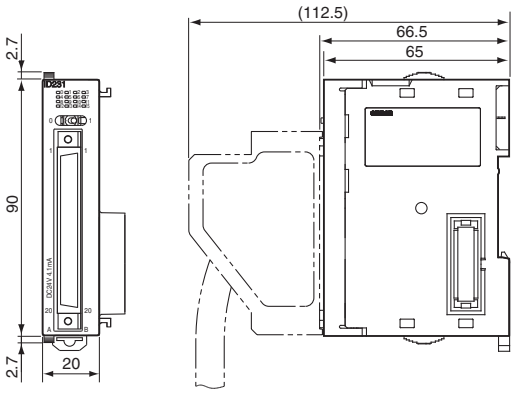
8/16-point Basic I/O Units

CJ1W-ID201 (8 inputs)
CJ1W-ID211 (16 inputs)
CJ1W-IA201 (8 inputs)
CJ1W-IA111 (16 inputs)
CJ1W-INT01 (16 interrupt inputs)
CJ1W-IDP01 (16 quick-response inputs)
CJ1W-OD201/203 (8 sinking outputs)
CJ1W-OD202/204 (8 sourcing outputs)
CJ1W-OD211 (16 sinking outputs)
CJ1W-OD212 (16 sourcing outputs)
CJ1W-OC201 (8 relay outputs)
CJ1W-OC211 (16 relay outputs)
CJ1W-OA201 (8 triac outputs)



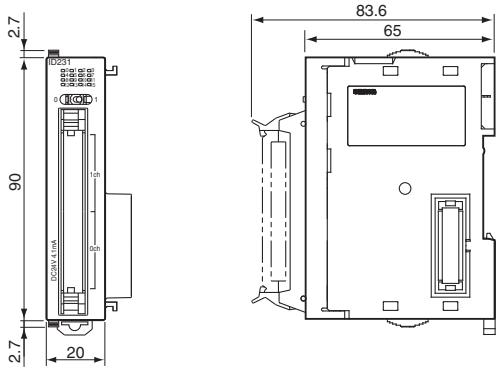
32-point Basic I/O Units, Fujitsu-compatible Connector

CJ1W-ID231 (32 inputs)
CJ1W-OD231 (32 outputs)



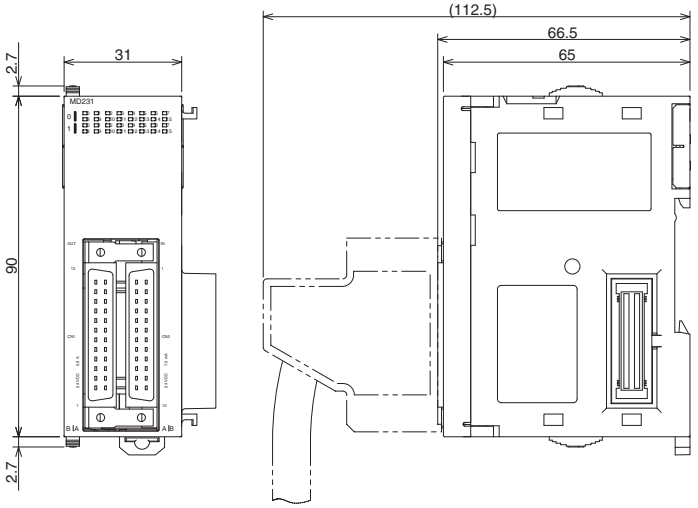
32-point Basic I/O Units, MIL Connector

CJ1W-ID232 (32 inputs)
CJ1W-OD232 (32 outputs)
CJ1W-OD233 (32 outputs)



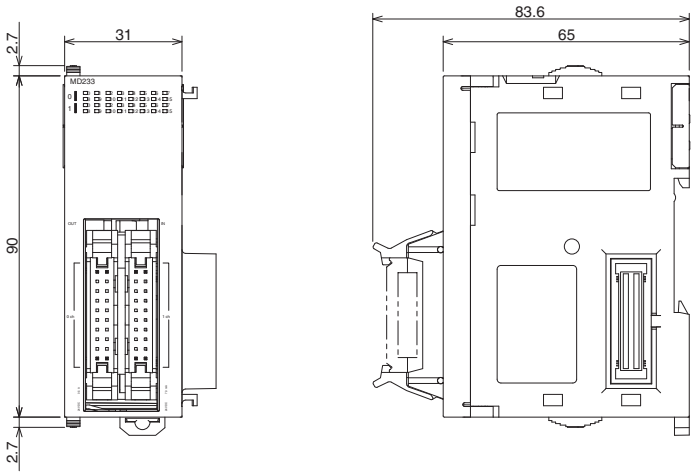
32-point Basic Mixed I/O Units, Fujitsu-compatible Connector

CJ1W-MD231 (16 inputs/16 outputs)



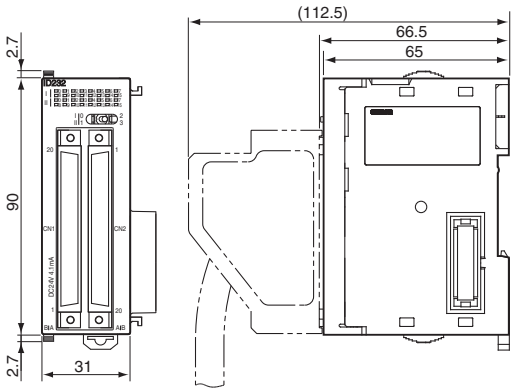
32-point Basic I/O Units, MIL Connector

CJ1W-MD232 (16 inputs/16 outputs)
CJ1W-MD233 (16 inputs/16 outputs)



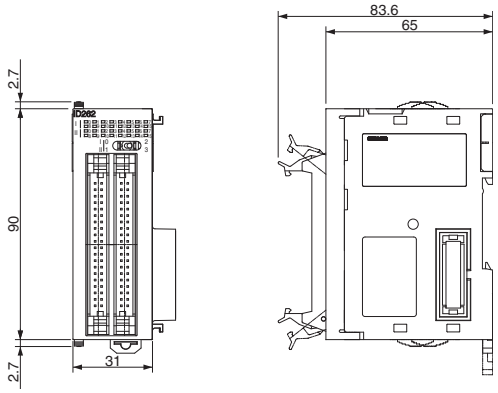
64-point Basic I/O Units, Fujitsu-compatible Connector

CJ1W-ID261 (64 inputs)
CJ1W-OD261 (64 outputs)



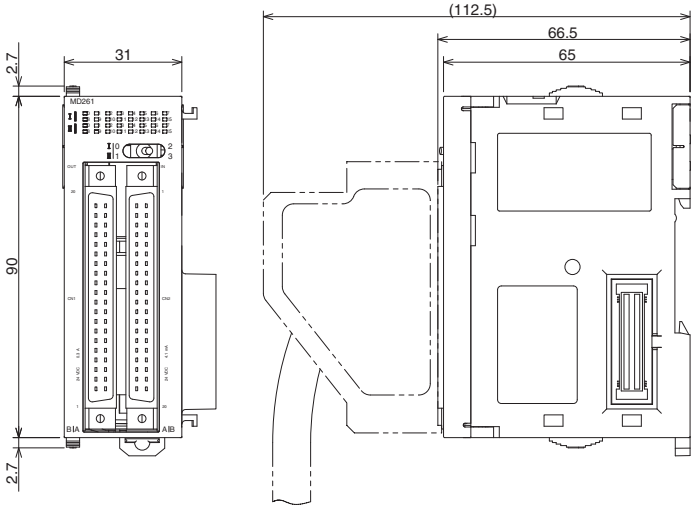
64-point Basic I/O Units, MIL Connector

CJ1W-ID262 (64 inputs)
CJ1W-OD262 (64 outputs)
CJ1W-OD263 (64 outputs)



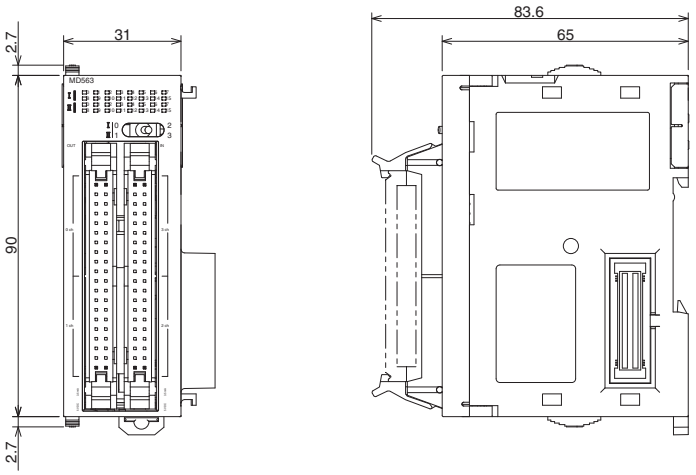
64-point Basic Mixed I/O Units, Fujitsu-compatible Connector

CJ1W-MD261 (32 inputs/32 outputs)



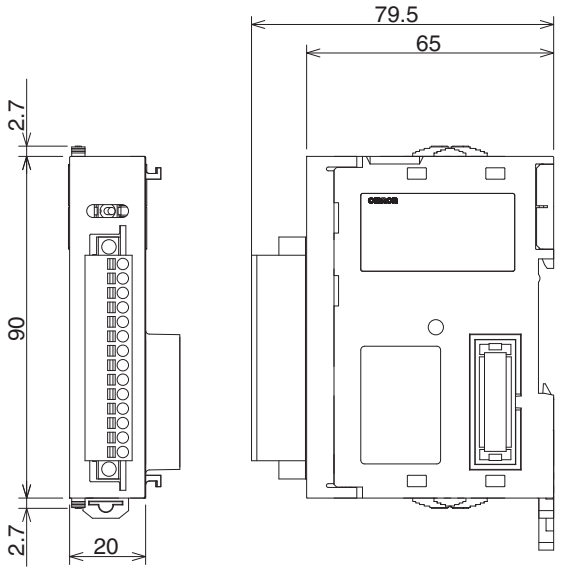
64-point Basic I/O Units, MIL Connector

CJ1W-MD263 (32 inputs/32 outputs)
CJ1W-MD563 (32 TTL inputs/32 TTL outputs)



B7A Interface Units

CJ1W-B7A14 (64 inputs (4 B7A ports))
CJ1W-B7A04 (64 outputs (4 B7A ports))
CJ1W-B7A22 (32 inputs/32 outputs (4 B7A ports))



5-2-4 CJ-series Unit Weights

Name	Model number	Weight
CJ-series Power Supply Unit	CJ1W-PA205R	250 g max.
	CJ1W-PA205C	400 g max.
	CJ1W-PA202	200 g max.
	CJ1W-PD025	300 g max.
	CJ1W-PD022	130 g max.
CJ-series CPU Units	CJ1H-CPU67H-R	200 g max. (See note.)
	CJ1H-CPU66H-R	200 g max. (See note.)
	CJ1H-CPU65H-R	200 g max. (See note.)
	CJ1H-CPU64H-R	200 g max. (See note.)
	CJ1H-CPU67H	200 g max. (See note.)
	CJ1H-CPU66H	200 g max. (See note.)
	CJ1H-CPU65H	200 g max. (See note.)
	CJ1G-CPU45H	190 g max. (See note.)
	CJ1G-CPU44H	190 g max. (See note.)
	CJ1G-CPU43H	190 g max. (See note.)
	CJ1G-CPU42H	190 g max. (See note.)
	CJ1M-CPU23	170 g max. (See note.)
	CJ1M-CPU22	170 g max. (See note.)
	CJ1M-CPU21	170 g max. (See note.)
	CJ1M-CPU13	120 g max. (See note.)
	CJ1M-CPU12	120 g max. (See note.)
	CJ1M-CPU11	120 g max. (See note.)
	CJ1G-CPU45	200 g max. (See note.)
	CJ1G-CPU44	200 g max. (See note.)
I/O Control Unit	CJ1W-IC101	70 g max.
I/O Interface Unit	CJ1W-II101	130 g max. (See note.)

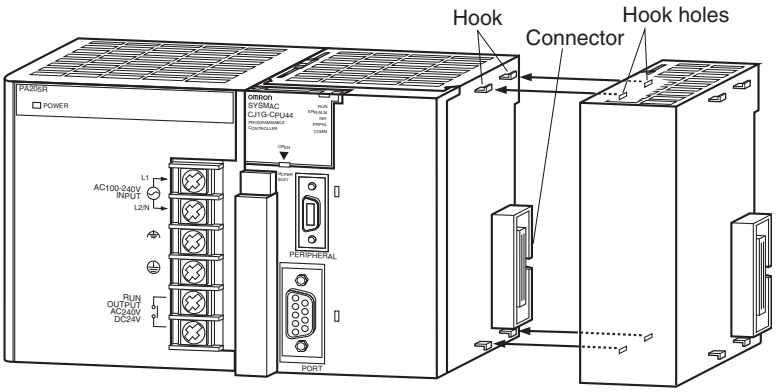
Name		Model number	Weight
CJ-series Basic I/O Units	Input Units	CJ1W-ID201	110 g max.
		CJ1W-ID211	110 g max.
		CJ1W-ID231	70 g max.
		CJ1W-ID232	70 g max.
		CJ1W-ID261	110 g max.
		CJ1W-ID262	110 g max.
		CJ1W-IA201	130 g max.
		CJ1W-IA111	130 g max.
		CJ1W-INT01	110 g max.
		CJ1W-IDP01	110 g max.
		CJ1W-B7A14	80 g max.
	Output Units	CJ1W-OD201	110 g max.
		CJ1W-OD202	120 g max.
		CJ1W-OD203	110 g max.
		CJ1W-OD204	120 g max.
		CJ1W-OD211	110 g max.
		CJ1W-OD212	120 g max.
		CJ1W-OD231	70 g max.
		CJ1W-OD232	80 g max.
		CJ1W-OD261	110 g max.
		CJ1W-OD262	110 g max.
		CJ1W-OD263	110 g max.
		CJ1W-OC201	140 g max.
		CJ1W-OC211	170 g max.
		CJ1W-OA201	150 g max.
		CJ1W-B7A04	80 g max.
	Mixed I/O Units	CJ1W-MD231	90 g max.
		CJ1W-MD232	100 g max.
		CJ1W-MD261	110 g max.
		CJ1W-MD233	90 g max.
		CJ1W-MD263	110 g max.
		CJ1W-MD563	110 g max.
		CJ1W-B7A22	80 g max.

Note The CPU Unit and I/O Interface Unit weights include the weight of the End Cover.

5-2-5 Connecting PLC Components

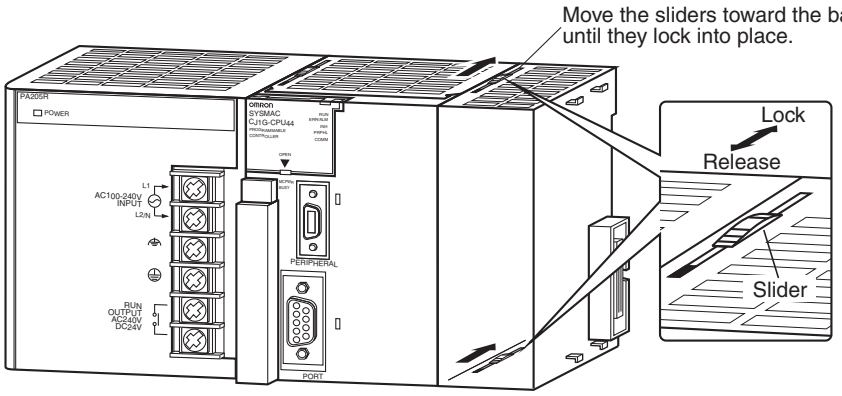
The Units that make up a CJ-series PLC can be connected simply by pressing the Units together and locking the sliders by moving them toward the back of the Units. The End Cover is connected in the same way to the Unit on the far right side of the PLC. Follow the procedure listed below to connect PLC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

1,2,3... 1. The following diagram shows the connection of two Units that make up a CJ-series PLC. Join the Units so that the connectors fit exactly.



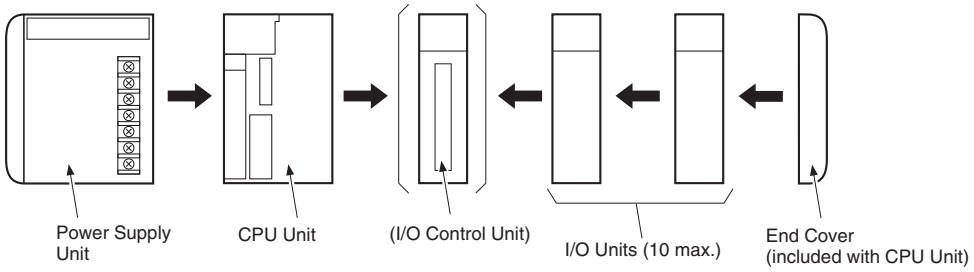
2. The yellow sliders at the top and bottom of each Unit lock the Units together. Move the sliders toward the back of the Units as shown below until they click into place.

   Note If the locking tabs are not secured properly, the CJ-series may not function properly. Be sure to slide the locking tabs until they are securely in place.



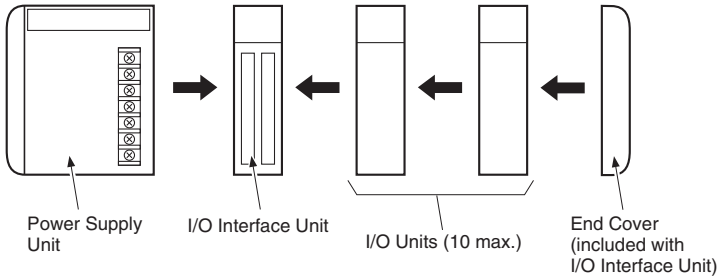
3. Attach the End Cover to the Unit on the far right side of the Rack.

CPU Rack



Note Connect the I/O Control Unit directly to the CPU Unit to enable connecting Expansion Racks.

Expansion Rack



Note Connect the I/O Interface Unit directly to the Power Supply Unit.

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

⚠ **Caution** Attach the End Cover to the Unit on the far right side of the Rack. An I/O bus error will occur and the PLC will not operate in either RUN or MONITOR mode if the End Cover is not connected. If this occurs, the following information will be set in memory.

Name	Address	Status
I/O Bus Error Flag	A 40114	ON
I/O Bus Error Slot Number	A40400 to A40407	0E hex
I/O Bus Error Rack Number	A40408 to A40415	0E hex

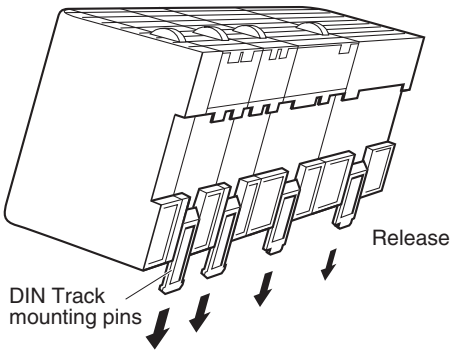
Note

1. Always turn OFF the power supply before connecting Units to each other.
2. Always turn OFF the power supply to the entire system before replacing a Unit.
3. A maximum of 10 I/O Units can be connected to a CPU Rack or an Expansion Rack. If 11 or more I/O Units are connected, and I/O overflow error will occur and the PLC will not operate in either RUN or MONITOR mode. If this occurs, The I/O Overflow Flag (A40111) will turn ON and A40713 to A40715 (I/O Overflow Details 2) will turn ON.

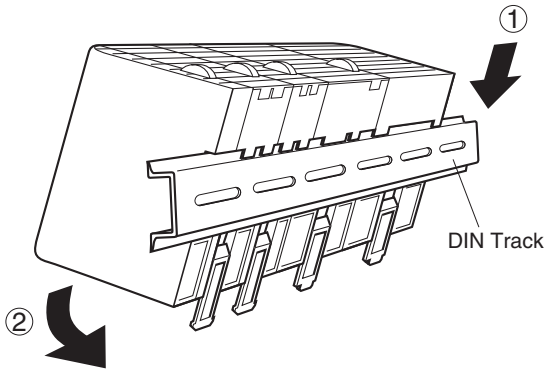
5-2-6 DIN Track Installation

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

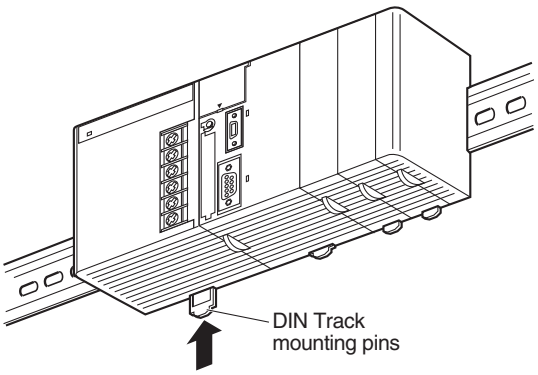
1,2,3... 1. Release the pins on the backs of the CJ-series Units.



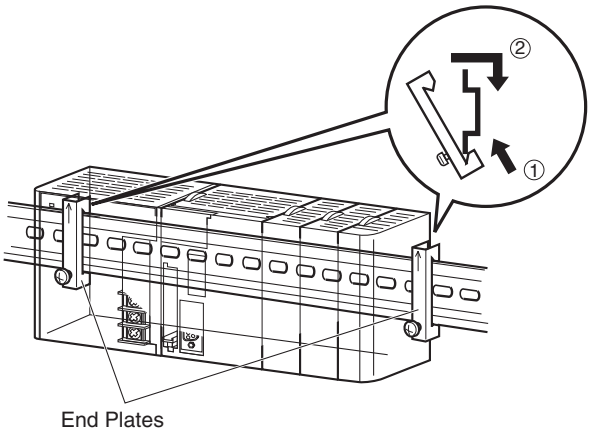
2. Fit the back of the PLC onto the DIN Track by inserting the top of the track and then pressing in at the bottom of the PLC, as shown below.



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



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

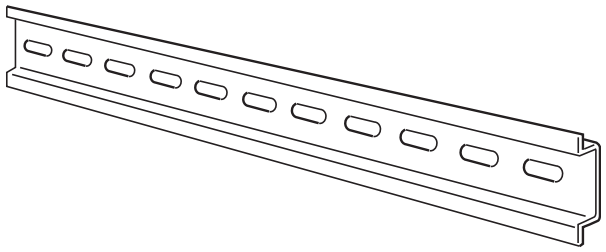


DIN Track and Accessories

Use the DIN Track and DIN Track End Plates shown below.

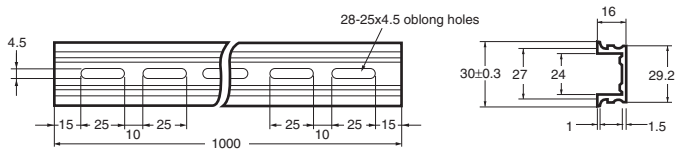
DIN Track

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

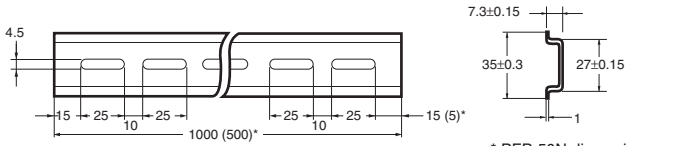


Secure the DIN Track to the control panel using M4 screws separated by 210 mm (6 holes) or less and using at least 3 screws. The tightening torque is 1.2 N·m.

PFP-100N2 DIN Track



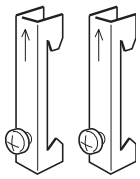
PFP-100N/50N DIN Track



* PFP-50N dimensions are given in parentheses.

DIN Track End Plates (2 required)

Model number: PFP-M



5-2-7 Connecting CJ-series Expansion Racks

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

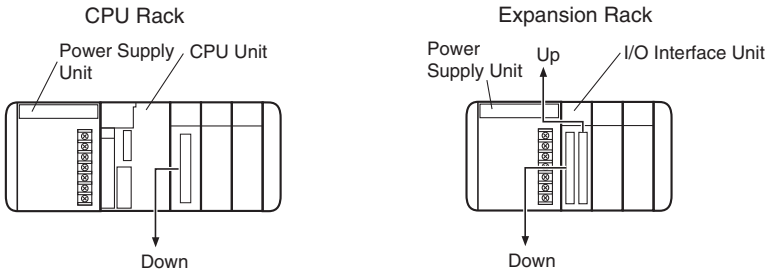
CS/CJ-series I/O Connecting Cables

The CS/CJ-series I/O Connecting Cables have connectors with a simple lock mechanism are used to connect the CPU Rack to an Expansion Rack or to connect two Expansion Racks.

CS/CJ-series I/O
Connecting Cables

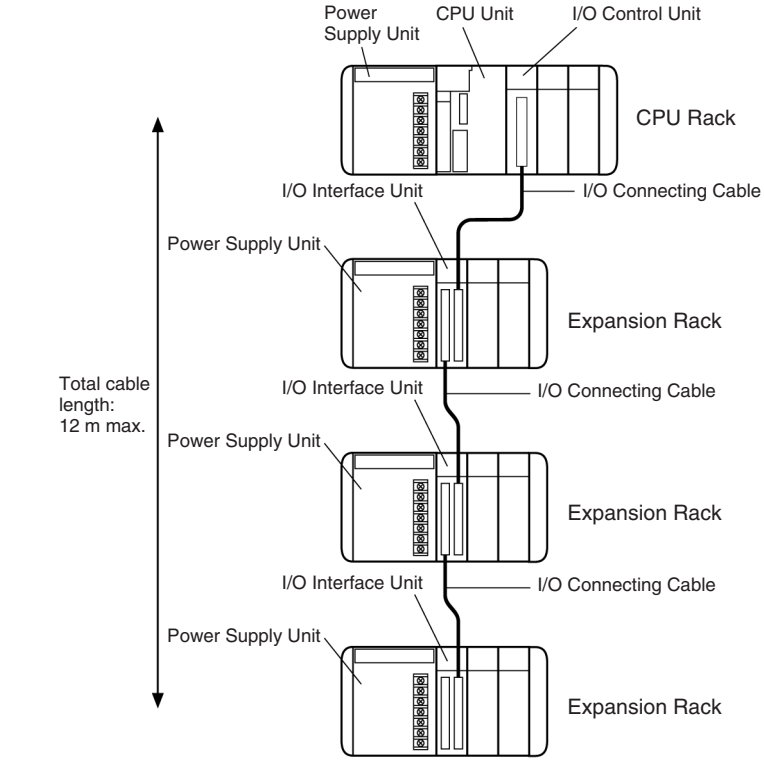
Model number	Cable length
CS1W-CN313	0.3 m
CS1W-CN713	0.7 m
CS1W-CN223	2 m
CS1W-CN323	3 m
CS1W-CN523	5 m
CS1W-CN133	10 m
CS1W-CN133B2	12 m

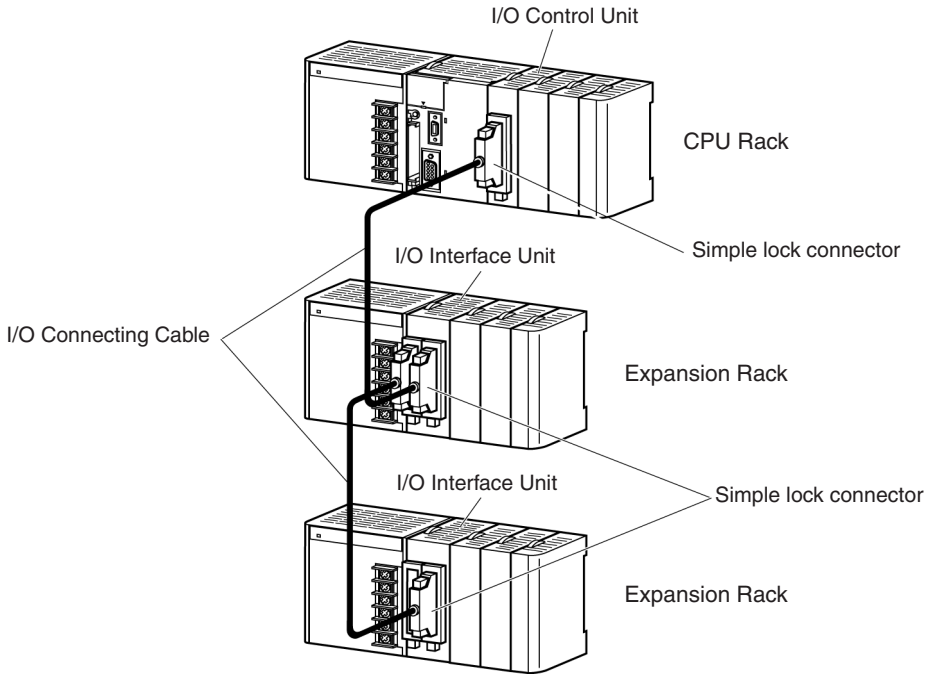
- Install the Racks and select I/O Connecting Cables so that the total length of all I/O Connecting Cables does not exceed 12 m.
- The following diagram shows where each I/O Connecting Cable must be connected on each Rack. The Rack will not operate if the cables aren't connected properly. (The "up" direction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



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

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



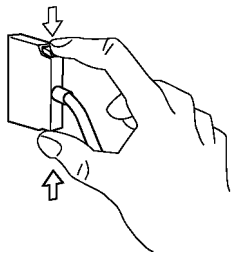


Connecting the Simple Locking Connectors

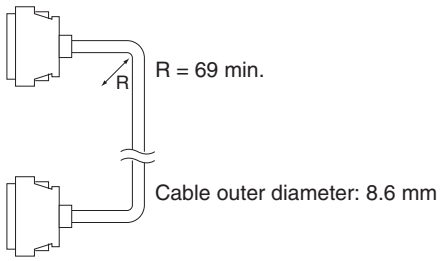
Press the tabs on the end of the connector and insert the connector until it locks in place. The PLC will not operate properly if the connector isn't inserted completely.

Note

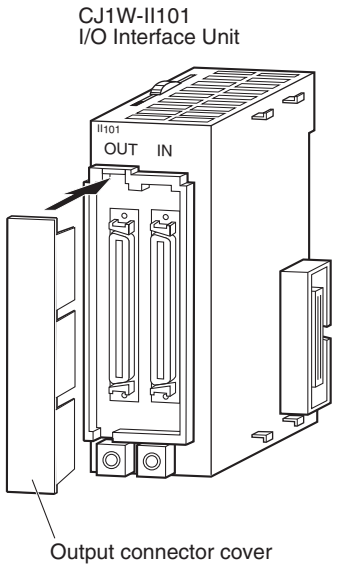
1. When using an I/O Connecting Cable with a locking connector, be sure that the connector is firmly locked in place before using it.



2. Always turn OFF the power supply to the PLC before connecting a cable.
3. Do not route the I/O Connecting Cables through ducts that contain the I/O or power wiring.
4. An I/O bus error will occur and the PLC will stop if an I/O Connecting Cable's connector separates from the Rack. Be sure that the connectors are secure.
5. A 63-mm hole will be required if the I/O Connecting Cable must pass through a hole when connecting an Expansion Rack.
6. The cables can withstand a pulling force up to 49 N (11 lbs), so be sure that they aren't pulled too forcefully.
7. The I/O Connecting Cables mustn't be bent too severely. The minimum bending radii are shown in the following diagram.



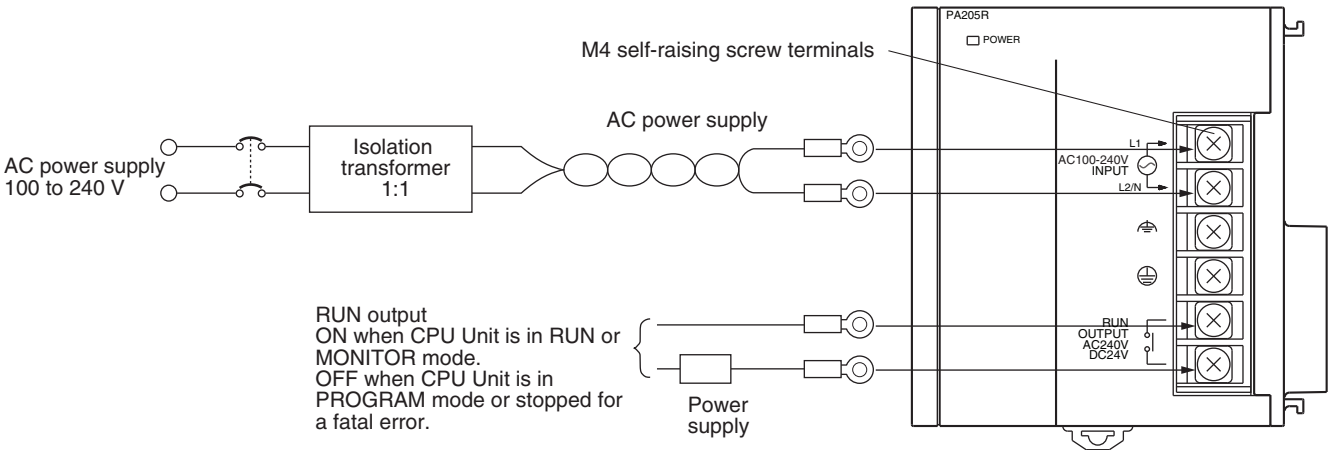
8. Always attach the cover to the output connector (left side) on the last I/O Interface Unit on the last Expansion Rack to protect it from dust.



5-3 Wiring

5-3-1 Power Supply Wiring

CJ1W-PA205R Power Supply Unit (AC)



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

AC Power Source

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

Supply voltage	Allowable voltage fluctuations
100 to 240 V AC	85 to 264 V AC

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

Isolation Transformer

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

Power Supply Capacity

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

RUN Output

This output is ON whenever the CPU Unit is operating in RUN or MONITOR mode; it is OFF when the CPU Unit is in PROGRAM mode or a fatal error has occurred.

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

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

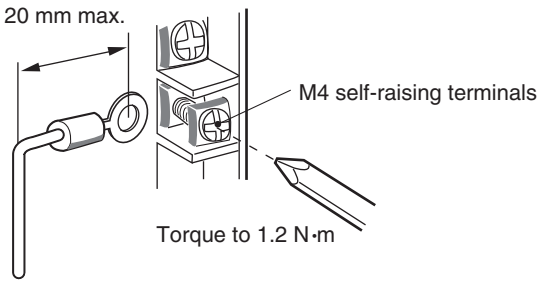
Crimp Terminals

Terminal screws	M4 self-rising screws
Recommended wire size	AWG 20 to 14 (0.517 to 2.08 mm^2)
Recommended tightening torque	1.2 N·m

Recommended crimp terminals

Manufacturer	Models	Shape	Applicable wire range (stranded wire)
JST Mfg.	V1.25-YS4A	Y-shaped terminal with sleeve	0.25 to 1.65 mm^2 (AWG 22 to 16)
	V1.25-M4	Round terminal with sleeve	
	V2-YS4A	Y-shaped terminal with sleeve	1.04 to 2.63 mm^2 (AWG 16 to 14)
	V2-M4	Round terminal with sleeve	

Note
1. Use crimp terminals for wiring.
2. Do not connect bare stranded wires directly to the terminals.

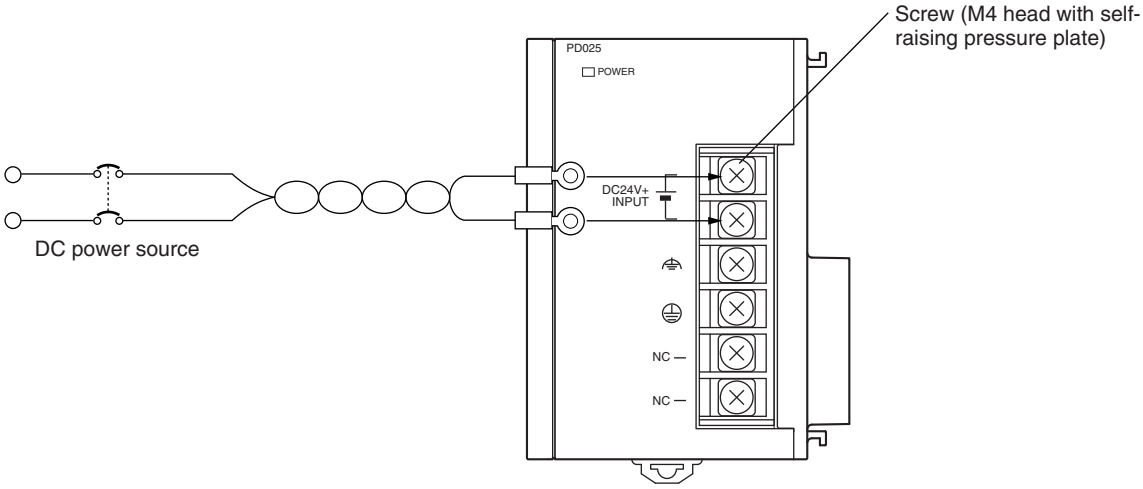


⚠ **Caution** Tighten the AC power supply terminal block screws to the torque of 1.2 N·m. Loose screws may result in short-circuit, malfunction, or fire.

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

DC Power Supplies

CJ1W-PD025 Power Supply Unit



DC Power Source

Supply 24 V DC. Keep voltage fluctuations within the specified range.

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

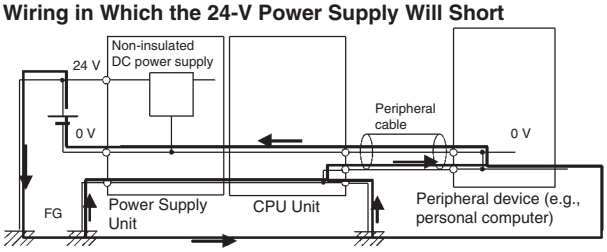
Power Supply Capacity

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

Precautions when Using CJ1W-PC022 Non-insulated Power Supply Units

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

Wiring in Which the 24-V Power Supply Will Short



Crimp Terminals

Terminal screws	M4 self-rising screws
Recommended wire size	AWG 20 to 14 (0.517 to 2.08 mm^2)
Recommended tightening torque	1.2 N·m

Recommended crimp terminals

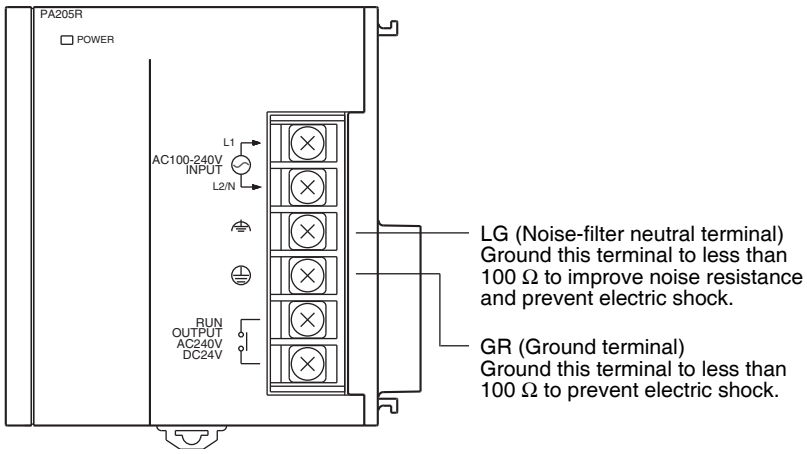
Manufacturer	Models	Shape	Applicable wire range (stranded wire)
JST Mfg.	V1.25-YS4A	Y-shaped terminal with sleeve	0.25 to 1.65 mm^2 (AWG 22 to 16)
	V1.25-M4	Round terminal with sleeve	
	V2-YS4A	Y-shaped terminal with sleeve	1.04 to 2.63 mm^2 (AWG 16 to 14)
	V2-M4	Round terminal with sleeve	

Note

1. Use crimp terminals for wiring.
2. Do not connect bare stranded wires directly to the terminals.
3. Be sure not to reverse the positive and negative leads when wiring the power supply terminals.
4. Supply power to all of the Power Supply Units from the same source.
5. Do not remove the protective label from the top of the Unit until wiring has been completed. This label prevents wire strands and other foreign matter from entering the Unit during wiring procedures.
6. Do not forget to remove the label from the top of the Power Supply Unit after wiring the Unit. The label will block air circulation needed for cooling.

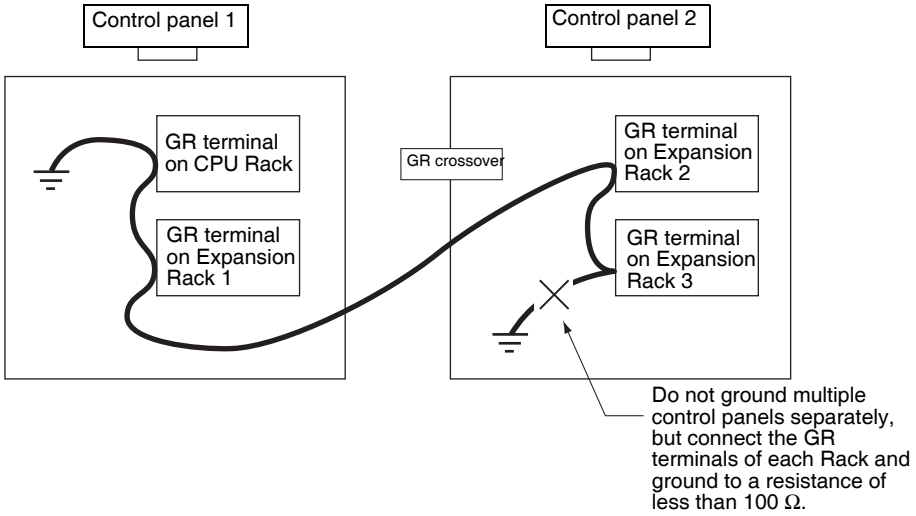
Grounding

The diagram below shows the location of the ground and line ground terminals.

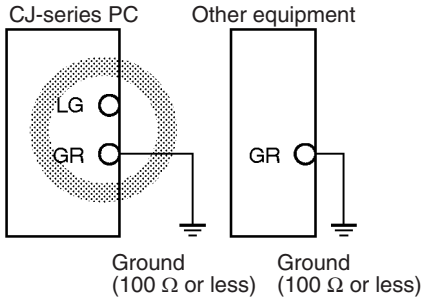


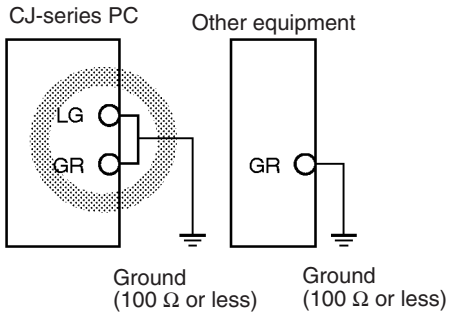
- To help prevent electrical shock, ground the ground terminal (GR: ⏚) with a ground resistance of less than 100 Ω using a 14-gauge wire (minimum cross-sectional area of 2 mm^2).
- The line ground terminal (LG: ⏚) is a noise-filtered neutral terminal. If noise is a significant source of errors or electrical shocks are a problem, connect the line ground terminal to the ground terminal and ground both with a ground resistance of less than 100 Ω.
- The ground wire should not be more than 20 m long.
- The following grounding configurations are acceptable.

- The CJ-series PLCs are designed to be mounted so that they are isolated (separated) from the mounting surface to protect them from the effects of noise in the installation environment (e.g., the control panel).

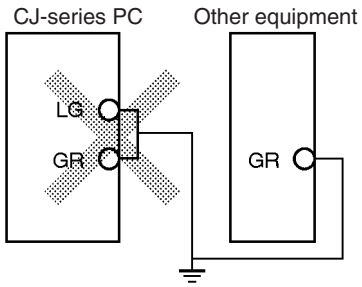


- Do not share a ground line with other equipment.





- Do not share the PLC's ground with other equipment or ground the PLC to the metal structure of a building. The configuration shown in the following diagram may worsen operation.



Crimp Terminals

Terminal screws	M4 self-rising screws
Recommended wire size	AWG 14 min. (2 mm^2 min.)
Recommended tightening torque	1.2 N·m

Recommended crimp terminals

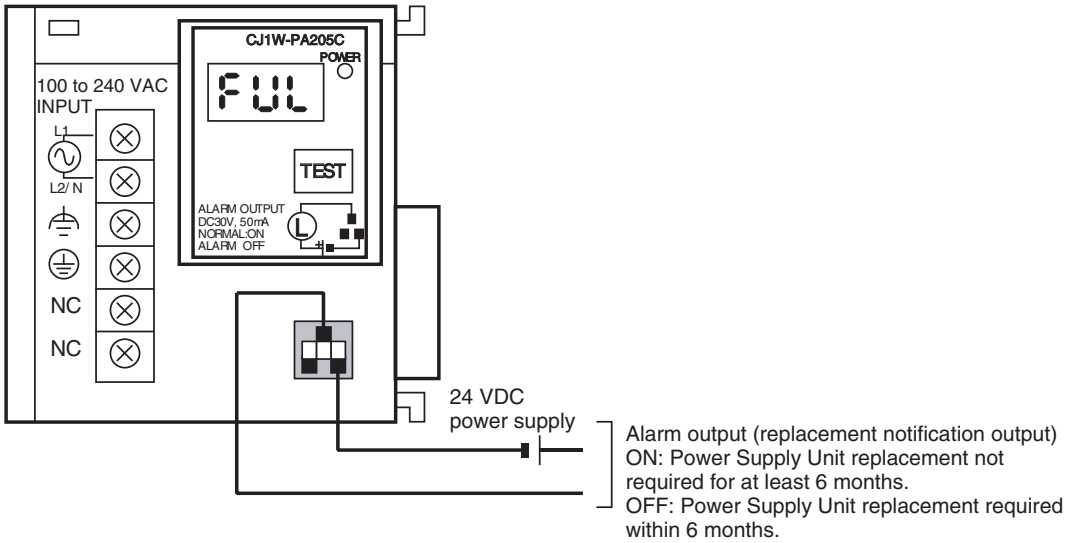
Manufacturer	Models	Shape	Applicable wire range (stranded wire)
JST Mfg.	V2-YS4A	Y-shaped terminal with sleeve	1.04 to 2.63 mm^2 (AWG 16 to 14)
	V2-M4	Round terminal with sleeve	

Note
1. Use crimp terminals for wiring.
2. Do not connect bare stranded wires directly to the terminals.

Alarm Output (Power Supply Units with Replacement Notification Only)

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

CJ1W-PA205C Power Supply Unit



Output Specifications

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

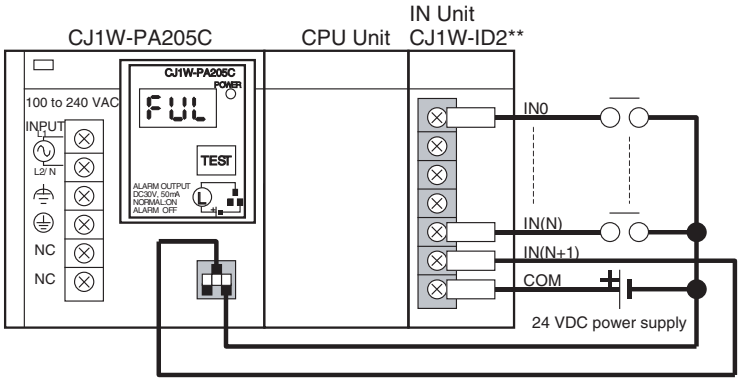
Wiring

• The following wire gauges are recommended.

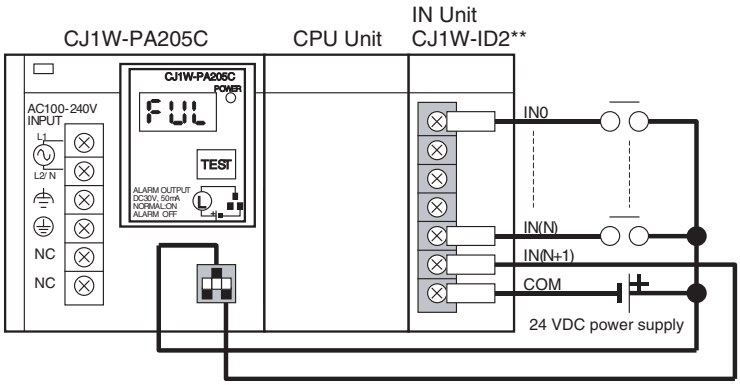
Recommended wire size	Use	Pushing strength (clamping operation)	Pulling strength (holding force)	Length of stripped section
AWG 22 to 18 (0.32 to 0.82 mm^2)	Connecting to PLC terminal block models	30 N max.	30 N min.	7 to 10 mm
AWG 28 to 24 (0.08 to 0.2 mm^2)	Connecting to PLC connector models		10 N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

PLC Input Unit Wiring Example

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

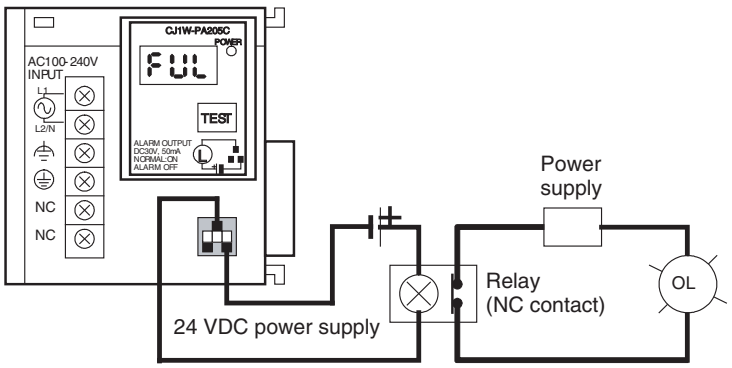


Connect the negative terminal of the 24-VDC power supply to the Input Unit common (COM) terminal.



External Display Device Connection Example

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



Note 1. The OL display will also light if the PLC's power supply fails.

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

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

I/O Unit Specifications

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

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

Crimp Terminals

Terminal screws	M3 self-rising screws
Recommended wire size	AWG 22 to 18 (0.326 to 0.823 mm^2)
Recommended tightening torque	0.5 N·m

Recommended crimp terminals

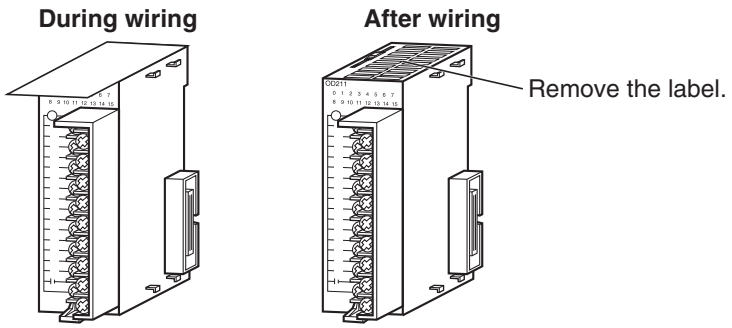
Manufacturer	Models	Shape	Applicable wire range (stranded wire)
JST Mfg.	V1.25-N3A	Y-shaped terminal with sleeve	0.25 to 1.65 mm^2 (AWG 22 to 16)
	V1.25-MS3	Round terminal with sleeve	

Note

1. Use crimp terminals for wiring.
2. Do not connect bare stranded wires directly to the terminals.

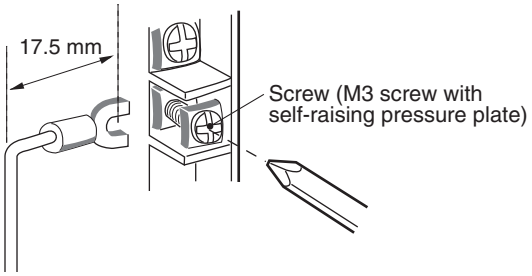
Wiring

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



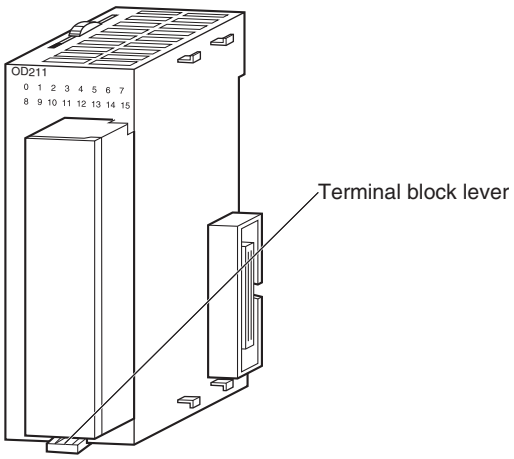
- Wire the Units so that they can be easily replaced. In addition, make sure that the I/O indicators are not covered by the wiring.
- Do not place the wiring for I/O Units in the same duct or raceway as power lines. Inductive noise can cause errors in operation.

- Tighten the terminal screws to the torque of 0.5 N·m.
- The terminals have screws with self-raising pressure plates. Connect the lead wires to the terminals as shown below.



Terminal Blocks

The I/O Units are equipped with removable terminal blocks. The lead wires do not have to be removed from the terminal block to remove it from an I/O Unit.



CJ-series Basic I/O Unit

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

This section describes wiring for the following Units:

- CJ-series Basic I/O Units with Connectors (32- and 64-point Units)

CJ-series Basic I/O Units with connectors use special connectors to connector to external I/O devices. The user can combine a special connector with cable or use a preassembled OMRON cable to connect to a terminal block or I/O Terminal. The available OMRON cables are described later in this section.

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

- Bending the cable too sharply can damage or break wiring in the cable.

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

Available Connectors

Use the following connectors when assembling a connector and cable.

CJ-series 32- and 64-point I/O Units with Fujitsu-compatible Connectors

Applicable Units

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

Applicable Cable-side Connectors

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

CJ-series 32- and 64-point I/O Units with MIL Connectors

Applicable Units

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

Applicable Cable-side Connectors

Connection	Pins	OMRON set	Daiichi Denko Industries part
Pressure-welded	40	XG4M-4030-T	FRC5-A040-3T0S
	20	XG4M-2030-T	FRC5-A020-3T0S

Wire Size

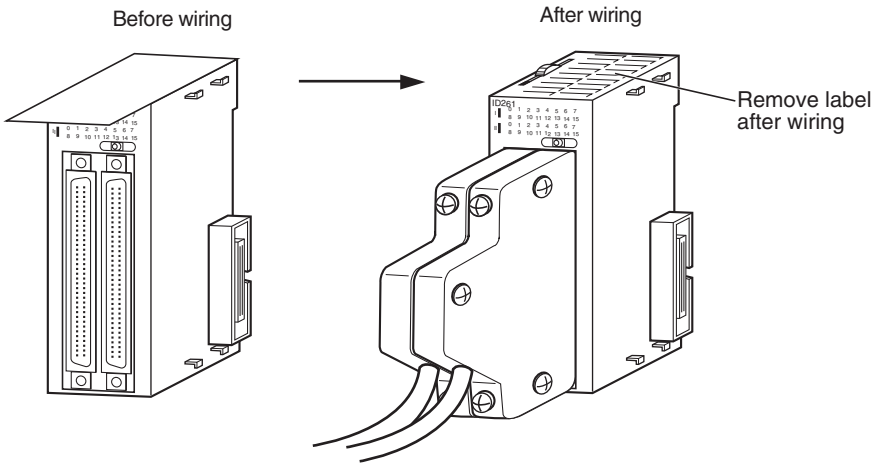
We recommend using cable with wire gauges of AWG 24 or AWG 28 (0.2 mm^2 to 0.08 mm^2). Use cable with external wire diameters of 1.61 mm max.

Wiring Procedure

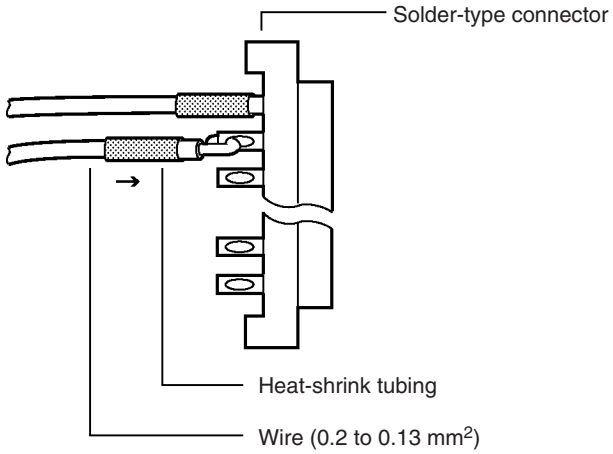
1,2,3... 1. Check that each Unit is installed securely.

Note Do not force the cables.

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

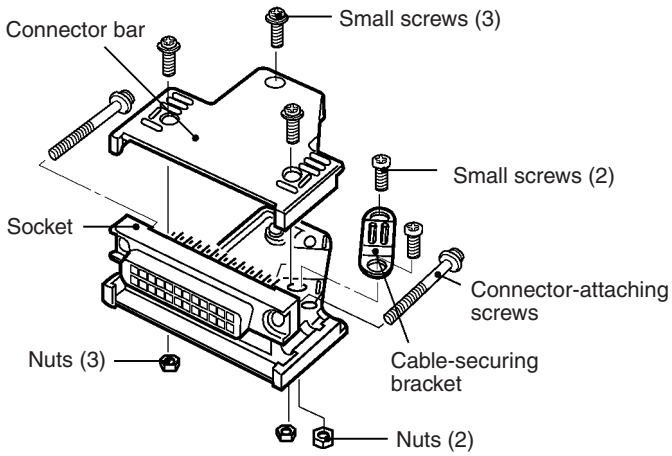


3. When solder-type connectors are being used, be sure not to accidentally short adjacent terminals. Cover the solder joint with heat-shrink tubing.

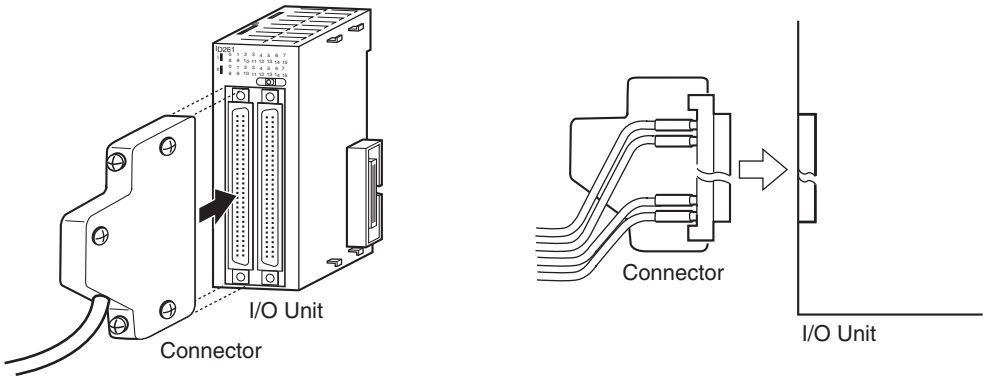


Note Double-check to make sure that the Output Unit's power supply leads haven't been reversed. If the leads are reversed, the Unit's internal fuse will blow and the Unit will not operate.

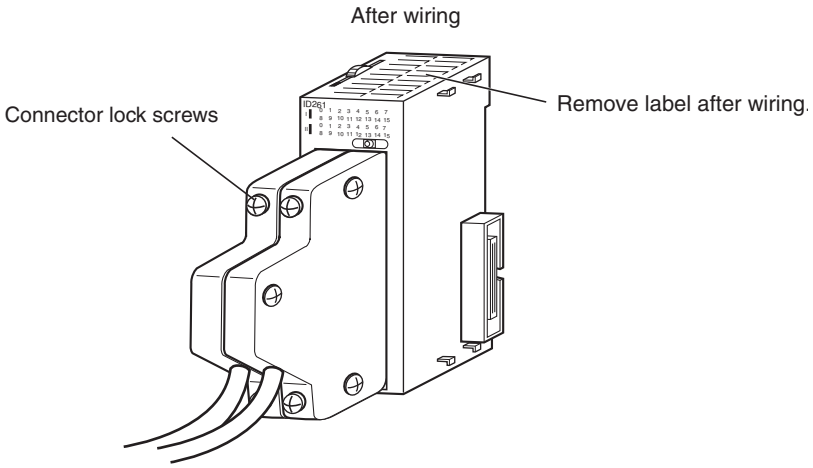
4. Assemble the connector (purchased separately).



5. Insert the wired connector.



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



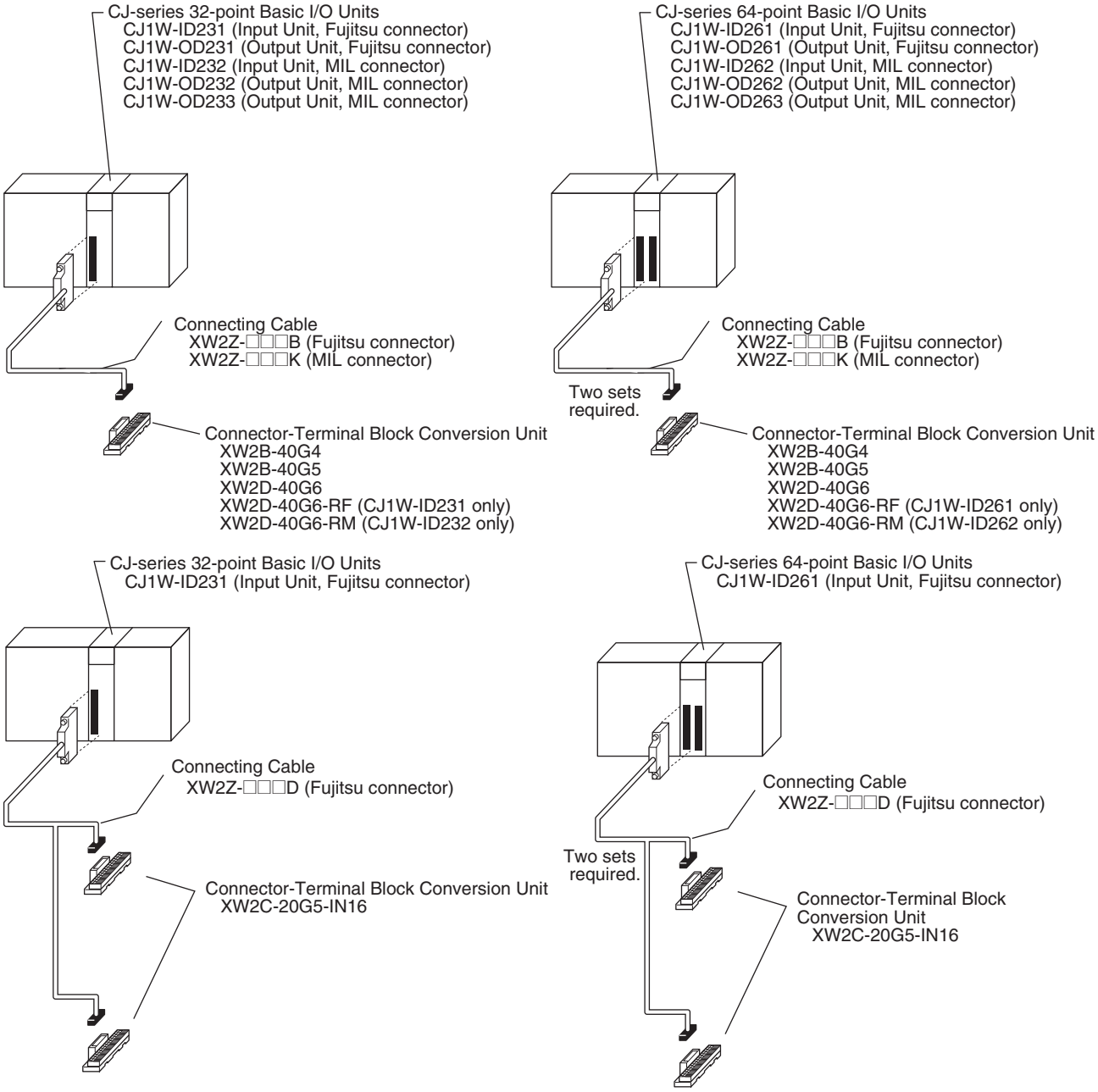
Tighten the connector-attaching screws to a torque of 0.2 N·m.

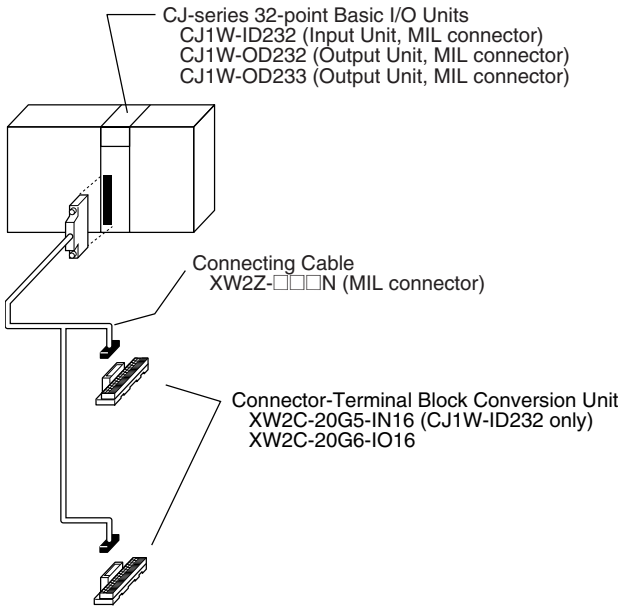
Connecting to Connector-Terminal Block Conversion Units or I/O Terminals

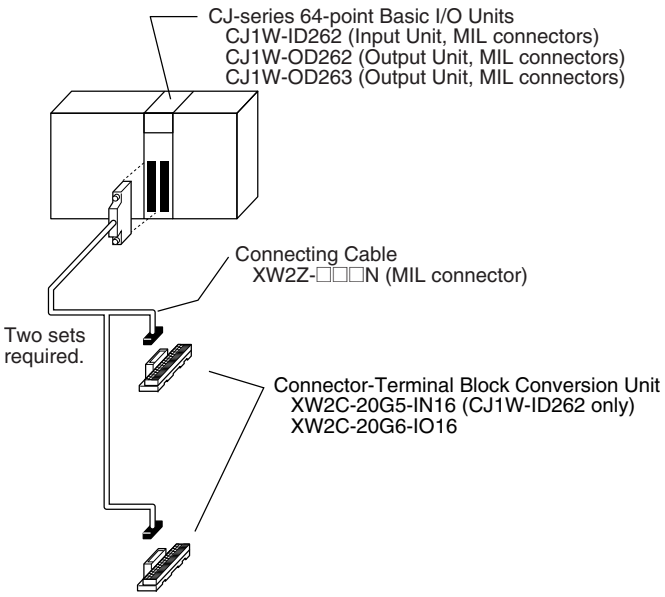
Basic I/O Units with Connectors can be connected to OMRON Connector-Terminal Block Conversion Units or OMRON I/O Terminals. Refer to CJ-series 32/64-point Basic I/O Units with Connectors on page 188 for a list of models.

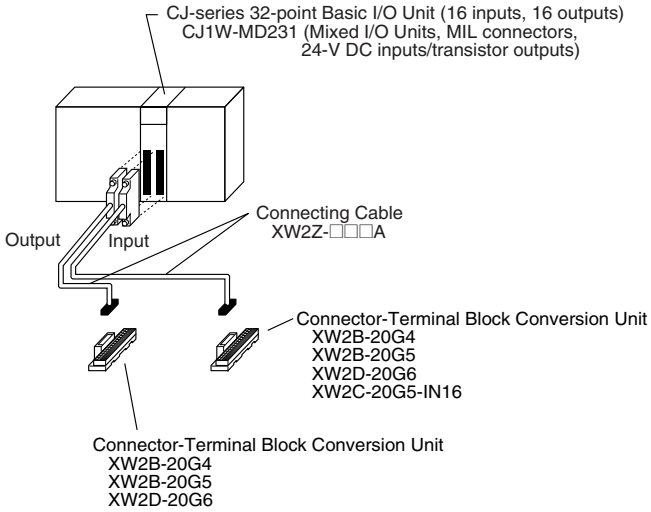
Connecting to Terminal Blocks

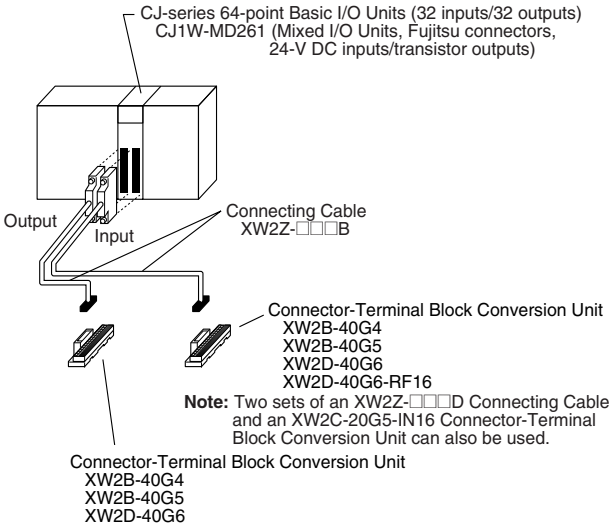
The following Connecting Cables and Connector-Terminal Block Conversion Units are required to connect to terminal blocks.

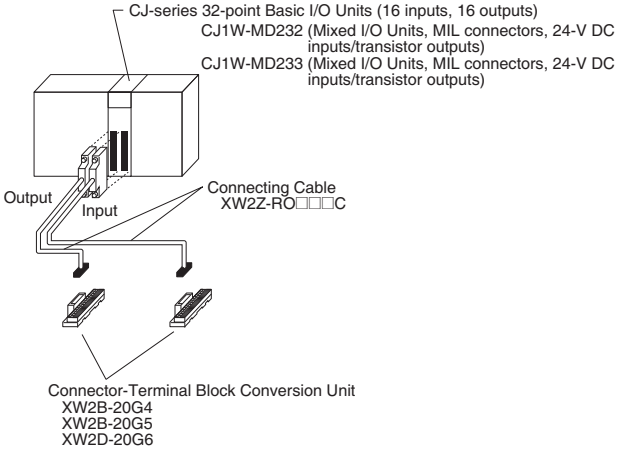


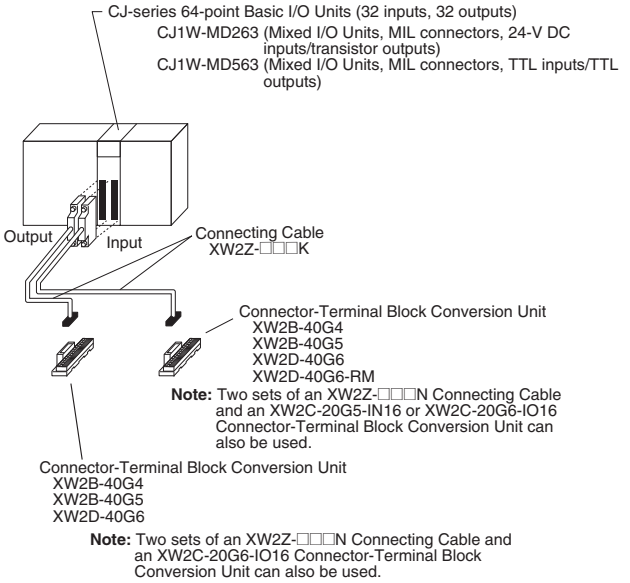

CJ-series 32-point Basic I/O Units
CJ1W-ID232 (Input Unit, MIL connector)
CJ1W-OD232 (Output Unit, MIL connector)
CJ1W-OD233 (Output Unit, MIL connector)
Connecting Cable
XW2Z-□□□N (MIL connector)
Connector-Terminal Block Conversion Unit
XW2C-20G5-IN16 (CJ1W-ID232 only)
XW2C-20G6-IO16


CJ-series 64-point Basic I/O Units
CJ1W-ID262 (Input Unit, MIL connectors)
CJ1W-OD262 (Output Unit, MIL connectors)
CJ1W-OD263 (Output Unit, MIL connectors)
Connecting Cable
XW2Z-□□□N (MIL connector)
Two sets required.
Connector-Terminal Block Conversion Unit
XW2C-20G5-IN16 (CJ1W-ID262 only)
XW2C-20G6-IO16


CJ-series 32-point Basic I/O Unit (16 inputs, 16 outputs)
CJ1W-MD231 (Mixed I/O Units, MIL connectors,
24-V DC inputs/transistor outputs)
Output
Input
Connecting Cable
XW2Z-□□□A
Connector-Terminal Block Conversion Unit
XW2B-20G4
XW2B-20G5
XW2D-20G6
XW2C-20G5-IN16
Connector-Terminal Block Conversion Unit
XW2B-20G4
XW2B-20G5
XW2D-20G6

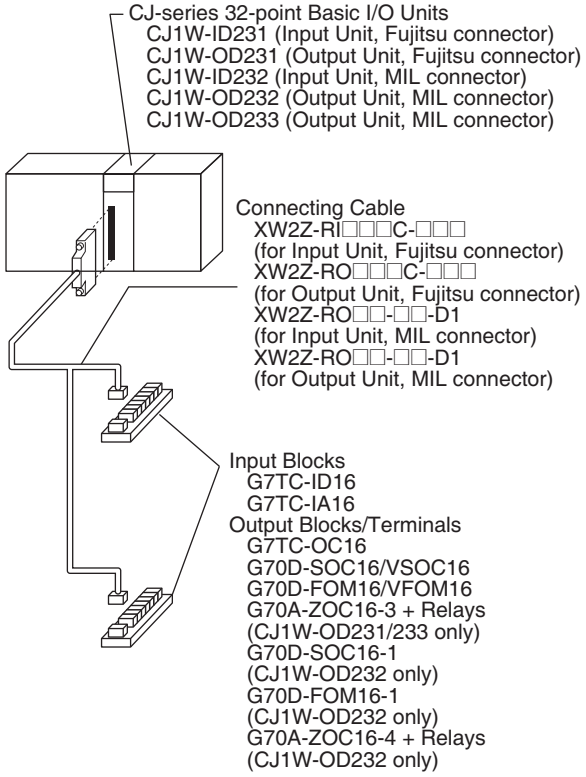

CJ-series 64-point Basic I/O Units (32 inputs/32 outputs)
CJ1W-MD261 (Mixed I/O Units, Fujitsu connectors,
24-V DC inputs/transistor outputs)
Output
Input
Connecting Cable
XW2Z-□□□B
Connector-Terminal Block Conversion Unit
XW2B-40G4
XW2B-40G5
XW2D-40G6
XW2D-40G6-RF16
Note: Two sets of an XW2Z-□□□D Connecting Cable and an XW2C-20G5-IN16 Connector-Terminal Block Conversion Unit can also be used.
Connector-Terminal Block Conversion Unit
XW2B-40G4
XW2B-40G5
XW2D-40G6

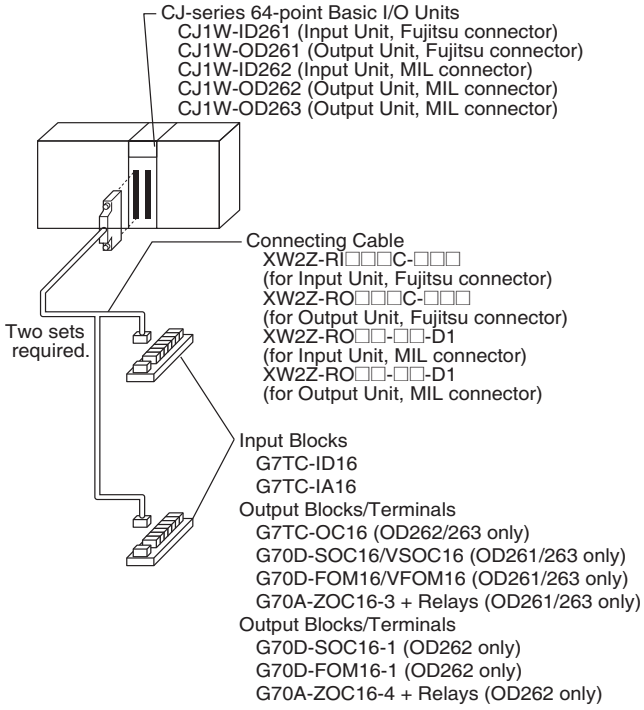

CJ-series 32-point Basic I/O Units (16 inputs, 16 outputs)
CJ1W-MD232 (Mixed I/O Units, MIL connectors, 24-V DC inputs/transistor outputs)
CJ1W-MD233 (Mixed I/O Units, MIL connectors, 24-V DC inputs/transistor outputs)
Output
Input
Connecting Cable
XW2Z-RO□□□C
Connector-Terminal Block Conversion Unit
XW2B-20G4
XW2B-20G5
XW2D-20G6

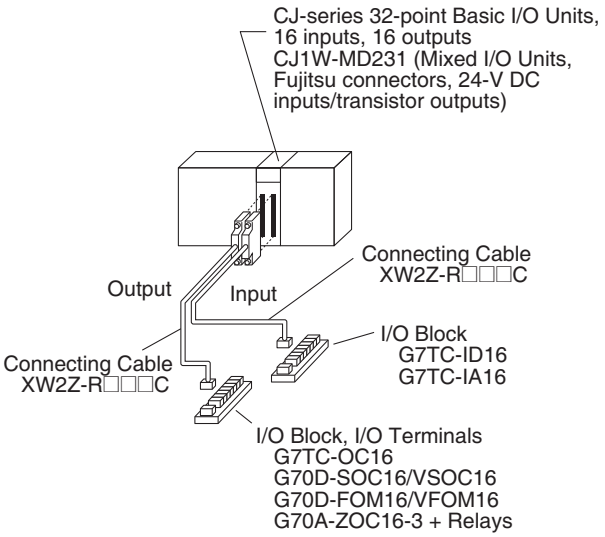

CJ-series 64-point Basic I/O Units (32 inputs, 32 outputs)
CJ1W-MD263 (Mixed I/O Units, MIL connectors, 24-V DC inputs/transistor outputs)
CJ1W-MD563 (Mixed I/O Units, MIL connectors, TTL inputs/TTL outputs)
Output
Input
Connecting Cable
XW2Z-□□□K
Connector-Terminal Block Conversion Unit
XW2B-40G4
XW2B-40G5
XW2D-40G6
XW2D-40G6-RM
Note: Two sets of an XW2Z-□□□N Connecting Cable and an XW2C-20G5-IN16 or XW2C-20G6-IO16 Connector-Terminal Block Conversion Unit can also be used.
Connector-Terminal Block Conversion Unit
XW2B-40G4
XW2B-40G5
XW2D-40G6
Note: Two sets of an XW2Z-□□□N Connecting Cable and an XW2C-20G6-IO16 Connector-Terminal Block Conversion Unit can also be used.

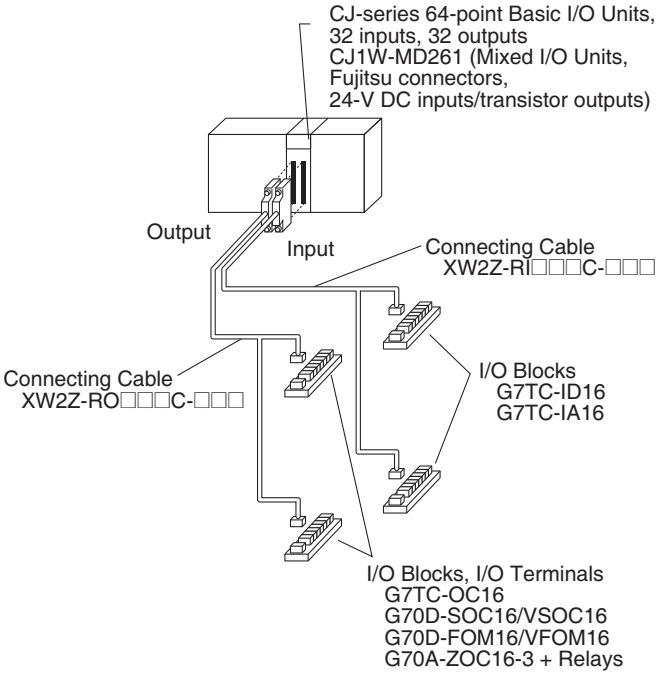
Connecting to I/O Terminals

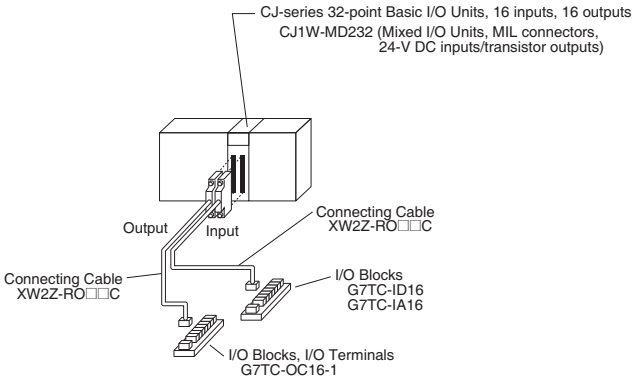
The following Connecting Cables and I/O Terminals are required to connect to terminal blocks.

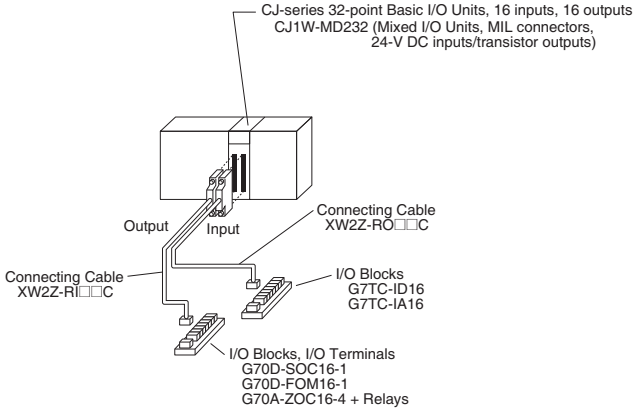


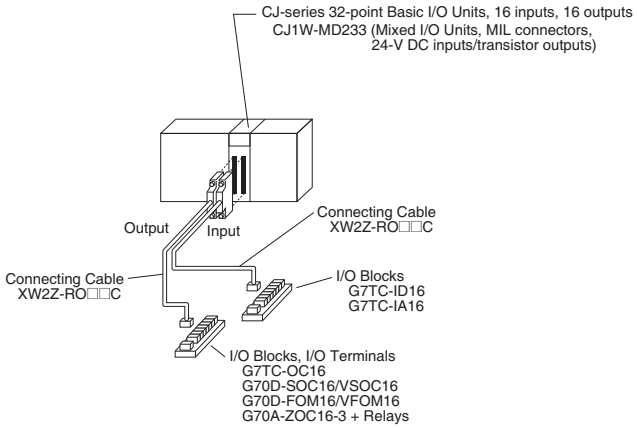


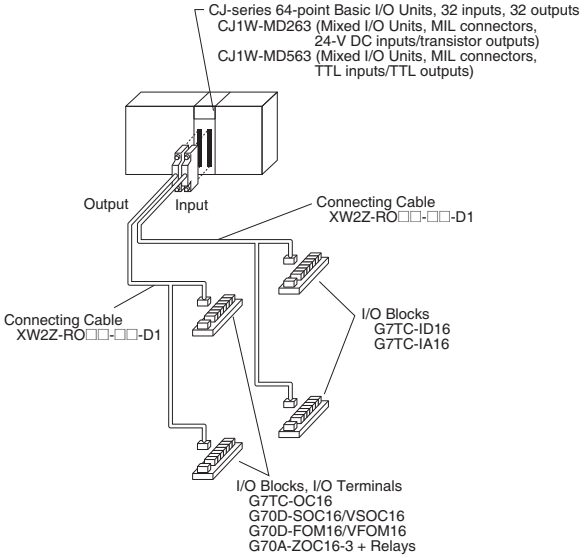





CJ-series 32-point Basic I/O Units, 16 inputs, 16 outputs
CJ1W-MD232 (Mixed I/O Units, MIL connectors, 24-V DC inputs/transistor outputs)
Output
Input
Connecting Cable XW2Z-RO□□C
Connecting Cable XW2Z-RO□□C
I/O Blocks G7TC-ID16 G7TC-IA16
I/O Blocks, I/O Terminals G7TC-OC16-1


CJ-series 32-point Basic I/O Units, 16 inputs, 16 outputs
CJ1W-MD232 (Mixed I/O Units, MIL connectors, 24-V DC inputs/transistor outputs)
Output
Input
Connecting Cable XW2Z-RO□□C
Connecting Cable XW2Z-RI□□C
I/O Blocks G7TC-ID16 G7TC-IA16
I/O Blocks, I/O Terminals G70D-SOC16-1 G70D-FOM16-1 G70A-ZOC16-4 + Relays


CJ-series 32-point Basic I/O Units, 16 inputs, 16 outputs
CJ1W-MD233 (Mixed I/O Units, MIL connectors, 24-V DC inputs/transistor outputs)
Output
Input
Connecting Cable XW2Z-RO□□C
Connecting Cable XW2Z-RO□□C
I/O Blocks G7TC-ID16 G7TC-IA16
I/O Blocks, I/O Terminals G7TC-OC16 G70D-SOC16/VSOC16 G70D-FOM16/VFOM16 G70A-ZOC16-3 + Relays


CJ-series 64-point Basic I/O Units, 32 inputs, 32 outputs
CJ1W-MD263 (Mixed I/O Units, MIL connectors, 24-V DC inputs/transistor outputs)
CJ1W-MD563 (Mixed I/O Units, MIL connectors, TTL inputs/TTL outputs)
Output
Input
Connecting Cable XW2Z-RO□□-□□-D1
Connecting Cable XW2Z-RO□□-□□-D1
I/O Blocks G7TC-ID16 G7TC-IA16
I/O Blocks, I/O Terminals G7TC-OC16 G70D-SOC16/VSOC16 G70D-FOM16/VFOM16 G70A-ZOC16-3 + Relays

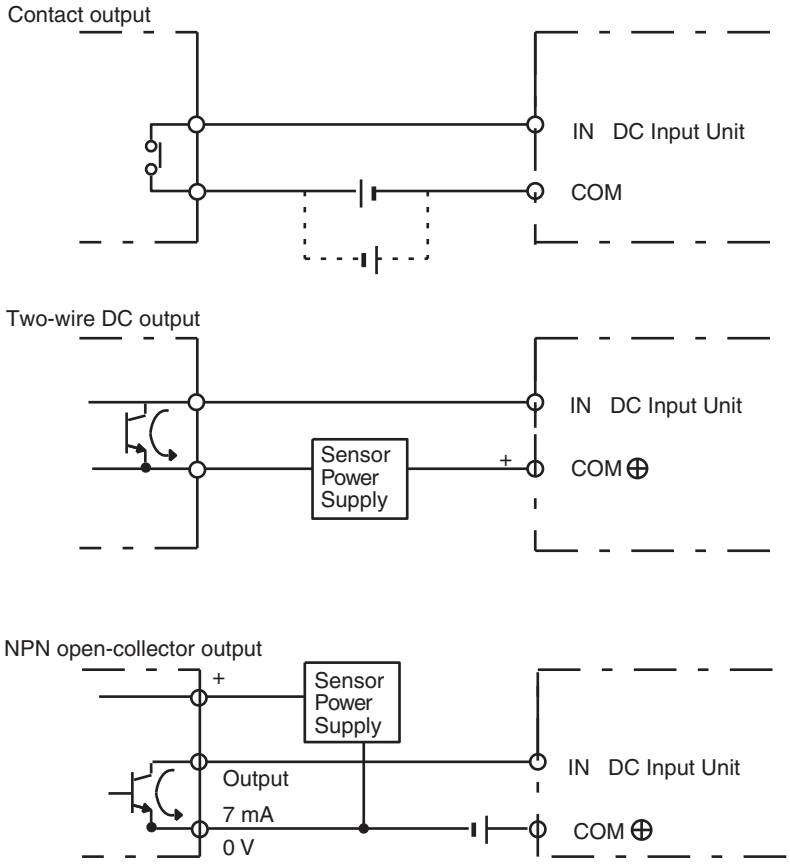
5-3-4 Connecting I/O Devices

Input Devices

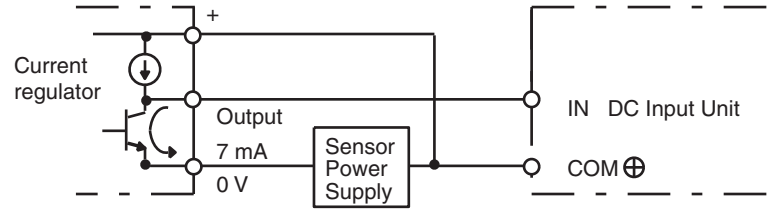
Use the following information for reference when selecting or connecting input devices.

DC Input Units

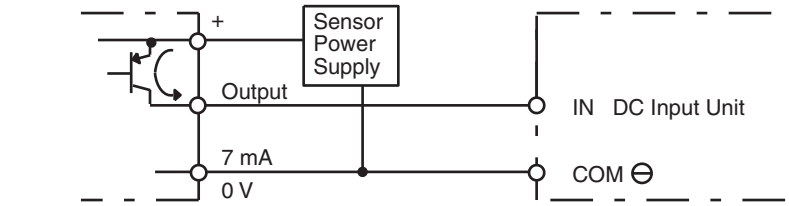
The following types of DC input devices can be connected.



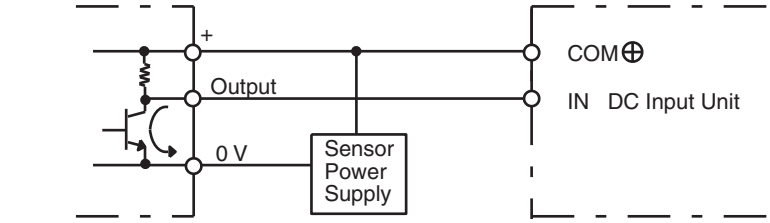
NPN current output



PNP current output

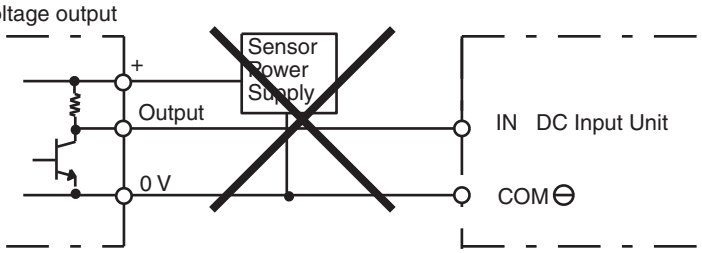


Voltage output



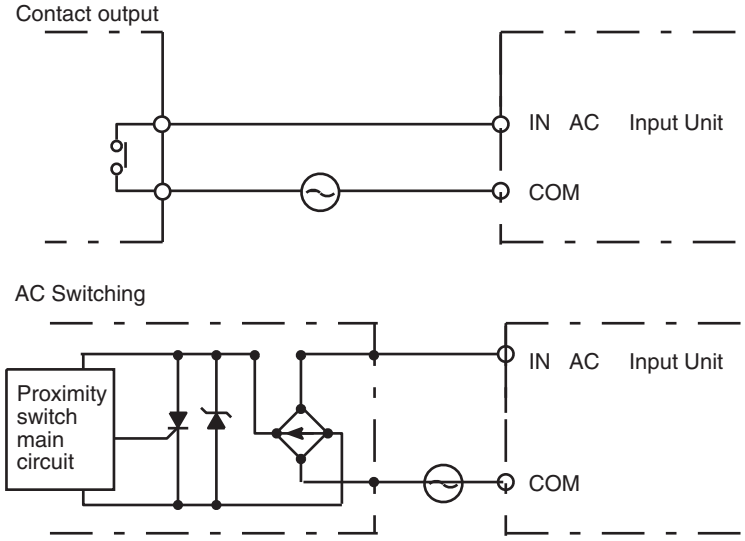
The circuit below should **NOT** be used for I/O devices having a voltage output.

Voltage output



AC Input Units

The following types of AC input devices can be connected.



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

Precautions when Connecting a Two-wire DC Sensor

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

1,2,3...

1. Relation between voltage when the PLC is ON and the sensor residual voltage:

   $V_{ON} \leq V_{CC} - V_R$

2. Relation between voltage when the PLC is ON and sensor control output (load current):

   I_{OUT} (min) $\leq I_{ON} \leq I_{OUT}$ (max.)

   $I_{ON} = (V_{CC} - V_R - 1.5$ [PLC internal residual voltage]$)/R_{IN}$

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

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

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

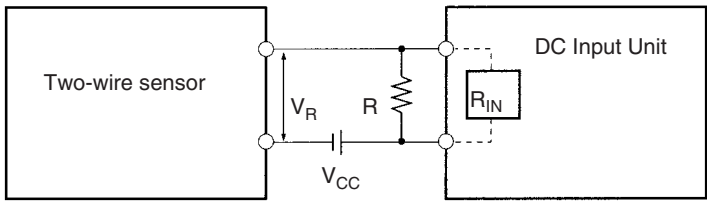
3. Relation between current when the PLC is OFF and sensor leakage current:

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

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

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

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



V_{CC}: Power voltage
V_{ON}: PLC ON voltage
V_{OFF}: PLC OFF voltage
I_{ON}: PLC ON current
I_{OFF}: PLC OFF current
R_{IN}: PLC input impedance

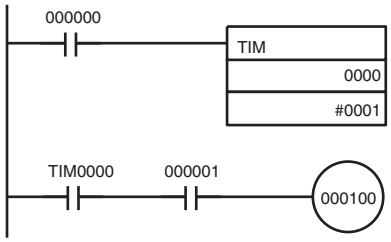
V_R: Sensor output residual current
I_{OUT}: Sensor control current (load current)
I_{leak}: Sensor leakage current
R: Bleeder resistance

4. Precautions on Sensor Surge Current

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

Example

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



Output Wiring Precautions

Output Short-circuit Protection

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

Transistor Output Residual Voltage

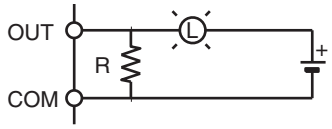
A TTL circuit cannot be connected directly to a transistor output because of the transistor's residual voltage. It is necessary to connect a pull-up resistor and a CMOS IC between the two.

Output Surge Current

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

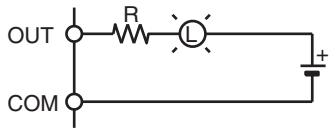
Method 1

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



Method 2

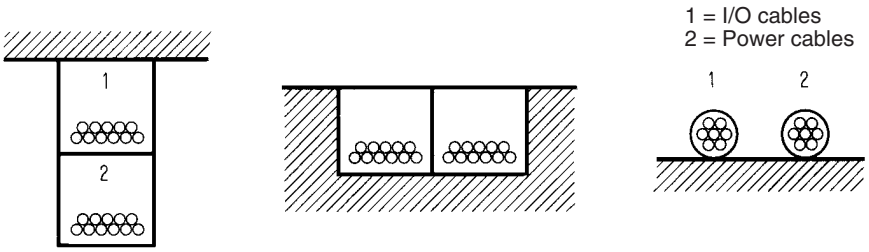
Add a control resistor as shown in the following diagram.



5-3-5 Reducing Electrical Noise

I/O Signal Wiring

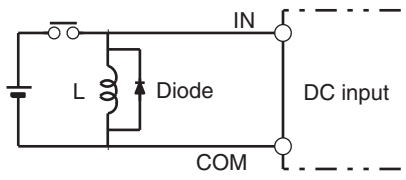
Whenever possible, place I/O signal lines and power lines in separate ducts or raceways both inside and outside of the control panel.

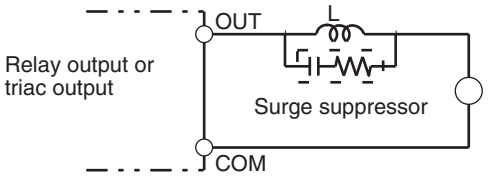


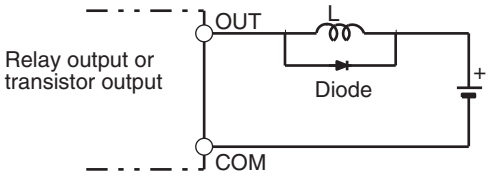
If the I/O wiring and power wiring must be routed in the same duct, use shielded cable and connect the shield to the GR terminal to reduce noise.

Inductive Loads

When an inductive load is connected to an I/O Unit, connect a surge suppressor or diode in parallel with the load as shown below.







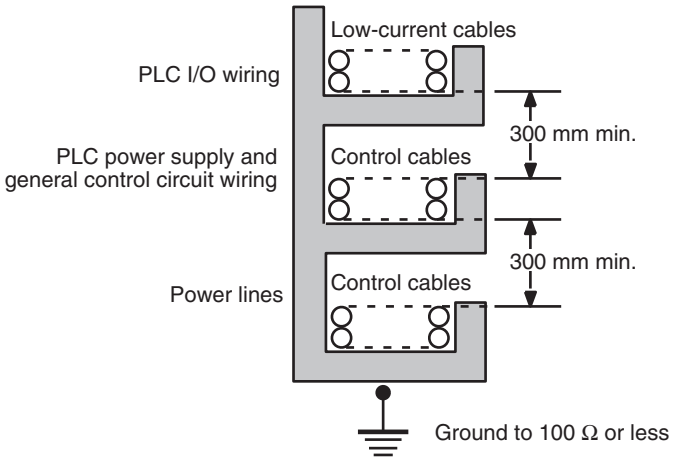
Note Use surge suppressors and diodes with the following specifications.

Surge suppressor specifications	Diode specifications
Resistor: 50 Ω Capacitor: 0.47 μF Voltage: 200 V	Breakdown voltage: 3 times load voltage min. Mean rectification current: 1 A

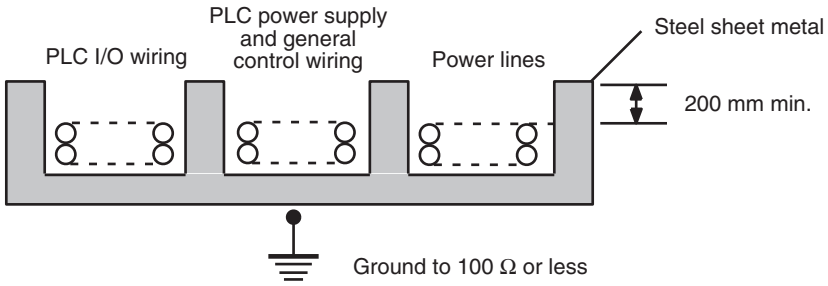
External Wiring

Observe the following precautions for external wiring.

- When multi-conductor signal cable is being used, avoid combining I/O wires and other control wires in the same cable.
- If wiring racks are parallel, allow at least 300 mm (12 inches) between the racks.



If the I/O wiring and power cables must be placed in the same duct, they must be shielded from each other using grounded steel sheet metal.



SECTION 6
DIP Switch Settings

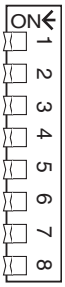
This section describes the initial hardware settings made on the CPU Unit's DIP switch.

6-1 Overview

There are two kinds of initial settings for a CJ-series PLC: Hardware settings and software settings. Hardware settings are made with the CPU Unit's DIP switch and software settings are made in the PLC Setup (using a Programming Device).

The DIP switch can be reached by opening the battery compartment cover on the front of the CPU Unit.

Note Before touching or setting the DIP switch while the power is being supplied to the CPU Unit, always touch a grounded piece of metal to release static electricity from your body.

Appearance	Pin No.	Setting	Function
	1	ON	Writing disabled for user program memory.
		OFF	Writing enabled for user program memory.
	2	ON	The user program is automatically transferred when power is turned ON.
		OFF	
	3	---	Not used.
	4	ON	Use peripheral port communications parameters set in the PLC Setup.
		OFF	Use default peripheral port communications parameters.
	5	ON	Use default RS-232C port communications parameters.
		OFF	Use RS-232C port communications parameters set in the PLC Setup.
	6	ON	User-defined pin. Turns ON the User DIP Switch Pin Flag (A39512).
		OFF	User-defined pin. Turns OFF the User DIP Switch Pin Flag (A39512).
	7	ON	Writing data from the CPU Unit to the Memory Card or restoring data from the Memory Card to the CPU Unit.
		OFF	Verifying contents of Memory Card.
	8	OFF	Always OFF.

Note The display language for the Programming Console is not set on the DIP switch for CJ-series CPU Units, but rather is set using a Programming Console key sequence.

6-2 Details

Pin	Function	Setting		Description
1	Write-protection for user program memory (UM) (See note 1.)	ON	Write-protected	User program memory is write-protected when this pin is ON. Turn ON to prevent the program from being changed accidentally.
		OFF	Read/write	
2	Automatic transfer of the program at start-up	ON	Yes	The program (AUTOEXEC.OBJ) and PLC Setup (AUTOEXEC.STD) will be transferred from the Memory Card to the CPU Unit automatically at start-up when this pin is ON. (See note 4.) A PLC's software (program and PLC Setup) can be completely initialized just by inserting a new Memory Card and turning on the power. This can be used to switch the system to a new arrangement very quickly. **Note** When pin 7 is ON, reading from the Memory Card for easy backup is given priority; even if pin 2 is ON, the program will not be automatically transferred.
		OFF	No	
3	Not used.	---	---	---
4	Peripheral port communications parameters	ON	Use parameters set in the PLC Setup.	• Leave this pin OFF when using a Programming Console or CX-Programmer (peripheral bus setting) connected to the peripheral port. • Turn this pin ON when the peripheral port is being used for a device other than a Programming Console or CX-Programmer (peripheral bus setting).
		OFF (default)	Auto-detect Programming Device (See note 2.)	
5	RS-232C port communications parameters	ON	Auto-detect Programming Device (See note 3.)	• Leave this pin OFF when the RS-232C port is being used for a device other CX-Programmer (peripheral bus setting) such as a Programmable Terminal or host computer. • Turn this pin ON when using CX-Programmer (peripheral bus setting) connected to the RS-232C port.
		OFF (default)	Use parameters set in the PLC Setup.	
6	User-defined pin	ON	A39512 ON	The ON/OFF status of this pin is reflected in A39512. Use this function when you want to create an Always-ON or Always-OFF condition in the program without using an Input Unit.
		OFF (default)	A39512 OFF	
7	Easy backup setting	ON	Writing from the CPU Unit to the Memory Card	Press and hold the Memory Card Power Supply Switch for three seconds.
			Restoring from the Memory Card to the CPU Unit.	To read from the Memory Card to the CPU Unit, turn ON the PLC power. This operation is given priority over automatic transfer (pin 2 is ON) when power is ON.
		OFF (default)	Verifying contents of Memory Card.	Press and hold the Memory Card Power Supply Switch for three seconds.
8	Not used	OFF (default)	Always OFF.	

Note 1. The following data is write-protected when pin 1 is ON: the user program and all data in the parameter area such as the PLC Setup and registered I/O table. Furthermore when pin 1 is ON, the user program and parameter area won't be cleared even when the memory clear operation is performed from a Programming Device.

2. The auto-detect goes through baud rates in the following order: Programming Console → Peripheral bus at 9,600 bps, 19,200 bps, 38,400 bps, and 115,200 bps. Programming Devices that aren't in Peripheral Bus Mode and devices in Peripheral Bus Mode operating at 51,200 bps will not be detected.

3. The auto-detect operation goes through baud rates in the following order: Peripheral bus at 9,600 bps, 19,200 bps, 38,400 bps, and 115,200 bps. Programming Devices that aren't in Peripheral Bus Mode and devices in Peripheral Bus Mode operating at any other speeds will not be detected.
4. When pin 2 is ON and the power is turned ON, any I/O Memory file (AUTOEXEC.IOM, ATEXEC□□.IOM) will also be transferred automatically. Both the program (AUTOEXEC.OBJ) and the parameter area (AUTOEXEC.STD) must exist in the Memory Card. I/O Memory files (AUTOEXEC.IOM, ATEXEC□□.IOM) are optional.
5. After a simple backup operation has been used to read the data from a Memory Card to the CPU Unit, the operating mode will remain in PROGRAM mode and cannot be changed to MONITOR or RUN mode until the PLC power is turned OFF. After reading out the data, turn OFF the power supply, turn OFF pin 7 on the DIP switch, and then turn the power supply back ON..

DIP switch settings		PLC Setup settings				
		Peripheral port settings				
		Default	NT Link	Peripheral bus	Host Link	Serial Gateway
Pin 4	OFF	Programming Console or CX-Programmer in Peripheral Bus Mode (Auto-detect connected device's baud rate)				
	ON	Host computer or CX-Programmer in host link mode	OMRON PT (NT Link)	CX-Programmer in Peripheral Bus Mode	Host computer or CX-Programmer in host link mode	OMRON component (Compo-Way/F)

DIP switch settings		PLC Setup settings					
		Peripheral port settings					
		Default	NT Link	No-protocol	Peripheral bus	Host Link	Serial Gateway
Pin 5	OFF	Host computer or CX-Programmer in host link mode	OMRON PT (NT Link)	Standard external device	CX-Programmer in Peripheral Bus Mode	Host computer or CX-Programmer in host link mode	OMRON component (Compo-Way/F)
	ON	CX-Programmer in Peripheral Bus Mode (Auto-detect connected device's baud rate)					

Note Use the following settings for the network on the CX-Programmer and pin 4 on the DIP switch when connecting the CX-Programmer via the peripheral or RS-232C port.

CX-Programmer network setting	Peripheral port connections	RS-232C port connection	PLC Setup
Toolbus (peripheral bus)	Turn OFF pin 4.	Turn ON pin 5.	None
SYSMAC WAY (Host Link)	Turn ON pin 4.	Turn OFF pin 5.	Set to Host Link.

When CX-Programmer is set to host link mode, it won't be possible to communicate (go online) in the following cases:

- The computer is connected to the CPU Unit's peripheral port and pin 4 is OFF.

- The computer is connected to the CPU Unit's RS-232C port and pin 5 is ON.

To go online, set CX-Programmer to Peripheral Bus Mode, turn pin 4 ON (turn pin 5 OFF for the RS-232C port), and set the communications mode to host link mode in the PLC Setup.

SECTION 7
PLC Setup

This section describes initial software settings made in the PLC Setup.

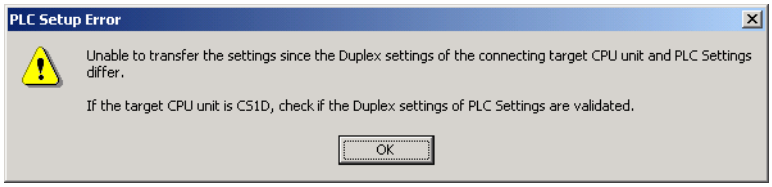
7-1 PLC Setup

7-1-1 Overview of the PLC Setup

The PLC Setup contains basic CPU Unit software settings that the user can change to customize PLC operation. These settings can be changed from a Programming Console or other Programming Device.

Note To read or set parameters in the PLC Setup, use the version of CX-Programmer that corresponds to the parameters.

For example, with CX-Programmer Ver.3.□, when the PLC Setup is uploaded from a PLC that was used to set the PLC Setup for Unit Ver. 2.0 or later only, the PLC Setup that was set cannot be downloaded again. (The following screen will be displayed.) Use the CX-Programmer Ver. 4.0 in this case.



The following table lists cases in which the PLC Setup must be changed. In other cases, the PLC can be operated with the default settings.

Cases when settings must be changed	Setting(s) to be changed
The input response time settings for CJ-series Basic I/O Units must be changed in the following cases: • Chattering or noise occur in Basic I/O Units. • Short pulse inputs are being received for intervals longer than the cycle time.	Basic I/O Unit Input Response Time
Data in all regions of I/O Memory (including the CIO Area, Work Areas, Timer Flags and PVs, Task Flags, Index Registers, and Data Registers) must be retained when the PLC's power is turned on.	IOM Hold Bit Status at Startup
The status of bits force-set or force-reset from a Programming Device (including Programming Consoles) must be retained when the PLC's power is turned on.	Forced Status Hold Bit Status at Startup
• You do not want the operating mode to be determined by the Programming Console's mode switch setting at startup. • You want the PLC to go into RUN mode or MONITOR mode and start operating immediately after startup. • You want the operating mode to be other than PROGRAM mode when the power is turned ON.	Startup Mode
Detection of low-battery errors is not required when using battery-free operation.	Detect Low Battery
Detection of interrupt-task errors is not required.	Detect Interrupt Task Error
Data files are required but a Memory Card cannot be used or the files are written frequently. (Part of the EM Area will be used as file memory.)	EM File Memory
The peripheral port will not be used with the Programming Console or CX-Programmer (peripheral bus) communications speed auto-detection and will not used the default host link communications settings such as 9,600 bps. **Note** Pin 4 of the DIP switch on the front of the CPU Unit must be OFF to change the PLC Setup settings.	Peripheral Port Settings

Cases when settings must be changed	Setting(s) to be changed
The RS-232C port will not be used with the Programming Console or CX-Programmer (peripheral bus) communications speed auto-detection and will not use the default host link communications settings such as 9,600 bps. **Note** Pin 5 of the DIP switch on the front of the CPU Unit must be OFF to change the PLC Setup settings.	RS-232C Port Settings
You want to speed up communications with a PT via an NT Link.	Set the peripheral port or the RS-232C port communications port baud rate to “high-speed NT Link.”
You want the intervals for scheduled interrupts to be set in units of 1 ms (or 0.1 ms) rather than 10 ms.	Scheduled Interrupt Time Units
You want CPU Unit operation to be stopped for instruction errors, i.e., when the ER Flag or AER Flag is turned ON. (You want instruction errors to be fatal errors.) You want to find the instructions where instruction errors are occurring (where the ER Flag is turning ON.	Instruction Error Operation
You want a minimum cycle time setting to create a consistent I/O refresh cycle.	Minimum Cycle Time
You want to set a maximum cycle time other than 1 second (10 ms to 40,000 ms).	Watch Cycle Time
You want to delay peripheral servicing so that it is executed over several cycles.	Fixed Peripheral Servicing Time
You want to give priority to servicing peripherals over program execution. Here, “peripherals” include CPU Bus Units, Special I/O Units, the built-in RS-232C port, and the peripheral port.	Peripheral Servicing Priority Mode
Performing special processing when power is interrupted.	Power OFF Interrupt Task (See note 5.)
You want to delay the detection of a power interruption.	Power OFF Detection Delay Time (See note 5.)
You want to execute IORF or FIORF (CJ1-H-R CPU Units only) in an interrupt task. You want to shorten the average cycle time when a lot of Special I/O Units are being used. You want to extend the I/O refreshing interval for Special I/O Units.	Special I/O Unit Cyclic Refreshing
You want to improve both program execution and peripheral servicing response.	CPU Processing Mode (CJ1-H CPU Units only)
You do not want to record user-defined errors for FAL(006) and FPD(269) in the error log.	FAL Error Log Registration (CJ1-H CPU Units only)
You want to reduce fluctuation in the cycle time caused by text string processing	Background Execution for Table Data, Text String, and Data Shift Instructions (CJ1-H CPU Units only)
You do not want to wait for Units to complete startup processing to start CPU Unit operation.	Startup Condition (CJ1-H CPU Units only)
You want to use high-speed counters with the built-in I/O. (See note 4.)	Use/Don’t use high-speed counter 0. Use/Don’t use high-speed counter 1.
You want to use interrupt inputs with the built-in I/O. (See note 4.)	IN0 to IN3 input operation settings.
You want to use quick-response inputs with the built-in I/O. (See note 4.)	IN0 to IN3 input operation settings.
You want to use general-purpose inputs for the input filter function with the built-in I/O. (See note 4.)	General purpose IN0 to IN9 input time constants.
You want to use the origin search function with the built-in I/O. (See note 4.)	Pulse outputs 0/1: Origin search operation setting

Cases when settings must be changed	Setting(s) to be changed
You want to set the various parameters for the origin search function. (See note 4.)	• Pulse outputs 0/1: Origin search, origin return initial speed • Pulse outputs 0/1: Origin search high speed • Pulse outputs 0/1: Origin search proximity speed • Pulse outputs 0/1: Origin compensation value • Pulse outputs 0/1: Origin search acceleration rate • Pulse outputs 0/1: Origin search deceleration rate • Pulse outputs 0/1: Limit input signal type • Pulse outputs 0/1: Origin proximity input signal type • Pulse outputs 0/1: Origin input signal type • Pulse outputs 0/1: Positioning monitor time • Pulse outputs 0/1: Origin return target speed • Pulse outputs 0/1: Origin return acceleration rate • Pulse outputs 0/1: Origin return deceleration rate
You want to use the Serial PLC Link. (See note 4.)	• RS-232C Communications Port: Serial Communications Mode • Serial PLC Link: Format • Serial PLC Link: Number of words to send • Serial PLC Link: Maximum unit number • Serial PLC Link: Polled Unit unit number

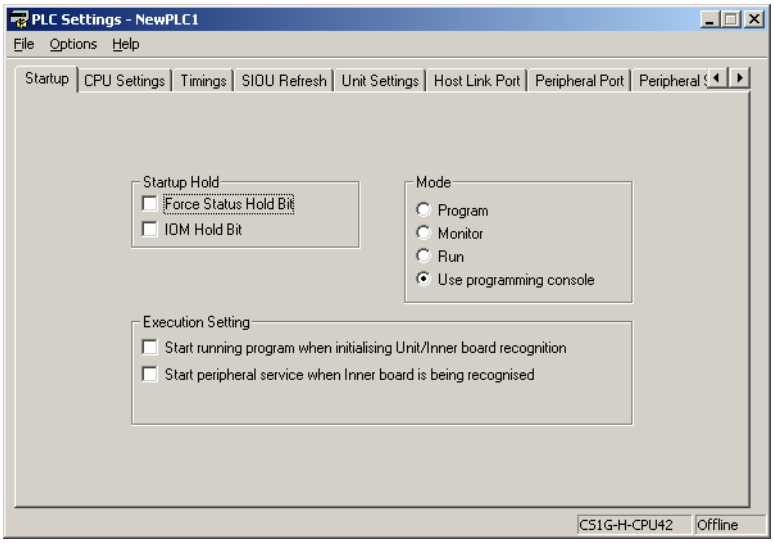
Note
1. CJ1-H CPU Units only.
2. CJ1-H and CJ1M CPU Units only.
3. CJ1-H and CJ1 CPU Units only.
4. CJ1M CPU Units only.
5. Not supported when the CJ1W-PD022 Power Supply Unit is mounted. (Refer to *Power OFF Operation on page 453*.)

7-1-2 PLC Setup Settings

All non-binary settings in the following tables are hexadecimal unless otherwise specified.

The Programming Console addresses given in this section are used to access and change settings in the PLC Setup when using a Programming Console or the Programming Console function of an NS-series Programming Terminal. The PLC Setup is stored in the Parameter Area, which can be accessed only from a Programming Device. Do not use the Programming Console addresses as operands in programming instructions. They will be interpreted as addresses in the CIO Area of I/O memory.

7-1-2-1 Startup Operation Settings (CX-Programmer's Startup Tab Page)



Startup Hold Settings

Forced Status Hold Bit

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+80	14	0: Cleared 1: Retained Default: 0	This setting determines whether or not the status of the Forced Status Hold Bit (A50013) is retained at startup. When you want all of the bits that have been force-set or force-reset to retain their forced status when the power is turned on, turn ON the Forced Status Hold Bit and set this setting to 1 (ON).	A50013 (Forced Status Hold Bit)	At startup

IOM Hold Bit

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+80	15	0: Cleared 1: Retained Default: 0	This setting determines whether or not the status of the IOM Hold Bit (A50012) is retained at startup. When you want all of the data in I/O Memory to be retained when the power is turned on, turn ON the IOM Hold Bit and set this setting to 1 (ON).	A50012 (IOM Hold Bit)	At startup

Mode Setting

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+81	---	Program (PRG): PROGRAM mode Monitor (MON): MONITOR mode Run (RUN): RUN mode Use programming console (PRNC): Programming Console's mode switch Default: Use programming console	This setting determines whether the Startup Mode will be the mode set on the Programming Console's mode switch or the mode set here in the PLC Setup. **Note** If this setting is PRCN and a Programming Console isn't connected, startup mode will be RUN mode.	---	At startup

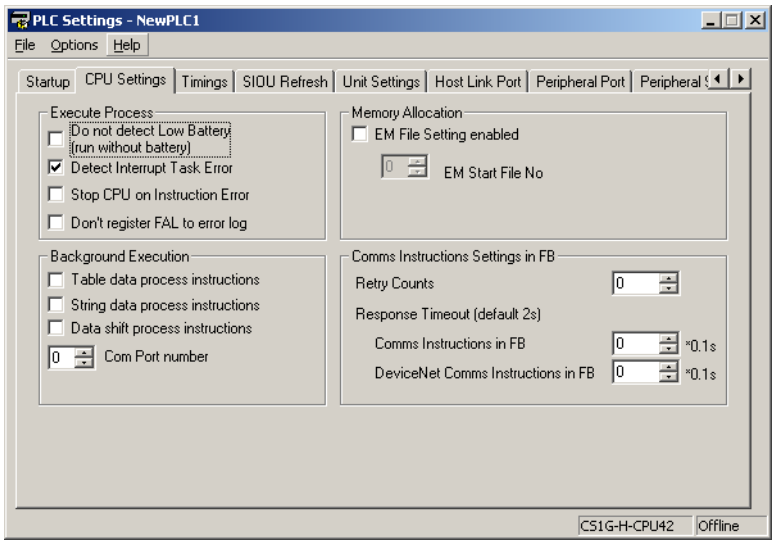
Execution Settings

Startup Condition (CJ1-H CPU Units Only)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+83	15	0: Wait for Units. 1: Don't wait. Default: 0	To start the CPU Unit in MONITOR or PROGRAM mode even if there is one or more Units that has not completed startup processing, set this setting to 1 (Don't wait for Units). To wait for all Units to finish startup processing, set this setting to 0 (Wait for Units).	---	At startup

Note This setting applies only to specific Units. If "don't wait" is set, the CPU Unit will not wait only for those specific Units, i.e., it will still wait for all other Units to start.

7-1-2-2 CPU Settings Tab Page



Execute Process

Detect Low Battery

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+128	15	0: Detect 1: Do not detect Default: 0	This setting determines whether CPU Unit battery errors are detected. If this setting is set to 0 and a battery error is detected, the ERR/ALM indicator on the CPU Unit will flash and the Battery Error Flag (A40204) will be turned ON, but CPU Unit operation will continue.	A40204 (Battery Error Flag)	At the next cycle.

Detect Interrupt Task Error

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+128	14	0: Detect 1: Do not detect Default: 0	This setting determines whether interrupt task errors are detected. If this setting is set to 0 and an interrupt task error is detected, the ERR/ALM indicator on the CPU Unit will flash and the Interrupt Task Error Flag (A40213) will be turned ON, but CPU Unit operation will continue.	A40213 (Interrupt Task Error Flag)	At the next cycle.

Stop CPU on Instruction Error (Instruction Error Operation)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+197	15	0: Continue 1: Stop Default: 0	This setting determines whether instruction errors (instruction processing errors (ER) and illegal access errors (AER)) are treated as non-fatal or fatal errors. When this setting is set to 1, CPU Unit operation will be stopped if the ER or AER Flags is turned ON (even when the AER Flag is turned ON for an indirect DM/EM BCD error). Related Flags: A29508 (Instruction Processing Error Flag) A29509 (Indirect DM/EM BCD Error Flag) A29510 (Illegal Access Error Flag)	A29508, A29509, A29510 (If this setting is set to 0, these flags won't be turned ON even if an instruction error occurs.)	At start of operation.

Do Not Register FAL to Error Log

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+129	15	0: Record user-defined FAL errors in error log. 1: Don't record user-defined FAL errors in error log. Default: 0	This setting determines if user-defined FAL errors created with FAL(006) and time monitoring for FPD(269) will be recorded in the error log (A100 to A199). Set it to 1 so prevent these errors from being recorded.	---	Whenever FAL(006) is executed (every cycle).

Note This setting does not exists in CJ1G-CPU□□ CPU Units.

Memory Allocation Settings

EM File Setting Enabled

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+136	7	0: None 1: EM File Memory Enabled. Default: 0	This setting determines whether part of the EM Area will be used for file memory.	---	After initialization from Programming Device or via FINS command.

Note This setting does not exist in CJ1M CPU Units.

EM Start File No.

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+136	0 to 3	0 to 6 Default: 0	If bit 7 (above) is set to 1, the setting here specifies the EM bank where file memory begins. The specified EM bank and all subsequent banks will be used as file memory. This setting will be disabled if bit 7 is set to 0.	A344 (EM File Memory Starting Bank)	After initialization from Programming Device or via FINS command.

Note This setting does not exist in CJ1M CPU Units.

Background Execution Settings

Table Data Process Instructions

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+198	15	0: Not executed in background. 1: Executed in background. Default: 0	This setting determines if Table Data Instructions will be processed over multiple cycle times (i.e., processed in the background).	---	At start of operation

Note This setting does not exists in CJ1G-CPU□□ CPU Units.

String Data Process Instructions

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+198	14	0: Not executed in background. 1: Executed in background. Default: 0	This setting determines if Text String Data Instructions will be processed over multiple cycle times (i.e., processed in the background).	---	At start of operation

Note This setting does not exists in CJ1G-CPU□□ CPU Units.

Data Shift Process Instructions

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+198	13	0: Not executed in background. 1: Executed in background. Default: 0	This setting determines if Data Shift Instructions will be processed over multiple cycle times (i.e., processed in the background).	---	At start of operation

Note This setting does not exists in CJ1G-CPU□□ CPU Units.

Communications Port Number for Background Execution

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+198	0 to 3	0 to 7: Communications ports 0 to 7 (internal logical ports)	The communications port number (internal logical port) that will be used for background execution.	---	At start of operation.

Note This setting does not exists in CJ1G-CPU□□ CPU Units.

FB Communications Instruction Settings (Settings for OMRON FB Library)

The following PLC Setup settings are used only when using the OMRON FB Library.

Number of Resends

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+200	0 to 3	0 to F: 0 to 15 Default: 0	Set the number of retries for sending commands when executing DeviceNet explicit messages or FINS messages within function blocks.	A58000 to A58003	Start of operation

Note This setting does not exists in CJ1G-CPU□□ CPU Units.

Response Timeout, Comms Instruction in FB

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+201	0 to 15	0001 to FFFF (Unit: 0.1 s, 0.1 to 6553.5) 0000: 2 s	A response timeout occurs when no response is returned within the time set here for FINS commands executed within a function block.	A581	Start of operation

Note This setting does not exists in CJ1G-CPU□□ CPU Units.

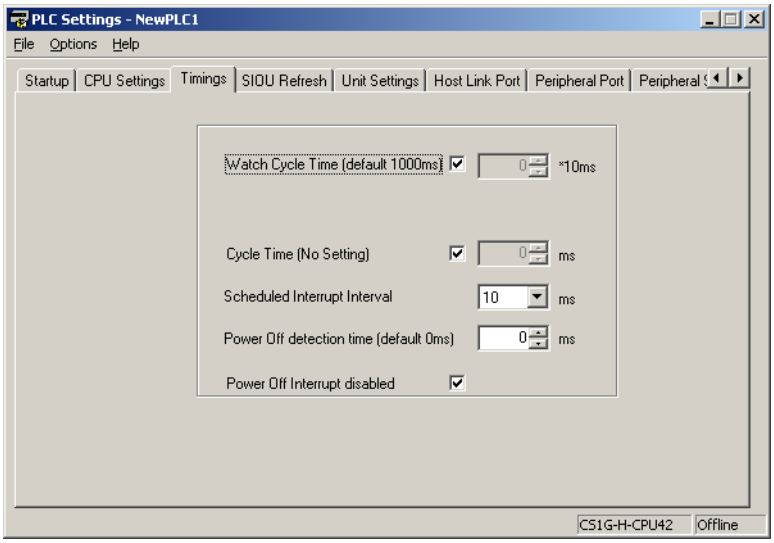
DeviceNet Communications Instruction Response Monitoring Time

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+202	0 to 15	0001 to FFFF (Unit: 0.1 s, 0.1 to 6553.5) 0000: 2 s	A response timeout occurs when no response is returned within the time set here for explicit messages commands executed within a function block.	A582	Start of operation

Note This setting does not exists in CJ1G-CPU□□ CPU Units.

The number of resends and response monitoring time must be set by the user in the FB communications instructions settings in the PLC Setup, particularly when using function blocks from the OMRON FB Library to execute FINS messages or DeviceNet explicit messages communications. The values set in this PLC Setup for OMRON FB Library will be automatically stored in the related Auxiliary Area words A580 to A582 and used by the function blocks from the OMRON FB Library.

7-1-2-3 Time and Interrupt Settings (CX-Programmer Timings Tab Page)



Enable Watch Cycle Time Setting

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+209	15	0: Default 1: Bits 0 to 14 Default: 0	Set to 1 to enable the Watch Cycle Time Setting in bits 0 to 14. Leave this setting at 0 for a maximum cycle time of 1 s.	A40108 (Cycle Time Too Long Flag)	At start of operation. (Can't be changed during operation.)

Watch Cycle Time

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+209	0 to 14	001 to FA0: 10 to 40,000 ms (10-ms units) Default: 001 (1 s)	This setting is valid only when bit 15 of 209 is set to 1. The Cycle Time Too Long Flag (A40108) will be turned ON if the cycle time exceeds this setting.	A264 and A265 (Present Cycle Time)	At start of operation (Can't be changed during operation.)

Cycle Time (Minimum Cycle Time)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+208	0 to 15	0001 to 7D00: 1 to 32,000 ms (1-ms units) Default: 0000 (No minimum)	Set to 0001 to 7D00 to specify a minimum cycle time. If the cycle time is less than this setting, it will be extended until this time passes. Leave this setting at 0000 for a variable cycle time. (Can't be changed during operation.) This cycle time will apply to the program execution cycle when a parallel processing mode is used.	---	At start of operation.

Scheduled Interrupt Interval

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+195	0 to 3	0: 10 ms 1: 1.0 ms 2: 0.1 ms (See note.) Default: 0	This setting determines the time units used in scheduled interrupt interval settings. (This setting cannot be changed during operation.)	---	At start of operation.

Note CJ1M/CJ1-H-R CPU Units only.

Power OFF Detection Time (Power OFF Detection Delay Time) (See note.)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+225	0 to 7	00 to 0A: 0 to 10 ms (1-ms units) Default: 00	This setting determines how much of a delay there will be from the detection of a power interruption (approximately 10 to 25 ms for AC power and 2 to 5 ms for DC power after the power supply voltage drops below 85% of the rated value) to the confirmation of a power interruption. The default setting is 0 ms. When the power OFF interrupt task is enabled, it will be executed when the power interruption is confirmed. If the power OFF interrupt task is disabled, the CPU will be reset and operation will be stopped.	---	At startup or at start of operation. (Can't be changed during operation.)

Note This setting is not supported when the CJ1W-PD022 Power Supply Unit is mounted. (Refer to *Power OFF Operation on page 453*.)

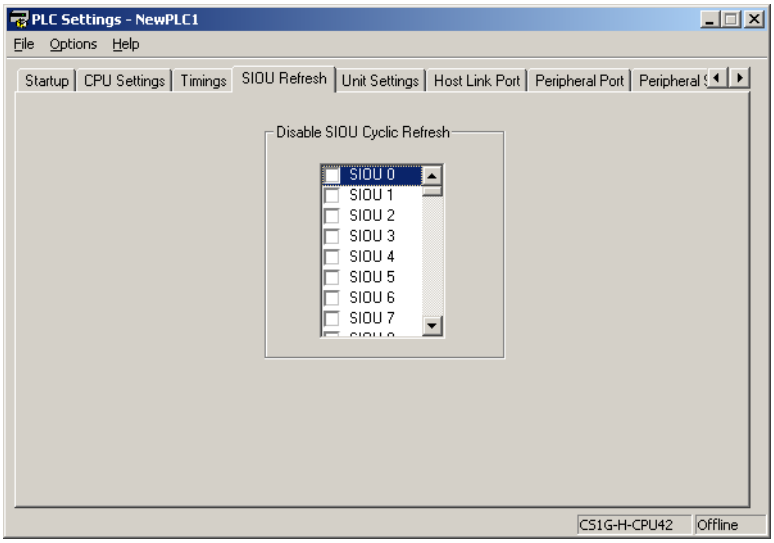
Power OFF Interrupt Disable (See note.)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+225	15	0: Disabled 1: Enabled Default: 0	When this setting is set to 1, the power OFF interrupt task will be executed when power is interrupted.	---	At startup or at start of operation. (Can't be changed during operation.)

Note This setting is not supported when the CJ1W-PD022 Power Supply Unit is mounted. (Refer to *Power OFF Operation on page 453*.)

7-1-2-4 SIOU Refresh Tab Page

Special I/O Unit Cyclic Refreshing

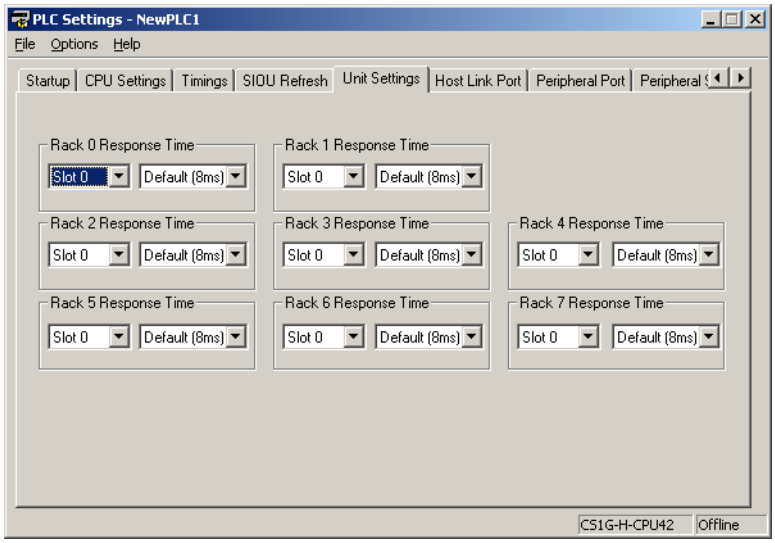


Item	Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
	Word	Bit(s)				
Cyclic Refreshing of Units 0 to 15	+226	0 to 15	0: Enabled 1: Disabled Default: 0	These settings determine whether data will be exchanged between the specified Unit and the Special I/O Unit's allocated words (10 words/Unit) during cyclic refreshing for Special I/O Units. Turn ON the corresponding bit to disable cyclic refreshing when the Unit will be refreshed in an interrupt task by IORF(097), several Special I/O Units are being used and you don't want to extend the cycle time, or the cycle time is so short that the Special I/O Unit's internal processing can't keep up. (Special I/O Units can be refreshed from the program with IORF(097).)	---	At start of operation.
Cyclic Refreshing of Units 16 to 31	+227	0 to 15	0: Enabled 1: Disabled Default: 0			
Cyclic Refreshing of Units 32 to 47	+228	0 to 15	0: Enabled 1: Disabled Default: 0			
Cyclic Refreshing of Units 48 to 63	+229	0 to 15	0: Enabled 1: Disabled Default: 0			
Cyclic Refreshing of Units 64 to 79	+230	0 to 15	0: Enabled 1: Disabled Default: 0			
Cyclic Refreshing of Units 80 to 95	+231	0 to 15	0: Enabled 1: Disabled Default: 0			

Note If Special I/O Units are not refreshed periodically (i.e., within 11 s) by the CPU Unit, a CPU Unit monitoring error will occur. (The ERH and RUN indicators on the Special I/O Unit will be lit.) If the PLC Setup is set to disable cyclically refreshing Special I/O Units, use the I/O REFRESH (IORF(097)) or SPEICAL I/O UNIT REFRESH (FIORF(225)) (FIORF: CJ1-H-R CPU Units only) instruction in the user program to refresh them.

7-1-2-5 Unit Settings Tab Page

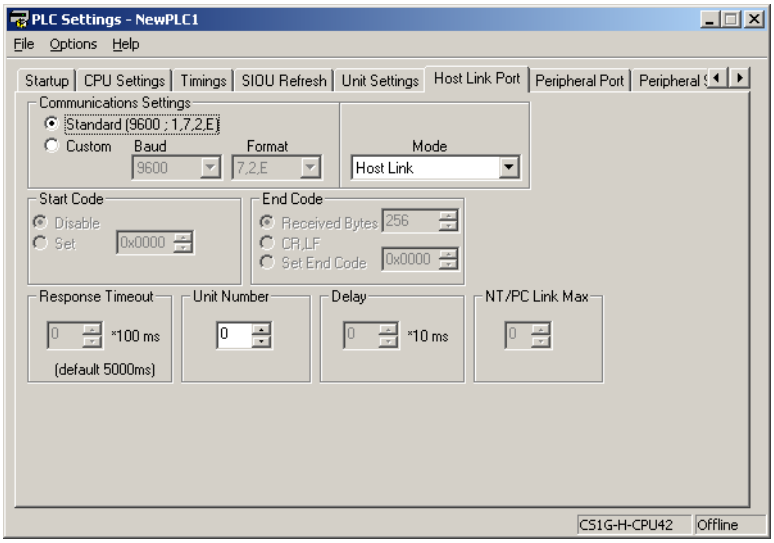
Basic I/O Unit Input (Rack) Response Times



Item	Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
	Word	Bit(s)				
Rack 0, Slot 0	+10	0 to 7	00: 8 ms 10: 0 ms 11: 0.5 ms 12: 1 ms 13: 2 ms 14: 4 ms 15: 8 ms 16: 16 ms 17: 32 ms Default: 00 (8 ms)	Sets the input response time (ON response time = OFF response time) for CJ-series Basic I/O Units. The default setting is 8 ms and the setting range is 0 ms to 32 ms. This value can be increased to reduce the effects of chattering and noise, or it can be reduced to allow reception of shorter input pulses.	A220 to A259: Actual input response times for Basic I/O Units	At startup.
Rack 0, Slot 1		8 to 15				
Rack 0, Slot 2	+11	0 to 7				
Rack 0, Slot 3		8 to 15				
Rack 0, Slot 4	+12	0 to 7				
Rack 0, Slot 5		8 to 15				
Rack 0, Slot6	+13	0 to 7				
Rack 0, Slot 7		8 to 15				
Rack 0, Slot 8	+14	0 to 7				
Rack 0, Slot 9		8 to 15				
Rack 1, Slots 0 to 9	+15 to 19	See Rack 0.				
Rack 2, Slots 0 to 9	+20 to 24					
Rack 3, Slots 0 to 9	+25 to 29					
Rack 4, Slots 0 to 9	+30 to 34					
Rack 5, Slots 0 to 9	+35 to 39					
Rack 6, Slots 0 to 9	+40 to 44					
Rack 7, Slots 0 to 9	+45 to 49					

7-1-2-6 Host Link (RS-232C) Port Tab Page

The following settings are valid when pin 5 on the DIP switch on the CPU Unit is OFF.



Host Link Settings

Communications Settings

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	15	0: Standard* 1: PLC Setup (custom) Default: 0	*The default settings are for 1 start bit, 7 data bits, even parity, 2 stop bits, and a baud rate of 9,600 bps.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Mode: Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	8 to 11	00: Host link 05: Host link Default: 0	This setting determines whether the RS-232C port will operate in host link mode or another serial communications mode. (Host link can be specified with 00 or 05.) The Peripheral bus mode is for communications with Programming Devices other than the Programming Console.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Format: Data Bits

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	3	0: 7 bits 1: 8 bits Default: 0	These settings are valid only when the communications mode is set to host link or no-protocol. These settings are also valid only when the RS-232C Port Settings Selection is set to 1: PLC Setup.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Format: Stop Bits

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	2	0: 2 bits 1: 1 bit Default: 0	These settings are valid only when the communications mode is set to host link or no-protocol. These settings are also valid only when the RS-232C Port Settings Selection is set to 1: PLC Setup.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Format: Parity

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	0 to 1	00: Even 01: Odd 10: None Default: 00	These settings are valid only when the communications mode is set to host link or no-protocol. These settings are also valid only when the RS-232C Port Settings Selection is set to 1: PLC Setup.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Baud Rate (bps)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+161	0 to 7	00: 9,600 bps 01: 300 bps 02: 600 bps 03: 1,200 bps 04: 2,400 bps 05: 4,800 bps 06: 9,600 bps 07: 19,200 bps 08: 38,400 bps 09: 57,600 bps 0A: 115,200 bps Default: 00	These settings are valid only when the communications mode is set to host link or no-protocol. These settings are also valid only when the RS-232C Port Settings Selection is set to 1: PLC Setup.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Unit Number (for CPU Unit in Host Link Mode)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+163	0 to 7	00 to 1F: (0 to 31) Default: 00	This setting determines the CPU Unit's unit number when it is connected in a 1-to-N (N=2 to 32) Host Link.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

NT Link Settings

Mode: Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	8 to 11	02: 1:N NT Link Default: 0	This setting determines whether the RS-232C port will operate in host link mode or another serial communications mode. **Note** Communications will not be possible with PTs set for 1:1 NT Links.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Baud Rate (bps)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+161	0 to 7	00: Standard 0A: High-speed NT Link* Default: 00	* Set to 115,200 bps when setting this value from the CX-Programmer. To return to the standard setting, leave the setting set to "PLC Setup" and set the baud rate to 9,600 bps.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

NT Link Max. (Maximum Unit Number in NT Link Mode)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+166	0 to 3	0 to 7 Default: 0	This setting determines the highest unit number of PT that can be connected to the PLC.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Peripheral Bus Settings

Communications Settings

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	15	0: Standard* 1: PLC Setup (custom) Default: 0	*The default settings are for a baud rate of 9,600 bps.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Mode: Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	8 to 11	04: Peripheral bus Default: 0	This setting determines whether the RS-232C port will operate in host link mode or another serial communications mode. (Host link can be specified with 00 or 05.) The Peripheral Bus mode is for communications with Programming Devices other than the Programming Console.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Baud Rate (bps)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+161	0 to 7	00: 9,600 bps 06: 9,600 bps 07: 19,200 bps 08: 38,400 bps 09: 57,600 bps 0A: 115,200 bps Default: 00	Settings 00 and 06 through 0A are valid when the communications mode is set to peripheral bus.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

No-protocol Settings

Standard/Custom Settings

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	15	0: Standard 1: Custom Default: 0	The standard settings are as follows: 1 stop bit, 7-bit data, even parity, 2 stop bits, 9,600 bps	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Serial Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	08 to 11	03 Hex: No-protocol Default: 00 Hex	This setting determines whether the RS-232C port will operate in no-protocol mode or another serial communications mode.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Data Length

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	3	0: 7-bit 1: 8-bit Default: 0	This setting is valid only in no-protocol communications mode. Set the Standard/Custom setting (word 160, bit 15) to 1 to enable this setting.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Stop Bits

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	2	0: 2 bits 1: 1 bit Default: 0	This setting is valid only in no-protocol communications mode. Set the Standard/Custom setting (word 160, bit 15) to 1 to enable this setting.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Parity

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	00 to 01	00 Hex: Even 01 Hex: Odd 10 Hex: None Default: 00	This setting is valid only in no-protocol communications mode. Set the Standard/Custom setting (word 160, bit 15) to 1 to enable this setting.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Baud Rate

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+161	00 to 07	00 Hex: 9,600 bps 01 Hex: 300 bps 02 Hex: 600 bps 03 Hex: 1,200 bps 04 Hex: 2,400 bps 05 Hex: 4,800 bps 06 Hex: 9,600 bps 07 Hex: 19,200 bps 08 Hex: 38,400 bps 09 Hex: 57,600 bps 0A Hex: 115,200 bps Default: 00 Hex	This setting is valid only in no-protocol communications mode. Set the Standard/Custom setting (word 160, bit 15) to 1 to enable this setting.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Send Delay

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+162	00 to 15	0000 to 270F Hex (0 to 99,990 ms) Unit: 10 ms Default: 0000	When the TXD(236) instruction is executed, data will be sent from the RS-232C after the send delay set here has expired.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Start Code/End Code

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	**Bit(s)**				
+164	8 to 15	00 to FF Default: 00	Start code: Set this start code only when the start code is enabled (1) in bits 12 to 15 of 165.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)
	0 to 7	00 to FF Default: 00	End code: Set this end code only when the end code is enabled (1) in bits 8 to 11 of 165.		
+165	12	0: None 1: Code in 164 Default: 0	Start code setting: A setting of 1 enables the start code in 164 bits 8 to 15.		
	8 to 9	0: None 1: Code in 164 2: CR+LF Default: 0	End code setting: With a setting of 0, the amount of data being received must be specified. A setting of 1 enables the end code in bits 0 to 7 of 164. A setting of 2 enables an end code of CR+LF.		
	0 to 7	00: 256 bytes 01 to FF: 1 to 255 bytes Default: 00	Set the data length to be sent and received with no-protocol communications. The end code and start code are not included in the data length. Set this value only when the end code setting in bits 8 to 11 of 165 is “0: None.” This setting can be used to change the amount of data that can be transferred at one time by TXD(236) or RXD(235). The default setting is the maximum value of 256 bytes.		

Serial Gateway Settings

Communications Settings

Programming Console address		Settings	Function	Related flags and words	New setting’s effectiveness
Word	**Bit(s)**				
+160	15	0: Default (standard)* 1: PLC Setup (custom) Default: 0	*The default settings are for a baud rate of 9,600 bps.	A61901 (RS-232C Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Mode: Communications Mode

Programming Console address		Settings	Function	Related flags and words	New setting’s effectiveness
Word	**Bit(s)**				
+160	8 to 11	9: Serial Gateway Default: 0	This setting determines whether the communications mode for the RS-232C port port. The peripheral bus mode is used for all Programming Devices except for Programming Consoles.	A61901 (RS-232C Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Data Bits

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+160	3	0: 7 bits 1: 8 bits Default: 0	These settings are valid when the RS-232C Port Settings Selection is set to 1: PLC Setup.	A61901 (RS-232C Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Stop Bits

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+160	2	0: 2 bits 1: 1 bit Default: 0	These settings are valid when the RS-232C Port Settings Selection is set to 1: PLC Setup.	A61901 (RS-232C Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Parity

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+160	0 to 1	00: Even 01: Odd 10: None Default: 00	These setting is valid only when the communications mode is set to Host Link. These settings are also valid only when the RS-232C Port Settings Selection is set to 1: PLC Setup.	A61902 (RS-232C Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Baud Rate (bps)

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+161	0 to 7	00: 9,600 01: 300 02: 600 03: 1,200 04 2,400 05: 4,800 06: 9,600 07: 19,200 08: 38,400 09: 57,600 0A: 115,200 Default: 00	These setting is valid only when the communications mode is set to Host Link. These settings are also valid only when the RS-232C Port Settings Selection is set to 1: PLC Setup.	A61902 (RS-232C Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Response Monitoring Time

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+167	8 to 15	00: 5 s 01 to FF: 100 to 25,500 ms (Unit: 100 ms) Default: 00	Monitors the time from when the FINS command that has been converted into the specified protocol using Serial Gateway is sent until the response is received. Default: 5 s; PLC Setup: 0.1 to 25.5 s Note: If a timeout occurs, the FINS end code 0205 hex (response timeout) will be returned to the FINS source.	A61902 (RS-232C Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Serial PLC Link (CJ1M CPU Units Only)

Polling Unit: Serial Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	8 to 11	8: Serial PLC Link Polling Unit Default: 0	This setting specifies the serial communications mode that the RS-232C port is to be used with. It also designates the local node as the Serial PLC Link Polling Unit.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Polling Unit: Port Baud Rate

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+161	0 to 7	00: Standard 0A: High-speed (See note.) Default: 00	This setting specifies the Serial PLC Link baud rate. Note: The setting must be the same for all of the Polled Units and the Polling Unit using the Serial PLC Links.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Note Set to 115,200 bps when using the CX-Programmer

Polling Unit: Link Method

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+166	15	0: Complete link method 1: Polling Unit link method Default: 0	This setting specifies the link method for the Serial PLC Link.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Polling Unit: Number of Link Words

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+166	4 to 7	1 to A Default: 0 (See note.) Note: If the default is set, the number of words will automatically be 10 (A hex).	This setting specifies the number of words per node in the Serial PLC Link Area to be used for Serial PLC Links.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Polling Unit: Maximum Unit Number in Serial PLC Link

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+166	0 to 3	0 to 7 Default: 0	This setting specifies the highest Polled Unit unit number that can be connected in Serial PLC Links. Note: If a PT is to be connected, it must be included when counting Units.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Polled Unit: Serial Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+160	8 to 11	7: Serial PLC Link Polled Unit Default: 0	This setting specifies the serial communications mode that the RS-232C port is to be used with. It also designates the local node as a a Serial PLC Link Polled Unit.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Polled Unit: Port Baud Rate

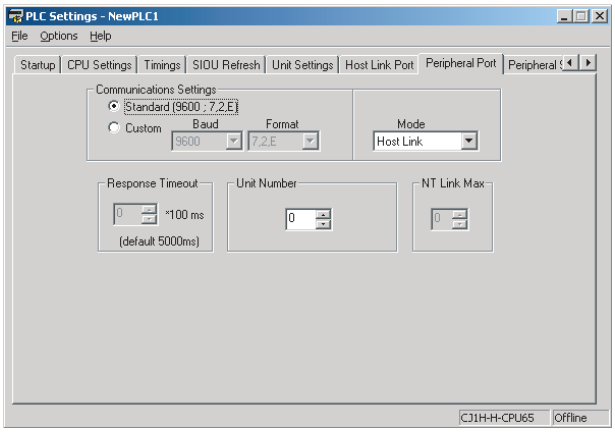
Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+161	0 to 7	00: Standard 0A: High-speed (See note.) Default: 00	This setting specifies the Serial PLC Link baud rate. Note: The setting must be the same for all of the Polled Units and the Polling Unit using Serial PLC Link.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

Note Set to 115,200 bps when using the CX-Programmer

Polled Unit: Serial PLC Link Polled Unit Unit Number

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+167	0 to 3	0 to 7 Default: 00	This setting specifies the Polled Unit unit number for the local node on the Serial PLC Link.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle.

7-1-2-7 Peripheral Port Tab Page



The following settings are valid when pin 4 on the DIP switch on the CPU Unit is ON.

Host Link Settings

Communications Settings

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+144	15	0: Standard* 1: PLC Setup (Custom) Default: 0	*The default settings are for 1 start bit, 7 data bits, even parity, 2 stop bits, and a baud rate of 9,600 bps.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Mode: Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+144	8 to 11	00: Host Link 05: Host link Default: 0	This setting determines whether the peripheral port will operate in host link mode or another serial communications mode. (Host link can be specified with 00 or 05.) The Peripheral Bus Mode is for communications with Programming Devices other than the Programming Console.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Format: Data Bits

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+144	3	0: 7 bits 1: 8 bits Default: 0	These settings are valid only when the communications mode is set to Host link. These settings are also valid only when the Peripheral Port Settings Selection is set to 1: PLC Setup.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Format: Stop Bits

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+144	2	0: 2 bits 1: 1 bit Default: 0	These settings are valid only when the communications mode is set to Host link. These settings are also valid only when the Peripheral Port Settings Selection is set to 1: PLC Setup.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Format: Parity

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+144	0 and 1	00: Even 01: Odd 10: None Default: 00	These setting is valid only when the communications mode is set to Host link. These settings are also valid only when the Peripheral Port Settings Selection is set to 1: PLC Setup.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Baud Rate (bps)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+145	0 to 7	00: 9,600 bps 01: 300 bps 02: 600 bps 03: 1,200 bps 04: 2,400 bps 05: 4,800 bps 06: 9,600 bps 07: 19,200 bps 08: 38,400 bps 09: 57,600 bps 0A: 115,200 bps Default: 00	This setting is valid only when the communications mode is set to the Host Link mode. These settings are also valid only when the Peripheral Port Settings Selection is set to 1: PLC Setup.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Unit Number (for CPU Unit in Host Link Mode)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+147	0 to 7	00 to 1F (0 to 31) Default: 00	This setting determines the CPU Unit's unit number when it is connected in a 1-to-N (N=2 to 32) Host Link.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

NT Link Settings

Mode: Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+144	8 to 11	02: 1:N NT Link Default: 0	This setting determines whether the RS-232C port will operate in host link mode or another serial communications mode. **Note** Communications will not be possible with PTs set for 1:1 NT Links.	A61902 (RS-232C Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Baud Rate (bps)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+145	0 to 7	00: Standard 0A: High-speed NT Link* Default: 00	* Set to 115,200 bps when setting this value from the CX-Programmer.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

NT Link Max. (Maximum Unit Number in NT Link Mode)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+150	0 to 3	0 to 7 Default: 0	This setting determines the highest unit number of PT that can be connected to the PLC in NT Link mode.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Peripheral Bus Settings

Communications Setting

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+144	15	0: Default (standard)* 1: PLC Setup (custom) Default: 0	*The default settings are for a baud rate of 9,600 bps.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Mode: Communications Mode

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+144	8 to 11	4: Peripheral bus Default: 0	This setting determines whether the communications mode for the peripheral port. The Peripheral Bus Mode is used for all Programming Devices except for Programming Consoles.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Baud Rate (bps)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+145	0 to 7	00: 9,600 bps 06: 9,600 bps 07: 19,200 bps 08: 38,400 bps 09: 57,600 bps 0A: 115,200 bps Default: 00	The following settings are valid for the Peripheral Bus Mode: 00 and 06 to 0A hex.	A61901 (Peripheral Port Settings Changing Flag)	At the next cycle. (Also can be changed with STUP (237).)

Serial Gateway Settings

Communications Setting

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+144	15	0: Default (standard)* 1: PLC Setup (custom)	*The default settings are for a baud rate of 9,600 bps.	A61901 (Peripheral Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Mode: Communications Mode

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+144	8 to 11	9: Serial Gateway Default: 0	This setting determines whether the communications mode for the peripheral port. The peripheral bus mode is used for all Programming Devices except for Programming Consoles.	A61901 (Peripheral Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Format: Data Bits

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+144	3	0: 7 bits 1: 8 bits Default: 0	These settings are valid when the Peripheral Port Settings Selection is set to 1: PLC Setup.	A61901 (Peripheral Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Format: Stop Bits

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+144	2	0: 2 bits 1: 1 bit Default: 0	These settings are valid when the Peripheral Port Settings Selection is set to 1: PLC Setup.	A61901 (Peripheral Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Format: Parity

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+144	0 to 1	00: Even 01: Odd 10: None Default: 00	These setting is valid only when the communications mode is set to Host Link. These settings are also valid only when the Peripheral Port Settings Selection is set to 1: PLC Setup.	A61901 (Peripheral Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Baud Rate (bps)

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+145	0 to 7	00: 9,600 01: 300 02: 600 03: 1,200 04 2,400 05: 4,800 06: 9,600 07: 19,200 08: 38,400 09: 57,600 0A: 115,200 Default: 00	These setting is valid only when the communications mode is set to Host Link. These settings are also valid only when the Peripheral Port Settings Selection is set to 1: PLC Setup.	A61901 (Peripheral Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

Response Monitoring Time

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+151	8 to 15	00: 5 s 01 to FF: 100 to 25,500 ms (Unit: 100 ms) Default: 00	Monitors the time from when the FINS command is converted into CompoWay/F using Serial Gateway and sent until the response is received. Default: 5 s; PLC Setup: 0.1 to 25.5 s Note: If a timeout occurs, the FINS end code 0205 hex (response timeout) will be returned to the FINS source.	A61901 (Peripheral Port Settings Changing Flag)	Takes effect the next cycle. (Also can be changed with STUP (237).)

7-1-2-8 Peripheral Service Tab Page (CPU Processing Mode Settings)

Peripheral Service Mode (Peripheral Servicing Priority Mode)

Instruction Execution Time

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+219	08 to 15	00 05 to FF (hex) Default: 00 (hex)	The Peripheral Servicing Priority Mode will be used if a time slice is set for instruction execution (5 to 255 ms in 1-ms increments). Instructions will be executed at the set time slice. 00: Disable priority servicing 05 to FF: Time slice for instruction execution (5 to 255 ms in 1-ms increments)	A266 and A267	At start of operation (Can't be changed during operation.)

Peripheral Service Execution Time

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+219	00 to 07	00 to FF (hex) Default: 00 (hex)	This parameter sets the time slice for peripheral servicing (0.1 to 25.5 ms in 0.1-ms increments). The specified amount of time will be used to service peripherals for each time slice. 00: Disable priority servicing 01 to FF: Time slice for peripheral servicing (0.1 to 25.5 ms in 0.1-ms increments)	A266 and A267	At start of operation (Can't be changed during operation.)

Target Units (Units for Priority Servicing)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+220	08 to 15	00 10 to 1F 20 to 2F E1 FC FD Default: 00	Up to five Units can be specified for priority servicing. 00: Disable priority servicing 10 to 1F: CPU Bus Unit unit number (0 to 15) + 10 (hex) 20 to 7F: CJ-series Special I/O Unit unit number (0 to 96) + 20 (hex) FC: RS-232C port FD: Peripheral port	---	At start of operation (Can't be changed during operation.)
	00 to 07				
+221	08 to 15				
	00 to 07				
+222	08 to 15				

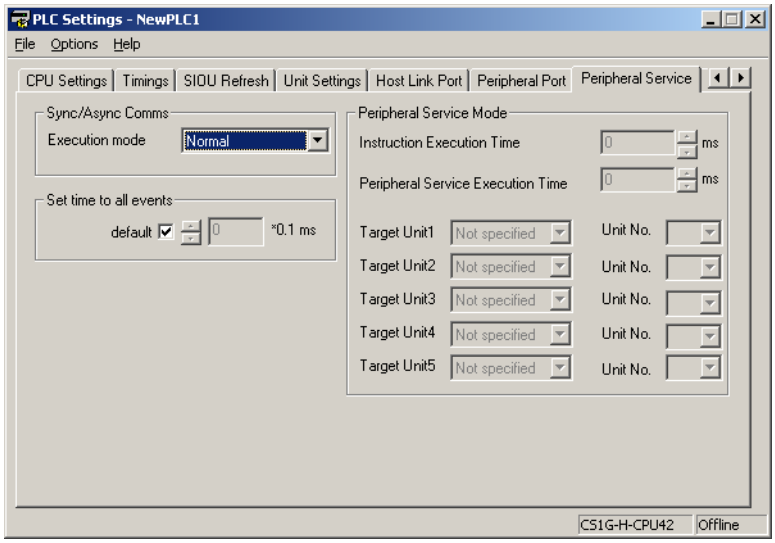
Sync/Async Comms (Parallel Processing Modes)

The following setting is supported only by the CJ1-H CPU Units

Execution Mode (Parallel Processing Mode)

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+219	08 to 15	00 01 02 Default: 00	This parameter specifies if I/O memory access is to be included in the peripheral service processing executed in parallel with instruction execution. 00: Not specified (disable parallel processing) 01: Synchronous (Synchronous Memory Access 02: Asynchronous (Asynchronous Memory Access)	---	At start of operation (Can't be changed during operation.)

7-1-2-9 Set Time to All Events (Fixed Peripheral Servicing Time)



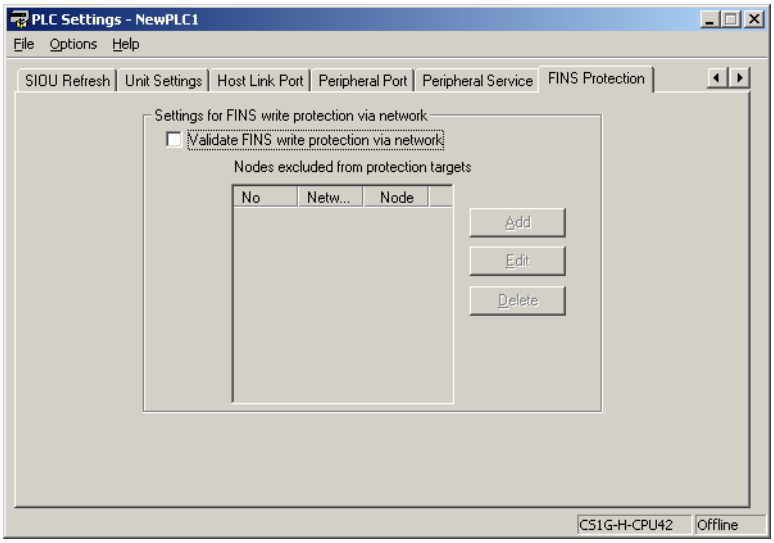
Enable Fixed Servicing Time

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+218	15	0: Default* 1: Bits 0 to 7 Default: 0	Set to 1 to enable the fixed peripheral servicing time in bits 0 to 7. *Default: 4% of the cycle time	---	At start of operation (Can't be changed during operation.)

Fixed Servicing Time

Programming Console address		Settings	Function	Related flags and words	When setting is read by CPU Unit
Word	Bit(s)				
+218	0 to 7	00 to FF: 0.0 to 25.5 ms (0.1-ms units) Default: 00	Set the peripheral servicing time. This setting is valid only when bit 15 of 218 is set to 1.	---	At start of operation (Can't be changed during operation.)

7-1-2-10 FINS Protection Tab Page (Protection Against FINS Writes Across Networks) (CJ-series CPU Unit Ver. 2.0 Only)



Enabling FINS Write Protection (Use FINS Write Protection)

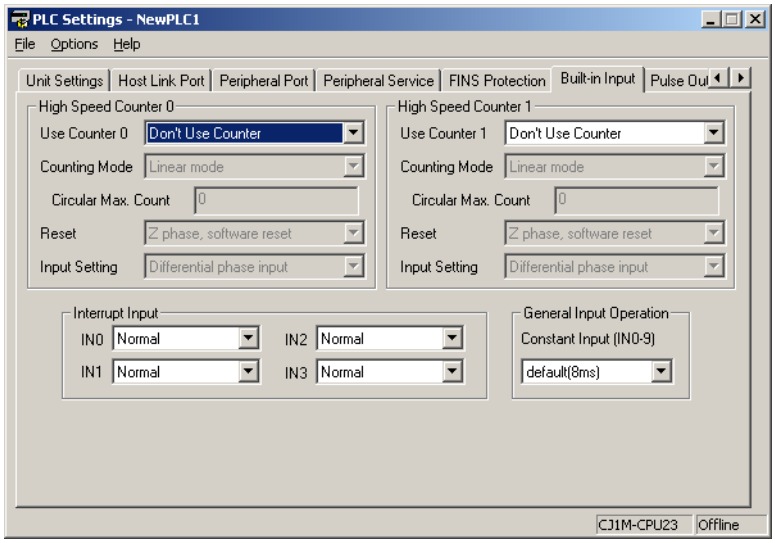
Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
+448	15	0: Disable FINS write protection 1: Enable FINS write protection Default: 0	Enables or disables write protection for the CPU Unit from FINS command sent over a network (i.e., all connections except for serial connections).	---	At any time

Nodes Excluded from Write Protection (Protection Releasing Addresses)

Programming Console address		Settings	Function	Related flags and words	New setting's effectiveness
Word	Bit(s)				
Set the nodes and networks from which FINS write operations will be enabled. The total number of nodes set to be excluded from write protection will be automatically set. A maximum of 32 nodes can be set. If these settings are not made (i.e., if the total number of nodes is 0), write operations will be disabled for all nodes but the local node. Note: This setting is valid only when FINS write protection has been enabled.					
+449 to 480	8 to 15	0 to 127 (00 to 7F hex)	FINS command source network address	---	At any time
	0 to 7	1 to 255 (01 to FE hex) Note: 255 (FF hex) can be set to include all nodes in the specified network.	FINS command source node address	---	
+448	0 to 7	0 to 32 (00 to 20 hex)	Number of nodes excluded from protection (Automatically calculated by the CX-Programmer; do not set.)	---	

7-1-2-11 Built-in Inputs

The following tables show the CX-Programmer's settings. These settings are for CJ1M CPU Units equipped with the built-in I/O functions.



Note In the CX-Programmer version 3.1 or lower, the Tab Page's name is *Built-in I/O Settings*.

High-speed Counter 0 Operation Settings

High-speed Counter 0 Enable/Disable

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+50	12 to 15	0 hex: Don't Use Counter. 1 hex*: Use Counter (60 kHz). 2 hex*: Use Counter (100 kHz).	0 hex	Specifies whether or not high-speed counter 0 is being used. **Note** When high-speed counter 0 is enabled (setting 1 or 2), the input operation settings for IN8 and IN9 are disabled. The input operation setting for IN3 is also disabled if the reset method is set to Phase-Z signal + software reset.	---	When power is turned ON

High-speed Counter 0 Pulse Input Setting (Pulse Input Mode)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+50	00 to 03	0 hex: Differential phase inputs 1 hex: Pulse + direction inputs 2 hex: Up/Down inputs 3 hex: Increment pulse input	0 hex	Specifies the pulse-input method for high-speed counter 0.	---	When power is turned ON

High-speed Counter 0 Reset Method

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+50	04 to 07	0 hex: Z phase, software reset (stop comparing) 1 hex: Software reset (stop comparing) 2 hex: Z phase, software reset (continue comparing) 3 hex: Software reset (continue comparing)	0 hex	Specifies the reset method for high-speed counter 0.	---	When power is turned ON

High-speed Counter 0 Counting Mode

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+50	08 to 11	0 hex: Linear mode 1 hex: Ring mode	0 hex	Specifies the counting mode for high-speed counter 0.	---	When operation starts

High-speed Counter 0 Circular Max. Count (Ring Counter Maximum Value)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+51	00 to 15	00000000 to FFFFFFFF hex (See note.)	00000000 hex	Sets the max. ring count for high-speed counter 0. When the high-speed counter 0 counting mode is set to ring mode, the count will be reset to 0 automatically when the counter PV exceeds the max. ring count.	A270 (Rightmost 4 digits of the high-speed counter 0 PV)	When operation starts
+52	00 to 15				A271 (Leftmost 4 digits of the high-speed counter 0 PV)	

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

High-speed Counter 1 Operation Settings

High-speed Counter 1 Enable/Disable

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+53	12 to 15	0 hex: Don't Use Counter. 1 hex*: Use Counter (60 kHz). 2 hex*: Use Counter (100 kHz).	0 hex	Specifies whether or not high-speed counter 1 is being used. **Note** When high-speed counter 1 is enabled (setting 1 or 2), the input operation settings for IN6 and IN7 are disabled. The input operation setting for IN2 is also disabled if the reset method is set to Phase-Z signal + software reset.	---	When power is turned ON

High-speed Counter 1 Pulse Input Setting (Pulse Input Mode)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+53	00 to 03	0 hex: Differential phase inputs 1 hex: Pulse + direction inputs 2 hex: Up/Down inputs 3 hex: Increment pulse input	0 hex	Specifies the pulse-input method for high-speed counter 1.	---	When power is turned ON

High-speed Counter 1 Reset Method

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+53	04 to 07	0 hex: Z phase, software reset (stop comparing) 1 hex: Software reset (stop comparing) 2 hex: Z phase, software reset (continue comparing) 3 hex: Software reset (continue comparing)	0 hex	Specifies the reset method for high-speed counter 1.	---	When power is turned ON

High-speed Counter 1 Counting Mode

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+53	08 to 11	0 hex: Linear mode 1 hex: Ring mode	0 hex	Specifies the counting mode for high-speed counter 1.	---	When operation starts

High-speed Counter 1 Circular Max. Count (Ring Counter Maximum Value)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+54	00 to 15	00000000 to FFFFFFFF hex (See note.)	00000000 hex	Sets the max. ring count for high-speed counter 1. When the high-speed counter 1 counting mode is set to ring mode, the count will be reset to 0 automatically when the counter PV exceeds the max. ring count.	A272 (Rightmost 4 digits of the high-speed counter 1 PV)	When operation starts
+55	00 to 15				A273 (Leftmost 4 digits of the high-speed counter 1 PV)	

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Input Operation Settings for Built-in Inputs IN0 to IN3

Input Operation Setting for IN0

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+60	00 to 03	0 hex: Normal (General-purpose input) 1 hex: Interrupt (Interrupt input) (See note.) 2 hex: Quick (Quick-response input)	0 hex	Specifies the kind of input that is being received at built-in input IN0.	---	When power is turned ON

Note When IN0 is set as an interrupt input (1 hex), use the MSKS(690) instruction to select direct mode or counter mode operation.

Input Operation Setting for IN1

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+60	04 to 07	0 hex: Normal (General-purpose input) 1 hex: Interrupt (Interrupt input) (See note.) 2 hex: Quick (Quick-response input)	0 hex	Specifies the kind of input that is being received at built-in input IN1.	---	When power is turned ON

Note When IN1 is set as an interrupt input (1 hex), use the MSKS(690) instruction to select direct mode or counter mode operation.

Input Operation Setting for IN2

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+60	08 to 11	0 hex: Normal (General-purpose input) 1 hex: Interrupt (Interrupt input) (See note.) 2 hex: Quick (Quick-response input)	0 hex	Specifies the kind of input that is being received at built-in input IN2. **Note** The input operation setting for IN2 is disabled when high-speed counter 1 is being used and the reset method is set to Phase-Z signal + software reset.	---	When power is turned ON

Note When IN2 is set as an interrupt input (1 hex), use the MSKS(690) instruction to select direct mode or counter mode operation.

Input Operation Setting for IN3

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+60	12 to 15	0 hex: Normal (General-purpose input) 1 hex: Interrupt (Interrupt input) (See note.) 2 hex: Quick (Quick-response input)	0 hex	Specifies the kind of input that is being received at built-in input IN3 **Note** The input operation setting for IN3 is disabled when high-speed counter 0 is being used and the reset method is set to Phase-Z signal + software reset.	---	When power is turned ON

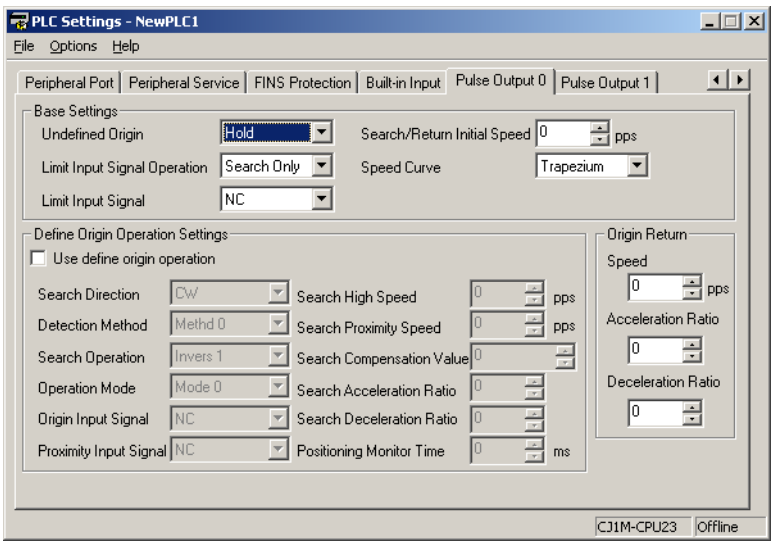
Note When IN3 is set as an interrupt input (1 hex), use the MSKS(690) instruction to select direct mode or counter mode operation.

Input Time Constant Setting for the General-purpose Inputs

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+61	00 to 07	00 hex: Default (8 ms) 10 hex: 0 ms (no filter) 11 hex: 0.5 ms 12 hex: 1 ms 13 hex: 2 ms 14 hex: 4 ms 15 hex: 8 ms 16 hex: 16 ms 17 hex: 32 ms	0 hex	Specifies the input time constant for general-purpose inputs IN0 to IN9. **Note** This setting has no effect on inputs set as interrupt inputs, quick-response inputs, or high-speed counters.	---	When operation starts

7-1-2-12 Origin Search Function

The following tables show the settings for the origin search function in the CX-Programmer. These settings are for CJ1M CPU Units equipped with the built-in I/O functions.



Note In the CX-Programmer version 3.1 or lower, the Tab Page's name is *Define Origin Operation Settings Field of Define Origin*.

Pulse Output 0 Settings

Pulse Output 0 Use Origin Operation Settings (Origin Search Function Enable/Disable)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+256	00 to 03	0 hex: Disabled 1 hex*: Enabled	0 hex	Specifies whether or not the origin search function is used for pulse output 0. **Note** Interrupt inputs 0 and 1 and PWM(891) output 0 cannot be used when the origin search function is enabled (setting 1) for pulse output 0. High-speed counters 0 and 1 can be used.	---	When power is turned ON

Pulse Output 0 Limit Input Signal Operation (CJ1M CPU Unit Ver. 2.0 Only)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+256	04 to 07	0 hex: Search only 1 hex: Always	0 hex	Specifies whether to use the CW/CCW limit input signals (reflected in A54008, A54009, A54108, and A54109) only for origin searches or for all pulse output functions.	---	When power is turned ON

Pulse Output 0 Speed Curve (CJ1M CPU Unit Ver. 2.0 Only)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+256	12 to 15	0 hex: Trapezium (linear) 1 hex: S-shaped	0 hex	Specifies whether to use S-curve or linear acceleration/deceleration rates for pulse outputs with acceleration/ deceleration.	---	When power is turned ON

Pulse Output 0 Origin Search Operating Mode

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+257	00 to 03	0 hex: Mode 0 1 hex: Mode 1 2 hex: Mode 2	0 hex	Specifies the origin search mode for pulse output 0.	---	When operation starts

Pulse Output 0 Origin Search Operation Setting

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+257	04 to 07	0 hex: Inverse 1 (Reversal mode 1) 1 hex: Inverse 2 (Reversal mode 2)	0 hex	Specifies the origin search operation for pulse output 0.	---	When operation starts

Pulse Output 0 Origin Detection Method

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+257	08 to 11	0 hex: Method 0 (Origin detection method 0) 1 hex: Method 1 (Origin detection method 1) 2 hex: Method 2 (Origin detection method 2)	0 hex	Specifies the origin detection method for pulse output 0.	---	When operation starts

Pulse Output 0 Origin Search Direction Setting

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+257	12 to 15	0 hex: CW direction 1 hex: CCW direction	0 hex	Specifies the origin search direction for pulse output 0.	---	When operation starts

Pulse Output 0 Origin Search/Return Initial Speed

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+258	00 to 15	00000000 to 000186A0 hex (See note.)	00000000 hex	Specifies the starting speed (0 to 100,000 pps) for the pulse output 0 origin search and origin return operations.	---	When operation starts
+259	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 0 Origin Search High Speed

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+260	00 to 15	00000001 to 000186A0 hex (See note.)	00000000 hex	Specifies the high speed setting (1 to 100,000 pps) for pulse output 0 origin search operation.	---	When operation starts
+261	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 0 Origin Search Proximity Speed

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+262	00 to 15	00000001 to 000186A0 hex (See note.)	00000000 hex	Specifies the proximity speed setting (1 to 100,000 pps) for pulse output 0 origin search operation.		When operation starts
+263	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 0 Search Compensation Value (Origin Compensation)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+264	00 to 15	80000000 to 7FFFFFFF hex (See note.)	---	Sets the pulse output 0 origin compensation (–2,147,483,648 to 2,147,483,647).	---	When operation starts
+265	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 0 Origin Search Acceleration Rate

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+266	00 to 15	Pre-Ver. 2.0 CPU Units: 0001 to 07D0 hex CPU Units Ver. 2.0: 0001 to FFFF hex (See note.)	---	Sets the origin search acceleration rate for pulse output 0. Pre-Ver. 2.0 CPU Units: 1 to 2,000 pulses/4 ms CPU Units Ver. 2.0: 1 to 65,535 pulses/4 ms	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 0 Origin Search Deceleration Rate

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+267	00 to 15	Pre-Ver. 2.0 CPU Units: 0001 to 07D0 hex CPU Units Ver. 2.0: 0001 to FFFF hex (See note.)	---	Sets the origin search deceleration rate for pulse output 0. Pre-Ver. 2.0 CPU Units: 1 to 2,000 pulses/4 ms CPU Units Ver. 2.0: 1 to 65,535 pulses/4 ms	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 0 Limit Input Signal Type

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+268	00 to 03	0 hex: NC 1 hex: NO	0 hex	Specifies whether the limit input signal for pulse output 0 is normally closed or normally open.	---	When operation starts

Pulse Output 0 Origin Proximity Input Signal Type

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+268	04 to 07	0 hex: NC 1 hex: NO	0 hex	Specifies whether the Origin Proximity Input Signal for pulse output 0 is normally closed or normally open.	---	When operation starts

Pulse Output 0 Origin Input Signal Type

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+268	08 to 11	0 hex: NC 1 hex: NO	0 hex	Specifies whether the Origin Input Signal for pulse output 0 is normally closed or normally open.	---	When operation starts

Pulse Output 0 Undefine Origin Setting (CJ1M CPU Unit Ver. 2.0 Only)

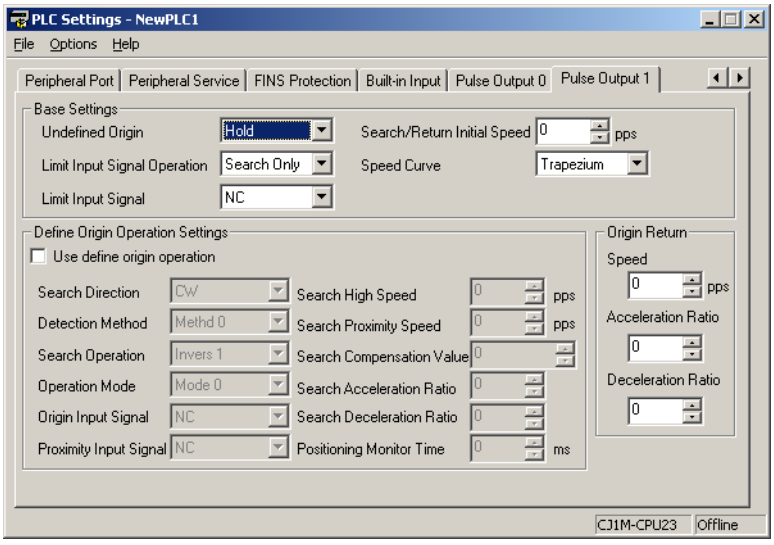
Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+268	12 to 15	0 hex: Hold 1 hex: Undefine	0 hex	Specifies whether to hold the origin setting when the CW/CCW limit input signal is input during execution of an origin search or pulse output function.	---	When operation starts

Pulse Output 0 Positioning Monitor Time

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+269	00 to 15	0000 to 270F hex (See note.)	0000 hex	Specifies the positioning monitor time (0 to 9,999 ms) for pulse output 0.	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

7-1-2-13 Pulse Output 1 Settings



Note In the CX-Programmer version 3.1 or lower, the Tab Page's name is *Define Origin Operation Settings Field of Define Origin 2*.

Pulse Output 1 Use Origin Operation Settings (Origin Search Function Enable/Disable)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+274	00 to 03	0 hex: Disabled 1 hex*: Enabled	0 hex	Specifies whether or not the origin search function is used for pulse output 1. **Note** Interrupt inputs 2 and 3 and PWM(891) output 1 cannot be used when the origin search function is enabled (setting 1) for pulse output 1. High-speed counters 0 and 1 can be used.	---	When power is turned ON

Pulse Output 1 Limit Input Signal Operation (CJ1M CPU Unit Ver. 2.0 Only)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+274	04 to 07	0 hex: Search only 1 hex: Always	0 hex	Specifies whether to use the CW/CCW limit input signals (reflected in A54008, A54009, A54108, and A54109) only for origin searches or for all pulse output functions.	---	When power is turned ON

Pulse Output 1 Speed Curve (CJ1M CPU Unit Ver. 2.0 Only)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+274	12 to 15	0 hex: Trapezium (linear) 1 hex: S-shaped	0 hex	Specifies whether to use S-curve or linear acceleration/deceleration rates for pulse outputs with acceleration/deceleration.	---	When power is turned ON

Pulse Output 1 Origin Search Operating Mode

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+275	00 to 03	0 hex: Mode 0 1 hex: Mode 1 2 hex: Mode 2	0 hex	Specifies the origin search mode for pulse output 1.	---	When operation starts

Pulse Output 1 Origin Search Operation Setting

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+275	04 to 07	0 hex: Inverse 1 (Reversal mode 1) 1 hex: Inverse 2 (Reversal mode 2)	0 hex	Specifies the origin search operation for pulse output 1.	---	When operation starts

Pulse Output 1 Origin Detection Method

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+275	08 to 11	0 hex: Method 0 (Origin detection method 0) 1 hex: Method 1 (Origin detection method 1) 2 hex: Method 2 (Origin detection method 2)	0 hex	Specifies the origin detection method for pulse output 1.	---	When operation starts

Pulse Output 1 Origin Search Direction Setting

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+275	12 to 15	0 hex: CW direction 1 hex: CCW direction	0 hex	Specifies the origin search direction for pulse output 1.	---	When operation starts

Pulse Output 1 Origin Search/Return Initial Speed

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+276	00 to 15	00000000 to 000186A0 hex (See note.)	00000000 hex	Specifies the starting speed (0 to 100,000 pps) for the pulse output 1 origin search and origin return operations.	---	When operation starts
+277	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 1 Origin Search High Speed

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+278	00 to 15	00000001 to 000186A0 hex (See note.)	00000001 hex	Specifies the high speed setting (1 to 100,000 pps) for pulse output 1 origin search operation.	---	When operation starts
+279	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 1 Origin Search Proximity Speed

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+280	00 to 15	00000001 to 000186A0 hex (See note.)	00000000 hex	Specifies the proximity speed setting (1 to 100,000 pps) for pulse output 1 origin search operation.	---	When operation starts
+281	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 1 Search Compensation Value 1 (Origin Compensation)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+282	00 to 15	80000000 to 7FFFFFFF hex (See note.)	---	Sets the pulse output 1 origin compensation (–2,147,483,648 to 2,147,483,647).	---	When operation starts
+283	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 1 Origin Search Acceleration Rate

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+284	00 to 15	Pre-Ver. 2.0 CPU Units: 0001 to 07D0 hex CPU Units Ver. 2.0: 0001 to FFFF hex (See note.)	---	Sets the origin search acceleration rate for pulse output 0. Pre-Ver. 2.0 CPU Units: 1 to 2,000 pulses/4 ms CPU Units Ver. 2.0: 1 to 65,535 pulses/4 ms	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 1 Origin Search Deceleration Rate

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+285	00 to 15	Pre-Ver. 2.0 CPU Units: 0001 to 07D0 hex CPU Units Ver. 2.0: 0001 to FFFF hex (See note.)	---	Sets the origin search deceleration rate for pulse output 0. Pre-Ver. 2.0 CPU Units: 1 to 2,000 pulses/4 ms CPU Units Ver. 2.0: 1 to 65,535 pulses/4 ms	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 1 Limit Input Signal Type

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+286	00 to 03	0 hex: NC 1 hex: NO	0 hex	Specifies whether the limit input signal for pulse output 1 is normally closed or normally open.	---	When operation starts

Pulse Output 1 Origin Proximity Input Signal Type

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+286	04 to 07	0 hex: NC 1 hex: NO	0 hex	Specifies whether the Origin Proximity Input Signal for pulse output 1 is normally closed or normally open.	---	When operation starts

Pulse Output 1 Origin Input Signal Type

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+286	08 to 11	0 hex: NC 1 hex: NO	0 hex	Specifies whether the Origin Input Signal for pulse output 1 is normally closed or normally open.	---	When operation starts

Pulse Output 1 Undefine Origin Setting (CJ1M CPU Unit Ver. 2.0 Only)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+286	12 to 15	0 hex: Hold 1 hex: Undefine	0 hex	Specifies whether to hold the origin setting when the CW/CCW limit input signal is input during execution of an origin search or pulse output function.	---	When operation starts

Pulse Output 1 Positioning Monitor Time

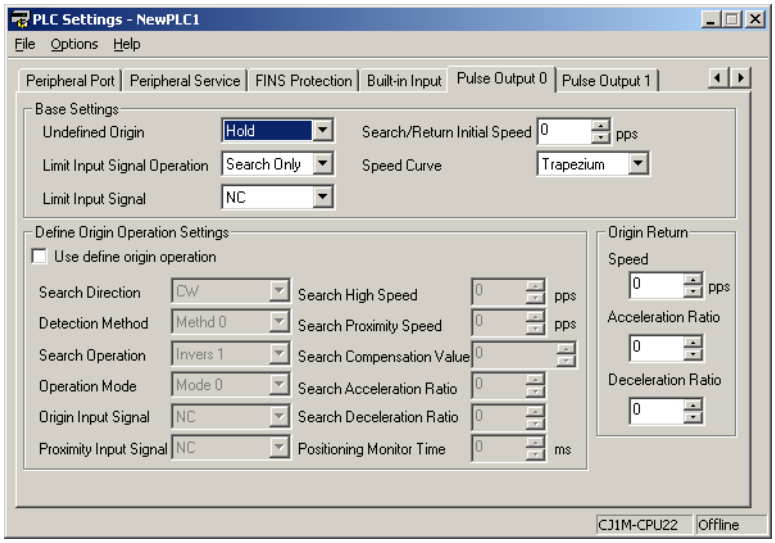
Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+287	00 to 15	0000 to 270F hex (See note.)	0000 hex	Specifies the positioning monitor time (0 to 9,999 ms) for pulse output 1.	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

7-1-2-14 Origin Return Function

The following tables show the settings for the origin return function in the CX-Programmer. These settings are for CJ1M CPU Units equipped with the built-in I/O functions.

Pulse Output 0 Settings



Note CX-Programmer Tabs
CX-Programmer Ver. 3.1 or lower: Define Origin Operation Settings Field of Define Origin 1
CX-Programmer Ver. 3.2 or higher: Pulse Output 0

Pulse Output 0 Origin Search/Return Initial Speed

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+258	00 to 15	00000000 to 000186A0 hex (See note.)	00000000 hex	Specifies the starting speed (0 to 100,000 pps) for the pulse output 0 origin search and origin return operations.	---	When operation starts
+259	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Speed (Target Speed for Pulse Output 0 Origin Return)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+270	00 to 15	00000001 to 000186A0 hex (See note.)	00000000 hex	Specifies the target speed (1 to 100,000 pps) for pulse output 0 origin return operation.	---	When operation starts
+271	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Acceleration Rate (Pulse Output 0 Origin Return Acceleration Rate)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+272	00 to 15	Pre-Ver. 2.0 CPU Units: 0001 to 07D0 hex CPU Units Ver. 2.0: 0001 to FFFF hex (See note.)	0000 hex	Sets the origin search acceleration rate for pulse output 0. Pre-Ver. 2.0 CPU Units: 1 to 2,000 pulses/4 ms CPU Units Ver. 2.0: 1 to 65,535 pulses/4 ms	---	When operation starts

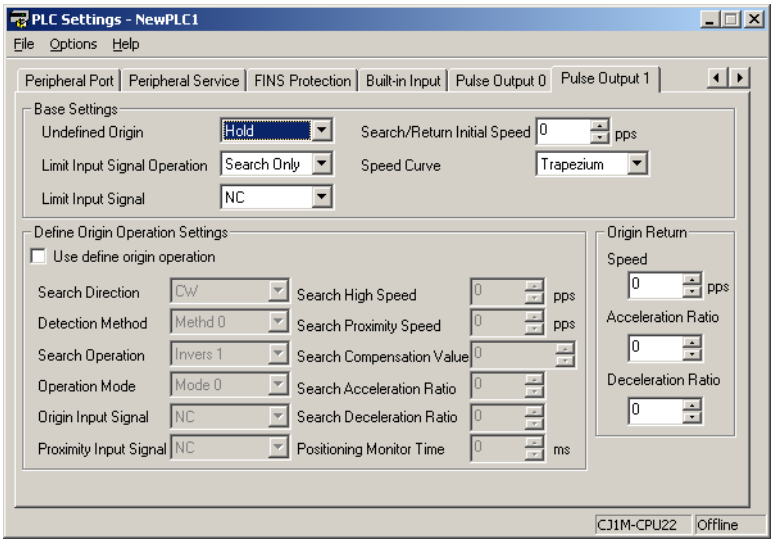
Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Deceleration Rate (Pulse Output 0 Origin Return Deceleration Rate)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+273	00 to 15	Pre-Ver. 2.0 CPU Units: 0001 to 07D0 hex CPU Units Ver. 2.0: 0001 to FFFF hex (See note.)	0000 hex	Sets the origin search deceleration rate for pulse output 0. Pre-Ver. 2.0 CPU Units: 1 to 2,000 pulses/4 ms CPU Units Ver. 2.0: 1 to 65,535 pulses/4 ms	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Pulse Output 1 Settings



Note CX-Programmer Tabs
CX-Programmer Ver. 3.1 or lower: Define Origin Operation Settings Field of Define Origin 2
CX-Programmer Ver. 3.2 or higher: Pulse Output 1

Pulse Output 1 Origin Search/Return Initial Speed

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+276	00 to 15	00000000 to 000186A0 hex (See note.)	00000000 hex	Specifies the starting speed (0 to 100,000 pps) for the pulse output 1 origin search and origin return operations.	---	When operation starts
+277	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Speed (Target Speed for Pulse Output 1 Origin Return)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+288	00 to 15	00000001 to 000186A0 hex (See note.)	00000000 hex	Specifies the target speed (1 to 100,000 pps) for pulse output 1 origin return operation.	---	When operation starts
+289	00 to 15					

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Acceleration Rate (Pulse Output 1 Origin Return Acceleration Rate)

Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+290	00 to 15	Pre-Ver. 2.0 CPU Units: 0001 to 07D0 hex CPU Units Ver. 2.0: 0001 to FFFF hex (See note.)	0000 hex	Sets the origin search acceleration rate for pulse output 0. Pre-Ver. 2.0 CPU Units: 1 to 2,000 pulses/4 ms CPU Units Ver. 2.0: 1 to 65,535 pulses/4 ms	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

Deceleration (Pulse Output 1 Origin Return Deceleration Rate)

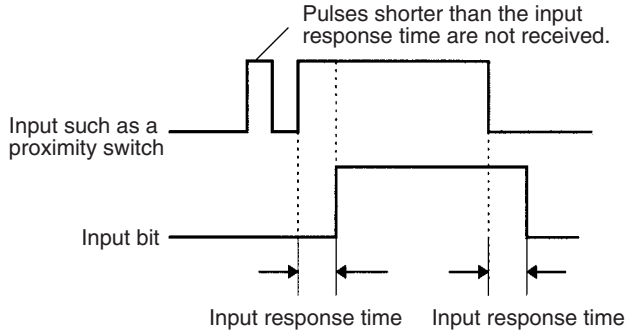
Programming Console address		Settings	Default	Function	Related Auxiliary Area flags/ bits	Time when setting is read by CPU Unit
Word	Bits					
+291	00 to 15	Pre-Ver. 2.0 CPU Units: 0001 to 07D0 hex CPU Units Ver. 2.0: 0001 to FFFF hex (See note.)	0000 hex	Sets the origin search deceleration rate for pulse output 0. Pre-Ver. 2.0 CPU Units: 1 to 2,000 pulses/4 ms CPU Units Ver. 2.0: 1 to 65,535 pulses/4 ms	---	When operation starts

Note When the CX-Programmer is being used to make the setting, the setting is input in decimal.

7-2 Explanations of PLC Setup Settings

Basic I/O Unit Input Response Time

The input response time can be set for Basic I/O Units by Rack and Slot number. Increasing this value reduces the effects of chattering and noise. Decreasing this value allows reception of shorter input pulses, (but do not set the ON response time or OFF response time to less than the cycle time).



The default setting for the input response time is 8 ms and the setting range is 0 to 32 ms. When the input response time is set to 0 ms, the only delay will be the delays in the Unit's internal elements. For information on the Unit's internal elements, refer to *Appendix A Specifications of Basic I/O Units* and check the input response time for the Unit that you are using.

The input response time settings are transferred to the Basic I/O Units when the PLC is turned ON.

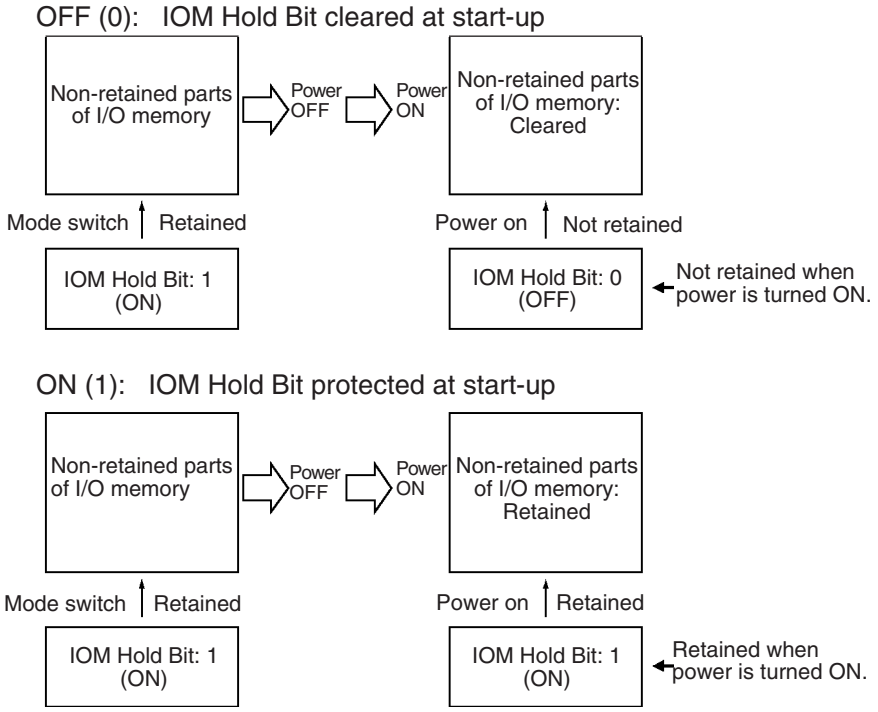
When the Unit's settings are changed, they are stored in A220 to A259 (Actual Input Response Times for Basic I/O Units). When the settings in the PLC Setup have been changed with the PLC in PROGRAM mode, the PLC Setup settings will differ from the actual settings in the Units. In this case, the values in A220 to A259 can be checked to see the input response times actually set in the Units.

IOM Hold Bit Status at Startup

The IOM Hold Bit (A50012) can be turned ON to retain all of the data in I/O Memory when the CPU Unit's operating mode is switched between PROGRAM mode and RUN/MONITOR mode. When the PLC is turned on, the IOM Hold Bit itself will be cleared (OFF) unless it is protected with this PLC Setup setting.

If the IOM Hold Bit Status at Startup setting is ON, the status of the IOM Hold Bit will be protected when the PLC is turned on. If this setting is ON and the IOM Hold BIt itself is ON, all data in I/O memory will be retained when the PLC is turned ON.

Note If the backup battery fails or is disconnected, the IOM Hold Bit will be cleared whether this setting is ON or OFF.



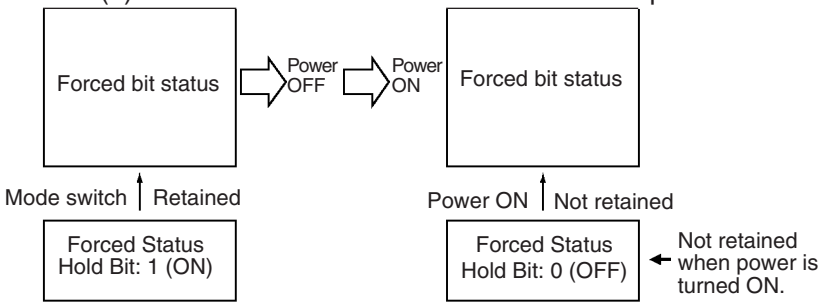
Forced Status Hold Bit at Startup

The Forced Status Hold Bit (A50013) can be turned ON to retain the forced status of all bits that have been force-set or force-reset when the CPU Unit's operating mode is switched between PROGRAM mode and RUN/MONITOR mode. When the PLC is turned on, the Forced Status Hold Bit itself will be cleared (OFF) unless it is protected with this PLC Setup setting.

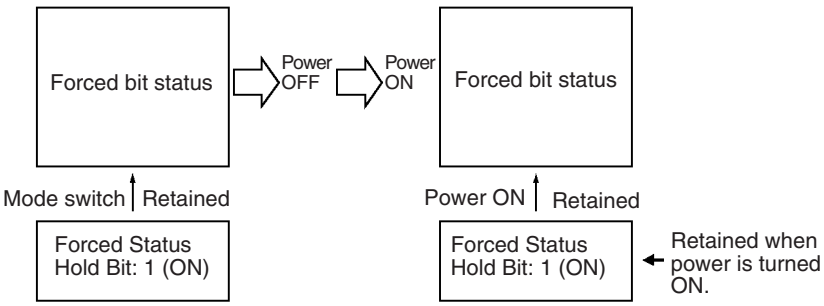
If the Forced Status Hold Bit at Startup setting is ON, the status of the Forced Status Hold Bit will be protected when the PLC is turned on. If this setting is ON and the Forced Status Hold BIt itself is ON, all force-set and force-reset bits will retain their forced status when the PLC is turned on.

Note If the backup battery fails or is disconnected, the Forced Status Hold Bit will be cleared whether this setting is ON or OFF.

OFF (0): Forced Status Hold Bit cleared at start-up



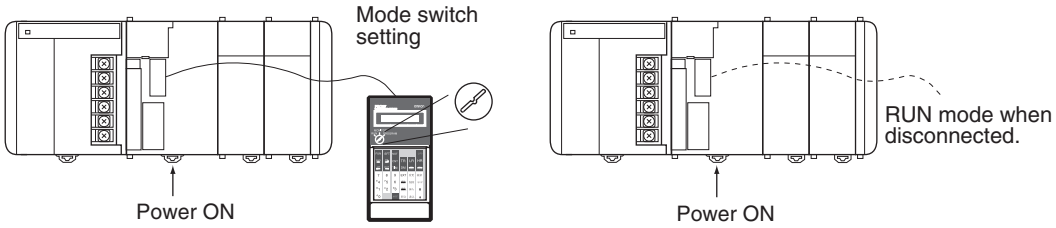
ON (1): Forced Status Hold Bit protected at start-up



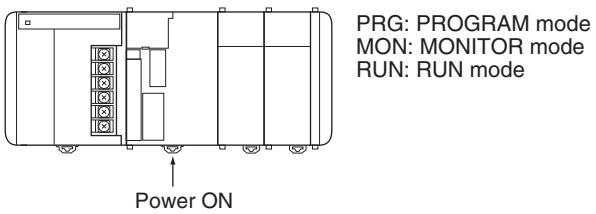
Startup Mode Setting This setting determines whether the startup mode will be the mode set on the Programming Console's mode switch or the mode set here in the PLC Setup.

Note If this setting specifies the mode set on the Programming Console's mode switch (0) but a Programming Console isn't connected, the CPU Unit will automatically enter RUN mode at startup. (This differs from the default operation for CS-series CPU Units.)

PRCN: Programming Console's mode switch



Other: PC Setup's Startup Mode setting



Note If a Programming Console is not connected when the PLC Setup is set to use the mode set on the Programming Console's mode switch, the CPU Unit will start in RUN mode.

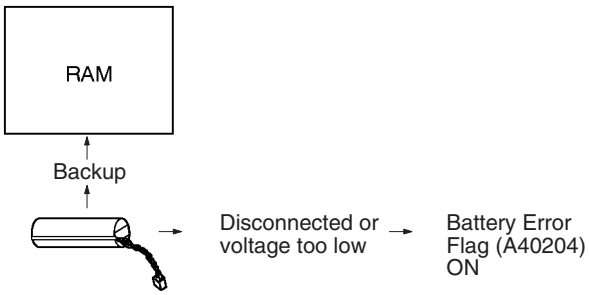
Detect Low Battery

This setting determines whether CPU Unit battery errors are detected. Set the PLC Setup so that battery errors are not detected when using battery-free operation. Refer to the *CS/CJ Series Programming Manual* for details.

If this setting is set to detect errors (0) and a battery error is detected, the Battery Error Flag (A40204) will be turned ON.

Note

1. The contents of the DM, EM, and HR Areas in the CPU Unit are not backed up to flash memory; they are backed up only by a Battery. If the Battery voltage drops, this data may be lost. Provide countermeasures in the program using the Battery Error Flag (A40204) to re-initialize data or take other actions if the Battery voltage drops
2. A battery error will be detected when the battery is disconnected or its voltage drops below the minimum allowed.



Detect Interrupt Task Error

If this setting is set to detect errors (0), an interrupt task error will be detected in the following cases:

- IORF(097) or FIORF(225) (CJ1-H-R CPU Units only) is executed in an interrupt task to refresh a Special I/O Unit's I/O while that Unit's I/O is being refreshed during cyclic refreshing.

EM File Memory Settings (CJ1 and CJ1-H CPU Units Only)

These settings are used to convert part of the EM Area to file memory.

Programming Console

The specified EM bank and all subsequent banks will be set aside as file memory. Changing these settings using the Programming Console does not format the specified EM banks; the EM banks must be formatted with a Programming Device after changing these PLC Setup settings. When formatting the EM banks with a Programming Console, refer to *7-2 Memory Card Format* in the *Programming Console Operation Manual* (W341).

CX-Programmer

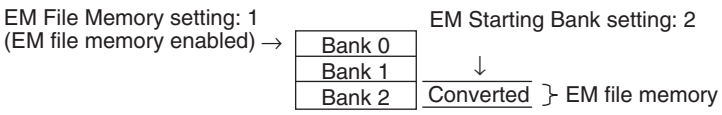
With the CX-Programmer, file memory will be formatted when file memory conversion and the number of banks to be converted is specified when transferring the PLC Setup. (EM banks cannot be formatted as file memory unless they have been specified as file memory in the PLC Setup.)

Once part of the EM Area has been formatted for use as file memory, it can be converted back to normal EM Area usage by changing these PLC Setup settings back to their previous value and "un-formatting" the EM banks with a Programming Device.

Note

1. The actual starting file memory bank is stored in A344 (EM File Memory Starting Bank). When the settings in the PLC Setup have been changed but the EM Area hasn't been formatted, the PLC Setup setting will differ from the actual file memory setting in the EM Area. In this case, the values in A344 can be checked to see the actual file memory setting.
2. The EM Area cannot be formatted if the current EM bank is one of the banks that is being converted to file memory.

The following example shows EM bank 2 converted to file memory.

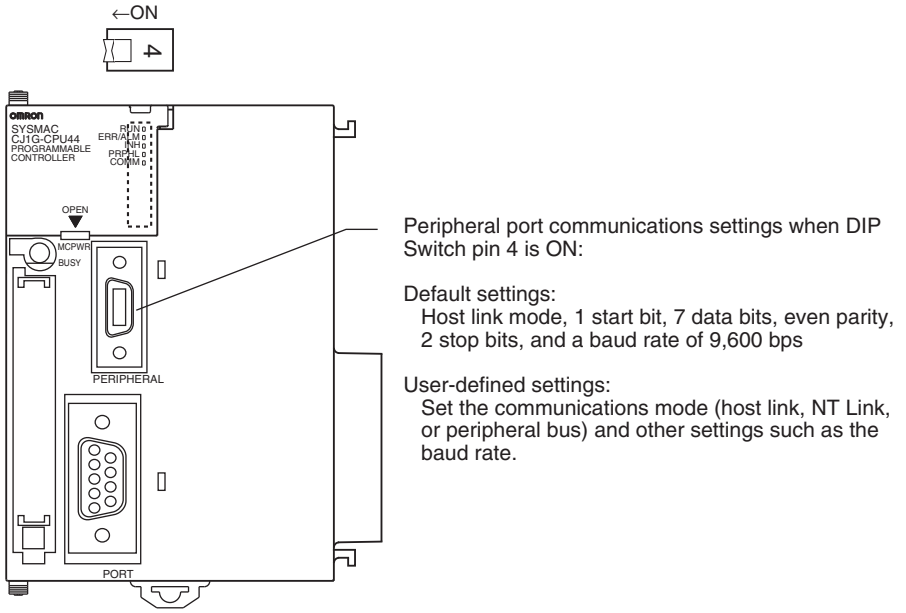


Peripheral Port Settings

These settings are effective only when pin 4 of the DIP switch on the front of the CPU Unit is ON.

The default settings for the peripheral port are: host link mode, 1 start bit, 7 data bits, even parity, 2 stop bits, and a baud rate of 9,600 bps. Set the peripheral port settings in the PLC Setup when you need to change these settings.

Note When pin 4 of the DIP switch on the front of the CPU Unit is OFF, the CPU Unit automatically detects the communications parameters of a connected Programming Device (including Programming Consoles). Those automatically detected parameters are not stored in the PLC Setup.



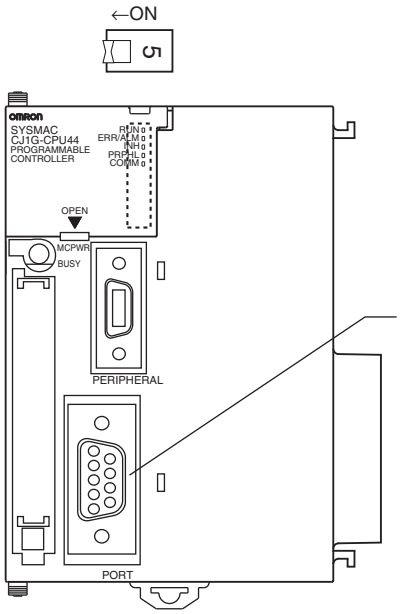
RS-232C Port Settings

These settings are effective only when pin 5 of the DIP switch on the front of the CPU Unit is OFF.

The default settings for the RS-232C port are: host link mode, 1 start bit, 7 data bits, even parity, 2 stop bits, and a baud rate of 9,600 bps. Set the RS-232C port settings in the PLC Setup when you need to change these settings. Specify the frame format when no-protocol mode is selected.

The RS-232C port settings can also be changed with STUP(237). The RS-232C Port Settings Changing Flag (A61902) is turned ON when STUP(237) is executed and it is turned OFF when the RS-232C port settings have been changed.

Note When pin 5 of the DIP switch on the front of the CPU Unit is ON, the CPU Unit automatically detects the communications parameters of a Programming Device (including Programming Consoles) connected to the RS-232C port. Those automatically detected parameters are not stored in the PLC Setup.



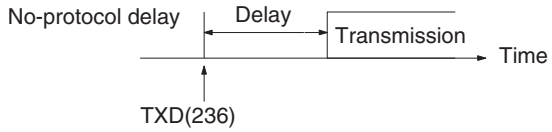
RS-232C port communications settings when DIP switch pin 5 is OFF:

Default settings:
Host link mode, 1 start bit, 7 data bits, even parity, 2 stop bits, and a baud rate of 9,600 bps

User-defined settings:
Set the communications mode (host link, NT Link, no-protocol*, or peripheral bus) and other settings such as the baud rate.

*See notes 1 and 2 for details on no-protocol mode.

Note 1. A no-protocol transmission delay (address 162) can be set in no-protocol mode. The operation of this delay is shown in the following diagram.



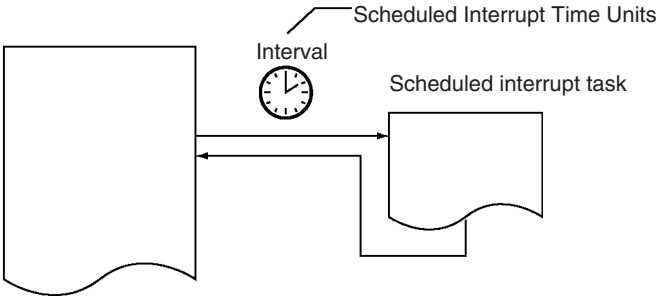
2. The following table shows the message formats that can be set for transmissions and receptions in no-protocol mode. The format is determined by the start code (ST) and end code (ED) settings. (From 1 to 256 bytes can be received in no-protocol mode.)

Start code setting	End code setting		
	None	Yes	CR+LF
None	DATA	DATA+ED	DATA+CR+LF
Yes	ST+DATA	ST+DATA+ED	ST+DATA+CR+LF

Scheduled Interrupt Time Units

This setting determines the time units for the scheduled interrupt interval settings. Set the scheduled interrupt interval from the program with MSKS(690).

Note This setting cannot be changed while the CPU Unit is in RUN or MONITOR mode.



Instruction Error Operation

This setting determines whether instruction execution errors are treated as non-fatal (0) or fatal errors (1). A program error will be generated as an instruction error if any of the following flags is turned ON.

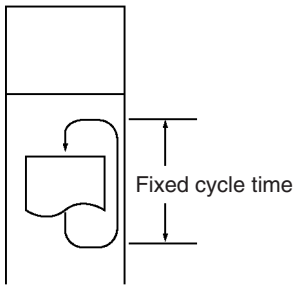
Instruction error flag	Address	Cause
Instruction Processing Error Flag	A29508	The ER Flag was turned ON.
Indirect DM/EM BCD Error Flag	A29509	The contents of a DM/EM word wasn't BCD when BCD was required for indirect addressing.
Illegal Access Error Flag	A29510	Attempted to access part of memory that is off-limits from the program.

If this setting is OFF (0), PLC operation will continue after one of these errors. If this setting is ON (1), PLC operation will stop after one of these errors.

Minimum Cycle Time

Set the minimum cycle time to a non-zero value to eliminate inconsistencies in I/O responses. This setting is effective only when the actual cycle time is shorter than the minimum cycle time setting. If the actual cycle time is longer than the minimum cycle time setting, the actual cycle time will remain unchanged.

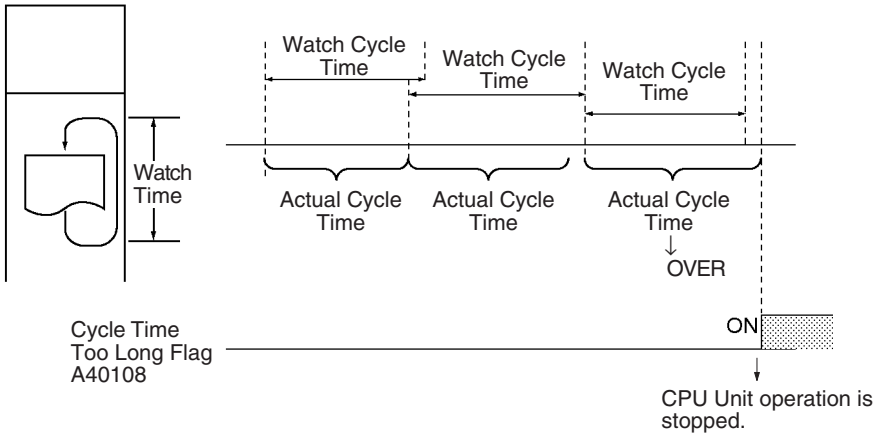
Note The minimum cycle time setting cannot be changed while the CPU Unit is in RUN or MONITOR mode. If the cycle time is increased, the peripheral device servicing interval will be longer, slowing down the response to online editing from peripheral devices or making it difficult to go online.



Watch Cycle Time

If the cycle time exceeds the watch (maximum) cycle time setting, the Cycle Time Too Long Flag (A40108) will be turned ON and PLC operation will be stopped. This setting must be changed if the normal cycle time exceeds the default watch cycle time setting of 1 s.

Note The watch cycle time setting cannot be changed while the CPU Unit is in RUN or MONITOR mode.



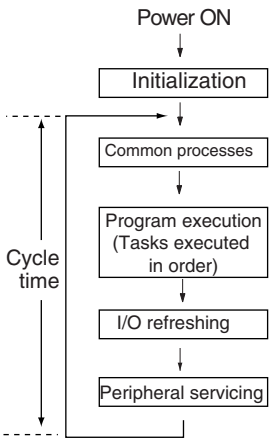
Note The default value for the watch cycle time is 1 s (1,000 ms).

Fixed Peripheral Servicing Time

This setting determines whether the peripheral servicing for the following processes is performed with the default settings (4% of the cycle time) or all together in a fixed servicing time.

Exchange data with Special I/O Units when necessary
Exchange data with CPU Bus Units when necessary
Exchange data with peripheral port
Exchange data with serial communications ports
Service file access operations (Memory Card)

Peripheral servicing is performed at the end of the cycle, just after I/O refreshing.



The following table shows a breakdown of the peripheral servicing time.

Peripheral servicing time	Default value	Setting range
Event service time for Special I/O Units	4% of the previous cycle's cycle time	Uniform servicing time in ms: 0.0 to 25.5 ms in 0.1-ms units
Event service time for CPU Bus Units	Same as above.	
Event service time for peripheral port	Same as above.	
Event service time for RS-232C port	Same as above.	
File access service time for Memory Card	Same as above.	

The default value for each servicing process is 4% of the last cycle's cycle time.

In general, it is recommended that the default value be used. Set a uniform servicing time only when peripheral servicing is being delayed because each service process is being spread over several cycles.

Note

1. When the peripheral servicing time is set to a time longer than the default value, the cycle time will also be longer.
2. The fixed peripheral servicing time setting cannot be changed while the CPU Unit is in RUN mode or MONITOR mode.
3. Use the Peripheral Servicing Priority Mode to give priority to servicing peripheral over program execution.

Power OFF Interrupt Task

This setting determines whether or not a power OFF interrupt task will be executed when a power interruption is detected. (When this setting is set to 0, the regular program will just stop when a power interruption is detected.)

The power OFF interrupt task will be stopped when the power hold time (processing time after power interrupt + power OFF detection delay time) has elapsed. The maximum power hold time is 10 ms.

When a power OFF detection delay time has to be set, be sure that the power OFF interrupt task can be executed in the available time (10 ms – power OFF detection delay time).

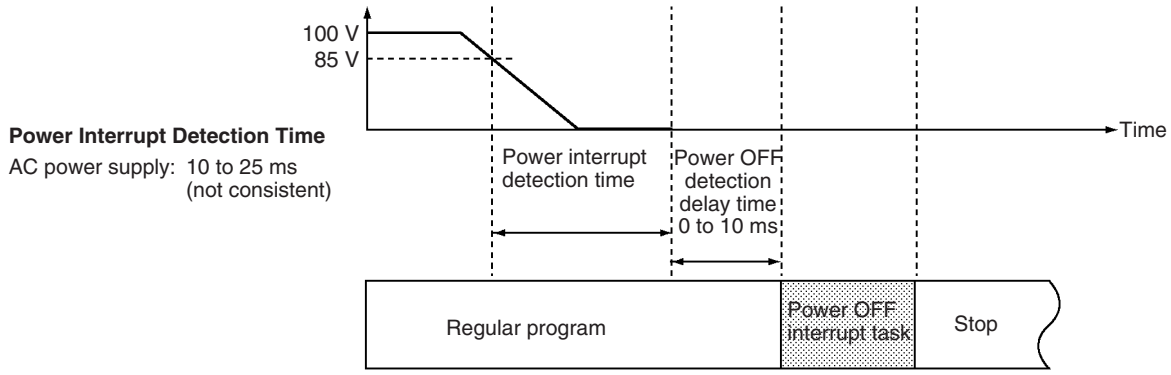
Note The power OFF interrupt task setting cannot be changed while the CPU Unit is in RUN mode or MONITOR mode. This setting is not supported when the CJ1W-PD022 Power Supply Unit is mounted. (Refer to *Power OFF Operation on page 453*.)

Power OFF Detection Delay Time

This setting determines how much of a delay there will be from the detection of a power interruption (approximately after the power supply voltage drops below 85% of the rated value) until a power interruption is established and the regular program is stopped. The setting can be between 0 and 10 ms.

It takes a maximum of 10 ms for the internal 5-V DC power supply to drop to 0 V DC after the initial power interrupt detection time. Extend the time until detection of a power interruption when momentary interruptions in a bad power supply are causing PLC operation to stop.

Note The power OFF detection delay time setting cannot be changed while the CPU Unit is in RUN mode or MONITOR mode. This setting is not supported when the CJ1W-PD022 Power Supply Unit is mounted. (Refer to *Power OFF Operation on page 453*.)



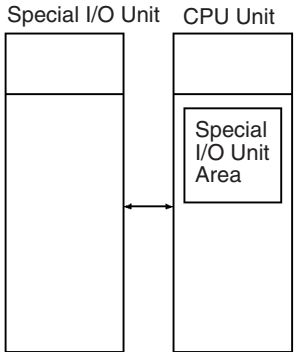
Note The execution time for the power OFF interrupt task must be less than the maximum time available, namely: 10 ms – power OFF detection delay time. Refer to *10-3 Power OFF Operation* for details on CPU Unit operation when power is turned OFF.

Special I/O Unit Cyclic Refreshing

When a Special I/O Unit will be refreshed in an interrupt task by IORF(097) or FIORF(225) (CJ1-H-R CPU Units only) or data will be read from or written to a Special I/O Unit in an interrupt task using IORD (222) or IOWR (223), always disable cyclic refreshing for that Unit with this setting.

If cyclic refreshing is not disabled and either of the following processes is executed in an interrupt task, a non-fatal error will occur and the Interrupt Task Error Flag (A40213) will turn ON.

- I/O refreshing is executed using IORF(097) or FIORF(225) (CJ1-H-R CPU Units only) for the same Special I/O Unit.
- Data is read or written to or from the memory area using IORD (222) or IOWR(223) for the same Special I/O Unit.



These settings determine whether or not data will be exchanged with the 10 words allocated to each Special I/O Unit in the Special I/O Unit Area during cyclic I/O refreshing.

Note Whenever disabling a Special I/O Unit's cyclic refreshing, be sure that the I/O for that Unit is refreshed with IORF(097) or FIORF(225) (CJ1-H-R CPU Units only) in the program at least every 11 seconds during operation. A CPU Unit service monitoring error will occur in the Special I/O Unit if it is not refreshed every 11 seconds.

SECTION 8
I/O Allocations

This section describes I/O allocations to Basic I/O Units, Special I/O Units, and CPU Bus Units, and data exchange with CPU Bus Units.

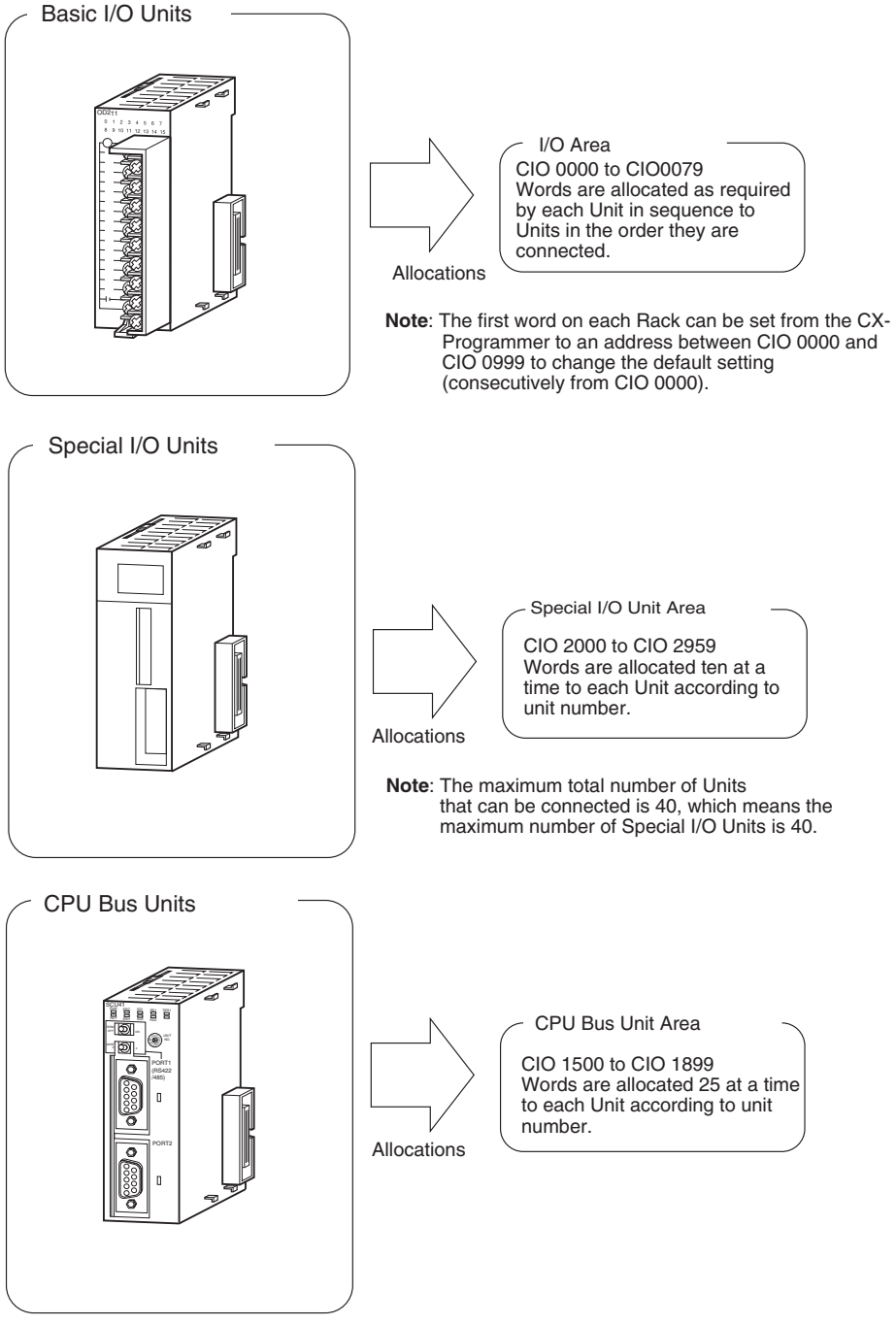
8-1 I/O Allocations

With a CJ-series PLC, the CPU Unit can automatically allocate I/O words to the Basic I/O Units that are started and start operation automatically when the power supply is turned ON. Words will be allocated to Special I/O Units and CPU Bus Units according to the unit numbers set on the Units.

To help prevent troubles from occurring when adding Units or when the wrong Unit is mounted, I/O tables can also be registered in the CPU Unit. (Refer to *8-2 Creating I/O Tables* for details.)

8-1-1 Unit Types

Memory is allocated differently to Basic I/O Units, Special I/O Units, and CJ-series CPU Bus Units.



8-1-2 I/O Allocation

If I/O tables are not registered in a CJ-series CPU Unit, the CPU Unit will automatically allocate I/O words to the Basic I/O Units that are mounted each time the power supply is turned ON and then operation will start. This is called automatic I/O allocation at startup (see note). This is the default setting for the CJ-series CPU Units and it results in the allocations described in this section.

Note When using automatic I/O allocation at startup, the words allocated to Units may disagree with the words used for them in the program if a Unit is added or removed from the PLC. Be sure not to add or remove Units without checking the program and be sure to always replace Units with the same type of Unit and with the same number of I/O.

I/O Allocation to Basic I/O Units

CJ-series Basic I/O Units are allocated words in the I/O Area (CIO 0000 to CIO 0079) and can be mounted to the CPU Rack or Expansion Racks.

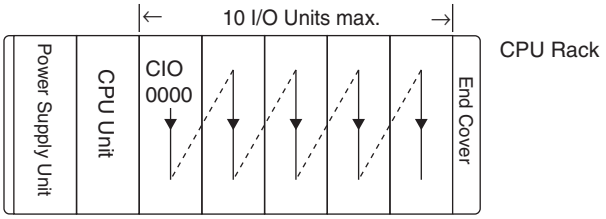
Refer to *2-4 I/O Units* for more details on the available Basic I/O Units.

■ Word Allocations

Basic I/O Units on the CPU Rack

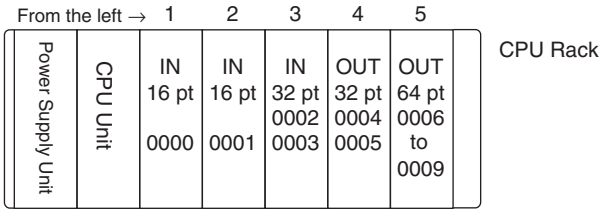
Basic I/O Units on the CPU Rack are allocated words from left to right starting with the Unit closest to the CPU Unit. Each Unit is allocated as many words as it requires.

Note Units that have 1 to 16 I/O points are allocated16 bits and Units that have 17 to 32 I/O points are allocated 32 bits. For example, an 8-point Unit is allocated 16 bits (1 word) and bits 00 to 07 of that word are allocated to the Unit's 8 points.



Example 1

The following example shows the I/O allocation to 5 Basic I/O Units in the CPU Rack.

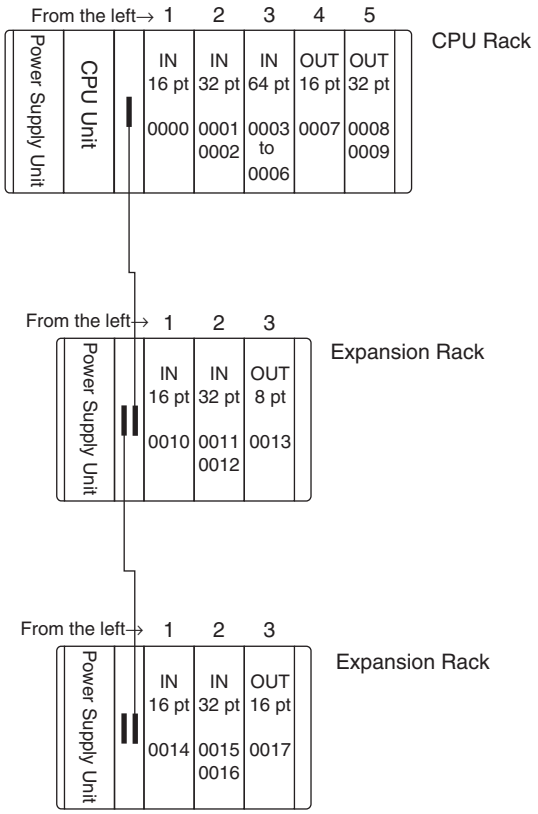


Basic I/O Units in Expansion Racks

I/O allocation to Basic I/O Units continues from the CJ-series CPU Rack to the CJ-series Expansion Rack connected to the CJ-series CPU Rack. Words are allocated from left to right and each Unit is allocated as many words as it requires, just like Units in the CJ-series CPU Rack.

Example

The following example shows the I/O allocation to Basic I/O Units in the CPU Rack and two CJ-series Expansion Racks.



I/O Allocation to Special I/O Units

Each CJ-series Special I/O Unit is allocated ten words in the Special I/O Unit Area (CIO 2000 to CIO 2959) according the unit number set on the Unit. Special I/O Units can be mounted to the CJ-series CPU Rack or CJ-series Expansion Racks.

Refer to *2-4 I/O Units* for more details on the available Special I/O Units.

■ **Word Allocations**

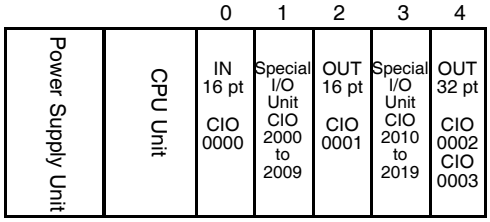
The following table shows which words in the Special I/O Unit Area are allocated to each Unit.

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

Special I/O Units are ignored during I/O allocation to Basic I/O Units. Positions containing Special I/O Units aren't allocated any words in the I/O Area.

Example

The following example shows the I/O word allocation to Basic I/O Units and Special I/O Units in the CPU Rack.



Slot	Unit	Words required	Words allocated	Unit number	Group
0	CJ1W-ID211 16-point DC Input Unit	1	CIO 0000	---	Basic I/O Unit
1	CJ1W-AD081 Analog Input Unit	10	CIO 2000 to CIO 2009	0	Special I/O Unit
2	CJ1W-OD211 16-point Transistor Output Unit	1	CIO 0001	---	Basic I/O Unit
3	CJ1W-TC001 Temperature Control Unit	20	CIO 2010 to CIO 2029	1	Special I/O Unit
4	CJ1W-OD231 32-point Transistor Output Unit	2	CIO 0002 and CIO 0003	---	Basic I/O Unit

I/O Allocation to CPU Bus Units

Each CJ-series CPU Bus Unit is allocated 25 words in the CPU Bus Unit Area (CIO 1500 to CIO 1899) according the unit number set on the Unit. CJ-series CPU Bus Units can be mounted to the CJ-series CPU Rack or CJ-series Expansion Racks.

■ Word Allocation

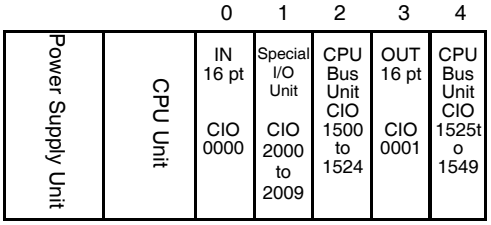
The following table shows which words in the CJ-series CPU Bus Unit Area are allocated to each Unit.

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

CPU Bus Units are ignored during I/O allocation to Basic I/O Units. Positions containing CJ-series CPU Bus Units aren't allocated any words in the I/O Area.

Example

The following example shows the I/O word allocation to Basic I/O Units, Special I/O Units, and CPU Bus Units in the CPU Rack.



Slot	Unit	Words required	Words allocated	Unit number	Group
0	CJ1W-ID211 16-point DC Input Unit	1	CIO 0000	---	Basic I/O Unit
1	CJ1W-AD081 Analog Input Unit	10	CIO 2000 to CIO 2009	0	Special I/O Unit
2	CJ1W-SCU41 Serial Communications Unit	25	CIO 1500 to CIO 1524	0	CPU Bus Unit
3	CJ1W-OD211 16-point Transistor Output Unit	1	CIO 0001	---	Basic I/O Unit
4	CJ1W-CLK21 Controller Link Unit	25	CIO 1525 to CIO 1549	1	CPU Bus Unit

Data Area Allocations for Built-in I/O (CJ1M CPU Units Only)

I/O Code			IN0	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	OUT0	OUT1	OUT2	OUT3	OUT4	OUT5
		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 0 (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 PWM(891) output1 cannot be used on the CJ1M-CPU21.

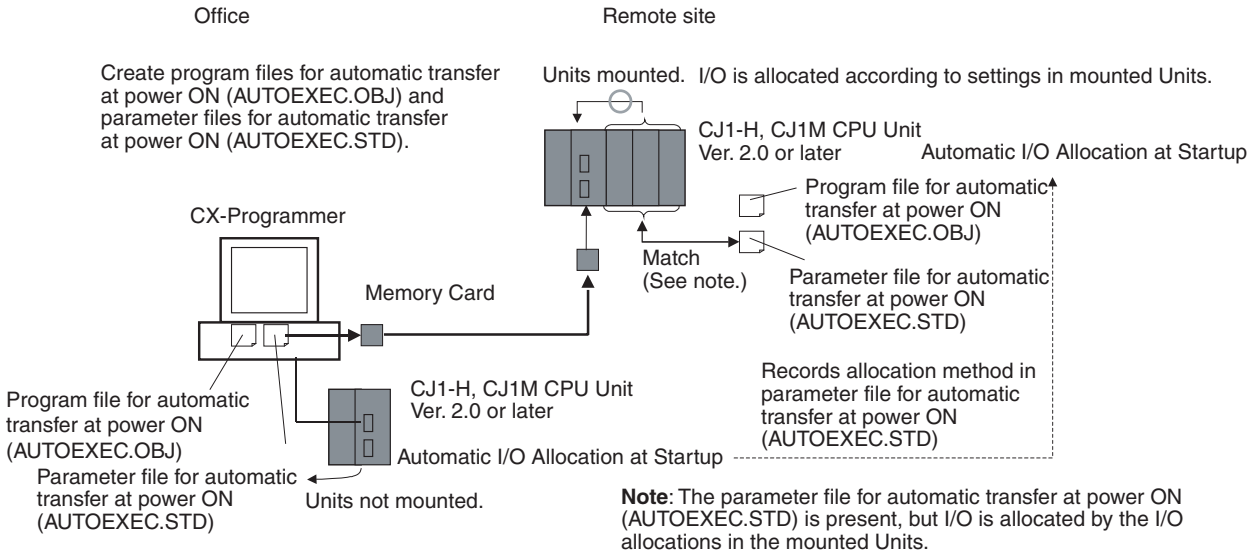
8-1-3 Precautions when Using Memory Cards

With CJ-series CPU Units with unit version 2.0 or later, the I/O allocation method used to create the CPU Unit's I/O table (automatic I/O allocation at startup or user-set I/O allocation) is recorded in the parameter file for automatic transfers at power ON (AUTOEXEC.STD). When automatic transfer at power ON is executed from the Memory Card, the recorded method is automatically detected and used to allocate I/O automatically at power ON or verify the I/O table.

The descriptions below explain the two different methods used to create the I/O table by the CPU Unit that creates the parameter file for automatic transfers at power ON (AUTOEXEC.STD).

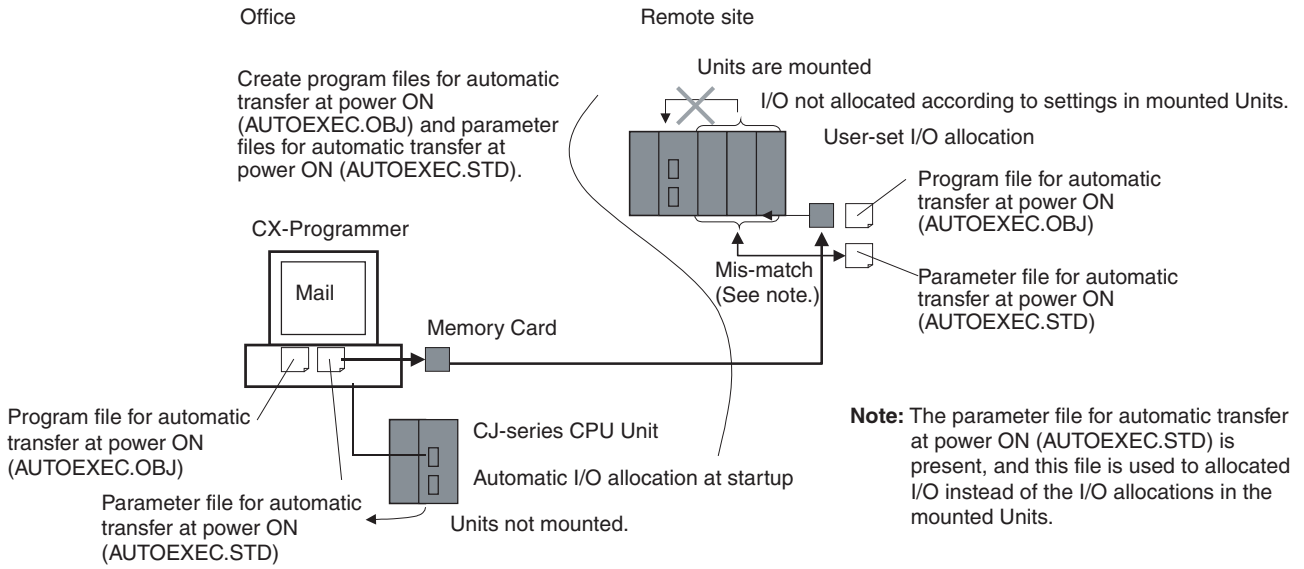
- Automatic Allocation at Startup (See note.)
  The I/O tables in the parameter file for automatic transfer at power ON in the Memory Card are disabled and I/O is allocated using automatic I/O allocation at startup based on the Units actually mounted in the PLC.
- User-set I/O Allocations
  The I/O tables in the parameter file for automatic transfer at power ON in the Memory Card are enabled, and the CPU Unit compares and verifies the I/O table with the Units actually mounted in the PLC.

Note With automatic I/O allocation at startup, I/O tables are not created in advance and I/O allocations are automatically made to the Basic I/O Units that are actually mounted each time the power supply is turned ON.



■ Previous CPU Units (Pre-Ver. 2.0 CPU Units)

With earlier versions of the CJ-series CPU Units, there wasn't a function that recorded in the AUTOEXEC.STD parameter file which method was used to create the CPU Unit's I/O tables. The user-set I/O allocation method was automatically used in the parameter file when an automatic transfer at startup was executed from the Memory Card, and I/O was allocated according to the I/O tables in the parameter file and the I/O tables verified against the Units actually mounted in the PLC. If a parameter file for automatic transfer at power ON was created using the automatic I/O allocation at startup method in an office with the CX-Programmer connected online to the CPU Unit without any I/O Units connected, an I/O setting error would occur when the Memory Card was mounted to a CPU Unit and the power supply was turned ON.



To solve this problem, the CX-Programmer had to be connected to the CPU Unit onsite to recreate the I/O tables or to delete the I/O tables to enable using the automatic I/O allocation at power ON method.

8-2 Creating I/O Tables

Although the automatic I/O allocation at startup method can be used for CJ-series PLCs, I/O tables must be created and transferred to the CPU Unit in cases like the following:

- To provide a record of the current Unit configuration to prevent it from being changed.
- To reserve words for future use when Units are added to the PLC.
- To set the first word on the CPU Rack or Expansion I/O Racks.
- To allocate specified words to specific Units.

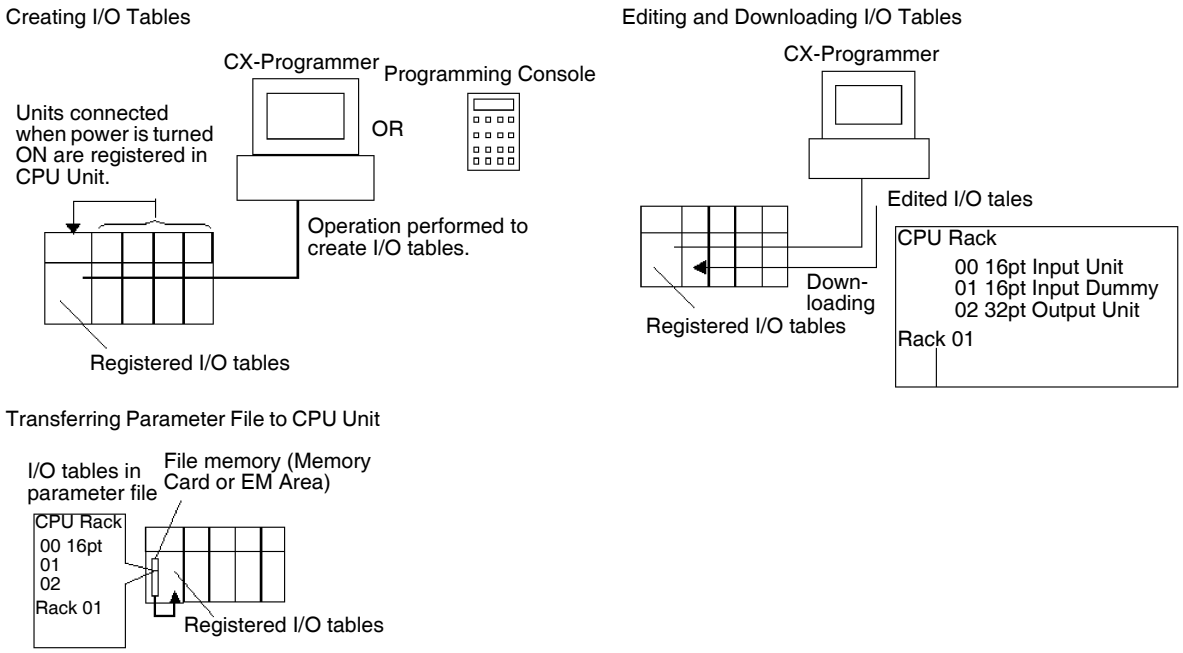
Once I/O tables are transferred to the CPU Unit, it saves them at the I/O allocation status, and each time the power supply is turned ON, the CPU Unit compares the contents of the I/O tables with the Units actually mounted to verify the Unit configuration. Operation starts when the Unit configuration is verified, but a fatal error occurs if a discrepancy is found.

When a Memory Card is used, the I/O tables are saved as one of the parameter files and can be used as a parameter file for automatic transfer at power ON.

8-2-1 Creating, Editing, and Transferring I/O Tables

When the CX-Programmer or a Programming Console is used to create I/O tables in the CPU Unit, the CPU Unit will check Unit connections when the power supply is turned ON and then start operation. There are two ways to register the I/O tables in the CPU Unit: Create them according to the Units actually connected in the PLC by using the online I/O table creation operation from the CX-Programmer or a Programming Console, or edit the I/O tables offline on the CX-Programmer and then transfer them to the CPU Unit.

User-set I/O Allocations



8-2-2 Procedures for Registering I/O Tables

I/O Table Registration with CX-Programmer

Use the following procedure to register the I/O tables with the CX-Programmer.

1,2,3...

1. Double-click ***IO Table*** in the project tree in the main window. The I/O Table Window will be displayed.
2. Select ***Options*** and then ***Create***. The models and positions of the Units mounted to the Racks will be written to the CPU Unit as the registered I/O tables.

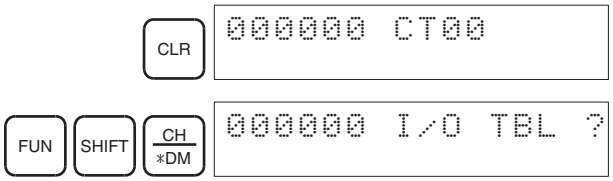
The I/O tables can also be edited offline and then transferred to the CPU Unit.

1,2,3...

1. Double-click ***IO Table*** in the project tree in the main window. The I/O Table Window will be displayed.
2. Double-click Rack to be edited. The slots for the selected Rack will be displayed.
3. Right-click the slot to which a Unit is to be assigned and select the Unit from the pull-down menu.
4. After editing the I/O tables, transfer them to the CPU Unit by selecting ***Options - Transfer to PLC.***

I/O Table Registration with a Programming Console

A Programming Console can be used to automatically register the I/O tables in the CPU Unit according to the Units actually mounted in the PLC. With a Programming Console, words cannot be reserved and first words cannot be set for Racks or slots. Use the following procedure to create I/O tables with a Programming Console.



Unit Check

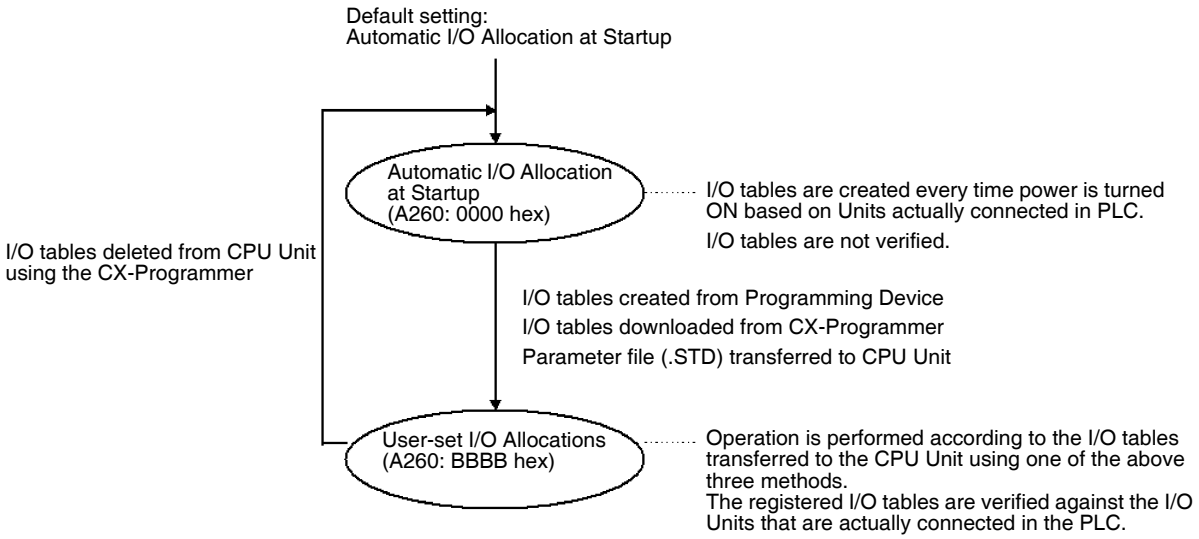
When this method is used, the registered I/O tables are compared with the actual I/O at startup. If they do not agree, A40110 will turn ON to indicate an I/O setting error and operation will not be possible.

Checking I/O Allocation Status

The I/O allocation status can be checked in A260. If A260 contain 0000 hex, automatic I/O allocation at startup is being used. If A260 contains BBBB hex, user-set I/O allocations are being used.

Address	Name	Contents
A260	I/O Allocations Status	0000 hex: Automatic I/O Allocation at Startup BBBB hex: User-set I/O Allocation

■ Changes in I/O Allocation Status



You cannot return to automatic I/O allocation at startup by using the Programming Console. To return to automation I/O allocation, the I/O tables must be deleted from the CPU Unit using the CX-Programmer. When the I/O tables are deleted, all settings for first words for Racks will also be deleted.

Precautions when Changing I/O Allocation Status

The I/O allocation status will change when one of these three operations are performed.

1. Automatic transfer at startup

2. Parameter file transferred by user operation
3. Simple backup/recovery operations

The I/O allocation status changes are described below.

1. I/O Allocation Status Changes due to Automatic Transfer at Startup

The I/O allocation status depends on the unit versions of the source and destination CPU Units when using a single CJ-series CPU Unit to create parameter files for automatic transfer at startup (AUTOEXEC.STD), save them in the Memory Card, and then automatically transfer them to another CJ-series CPU Unit at startup. The changes to I/O allocation status for different unit version combinations is shown in the following table.

Source CPU Unit		Original I/O allocation status	Destination CPU Unit		
			Unit version of CPU Unit to which files for automatic transfer at startup will be sent		
			Pre-Ver. 2.0	Unit Ver. 2.0	Unit Ver. 3.0 or later
CPU Unit's unit version used to create files for automatic transfer at startup	Pre-Ver. 2.0	Automatic allocation	Switches to user-specified	(Same) automatic allocation	Switches to user-specified
		User-specified	(Same) User-specified	Switches to automatic allocation (See note 1.)	(Same) User-specified
	Unit Ver. 2.0	Automatic allocation	Switches to user-specified	(Same) automatic allocation	Switches to user operation
		User-specified	(Same) User-specified		
	Unit Ver. 3.0 or later	Automatic allocation	Switches to user-specified	(Same) Automatic allocation	(Same) Automatic allocation
		User-specified	(Same) User-specified		

Note

1. When files for automatic transfer at startup (AUTOEXEC.STD) are created and saved in a Memory Card using user-specified I/O allocations with a pre-Ver. 2.0 CJ-series CPU Unit, the system will automatically switch to automatic I/O allocation at startup if the data is automatically transferred from the Memory Card.
2. When files for automatic transfer at startup (AUTOEXEC.STD) are created and saved in the Memory Card using a CJ-series CPU Unit with unit version 2.0, the I/O allocation status will switch automatically to user-specified I/O allocations if the data is automatically transferred from the Memory Card to a CJ-series CPU Unit with unit version 3.0 or later.

2. I/O Allocation Status Changes Due to Transfer of Parameter Files

Source CPU Unit		Original I/O allocation status	Destination CPU Unit		
			Unit version of CPU Unit to which parameter files will be transferred		
			Pre-Ver. 2.0	Unit Ver. 2.0	Unit Ver. 3.0 or later
CPU Unit's unit version used to create parameter files	Pre-Ver. 2.0	Automatic allocation	Switches to user-specified	(Same) automatic allocation	Switches to user-specified
		User-specified	(Same) User-specified	Switches to automatic allocation (See note 1.)	(Same) User-specified
	Unit Ver. 2.0	Automatic allocation	Switches to user-specified	(Same) automatic allocation	Switches to user operation
		User-specified	(Same) User-specified		
	Unit Ver. 3.0 or later	Automatic allocation	Switches to user-specified	(Same) Automatic allocation (See note 3.) and an I/O setting error occurs.	(Same) Automatic allocation
		User-specified	(Same) User-specified		

Note

1. When parameter files (.STD) are created and saved in a Memory Card using user-specified I/O allocations with a CJ-series CPU Unit with unit Ver. 2.0, the system will automatically switch to automatic I/O allocation at startup if the parameter file is transferred from the Memory Card using by a user operation.
2. When parameter files (.STD) are created and saved in the Memory Card using automatic I/O allocation at startup with a CJ-series CPU Unit with unit version 2.0, the I/O allocation status will switch automatically to user-specified I/O allocations if the parameter file is transferred from the Memory Card to a CJ-series CPU Unit with unit version 3.0 or later.
3. An I/O setting error will occur if a parameter file (.STD) created and saved in a Memory Card using a CJ-series CPU Unit with unit Ver. 3.0 or later is transferred from the Memory Card using a CJ-series CPU Unit with unit Ver. 2.0 and user-specified I/O allocations. The I/O setting error will occur after the parameter file is transferred. If this error occurs, cycle the power and clear the error.

3. I/O Allocation Status Changes Due to Backup/Restore Operations

The I/O allocation status depends on the unit versions of the source and destination CPU Units when using a single CJ-series CPU Unit to create backup parameter files (BKUP.STD), save them in the Memory Card, and then back up or restore them to another CJ-series CPU Unit. The changes to I/O alloca-

tion status for different unit version combinations are shown in the following table.

Source CPU Unit		Original I/O allocation status	Destination CPU Unit		
			Unit version of CPU Unit at the backup/restore destination		
			Pre-Ver. 2.0	Unit Ver. 2.0	Unit Ver. 3.0 or later
Unit version of CPU Unit at the backup source	Pre-Ver. 2.0	Automatic allocation	(Same) automatic allocation		
		User-specified	(Same) User-specified	Switches to automatic allocation.	(Same) User-specified
	Unit Ver. 2.0	Automatic allocation	(Same) automatic allocation		
		User-specified	(Same) User-specified		
	Unit Ver. 3.0 or later	Automatic allocation	(Same) automatic allocation		
		User-specified	(Same) User-specified		

8-3 Allocating First Words to Slots and Reserving Words

The first word allocated to a slot on any Rack can be set with the CX-Programmer's I/O table edit operation regardless of the position of the slot. This feature can be used whenever it's necessary to control allocations to specific Units regardless of the position of the Unit to group allocated I/O words by device or circuit or to prepare for future changes to or additions of I/O Units for system design changes.

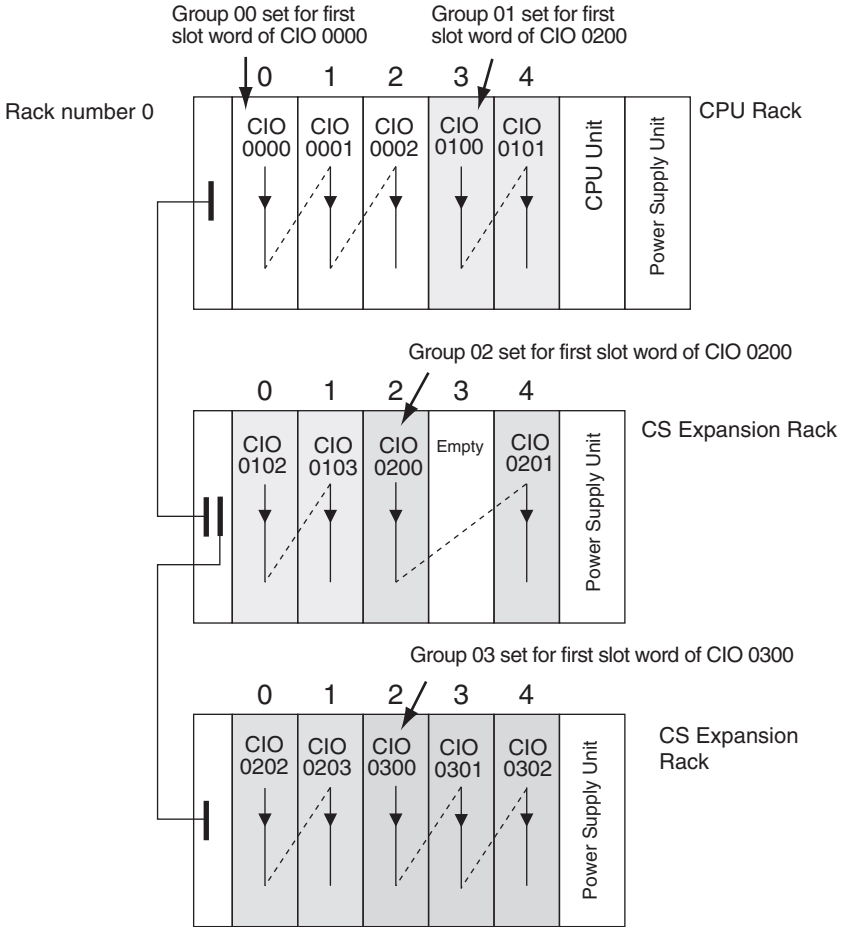
Word Allocations

When setting first words for slots, the first word must be set for slot 00 on the CPU Rack. The first word can then be set for any slot on any Rack for up to 63 other slots.

Each first word set for a slot creates a group starting with that slot. Words are allocated starting from the specified word to the first slot in the group and continuing left to right allocating consecutive words to each Unit until the next group (i.e., until the next Unit for which a first slot word is set). The next group can start on the same Rack or on a following Rack.

Example: Setting the First Words for Racks

In this example, a first slot word has been set in the middle of each Rack. For simplicity, only 16-bit Units have been used.



First Slot Word Settings

Group	Rack	Slot	Word
00	CPU Rack	00	CIO 0000
01	CPU Rack	03	CIO 0100
02	Rack 1	02	CIO 0200
03	Rack 2	02	CIO 0300

Note Group 00 must start at slot 00 on the CPU Rack. Any word can be set. Any slot can be set on any Rack for groups 01 to 63.

Setting First Slot Words from the CX-Programmer

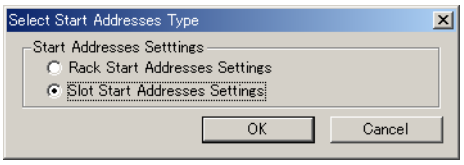
First slot words can be set from the CX-Programmer. These settings are not possible from a Programming Console.

Note For CJ1-H CPU Units, an indication of whether or not the first rack words have been set will be displayed on a Programming Console.

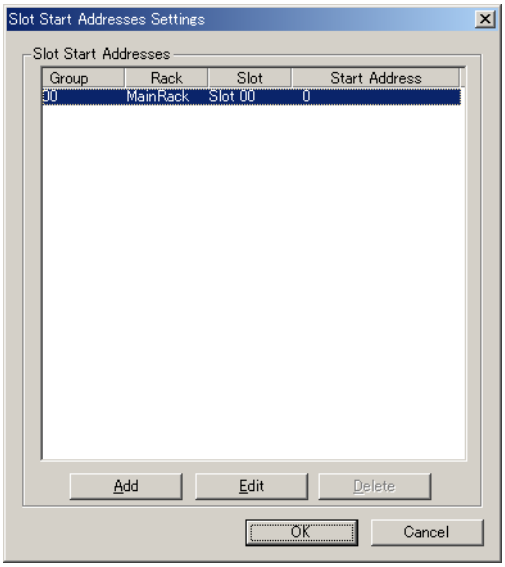
Use the following procedure to set the first rack words.

1,2,3...

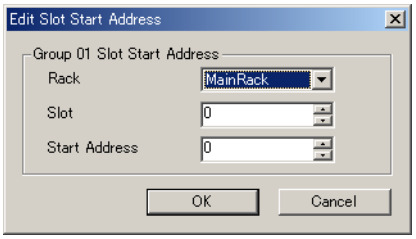
1. Select the ***Rack/Slot Start Addresses*** from the Option Menu on the I/O Table Window. The following dialog box will be displayed.



2. Select the *Slot Start Addresses Settings* Option and click the **OK** Button.
3. In the dialog box that will appear, set the first word for slot 00 on the CPU Rack.



4. To change the setting from CIO 0000, click the **Edit** Button. The follow dialog box will appear.



5. Set the desired word and click the **OK** Button.
6. To set slot first words for other groups, click the **Add** Button and make the appropriate settings for the Rack, slot, and word.

Up to 64 groups can be set for the CS/CJ-series CPU Unit Ver. 2.0. Only 8 groups can be set for the CS/CJ-series CPU Unit Ver. 1.0

Setting	Setting range	Default	Remarks
Group	00 to 63	00	Groups numbers are allocated automatically in the order the groups are displayed and set.
Rack	CPU Rack (“MainRack”) Racks 1 to 7	CPU Rack	Group 00 always starts at slot 00 on the CPU Rack.
Slot	00 to 99	0	
First word	0 to 999	0	---

Precautions in Setting First Slot Words

When the I/O tables are edited, the CX-Programmer checks for any duplications in word allocations caused by first word settings. It is conceivable, however, that duplications in word allocations could occur after the I/O tables have been registered, e.g., as the result of replacing a 1-word Unit with a 2-word Unit. In this case the extra word needed by the new Unit would still also be allocated to the next Unit.

When the PLC is turned ON, the CPU Unit checks the registered I/O tables against the actual Units mounted to the PLC. If there are any duplications, and error will occur and it will be no longer possible to edit the I/O tables. If this happens, the I/O tables will have to be deleted and recreated or retransferred from a Programming Devices.

8-4 Allocating First Words to Racks

In the CJ-series PLCs, the first word allocated to each Rack can be set with the CX-Programmer's I/O table edit operation. For example, the CPU Rack can be set to be allocated words starting with CIO 0000; the next Rack, words starting with CIO 0100; the next Rack, words starting with CIO 0200; etc. This can make it easier to check word allocations to Units without calculating all the way from the CPU Rack.

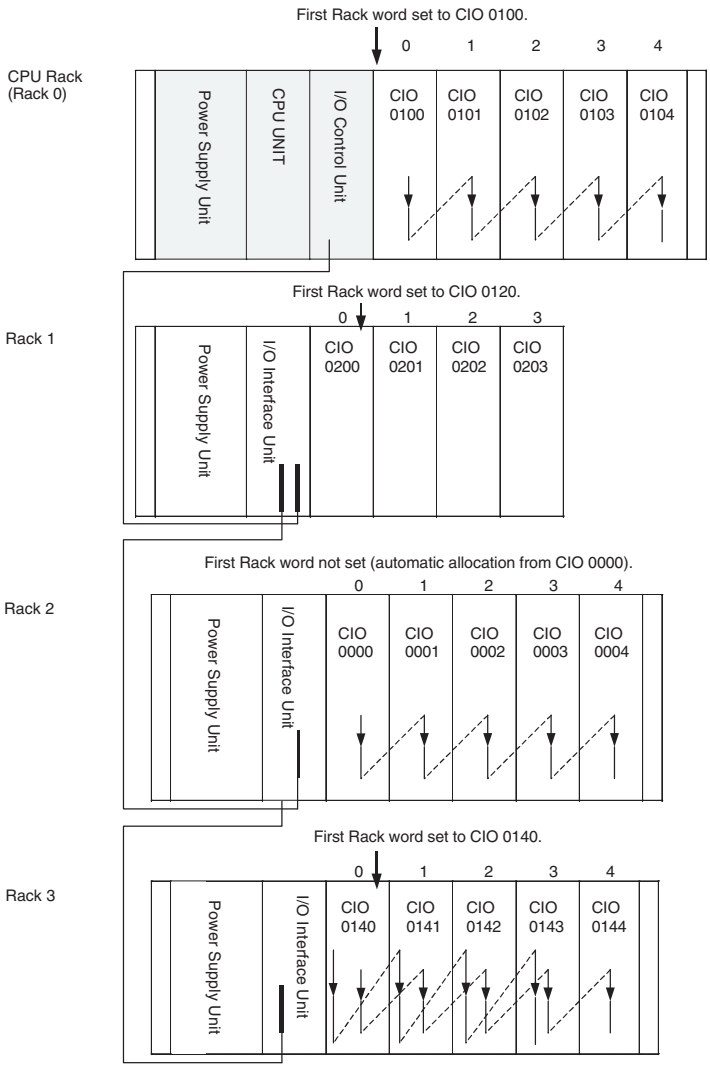
Note The first words for Racks cannot be set at the same time as the first words for slots.

Word Allocations

For Racks in which the first word address has been set, words are allocated to Units in the order that the Units are mounted (from left to right) beginning with the specified first word. Words are not allocated to empty slots.

For Racks in which the first word address has not been set, words are allocated in rack-number order (lowest to highest) continuing from the last word allocated to the previous rack and starting with CIO 0000 on the first Rack for which the first word is not set.

Example: Setting the First Words for Racks



Rack First Word Settings

Rack	First word
CPU Rack	CIO 0100
Rack 1	CIO 0120
Rack 2	0000
Rack 3	0140

Note Rack numbers (0 to 3) are fixed according to the order that the Racks are physically connected with cable. The CPU Rack is always Rack 0 and the other Racks are, in order, Racks 1 to 3. These numbers cannot be changed.

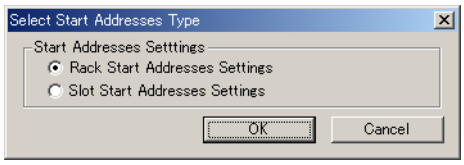
Setting First Rack Words from the CX-Programmer

The first word allocated on each Rack can be set from the CX-Programmer. These settings are not possible from a Programming Console.

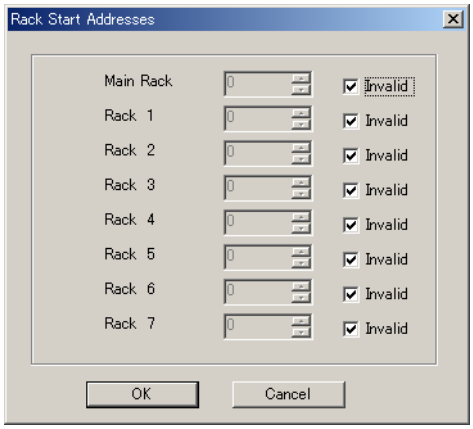
Note For CJ1-H CPU Units, an indication of whether or not the first rack words have been set will be displayed on a Programming Console.

Use the following procedure to set the first rack words.

1,2,3... 1. Select the ***Rack/Slot Start Addresses*** from the Option Menu on the I/O Table Window. The following dialog box will be displayed.



2. Select the *Rack Start Addresses Settings* Option and click the **OK** Button.
3. In the dialog box that will appear, remove the checkmarks from the settings disabling the first rack word settings and set the address of the first words for the CPU Rack and Expansion Racks (1 to 7).



Setting	Setting range	Default	Remarks
Rack Start Address	0 to 900	0	Same for all Racks
Invalid	Selected or cleared	Selected (invalid)	

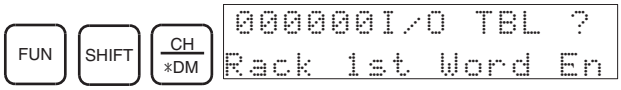
4. Click the **OK** Button.

Note
1. Up to 3 Racks can be set for any CPU Unit model.
2. Although the CX-Programmer window will display 7 Racks, only 3 Racks can be set for the CJ1.

Confirming First Rack Word Settings on a Programming Console

With a CJ1-H/CJ1M CPU Unit, the Programming Console can be used to check whether or not the first word has been set on a Rack. Use the following procedure.

1,2,3... 1. Press the **FUN**, **SHIFT**, and **CH** Keys to start the I/O table creation operation. If the first work for a Rack has been set, a message saying so will appear on the second line of the display.



If nothing is displayed, then a first word has not been set.

2. Press the **CHG** Key, enter the password (9713), and then press the **WRITE** Key to continue creating the I/O tables, or press the **CLR** Key to cancel the operation and return to the initial display.

Precautions in Setting Rack First Words

- Be sure to make first word settings so that allocated words do not overlap. The first word setting for a rack can be any address from CIO 0000 to CIO 0900. If the same word is allocated to two Racks, the I/O tables cannot be created and the Duplication Error Flag (A26103) in the I/O Table Error Information will turn ON.
- Always register the I/O table after installing an I/O Unit, after setting a rack number, or after setting the first word allocation for a Rack. The I/O Table Registration operation registers the I/O words allocated to the Racks.
- I/O words will not be allocated to empty slots. If an I/O Unit will be installed later, reserve words for the empty slot by changing the I/O table with a Programming Device's I/O Table Change Operation.
- If the actual system configuration is changed after registering the I/O table so that the number of words or I/O type does not match the I/O table, an I/O verification error (A40209) or I/O setting error (A40110) will occur. A CS-series CPU Bus Unit Setting Error (A40203) or Special I/O Unit Setting Error (A40202) may occur as well.
- When a Unit is removed, words can be reserved for the missing Unit using the I/O Table Change Operation. If a Unit is changed or added, all of the words in the program following that Unit's allocated words will be changed and the I/O Table Registration Operation will have to be performed again.

8-5 Detailed Information on I/O Table Creation Errors

With a CJ1-H CPU Unit, the contents of A261 provides information on the Unit causing the error whenever one occurs when creating the I/O tables from the Programming Console or CX-Programmer. This information will make it easier to find the Unit causing the problem with troubleshooting I/O tables. Refer to *SECTION 11 Troubleshooting* for actual procedures.

Name	Address		Contents	When changing to RUN mode	At startup	Setting timing
	Word	Bit				
CPU Bus Unit Setup Area Initialization Error Flag	A261	00	ON: Error in CPU Bus Unit Setup Turns OFF when I/O tables are generated normally.	Held	Cleared	When I/O tables are created
I/O Overflow Flag		02	ON: Overflow in maximum number of I/O points. Turns OFF when I/O tables are generated normally.			
Duplication Error Flag		03	ON: The same unit number was used more than once. Turns OFF when I/O tables are generated normally.			
I/O Bus Error Flag		04	ON: I/O bus error Turns OFF when I/O tables are generated normally.			
Special I/O Unit Error Flag		07	ON: Error in a Special I/O Unit Turns OFF when I/O tables are generated normally.			
I/O Unconfirmed Error Flag		09	ON: I/O detection has not been completed. Turns OFF when I/O tables are generated normally.			

Note This function does not exist in CJ1-CPU□□ CPU Units.

8-6 Data Exchange with CPU Bus Units

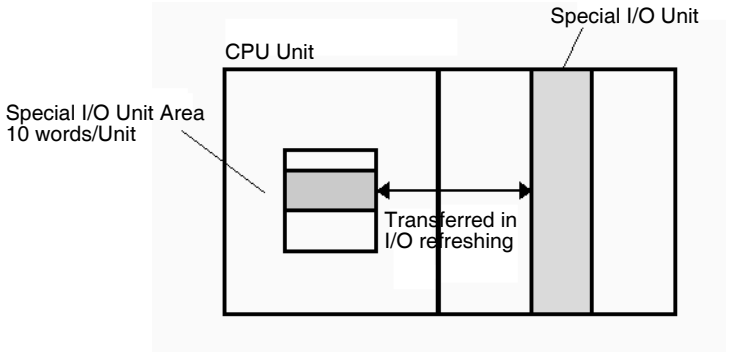
This section describes how data can be exchanged between Special I/O Units or CJ-series CPU Bus Units, and the CPU Unit.

8-6-1 Special I/O Units

Special I/O Unit Area (I/O Refreshing)

Data is exchanged each cycle during I/O refreshing of the Special I/O Unit Area. Basically, 10 words are allocated to each Special I/O Unit based on its unit number setting. Refer to the operation manuals for individual Special I/O Units for details.

The Special I/O Unit Area ranges from CIO 2000 to CIO 2959 (10 words × 96 Units).



Transfer of Words Allocated in DM Area

There are three times that data may be transferred through the words allocated to each Unit. The timing of data transfers depends on the model being used.

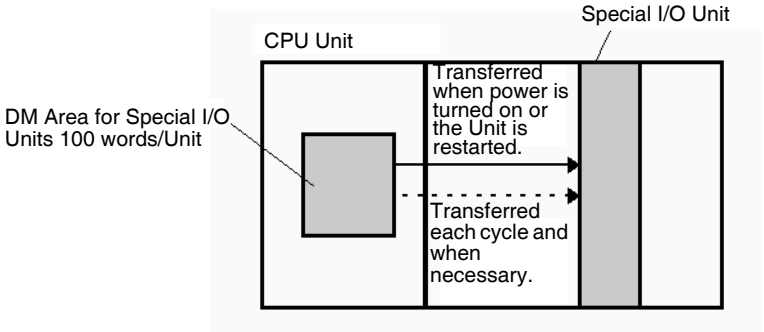
1,2,3...

1. Data transferred when the PLC is turned on.
2. Data transferred when the Unit is restarted.
3. Data transferred when necessary.

Some models transfer data in both directions, from the DM Area to the Unit and from the Unit to the DM Area. See the Unit's *Operation Manual* for details on data transfers.

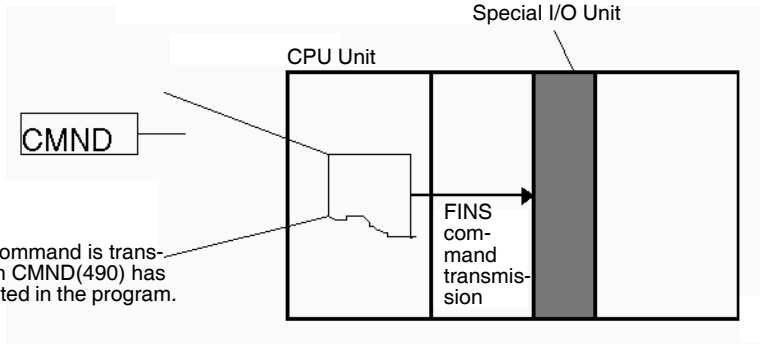
Special I/O Unit Words in the DM Area: D20000 to D29599 (100 Words x 96 Units)

Each Special I/O Unit is allocated 100 words in the DM Area in the range of D20000 to D29599 (100 words × 96 Units). These 100 words are generally used to hold initial settings for the Special I/O Unit. When the contents of this area are changed from the program to reflect a change in the system, the Restart Bits for affected Units must be turned ON to restart the Units.

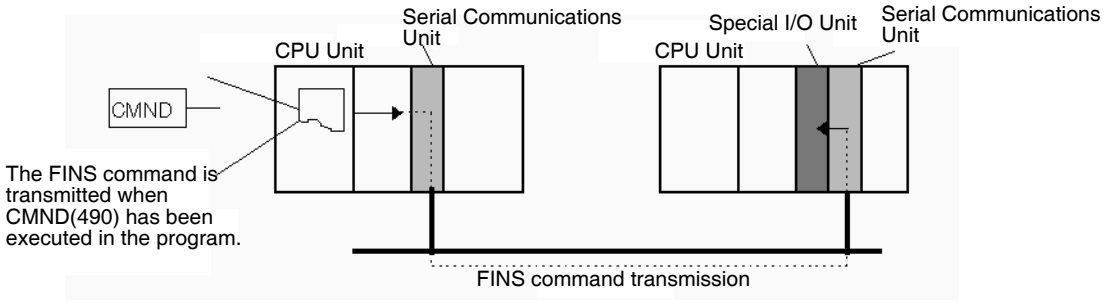


FINS Commands

The CMND(490) instruction can be added to the ladder program to issue a FINS command to the Special I/O Unit.



FINS commands can be transmitted to Special I/O Units in other PLCs in the network, not just the local PLC.



Special I/O Unit Initialization

Special I/O Units are initialized when the PLC's power is turned on or the Unit's Restart Bit is turned ON. The Unit's Special I/O Unit Initialization Flag (A33000 to A33515) will be ON while the Unit is initializing.

I/O refreshing (cyclic I/O refreshing or refreshing by IORF(097) or FIORF(225) (CJ1-H-R CPU Units only) will not be performed for a Special I/O Unit while its Initialization Flag is ON.

Disabling Special I/O Unit Cyclic Refreshing

Ten words are allocated to each Special I/O Unit in the Special I/O Unit Area (CIO 2000 to CIO 2959) based on the unit number set on the front of each Unit. The data in the Special I/O Unit Area is refreshed in the CPU Unit every cycle during I/O refreshing (just after execution of the END(001) instruction).

I/O refreshing may take too long if too many Special I/O Units are installed. If I/O refreshing is taking too much time, the PLC Setup can be set to disable cyclic refreshing for particular Special I/O Units. (The Special I/O Unit Cyclic Refreshing Disable Bits are in PLC Setup addresses 226 to 231.)

If the I/O refreshing time is too short, the Unit's internal processing will not be able to keep pace, the Special I/O Unit Error Flag (A40206) will be turned ON, and the Special I/O Unit may not operate properly. In this case, the cycle time can be extended by setting a minimum cycle time in the PLC Setup or cyclic I/O refreshing with the Special I/O Unit can be disabled.

Then cyclic refreshing has been disabled, the Special I/O Unit's data can be refreshed during program execution with IORF(097) or FIORF(225) (CJ1-H-R CPU Units only).

Note IORF(097), FIORF(225) (CJ1-H-R CPU Units only), IORD (222), and IOWR(223) can be executed for Special I/O Units from interrupt tasks. When doing so, always disable the Special I/O Unit's cyclic refreshing in the PLC

Setup. If cyclic refreshing is not disabled and either of the following processes is executed in an interrupt task, a non-fatal error will occur and the Interrupt Task Error Flag (A40213) will turn ON.

- I/O refreshing is executed using IORF(097) or FIORF(225) (CJ1-H-R CPU Units only) for the same Special I/O Unit.
- Data is read or written to or from the memory area using IORD (222) or IOWR(223) for the same Special I/O Unit.

Whenever disabling a Special I/O Unit's cyclic refreshing, be sure that the I/O for that Unit is refreshed with IORF(097) or FIORF(225) (CJ1-H-R CPU Units only) in the program at least every 11 seconds during operation. A CPU Unit service monitoring error will occur in the Special I/O Unit if it is not refreshed every 11 seconds.

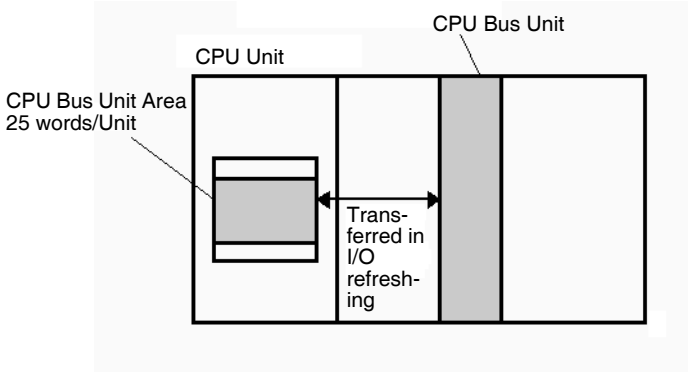
8-6-2 CPU Bus Units

Data can be exchanged between CPU Bus Units and the CPU Unit through the CPU Bus Unit Area, the DM Area, or FINS commands.

CPU Bus Unit Area (I/O Refreshing)

Data is exchanged each cycle during I/O refreshing of the CPU Bus Unit Area. Basically, 25 words are allocated to each CPU Bus Unit based on its unit number setting. The number of words actually used by the CPU Bus Unit varies.

The Special I/O Unit Area ranges from CIO 1500 to CIO 1899 (25 words × 16 Units).



Note With CJ1-H CPU Units, the CPU BUS I/O REFRESH instruction (DLNK(226)) can be executed in the ladder program to refresh the CIO Area words allocated to the CPU Bus Unit of a specified unit number.

Transfer of Words Allocated in the DM Area

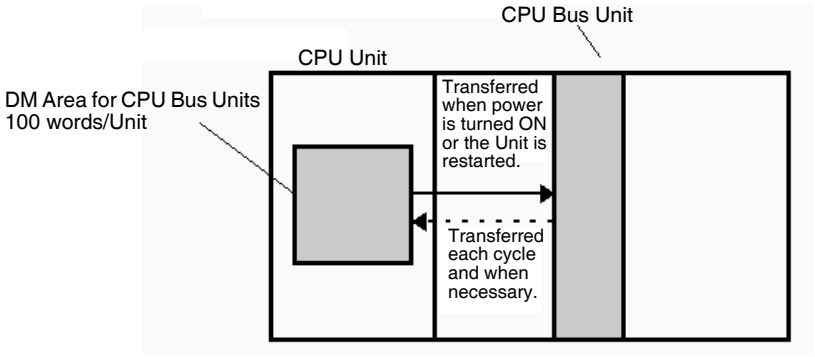
Each CPU Bus Unit is allocated 100 words in the DM Area in the range of D30000 to D31599 (100 words × 16 Units). There are three times that data may be transferred through the words allocated to each Unit. The timing of data transfers depends on the model being used.

1,2,3... 1. Data transferred when the PLC is turned ON.
2. Data transferred each cycle.
3. Data transferred when necessary.

Note With CJ1-H CPU Units, the CPU BUS I/O REFRESH instruction (DLNK(226)) can be executed in the ladder program to refresh the DM Area words allocated to the CPU Bus Unit of a specified unit number.

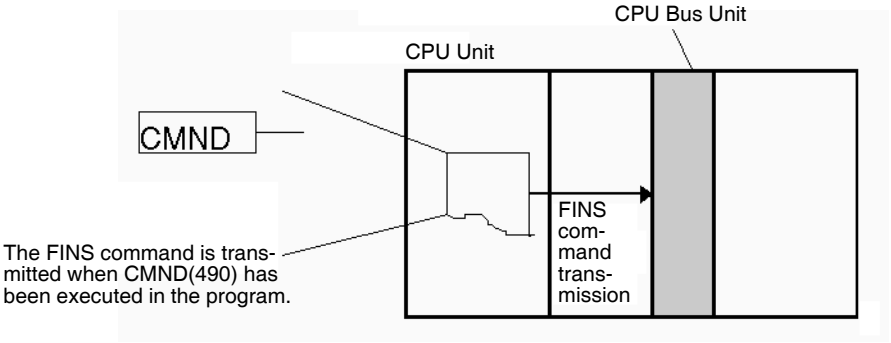
Some models transfer data in both directions, from the DM Area to the Unit and from the Unit to the DM Area. See the Unit's Operation Manual for details on data transfers.

These 100 words are generally used to hold initial settings for the CPU Bus Unit. When the contents of this area are changed from the program to reflect a change in the system, the Restart Bits (A50100 to A50115) for affected Units must be turned ON to restart the Units.

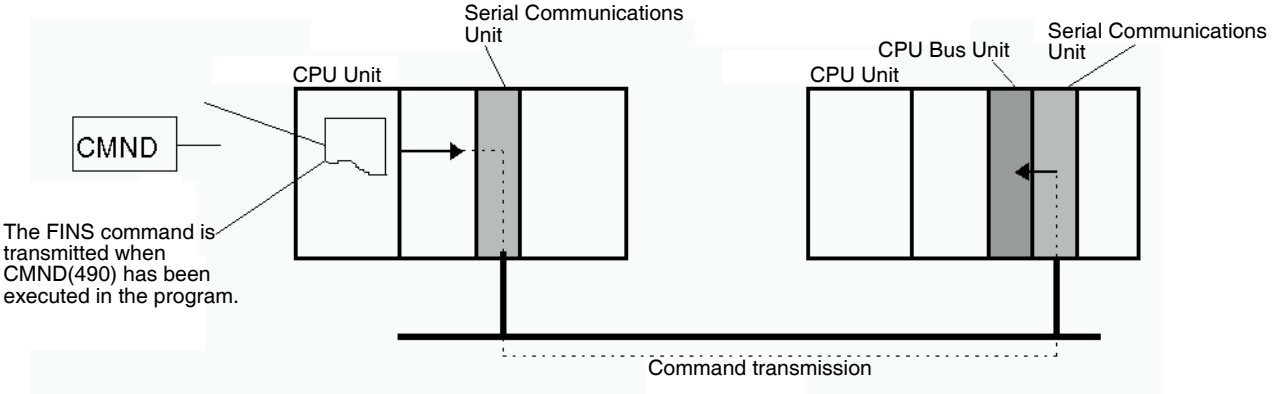


FINS Commands

The CMND(490) instruction can be added to the ladder program to issue a FINS command to the CPU Bus Unit.



FINS commands can be transmitted to CPU Bus Units in other PLCs in the network, not just the local PLC.



CPU Bus Unit Initialization

CPU Bus Units are initialized when the PLC's power is turned on or the Unit's Restart Bit is turned ON. The Unit's CPU Bus Unit Initialization Flag (A30200 to A30215) will be ON while the Unit is initializing.

Cyclic I/O refreshing will not be performed for a CPU Bus Unit while its Initialization Flag is ON.

SECTION 9
Memory Areas

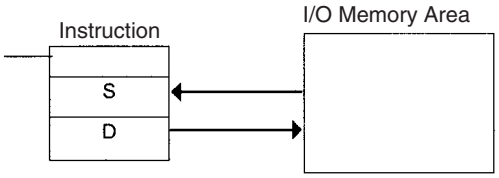
This section describes the structure and functions of the I/O Memory Areas and Parameter Areas.

9-1 Introduction

The CPU Unit's memory (RAM with battery back-up) can be divided into three parts: the User Program Memory, I/O Memory Area, and Parameter Area. This section describes the I/O Memory Area and Parameter Area.

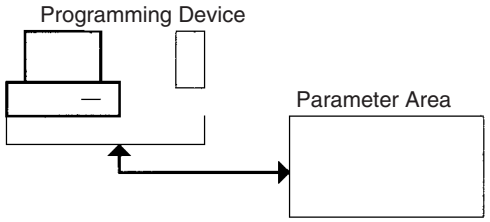
I/O Memory Area

This region of memory contains the data areas which can be accessed by instruction operands. The data areas include the CIO Area, Work Area, Holding Area, Auxiliary Area, DM Area, EM Area, Timer Area, Counter Area, Task Flag Area, Data Registers, Index Registers, Condition Flag Area, and Clock Pulse Area.



Parameter Area

This region of memory contains various settings that cannot be specified by instruction operands; they can be specified from a Programming Device only. The settings include the PLC Setup, I/O Table, Routing Table, and CPU Bus Unit settings.



9-2 I/O Memory Areas

9-2-1 I/O Memory Area Structure

The following table shows the basic structure of the I/O Memory Area.

Area		Size	Range	Task usage	External I/O allocation	Bit access	Word access	Access		Change from Programming Device	Status at startup or mode change	Forcing bit status
								Read	Write			
CIO Area	I/O Area	1,280 bits (80 words)	CIO 0000 to CIO 0079 (Note 1)	Shared by all tasks	Basic I/O Units	OK	OK	OK	OK	OK	Cleared (See note 8.)	OK
	Data Link Area	3,200 bits (200 words)	CIO 1000 to CIO 1199		Data link	OK	OK	OK	OK	OK		OK
	CPU Bus Unit Area	6,400 bits (400 words)	CIO 1500 to CIO 1899		CPU Bus Units	OK	OK	OK	OK	OK		OK
	Special I/O Unit Area	15,360 bits (960 words)	CIO 2000 to CIO 2959		Special I/O Units	OK	OK	OK	OK	OK		OK
	Built-in I/O Area (CJ1M CPU Units with built-in I/O only.)	10 bits + 6 bits (1 word + 1 word)	CIO 2960 to CIO 2961		Built-in I/O port	OK	OK	OK	OK	OK		OK
	Serial PLC Link Area (CJ1M CPU Units only.)	1,440 bits (90 words)	CIO 3100 to CIO 3189		Serial PLC Link	OK	OK	OK	OK	OK		OK
	DeviceNet Area	9,600 bits (600 words)	CIO 3200 to CIO 3799		DeviceNet Master (fixed allocations	OK	OK	OK	OK	OK		OK
	Internal I/O Areas	37,504 bits (2,344 words) 4,800 bits (300 words)	CIO 1200 to CIO 1499 CIO 3800 to CIO 6143		---	OK	OK	OK	OK	OK		OK

Area	Size	Range	Task usage	External I/O allocation	Bit access	Word access	Access		Change from Programming Device	Status at startup or mode change	Forcing bit status
							Read	Write			
Work Area	8,192 bits (512 words)	W000 to W511	Shared by all tasks	---	OK	OK	OK	OK	OK	Cleared (Note 8.)	OK
Holding Area (Note 7.)	8,192 bits (512 words)	H000 to H511		---	OK	OK	OK	OK	OK	Maintained	OK
Auxiliary Area	15,360 bits (960 words)	A000 to A959		---	OK	OK	OK	A000 to A447 No	A000 to A447 No	Varies from address to address.	No
								A448 to A959 OK	A448 to A959 OK		
TR Area	16 bits	TR0 to TR15		---	OK	---	OK	OK	No	Cleared	No
DM Area	32,768 words	D00000 to D32767		---	No (Note 2.)	OK	OK	OK	OK	Maintained	No
EM Area (Note 6.)	32,768 words per bank (0 to C max.)	E0_0000 0 to EC_3276 7		---	No (Note 2.)	OK	OK	OK	OK	Maintained	No
Timer Completion Flags	4,096 bits	T0000 to T4095		---	OK	---	OK	OK	OK	Cleared (Note 8.)	OK
Counter Completion Flags	4,096 bits	C0000 to C4095		---	OK	---	OK	OK	OK	Maintained	OK
Timer PVs	4,096 words	T0000 to T4095		---	---	OK	OK	OK	OK	Cleared (Note 8.)	No (Note 4.)
Counter PVs	4,096 words	C0000 to C4095		---	---	OK	OK	OK	OK	Maintained	No (Note 5.)
Task Flag Area	32 bits	TK00 to TK31		---	OK	---	OK	No	No	Cleared	No
Index Registers (Note 3.)	16 registers	IR0 to IR15	Used separately in each task	---	OK	OK	Indirect addressing only	Specific instructions only	No	Cleared (Note 8.)	No
Data Registers (Note 3.)	16 registers	DR0 to DR15		---	No	OK	OK	OK	No	Cleared (Note 8.)	No

Note

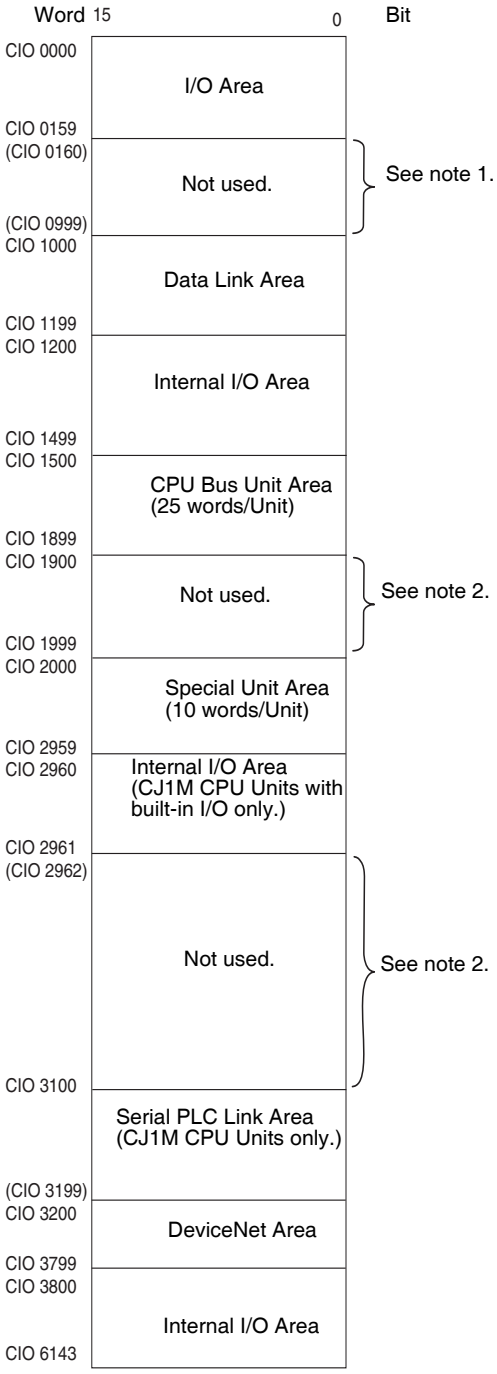
1. The I/O Area can be expanded to CIO 0000 to CIO 0999 by changing the first words allocated to Racks.
2. Bits can be manipulated using TST(350), TSTN(351), SETB(532), RSTB(533), OUTB(534).
3. Index registers and data registers can be used either individually by task or they can be shared by all the tasks (CJ1-H and CJ1M CPU Units only).
4. Timer PVs can be refreshed indirectly by forced setting/resetting Timer Completion Flags.
5. Counter PVs can be refreshed indirectly by forced setting/resetting Counter Completion Flags.
6. CJ1-H and CJ1 CPU Units only.
7. The Function Block Holding Area words are allocated from H512 to H1535. These words can be used only for the function block instance area (internally allocated variable area).
8. If the I/O Memory Hold Flag (A50012) is turned ON, the memory values will be maintained when the operating mode is changed. If, in addition, the PLC Setup is set to hold the status of the I/O Memory Hold Flag at startup (IOM Hold Bit parameter), the memory values will be maintained when the power supply is turned ON.

9-2-2 Overview of the Data Areas

The data areas in the I/O Memory Area are described in detail below.

CIO Area

It is not necessary to input the "CIO" acronym when specifying an address in the CIO Area. The CIO Area is generally used for data exchanges such as I/O refreshing with various Units. Words that are not allocated to Units may be used as work words and work bits in the program only.



Note 1. It is possible to use CIO 0080 to CIO 0999 for I/O words by making the appropriate settings for the first words on the Racks. Settings for the first words on the Racks can be made using the CX-Programmer to set the first

Rack addresses in the I/O table. The settings range for the first Rack addresses is from CIO 0000 to CIO 0900.

2. The parts of the CIO Area that are labelled “Not used” may be used in programming as work bits. In the future, however, unused CIO Area bits may be used when expanding functions. Always use Work Area bits first.

I/O Area

These words are allocated to external I/O terminals on Basic I/O Units. Words that aren’t allocated to external I/O terminals may be used only in the program.

Data Link Area

These words are used for data links in Controller Link Networks. Words that aren’t used in data links may be used only in the program.

CPU Bus Unit Area

These words are allocated to CPU Bus Units to transfer status information. Each Unit is allocated 25 words and up to 16 Units (with unit numbers 0 to 15) can be used. Words that aren’t used by CPU Bus Units may be used only in the program.

Special I/O Unit Area

These words are allocated to Special I/O Units. Each Unit is allocated 10 words and up to 96 Units (unit numbers 0 to 95) can be used).
Words that aren’t used by Special I/O Units may be used only in the program.

Built-in I/O Area (CJ1M CPU Units with Built-in I/O Only)

These words are allocated to the CPU Unit’s built-in I/O port. Allocations are fixed and cannot be changed. This area can be used only by CJ1M CPU Units with the built-in I/O. Other CPU Units can be programmed only as described below under “Internal I/O Area.”

Serial PLC Link Area

These words are allocated for use with the Serial PLC Link, for data links with other PLCs. Addresses not used for Serial PLC Link can be used only in the program, the same as the Work Area.

DeviceNet Area

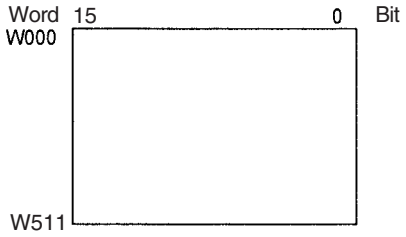
These words are allocated to Slaves for DeviceNet Remote I/O Communications. Allocations are fixed and cannot be changed. Words that aren’t used by DeviceNet devices can be used only in the program.

Internal I/O Area

These words can be used only in the program; they cannot be used for I/O exchange with external I/O terminals. Be sure to use the work words provided in the Work Area (WR) before allocating words in the Internal I/O Area or other unused words in the CIO Area. It is possible that these words will be assigned to new functions in future versions of CJ-series CPU Units, so the program may have to be changed before being used in a new CJ-series PLC if CIO Area words are used as work words in the program.

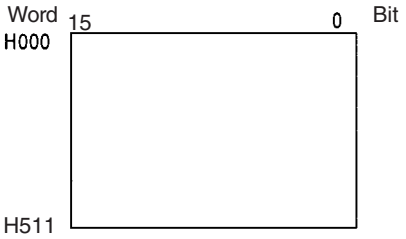
Work Area (WR)

Words in the Work Area can be used only in the program; they cannot be used for I/O exchange with external I/O terminals. No new functions will be assigned to this area in future versions of CJ-series PLCs, so use this area for work words and bits before any words in the CIO Area.



Holding Area (HR)

Words in the Holding Area can be used only in the program. These words retain their content when the PLC is turned on or the operating mode is switched between PROGRAM mode and RUN or MONITOR mode.

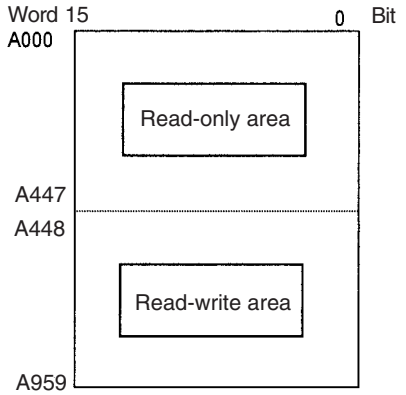


Note The Function Block Holding Area words are allocated from H512 to H1535. These words can be used only for the function block instance area (internally allocated variable area). These words cannot be specified as instruction operands in the user program.

Auxiliary Area (AR)

The Auxiliary Area contains flags and control bits used to monitor and control PLC operation. This area is divided into two parts: A000 to A447 are read-only and A448 to A959 can be read or written. Refer to *9-11 Auxiliary Area* for details on the Auxiliary Area.

Note There is a possibility that a function will be assigned to an undefined Auxiliary Area word or bit in a future upgrade of the CPU Units. Do not use undefined words or bits in the Auxiliary Area as work words or bits in the user program.

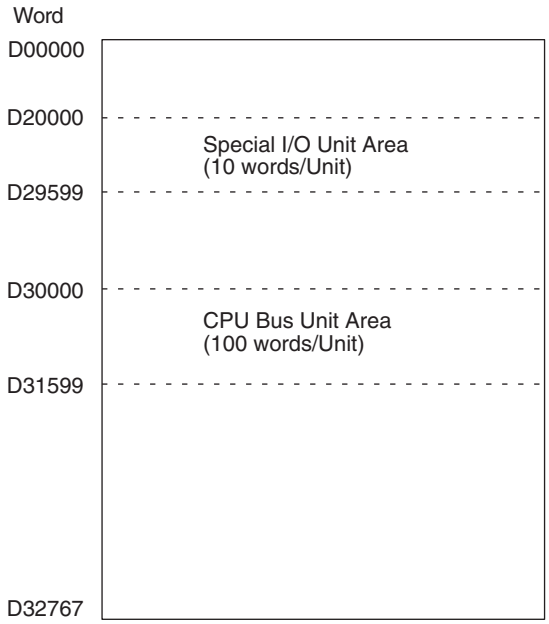


Temporary Relay Area (TR)

The TR Area contains bits that record the ON/OFF status of program branches. The TR bits are used with mnemonics only.

Data Memory Area (DM)

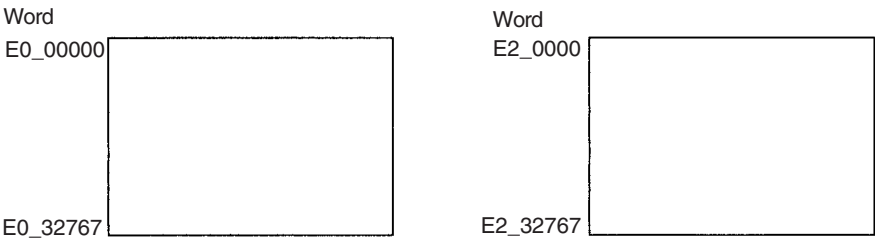
The DM Area is a multi-purpose data area that can be accessed in word-units only. These words retain their content when the PLC is turned on or the operating mode is switched between PROGRAM mode and RUN or MONITOR mode.



Extended Data Memory Area (EM) (CJ1 and CJ1-H CPU Units Only)

The EM Area is a multi-purpose data area that can be accessed in word-units only. These words retain their content when the PLC is turned on or the operating mode is switched between PROGRAM mode and RUN or MONITOR mode.

The EM Area is divided into 32,767-word regions called banks. The number of EM banks depends upon the model of CPU Unit, with a maximum of 13 banks (0 to C). Refer to *2-1 Specifications* for details on the number of EM banks provided in each model of CPU Unit.



Timer Area

There are two timer data areas, the Timer Completion Flags and the Timer Present Values (PVs). Up to 4,096 timers with timer numbers T0000 to T4095 can be used. The same number is used to access a timer's Completion Flag and PV.

Timer Completion Flags

These flags are read as bits. A Completion Flag is turned ON by the system when the corresponding timer times out (the set time elapses).

Timer PVs

The PVs are read and written as words (16 bits). The PVs count up or down as the timer operates.

Counter Area

There are two counter data areas, the Counter Completion Flags and the Counter Present Values (PVs). Up to 4,096 counters with counter numbers C0000 to C4095 can be used. The same number is used to access a counter's Completion Flag and PV.

Counter Completion Flags

These flags are read as bits. A Completion Flag is turned ON by the system when the corresponding counter counts out (the set value is reached).

Counter PVs

The PVs are read and written as words (16 bits). The PVs count up or down as the counter operates.

Condition Flags

These flags include the Arithmetic Flags such as the Error Flag and Equals Flag which indicate the results of instruction execution as well as the Always ON and Always OFF Flags. The Condition Flags are specified with labels (symbols) rather than addresses.

Clock Pulses

The Clock Pulses are turned ON and OFF by the CPU Unit's internal timer. These bits are specified with labels (symbols) rather than addresses.

Task Flag Area (TK)

Task Flags range from TK00 to TK31 and correspond to cyclic tasks 0 to 31. A Task Flag will be ON when the corresponding cyclic task is in executable (RUN) status and OFF when the cyclic task hasn't been executed (INI) or is in standby (WAIT) status.

Index Registers (IR)

These registers (IR0 to IR15) are used to store PLC memory addresses (absolute memory addresses in RAM) to indirectly address words in I/O memory. The Index Registers can be used separately in each task or, for CJ1-H or CJ1M CPU Units, they can be shared by all tasks.Data Registers (DR)

Data Registers (DR)

These registers (DR0 to DR15) are used together with the Index Registers. When a Data Register is input just before an Index Register, the content of the Data Register is added to the PLC memory address in the Index Register to offset that address. The Data Registers are used separately in each task or, for CJ1-H or CJ1M CPU Units, they can be shared by all tasks.

9-2-3 Data Area Properties

Content after Fatal Errors, Forced Set/Reset Usage

Area		Fatal Error Generated				Forced Set/ Forced Reset Functions Usable?
		Execution of FALS(007)		Other Fatal Error		
		IOM Hold Bit OFF	IOM Hold Bit ON	IOM Hold Bit OFF	IOM Hold Bit ON	
CIO Area	I/O Area	Retained	Retained	Cleared	Retained	Yes
	Data Link Area					
	CPU Bus Unit Area					
	Special I/O Unit Area					
	DeviceNet Area					
	Internal I/O Area					
Work Area (W)		Retained	Retained	Cleared	Retained	Yes
Holding Area (H)		Retained	Retained	Retained	Retained	Yes
Auxiliary Area (A)		Status varies from address to address.				No
Data Memory Area (D)		Retained	Retained	Retained	Retained	No
Extended Data Memory Area (E)		Retained	Retained	Retained	Retained	No
Timer Completion Flags (T)		Retained	Retained	Cleared	Retained	Yes
Timer PVs (T)		Retained	Retained	Cleared	Retained	No
Counter Completion Flags (C)		Retained	Retained	Retained	Retained	Yes
Counter PVs (C)		Retained	Retained	Retained	Retained	No
Task Flags (TK)		Cleared	Cleared	Retained	Retained	No
Index Registers (IR)		Retained	Retained	Cleared	Retained	No
Data Registers (DR)		Retained	Retained	Cleared	Retained	No

Content after Mode Change or Power Interruption

Area		Mode Changed (See note 1.)		PLC Power OFF to ON			
				IOM Hold Bit Cleared (See note 2.)		IOM Hold Bit Held (See note 2.)	
		IOM Hold Bit OFF	IOM Hold Bit ON	IOM Hold Bit OFF	IOM Hold Bit ON	IOM Hold Bit OFF	IOM Hold Bit ON
CIO Area	I/O Area	Cleared	Retained	Cleared	Cleared	Cleared	Retained
	Data Link Area						
	CPU Bus Unit Area						
	Special I/O Unit Area						
	Built-in I/O Area (CJ1M CPU Units with built-in I/O only.)						
	Serial PLC Link Area (CJ1M CPU Units only.)						
	DeviceNet Area						
	Internal I/O Area						
Work Area (W)		Cleared	Retained	Cleared	Cleared	Cleared	Retained
Holding Area (H)		Retained	Retained	Retained	Retained	Retained	Retained
Auxiliary Area (A)		Status varies from address to address.					
Data Memory Area (D)		Retained	Retained	Retained	Retained	Retained	Retained
Extended Data Memory Area (E)		Retained	Retained	Retained	Retained	Retained	Retained
Timer Completion Flags (T)		Cleared	Retained	Cleared	Cleared	Cleared	Retained
Timer PVs (T)		Cleared	Retained	Cleared	Cleared	Cleared	Retained
Counter Completion Flags (C)		Retained	Retained	Retained	Retained	Retained	Retained
Counter PVs (C)		Retained	Retained	Retained	Retained	Retained	Retained
Task Flags (TK)		Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
Index Registers (IR)		Cleared	Retained	Cleared	Cleared	Cleared	Cleared
Data Registers (DR)		Cleared	Retained	Cleared	Cleared	Cleared	Cleared

Note
1. Mode changed from PROGRAM to RUN/MONITOR or vice-versa.
2. The PLC Setup's "IOM Hold Bit Status at Startup" setting determines whether the IOM Hold Bit's status is held or cleared when the PLC is turned on.

9-3 I/O Area

I/O Area addresses range from CIO 0000 to CIO 0159 (CIO bits 000000 to 015915), but the area can be expanded to CIO 0000 to CIO 0999 by changing the first Rack word with any Programming Device other than a Programming Console. The maximum number of bits that can be allocated for external I/O will still be 2,560 (160 words) even if the I/O Area is expanded.

Note The maximum number of external I/O points depends upon the CPU Unit being used.

Words in the I/O Area are allocated to I/O terminals on Basic I/O Units.

Words are allocated to Basic I/O Units based on the slot position (left to right) and number of words required. The words are allocated consecutively and empty slots are skipped. Words in the I/O Area that aren't allocated to Basic I/O Units can be used only in the program.

Forcing Bit Status

Bits in the I/O Area can be force-set and force-reset.

I/O Area Initialization

The contents of the I/O Area will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM to RUN or MONITOR mode or vice-versa and the IOM Hold Bit is OFF.
   (See the following explanation of IOM Hold Bit Operation.)
2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.
   (See the following explanation of IOM Hold Bit Operation.)
3. The I/O Area is cleared from a Programming Device.
4. PLC operation is stopped when a fatal error other than an FALS(007) error occurs. (The contents of the I/O Area will be retained if FALS(007) is executed.)

IOM Hold Bit Operation

If the IOM Hold Bit (A50012) is ON, the contents of the I/O Area won't be cleared when a fatal error occurs or the operating mode is changed from PROGRAM mode to RUN or MONITOR mode or vice-versa.

If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the contents of the I/O Area won't be cleared when the PLC's power supply is cycled. All I/O bits, including outputs, will retain the status that they had before the PLC was turned off.

Note If the I/O Hold Bit is turned ON, the outputs from the PLC will not be turned OFF and will maintain their previous status when the PLC is switched from RUN or MONITOR mode to PROGRAM mode. Make sure that the external loads will not produce dangerous conditions when this occurs. (When operation stops for a fatal error, including those produced with the FALS(007) instruction, all outputs from Output Unit will be turned OFF and only the internal output status will be maintained.)

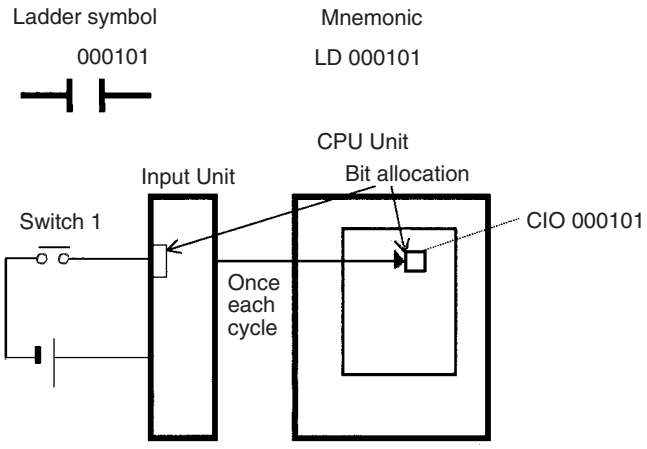
Input Bits

A bit in the I/O Area is called an input bit when it is allocated to an Input Unit. Input bits reflect the ON/OFF status of devices such as push-button switches, limit switches, and photoelectric switches. There are three ways for the status of input points to be refreshed in the PLC: normal I/O refreshing, immediate refreshing, and IORF(097) refreshing.

Normal I/O Refreshing

The status of I/O points on external devices is read once each cycle after program execution.

In the following example, CIO 000101 is allocated to switch 1, an external switch connected to the input terminal of an Input Unit. The ON/OFF status of switch 1 is reflected in CIO 000101 once each cycle.



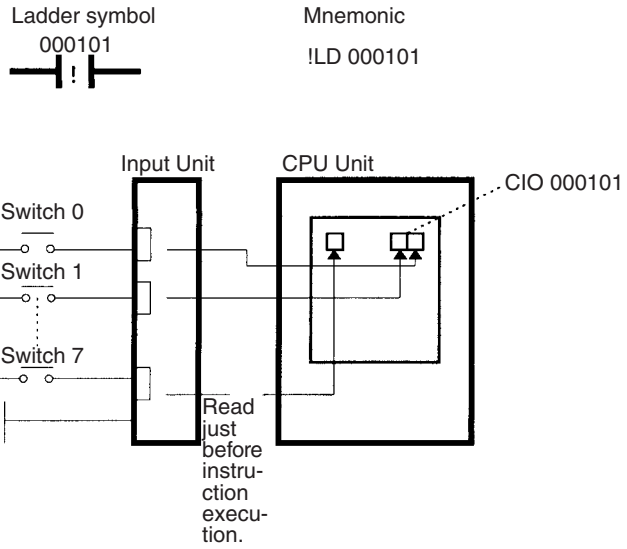
Immediate Refreshing

When the immediate refreshing variation of an instruction is specified by inputting an exclamation point just before the instruction, and the instruction's operand is an input bit or word, the word containing the bit or the word itself will be refreshed just before the instruction is executed. This immediate refreshing is performed in addition to the normal I/O refreshing performed once each cycle.

1,2,3...

1. Bit Operand
   Just before the instruction is executed, the ON/OFF status of the 16 I/O points allocated to the word containing the specified bit will be read to the PLC.
2. Word Operand
   Just before the instruction is executed, the ON/OFF status of the 16 I/O points allocated to the specified word will be read to the PLC.

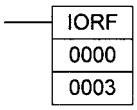
In the following example, CIO 000101 is allocated to switch 1, an external switch connected to the input terminal of an Input Unit. The ON/OFF status of switch 1 is read and reflected in CIO 000101 just before !LD 000101 is executed.



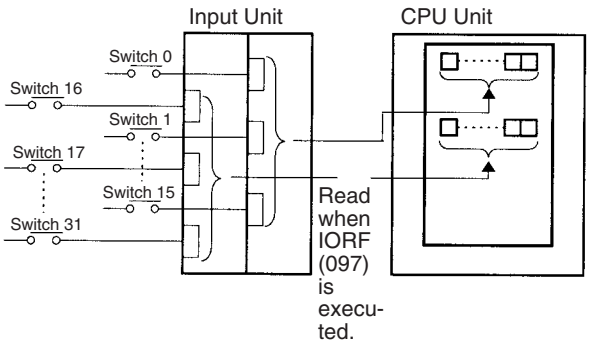
IORF(097) Refreshing

When IORF(097) (I/O REFRESH) is executed, the input bits in the specified range of words are refreshed. This I/O refreshing is performed in addition to the normal I/O refreshing performed once each cycle.

The following IORF(097) instruction refreshes the status of all I/O points in I/O Area words CIO 0000 to CIO 0003. The status of input points is read from the Input Units and the status of output bits is written to the Output Units.



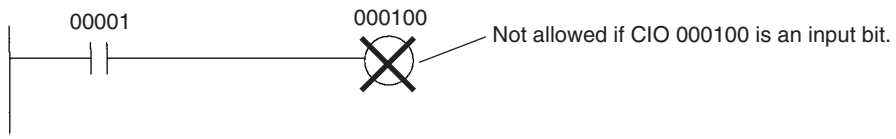
In the following example, the status of input points allocated to CIO 0000 and CIO 0001 are read from the Input Unit. (CIO 0002 and CIO 0003 are allocated to Output Units.)



Limitations on Input bits

There is no limit on the number of times that input bits can be used as normally open and normally closed conditions in the program and the addresses can be programmed in any order.

An input bit cannot be used as an operand in an Output instruction.

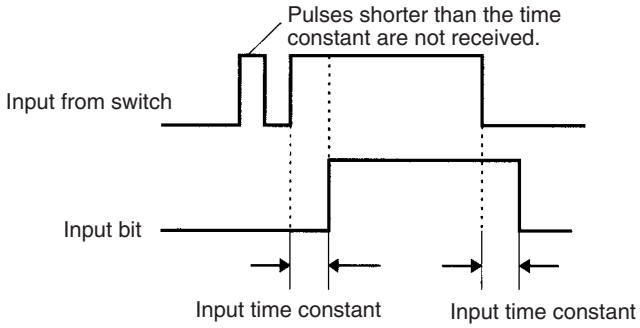


Input Response Time Settings

The input response times for each Input Unit can be set in the PLC Setup. Increasing the input response time will reduce chattering and the effects of noise and decreasing the input response time allows higher speed input pulses to be received.

The default value for input response times is 8 ms and the setting range is 0.5 ms to 32 ms.

Note If the time is set to 0 ms, there will still be an ON delay time of 20 μs max. and an OFF delay time of 300 μs due to delays caused by internal elements.



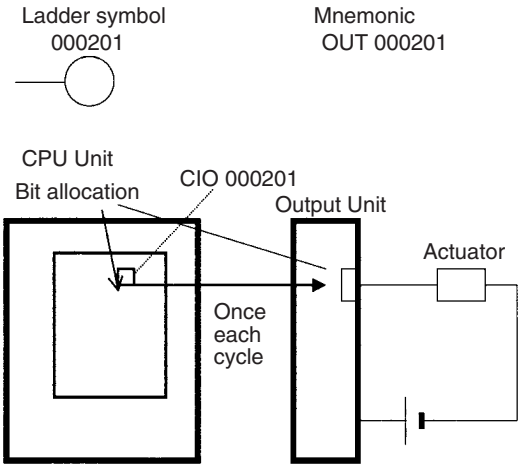
Output Bits

A bit in the I/O Area is called an output bit when it is allocated to an Output Unit. The ON/OFF status of an output bits are output to devices such as actuators. There are three ways for the status of output bits to be refreshed to an Output Unit: normal I/O refreshing, immediate refreshing, and IORF(097) refreshing.

Normal I/O Refreshing

The status of output bits are output to external devices once each cycle after program execution.

In the following example, CIO 000201 is allocated to an actuator, an external device connected to an output terminal of an Output Unit. The ON/OFF status of CIO 000201 is output to that actuator once each cycle.



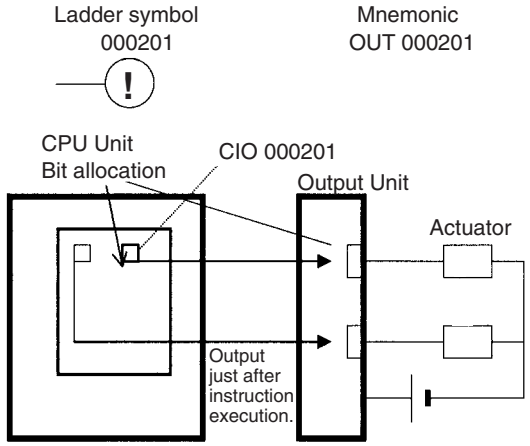
Immediate Refreshing

When the immediate refreshing variation of an instruction is specified by inputting an exclamation point just before the instruction, and the instruction's operand is an output bit or word, the content of the word containing the bit or the word itself will be output just after the instruction is executed. This immediate refreshing is performed in addition to the normal I/O refreshing performed once each cycle.

1,2,3...

1. Bit Operand
   Just after the instruction is executed, the ON/OFF status of the 16 I/O points allocated to the word containing the specified bit will be output to the output device(s).
2. Word Operand
   Just after the instruction is executed, the ON/OFF status of the 16 I/O points allocated to the specified word will be output to the output device(s).

In the following example, CIO 000201 is allocated to an actuator, an external device connected to the output terminal of an Output Unit. The ON/OFF status of CIO 000201 is output to the actuator just after !OUT 000201 is executed.

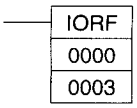


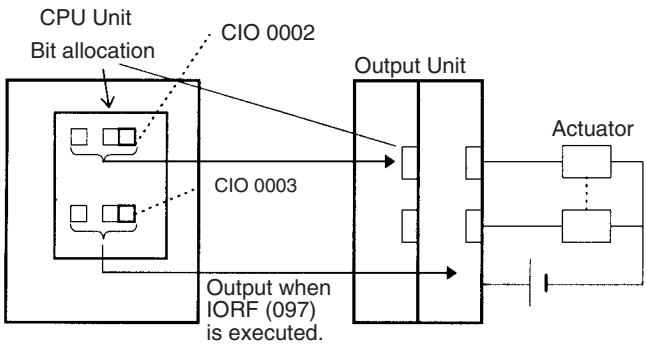
IORF(097) Refreshing

When IORF(097) (I/O REFRESH) is executed, the ON/OFF status of output bits in the specified range of words is output to their external devices. This I/O refreshing is performed in addition to the normal I/O refreshing performed once each cycle.

The following IORF(097) instruction refreshes the status of all I/O points in I/O Area words CIO 0000 to CIO 0003. The status of input points is read from the Input Units and the status of output bits is written to the Output Units.

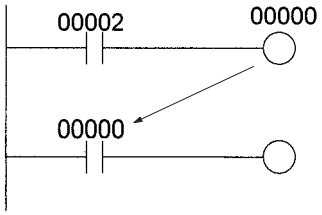
In this example, the status of input points allocated to CIO 0002 and CIO 0003 are output to the Output Unit. (CIO 0000 and CIO 0001 are allocated to Input Units.)



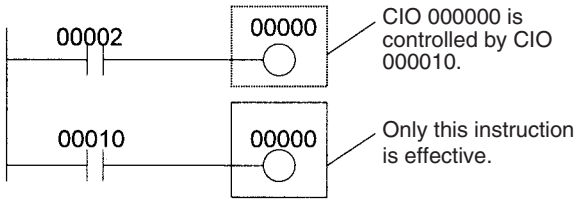


Limitations on Output Bits

Output bits can be programmed in any order. Output bits can be used as operands in Input instructions and there is no limit on the number of times that an output bit is used as a normally open and normally closed condition.



An output bit can be used in only one Output instruction that controls its status. If an output bit is used in two or more Output instructions, only the last instruction will be effective.



Note All outputs on Basic I/O Units and Special I/O Units can be turned OFF by turning ON the Output OFF Bit (A50015). The status of the output bits won't be affected even though the actual outputs are turned OFF.

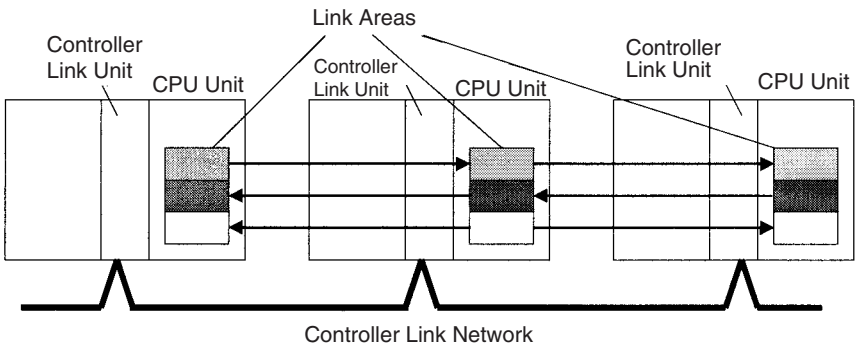
9-4 Data Link Area

Data Link Area addresses range from CIO 1000 to CIO 1199 (CIO bits 100000 to 119915). Words in the Link Area are used for data links when *LR* is set as the data link area for Controller Link Networks. It is also used for PLC Links.

A data link automatically (independently of the program) shares data with Link Areas in other CJ-series CPU Units in the network through a Controller Link Unit mounted to the PLC's CPU Rack.

Data links can be generated automatically (using the same number of words for each node) or manually. When a user defines the data link manually, he can assign any number of words to each node and make nodes receive-only or transmit-only. Refer to the *Controller Link Units Operation Manual* (W309) for more details.

Words in the Link Area can be used in the program when *LR* is not set as the data link area for Controller Link Networks and PLC Links are not used.



Forcing Bit Status

Bits in the Data Link Area can be force-set and force-reset.

Links to C200HX/HG/HE, C200HS, and C200H PLCs

Link Area words CIO 1000 to CIO 1063 in CJ-series PLCs correspond to Link Relay Area words LR 00 to LR 63 for data links created in C200HX/HG/HE PLCs. When converting C200HX/HG/HE, C200HS, or C200H programs for use in CJ-series PLCs, change addresses LR 00 through LR 63 to their equivalent Link Area addresses CIO 1000 through CIO 1063.

Link Area Initialization

The contents of the Link Area will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa and the IOM Hold Bit is OFF.
2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.
3. The Link Area is cleared from a Programming Device.
4. PLC operation is stopped when a fatal error other than an FALS(007) error occurs. (The contents of the Link Area will be retained if FALS(007) is executed.)

IOM Hold Bit Operation

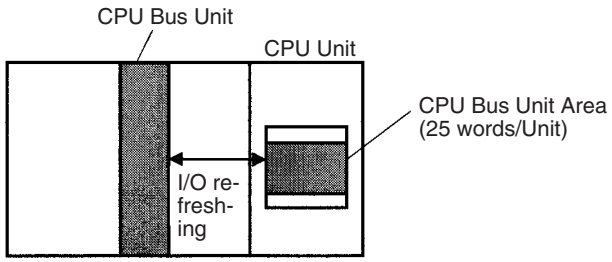
If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the contents of the Link Area won't be cleared when the PLC's power supply is cycled.

If the IOM Hold BIt (A50012) is ON, the contents of the Link Area won't be cleared when a fatal error occurs or the operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

9-5 CPU Bus Unit Area

The CPU Bus Unit Area contains 400 words with addresses ranging from CIO 1500 to CIO 1899. Words in the CPU Bus Unit Area can be allocated to CPU Bus Units to transfer data such as the operating status of the Unit. Each Unit is allocated 25 words based on the Unit's unit number setting.

Data is exchanged with CPU Bus Units once each cycle during I/O refreshing, which occurs after program execution. (Words in this data area cannot be refreshed with immediate-refreshing, IORF(097) or FIORF(225) (CJ1-H-R CPU Units only).)



Each CPU Bus Unit is allocated 25 words based on its unit number, as shown in the following table.

Unit number	Allocated words
0	CIO 1500 to CIO 1524
1	CIO 1525 to CIO 1549
2	CIO 1550 to CIO 1574
3	CIO 1575 to CIO 1599
4	CIO 1600 to CIO 1624
5	CIO 1625 to CIO 1649
6	CIO 1650 to CIO 1674
7	CIO 1675 to CIO 1699
8	CIO 1700 to CIO 1724
9	CIO 1725 to CIO 1749
A	CIO 1750 to CIO 1774
B	CIO 1775 to CIO 1799
C	CIO 1800 to CIO 1824
D	CIO 1825 to CIO 1849
E	CIO 1850 to CIO 1874
F	CIO 1875 to CIO 1899

The function of the 25 words depends upon the CPU Bus Unit being used. For details, refer to the Unit's operation manual.

Words in the CPU Bus Unit Area that aren't allocated to CPU Bus Units can be used only in the program.

Forcing Bit Status

Bits in the CPU Bus Unit Area can be force-set and force-reset.

CPU Bus Unit Area Initialization

The contents of the CPU Bus Unit Area will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM to RUN or MONITOR mode or vice-versa and the IOM Hold Bit is OFF.
2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.
3. The CPU Bus Unit Area is cleared from a Programming Device.
4. PLC operation is stopped when a fatal error other than an FALS(007) error occurs. (The contents of the CPU Bus Unit Area will be retained when FALS(007) is executed.)

IOM Hold Bit Operation

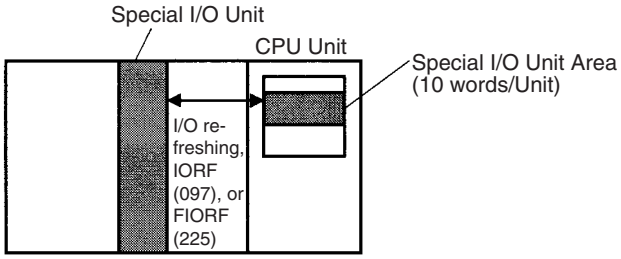
If the IOM Hold BIt (A50012) is ON, the contents of the CPU Bus Unit Area won't be cleared when a fatal error occurs or the operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the contents of the CPU Bus Unit Area won't be cleared when the PLC's power supply is cycled.

9-6 Special I/O Unit Area

The Special I/O Unit Area contains 960 words with addresses ranging from CIO 2000 to CIO 2959. Words in the Special I/O Unit Area are allocated to CJ to transfer data such as the operating status of the Unit. Each Unit is allocated 10 words based on its unit number setting.

Data is exchanged with Special I/O Units once each cycle during I/O refreshing, which occurs after program execution. The words can also be refreshed with IORF(097) or FIORF(225) (CJ1-H-R CPU Units only).



Each Special I/O Unit is allocated 25 words based on its unit number, as shown in the following table.

Unit number	Allocated words
0	CIO 2000 to CIO 2009
1	CIO 2010 to CIO 2019
2	CIO 2020 to CIO 2029
3	CIO 2030 to CIO 2039
4	CIO 2040 to CIO 2049
5	CIO 2050 to CIO 2059
6	CIO 2060 to CIO 2069
7	CIO 2070 to CIO 2079
8	CIO 2080 to CIO 2089
9	CIO 2090 to CIO 2099
10 (A)	CIO 2100 to CIO 2109
11 (B)	CIO 2110 to CIO 2119
12 (C)	CIO 2120 to CIO 2129
13 (D)	CIO 2130 to CIO 2139
14 (E)	CIO 2140 to CIO 2149
15 (F)	CIO 2150 to CIO 2159
16	CIO 2160 to CIO 2169
17	CIO 2170 to CIO 2179
⋮	⋮
95	CIO 2950 to CIO 2959

The function of the 10 words allocated to a Unit depends upon the Special I/O Unit being used. For details, refer to the Unit's Operation Manual.

Words in the Special I/O Unit Area that are not allocated to Special I/O Units can be used only in the program.

Forcing Bit Status

Bits in the Special I/O Unit Area can be force-set and force-reset.

Special I/O Unit Area Initialization

The contents of the Special I/O Unit Area will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa and the IOM Hold Bit is OFF.
2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.
3. The Special I/O Unit Area is cleared from a Programming Device.
4. PLC operation is stopped when a fatal error other than an FALS(007) error occurs. (The contents of the Special I/O Unit Area will be retained when FALS(007) is executed.)

IOM Hold Bit Operation

If the IOM Hold BIt (A50012) is ON, the contents of the Special I/O Unit Area will not be cleared when a fatal error occurs or the operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the contents of the Special I/O Unit Area will not be cleared when the PLC's power supply is cycled.

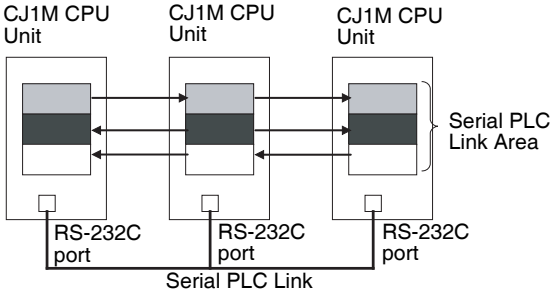
9-7 Serial PLC Link Area

The Serial PLC Link Area contains 90 words with addresses ranging from CIO 3100 to CIO 3189. Words in the Serial PLC Link Area can be used for data links with other PLCs.

Serial PLC Links exchange data among CPU Units via the built-in RS-232C ports, with no need for special programming.

The Serial PLC Link allocation is set automatically by means of the following PLC Setup settings at the Polling Unit.

- Serial PLC Link Mode
- Number of Serial PLC Link transfer words
- Maximum Serial PLC Link unit number



Addresses not used for Serial PLC Links can be used only in the program, the same as the Work Area.

Forcing Bit Status

Bits in the Serial PLC Link Area can be force-set and force-reset.

Serial PLC Link Area Initialization

The contents of the Serial PLC Link Area will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa and the IOM Hold Bit is OFF.
2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.
3. The Serial PLC Link Area is cleared from a Programming Device.

4. PLC operation is stopped when a fatal error other than an FALS(007) error occurs. (The contents of the Serial PLC Link Area will be retained when FALS(007) is executed.)

IOM Hold Bit Operation

If the IOM Hold BIt (A50012) is ON, the contents of the Serial PLC Link Area will not be cleared when a fatal error occurs or the operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the contents of the Serial PLC Link Area will not be cleared when the PLC's power supply is cycled.

9-8 DeviceNet Area

The DeviceNet Area consists of 600 words from CIO 3200 to CIO 3799. Words in the DeviceNet Area are allocated to Slaves for DeviceNet remote I/O communications. Data is exchanged regularly to Slaves in the network (independent of the program) through the DeviceNet Unit.

Words are allocated to Slaves using fixed allocations according to fixed allocation settings 1, 2, and 3. One of these fixed areas is selected.

Area	Output Area (master to slaves)	Input Area (slaves to master)
Fixed Allocation Area 1	CIO 3200 to CIO 3263	CIO 3300 to CIO 3363
Fixed Allocation Area 2	CIO 3400 to CIO 3463	CIO 3500 to CIO 3563
Fixed Allocation Area 3	CIO 3600 to CIO 3663	CIO 3700 to CIO 3763

The following words are allocated to the DeviceNet Unit when the remote I/O slave function is used with fixed allocations.

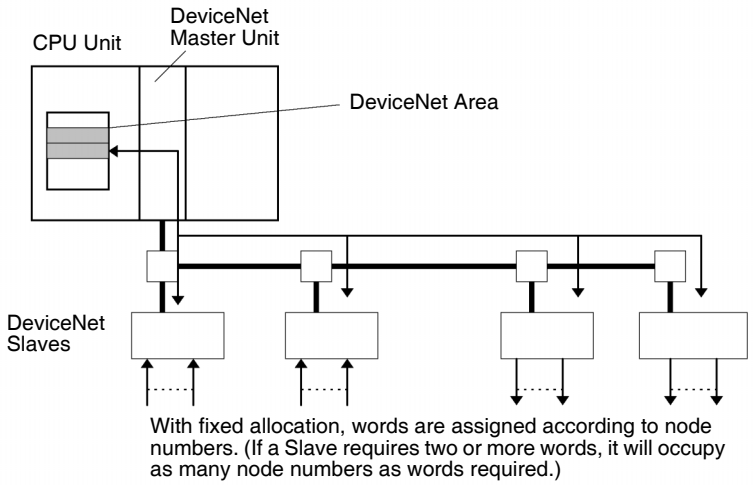
Area	Output Area (master to slaves)	Input Area (slaves to master)
Fixed Allocation Area 1	CIO 3370	CIO 3270
Fixed Allocation Area 2	CIO 3570	CIO 3470
Fixed Allocation Area 3	CIO 3770	CIO 3670

Bits in the DeviceNet Area can be force-set and force-reset.

Note There are two ways to allocated I/O in DeviceNet networks: Fixed allocations according to node addresses and user-set allocations.

- With fixed allocations, words are automatically allocated to the slave in the specified fixed allocation area according to the node addresses.
- With user-set allocations, the user can allocate words to Slaves from the following words.
  CIO 0000 to CIO 6143
  W000 to W511
  H000 to H511
  D00000 to D32767
  E00000 to E32767, banks 0 to 2

For details on word allocations, refer to the *DeviceNet Operation Manual* (W267).



DeviceNet Area Initialization

The contents of the DeviceNet Area will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM to RUN or MONITOR mode or vice-versa and the IOM Hold Bit is OFF.
2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.
3. The DeviceNet Area is cleared from a Programming Device.
4. PLC operation is stopped when a fatal error other than an FALS(007) error occurs. (The contents of the DeviceNet Area will be retained when FALS(007) is executed.)

IOM Hold Bit Operation

If the IOM Hold BIt (A50012) is ON, the contents of the DeviceNet Area will not be cleared when a fatal error occurs or the operating mode is changed from PROGRAM mode to RUN or MONITOR mode or vice-versa.

If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the contents of the DeviceNet Area will not be cleared when the PLC's power supply is cycled.

9-9 Internal I/O Area

The Internal I/O (Work) Area contains 512 words with addresses ranging from W000 to W511. These words can be used only in the program as work words.

There are unused words in the CIO Area (CIO 1200 to CIO 1499 and CIO 3800 to CIO 6143) that can also be used in the program, but use any available words in the Work Area first because the unused words in the CIO Area may be allocated to new functions in future versions of CJ-series CPU Units.

Bits in the Work Area can be force-set and force-reset.

Work Area Initialization

The contents of the Work Area will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM to RUN or MONITOR mode or vice-versa and the IOM Hold Bit is OFF.
2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.
3. The Work Area is cleared from a Programming Device.
4. PLC operation is stopped when a fatal error other than an FALS(007) error occurs. (The contents of the Work Area will be retained when FALS(007) is executed.)

IOM Hold Bit Operation

If the IOM Hold BIt (A50012) is ON, the contents of the Work Area won't be cleared when a fatal error occurs or the operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the contents of the Work Area won't be cleared when the PLC's power supply is cycled.

9-10 Holding Area

The Holding Area contains 512 words with addresses ranging from H000 to H511 (bits H00000 to H51115). These words can be used only in the program.

Holding Area bits can be used in any order in the program and can be used as normally open or normally closed conditions as often as necessary.

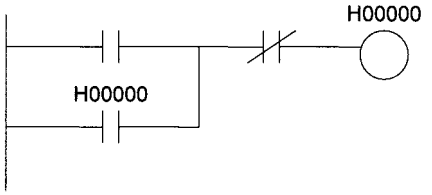
Holding Area Initialization

Data in the Holding Area is not cleared when the PLC's power supply is cycled or the PLC's operating mode is changed from PROGRAM mode to RUN or MONITOR mode or vice-versa.

A Holding Area bit will be cleared if it is programmed between IL(002) and ILC(003) and the execution condition for IL(002) is OFF. To keep a bit ON even when the execution condition for IL(002) is OFF, turn ON the bit with the SET instruction just before IL(002).

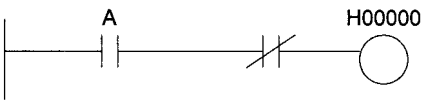
Self-maintaining Bits

When a self-maintaining bit is programmed with a Holding Area bit, the self-maintaining bit won't be cleared even when the power is reset.



Note

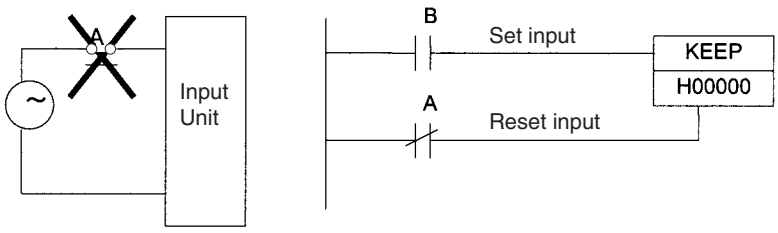
1. If a Holding Area bit is not used for the self-maintaining bit, the bit will be turned OFF and the self-maintaining bit will be cleared when the power is reset.
2. If a Holding Area bit is used but not programmed as a self-maintaining bit as in the following diagram, the bit will be turned OFF by execution condition A when the power is reset.



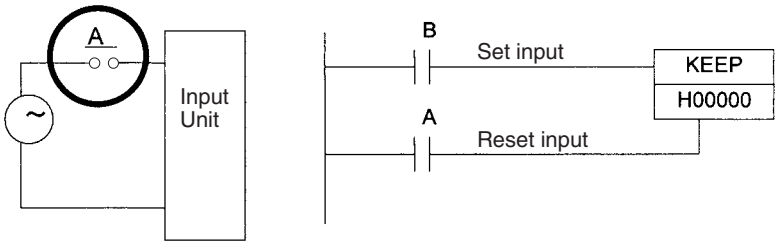
3. The Function Block Holding Area words are allocated from H512 to H1535. These words can be used only for the function block instance area (internally allocated variable area). These words cannot be specified as instruction operands in the user program.

Precautions

When a Holding Area bit is used in a KEEP(011) instruction, never use a normally closed condition for the reset input if the input device uses an AC power supply. When the power supply goes OFF or is temporarily interrupted, the input will go OFF before the PLC's internal power supply and the Holding Area bit will be reset.



Instead, use a configuration like the one shown below.



There are no restrictions in the order of using bit address or in the number of N.C. or N.O. conditions that can be programmed.

9-11 Auxiliary Area

The Auxiliary Area contains 960 words with addresses ranging from A000 to A959). These words are preassigned as flags and control bits to monitor and control operation.

A000 through A447 are read-only, but A448 through A959 can be read or written from the program or a Programming Device.

Forcing Bit Status

Bits in the Auxiliary Area cannot be force-set and force-reset continuously.

Writing Auxiliary Area Data

The following operations can be performed from a Programming Device to write data in the Auxiliary Area.

- Using the CX-Programmer: Online set/reset (not force-set/force-reset), changing present values when monitoring programming addresses (set values dialog box), or transferring data to the PLC after editing the PLC data tables. Refer to the *CX-Programmer Operation Manual* (W414).
- Using a Programming Console: Temporarily force-setting/force-resetting bits from the Bit/Word Monitor or the 3-word Monitor operation (refer to the *Programming Console Operation Manual* (W341)).

Note There is a possibility that a function will be assigned to an undefined Auxiliary Area word or bit in a future upgrade of the CPU Units. Do not use undefined words or bits in the Auxiliary Area as work words or bits in the user program.

Functions

The following tables list the functions of Auxiliary Area flags and control bits. The table is organized according to the functions of the flags and bits. Some of these functions are not supported by some CPU Unit models and unit versions. For more details or to look up a bit by its address, refer to *Appendix C Auxiliary Area*.

Initial Settings

Name	Address	Description	Access
I/O Response Times in Basic I/O Units	A22000 to A25915	Contains the current I/O response times for CJ-series Basic I/O Units.	Read-only
IOM Hold Bit	A50012	Determines whether the contents of I/O memory are retained when the PLC's power is reset or the PLC's operating mode is changed (from PROGRAM to RUN/MONITOR or vice-versa). Turn ON this bit to maintain I/O memory when changing between PROGRAM and RUN or MONITOR mode. Turn OFF this bit to clear I/O memory when changing the changing between PROGRAM and RUN or MONITOR mode.	Read/write
Forced Status Hold BIt	A50013	Determines whether the status of force-set and force-reset bits is maintained when the PLC's power is reset or the PLC's operating mode is changed (between PROGRAM and RUN or MONITOR mode).	Read/write
Power Interruption Disable Setting (Not supported by CJ1G-CPU□□ CPU Units.)	A530	Set to A5A5 hex to disable power interrupts (except the Power OFF Interrupt task) between DI(693) and EI(694) instructions.	Read/write

CPU Unit Settings

Name	Address	Description	Access
Status of DIP Switch Pin 6	A39512	Contains the status set on pin 6 of the CPU Unit's DIP switch. (Refreshed every cycle.)	Read-only

Basic I/O Unit Settings

Name	Address	Description	Access
Basic I/O Unit Status Area	A05000 to A06915	Indicates alarm status (load short-circuit protection) for Basic I/O Units. (From slot 0 on Rack 0 + slot 7 on Rack 3)	Read-only
I/O Allocation Status	A260	Indicates the current status of I/O allocation, i.e., Automatic I/O Allocation at Startup or User-set I/O Allocations.	Read-only
Units Detected at Startup (Racks 0 to 3) (Not supported by CJ1G-CPU□□ CPU Units.)	Rack 0: A33600 to A33603 Rack 1: A33604 to A33607 Rack 2: A33608 to A33611 Rack 3: A33612 to A33615	The number of Units detected on each Rack is stored in 1-digit hexadecimal (0 to A hex). Example: The following would be stored if Rack 0 had 1 Unit, Rack 1 had 4 Units, Rack 2 had 8 Units and Rack 3 had 10 Units: A336 = A 8 4 1	Read-only

CPU Bus Unit Flags/Bits

Name	Address	Description	Access
CPU Bus Unit Initialization Flags	A30200 to A30215	These flags correspond to CPU Bus Units 0 to 15. A flag will be ON while the corresponding Unit is initializing after the power is turned ON or the Unit's Restart Bit (in A501) is turned ON.	Read-only
CPU Bus Unit Restart Bits	A50100 to A50115	These bits correspond to CPU Bus Units 0 to 15. Turn a bit from OFF to ON to restart the corresponding Unit.	Read/write

Special I/O Unit Flags/Bits

Name	Address	Description	Access
Special I/O Unit Initialization Flags	A33000 to A33515	These flags correspond to Special I/O Units 0 to 95. A flag will be ON while the corresponding Unit is initializing after the power is turned ON or the Unit's Restart Bit is turned ON. (Restart Bits A50200 to A50715 correspond to Units 0 to 95.)	Read-only
Special I/O Unit Restart Bits	A50200 to A50715	These bits correspond to Special I/O Units 0 to 95. Turn a bit from OFF to ON to restart the corresponding Unit.	Read/write

Flags for Programming

Name	Address	Description	Access
First Cycle Flag	A20011	This flag is turned ON for one cycle when program execution starts (the operating mode is switched from PROGRAM to RUN/MONITOR).	Read-only
Initial Task Execution Flag	A20015	When a task switches from INI to RUN status for the first time, this flag will be turned ON within the task for one cycle only.	Read-only
Task Started Flag (Not supported by CJ1G-CPU□□ CPU Units.)	A20014	When a task switches from WAIT or INI to RUN status, this flag will be turned ON within the task for one cycle only. The only difference between this flag and A20015 is that this flag also turns ON when the task switches from WAIT to RUN status.	Read-only
10-ms Incrementing Free Running Timer (Unit versions 3.0 or later)	A000	This word contains the system timer used after the power is turned ON. 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 10 ms. The value returns to 0000 hex after reaching FFFF hex (655,350 ms), and then continues to be automatically incremented by 1 every 10 ms. **Note:** The timer will continue to be incremented when the operating mode is switched to RUN mode. Example: The interval can be counted between processing A and processing B without requiring timer instructions. This is achieved by calculating the difference between the value in A000 for processing A and the value in A000 for processing B. The interval is counted in 10 ms units.	Read-only

Name	Address	Description	Access
100-ms Incrementing Free Running Timer (Unit versions 3.0 or later)	A001	This word contains the system timer used after the power is turned ON. 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 100 ms. The value returns to 0000 hex after reaching FFFF hex (6,553,500 ms), and then continues to be automatically incremented by 1 every 100 ms. **Note:** The timer will continue to be incremented when the operating mode is switched to RUN mode.	Read-only
1-s Incrementing Free Running Timer (Unit version 4.0 or later)	A002	This word contains the system timer used after the power is turned ON. 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 1 s. The value returns to 0000 hex after reaching FFFF hex (65,535 s), and then continues to be automatically incremented by 1 every 1 s. **Note:** The timer will continue to be incremented when the operating mode is switched to RUN mode.	Read-only

Cycle Time Information

Name	Address	Description	Access
Maximum Cycle Time	A262 to A263	These words contain the maximum cycle time in units of 0.1 ms. In a Parallel Processing Mode, the maximum cycle time of the program execution cycle will be given. The time is updated every cycle and is recorded in 32-bit binary (0 to FFFF FFFF, or 0 to 429,496,729.5 ms). (A263 is the leftmost word.)	Read-only
Present Cycle Time	A264 to A265	These words contain the present cycle time in units of 0.1 ms. In a Parallel Processing Mode, the maximum cycle time of the program execution cycle will be given. The time is updated every cycle and is recorded in 32-bit binary (0 to FFFF FFFF, or 0 to 429,496,729.5 ms). (A265 is the leftmost word.)	Read-only
Peripheral Servicing Cycle Time (CJ1-H CPU Units only)	A268	In Parallel Processing with Synchronous or Asynchronous Memory Access, this word contains the peripheral servicing cycle time in units of 0.1 ms. The time is updated every cycle and is recorded in 16-bit binary (0 to 4E20 hex, or 0.0 to 2,000.0 ms).	Read-only

Task Information

Name	Address	Description	Access
Task Number when Program Stopped	A294	This word contains the task number of the task that was being executed when program execution was stopped because of a program error.	Read-only
Maximum Interrupt Task Processing Time	A440	Contains the Maximum Interrupt Task Processing Time in units of 0.1 ms.	Read-only
Interrupt Task with Max. Processing Time	A441	Contains the task number of the interrupt task with the maximum processing time. Hexadecimal values 8000 to 80FF correspond to task numbers 00 to FF. Bit 15 is turned ON when an interrupt has occurred.	Read-only
IR/DR Operation between Tasks (Not supported by CJ1G-CPU□□ CPU Units.)	A09914	Turn ON this bit to share index and data registers between all tasks. Turn OFF this bit to use separate index and data registers between in each task.	Read-only

Debugging Information

■ Online Editing

Name	Address	Description	Access
Online Editing Wait Flag	A20110	ON when an online editing process is waiting. (An online editing request was received while online editing was disabled.)	Read-only
Online Editing Processing Flag	A20111	ON when an online editing process is being executed.	Read-only
Online Editing Disable Bit Validator	A52700 to A52707	The Online Editing Disable Bit (A52709) is valid only when this byte contains 5A.	Read/write
Online Editing Disable Bit	A52709	Turn this bit ON to disable online editing.	Read/write

■ Output Control

Name	Address	Description	Access
Output OFF Bit	A50015	Turn this bit ON to turn OFF all outputs from Basic I/O Units, Output Units, and Special I/O Units.	Read/write

■ Differentiate Monitor

Name	Address	Description	Access
Differentiate Monitor Completed Flag	A50809	ON when the differentiate monitor condition has been established during execution of differentiation monitoring.	Read/write

■ Data Tracing

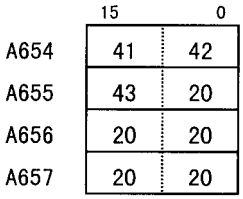
Name	Address	Description	Access
Sampling Start Bit	A50815	When a data trace is started by turning this bit from OFF to ON from a Programming Device, the PLC will begin storing data in Trace Memory by one of the three following methods: 1) Periodic sampling (10 to 2,550 ms) 2) Sampling at execution of TRSM(045) 3) Sampling at the end of every cycle.	Read/write
Trace Start Bit	A50814	Turn this bit from OFF to ON to establish the trigger condition. The offset indicated by the delay value (positive or negative) determines which data samples are valid.	Read/write
Trace Busy Flag	A50813	ON when the Sampling Start Bit (A50815) is turned from OFF to ON. OFF when the trace is completed.	Read/write
Trace Completed Flag	A50812	ON when sampling of a region of trace memory has been completed during execution of a Trace. OFF when the next time the Sampling Start Bit (A50815) is turned from OFF to ON.	Read/write
Trace Trigger Monitor Flag	A50811	ON when a trigger condition is established by the Trace Start Bit (A50814). OFF when the next Data Trace is started by the Sampling Start bit (A50815).	Read/write

File Memory Information

Name	Address	Description	Access
Memory Card Type	A34300 to A34302	Indicates the type of Memory Card, if any, installed.	Read-only
Memory Card Format Error Flag	A34307	ON when the Memory Card is not formatted or a formatting error has occurred.	Read-only
File Transfer Error Flag	A34308	ON when an error occurred while writing data to file memory.	Read-only
File Write Error Flag	A34309	ON when data cannot be written to file memory because it is write-protected or the data exceeds the capacity of the file memory.	Read-only
File Read Error	A34310	ON when a file could not be read because of a malfunction (file is damaged or data is corrupted).	Read-only

Name	Address	Description	Access
File Missing Flag	A34311	ON when an attempt is made to read a file that doesn't exist, or an attempt is made to write to a file in a directory that doesn't exist.	Read-only
File Memory Operation Flag	A34313	ON while any of the following operations is being executed. OFF when none of them are being executed. Memory Card detection started. CMND instruction sending a FINS command to the local CPU Unit. FREAD/FWRIT instructions. Program replacement using the control bit in the Auxiliary Area. Easy backup operation. If this flag is ON, write and comparison operations to the Memory Card cannot be executed.	Read-only
Memory Card Detected Flag	A34315	ON when a Memory Card has been detected. OFF when a Memory Card has not been detected.	Read-only
Number of Items to Transfer	A346 to A347	These words contain the number of words or fields remaining to be transferred (32 bits). For binary files (.IOM), the value is decremented for each word that is read. For text (.TXT) or CSV (.CSV) data, the value is decremented for each field that is read.	Read-only
Accessing File Data Flag	A34314	ON while file data is being accessed.	Read-only
EM File Memory Format Error Flag (CJ1/CJ1-H CPU Units only)	A34306	Turns ON when a format error occurs in the first EM bank allocated for file memory. Turns OFF when formatting is completed normally.	Read-only
EM File Memory Starting Bank (CJ1/CJ1-H CPU Units only)	A344	Contains the starting bank number of EM file memory (bank number of the first formatted bank). This number is read when starting to write data from a Memory Card. If the largest bank number for which there is an EM file for simple backup (BACKUPE□.IOM, where represents consecutive bank numbers) is the same as the largest bank number supported by the CPU Unit, the EM Area will be formatted as file memory using the value in A344. If the maximum bank numbers are different, the EM Area will be returned to it's unformatted (not file memory) status.	Read-only
Program Index File Flag	A34501	Turns ON when the comment memory contains a program index file. 0: No file 1: File present	Read-only
Comment File Flag	A34502	Turns ON when the comment memory contains a comment file. 0: No file 1: File present	Read-only
Symbol Table File Flag	A34503	Turns ON when the comment memory contains a symbol table file. 0: No file 1: File present	Read-only
File Deletion Flags	A39506	The system automatically deleted the remainder of an EM file memory file that was being updated when a power interruption occurred.	Read-only
	A39507	The system automatically deleted the remainder of a Memory Card file that was being updated when a power interruption occurred.	Read-only

Name	Address	Description	Access
Simple Backup Write Capacity	A397	If a write for a simple backup operation fails, A397 will contain the Memory Card capacity that would have been required to complete the write operation. The value is in Kbytes. (This indicates that the Memory Card did not have the specified capacity when the write operation was started.) 0001 to FFFF hex: Write error (value indicates required capacity from 1 to 65,535 Kbytes). A397 will be cleared to 0000 hex when the write is completed successfully for a simple backup operation.	Read-only
Program Replacement End Code	A65000 to A65007	Normal End (i.e., when A65014 is OFF) 01 hex: Program file (.OBJ) replaced. Error End (i.e., when A65014 is ON) 00 hex: Fatal error 01 hex: Memory error 11 hex: Write-protected 12 hex: Program replacement password error 21 hex: No Memory Card 22 hex: No such file 23 hex: Specified file exceeds capacity (memory error). 31 hex: One of the following in progress: File memory operation User program write Operating mode change	Read-only
Replacement Error Flag	A65014	ON when the Replacement Start Bit (A65015) has been turned ON to replace the program, but there is an error. If the Replacement Start Bit is turned ON again, the Replacement Error Flag will be turned OFF.	Read/write
Replacement Start Bit	A65015	Program replacement starts when the Replacement Start Bit is turned ON if the Program Password (A651) is valid (A5A5 hex). Do not turn OFF the Replacement Start Bit during program replacement. When the power is turned ON or program replacement is completed, the Replacement Start Bit will be turned OFF, regardless of whether replacement was completed normally or in error. It is possible to confirm if program replacement is being executed by reading the Replacement Start Bit using a Programming Device, PT, or host computer.	Read/write

Name	Address	Description	Access
Program Password	A651	Input the password to replace a program. A5A5 hex: Replacement Start Bit (A65015) is enabled. Any other value: Replacement Start Bit (A65015) is disabled. When the power is turned ON or program replacement is completed, the Replacement Start Bit will be turned OFF, regardless of whether replacement was completed normally or in error.	Read/write
Program File Name	A654 to A657	When program replacement starts, the program file name will be stored in ASCII. File names can be specified up to eight characters in length excluding the extension. File names are stored in the following order: A654 to A657 (i.e., from the lowest word to the highest), and from the highest byte to the lowest. If a file name is less than eight characters, the lowest remaining bytes and the highest remaining word will be filled with spaces (20 hex). Null characters and space characters cannot be used within file names. Example: File name is ABC.OBJ 	Read/write

Program Error Information

Name	Address	Description	Access
Program Error Flag (Fatal error)	A40109	ON when program contents are incorrect. CPU Unit operation will stop.	Read-only
Program Error Task	A294	Provides the type and number of the tack that was being executed when program execution stops as a result of a program error.	Read-only

Name	Address	Description	Access
Instruction Processing Error Flag	A29508	This flag and the Error Flag (ER) will be turned ON when an instruction processing error has occurred and the PLC Setup has been set to stop operation for an instruction error.	Read-only
Indirect DM/EM BCD Error Flag	A29509	This flag and the Access Error Flag (AER) will be turned ON when an indirect DM/EM BCD error has occurred and the PLC Setup has been set to stop operation an indirect DM/EM BCD error.	Read-only
Illegal Access Error Flag	A29510	This flag and the Access Error Flag (AER) will be turned ON when an illegal access error has occurred and the PLC Setup has been set to stop operation an illegal access error.	Read-only
No END Error Flag	A29511	ON when there isn't an END(001) instruction in each program within a task.	Read-only
Task Error Flag	A29512	ON when a task error has occurred. The following conditions will generate a task error. 1) There isn't an executable cyclic task. 2) There isn't a program allocated to the task.	Read-only
Differentiation Overflow Error Flag	A29513	ON when the specified Differentiation Flag Number exceeds the allowed value.	Read-only
Illegal Instruction Error Flag	A29514	ON when a program that cannot be executed has been stored.	Read-only
UM Overflow Error Flag	A29515	ON when the last address in UM (user program memory) has been exceeded.	Read-only
Program Address Where Program Stopped	A298 and A299	These words contain the 8-digit hexadecimal program address of the instruction where program execution was stopped due to a program error. (A299 contains the leftmost digits.)	Read-only

Error Information

■ Error Log, Error Code

Name	Address	Description	Access
Error Log Area	A100 to A199	When an error has occurred, the error code, error contents, and error's time and date are stored in the Error Log Area.	Read-only
Error Log Pointer	A300	When an error occurs, the Error Log Pointer is incremented by 1 to indicate the location where the next error record will be recorded as an offset from the beginning of the Error Log Area (A100).	Read-only
Error Log Pointer Reset Bit	A50014	Turn this bit ON to reset the Error Log Pointer (A300) to 00.	Read/write
Error Code	A400	When a non-fatal error (user-defined FALS(006) or system error) or a fatal error (user-defined FALS(007) or system error) occurs, the 4-digit hexadecimal error code is written to this word.	Read-only

■ FAL/FALS Error Information

Name	Address	Description	Access
FAL Error Flag (Non-fatal error)	A40215	ON when a non-fatal error is generated by executing FAL(006).	Read-only
Executed FAL Number Flags	A360 to A391	The flag corresponding to the specified FAL number will be turned ON when FAL(006) is executed. Bits A36001 to A39115 correspond to FAL numbers 001 to 511.	Read-only
FALS Error Flag (Fatal error)	A40106	ON when a fatal error is generated by the FALS(007) instruction.	Read-only
FAL/FALS Number for System Error Simulation (Not supported by CJ1G-CPU□□ CPU Units.)	A529	Set a dummy FAL/FALS number to use to simulate the system error using FAL(006) or FALS(007). 0001 to 01FF hex: FAL/FALS numbers 1 to 511 0000 or 0200 to FFFF hex: No FAL/FALS number for system error simulation. (No error will be generated.)	Read/write

■ **Memory Error Information**

Name	Address	Description	Access
Memory Error Flag (Fatal error)	A40115	ON when an error occurred in memory or there was an error in automatic transfer from the Memory Card when the power was turned ON. The ERR/ALM indicator on the front of the CPU Unit will light and CPU Unit operation will stop when this flag turns ON. If the automatic data transfer at startup fails, A40309 will be turned ON. If an error occurs in automatic transfer at startup, this error cannot be cleared.	Read-only
Memory Error Location	A40300 to A40308	When a memory error occurs, the Memory Error Flag (A40115) is turned ON and one of the following flags is turned ON to indicate the memory area where the error occurred. A40300: User program A40304: PLC Setup A40305: Registered I/O Table A40307: Routing Table A40308: CJ-series CPU Bus Unit Settings	Read-only
Startup Memory Card Transfer Error Flag	A40309	ON when an error occurs in automatically transferring a file from the Memory Card to the CPU Unit at startup, including when a file is missing or a Memory Card is not mounted. The error can be cleared by turning OFF the power. (This error cannot be cleared while the power is ON.)	Read-only
Flash Memory Error (Not supported by CJ1G-CPU□□ CPU Units.)	A40310	Turns ON when the flash memory fails.	Read-only

■ **PLC Setup Error Information**

Name	Address	Description	Access
PLC Setup Error Flag (Non-fatal error)	A40210	ON when there is a setting error in the PLC Setup.	Read-only
PLC Setup Error Location	A406	When there is a setting error in the PLC Setup, the location of that error is written to A406 in 16 bits binary. The location is given as the address set on the Programming Console.	Read-only

■ **Interrupt Task Error Information**

Name	Address	Description	Access
Interrupt Task Error Flag (Non-fatal error)	A40213	ON when the Detect Interrupt Task Errors setting in the PLC Setup is set to “Detect” and one of the following occurs for the same Special I/O Unit. FIORF(225), IORF(097) (CJ1-H-R CPU Units only), IORD(222) or IOWR(223) in a cyclic task are competing with FIORF(225), IORF(097), IORD(222) or IOWR(223) in an interrupt task. FIORF(225), IORF(097), IORD(222) or IOWR(223) was executed in an interrupt task when I/O was being refreshed. **Note** If cyclic refreshing is not disabled in the PLC Setup for a Special I/O Unit and FIORF(225), IORF(097), IORD(222) or IOWR(223) is executed for the same Special I/O Unit in an interrupt task, a duplicate refreshing status will occur and an interrupt task error will occur.	Read-only
Interrupt Task Error Cause Flag	A42615	Indicates the cause of an Interrupt Task Error.	Read-only
Interrupt Task Error, Task Number	A42600 to A42611	The function of these bits depends upon the status of A42615 (the Interrupt Task Error Flag). A42615 ON: Contains the Special I/O Unit’s unit number when an attempt was made to refresh a Special I/O Unit’s I/O from an interrupt task with IORF(097) while the Unit’s I/O was being refreshed by cyclic I/O refreshing (duplicate refreshing).	Read-only

■ **I/O Information**

Name	Address	Description	Access
Basic I/O Unit Error Flag (Non-fatal error)	A40212	ON when an error has occurred in a Basic I/O Unit (including C200H Group-2 High-density I/O Units and C200H Interrupt Input Units).	Read-only
Basic I/O Unit Error, Slot Number	A40800 to A40807	Contains the binary slot number where the error occurred when an error has occurred in a Basic I/O Unit (including C200H Group-2 High-density I/O Units and C200H Interrupt Input Units).	Read-only
Basic I/O Unit Error, Rack Number	A40808 to A40815	Contains the binary rack number where the error occurred when an error has occurred in a Basic I/O Unit (including C200H Group-2 High-density I/O Units and C200H Interrupt Input Units).	Read-only
I/O Setting Error Flag (Fatal error)	A40110	ON when an Input Unit has been installed in an Output Unit’s slot or vice-versa, so the Input and Output Units clash in the registered I/O table.	Read-only
Expansion I/O Rack Number Duplication Flags	A40900 to A40903	The corresponding flag will be turned ON when an Expansion I/O Rack’s starting word address was set from a Programming Device and two Racks have overlapping word allocations or a Rack’s starting address exceeds CIO 0901. Bits 00 to 07 correspond to Racks 0 to 3.	Read-only
Too Many I/O Points Flag (Fatal error)	A40111	ON when the number of I/O points being used in Basic I/O Units exceeds the maximum allowed for the PLC.	Read-only
Too Many I/O Points, Details	A40700 to A40712	The three possible causes of the Too Many I/O Points Error are listed below. The 3-digit binary value in A40713 to A40715 indicates the cause of the error. The number of I/O points will be written here when the total number of I/O points set in the I/O Table (excluding Slave Racks) exceed the maximum allowed for the CPU Unit. The number of interrupt inputs will be written here when there are more than 32 interrupt inputs. The number of Racks will be written here when the number of Expansion I/O Racks exceeds the maximum.	Read-only

Name	Address	Description	Access
Too Many I/O Points, Cause	A40713 to A40715	These three bits indicate the cause of the Too Many I/O Points Error. (See A40700 to A40712.) 000 (0): Too many I/O points. 001 (1): Too many Interrupt Input points. 101 (5): Too many Expansion Racks connected. 111 (7): Too many Units are connected to one rack (more than 10).	Read-only
I/O Bus Error Flag (Fatal error)	A40114	ON when an error occurs in a data transfer between the CPU Unit and a Unit mounted to a slot or the End Cover is not connected to the CPU Rack or an Expansion Rack.	Read-only
I/O Bus Error Slot Number	A40400 to A40407	Contains the 8-bit binary slot number (00 to 09) where an I/O Bus Error occurred. Contain 0E hex of the End Cover is not connected to the CPU Rack or an Expansion Rack.	Read-only
I/O Bus Error Rack Number	A40408 to A40415	Contains the 8-bit binary rack number (00 to 07) where an I/O Bus Error occurred.	Read-only
I/O Table Errors (Not supported by CJ1G-CPU□□ CPU Units.)	A26100	CPU Bus Unit Setup Area Initialization Error Flag ON: Error in CPU Bus Unit Setup Turns OFF when I/O tables are generated normally.	Read-only
	A26102	I/O Overflow Flag ON: Overflow in maximum number of I/O points. Turns OFF when I/O tables are generated normally.	Read-only
	A26103	Duplication Error Flag ON: The same unit number was used more than once. Turns OFF when I/O tables are generated normally.	Read-only
	A26104	I/O Bus Error Flag ON: I/O bus error Turns OFF when I/O tables are generated normally.	Read-only
	A26107	Special I/O Unit Error Flag ON: Error in a Special I/O Unit Turns OFF when I/O tables are generated normally.	Read-only
	A26109	I/O Unconfirmed Error Flag ON: I/O detection has not been completed. Turns OFF when I/O tables are generated normally.	Read-only
Duplication Error Flag (Fatal error)	A40113	ON in the following cases: Two CPU Bus Units have been assigned the same unit number. Two Special I/O Units have been assigned the same unit number. Two Basic I/O Units have been allocated the same data area words. The same rack number is set for more than one Expansion Rack.	Read-only
Interrupt Input Unit Position Error Flag (Not supported by CJ1G-CPU□□ CPU Units.)	A40508	CJ1-H CPU Units: ON when the Interrupt Input Unit is not connected in one of the five positions (slots 0 to 4) next to the CPU Unit on the CPU Rack. CJ1M CPU Units: ON when the Interrupt Input Unit is not connected in one of the three positions (slots 0 to 2) next to the CPU Unit on the CPU Rack.	Read-only

■ **CPU Bus Unit Information**

Name	Address	Description	Access
CPU Bus Unit Number Duplication Flags	A41000 to A41015	The Duplication Error Flag (A40113) and the corresponding flag in A410 will be turned ON when a CPU Bus Unit's unit number has been duplicated. Bits 00 to 15 correspond to unit numbers 0 to F.	Read-only
CPU Bus Unit Error, Unit Number Flags	A41700 to A41715	When an error occurs in a data exchange between the CPU Unit and a CPU Bus Unit, the CPU Bus Unit Error Flag (A40207) and the corresponding flag in A417 are turned ON. Bits 00 to 15 correspond to unit numbers 0 to F.	Read-only
CPU Bus Unit Setting Error, Unit Number Flags	A42700 to A42715	When a CPU Bus Unit Setting Error occurs, A40203 and the corresponding flag in A427 are turned ON. Bits 00 to 15 correspond to unit numbers 0 to F.	Read-only
CPU Bus Unit Setting Error Flag (Non-fatal error)	A40203	ON when an installed CPU Bus Unit does not match the CPU Bus Unit registered in the I/O table.	Read-only
CPU Bus Unit Error Flag (Non-fatal error)	A40207	ON when an error occurs in a data exchange between the CPU Unit and a CPU Bus Unit (including an error in the CPU Bus Unit itself).	Read-only

■ **Special I/O Unit Information**

Name	Address	Description	Access
Special I/O Unit Number Duplication Flags	A41100 to A41615	The Duplication Error Flag (A40113) and the corresponding flag in A411 through A416 will be turned ON when a Special I/O Unit's unit number has been duplicated. (Bits A41100 to A41615 correspond to unit numbers 0 to 95.)	Read-only
Special I/O Unit Setting Error Flag (Non-fatal error)	A40202	ON when an installed Special I/O Unit does not match the Special I/O Unit registered in the I/O table.	Read-only
Special I/O Unit Setting Error, Unit Number Flags	A42800 to A43315	When a Special I/O Unit Setting Error occurs, A40202 and the corresponding flag in these words are turned ON. (Bits A42800 to A43315 correspond to unit numbers 0 to 95.)	Read-only
Special I/O Unit Error Flag (Non-fatal error)	A40206	ON when an error occurs in a data exchange between the CPU Unit and a Special I/O Unit (including an error in the Special I/O Unit itself).	Read-only
Special I/O Unit Error, Unit Number Flags	A41800 to A42315	When an error occurs in a data exchange between the CPU Unit and a Special I/O Unit, the Special I/O Unit Error Flag (A40206) and the corresponding flag in these words are turned ON. (Bits A42800 to A43315 correspond to unit numbers 0 to 95.)	Read-only

■ **Other PLC Operating Information**

Name	Address	Description	Access
Battery Error Flag (Non-fatal error)	A40204	ON if the CPU Unit's battery is disconnected or its voltage is low and the PLC Setup has been set to detect this error. (Detect Low Battery)	Read-only
Cycle Time Too Long Flag (Fatal error)	A40108	ON if the cycle time exceeds the maximum cycle time set in the PLC Setup. In the Parallel Processing Modes, the program execution cycle time will be used. (Watch Cycle Time)	Read-only
Peripheral Servicing Too Long Flag (Fatal error, CJ1-H CPU Unit only.)	A40515	Turns ON when the peripheral servicing time in a Parallel Processing Mode exceeds 2 s. This will also cause a cycle time error and operation will stop.	Read-only
FPD Teaching Bit	A59800	Turn this bit ON to set the monitoring time in FPD(269) automatically with the teaching function.	Read/write
Memory Backup Battery Failure Flag	A39511	Data from the I/O memory areas that are maintained when power is turned OFF (HR, DM, etc.) are backed up with a Battery. A39511 turns ON if the Battery voltage drops and the data can no longer be maintained. The data in the I/O memory will not be dependable when this happens.	Read-only

Clock

■ Clock Information

Name	Address	Description	Access
Clock Data	The clock data from the clock built into the CPU Unit is stored here in BCD.		Read-only
	A35100 to A35107	Seconds: 00 to 59 (BCD)	Read-only
	A35108 to A35115	Minutes: 00 to 59 (BCD)	Read-only
	A35200 to A35207	Hour: 00 to 23 (BCD)	Read-only
	A35208 to A35215	Day of the month: 01 to 31 (BCD)	Read-only
	A35300 to A35307	Month: 01 to 12 (BCD)	Read-only
	A35308 to A35315	Year: 00 to 99 (BCD)	Read-only
	A35400 to A35407	Day of the week: 00: Sunday, 01: Monday, 02: Tuesday, 03: Wednesday, 04: Thursday, 05: Friday, 06: Saturday	Read-only
Operation Start Time (Not supported by CJ1G-CPU□□ CPU Units.)	A515 to A517	The time that operation started as a result of changing the operating mode to RUN or MONITOR mode is stored here in BCD. A51500 to A51507: Seconds (00 to 59) A51508 to A51515: Minutes (00 to 59) A51600 to A51607: Hour (00 to 23) A51608 to A51615: Day of month (01 to 31) A51700 to A51707: Month (01 to 12) A51708 to A51715: Year (00 to 99) Note: The previous start time is stored after turning ON the power supply until operation is started.	Read/write
Operation End Time (Not supported by CJ1G-CPU□□ CPU Units.)	A518 to A520	The time that operation stopped as a result of changing the operating mode to PROGRAM mode is stored here in BCD. A51800 to A51807: Seconds (00 to 59) A51808 to A51815: Minutes (00 to 59) A51900 to A51907: Hour (00 to 23) A51908 to A51915: Day of month (01 to 31) A52000 to A52007: Month (01 to 12) A52008 to A52015: Year (00 to 99) Note: If an error occurs in operation, the time of the error will be stored. If the operating mode is then changed to PROGRAM mode, the time that PROGRAM mode was entered will be stored.	Read/write

The above clock information in the Auxiliary Area is updated every few cycles according to the internal clock. For information on the accuracy of the internal clock, refer to *2-1-1 Performance Specifications*.

■ **Power Supply ON/OFF Time Information**

Name	Address	Description	Access
Startup Time	A510 and A511	These words contain the time (in BCD) at which the power was turned ON. The contents are updated every time that the power is turned ON. A51000 to A51007: Seconds (00 to 59) A51008 to A51015: Minutes (00 to 59) A51100 to A51107: Hour (00 to 23) A51108 to A51115: Day of the month (01 to 31)	Read/write
Power Interruption Time	A512 and A513	These words contain the time (in BCD) at which the power was interrupted. The contents are updated every time that the power is interrupted. A51200 to A51207: Seconds (00 to 59) A51208 to A51215: Minutes (00 to 59) A51300 to A51307: Hour (00 to 23) A51308 to A51315: Day of month (01 to 31)	Read/write
Number of Power Interruptions	A514	Contains the number of times (in binary) that power has been interrupted since the power was first turned on. To reset this value, overwrite the current value with 0000.	Read/write
Total Power ON Time	A523	Contains the total time (in binary) that the PLC has been on in 10-hour units. The data is stored is updated every 10 hours. To reset this value, overwrite the current value with 0000.	Read/write
Power ON Clock Data 1 (See note.)	A720 to A722	These words contain the startup date/time (the same time as the startup time stored in words A510 to A511 as well as the month and year information) for the last time that power was turned ON. The data is BCD. A72000 to A72007: Seconds (00 to 59) A72008 to A72015: Minutes (00 to 59) A72100 to A72107: Hour (00 to 23) A72108 to A72115: Day of month (01 to 31) A72200 to A72207: Month (01 to 12) A72208 to A72215: Year (00 to 99)	Read/write

Note This data is supported only by CPU Units with unit version 3.0 or later.

Name	Address	Description	Access
Power ON Clock Data 2 (See note.)	A723 to A725	These words contain the startup time/date for the second-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write
Power ON Clock Data 3 (See note.)	A726 to A728	These words contain the startup time/date for the third-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write
Power ON Clock Data 4 (See note.)	A729 to A731	These words contain the startup time/date for the fourth-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write
Power ON Clock Data 5 (See note.)	A732 to A734	These words contain the startup time/date for the fifth-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write
Power ON Clock Data 6 (See note.)	A735 to A737	These words contain the startup time/date for the sixth-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write
Power ON Clock Data 7 (See note.)	A738 to A740	These words contain the startup time/date for the seventh-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write
Power ON Clock Data 8 (See note.)	A741 to A743	These words contain the startup time/date for the eighth-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write
Power ON Clock Data 9 (See note.)	A744 to A746	These words contain the startup time/date for the ninth-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write
Power ON Clock Data 10 (See note.)	A747 to A749	These words contain the startup time/date for the tenth-to-last time that power was turned ON. The data is BCD and the storage format is the same as words A720 to A722.	Read/write

Note This data is supported only by CPU Units with unit version 3.0 or later.

User Data Revision Times

Name	Address	Description	Access
User Program Date (Not supported by CJ1G-CPU□□ CPU Units.)	A090 to A093	These words contain in BCD the date and time that the user program was last overwritten. A09000 to A09007: Seconds (00 to 59) A09008 to A09015: Minutes (00 to 59) A09100 to A09107: Hour (00 to 23) A09108 to A09115: Day of month (01 to 31) A09200 to A09207: Month (01 to 12) A09208 to A09215: Year (00 to 99) A09308 to A09307: Day of the week (00: Sunday, 01: Monday, 02: Tuesday, 03: Wednesday, 04: Thursday, 05: Friday, 06: Saturday)	Read-only
Parameter Date (Not supported by CJ1G-CPU□□ CPU Units.)	A094 to A097	These words contain in BCD the date and time that the parameters were last overwritten. A09400 to A09407: Seconds (00 to 59) A09408 to A09415: Minutes (00 to 59) A09500 to A09507: Hour (00 to 23) A09508 to A09515: Day of month (01 to 31) A09600 to A09607: Month (01 to 12) A09608 to A09615: Year (00 to 99) A09708 to A09707: Day of the week (00: Sunday, 01: Monday, 02: Tuesday, 03: Wednesday, 04: Thursday, 05: Friday, 06: Saturday)	Read-only

Information on Read Protection Using a Password

Name	Address	Description	Access
UM Read Protection Flag (Unit version 2.0 or later)	A09900	Indicates whether the entire user program in the PLC is read-protected. 0: UM not read-protected. 1: UM read-protected.	Read-only
Task Read Protection Flag (Unit version 2.0 or later)	A09901	Indicates whether read protection is set for individual tasks. 0: Tasks not read-protected. 1: Tasks read-protected.	Read-only
Program Write Protection for Read Protection (Unit version 2.0 or later)	A09902	Indicates whether the program is write-protected. 0: Write-enabled. 1: Write-protected.	Read-only
Enable/Disable Bit for Program Backup (Unit version 2.0 or later)	A09903	Indicates whether creating a backup program file (.OBJ) is enabled or disabled. 0: Enabled. 1: Disabled.	Read-only

Communications

■ **Network Communications Information**

Name	Address	Description	Access
Communications Port Enabled Flags	A20200 to A20207	ON when a network instruction (SEND, RECV, CMND, or PMCR) can be executed with the corresponding port number or background execution can be executed with the corresponding port number (CS1-H CPU Units only). Bits 00 to 07 correspond to communications ports 0 to 7. When the simple backup operation is used to performed a write or compare operation for a Memory Card on a CS1-H CPU Unit, a communications port will be automatically allocated, and the corresponding flag will be turned ON during the operation and turned OFF when the operation has been completed.	Read-only
Communications Port Completion Codes	A203 to A210	These words contain the completion codes for the corresponding port numbers when network instructions (SEND, RECV, CMND, or PMCR) have been executed. The contents will be cleared when background execution has been completed (for CS1-H CPU Unit only). Words A203 to A210 correspond to communications ports 0 to 7. When the simple backup operation is used to performed a write or compare operation for a Memory Card on a CS1-H CPU Unit, a communications port will be automatically allocated, and a completion code will be stored in the corresponding word.	Read-only
Communications Port Error Flags	A21900 to A21907	ON when an error occurred during execution of a network instruction (SEND, RECV, CMND, or PMCR). Turns OFF then execution has been finished normally. Bits 00 to 07 correspond to communications ports 0 to 7. When the simple backup operation is used to performed a write or compare operation for a Memory Card on a CS1-H CPU Unit, a communications port will be automatically allocated. The corresponding flag will be turned ON if an error occurs and will be turned OFF if the simple backup operation ends normally.	Read-only

■ Auxiliary Area Bits and Words Used when Automatically Allocating Communications Ports

Name	Address	Description	Access
Network Communications Port Allocation Enabled Flag	A20215	ON when there is a communications port available for automatic allocation. **Note:** Use this flag to confirm whether a communications port is available for automatic allocation before executing communications instructions when using 9 or more communications instructions simultaneously.	Read-only
First Cycle Flags after Network Communications Finished	A21400 to A21407	Each flag will turn ON for just one cycle after communications have been completed. Bits 00 to 07 correspond to ports 0 to 7. Use the Used Communications Port Number stored in A218 to determine which flag to access. **Note:** These flags are not effective until the next cycle after the communications instruction is executed. Delay accessing them for at least one cycle.	Read-only
First Cycle Flags after Network Communications Error	A21500 to A21507	Each flag will turn ON for just one cycle after a communications error occurs. Bits 00 to 07 correspond to ports 0 to 7. Use the Used Communications Port Number stored in A218 to determine which flag to access. Determine the cause of the error according to the Communications Port Completion Codes stored in A203 to A210. **Note:** These flags are not effective until the next cycle after the communications instruction is executed. Delay accessing them for at least one cycle.	Read-only
Network Communications Completion Code Storage Address	A216 to A217	The completion code for a communications instruction is automatically stored at the address with the I/O memory address given in these words. Place this address into an index register and use indirect addressing through the index register to read the communications completion code.	Read-only
Used Communications Port Numbers	A218	Stores the communications port numbers used when a communications instruction is executed using automatic communication port allocations. 0000 to 0007 hex: Communications port 0 to 7	Read-only

■ **Information on Explicit Message Instructions**

Name	Address	Description	Access
Explicit Communications Error Flag	A21300 to A21307	Turn ON when an error occurs in executing an Explicit Message Instruction (EXPLT, EGATR, ESATR, ECHRD, or ECHWR). Bits 00 to 07 correspond to communications ports 0 to 7. The corresponding bit will turn ON both when the explicit message cannot be sent and when an error response is returned for the explicit message. The status will be maintained until the next explicit message communication is executed. The bit will always turn OFF when the next Explicit Message Instruction is executed.	Read-only
Network Communications Error Flag	A21900 to A21907	Turn ON if the explicit message cannot be sent when executing an Explicit Message Instruction (EXPLT, EGATR, ESATR, ECHRD, or ECHWR). Bits 00 to 07 correspond to communications ports 0 to 7. The corresponding bit will turn ON when the explicit message cannot be sent. The status will be maintained until the next explicit message communication is executed. The bit will always turn OFF when the next Explicit Message Instruction is executed.	Read-only
Network Communications Response Code	A203 to A210	The following codes will be stored when an Explicit Message Instruction (EXPLT, EGATR, ESATR, ECHRD, or ECHWR) has been executed. A203 to A210 correspond to communications ports 0 to 7. If the Explicit Communications Error Flag turns OFF, 0000 hex is stored. If the Explicit Communications Error Flag is ON and the Network Communications Error Flag is ON, the FINS end code is stored. If the Explicit Communications Error Flag is ON and the Network Communications Error Flag is OFF, the explicit message end code is stored. During communications, 0000 hex will be stored and the suitable code will be stored when execution has been completed. The code will be cleared when operation is started.	Read-only

■ **Peripheral Port Communications Information**

Name	Address	Description	Access
Peripheral Port Communications Error Flag	A39212	ON when a communications error has occurred at the peripheral port. **Note:** This flag is disabled in NT Link (1:N) mode.	Read-only
Peripheral Port Restart Bit	A52601	Turn this bit ON to restart the peripheral port.	Read/write
Peripheral Port Settings Change Bit	A61901	ON while the peripheral port's communications settings are being changed.	Read/write
Peripheral Port Error Flags	A52808 to A52815	These flags indicate what kind of error has occurred at the peripheral port.	Read/write
Peripheral Port PT Communications Flags	A39400 to A39407	The corresponding bit will be ON when the peripheral port is communicating with a PT in NT link mode. Bits 0 to 7 correspond to units 0 to 7.	Read-only
Peripheral Port PT Priority Registered Flags	A39408 to A39415	The corresponding bit will be ON for the PT that has priority when the peripheral port is communicating in NT link mode. Bits 0 to 7 correspond to units 0 to 7.	Read-only

■ **RS-232C Port Communications Information**

Name	Address	Description	Access
RS-232C Port Communications Error Flag	A39204	ON when a communications error has occurred at the RS-232C port. **Note** This flag is disabled in 1:N NT Link or PLC Link Master/Slave mode.	Read-only
RS-232C Port Restart Bit	A52600	Turn this bit ON to restart the RS-232C port.	Read/write
RS-232C Port Settings Change Bit	A61902	ON while the RS-232C port's communications settings are being changed.	Read/write
RS-232C Port Error Flags	A52800 to A52807	These flags indicate what kind of error has occurred at the RS-232C port.	Read/write
RS-232C Port Send Ready Flag (No-protocol mode)	A39205	ON when the RS-232C port is able to send data in no-protocol mode.	Read-only
RS-232C Port Reception Completed Flag (No-protocol mode)	A39206	ON when the RS-232C port has completed the reception in no-protocol mode.	Read-only
RS-232C Port Reception Overflow Flag (No-protocol mode)	A39207	ON when a data overflow occurred during reception through the RS-232C port in no-protocol mode.	Read-only
RS-232C Port PT Communications Flags	A39300 to A39307	The corresponding bit will be ON when the RS-232C port is communicating with a PT in NT link mode. Bits 0 to 7 correspond to units 0 to 7.	Read-only
RS-232C Port PT Priority Registered Flags	A39308 to A39315	The corresponding bit will be ON for the PT that has priority when the RS-232C port is communicating in NT link mode. Bits 0 to 7 correspond to units 0 to 7.	Read-only
RS-232C Port Reception Counter (No-protocol mode)	A39300 to A39315	Indicates (in binary) the number of bytes of data received when the RS-232C port is in no-protocol mode.	Read-only

■ **Serial Device Communications Information**

Name	Address	Description	Access
Communications Units 0 to 15, Ports 1 to 4 Settings Change Bits	A62001 to A63504	The corresponding flag will be ON when the settings for that port are being changed. (Bits 1 to 4 in A620 to A635 correspond to ports 1 to 4 in Communications Units 0 to 15.)	Read/write

Instruction-related Information

Name	Address	Description	Access
Step Flag	A20012	ON for one cycle when step execution is started with STEP(008).	Read-only
Current EM Bank (CJ1 and CJ1-H CPU Units only.)	A301	This word contains the current EM bank number in 4-digit hexadecimal.	Read-only
Macro Area Input Words	A600 to A603	When MCRO(099) is executed, it copies the input data from the specified source words (input parameter words) to A600 through A603.	Read/write
Macro Area Output Words	A604 to A607	After the subroutine specified in MCRO(099) has been executed, the results of the subroutine are transferred from A604 through A607 to the specified destination words (output parameter words).	Read/write

Background Execution Information

Name	Address	Description	Access
DR00 Output for Background Execution (Not supported by CJ1G-CPU□□ CPU Units.)	A597	When a data register is specified as the output for an instruction processed in the background, A597 receives the output instead of DR00. 0000 to FFFF hex	Read-only
IR00 Output for Background Execution (Not supported by CJ1G-CPU□□ CPU Units.)	A595 and A596	When an index register is specified as the output for an instruction processed in the background, A595 and A596 receive the output instead of IR00. 0000 0000 to FFFF FFFF hex (A596 contains the leftmost digits.)	Read-only
Equals Flag for Background Execution (Not supported by CJ1G-CPU□□ CPU Units.)	A59801	Turns ON if matching data is found for an SRCH(181) instruction executed in the background.	Read-only
ER/AER Flag for Background Execution (Not supported by CJ1G-CPU□□ CPU Units.)	A39510	Turns ON if an error or illegal access occurs during background execution. Turns OFF when power is turned ON or operation is started.	Read-only

Function Block Information

■ Function Block Memory Information

Name	Address	Description	Access
FB Program Data Flag	A34500	Turns ON if the FB program memory contains FB program data. 0: No data 1: Data present	Read-only

■ OMRON FB Library Information

Name	Address	Description	Access
FB Communications Instruction Response Required	A58015	0: Not required 1: Required	Read-only
FB Communications Instruction Port No.	A58008 to A58011	0 to 7 hex: Communications port No. 0 to 7 F hex: Automatic allocation	Read-only
FB Communications Instruction Retries	A58000 to A58003	Automatically stores the number of retries in the FB communications instruction settings specified in the PLC Setup.	Read-only
FB Communications Instruction Response Monitoring Time	A581	Automatically stores the FB communications instruction response monitoring time set in the PLC Setup. 0001 to FFFF hex (Unit: 0.1 s; Range: 0.1 to 6553.5) 0000 hex: 2 s	Read-only
FB DeviceNet Communications Instruction Response Monitoring Time	A582	Automatically stores the FB DeviceNet communications instruction response monitoring time set in the PLC Setup. 0001 to FFFF hex (Unit: 0.1 s; Range: 0.1 to 6553.5) 0000 hex: 2 s	Read-only

Note These Auxiliary Area bits/words are not to be written by the user. The number of resends and response monitoring time must be set by the user in the FB communications instructions settings in the PLC Setup, particularly when using function blocks from the OMRON FB Library to execute FINS messages or DeviceNet explicit messages communications. The values set in the Settings for OMRON FB Library in the PLC Setup will be automatically stored in the related Auxiliary Area words A580 to A582 and used by the function blocks from the OMRON FB Library.

Auxiliary Area Flags and Bits for Built-in Inputs

The following tables show the Auxiliary Area words and bits that are related to the CJ1M CPU Unit's built-in inputs. These allocations apply to CPU Units equipped with the built-in I/O only.

■ Interrupt Inputs

Name	Address	Description	Read/Write	Times when data is accessed
Interrupt Counter 0 Counter SV	A532	Used for interrupt input 0 in counter mode. Sets the count value at which the interrupt task will start. Interrupt task 140 will start when interrupt counter 0 has counted this number of pulses.	Read/Write	• Retained when power is turned ON. • Retained when operation starts.
Interrupt Counter 1 Counter SV	A533	Used for interrupt input 1 in counter mode. Sets the count value at which the interrupt task will start. Interrupt task 141 will start when interrupt counter 1 has counted this number of pulses.	Read/Write	
Interrupt Counter 2 Counter SV	A534	Used for interrupt input 2 in counter mode. Sets the count value at which the interrupt task will start. Interrupt task 142 will start when interrupt counter 2 has counted this number of pulses.	Read/Write	
Interrupt Counter 3 Counter SV	A535	Used for interrupt input 3 in counter mode. Sets the count value at which the interrupt task will start. Interrupt task 143 will start when interrupt counter 3 has counted this number of pulses.	Read/Write	
Interrupt Counter 0 Counter PV	A536	These words contain the interrupt counter PVs for interrupt inputs operating in counter mode. In increment mode, the counter PV starts incrementing from 0. When the counter PV reaches the counter SV, the PV is automatically reset to 0. In decrement mode, the counter PV starts decrementing from the counter SV. When the counter PV reaches the 0, the PV is automatically reset to the SV.	Read/Write	• Retained when power is turned ON. • Cleared when operation starts. • Refreshed when interrupt is generated. • Refreshed when INI(880) instruction is executed.
Interrupt Counter 1 Counter PV	A537		Read/Write	
Interrupt Counter 2 Counter PV	A538		Read/Write	
Interrupt Counter 3 Counter PV	A539		Read/Write	

■ High-speed Counters

Name	Address	Description	Read/Write	Times when data is accessed
High-speed Counter 0 PV	A270 to A271	Contains the PV of high-speed counter 0. A271 contains the leftmost 4 digits and A270 contains the rightmost 4 digits.	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Refreshed each cycle during overseeing process. • Refreshed when PRV(881) instruction is executed for the corresponding counter.
High-speed Counter 1 PV	A272 to A273	Contains the PV of high-speed counter 1. A273 contains the leftmost 4 digits and A272 contains the rightmost 4 digits.	Read only	
High-speed Counter 0 Range 1 Comparison Condition Met Flag	A27400	These flags indicate whether the PV is within the specified ranges when high-speed counter 0 is being operated in range-comparison mode. 0: PV not in range 1: PV in range	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Refreshed each cycle during overseeing process. • Refreshed when PRV(881) instruction is executed for the corresponding counter.
High-speed Counter 0 Range 2 Comparison Condition Met Flag	A27401		Read only	
High-speed Counter 0 Range 3 Comparison Condition Met Flag	A27402		Read only	
High-speed Counter 0 Range 4 Comparison Condition Met Flag	A27403		Read only	
High-speed Counter 0 Range 5 Comparison Condition Met Flag	A27404		Read only	
High-speed Counter 0 Range 6 Comparison Condition Met Flag	A27405		Read only	
High-speed Counter 0 Range 7 Comparison Condition Met Flag	A27406		Read only	
High-speed Counter 0 Range 8 Comparison Condition Met Flag	A27407		Read only	

Name	Address	Description	Read/Write	Times when data is accessed
High-speed Counter 0 Comparison In-progress Flag	A27408	This flag indicates whether a comparison operation is being executed for high-speed counter 0. 0: Stopped. 1: Being executed.	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Refreshed when comparison operation starts or stops.
High-speed Counter 0 Overflow/Underflow Flag	A27409	This flag indicates when an overflow or underflow has occurred in the high-speed counter 0 PV. (Used only when the counting mode is set to Linear Mode.) 0: Normal 1: Overflow or underflow	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Cleared when the PV is changed. • Refreshed when an overflow or underflow occurs.
High-speed Counter 0 Count Direction	A27410	This flag indicates whether the high-speed counter is currently being incremented or decremented. The counter PV for the current cycle is compared with the PV in last cycle to determine the direction. 0: Decrementing 1: Incrementing	Read only	• Setting used for high-speed counter, valid during counter operation.

Name	Address	Description	Read/Write	Times when data is accessed
High-speed Counter 1 Range 1 Comparison Condition Met Flag	A27500	These flags indicate whether the PV is within the specified ranges when high-speed counter 1 is being operated in range-comparison mode. 0: PV not in range 1: PV in range	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Refreshed each cycle during overseeing process. • Refreshed when PRV(881) instruction is executed for the corresponding counter.
High-speed Counter 1 Range 2 Comparison Condition Met Flag	A27501		Read only	
High-speed Counter 1 Range 3 Comparison Condition Met Flag	A27502		Read only	
High-speed Counter 1 Range 4 Comparison Condition Met Flag	A27503		Read only	
High-speed Counter 1 Range 5 Comparison Condition Met Flag	A27504		Read only	
High-speed Counter 1 Range 6 Comparison Condition Met Flag	A27505		Read only	
High-speed Counter 1 Range 7 Comparison Condition Met Flag	A27506		Read only	
High-speed Counter 1 Range 8 Comparison Condition Met Flag	A27507		Read only	
High-speed Counter 1 Comparison In-progress Flag	A27508	This flag indicates whether a comparison operation is being executed for high-speed counter 1. 0: Stopped. 1: Being executed.	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Refreshed when comparison operation starts or stops.
High-speed Counter 1 Overflow/Underflow Flag	A27509	This flag indicates when an overflow or underflow has occurred in the high-speed counter 1 PV. (Used only when the counting mode is set to Linear Mode.) 0: Normal 1: Overflow or underflow	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Cleared when the PV is changed. • Refreshed when an overflow or underflow occurs.

Name	Address	Description	Read/Write	Times when data is accessed
High-speed Counter 1 Count Direction	A27510	This flag indicates whether the high-speed counter is currently being incremented or decremented. The counter PV for the current cycle is compared with the PV in last cycle to determine the direction. 0: Decrementing 1: Incrementing	Read only	• Setting used for high-speed counter, valid during counter operation.
High-speed Counter 0 Reset Bit	A53100	When the reset method is set to Phase-Z signal + Software reset, the corresponding high-speed counter's PV will be reset if the phase-Z signal is received while this bit is ON. When the reset method is set to Software reset, the corresponding high-speed counter's PV will be reset in the cycle when this bit goes from OFF to ON.	Read/Write	• Cleared when power is turned ON.
High-speed Counter 1 Reset Bit	A53101		Read/Write	
High-speed Counter 0 Gate Bit	A53102	When a counter's Gate Bit is ON, the counter's PV will not be changed even if pulse inputs are received for the counter. When the bit is turned OFF again, counting will restart and the high-speed counter's PV will be refreshed. When the reset method is set to Phase-Z signal + Software reset, the Gate Bit is disabled while the corresponding Reset Bit (A53100 or A53101) is ON.	Read/Write	• Cleared when power is turned ON.
High-speed Counter 1 Gate Bit	A53103		Read/Write	

Auxiliary Area Flags and Bits for Built-in Outputs

The following tables show the Auxiliary Area words and bits that are related to the CJ1M CPU Unit's built-in outputs. These allocations apply to CPU Units equipped with the built-in I/O only.

Name	Address	Description	Read/Write	Times when data is accessed
Pulse Output 0 PV	A276 to A277	Contain the number of pulses output from the corresponding pulse output port. PV range: 80000000 to 7FFFFFFF hex (–2,147,483,648 to 2,147,483,647) When pulses are being output in the CW direction, the PV is incremented by 1 for each pulse. When pulses are being output in the CCW direction, the PV is decremented by 1 for each pulse. PV after overflow: 7FFFFFFF hex PV after underflow: 80000000 hex A277 contains the leftmost 4 digits and A276 contains the rightmost 4 digits of the pulse output 0 PV. A279 contains the leftmost 4 digits and A278 contains the rightmost 4 digits of the pulse output 1 PV. **Note** If the coordinate system is relative coordinates (undefined origin), the PV will be cleared to 0 when a pulse output starts, i.e. when a pulse output instruction (SPED(885), ACC(888), or PLS2(887)) is executed.	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Refreshed each cycle during oversee process. • Refreshed when the INI(880) instruction is executed for the corresponding pulse output.
Pulse Output 1 PV	A278 to A279			

Name	Address	Description	Read/Write	Times when data is accessed
Pulse Output 0 Accel/Decel Flag	A28000	This flag will be ON when pulses are being output from pulse output 0 according to an ACC(888) or PLS2(887) instruction and the output frequency is being changed in steps (accelerating or decelerating). 0: Constant speed 1: Accelerating or decelerating	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed each cycle during oversee process.
Pulse Output 0 Overflow/Underflow Flag	A28001	This flag indicates when an overflow or underflow has occurred in the pulse output 0 PV. 0: Normal 1: Overflow or underflow	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Cleared when the PV is changed by the INI(880) instruction. • Refreshed when an overflow or underflow occurs.
Pulse Output 0 Output Amount Set Flag	A28002	ON when the number of output pulses for pulse output 0 has been set with the PULS(886) instruction. 0: No setting 1: Setting made	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed when the PULS(886) instruction is executed. • Refreshed when pulse output stops.
Pulse Output 0 Output Completed Flag	A28003	ON when the number of output pulses set with the PULS(886)/PLS2(887) instruction has been output through pulse output 0. 0: Output not completed. 1: Output completed.	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed at the start or completion of pulse output in independent mode.
Pulse Output 0 Output In-progress Flag	A28004	ON when pulses are being output from pulse output 0. 0: Stopped 1: Outputting pulses.	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed when pulse output starts or stops.

Name	Address	Description	Read/Write	Times when data is accessed
Pulse Output 0 No-origin Flag	A28005	ON when the origin has not been determined for pulse output 0 and goes OFF when the origin has been determined. 0: Origin established. 1: Origin not established.	Read only	• Turned ON when power is turned ON. • Turned ON when operation starts. • Refreshed when pulse output starts or stops. • Refreshed each cycle during the overseeing processes.
Pulse Output 0 At-origin Flag	A28006	ON when the pulse output PV matches the origin (0). 0: Not stopped at origin. 1: Stopped at origin.	Read only	• Cleared when power is turned ON. • Refreshed each cycle during the overseeing processes.
Pulse Output 0 Output Stopped Error Flag	A28007	ON when an error occurred while outputting pulses in the pulse output 0 origin search function. The Pulse Output 0 Output Stop Error code will be written to A444. 0: No error 1: Stop error occurred.	Read only	• Cleared when power is turned ON. • Refreshed when origin search starts. • Refreshed when a pulse output stop error occurs.
Pulse Output 1 Accel/Decel Flag	A28100	This flag will be ON when pulses are being output from pulse output 1 according to an ACC(888) or PLS2(887) instruction and the output frequency is being changed in steps (accelerating or decelerating). 0: Constant speed 1: Accelerating or decelerating	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed each cycle during oversee process.
Pulse Output 1 Overflow/Underflow Flag	A28101	This flag indicates when an overflow or underflow has occurred in the pulse output 1 PV. 0: Normal 1: Overflow or underflow	Read only	• Cleared when power is turned ON. • Cleared when operation starts. • Cleared when the PV is changed by the INI(880) instruction. • Refreshed when an overflow or underflow occurs.
Pulse Output 1 Output Amount Set Flag	A28102	ON when the number of output pulses for pulse output 1 has been set with the PULS(886) instruction. 0: No setting 1: Setting made	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed when the PULS(886) instruction is executed. • Refreshed when pulse output stops.

Name	Address	Description	Read/Write	Times when data is accessed
Pulse Output 1 Output Completed Flag	A28103	ON when the number of output pulses set with the PULS(886)/PLS2(887) instruction has been output through pulse output 1. 0: Output not completed. 1: Output completed.	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed at the start or completion of pulse output in independent mode.
Pulse Output 1 Output In-progress Flag	A28104	ON when pulses are being output from pulse output 1. 0: Stopped 1: Outputting pulses.	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed when pulse output starts or stops.
Pulse Output 1 No-origin Flag	A28105	ON when the origin has not been determined for pulse output 1 and goes OFF when the origin has been determined. 0: Origin established. 1: Origin not established.	Read only	• Turned ON when power is turned ON. • Turned ON when operation starts. • Refreshed when pulse output starts or stops. • Refreshed each cycle during the overseeing processes.
Pulse Output 1 At-origin Flag	A28106	ON when the pulse output PV matches the origin (0). 0: Not stopped at origin. 1: Stopped at origin.	Read only	• Cleared when power is turned ON. • Refreshed each cycle during the overseeing processes.
Pulse Output 1 Output Stopped Error Flag	A28107	ON when an error occurred while outputting pulses in the pulse output 1 origin search function. The Pulse Output 1 Output Stop Error code will be written to A445. 0: No error 1: Stop error occurred.	Read only	• Cleared when power is turned ON. • Refreshed when origin search starts. • Refreshed when a pulse output stop error occurs.
PWM(891) Output 0 Output In-progress Flag	A28300	ON when pulses are being output from PWM(891) output 0. 0: Stopped 1: Outputting pulses.	Read only	• Cleared when power is turned ON. • Cleared when operation starts or stops. • Refreshed when pulse output starts or stops.
PWM(891) Output 1 Output In-progress Flag	A28308	ON when pulses are being output from PWM(891) output 1. 0: Stopped 1: Outputting pulses.	Read only	

Name	Address	Description	Read/Write	Times when data is accessed
Pulse Output 0 Stop Error Code	A444	When a pulse output stop error occurred with pulse output 0, the corresponding error code is written to this word.	Read only	• Cleared when power is turned ON. • Refreshed when origin search starts. • Refreshed when a pulse output stop error occurs.
Pulse Output 1 Stop Error Code	A445	When a pulse output stop error occurred with pulse output 1, the corresponding error code is written to this word.	Read only	
Pulse Output 0 Reset Bit	A54000	The pulse output 0 PV (contained in A276 and A277) will be cleared when this bit is turned from OFF to ON.	Read/Write	• Cleared when power is turned ON.
Pulse Output 0 CW Limit Input Signal Flag	A54008	This is the CW limit input signal for pulse output 0, which is used in the origin search. To use this signal, write the input from the actual sensor as an input condition in the ladder program and output the result to this flag.	Read/Write	Cleared when power is turned ON.
Pulse Output 0 CCW Limit Input Signal Flag	A54009	This is the CCW limit input signal for pulse output 0, which is used in the origin search. To use this signal, write the input from the actual sensor as an input condition in the ladder program and output the result to this flag.	Read/Write	
Pulse Output 1 Reset Bit	A54100	The pulse output 1 PV (contained in A278 and A279) will be cleared when this bit is turned from OFF to ON.	Read/Write	
Pulse Output 1 CW Limit Input Signal Flag	A54108	This is the CW limit input signal for pulse output 1, which is used in the origin search. To use this signal, write the input from the actual sensor as an input condition in the ladder program and output the result to this flag.	Read/Write	
Pulse Output 1 CCW Limit Input Signal Flag	A54109	This is the CCW limit input signal for pulse output 1, which is used in the origin search. To use this signal, write the input from the actual sensor as an input condition in the ladder program and output the result to this flag.	Read/Write	

Serial PLC Link (CJ1M CPU Units Only)

Name	Address	Description	Read/Write	Time(s) when data is accessed
RS-232C Port PT Communications Flags	A39300 to A39307	The corresponding bit will be ON when the RS-232C port is communicating with a PT in NT link mode. Bits 0 to 7 correspond to units 0 to 7. ON: Communicating. OFF: Not communicating.	Read only	Cleared when power is turned ON. With the RS-232C port in NT Link Mode or Serial PLC Link Mode, the bit corresponding to the communicating PT or Slave turns ON. Bits 0 to 7 correspond to units 0 to 7.
RS-232C Port Restart Bit	A52600	Turn this bit ON to restart the RS-232C port.	Read/Write	Cleared when power is turned ON. Turn this bit ON to restart the RS-232C port. Automatically turned OFF by the system after the restart processing is completed.
RS-232C Port Error Flags	A52800 to A52807	These flags indicate what kind of error has occurred at the RS-232C port. Bit 0: Not used. Bit 1: Not used. Bit 2: Parity error Bit 3: Framing error Bit 4: Overrun error Bit 5: Timeout error Bit 6: Not used. Bit 7: Not used.	Read/Write	Cleared when power is turned ON. The error code is stored when an error occurs at the RS-232C port. Enabled in NT Link Mode only for Bit 5 (timeout error). Enabled in Serial PLC Link Mode only for the following: Polling Unit: Bit 5: Timeout error Polled Unit: Bit 5: Timeout error Bit 4: Overrun error Bit 3: Framing error **Note** If an error occurs during Serial PLC Link Mode, the Polling Unit will perform retries until communications is established. It is not necessary for you to restart the port in order to restore communications. As long as the cause of the error has been removed, communications will be automatically restored between the Polling Unit and Polled Units. However, the Error Flag will remain ON as a record. You must restart the port to clear the Error Flag.
RS-232C Port Settings Change Bit	A61902	ON while the RS-232C port's communications settings are being changed. ON: Changing. OFF: Not changing.	Read/Write	Cleared when power is turned ON. ON when the RS-232C port communications settings are being changed. ON when STUP(237) is executed and OFF after the settings have been changed.

9-12 TR (Temporary Relay) Area

The TR Area contains 16 bits with addresses ranging from TR0 to TR15. These temporarily store the ON/OFF status of an instruction block for branching. TR bits are useful when there are several output branches and interlocks cannot be used.

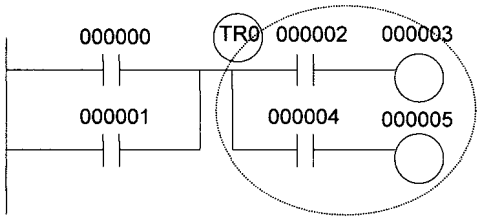
The TR bits can be used as many times as required and in any order required as long as the same TR bit is not used twice in the same instruction block.

TR bits can be used only with the OUT and LD instructions. OUT instructions (OUT TR0 to OUT TR15) store the ON OFF status of a branch point and LD instructions recall the stored ON OFF status of the branch point.

TR bits cannot be changed from a Programming Device.

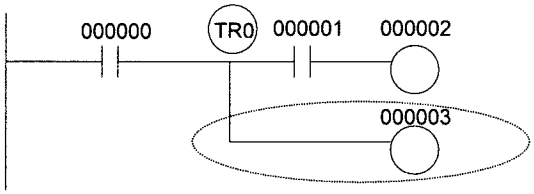
Examples

In this example, a TR bit is used when two outputs have been directly connected to a branch point.



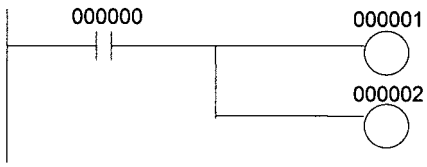
Instruction	Operand
LD	000000
OR	000001
OUT	TR 0
AND	000002
OUT	000003
LD	TR 0
AND	000004
OUT	000005

In this example, a TR bit is used when an output is connected to a branch point without a separate execution condition.

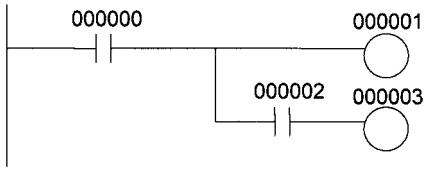


Instruction	Operand
LD	000000
OUT	TR 0
AND	000001
OUT	000002
LD	TR 0
OUT	000003

Note A TR bit is not required when there are no execution conditions after the branch point or there is an execution condition only in the last line of the instruction block.



Instruction	Operand
LD	000000
OUT	000001
OUT	000002



Instruction	Operand
LD	000000
OUT	000001
AND	000002
OUT	000003

9-13 Timer Area

The 4,096 timer numbers (T0000 to T4095) are shared by the HUNDRED-MS TIMER (TIM/TIMX(550)), TEN-MS TIMER (TIMH(015)/TIMHX(551)), ONE-MS TIMER (TMHH(540)/TMHHX(552)), TENTH-MS TIMER (TIMU(541)/TIMUX(556)) (see note), HUNDREDTH-MS TIMER (TMUH(544)/TMUHX(557)) (see note), ACCUMULATIVE TIMER (TTIM(087)/TTIMX(555)), TIMER WAIT (TIMW(813)/TIMWX(816)), and HIGH-SPEED TIMER WAIT (TMHW(815)/TMHWX(817)) instructions. Timer Completion Flags and present values (PVs) for these instructions are accessed with the timer numbers. (The TIML(542), TIMLX(553), MTIM(543), and MTIMX(554) instructions do not use timer numbers.)

Note CJ1-H-R CPU Units only.

When a timer number is used in an operand that requires bit data, the timer number accesses the Completion Flag of the timer. When a timer number is used in an operand that requires word data, the timer number accesses the

PV of the timer. Timer Completion Flags can be used as often as necessary as normally open and normally closed conditions and the values of timer PVs can be read as normal word data.

With CJ1-H and CJ1M CPU Units, the refresh method for timer PVs can be set from the CX-Programmer to either BCD or binary. With CJ1 CPU Units, it can only be set to binary.

Note It is not recommended to use the same timer number in two timer instructions because the timers will not operate correctly if they are timing simultaneously. (If two or more timer instructions use the same timer number, an error will be generated during the program check, but the timers will operate as long as the instructions are not executed in the same cycle.)

The following table shows when timer PVs and Completion Flags will be reset.

Instruction name	Effect on PV and Completion Flag			Operation in Jumps and Interlocks	
	Mode change[1]	PLC start-up[1]	CNR(545)/ CNRX(547)	Jumps (JMP-JME) or Tasks on standby	Interlocks (IL-ILC)
HUNDRED-MS TIMER: TIM/TIMX(550)	PV → 0 Flag → OFF	PV → 0 Flag → OFF	PV → 9999 Flag → OFF	PVs refreshed in operating timers	PV → SV (Reset to SV.) Flag → OFF
TEN-MS TIMER: TIMH(015)/TIMHX(551)					
ONE-MS TIMER: TMHH(540)/TMHHX(552)					
TENTH-MS TIMER: TIMU(541)/TIMUX(556) (See note 5.)					
HUNDERDTH-MS TIMER: TMUH(544)/TMUHX(557) (See note 5.)					
ACCUMULATIVE TIMER: TTIM(087)/TTIMX(555)				PV Maintained	PV Maintained
TIMER WAIT: TIMW(813)TIMWX(816)				PVs refreshed in operating timers	---
HIGH-SPEED TIMER WAIT: TMHW(815)/TMHWX(817)					---

Note

1. If the IOM Hold BIt (A50012) is ON, the PV and Completion Flag will be retained when a fatal error occurs or the operating mode is changed from PROGRAM mode to RUN or MONITOR mode or vice-versa. The PV and Completion Flag will be cleared when power is cycled.
2. If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the PV and Completion Flag will be retained when the PLC's power is cycled.
3. Since the TIML(542), TIMLX(553), MTIM(543), and MTIMX(554) instructions do not use timer numbers, they are reset under different conditions. Refer to the descriptions of these instructions for details.
4. The present value of HUNDRED-MS TIMER (TIM/TIMX(550)), TEN-MS TIMER (TIMH(015)/TIMHX(551)), ONE-MS TIMER (TMHH(540)/TMHHX(552)), TENTH-MS TIMER (TIMU(541)/TIMUX(556) (see note), HUNDREDTH-MS TIMER (TMUH(544)/TMUHX(557)) (see note), TIMER WAIT (TIMW(813)/TIMWX(816), and HIGH-SPEED TIMER WAIT (TMHW(815)/TMHWX(817)) timers programmed with timer numbers 0000 to 2047 will be updated even when jumped between JMP and JME instructions or when in a task that is on standby. The present value of timers pro-

grammed with timer numbers 2048 to 4095 will be held when jumped or when in a task that is on standby.

5. CJ1-H-R CPU Units only.

Timer Completion Flags can be force-set and force-reset.

Timer PVs cannot be force-set or force-reset, although the PVs can be refreshed indirectly by force-setting/resetting the Completion Flag.

There are no restrictions in the order of using timer numbers or in the number of N.C. or N.O. conditions that can be programmed. Timer PVs can be read as word data and used in programming.

9-14 Counter Area

The 4,096 counter numbers (C0000 to C4095) are shared by the CNT, CNTX(546), CNTR(012), CNTRX(548), CNTW(814), and CNTWX(818) instructions. Counter Completion Flags and present values (PVs) for these instructions are accessed with the counter numbers.

When a counter number is used in an operand that requires bit data, the counter number accesses the Completion Flag of the counter. When a counter number is used in an operand that requires word data, the counter number accesses the PV of the counter.

With CJ1-H and CJ1M CPU Units, the refresh method for counter PVs can be set from the CX-Programmer to either BCD or binary. With CJ1 CPU Units, it can only be set to binary.

It is not recommended to use the same counter number in two counter instructions because the counters will not operate correctly if they are counting simultaneously. If two or more counter instructions use the same counter number, an error will be generated during the program check, but the counters will operate as long as the instructions are not executed in the same cycle.

The following table shows when counter PVs and Completion Flags will be reset.

Instruction name	Effect on PV and Completion Flag					
	Reset	Mode change	PLC startup	Reset Input	CNR(545)/ CNRX(547)	Interlocks (IL-ILC)
COUNTER: CNT/ CNTX(546)	PV → 0000 Flag → OFF	Maintained	Maintained	Reset	Reset	Maintained
REVERSIBLE COUNTER: CNTR(012)/ CNTRX(548)						
COUNTER WAIT: CNTW(814)/CNTWX(818)						

Counter Completion Flags can be force-set and force-reset.

Counter PVs cannot be force-set or force-reset, although the PVs can be refreshed indirectly by force-setting/resetting the Completion Flag.

There are no restrictions in the order of using counter numbers or in the number of N.C. or N.O. conditions that can be programmed. Counter PVs can be read as word data and used in programming.

9-15 Data Memory (DM) Area

The DM Area contains 32,768 words with addresses ranging from D00000 to D32767. This data area is used for general data storage and manipulation and is accessible only by word.

Data in the DM Area is retained when the PLC's power is cycled or the PLC's operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

Although bits in the DM Area cannot be accessed directly, the status of these bits can be accessed with the BIT TEST instructions, TST(350) and TSTN(351).

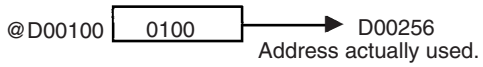
Bits in the DM Area cannot be force-set or force-reset.

Indirect Addressing

Words in the DM Area can be indirectly addressed in two ways: binary-mode and BCD-mode.

Binary-mode Addressing (@D)

When a "@" character is input before a DM address, the content of that DM word is treated as binary and the instruction will operate on the DM word at that binary address. The entire DM Area (D00000 to D32767) can be indirectly addressed with hexadecimal values 0000 to 7FFF.



BCD-mode Addressing (*D)

When a "*" character is input before a DM address, the content of that DM word is treated as BCD and the instruction will operate on the DM word at that BCD address. Only part of the DM Area (D00000 to D09999) can be indirectly addressed with BCD values 0000 to 9999.

DM Area Allocation to Special I/O Units

Parts of the DM Area are allocated to Special I/O Units and CPU Bus Units for functions such as initial Unit settings. The timing for data transfers is different for these Units, but may occur at any of the three following times.

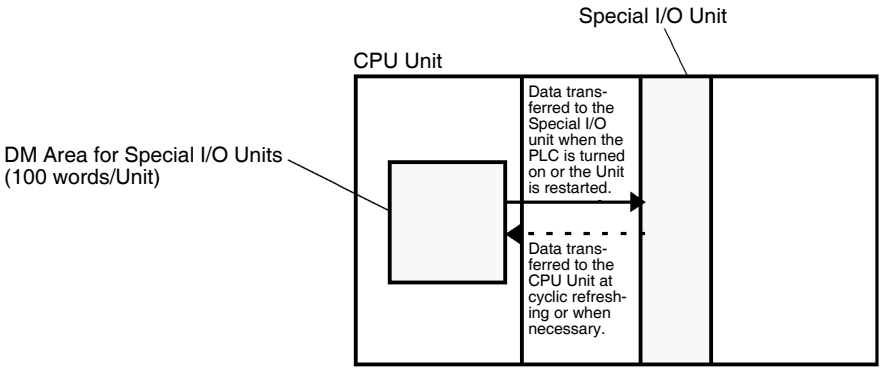
1,2,3...

1. Transfer data when the PLC's power is turned ON or the Unit is restarted.
2. Transfer data once each cycle.
3. Transfer data when required.

Refer to the Unit's operation manual for details on data transfer timing.

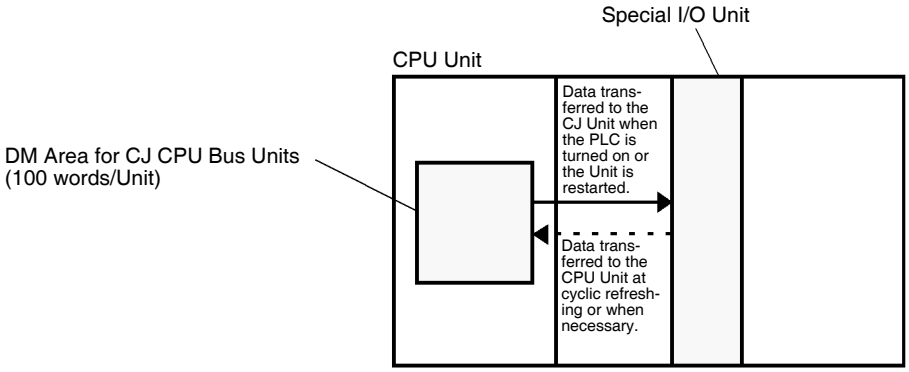
Special I/O Units (D20000 to D29599)

Each Special I/O Unit is allocated 100 words (based on unit numbers 0 to 95). Refer to the Unit's Operation Manual for details on the function of these words.



CPU Bus Units (D30000 to D31599)

Each CPU Bus Unit is allocated 100 words (based on unit numbers 0 to F). Refer to the Unit's Operation Manual for details on the function of these words. With some CPU Bus Units such as Ethernet Units, initial settings must be registered in the CPU Unit's Parameter Area; this data can be registered with a Programming Device other than a Programming Console.



9-16 Extended Data Memory (EM) Area

The EM Area is supported by the CJ1 and CJ1-H CPU Units only. It is divided into 7 banks (0 to C) that each contain 32,768 words. EM Area addresses range from E0_00000 to EC_32767. This data area is used for general data storage and manipulation and is accessible only by word.

Data in the EM Area is retained when the PLC's power is cycled or the PLC's operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

Although bits in the EM Area cannot be accessed directly, the status of these bits can be accessed with the BIT TEST instructions, TST(350) and TSTN(351).

Bits in the EM Area cannot be force-set or force-reset.

Specifying EM Addresses

There are two ways to specify an EM address: the bank and address can be specified at the same time or an address in the current bank can be specified (after changing the current bank, if necessary). In general, we recommend specifying the bank and address simultaneously.

1,2,3...

1. Bank and Address Specification
   With this method, the bank number is specified just before the EM address. For example, E2_00010 specifies EM address 00010 in bank 2.
2. Current Bank Address Specification
   With this method, just the EM address is specified. For example, E00010 specifies EM address 00010 in the current bank. (The current bank must be changed with EMBC(281) to access data in another bank. A301 contains the current EM bank number.)

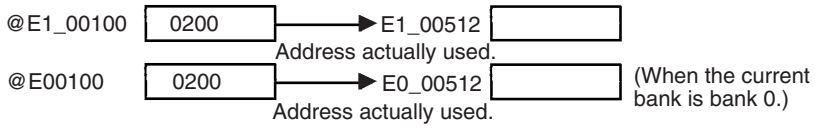
   The current bank will be reset to 0 when the operating mode is changed from PROGRAM mode to RUN/MONITOR mode, unless the IOM Hold Bit (A50012) is ON. The current bank is not changed as the program proceeds through cyclic tasks and the current bank will be returned to its original value (in the source cyclic task) if it has been changed in an interrupt task.

Indirect Addressing

Words in the EM Area can be indirectly addressed in two ways: binary-mode and BCD-mode.

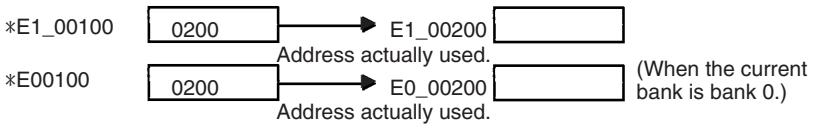
Binary-mode Addressing (@E)

When a "@" character is input before a EM address, the content of that EM word is treated as binary and the instruction will operate on the EM word in the same bank at that binary address. All of the words in the same EM bank (E00000 to E32767) can be indirectly addressed with hexadecimal values 0000 to 7FFF and words in the next EM bank (E00000 to E32767) can be addressed with hexadecimal values 8000 to FFFF.



BCD-mode Addressing (*E)

When a "*" character is input before a EM address, the content of that EM word is treated as BCD and the instruction will operate on the EM word in the same bank at that BCD address. Only part of the EM bank (E00000 to E09999) can be indirectly addressed with BCD values 0000 to 9999.

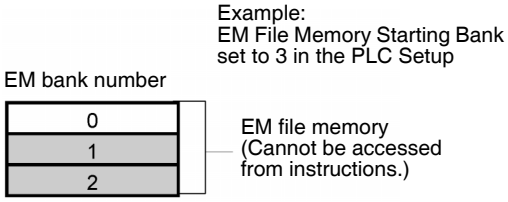


File Memory Conversion

Part of the EM Area can be converted for use as file memory with settings in the PLC Setup. All EM banks from the specified bank (EM File Memory Starting Bank) to the last EM bank will be converted to file memory.

Once EM banks have been converted to file memory, they cannot be accessed (read or written) by instructions. An Illegal Access Error will occur if a file-memory bank is specified as an operand in an instruction.

The following example shows EM file memory when the EM File Memory Starting Bank has been set to 3 in the PLC Setup.



9-17 Index Registers

The sixteen Index Registers (IR0 to IR15) are used for indirect addressing. Each Index Register can hold a single PLC memory address, which is the absolute memory address of a word in I/O memory. Use MOVR(560) to convert a regular data area address to its equivalent PLC memory address and write that value to the specified Index Register. (Use MOVRW(561) to set the PLC memory address of a timer/counter PV in an Index Register.)

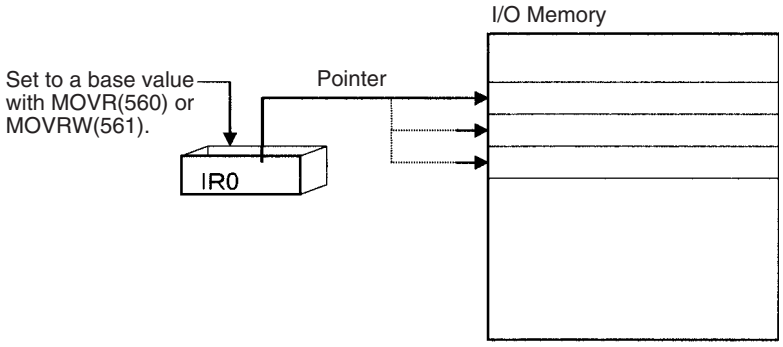
Note Refer to *Appendix D Memory Map of PLC Memory Addresses* for more details on PLC memory addresses.

Indirect Addressing

When an Index Register is used as an operand with a "," prefix, the instruction will operate on the word indicated by the PLC memory address in the Index Register, not the Index Register itself. Basically, the Index Registers are I/O memory pointers.

- All addresses in I/O memory (except Index Registers, Data Registers, and Condition Flags) can be specified seamlessly with PLC memory addresses. It isn't necessary to specify the data area.
- In addition to basic indirect addressing, the PLC memory address in an Index Register can be offset with a constant or Data Register, auto-incremented, or auto-decremented. These functions can be used in loops to read or write data while incrementing or decrementing the address by one each time that the instruction is executed.

With the offset and increment/decrement variations, the Index Registers can be set to base values with MOVR(560) or MOVRW(561) and then modified as pointers in each instruction.



Note It is possible to specify regions outside of I/O memory and generate an Illegal Access Error when indirectly addressing memory with Index Registers. Refer to *Appendix D Memory Map of PLC Memory Addresses* for details on the limits of PLC memory addresses.

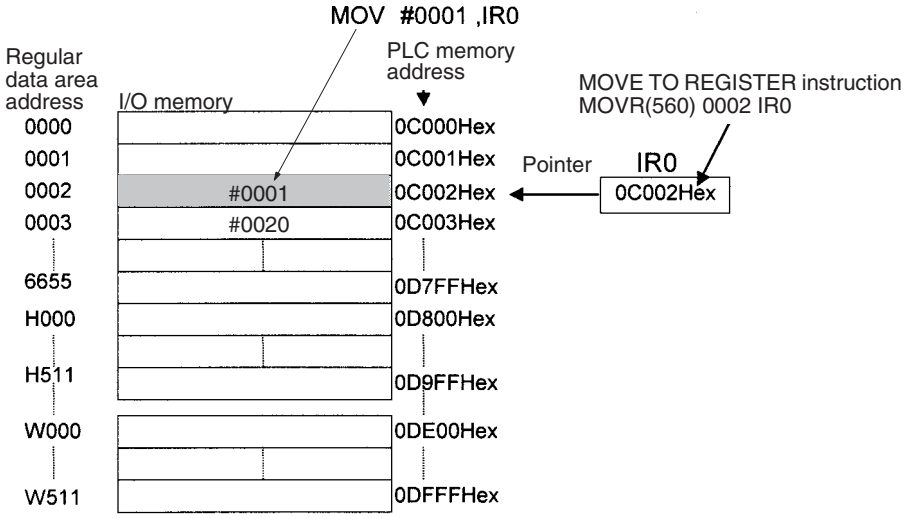
The following table shows the variations available when indirectly addressing I/O memory with Index Registers. (IR□ represents an Index Register from IR0 to IR15.)

Variation	Function	Syntax	Example	
Indirect addressing	The content of IR□ is treated as the PLC memory address of a bit or word.	,IR□	LD ,IR0	Loads the bit at the PLC memory address contained in IR0.
Indirect addressing with constant offset	The constant prefix is added to the content of IR□ and the result is treated as the PLC memory address of a bit or word. The constant may be any integer from –2,048 to 2,047.	Constant ,IR□ (Include a + or – in the constant.)	LD +5,IR0	Adds 5 to the contents of IR0 and loads the bit at that PLC memory address.
Indirect addressing with DR offset	The content of the Data Register is added to the content of IR□ and the result is treated as the PLC memory address of a bit or word.	DR□,IR□	LD DR0,IR0	Adds the contents of DR0 to the contents of IR0 and loads the bit at that PLC memory address.
Indirect addressing with auto-increment	After referencing the content of IR□ as the PLC memory address of a bit or word, the content is incremented by 1 or 2.	Increment by 1: ,IR□+ Increment by 2: ,IR□++	LD , IR0++	Loads the bit at the PLC memory address contained in IR0 and then increments the content of IR0 by 2.
Indirect addressing with auto-decrement	The content of IR□ is decremented by 1 or 2 and the result is treated as the PLC memory address of a bit or word.	Decrement by 1: ,–IR□ Decrement by 2: ,– –IR□	LD , – –IR0	Decrements the content of IR0 by 2 and then loads the bit at that PLC memory address.

Example

This example shows how to store the PLC memory address of a word (CIO 0002) in an Index Register (IR0), use the Index Register in an instruction, and use the auto-increment variation.

MOVR(560)	0002	IR0	Stores the PLC memory address of CIO 0002 in IR0.
MOV(021)	#0001	,IR0	Writes #0001 to the PLC memory address contained in IR0.
MOV(021)	#0020	+1,IR0	Reads the content of IR0, adds 1, and writes #0020 to that PLC memory address.



Note The PLC memory addresses are listed in the diagram above, but it isn't necessary to know the PLC memory addresses when using Index Registers.

Since some operands are treated as word data and others are treated as bit data, the meaning of the data in an Index Register will differ depending on the operand in which it is used.

1,2,3... 1. Word Operand:

```
MOVR(560)    0000      IR2
MOV(021)     D00000    , IR2
```

When the operand is treated as a word, the contents of the Index Register are used "as is" as the PLC memory address of a word.
In this example MOVR(560) sets the PLC memory address of CIO 0002 in IR2 and the MOV(021) instruction copies the contents of D00000 to CIO 0002.

2. Bit Operand:

```
MOVR(560)    000013    ,IR2
SET          +5 , IR2
```

When the operand is treated as a bit, the leftmost 7 digits of the Index Register specify the word address and the rightmost digit specifies the bit number. In this example, MOVR(560) sets the PLC memory address of CIO 000013 (0C000D hex) in IR2. The SET instruction adds +5 from bit 13 to this PLC memory address, so it turns ON bit CIO 000102.

Direct Addressing

When an Index Register is used as an operand without a "," prefix, the instruction will operate on the contents of the Index Register itself (a two-word or "double" value). Index Registers can be directly addressed only in the instructions shown in the following table. Use these instructions to operate on the Index Registers as pointers.

The Index Registers cannot be directly addressed in any other instructions, although they can usually be used for indirect addressing.

Instruction group	Instruction name	Mnemonic
Data Movement Instructions	MOVE TO REGISTER	MOVR(560)
	MOVE TIMER/COUNTER PV TO REGISTER	MOVRW(561)
	DOUBLE MOVE	MOVL(498)
	DOUBLE DATA EXCHANGE	XCGL(562)
Table Data Processing Instructions	SET RECORD LOCATION	SETR(635)
	GET RECORD NUMBER	GETR(636)
Increment/Decrement Instructions	DOUBLE INCREMENT BINARY	++L(591)
	DOUBLE DECREMENT BINARY	– –L(593)
Comparison Instructions	DOUBLE EQUAL	=L(301)
	DOUBLE NOT EQUAL	< >L(306)
	DOUBLE LESS THAN	< L(311)
	DOUBLE LESS THAN OR EQUAL	< =L(316)
	DOUBLE GREATER THAN	> L(321)
	DOUBLE GREATER THAN OR EQUAL	> =L(326)
	DOUBLE COMPARE	CMPL(060)
Symbol Math Instructions	DOUBLE SIGNED BINARY ADD WITHOUT CARRY	+L(401)
	DOUBLE SIGNED BINARY SUBTRACT WITHOUT CARRY	–L(411)

The SRCH(181), MAX(182), and MIN(183) instructions can output the PLC memory address of the word with the desired value (search value, maximum, or minimum) to IR0. In this case, IR0 can be used in later instructions to access the contents of that word.

Index Register Initialization

The Index Registers will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa and the IOM Hold Bit is OFF.
2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.

IOM Hold Bit Operation

If the IOM Hold BIt (A50012) is ON, the Index Registers won't be cleared when a FALS error occurs or the operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the Index Registers won't be cleared when the PLC's power supply is reset (ON → OFF → ON).

Precautions

Do not use Index Registers until a PLC memory address has been set in the register. The pointer operation will be unreliable if the registers are used without setting their values.

The values in Index Registers are unpredictable at the start of an interrupt task. When an Index Register will be used in an interrupt task, always set a PLC memory address in the Index Register with MOVR(560) or MOVRW(561) before using the register in that task.

Each Index Register task is processed independently, so they do not affect each other. For example, IR0 used in Task 1 and IR0 used in Task 2 are different. Consequently, each Index Register task has 16 Index Registers.

Limitations when Using Index Registers

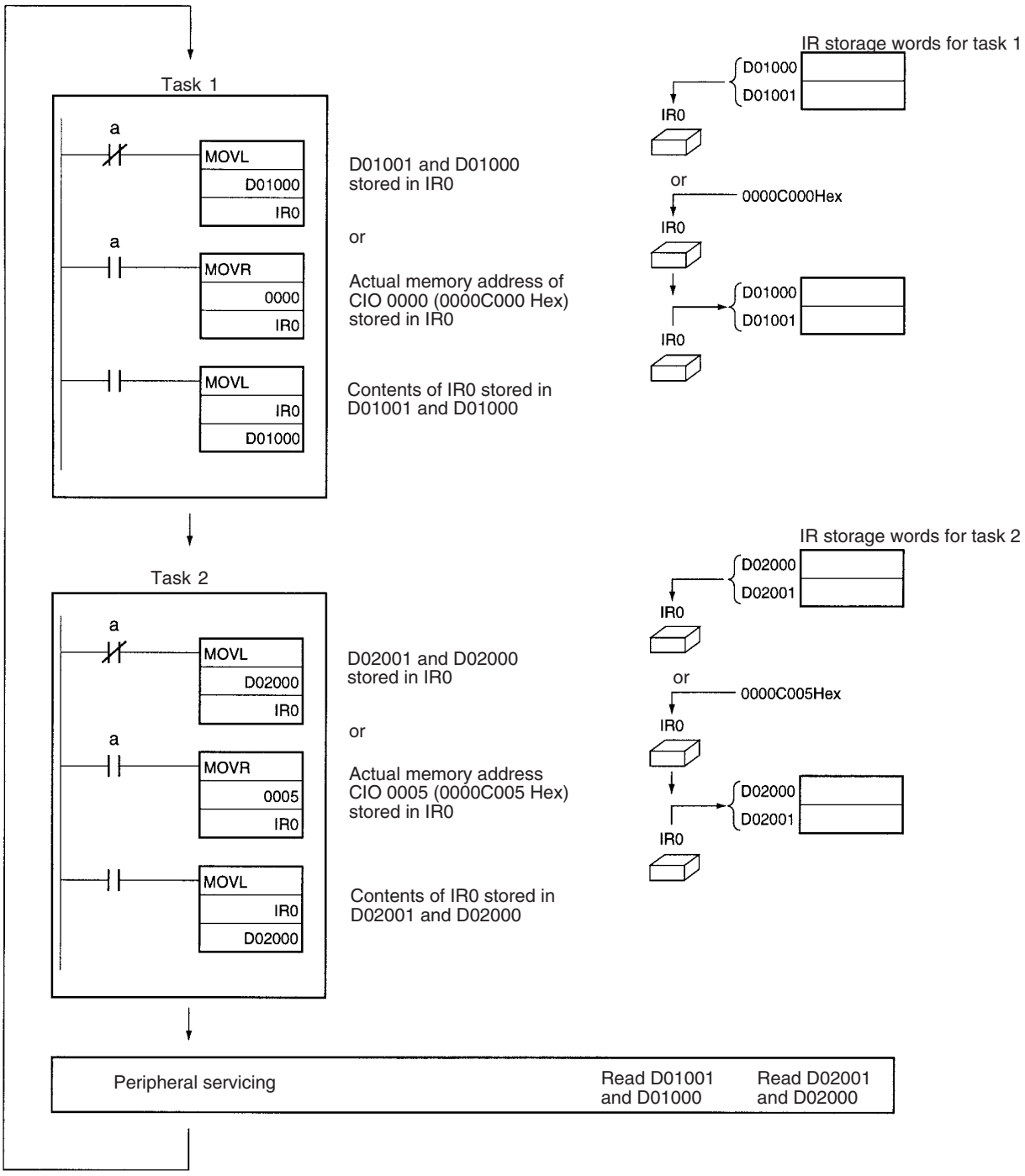
- It is only possible to read the Index Register for the last task executed within the cycle from the Programming Devices (CX-Programmer or Programming Console). If using Index Registers with the same number to perform multiple tasks, it is only possible with the Programming Devices to read the Index Register value for the last task performed within the cycle from the multiple tasks. Nor is it possible to write the Index Register value from the Programming Devices.
- It is not possible to either read or write to the Index Registers using Host Link commands or FINS commands.
- The Index Registers cannot be shared between tasks for CJ1 CPU Units. (With CJ1-H and CJ1M CPU Units, a PLC Setup setting can be made from the CX-Programmer to share Index Registers between tasks.)

Monitoring Index Registers

It is possible to monitor Index Registers as follows:

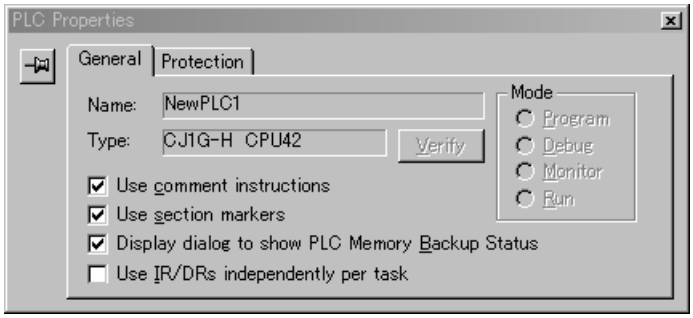
To use the Programming Devices to monitor the final Index Register values for each task, or to monitor the Index Register values using Host Link commands or FINS commands, write a program to store Index Register values from each task to another area (e.g., DM area) at the end of each task, and to read Index Register values from the storage words (e.g., DM area) at the beginning of each task. The values stored for each task in other areas (e.g., DM area) can then be edited using the Programming Devices, Host Link commands, or FINS commands.

Note Be sure to use PLC memory addresses in Index Registers.



Sharing Index Registers (CJ1-H and CJ1M CPU Units Only)

The following setting can be made from the PLC properties dialog box on the CX-Programmer to control sharing index and data registers between tasks.



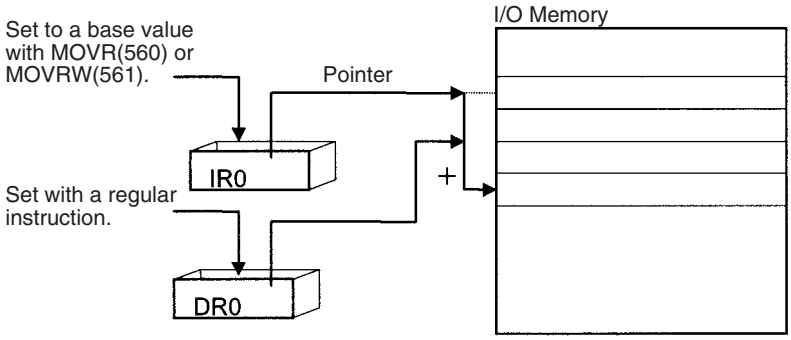
9-18 Data Registers

The sixteen Data Registers (DR0 to DR15) are used to offset the PLC memory addresses in Index Registers when addressing words indirectly.

The value in a Data Register can be added to the PLC memory address in an Index Register to specify the absolute memory address of a bit or word in I/O memory. Data Registers contain signed binary data, so the content of an Index Register can be offset to a lower or higher address.

Normal instructions can be use to store data in Data Registers.

Bits in Data Registers cannot be force-set and force-reset.



Examples

The following examples show how Data Registers are used to offset the PLC memory addresses in Index Registers.

LD DR0 ,IR0	Adds the contents of DR0 to the contents of IR0 and loads the bit at that PLC memory address.
MOV(021) #0001 DR0 ,IR1	Adds the contents of DR0 to the contents of IR1 and writes #0001 to that PLC memory address.

Range of Values

The contents of data registers are treated as signed binary data and thus have a range of –32,768 to 32,767.

Hexadecimal content	Decimal equivalent
8000 to FFFF	–32,768 to –1
0000 to 7FFF	0 to 32,767

Data Register Initialization

The Data Registers will be cleared in the following cases:

1,2,3...

1. The operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa and the IOM Hold Bit is OFF.

2. The PLC's power supply is cycled and the IOM Hold Bit is OFF or not protected in the PLC Setup.

IOM Hold Bit Operation

If the IOM Hold BIt (A50012) is ON, the Data Registers won't be cleared when a FALS error occurs or the operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.

If the IOM Hold BIt (A50012) is ON and the PLC Setup's "IOM Hold Bit Status at Startup" setting is set to protect the IOM Hold Bit, the Data Registers won't be cleared when the PLC's power supply is reset (ON →OFF →ON).

Precautions

Data Registers are normally local to each task. For example, DR0 used in task 1 is different from DR0 used in task 2. (With CJ1-H CPU Units, a PLC Setup setting can be made from the CX-Programmer to share Data Registers between tasks.)

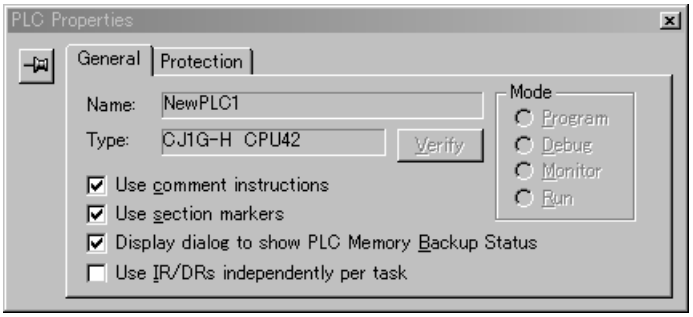
The content of Data Registers cannot be accessed (read or written) from a Programming Device.

Do not use Data Registers until a value has been set in the register. The register's operation will be unreliable if they are used without setting their values.

The values in Data Registers are unpredictable at the start of an interrupt task. When a Data Register will be used in an interrupt task, always set a value in the Data Register before using the register in that task.

Sharing Data Registers

The following setting can be made from the PLC properties dialog box on the CX-Programmer to control sharing index and data registers between tasks.



Note This function is not supported by CJ1-CPU□□ CPU Units.

9-19 Task Flags

Task Flags range from TK00 to TK31 and correspond to cyclic tasks 0 to 31. A Task Flag will be ON when the corresponding cyclic task is in executable (RUN) status and OFF when the cyclic task hasn't been executed (INI) or is in standby (WAIT) status.

Note These flags indicate the status of cyclic tasks only, they do not reflect the status of interrupt tasks.

Task Flag Initialization

The Task Flags will be cleared in the following cases, regardless of the status of the IOM Hold Bit.

1,2,3...

1. The operating mode is changed from PROGRAM mode to RUN/MONITOR mode or vice-versa.
2. The PLC's power supply is cycled.

Forcing Bit Status

The Task Flags **cannot** be force-set and force-reset.

9-20 Condition Flags

These flags include the Arithmetic Flags such as the Error Flag and Equals Flag which indicate the results of instruction execution. In earlier PLCs, these flags were in the SR Area.

The Condition Flags are specified with labels, such as CY and ER, or with symbols, such as P_Carry and P_Instr_Error, rather than addresses. The status of these flags reflects the results of instruction execution, but the flags are read-only; they cannot be written directly from instructions or Programming Devices (CX-Programmer or Programming Console).

Note The CX-Programmer treats condition flags as global symbols beginning with P_.

All Condition Flags are cleared when the program switches tasks, so the status of the ER and AER flags are maintained only in the task in which the error occurred.

The Condition Flags **cannot** be force-set and force-reset.

Summary of the Condition Flags

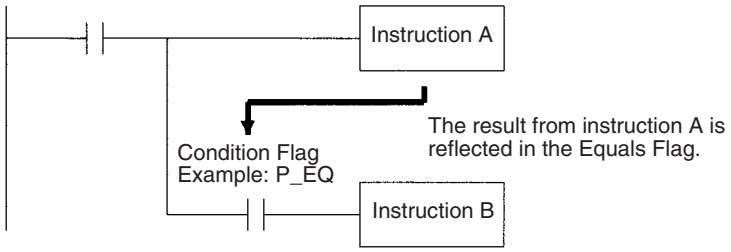
The following table summarizes the functions of the Condition Flags, although the functions of these flags will vary slightly from instruction to instruction. Refer to the description of the instruction for complete details on the operation of the Condition Flags for a particular instruction.

Name	Symbol	Label	Function
Error Flag	P_ER	ER	Turned ON when the operand data in an instruction is incorrect (an instruction processing error) to indicate that an instruction ended because of an error. When the PLC Setup is set to stop operation for an instruction error (Instruction Error Operation), program execution will be stopped and the Instruction Processing Error Flag (A29508) will be turned ON when the Error Flag is turned ON.
Access Error Flag	P_AER	AER	Turned ON when an Illegal Access Error occurs. The Illegal Access Error indicates that an instruction attempted to access an area of memory that should not be accessed. When the PLC Setup is set to stop operation for an instruction error (Instruction Error Operation), program execution will be stopped and the Instruction Processing Error Flag (A429510) will be turned ON when the Access Error Flag is turned ON.
Carry Flag	P_CY	CY	Turned ON when there is a carry in the result of an arithmetic operation or a “1” is shifted to the Carry Flag by a Data Shift instruction. The Carry Flag is part of the result of some Data Shift and Symbol Math instructions.
Greater Than Flag	P_GT	>	Turned ON when the first operand of a Comparison Instruction is greater than the second or a value exceeds a specified range.
Equals Flag	P_EQ	=	Turned ON when the two operands of a Comparison Instruction are equal the result of a calculation is 0.
Less Than Flag	P_LT	<	Turned ON when the first operand of a Comparison Instruction is less than the second or a value is below a specified range.
Negative Flag	P_N	N	Turned ON when the most significant bit (sign bit) of a result is ON.
Overflow Flag	P_OF	OF	Turned ON when the result of calculation overflows the capacity of the result word(s).
Underflow Flag	P_UF	UF	Turned ON when the result of calculation underflows the capacity of the result word(s).
Greater Than or Equals Flag	P_GE	>=	Turned ON when the first operand of a Comparison Instruction is greater than or equal to the second.
Not Equal Flag	P_NE	< >	Turned ON when the two operands of a Comparison Instruction are not equal.

Name	Symbol	Label	Function
Less Than or Equals Flag	P_LE	< =	Turned ON when the first operand of a Comparison Instruction is less than or equal to the second.
Always ON Flag	P_On	ON	Always ON. (Always 1.)
Always OFF Flag	P_Off	OFF	Always OFF. (Always 0.)

Using the Condition Flags

The Condition Flags are shared by all of the instructions, so their status may change often in a single cycle. Be sure to read the Condition Flags immediately after the execution of instruction, preferably in a branch from the same execution condition.



Instruction	Operand
LD	
Instruction A	
AND	=
Instruction B	

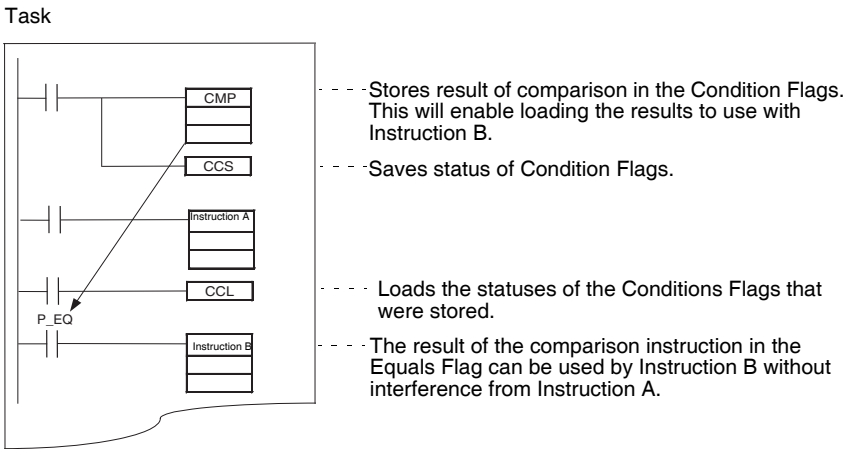
Since the Condition Flags are shared by all of the instructions, program operation can be changed from its expected course by interruption of a single task. Be sure to consider the effects of interrupts when writing the program. Refer to *SECTION 2 Programming* of *CS/CJ Series Programming Manual* (W394) for more details.

The Condition Flags are cleared when the program switches tasks, so the status of a Condition Flag cannot be passed to another task. For example the status of a flag in task 1 cannot be read in task 2.

Saving and Loading Condition Flag Status

The Condition Flag status instructions (CCS(282) and CCL(283)) can be used to save and load the status of the Condition Flags between different locations within a task (program) or between different tasks or cycles.

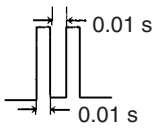
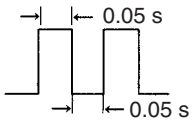
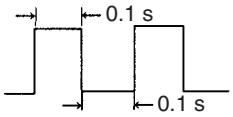
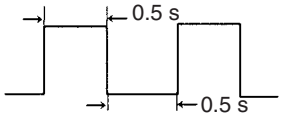
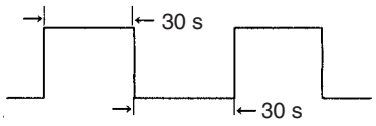
The following example shows how the Equals Flag is used at a different location in the same task.



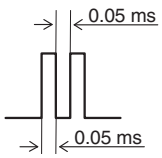
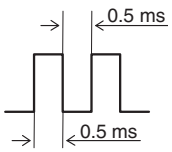
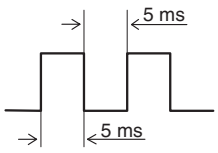
Note This instruction does not exist in CJ1 CPU Units.

9-21 Clock Pulses

The Clock Pulses are flags that are turned ON and OFF at regular intervals by the system.

Name	Label	Symbol	Name on Programming Console	Operation	
0.02 s Clock Pulse	0.02s	P_0_02_s	0.02 s		ON for 0.01 s OFF for 0.01 s
0.1 s Clock Pulse	0.1s	P_0_1s	0.1 s		ON for 0.05 s OFF for 0.05 s
0.2 s Clock Pulse	0.2s	P_0_2s	0.2 s		ON for 0.1 s OFF for 0.1 s
1 s Clock Pulse	1s	P_1s	1 s		ON for 0.5 s OFF for 0.5 s
1 min Clock Pulse	1min	P_1min	1 min		ON for 30 s OFF for 30 s

High-speed Clock Pulses (CJ1-H-R CPU Units Only)

Name	Label	Symbol	Name on Programming Console	Operation	
0.1 ms Clock Pulse	0.1 ms	P_0_1ms	0.1 ms		ON for 0.05 ms OFF for 0.05 ms
1 ms Clock Pulse	1 ms	P_1ms	1 ms		ON for 0.5 ms OFF for 0.5 ms
0.01 s Clock Pulse (Cannot be used with unit version 4.1 of the CJ1-H-R CPU Units. Can be used with other unit versions.)	0.01 s	P_0_1s	0.01 s		ON for 5 ms OFF for 5 ms

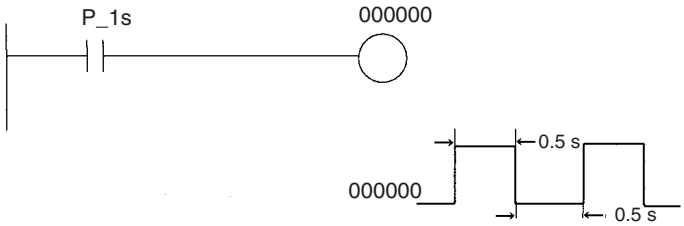
The Clock Pulses are specified with labels (or symbols) rather than addresses.

Note The CX-Programmer treats condition flags as global symbols beginning with P_.

The Clock Pulses are read-only; they cannot be overwritten from instructions or Programming Devices (CX-Programmer or Programming Console).

The Clock Pulses are cleared at the start of operation.

Using the Clock Pulses The following example turns CIO 000000 ON and OFF at 0.5 s intervals.



Instruction	Operand
LD	P_1s
OUT	000000

Clock Pulse Refreshing The clock pulses are refreshed even during program execution. ON/OFF status may not be the same at the beginning and end of a program.

Clock Pulse Error The maximum error in the clock pulses is 0.01% (at 25°C). For long-term, time-based control, we recommend you use the internal clock instead of the clock pulses. Be sure to allow for the error in the internal clock.

9-22 Parameter Areas

Unlike the data areas in I/O memory which can be used in instruction operands, the Parameter Area can be accessed only from a Programming Device. The Parameter Area is made up of the following parts.

- The PLC Setup
- The Registered I/O Table
- The Routing Table
- The CPU Bus Unit Settings

9-22-1 PLC Setup

The user can customize the basic specifications of the CPU Unit with the settings in the PLC Setup. The PLC Setup contains settings such as the serial port communications settings and minimum cycle time setting.

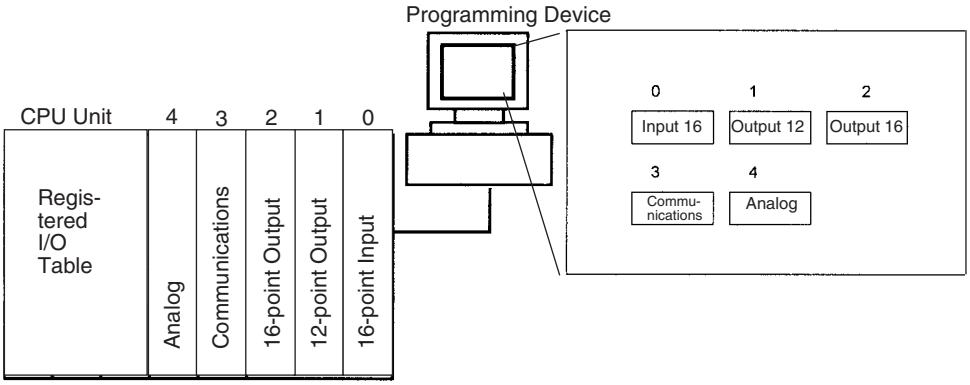
Note Refer to the Programming Device's Operation Manual for details on changing these settings.

9-22-2 Registered I/O Tables

The Registered I/O Tables are tables in the CPU Unit that contain the information on the model and slot location of all of the Units mounted to the CPU Rack and Expansion Rack. The I/O Tables are written to the CPU Unit with a Programming Device operation.

The CPU Unit allocates I/O memory to I/O points on Basic I/O Unit and CPU Bus Units based on the information in the Registered I/O Tables. Refer to the

Programming Device's Operation Manual for details on registering the I/O Tables.



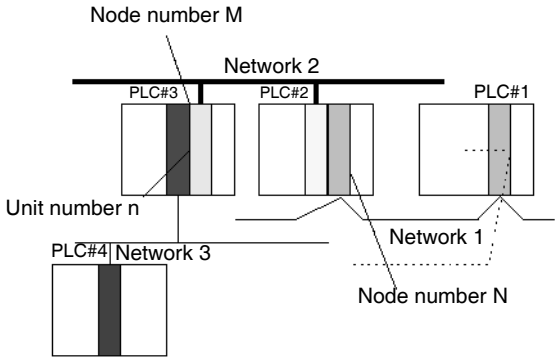
The I/O Setting Error Flag (A40110) will be turned ON if the models and locations of the Units actually mounted to the PLC (CPU Rack and Expansion Racks) do not match the information in the Registered I/O Table.

By default, the CJ-series CPU Unit will automatically create I/O tables at startup and operate according to them. I/O tables do not necessarily need to be created by the user.

9-22-3 Routing Tables

When transferring data between networks, it is necessary to create a table in each CPU Unit that shows the communications route from the local PLC's Communications Unit to the other networks. These tables of communications routes are called "Routing Tables."

Create the Routing Tables with a Programming Device or the Controller Link Support Software and transfer the tables to each CPU Unit. The following diagram shows the Routing Tables used for a data transfer from PLC #1 to PLC #4.



1,2,3... 1. Relay Network Table of PLC #1:

Destination network	Relay network	Relay node
3	1	N

2. Relay Network Table of PLC #2:

Destination network	Relay network	Relay node
3	2	M

3. Local Network Table of PLC #3:

Local network	Unit number
3	n

Relay Network Table

This table lists the network address and node number of the first relay node to contact in order to reach the destination network. The destination network is reached through these relay nodes.

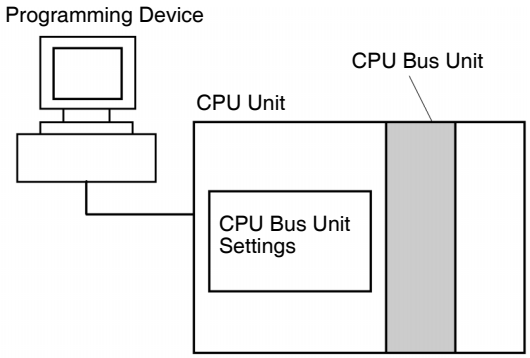
Local Network Table

This table lists the network address and unit number of the Communications Unit connected to the local PLC.

These are settings for the CPU Bus Units which are controlled by the CPU Unit. The actual settings depend on the model of CPU Bus Unit being used; refer to the Unit's Operation Manual for details.

9-22-4 CPU Bus Unit Setting

These settings are not managed directly like the I/O memory's data areas, but are set from a Programming Device (CX-Programmer or Programming Console) like the Registered I/O Table. Refer to the Programming Device's operation manual for details on changing these settings.



SECTION 10
CPU Unit Operation and the Cycle Time

This section describes the internal operation of the CPU Unit and the cycle used to perform internal processing.

10-1 CPU Unit Operation

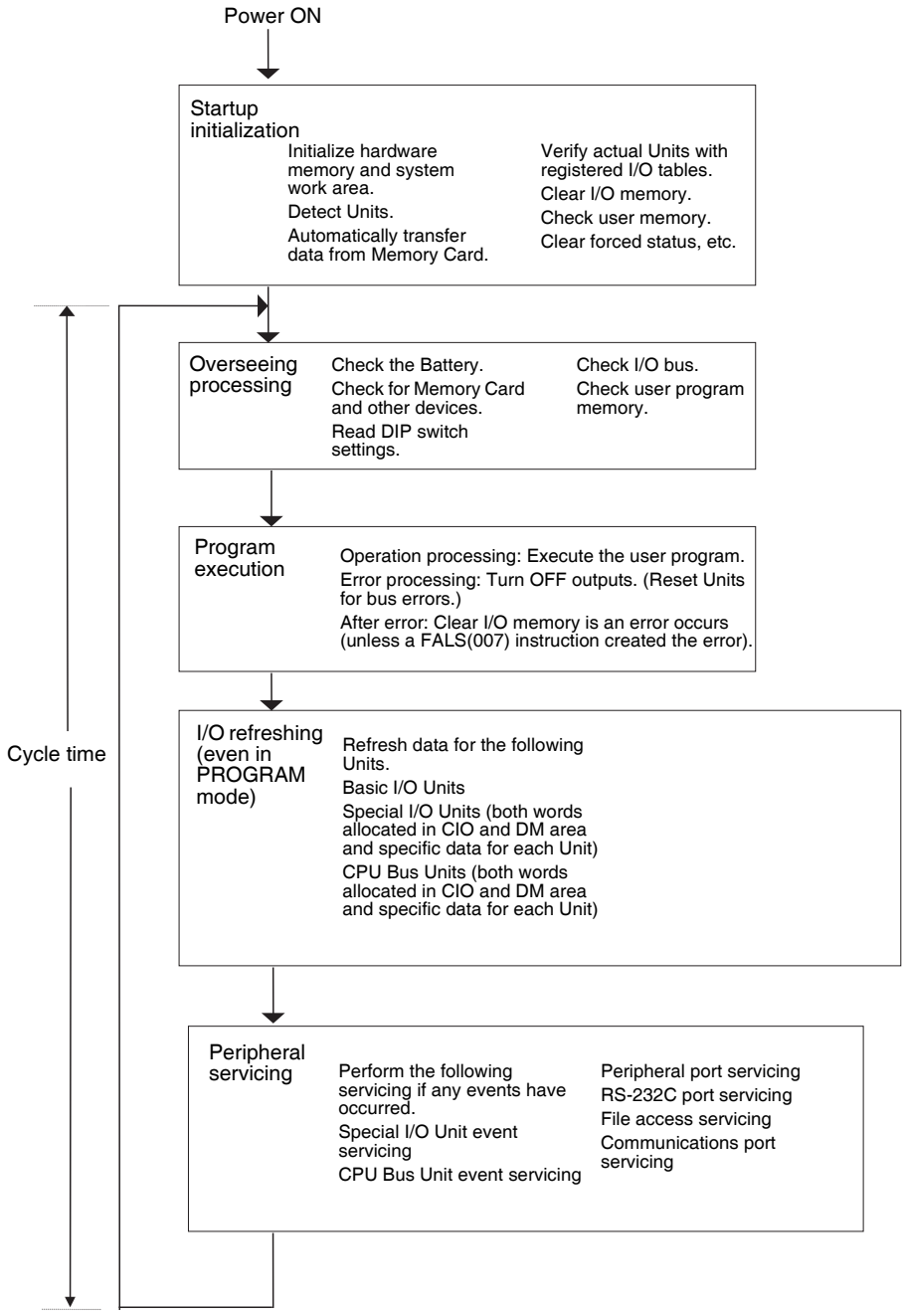
10-1-1 General Flow

The following flowchart shows the overall operation of the CPU Unit.

Note The CPU Unit's processing mode is set to Normal Mode, Parallel Processing with Synchronous Memory Access, or Parallel Processing with Asynchronous Memory Access in the PLC Setup (Programming Console address 219, bits 08 to 15). This setting is also possible from the CX-Programmer.

Normal Mode

In the normal mode, the program is executed before I/O is refreshed and peripherals are serviced. This cycle is executed repeatedly.



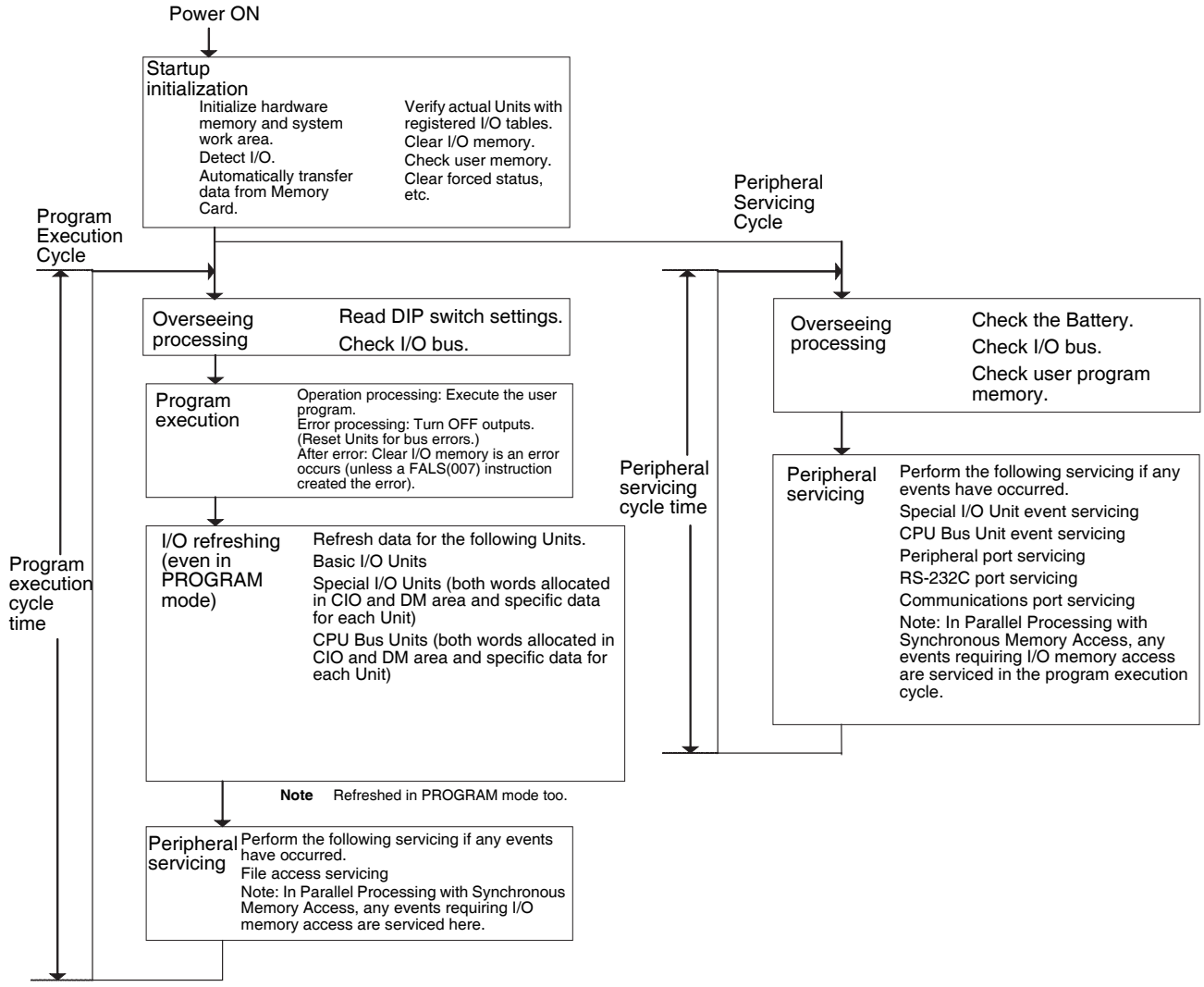
Parallel Processing (CJ1-H CPU Units Only)

The following two types of processing are performed in parallel in either of the Parallel Processing Modes.

1,2,3... 1. Program execution: Includes user program execution and I/O refreshing. It is this cycle time that is monitored from a Programming Device.

2. Peripheral servicing: Programming Devices and events from Special I/O Units and CPU Bus Units are serviced when they occur.

There are two different Parallel Processing Modes. Parallel Processing with Synchronous Memory Access refreshes I/O memory in the program execution cycle and Parallel Processing with Asynchronous Memory Access refreshes I/O memory in the peripheral servicing cycle.



Note Always disconnect the Programming Console from the peripheral port during actual system operation in a Parallel Processing Mode. If the Programming Console is left attached, excess time will be allocated to increase key response for the Programming Console, adversely affecting performance.

10-1-2 I/O Refreshing and Peripheral Servicing

I/O Refreshing

I/O refreshing involves cyclically transferring data with external devices using preset words in memory. I/O refreshing includes the following:

- Refreshing between Basic I/O Units and I/O words in the CIO Area
- Refreshing between Special I/O Units and CPU Bus Units, and the words allocated to these in the CIO Area (and for CPU Bus Units, words allocated in the DM Area)
- Refreshing Unit-specific data for Special I/O Units and CPU Bus Units.

All I/O refreshing is performed in the same cycle (i.e., time slicing is not used). I/O refreshing is always performed after program execution (even in a Parallel Processing Mode for CJ1-H CPU Units).

Units			Max. data exchange	Data exchange area
Basic I/O Units			Depends on the Unit.	I/O Bit Area
Special I/O Units	Words allocated in CIO Area		10 words/Unit (Depends on the Unit.)	Special I/O Unit Area
	Unit-specific data	DeviceNet Master Unit	Depends on the Unit.	Words set for remote I/O communications (for either fixed or user-set allocations)
		CompoBus/S Master Unit	Depends on the Unit.	Special I/O Units Area
CPU Bus Units	Words allocated in CIO Area		25 words/Unit	CJ-series CPU Bus Unit Area
	Words allocated in DM Area		100 words/Unit	CJ-series CPU Bus Unit Area
	Unit-specific data	Controller Link Unit and SYSMAC LINK Unit	Depends on the Unit.	Words set for data links (for either fixed or user-set allocations)
		DeviceNet Unit	Depends on the Unit.	Words set for remote I/O communications (for either fixed or user-set allocations)
		Serial Communications Unit	Depends on the protocol macros.	Communications data set for protocol macros
		Ethernet Unit	Depends on the Unit.	Communications data for socket services initiated by specific control bit operations.

Peripheral Servicing

Peripheral servicing involves servicing non-scheduled events for external devices. This includes both events from external devices and service requests to external devices.

Most peripheral servicing for CJ-series PLCs involved FINS commands. The specific amount of time set in the system is allocated to each type of servicing and executed every cycle. If all servicing cannot be completed within the allocated time, the remaining servicing is performed the next cycle.

Units	Servicing
Event servicing for Special I/O Units	Non-scheduled servicing for FINS commands from CJ-series Special I/O Units and CJ-series CPU Bus Units (e.g., requests to start external interrupt tasks)
Event servicing for CPU Bus Units	Non-scheduled servicing for FINS commands from the CPU Unit to the above Units.
Peripheral port servicing	Non-scheduled servicing for FINS or Host Link commands received via the peripheral or RS-232C ports from Programming Devices, PTs, or host computers (e.g., requests to transfer programming, monitoring, forced-set/reset operations, or online editing
RS-232C port servicing	Non-scheduled servicing from the CPU Unit transmitted from the peripheral or RS-232C port (non-solicited communications)
Communications port servicing	Servicing to execute network communications, serial communications, or file memory access for the SEND, RECV, CMND or PMCR instructions using communications ports 0 to 7 (internal logical ports) Servicing to execute background execution using communications ports 0 to 7 (internal logical ports) (CJ1-H and CJ1M CPU Units only)
File access servicing	File read/write operations for Memory Cards or EM file memory.

Note

1. Special I/O Units, CPU Bus Units, RS-232C communications ports, and file servicing is allocated 4% of the cycle time by default (the default can be changed). If servicing is separated over many cycles, delaying completion of the servicing, set the same allocated time (same time for all services) rather than a percentage under execute time settings in the PLC Setup.
2. In either of the Parallel Processing Modes for the CJ1-H CPU Unit, all peripheral servicing except for file access is performed in the peripheral servicing cycle.

10-1-3 Startup Initialization

The following initializing processes will be performed once each time the power is turned ON.

- Detect mounted Units.
- Compare the registered I/O tables and the actual Units.
- Clear the non-holding areas of I/O memory according to the status of the IOM Hold Bit. (See note 1.)
- Clear forced status according to the status of the Forced Status Hold Bit. (See note 2.)
- Autoboot using the autotransfer files in the Memory Card if one is inserted.
- Perform self-diagnosis (user memory check).
- Restore the user program. (See note 3.)

Note

1. The I/O memory is held or cleared according to the status of the IOM Hold Bit and the setting for IOM Hold Bit Status at Startup in the PLC Setup (read only when power is turned ON).

Auxiliary bit / PLC Setup setting		IOM Hold Bit (A50012)	
		Clear (OFF)	Hold (ON)
IOM Hold Bit Status at Startup (Programming Console address: Word 80, bit 15)	Clear (OFF)	At power ON: Clear At mode change: Clear	At power ON: Clear At mode change: Hold
	Hold (ON)		At power ON: Hold At mode change: Hold

   Mode Change: Between PROGRAMMING mode and RUN or MONITOR mode

2. The forced status held or cleared according to the status of the Force Status Hold Bit and the setting for Forced Status Hold Bit Status at Startup in the PLC Setup.

Auxiliary bit / PLC Setup setting		Forced Status Hold Bit (A50013)	
		Clear (OFF)	Hold (ON)
Forced Status Hold Bit Status at Startup (Programming Console address: Word 80, bit 14)	Clear (OFF)	At power ON: Clear At mode change: Clear	At power ON: Clear At mode change: Hold
	Hold (ON)		At power ON: Hold At mode change: Hold

   Mode Change: Between PROGRAMMING mode and MONITOR mode

3. If the CPU Unit is turned OFF after online editing before the backup process has been competed, an attempt will be made to recover the program when power is turned ON again. The BKUP indicator will light during this process. Refer to the *CS/CJ Series Programming Manual* (W394) for details.

10-2 CPU Unit Operating Modes

10-2-1 Operating Modes

The CPU Unit has three operating modes that control the entire user program and are common to all tasks.

PROGRAM: Programs are not executed and preparations, such as creating I/O tables, initializing the PLC Setup and other settings, transferring programs, checking programs, force-setting and force-resetting can be executed prior to program execution.

MONITOR: Programs are executed, but some operations, such as online editing, forced-set/reset, and changes to present values in I/O memory, are enabled for trial operation and other adjustments.

RUN: Programs are executed and some operations are disabled.

10-2-2 Status and Operations in Each Operating Mode

PROGRAM, RUN, and MONITOR are the three operating modes available in the CPU Unit. The following lists status and operations for each mode.

Overall Operation

Mode	Program (See note)	I/O refresh	External outputs	I/O Memory	
				Non-holding areas	Holding areas
PROGRAM	Stopped	Executed	OFF	Clear	Hold
MONITOR	Executed	Executed	Controlled by program	Controlled by program	
RUN	Executed	Executed	Controlled by program	Controlled by program	

Programming Console Operations

Mode	Monitor I/O Memory	Monitor Program	Transfer Program		Check Program	Create I/O Table
			PLC to Programming Device	Programming Device to PLC		
PROGRAM	**OK**	**OK**	**OK**	**OK**	**OK**	**OK**
MONITOR	**OK**	**OK**	**OK**	X	X	X
RUN	**OK**	**OK**	**OK**	X	X	X

Mode	PLC Setup	Modify Program	Force- set/ reset	Changing Timer/Counter SV	Changing Timer/Counter PV	Changing I/O Memory PV
PROGRAM	**OK**	**OK**	**OK**	**OK**	**OK**	**OK**
MONITOR	X	**OK**	**OK**	**OK**	**OK**	**OK**
RUN	X	X	X	X	X	X

Note The following table shows the relationship of operating modes to tasks.

Mode	Cyclic task status	Interrupt task status
PROGRAM	Disabled status (INI)	Stopped
MONITOR	• Any task that has not yet been executed, will be in disabled status (INI). • A task will go to READY status if the task is set to go to READY status at startup or the TASK ON (TKON) instruction has been executed for it. • A task in READY status will be executed (RUN status) when it obtains the right to execute. • A status will go to Standby status if a READY task is put into Standby status by a TASK OFF (TKOF) instruction.	Executed if interrupt condition is met.
RUN		

10-2-3 Operating Mode Changes and I/O Memory

Mode Changes	Non-holding areas	Holding Areas
	• I/O bits • Data Link bits • CPU Bus Unit bits • Special I/O Unit bits • Work bits • Timer PV/Completion Flags • Index Registers • Data Registers • Task Flags (Auxiliary Area bits/words are holding or non-holding depending on the address.)	• HR Area • DM Area • EM Area • Counter PV and Completion Flags (Auxiliary Area bits/words are holding or non-holding depending on the address.)
RUN or MONITOR to PROGRAM	Cleared (See note 1.)	Held
PROGRAM to RUN or MONITOR	Cleared (See note 1.)	Held
RUN to MONITOR or MONITOR to RUN	Held (See note 2.)	Held

Note
1. The following processing is performed depending on the status of the I/O Memory Hold Bit. Output from Output Units will be turned OFF when operation stops even if I/O bit status is held in the CPU Unit.
2. the cycle time will increase temporarily by approximately 10 ms when the operating mode is changed from MONITOR to RUN mode.

I/O Memory Hold Bit status (A50012)	I/O Memory			Output bits allocated to Output Units		
	Mode changed between PROGRAM and RUN/ MONITOR	Operation stopped		Mode changed between PROGRAM and RUN/ MONITOR	Operation stopped	
		Fatal error other than FALS	FALS executed		Fatal error other than FALS	FALS executed
OFF	Cleared	Cleared	Held	OFF	OFF	OFF
ON	Held	Held	Held	Held	OFF	OFF

Note See *Chapter 7 Memory Areas*, etc. for more details on I/O Memory.

10-3 Power OFF Operation

The following processing is performed if CPU Unit power is turned OFF. Power OFF processing will be performed if the power supply falls below 85% (80% for CJ1W-PD025 DC Power Supply Units or 90% for CJ1W-PD022 DC Power Supply Units) of the minimum rated voltage while the CPU Unit is in RUN or MONITOR mode.

1,2,3...
1. The CPU Unit will stop.
2. All outputs from Output Units will be turned OFF.

Note All output will turn OFF despite an I/O Memory Hold Bit or I/O Memory Hold Bit at power ON settings in the PLC Setup.

85% of the rated voltage:
85 V AC for 100 to 240 V (wide range)

DC Power Supply Units:
CJ1W-PD025: 19.2 V DC
CJ1W-PD022: 21.6 V DC

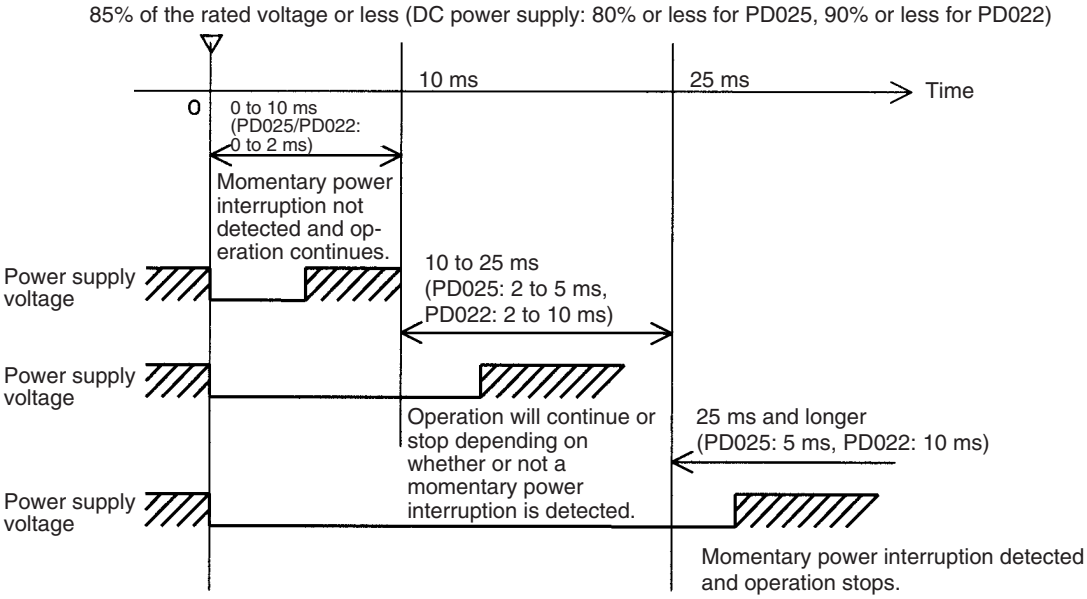
The following processing will be performed if power drops only momentarily (momentary power interruption).

1,2,3... 1. The system will continue to run unconditionally if the momentary power interruption lasts less than 10 ms, i.e., the time it takes the minimum rated voltage at 85% or less to return to 85% or higher is less than 10 ms.

Note When DC power supplies are used, less than 2 ms is required for the rated voltage of a CJ1W-PD025 at 80% or less to return to 80% or higher or for the rated voltage of a CJ1W-PD022 at 90% or less to return to 90% or higher.

2. A momentary power interruption that lasts more than 10 ms but less than 25 ms (when using a DC power supply, more than 2 ms but less than 5 ms for CJ1W-PD025 and more than 2 ms but less than 10 ms for CJ1W-PD022) is difficult to determine and a power interruption may or may not be detected.
3. The system will stop unconditionally if the momentary power interruption lasts more than 25 ms (when using a DC power supply, more than 5 ms for CJ1W-PD025 and more than 10 ms for CJ1W-PD022).

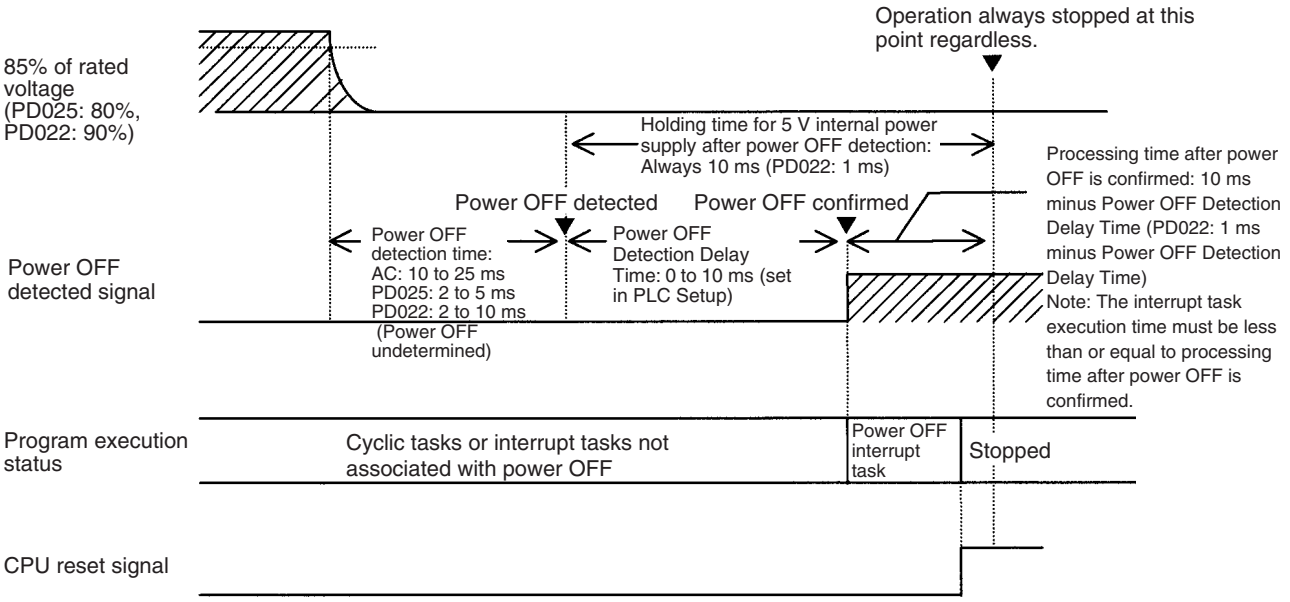
Therefore, the time required to detect a power interruption is 10 to 25 ms (when using a DC power supply, 2 to 5 ms for CJ1W-PD025 and 2 to 10 ms for CJ1W-PD022) If operation stops under the conditions given in items 2 and 3 above, the timing used to stop operation (or the timing used to start execution of the Power OFF Interrupt Task) can be delayed by setting the Power OFF Detection Delay Time (0 to 10 ms) in the PLC Setup. Operation, however, will always be stopped 10 ms after detecting a momentary power interruption regardless of the setting in the PLC Setup. The holding time for the 5-VDC outputs of CJ1W-PD022 Power Supply Units when a power interruption occurs is 1 ms, however, so bit 22515 (Power OFF Interrupt Task Disable Bit) and bits 22500 to 22507 (Power OFF Detection Time (Power OFF Detection Delay Time) Bits) cannot be used.



Note The above timing chart shows an example when the power OFF detection delay time is set to 0 ms.

The following timing chart shows the CPU Unit power OFF operation in more detail.

Power OFF Timing Chart



Power OFF Detection Time

The time it takes to detect power OFF after the power supply falls below 85% (80% for CJ1W-PD025 DC Power Supply Units or 90% for CJ1W-PD022 DC Power Supply Units) of the minimum rated voltage.

Power OFF Detection Delay Time

The delay time after power OFF is detected until it is confirmed. This can be set in the PLC Setup within a range from 0 to 10 ms.

If the power OFF interrupt task is disabled, then the CPU reset signal will turn ON and the CPU will be reset when this time expires.

If the power OFF interrupt task is enabled in the PLC Setup, then the CPU reset signal will turn ON and the CPU will be reset only after the power OFF interrupt task has been executed.

If an unstable power supply is causing power interruptions, set a longer Power OFF Detection Delay Time (10 ms max.) in the PLC Setup. The CJ1W-PD022 Power Supply Units only support a holding time of 1 ms, however, so this setting is not possible.

Power Holding Time

The maximum amount of time (fixed at 10 ms) that 5 V will be held internally after power shuts OFF. The time that it takes for the power OFF interrupt task to execute must not exceed 10 ms minus the Power OFF Detection Delay Time (processing time after power OFF is confirmed). The power OFF interrupt task will be ended even if it has not been completely executed the moment this time expires. The CJ1W-PD022 Power Supply Units only support a holding time of 1 ms, however, so this setting is not possible.

Description of Operation

1,2,3... 1. Power OFF will be detected if the 100 to 120 V AC, 200 to 240 V AC or 24-V DC power supply falls below 85% (80% for CJ1W-PD025 DC Power Supply Units or 90% for CJ1W-PD022 DC Power Supply Units) of the minimum rated voltage for the power OFF detection time (somewhere between 10 to 25 ms for AC Power Supply Units, somewhere between 2 to 5 ms for

CJ1W-PD025 DC Power Supply Units, and somewhere between 2 to 10 ms for CJ1W-PD022 DC Power Supply Units).

2. If the Power OFF Detection Delay Time is set (0 to 10 ms) in the PLC Setup, then the following operations will be performed when the set time expires.
   a) If the power OFF interrupt task is disabled (default PLC Setup setting) The CPU reset signal will turn ON and the CPU will be reset immediately.
   b) If the power OFF interrupt task is enabled (in the PLC Setup), the CPU reset signal will turn ON and the CPU will be reset after the power OFF interrupt task has been executed. Make sure that the power OFF interrupt task will finish executing within 10 ms minus the Power OFF Detection Delay Time = processing time after power OFF. The 5-V internal power supply will be maintained only for 10 ms after power OFF is detected. The holding time for the internal 5-V power supply of CJ1W-PD022 Power Supply Units when a power interruption occurs is 1 ms, however, so the Power OFF Detection Delay Time and Power OFF Interrupt Task Disable functions cannot be used.

10-3-1 Instruction Execution for Power Interruptions

If power is interrupted and the interruption is confirmed when the CPU Unit is operating in RUN or MONITOR mode, the instruction currently being executed will be completed (see note 1) and the following power interruption processing will be performed.

- If the power OFF interrupt task has not been enabled, the CPU Unit will be reset immediately.
- If the power OFF interrupt task has been enabled, the task will be executed and then the CPU Unit will be reset immediately.

The power OFF interrupt task is enabled and disabled in the PLC Setup.

Note

1. The current instruction can be completed only when the time required to complete execution is less than or equal to the processing time after power interruption detection (10 ms – power interruption detection delay time). If the instruction is not completed within this time, it will be interrupted and the above processing will be performed.
2. The processing time after a power interruption is detected is 1 ms when a CJ1W-PD022 is mounted.

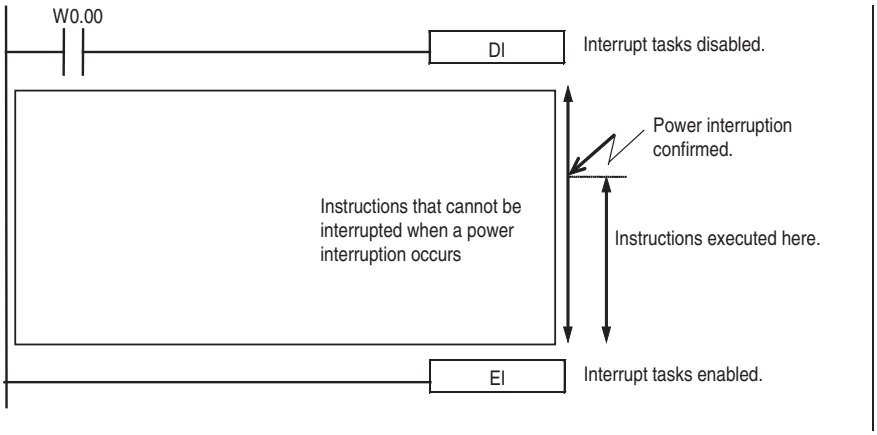
Disabling Power Interruption Processing in the Program

With CS1-H and CJ1M CPU Units, if the power OFF interrupt task is disabled, areas of the program can be protected from power interruptions so that the instructions will be executed before the CPU Unit performs power OFF processing even if the power supply is interrupted. This is achieved by using the DISABLE INTERRUPTS (DI(693)) and ENABLE INTERRUPTS (EI(694)) instructions.

The following procedure is used.

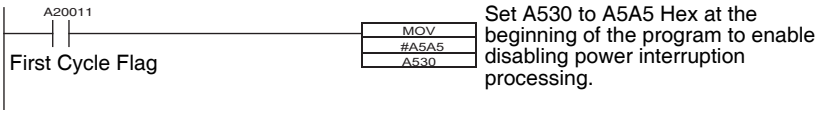
1,2,3...

1. Insert DI(693) before the program section to be protected to disable interrupts and then place EI(694) after the section to enable interrupts.



2. Set the Disable Setting for Power OFF Interrupts in A530 to A5A5 Hex to enable disabling power interruption processing.

   Note A530 is normally cleared when power is turned OFF. To prevent this, the IOM Hold Bit (A50012) must be turned ON and the PLC Setup must be set to maintain the setting of the IOM Hold Bit at Startup, or the following type of instruction must be included at the beginning of the program to set A530 to A5A5 Hex.



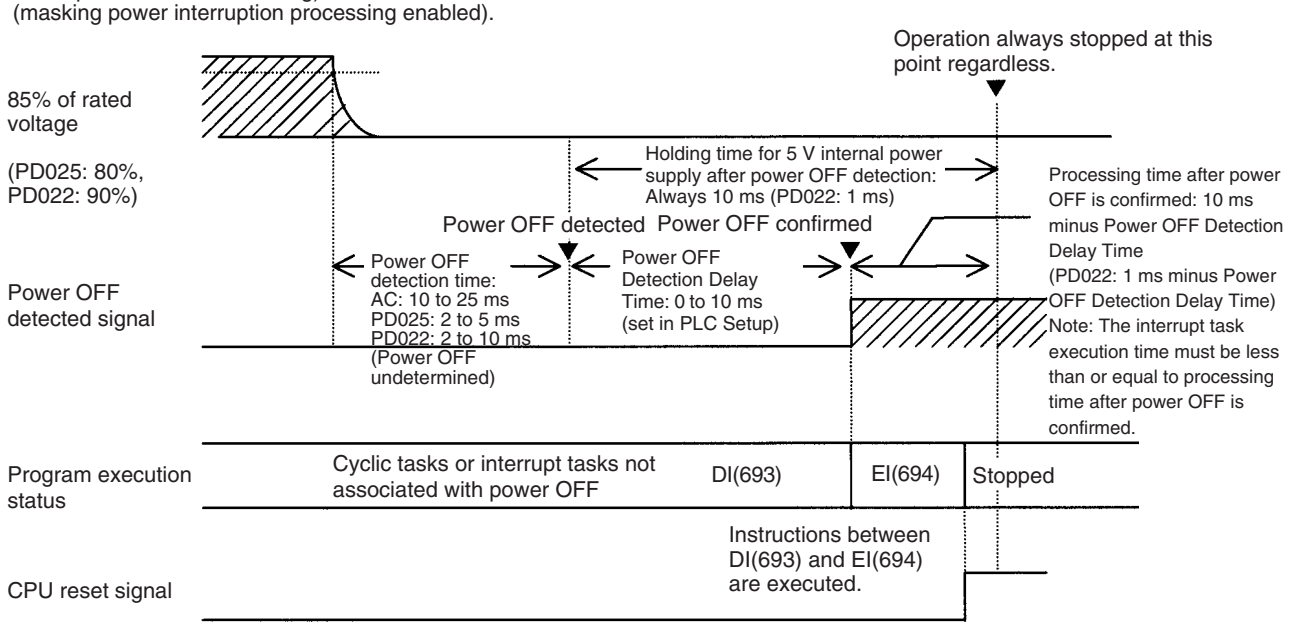
3. Disable the Power OFF Interrupt Task in the PLC Setup.

With the above procedure, all instructions between DI(693) and EI(694) (or END) will be completed (see note 1) before the Power OFF Interrupt is executed even if the power interruption occurs while executing the instructions between DI(693) and EI(694).

Note

1. The protected instructions can be completed only when the time required to complete execution is less than or equal to the processing time after power interruption detection (10 ms − power interruption detection delay time). If the instructions is not completed within this time, they will be interrupted and the above processing will be performed.
2. If the Power OFF Interrupt Task is not disabled in the PLC Setup, the Power OFF Interrupt Task will be executed, and the CPU Unit will be reset without executing the protected instructions as soon as the power interruption is detected.
3. If a power interrupt is detected while DI(693) is being executed, the CPU Unit will be reset without executing the protected instructions.
4. The processing time after a power interruption is detected is 1 ms when a CJ1W-PD022 is mounted.

The following example is for a CJ1-H CPU Unit with the power OFF interrupt enabled and A530 (Power Interrupt Disabled Area Setting) set to A5A5 hex (masking power interruption processing enabled).



Interrupt processing is performed according to the contents of A530 and the PLC Setup as shown below.

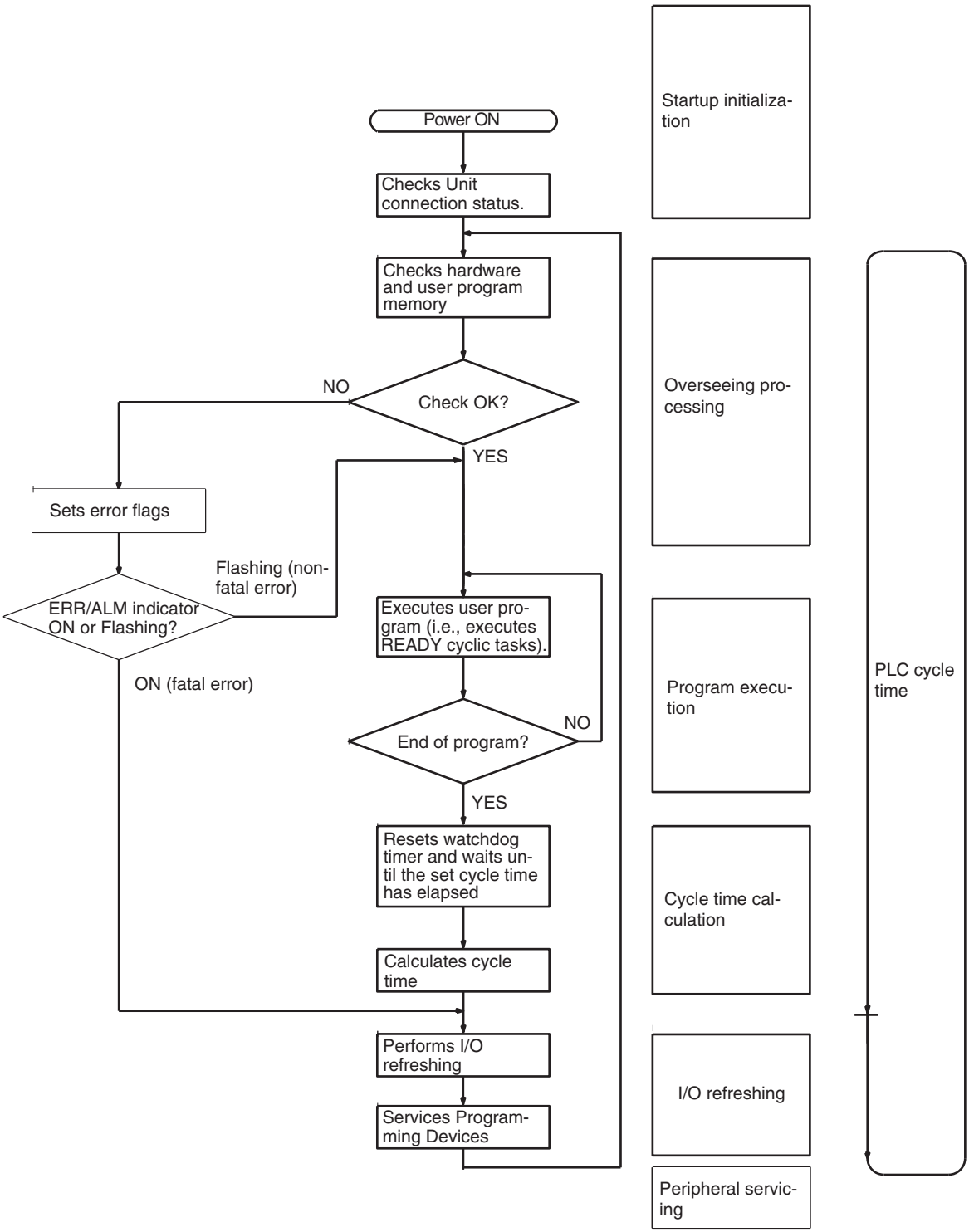
A530 (Power Interrupt Disabled Area Setting)		**A5A5 hex (masking power interruption processing enabled)**	**Not A5A5 hex**
Power OFF Interrupt Task (PLC Setup)	Disabled	All instructions between DI(693) and EI(694) are executed and the CPU Unit is reset.	Execution of the current instruction is completed and the CPU Unit is reset.
	Enabled	Execution of the current instruction is completed, the Power OFF Interrupt Task is executed, and the CPU Unit is reset.	

10-4 Computing the Cycle Time

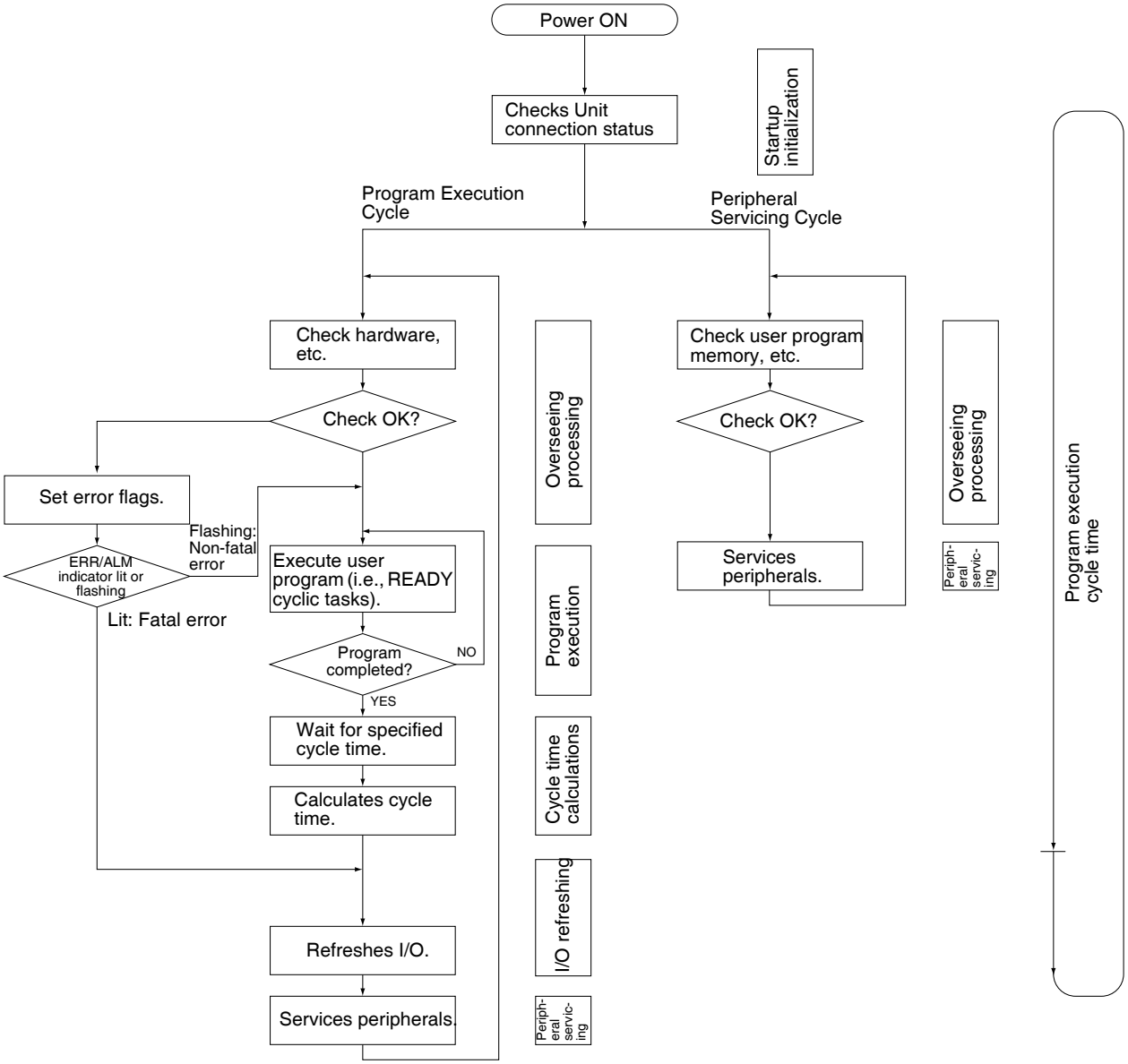
10-4-1 CPU Unit Operation Flowchart

The CJ-series CPU Units process data in repeating cycles from the overseeing processing up to peripheral servicing as shown in the following diagrams.

Normal Processing Mode



Parallel Processing Mode (CJ-H CPU Units Only)



10-4-2 Cycle Time Overview

Normal Processing Mode

The cycle time depends on the following conditions.

- Type and number of instructions in the user program (in all cyclic tasks that are executed during a cycle, and within interrupt tasks for which the execution conditions have been satisfied).
- Type and number of Basic I/O Units
- Type and number of Special I/O Units, CPU Bus Units, and type of services being executed.
- Specific servicing for the following Units
  - Data link refreshing and the number of data link words for Controller Link and SYSMAC LINK Units

- Remote I/O for DeviceNet (Master) Units and the number of remote I/O words
- Use of protocol macros and the largest communications message
- Socket services for specific control bits for Ethernet Units and the number of send/receive words

- Fixed cycle time setting in the PLC Setup
- File access in file memory, and the amount of data transferred to/from file memory
- Event servicing for Special I/O Units, CPU Bus Units, and communications ports
- Use of peripheral and RS-232C ports
- Fixed peripheral servicing time in the PLC Setup

Note
1. The cycle time is not affected by the number of tasks that are used in the user program. The tasks that affect the cycle time are those cyclic tasks that are READY in the cycle.
2. When the mode is switched from MONITOR mode to RUN mode, the cycle time will be extended by 10 ms (this will not, however, take the cycle time over its limit).

The cycle time is the total time required for the PLC to perform the 5 operations shown in the following tables.

Cycle time = (1) + (2) + (3) + (4) + (5)

1: Overseeing

Details	Processing time and fluctuation cause
Checks the I/O bus and user program memory, checks for battery errors and refreshes the clock.	CJ1-H-R CPU Unit: 0.13 ms CJ1-H CPU Unit: 0.3 ms CJ1M CPU Unit: 0.5 ms (See note.) CJ1 CPU Unit: 0.5 ms

Note With CPU22 and CPU23 models, the processing time is 0.6 ms while the pulse I/O function is used.

2: Program Execution

Details	Processing time and fluctuation cause
Executes the user program, and calculates the total time time taken for the instructions to execute the program.	Total instruction execution time

3: Cycle Time Calculation

Details	Processing time and fluctuation cause
Waits for the specified cycle time to elapse when a minimum (fixed) cycle time has been set in the PLC Setup. Calculates the cycle time.	When the cycle time is not fixed, the time for step 3 is approximately 0. When the cycle time is fixed, the time for step 3 is the preset fixed cycle time minus the actual cycle time ((1) + (2) + (4) + (5)).

4: I/O Refreshing

Details			Processing time and fluctuation cause
Basic I/O Units	Basic I/O Units are refreshed. Outputs from the CPU Unit to the I/O Unit are refreshed first for each Unit, and then inputs.		I/O refresh time for each Unit multiplied by the number of Units used.
Special I/O Units	Words allocated in CIO Area		I/O refresh time for each Unit multiplied by the number of Units used.
	Unit- specific data	CompoBus/S remote I/O	
CPU Bus Units	Words allocated in CIO and DM Areas		I/O refresh time for each Unit multiplied by the number of Units used.
	Unit- specific data	Data links for Controller Link and SYSMAC LINK Units, DeviceNet remote I/O for CJ-series DeviceNet Units, send/receive data for protocol macros, and socket services for specific control bits for Ethernet Units	I/O refresh time for each Unit multiplied by the number of Units used.

5: Peripheral Servicing

Details	Processing time and fluctuation cause
Services events for Special I/O Units. **Note** Peripheral servicing does not include I/O refreshing,	If a uniform peripheral servicing time hasn't been set in the PLC Setup for this servicing, 4% of the previous cycle's cycle time (calculated in step (3)) will be allowed for peripheral servicing. If a uniform peripheral servicing time has been set in the PLC Setup, servicing will be performed for the set time. At least 0.1 ms, however, will be serviced whether the peripheral servicing time is set or not. If no Units are mounted, the servicing time is 0 ms.
Services events for CPU Bus Units. **Note** Peripheral servicing does not include I/O refreshing.	Same as above.
Services events for peripheral ports.	If a uniform peripheral servicing time hasn't been set in the PLC Setup for this servicing, 4% of the previous cycle's cycle time (calculated in step (3)) will be allowed for peripheral servicing. If a uniform peripheral servicing time has been set in the PLC Setup, servicing will be performed for the set time. At least 0.1 ms, however, will be serviced whether the peripheral servicing time is set or not. If the ports are not connected, the servicing time is 0 ms.
Services RS-232C ports.	Same as above.
Services file access (Memory Card or EM file memory).	If a uniform peripheral servicing time hasn't been set in the PLC Setup for this servicing, 4% of the previous cycle's cycle time (calculated in step (3)) will be allowed for peripheral servicing. If a uniform peripheral servicing time has been set in the PLC Setup, servicing will be performed for the set time. At least 0.1 ms, however, will be serviced whether the peripheral servicing time is set or not. If there is no file access, the servicing time is 0 ms.
Services communications ports.	If a uniform peripheral servicing time hasn't been set in the PLC Setup for this servicing, 4% of the previous cycle's cycle time (calculated in step (3)) will be allowed for peripheral servicing. If a uniform peripheral servicing time has been set in the PLC Setup, servicing will be performed for the set time. At least 0.1 ms, however, will be serviced whether the peripheral servicing time is set or not. If no communications ports are used, the servicing time is 0 ms.

Parallel Processing with Asynchronous Memory Access (CJ1-H CPU Units Only)

Program Execution Cycle

The program execution cycle time depends on the following conditions.

- Type and number of instructions in the user program (in all cyclic tasks that are executed during a cycle, and within interrupt tasks for which the execution conditions have been satisfied).
- Type and number of Basic I/O Units
- Type and number of Special I/O Units, CJ-series CPU Bus Units, and type of services being executed.
- Specific servicing for the following Units
  - Data link refreshing and the number of data link words for Controller Link and SYSMAC LINK Units
  - Remote I/O for DeviceNet (Master) Units and the number of remote I/O words
  - Use of protocol macros and the largest communications message
  - Socket services for specific control bits for Ethernet Units and the number of send/receive words
- Fixed cycle time setting in the PLC Setup
- File access in file memory, and the amount of data transferred to/from file memory
- Fixed peripheral servicing time in the PLC Setup

The program execution cycle time is the total time required for the PLC to perform the five operations shown in the following tables.

Cycle time = (1) + (2) + (3) + (4) + (5)

Details			Processing time and fluctuation cause
(1)	Overseeing	I/O bus check, etc.	• CJ1H-CPU□□H-R: 0.28 ms • CJ1□-CPU□□H/CJ1G-CPU□□P: 0.3 ms
(2)	Program execution	Same as for Normal Mode.	Same as for Normal Mode.
(3)	Cycle time calculation	Waits for the specified cycle time.	Same as for Normal Mode.
(4)	I/O refreshing	Same as for Normal Processing Mode.	Same as for Normal Processing Mode.
(5)	Partial peripheral servicing	Servicing file access	Same as for Normal Processing Mode.

Peripheral Servicing Cycle Time

The peripheral servicing execution cycle time depends on the following conditions.

- Type and number of Special I/O Units, CJ-series CPU Bus Units, and type of services being executed.
- Type and frequency of event servicing requiring communications ports.
- Use of peripheral and RS-232C ports

The peripheral servicing cycle time is the total time required for the PLC to perform the five operations shown in the following tables.

Cycle time = (1) + (2)

Name		Processing		Processing time and fluctuation cause
(1)	Overseeing processing	Checks user program memory, checks for battery errors, etc.		• CJ1H-CPU□□H-R: 0.18 ms • CJ1□-CPU□□H/ CJ1G-CPU□□P: 0.2 ms
(2)	Peripheral servicing	Performs services for the events give at the right, including I/O memory access.	Events with CJ-series Special I/O Units (does not include I/O refreshing)	1.0 ms for each type of service If servicing ends before 1 ms has expired, the next type of servicing will be started immediately without waiting.
			Events with CJ-series CPU Bus Units (does not include I/O refreshing)	
			Peripheral port events	
			RS-232C port events	
			Events using communications ports	

Note

1. The cycle time display on a Programming Device is the Program Execution Cycle Time.
2. The peripheral service cycle time varies with the event load and number of Units that are mounted. In a Parallel Processing Mode, however, this variation will not affect the program execution cycle time.

Parallel Processing with Synchronous Memory Access (CJ1-H CPU Units Only)

Program Execution Cycle

The program execution cycle time depends on the same conditions as Parallel Processing with Asynchronous Memory Access.

The program execution cycle time is the total time required for the PLC to perform the five operations shown in the following tables.

Cycle time = (1) + (2) + (3) + (4) + (5)

Details			Processing time and fluctuation cause
(1)	Overseeing	I/O bus check, etc.	• CJ1H-CPU□□H-R: 0.28 ms • CJ1□-CPU□□H/ CJ1G-CPU□□P: 0.3 ms
(2)	Program execution	Same as for Normal Mode.	Same as for Normal Mode.
(3)	Cycle time calculation	Waits for the specified cycle time.	Same as for Normal Mode.
(4)	I/O refreshing	Same as for Normal Processing Mode.	Same as for Normal Mode.

Details				Processing time and fluctuation cause
(5)	Partial peripheral servicing	Servicing file access (Memory Card or EM file memory)		Same as for Normal Mode.
		Performs services for the events give at the right that requires I/O memory access	Events with Special I/O Units (does not include I/O refreshing)	
			Events with CPU Bus Units (does not include I/O refreshing)	
			Peripheral port events	
			RS-232C port events	
			Events using communications ports	

Peripheral Servicing Cycle Time

The peripheral servicing cycle time depends on the same conditions as Parallel Processing with Asynchronous Memory Access.

The peripheral servicing cycle time is the total time required for the PLC to perform the five operations shown in the following tables.

Cycle time = (1) + (2)

Name		Processing		Processing time and fluctuation cause
(1)	Overseeing processing	Checks user program memory, checks for battery errors, etc.		• CJ1H-CPU□□H-R: 0.18 ms • CJ1□-CPU□□H/ CJ1G-CPU□□P: 0.2 ms
(2)	Peripheral servicing	Performs services for the events give at the right, excluding those that require I/O memory access.	Events with Special I/O Units (does not include I/O refreshing)	1.0 ms for each type of service If servicing ends before 1 ms has expired, the next type of servicing will be started immediately without waiting.
			Events with CPU Bus Units (does not include I/O refreshing)	
			Peripheral port events	
			RS-232C port events	
			Events using communications ports	

Note

1. The cycle time display on a Programming Device is the Program Execution Cycle Time.
2. The peripheral service cycle time varies with the event load and number of Units that are mounted. In a Parallel Processing Mode, however, this variation will not affect the program execution cycle time.

10-4-3 I/O Unit Refresh Times for Individual Units

Typical Basic I/O Unit Refresh Times

Name	Model	I/O refresh time per Unit			
		CJ1-H-R	CJ1-H	CJ1M	CJ1
8/16-point DC Input Units	CJ1W-ID201/211	0.0014 ms	0.003 ms	0.003 ms	0.004 ms
32-point DC Input Units	CJ1W-ID231/232	0.0023 ms	0.005 ms	0.005 ms	0.006 ms
64-point DC Input Units	CJ1W-ID261/262	0.0041 ms	0.011 ms	0.011 ms	0.012 ms
8/16-point AC Input Units	CJ1W-IA201/111	0.0014 ms	0.003 ms	0.003 ms	0.004 ms
16-point Interrupt Input Units	CJ1W-INT01	0.0014 ms	0.003 ms	0.003 ms	0.004 ms
16-point Quick-response Input Units	CJ1W-IDP01	0.0014 ms	0.003 ms	0.003 ms	0.004 ms
8/16-point Relay Output Units	CJ1W-OC201/211	0.0014 ms	0.003 ms	0.003 ms	0.005 ms
8-point Triac Output Units	CJ1W-OA201	0.0014 ms	0.003 ms	0.003 ms	0.005 ms
8/16-point Transistor Output Units	CJ1W-OD201/202/203/204/211/212	0.0014 ms	0.003 ms	0.003 ms	0.005 ms
32-point Transistor Output Units	CJ1W-OD231/232/233	0.0023 ms	0.005 ms	0.005 ms	0.008 ms
64-point Transistor Output Units	CJ1W-OD261/262/263	0.0041 ms	0.011 ms	0.011 ms	0.015 ms
24-V DC Input/Transistor Output Units (16 inputs/16 outputs)	CJ1W-MD231/232/233	0.0023 ms	0.005 ms	0.005 ms	0.007 ms
24-V DC Input/Transistor Output Units (32 inputs/32 outputs)	CJ1W-MD261/263	0.0041 ms	0.011 ms	0.011 ms	0.014 ms
TTL Input/TTL Output Units (16 inputs/16 outputs)	CJ1W-MD563	0.0041 ms	0.011 ms	0.011 ms	0.014 ms
B7A Interface Unit (64 inputs)	CJ1W-B7A14	0.0041 ms	0.011 ms	0.011 ms	0.012 ms
B7A Interface Unit (64 outputs)	CJ1W-B7A04	0.0041 ms	0.011 ms	0.011 ms	0.015 ms
B7A Interface Unit (32 inputs/32 outputs)	CJ1W-B7A22	0.0041 ms	0.011 ms	0.011 ms	0.014 ms

Typical Special I/O Unit Refresh Times

Name	Model	I/O refresh time per Unit			
		CJ1-H-R	CJ1-H	CJ1M	CJ1
Analog Input Units	CJ1W-AD041/081(V1)	0.05 ms	0.12 ms	0.16 ms	0.20 ms
Analog Output Units	CJ1W-DA021/041/08V	0.05 ms	0.12 ms	0.16 ms	0.20 ms
Analog I/O Unit	CJ1W-MAD42	0.05 ms	0.12 ms	0.16 ms	0.20 ms
Temperature Control Units	CJ1W-TC□□□	0.26 ms	0.30 ms	0.36 ms	0.40 ms
Position Control Units	CJ1W-NC113/133	0.13 ms	0.14 ms	0.14 ms	0.18 ms
		+ 0.7 ms for each instruction (IOWR/ IORD) used to transfer data.			
	CJ1W-NC213/233	0.16 ms	0.18 ms	0.22 ms	0.26 ms
		+ 0.7 ms for each instruction (IOWR/ IORD) used to transfer data.			
	CJ1W-NC413/433	0.19 ms	0.22 ms	0.28 ms	0.34 ms
		+ 0.6 ms for each instruction (IOWR/ IORD) used to transfer data.			
ID Sensor Units	CJ1W-V600C11	0.11 ms	0.15 ms	0.20 ms	0.25 ms
	CJ1W-V600C12	0.14 ms	0.30 ms	0.40 ms	0.50 ms
High-speed Counter Unit	CJ1W-CT021	0.12 ms	0.14 ms	0.20 ms	0.20 ms
Process Input Unit	CJ1W-PH41U	0.3 ms	0.3 ms	0.4 ms	0.3 ms

Name	Model		I/O refresh time per Unit			
			CJ1-H-R	CJ1-H	CJ1M	CJ1
CompoNet Master Unit	CJ1W-CRM21	Communications mode No. 0	0.142 ms	CJ1H-H: 0.156 ms CJ1G-H: 0.189 ms	Low-end: 0.256 ms (See note 1.) Other: 0.233 ms	0.200 ms
		Communications mode No. 1	0.155 ms	CJ1H-H: 0.178 ms CJ1G-H: 0.211 ms	Low-end: 0.267 ms (See note 1.) Other: 0.256 ms	0.256 ms
		Communications mode No. 2	0.183 ms	CJ1H-H: 0.189 ms CJ1G-H: 0.233 ms	Low-end: 0.289 ms (See note 1.) Other: 0.267 ms	0.300 ms
		Communications mode No. 3	0.215 ms	CJ1H-H: 0.244 ms CJ1G-H: 0.289 ms	Low-end: 0.367 ms (See note 1.) Other: 0.322 ms	0.322 ms
		Communications mode No. 8 (See note 2.)	0.091 + (0.0012 × No. of words allocated) ms	CJ1H-H: 0.106 + (0.0012 × No. of words allocated) ms CJ1G-H: 0.109 + (0.0014 × No. of words allocated) ms	Low-end: 0.166 + (0.0016 × No. of words allocated) ms (See note 1.) Other: 0.100 + (0.0016 × No. of words allocated) ms	0.154 + (0.0022 × No. of words allocated) ms
CompoBus/S Master Unit	CJ1W-SRM21	Assigned 1 unit number	0.10 ms	0.12 ms	0.15 ms	0.15 ms
		Assigned 2 unit numbers	0.11 ms	0.13 ms	0.17 ms	0.17 ms

Note
1. CJ1M Low-end CPU Units: CJ1M-CPU11/21.
2. The number of words allocated is the actual number of words allocated in the I/O memory areas for all slaves.

Increase in Cycle Time Caused by CPU Bus Units

The increase in the cycle time will be the I/O refresh times from the following table plus the refresh time required for specific Unit functions.

Name	Model	Increase	Remarks
Controller Link Unit	CJ1W-CLK21(V1)	CJ1-H: 0.1 ms CJ1M: 0.15 ms CJ1: 0.2 ms	There will be an increase of 0.1 ms + 0.7 μs × number of data link words for CJ1-H and CJ1M CPU Units and 1.5 ms + 1 μs × number of data link words for CJ1 CPU Units. There will be an additional increase of the event execution times when message services are used.
Serial Communications Unit	CJ1W-SCU41-V1 CJ1W-SCU21-V1 CJ1W-SCU31-V1	CJ1-H: 0.22 ms CJ1M: 0.24 ms CJ1: 0.25 ms	There will be an increase of up to the following time when a protocol macro is executed: CJ1-H and CJ1M CPU Units: 0.7 μs × maximum number of data words sent or received (0 to 500 words) CJ1 CPU Units: 1 μs × maximum number of data words sent or received (0 to 500 words) There will be an increase of the event execution times when Host Links or 1:N NT Links are used.
Ethernet Unit	CJ1W-ETN11/21	CJ1-H: 0.1 ms CJ1M: 0.17 ms CJ1: 0.25 ms	If socket services are executed with software switches, there will be an increase of 1.4 μs × the number of bytes sent/received for CJ1-H and CJ1M CPU Units and 2 μs × the number of bytes sent/received for CJ1 CPU Units. There will be an increase in the event execution times when FINS communications services, socket services for CMND instructions, or FTP services are performed.

Name	Model	Increase	Remarks
FL-net Unit	CJ1W-FLN22	0.3 + No. of data link words × 0.0011 ms	The number of data link words is the number of words of data sent and received by a node. If the message service is used, the event execution time must be added separately.
DeviceNet Unit	CJ1W-DRM21	CJ1: 0.7 ms + 1 μs for each allocated word CJ1-H: 0.4 ms + 0.7 μs for each allocated word CJ1M: 0.5 ms + 0.7 μs for each allocated word	Include all words allocated to the slaves, including unused ones. For message communications, add the number of communications words to the calculations as the left.
Position Control Unit with MECHATROLINK-II Communications	CJ1W-NCF71	According to the number of Servo Driver axes connected to the Unit. 1 axis: 0.2 ms, 3 axes: 0.3 ms, 6 axes: 0.4 ms, 16 axes: 1.0 ms	---
Motion Control Unit with MECHATROLINK-II Communications	CJ1W-MCH71	No. of motion tasks × 6 × 0.001 + No. of axes × 0.001 + No. of words allocated for general I/O × 0.01 + 0.6 ms	---
SYSMAC SPU Unit	CJ1W-SPU01	0.2 ms + No. of sampled words × 0.8 μs	---

Note The influence on the cycle time for CJ1-H-R CPU Units for Special I/O Units and CPU Bus Units is the same as that for the CJ1-H CPU Units.

10-4-4 Cycle Time Calculation Example

Example 1: Application Based on Basic Instructions and Basic I/O Units

The following example shows the method used to calculate the cycle time when only Basic I/O Units are connected in the PLC and the program consists of 20K steps of basic and data movement instructions. Here, a CJ1H-CPU6□H-R CPU Unit is used.

Conditions

Item	Details	
CPU Unit	CJ1H-CPU6□H-R	
CJ-series CPU Rack	CJ1W-ID261 64-point Input Units	2 Units
	CJ1W-OD261 64-point Output Units	2 Units
User program	20 Ksteps	LD instructions: 10 Ksteps MOV instructions: 10 Ksteps **Note** • LD: Each instruction is 1 step. • MOV: Each instruction is 3 steps.
Peripheral port connection	Yes and no	
Fixed cycle time processing	No	
RS-232C port connection	No	
Peripheral servicing with other devices (Special I/O Units, CPU Bus Units, and file access)	No	

Calculation Example

Process name	Calculation	Processing time	
		With Programming Device	Without Programming Device
(1) Overseeing	---	0.13 ms	0.13 ms
(2) Program execution	0.016 μs × 10,000 + 0.14 μs/ 3 steps × 10,000	0.63 ms	0.63 ms
(3) Cycle time calculation	(Fixed cycle time not set)	0 ms	0 ms
(4) I/O refreshing	0.0039 ms × 2 + 0.0039 ms × 2	0.0164 ms	0.0164 ms
(5) Peripheral servicing	(Peripheral port connected only)	0.1 ms	0 ms
Cycle time	(1) + (2) + (3) + (4) + (5)	0.8764 ms	0.7764 ms

Example 2: Application Containing Calculations and Special I/O Units

The following example shows the method used to calculate the cycle time when Basic I/O Units and Special I/O Units are connected in the PLC and the program consists of 20K steps of basic instructions, data movement instructions, and floating-point calculation instructions. Here, a CJ1H-CPU6□H-R CPU Unit is used.

Conditions

Item	Details	
CPU Unit	CJ1H-CPU6□H-R	
CJ-series CPU Rack	CJ1W-ID261 64-point Input Units	2 Units
	CJ1W-OD261 64-point Output Units	2 Units
	CJ1W-AD081 Analog Input Unit	2 Units
	CJ1W-NC413 Position Control Unit	2 Units

Item	Details	
User program	20 Ksteps	LD instructions: 12 Ksteps MOV instructions: 6 Ksteps +F instructions: 2K steps **Note:** • LD: Each instruction is 1 step. • MOV: Each instruction is 3 steps. • +F: Each instruction is 4 steps
Peripheral port connection	Yes and no	
Fixed cycle time processing	No	
RS-232C port connection	No	
Peripheral servicing with other devices (Special I/O Units, CPU Bus Units, and file access)	No	

Calculation Example

Process name	Calculation	Processing time	
		With Programming Device	Without Programming Device
(1) Overseeing	---	0.13 ms	0.13 ms
(2) Program execution	0.016 μs × 12,000 + 0.14 μs/ 3 steps × 6,000 + 0.24 μs/ 4 steps × 2,000	0.59 ms	0.59 ms
(3) Cycle time calculation	(Fixed cycle time not set)	0 ms	0 ms
(4) I/O refreshing	0.0041 ms × 2 + 0.0041 ms × 2 + 0.05 ms × 2 + 0.19 ms × 2	0.4964 ms	0.4964 ms
(5) Peripheral servicing	(Peripheral port connected only)	0.1 ms	0 ms
Cycle time	(1) + (2) + (3) + (4) + (5)	1.3164 ms	1.2164 ms

10-4-5 Online Editing Cycle Time Extension

When online editing is executed from a Programming Device (such as Programming Console or CX-Programmer) while the CPU Unit is operating in MONITOR mode to change the program, the CPU Unit will momentarily suspend operation while the program is being changed. The period of time that the cycle time is extended is determined by the following conditions.

- Editing operations (insert/delete/overwrite).
- Types of instructions used.

The cycle time extension for online editing will be negligibly affected by the size of task programs.

The following table shows the maximum expected cycle time extension due to online editing when the maximum program size for each task is 64 Ksteps.

CPU Unit	Increase in cycle time for online editing
CJ1-H-R CPU Unit (CPU6□H-R)	8 ms
CPU6□H CJ1-H Unit (CPU6□)	8 ms
CPU4□H CJ1-H Unit (CPU4□)	11 ms
CJ1M CPU Unit	14 ms (Program size: 20 steps)
CJ1 CPU Unit	12 ms

When editing online, the cycle time will be extended by the time that operation is stopped.

Note When there is one task, online editing is processed all in the cycle time following the cycle in which online editing is executed (written). When there are multiple tasks (cyclic tasks and interrupt tasks), online editing is separated, so that for n tasks, processing is executed over n to n ×2 cycles max.

10-4-6 I/O Response Time

The I/O response time is the time it takes from when an Input Unit's input turns ON, the data is recognized by the CJ-series CPU Unit, and the user program is executed, up to the time for the result to be output to an Output Unit's output terminals.

The length of the I/O response time depends on the following conditions.

- Timing of Input Bit turning ON.
- Cycle time.
- Type of Rack to which Input and Output Units are mounted (CPU Rack, CPU Expansion Rack, Expansion Rack).

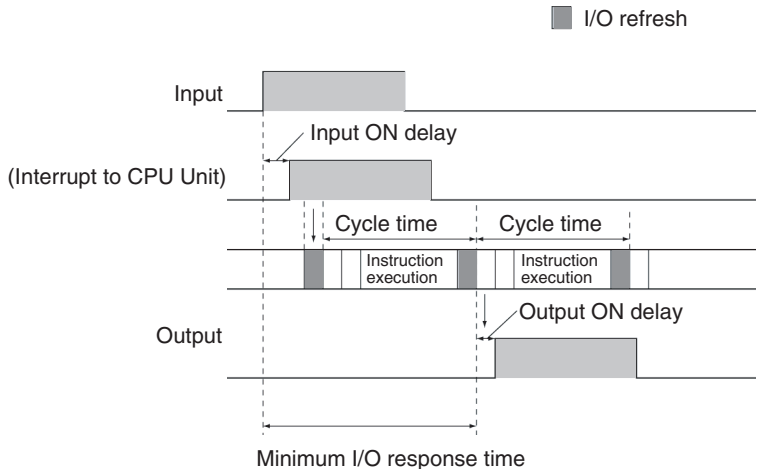
Basic I/O Units

Minimum I/O Response Time

The I/O response time is shortest when data is retrieved immediately before I/O refresh of the CPU Unit.

The minimum I/O response time is the total of the Input ON delay, the cycle time, and the Output ON delay.

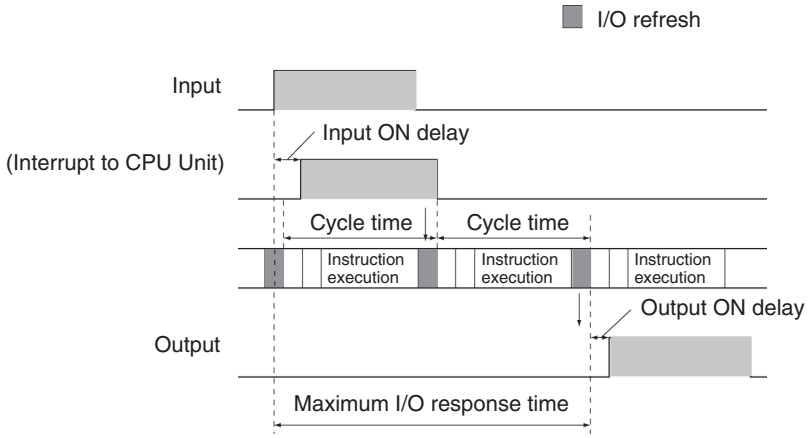
Note The Input and Output ON delay differs according to the Unit used.



Maximum I/O Response Time

The I/O response time is longest when data is retrieved immediately after I/O refresh of the Input Unit.

The maximum I/O response time is the total of the Input ON delay, (the cycle time × 2), and the Output ON delay.



Calculation Example

Conditions: Input ON delay 1.5 ms
Output ON delay 0.2 ms
Cycle time 20.0 ms

Minimum I/O response time = 1.5 ms + 20 ms + 0.2 ms = 21.7 ms

Maximum I/O response time = 1.5 ms + (20 ms × 2) + 0.2 ms = 41.7 ms

10-4-7 Interrupt Response Times

I/O Interrupt Tasks

The interrupt response time for I/O interrupt tasks is the time taken from when an input from a CJ1W-INT01 Interrupt Input Unit (or the built-in I/O in a CJ1M CPU Unit) has turned ON (or OFF) until the I/O interrupt task has actually been executed.

The length of the interrupt response time for I/O interrupt tasks depends on the following conditions.

When an Interrupt Input Unit is Used

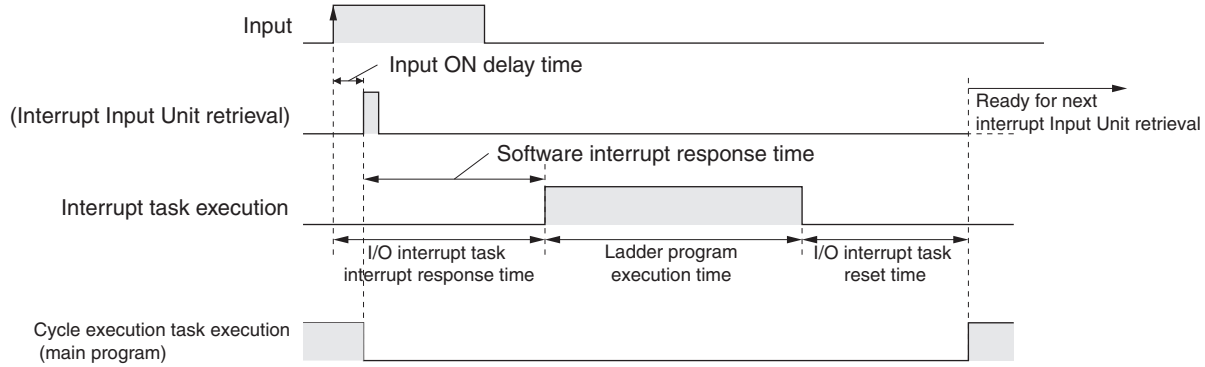
Item	CPU Unit	Time
Hardware response	CJ1-H-R CPU Unit	Upward differentiation: 0.05 ms, Downward differentiation: 0.5 ms
	CJ1-H CPU Units	
	CJ1M CPU Unit	
	CJ1 CPU Unit	
Software interrupt response	CJ1-H-R CPU Unit	40 μs
	CJ1-H CPU Units	124 μs
	CJ1M CPU Unit	169 μs
	CJ1 CPU Unit	320 μs

When CJ1M CPU Unit Built-in I/O is Used

Item	CPU Unit	Time
Hardware response	CJ1M CPU Unit	Upward differentiation: 0.03 ms, Downward differentiation: 0.15 ms
Software interrupt response	CJ1M CPU Unit	93 to 209 μs

Note I/O interrupt tasks can be executed (while an instruction is being executed, or by stopping the execution of an instruction) during execution of the user program, I/O refresh, peripheral servicing, or overseeing. The interrupt response time is not affected by the Input of the Interrupt Input Unit turning ON during any of the above processing operations.

Some I/O interrupts, however, are not executed during interrupt tasks even if the I/O interrupt conditions are satisfied. Instead, the I/O interrupts are executed in order of priority after the other interrupt task has completed execution and the software interrupt response time (1 ms max.) has elapsed.



The time from when the I/O interrupt task ladder program execution is completed until the cycle execution task resumes execution is 60 μs.

Scheduled Interrupt Tasks

The interrupt response time of scheduled interrupt tasks is the time taken from after the scheduled time specified by the MSKS(690) instruction has elapsed until the interrupt task has actually been executed.

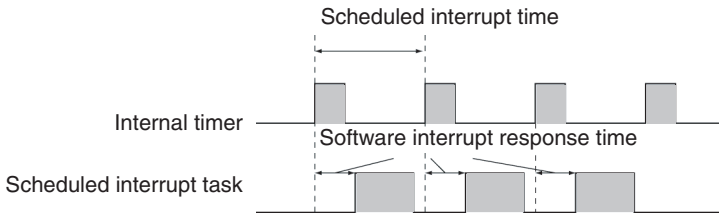
The maximum interrupt response time for scheduled interrupt tasks is 0.1 ms.

Also, there a deviation of 50 μs from the specified scheduled interrupt time (minimum of 0.2 ms, for CJ1-H-R CPU Units) due to the time interval required for actually starting the scheduled interrupt task.

Note Scheduled interrupt tasks can be executed (while an instruction is being executed, or by stopping the execution of an instruction) during execution of the user program, I/O refresh, peripheral servicing, or overseeing. The interrupt response time is not affected by the scheduled time elapsing during any of the above processing operations.

Some scheduled interrupts, however, are not executed during other interrupt tasks even if the scheduled interrupt conditions are satisfied. Instead, the scheduled interrupt is executed after the other interrupt task has completed execution and the software interrupt response time (1 ms max.) has elapsed.

The interrupt response time for scheduled interrupt tasks is the software interrupt response time (1 ms max.).



External Interrupt Tasks

The interrupt response time for external interrupt tasks differs depending on the Unit (Special I/O Unit or CJ-series CPU Bus Unit) that is requesting the external interrupt task of the CPU Unit and the type of service requested by the interrupt. For details, refer to the appropriate operation manual for the Unit being used.

Power OFF Interrupt Tasks

Power OFF interrupt tasks are executed within 0.1 ms of the power being confirmed as OFF.

10-4-8 Serial PLC Link Response Time

The I/O response time between CPU Units (Polling Unit to Polled Unit, or Polled Unit to Polling Unit) connected in Serial PLC Link (CJ1M CPU Units only) can be found by means of the formulas provided below. The values will vary, however, if a PT is connected in the Serial PLC Links, because the amount of communications data is not fixed.

- Maximum I/O response time (not including hardware delays):
  Polling Unit cycle time + Communications cycle time + Polled Unit cycle time + 4 ms
- Minimum I/O response time (not including hardware delays):
  Polled Unit communications time + 1.2 ms

Number of connected Polled Units	The number of Polled Units connected in the Link, within the maximum number of Units that can be set for the Polling Unit.
Number of disconnected Polled Units	The number of Polled Units disconnected from the Link, within the maximum number of Units that can be set for the Polling Unit.
Communications cycle time (Unit: ms)	Polled Unit communications time × Number of connected Polled Units + 10 × Number of disconnected Polled Units
Polled Unit communications time (Unit: ms)	When communications speed is “standard”: 0.6 + 0.286 × (Number of Polled Units + 1) × Number of Link words × 2 + 12 When communications speed is “high speed”: 0.6 + 0.0955 × (Number of Polled Units + 1) × Number of Link words × 2 + 12

10-5 Instruction Execution Times and Number of Steps

The following table lists the execution times for all instructions that are available for CJ PLCs.

The total execution time of instructions within one whole user program is the process time for program execution when calculating the cycle time (See note.).

Note User programs are allocated tasks that can be executed within cyclic tasks and interrupt tasks that satisfy interrupt conditions.

Execution times for most instructions differ depending on the CPU Unit used (CJ1H-CPU6□H-R, CJ1H-CPU6□H, CJ1H-CPU4□H, CJ1M-CPU□□ and CJ1G-CPU4□) and the conditions when the instruction is executed. The top line for each instruction in the following table shows the minimum time required to process the instruction and the necessary execution conditions, and the bottom line shows the maximum time and execution conditions required to process the instruction.

The execution time can also vary when the execution condition is OFF.

The following table also lists the length of each instruction in the *Length (steps)* column. The number of steps required in the user program area for each of the CJ-series instructions varies from 1 to 15 steps, depending upon the instruction and the operands used with it. The number of steps in a program is not the same as the number of instructions.

Note

1. Program capacity for CJ-series PLCs is measured in steps, whereas program capacity for previous OMRON PLCs, such as the C-series and CV-series PLCs, was measured in words. Basically speaking, 1 step is equivalent to 1 word. The amount of memory required for each instruction, however, is different for some of the CJ-series instructions, and inaccuracies

will occur if the capacity of a user program for another PLC is converted for a CJ-series PLC based on the assumption that 1 word is 1 step. Refer to the information at the end of *10-5 Instruction Execution Times and Number of Steps* for guidelines on converting program capacities from previous OMRON PLCs.

2. Most instructions are supported in differentiated form (indicated with ↑, ↓, @, and %). Specifying differentiation will increase the execution times by the following amounts.

Symbol	CJ1-H			CJ1M	CJ1
	CPU6□H-R	CPU6□H	CPU4□H	CPU□□	CPU4□
↑ or ↓	+0.24 μs	+0.24 μs	+0.32 μs	+0.5 μs	+0.45 μs
@ or %	+0.24 μs	+0.24 μs	+0.32 μs	+0.5 μs	+0.33 μs

3. Use the following times as guidelines when instructions are not executed.

CJ1-H			CJ1M	CJ1
CPU6□H-R	CPU6□H	CPU4□H	CPU□□	CPU4□
Approx. 0.1 μs	Approx. 0.1 μs	Approx. 0.2 μs	Approx. 0.2 to 0.5 μs	Approx. 0.2 to 0.4 μs

10-5-1 Sequence Input Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
LOAD	LD	---	1	0.016	0.02	0.04	0.08	0.10	0.10	---
	!LD	---	2	+21.14	+21.14	+21.16	+21.16	+24.10	+28.07	Increase for immediate refresh
LOAD NOT	LD NOT	---	1	0.016	0.02	0.04	0.08	0.10	0.10	---
	!LD NOT	---	2	+21.14	+21.14	+21.16	+21.16	+24.10	+28.07	Increase for immediate refresh
AND	AND	---	1	0.016	0.02	0.04	0.08	0.10	0.10	---
	!AND	---	2	+21.14	+21.14	+21.16	+21.16	+24.10	+28.07	Increase for immediate refresh
AND NOT	AND NOT	---	1	0.016	0.02	0.04	0.08	0.10	0.10	---
	!AND NOT	---	2	+21.14	+21.14	+21.16	+21.16	+24.10	+28.07	Increase for immediate refresh
OR	OR	---	1	0.016	0.02	0.04	0.08	0.10	0.10	---
	!OR	---	2	+21.14	+21.14	+21.16	+21.16	+24.10	+28.07	Increase for immediate refresh
OR NOT	OR NOT	---	1	0.016	0.02	0.04	0.08	0.10	0.10	---
	!OR NOT	---	2	+21.14	+21.14	+21.16	+21.16	+24.10	+28.07	Increase for immediate refresh
AND LOAD	AND LD	---	1	0.016	0.02	0.04	0.08	0.05	0.05	---
OR LOAD	OR LD	---	1	0.016	0.02	0.04	0.08	0.05	0.05	---
NOT	NOT	520	1	0.016	0.02	0.04	0.08	0.05	0.05	---
CONDITION ON	UP	521	3	0.24	0.3	0.42	0.54	0.50	0.50	---
CONDITION OFF	DOWN	522	4	0.24	0.3	0.42	0.54	0.50	0.50	---
LOAD BIT TEST	LD TST	350	4	0.11	0.14	0.24	0.37	0.35	0.35	---
LOAD BIT TEST NOT	LD TSTN	351	4	0.11	0.14	0.24	0.37	0.35	0.35	---
AND BIT TEST NOT	AND TSTN	351	4	0.11	0.14	0.24	0.37	0.35	0.35	---
OR BIT TEST	OR TST	350	4	0.11	0.14	0.24	0.37	0.35	0.35	---
OR BIT TEST NOT	OR TSTN	351	4	0.11	0.14	0.24	0.37	0.35	0.35	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table

10-5-2 Sequence Output Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
OUTPUT	OUT	---	1	0.016	0.02	0.04	0.21	0.35	0.35	---
	!OUT	---	2	+21.37	+21.37	+21.37	+21.37	+23.07	+28.60	Increase for immediate refresh
OUTPUT NOT	OUT NOT	---	1	0.016	0.02	0.04	0.21	0.35	0.35	---
	!OUT NOT	---	2	+21.37	+21.37	+21.37	+21.37	+23.07	+28.60	Increase for immediate refresh
KEEP	KEEP	011	1	0.048	0.06	0.08	0.29	0.40	0.40	---
DIFFERENTIATE UP	DIFU	013	2	0.21	0.24	0.40	0.54	0.50	0.50	---
DIFFERENTIATE DOWN	DIFD	014	2	0.21	0.24	0.40	0.54	0.50	0.50	---
SET	SET	---	1	0.016	0.02	0.06	0.21	0.30	0.30	---
	!SET	---	2	+21.37	+21.37	+21.37	+21.37	+23.17	+28.60	Increase for immediate refresh
RESET	RSET	---	1	0.016	0.02	0.06	0.21	0.30	0.30	Word specified
	!RSET	---	2	+21.37	+21.37	+21.37	+21.37	+23.17	+28.60	Increase for immediate refresh
MULTIPLE BIT SET	SETA	530	4	5.8	5.8	6.1	7.8	11.8	11.8	With 1-bit set
				25.7	25.7	27.2	38.8	64.1	64.1	With 1,000-bit set
MULTIPLE BIT RESET	RSTA	531	4	5.7	5.7	6.1	7.8	11.8	11.8	With 1-bit reset
				25.8	25.8	27.1	38.8	64.0	64.0	With 1,000-bit reset
SINGLE BIT SET	SETB	532	2	0.19	0.24	0.34	---	0.5	0.5	---
	!SETB		3	+21.44	+21.44	+21.54	---	+23.31	+23.31	---
SINGLE BIT RESET	RSTB	533	2	0.19	0.24	0.34	---	0.5	0.5	---
	!RSTB		3	+21.44	+21.44	+21.54	---	+23.31	+23.31	---
SINGLE BIT OUTPUT	OUTB	534	2	0.19	0.22	0.32	---	0.45	0.45	---
	!OUTB		3	+21.42	+21.42	+21.52	---	+23.22	+23.22	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-3 Sequence Control Instructions

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
END	END	001	1	5.5	5.5	6.0	4.0	7.9	7.9	---
NO OPERATION	NOP	000	1	0.016	0.02	0.04	0.12	0.05	0.05	---
INTERLOCK	IL	002	1	0.048	0.06	0.06	0.12	0.15	0.15	---
INTERLOCK CLEAR	ILC	003	1	0.048	0.06	0.06	0.12	0.15	0.15	---
MULTI-INTERLOCK DIFFERENTIATION HOLD (See note 2.)	MILH	517	3	6.1	6.1	6.5	---	10.3	11.7	During interlock
				7.5	7.5	7.9	---	13.3	14.6	Not during interlock and interlock not set
				8.9	8.9	9.7	---	16.6	18.3	Not during interlock and interlock set
MULTI-INTERLOCK DIFFERENTIATION RELEASE (See note 2.)	MILR	518	3	6.1	6.1	6.5	---	10.3	11.7	During interlock
				7.5	7.5	7.9	---	13.3	14.6	Not during interlock and interlock not set
				8.9	8.9	9.7	---	16.6	18.3	Not during interlock and interlock set
MULTI-INTERLOCK CLEAR (See note 2.)	MILC	519	2	5.0	5.0	5.6	---	8.3	12.5	Interlock not cleared
				5.7	5.7	6.2	---	9.6	14.2	Interlock cleared
JUMP	JMP	004	2	0.31	0.38	0.48	8.1	0.95	0.95	---
JUMP END	JME	005	2	---	---	---	---	---	---	---
CONDITIONAL JUMP	CJP	510	2	0.31	0.38	0.48	7.4	0.95	0.95	When JMP condition is satisfied

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
CONDITIONAL JUMP NOT	CJPN	511	2	0.31	0.38	0.48	8.5	0.95	0.95	When JMP condition is satisfied
MULTIPLE JUMP	JMP0	515	1	0.048	0.06	0.06	0.12	0.15	0.15	---
MULTIPLE JUMP END	JME0	516	1	0.048	0.06	0.06	0.12	0.15	0.15	---
FOR LOOP	FOR	512	2	0.18	0.21	0.21	0.21	1.00	1.00	Designating a constant
BREAK LOOP	BREAK	514	1	0.048	0.12	0.12	0.12	0.15	0.15	---
NEXT LOOP	NEXT	513	1	0.14	0.18	0.18	0.18	0.45	0.45	When loop is continued
				0.18	0.22	0.22	0.22	0.55	0.55	When loop is ended

Note 1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.

2. Supported only by CPU Units Ver. 2.0 or later.

10-5-4 Timer and Counter Instructions

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
HUNDRED-MS TIMER	TIM	---	3	0.45	0.56	0.88	0.42	1.30	1.30	---
	TIMX	550		0.45						
TEN-MS TIMER	TIMH	015	3	0.70	0.88	1.14	0.42	1.80	1.80	---
	TIMHX	551		0.46	0.56	0.88	0.42	1.30	1.30	
ONE-MS TIMER	TMHH	540	3	0.69	0.86	1.12	0.42	1.75	1.75	---
	TMHHX	552		0.46	0.56	0.88	0.42	1.30	1.30	
TENTH-MS TIMER (See note 2.)	TIMU	541	3	0.45	---	---	---	---	---	---
	TIMUX	556		0.45						
HUNDREDTH-MS TIMER (See note 2.)	TMUH	544	3	0.45	---	---	---	---	---	---
	TMUHX	557		0.45						
ACCUMULATIVE TIMER	TTIM	087	3	16.1	16.1	17.0	21.4	27.4	30.9	---
				10.9	10.9	11.4	14.8	19.0	21.2	When resetting
				8.5	8.5	8.7	10.7	15.0	16.6	When interlocking
	TTIMX	555		16.1	16.1	17.0	21.4	27.4	---	---
				10.9	10.9	11.4	14.8	19.0	---	When resetting
				8.5	8.5	8.7	10.7	15.0	---	When interlocking
LONG TIMER	TIML	542	4	7.6	7.6	10.0	12.8	16.3	17.2	---
				6.2	6.2	6.5	7.8	13.8	15.3	When interlocking
	TIMLX	553		7.6	7.6	10.0	12.8	16.3	---	---
				6.2	6.2	6.5	7.8	13.8	---	When interlocking
MULTI-OUTPUT TIMER	MTIM	543	4	20.9	20.9	23.3	26.0	38.55	43.3	---
				5.6	5.6	5.8	7.8	12.9	13.73	When resetting
	MTIMX	554		20.9	20.9	23.3	26.0	38.55	---	---
				5.6	5.6	5.8	7.8	12.9	---	When resetting
COUNTER	CNT	---	3	0.51	0.56	0.88	0.42	1.30	1.30	---
	CNTX	546		0.51					---	
REVERSIBLE COUNTER	CNTR	012	3	16.9	16.9	19.0	20.9	31.8	27.2	---
	CNTRX	548							---	
RESET TIMER/ COUNTER	CNR	545	3	9.9	9.9	10.6	13.9	14.7	17.93	When resetting 1 word
				4.16 ms	4.16 ms	4.16 ms	5.42 ms	6.21 ms	6.30 ms	When resetting 1,000 words
	CNRX	547		9.9	9.9	10.6	13.9	14.7	17.93	When resetting 1 word
				4.16 ms	4.16 ms	4.16 ms	5.42 ms	6.21 ms	6.30 ms	When resetting 1,000 words

Note 1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.

2. CJ1-H-R CPU Units only.

10-5-5 Comparison Instructions

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
Input Comparison Instructions (unsigned)	LD, AND, OR +=	300	4	0.08	0.10	0.16	0.37	0.35	0.35	---
	LD, AND, OR + <>	305								
	LD, AND, OR + <	310								
	LD, AND, OR +<=	315								
	LD, AND, OR +>	320								
	LD, AND, OR +>=	325								
Input Comparison Instructions (double, unsigned)	LD, AND, OR +=+L	301	4	0.08	0.10	0.16	0.54	0.35	0.35	---
	LD, AND, OR +<>+L	306								
	LD, AND, OR +<+L	311								
	LD, AND, OR +<=+L	316								
	LD, AND, OR +>+L	321								
	LD, AND, OR +>=+L	326								
Input Comparison Instructions (signed)	LD, AND, OR +=+S	302	4	0.08	0.10	0.16	6.50	0.35	0.35	---
	LD, AND, OR +<>+S	307								
	LD, AND, OR +<+S	312								
	LD, AND, OR +<=	317								
	LD, AND, OR +>+S	322								
	LD, AND, OR +>=+S	327								
Input Comparison Instructions (double, signed)	LD, AND, OR +=+SL	303	4	0.08	0.10	0.16	6.50	0.35	0.35	---
	LD, AND, OR +<>+SL	308								
	LD, AND, OR +<+SL	313								
	LD, AND, OR +<=+SL	318								
	LD, AND, OR +>+SL	323								
	LD, AND, OR +>=+SL	328								
Time Comparison Instructions (See note 2.)	=DT	341	4	25.1	25.1	36.4	---	18.8	39.6	---
	<>DT	342	4	25.2	25.2	36.4	---	45.6	40.6	---
	<DT	343	4	25.2	25.2	36.4	---	45.6	40.7	---
	<=DT	344	4	25.2	25.2	36.4	---	18.8	39.6	---
	>DT	345	4	25.1	25.1	36.4	---	45.6	41.1	---
	>=DT	346	4	25.2	25.2	36.4	---	18.8	39.6	---
COMPARE	CMP	020	3	0.032	0.04	0.04	0.29	0.10	0.10	---
	!CMP	020	7	+42.1	42.1	42.1	42.4	+45.2	45.2	Increase for immediate refresh

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
DOUBLE COMPARE	CMPL	060	3	0.064	0.08	0.08	0.46	0.50	0.50	---
SIGNED BINARY COMPARE	CPS	114	3	0.064	0.08	0.08	6.50	0.30	0.30	---
	!CPS	114	7	+35.9	35.9	35.9	42.4	+45.2	45.2	Increase for immediate refresh
DOUBLE SIGNED BINARY COMPARE	CPSL	115	3	0.064	0.08	0.08	6.50	0.50	0.50	---
TABLE COMPARE	TCMP	085	4	14.0	14.0	15.2	21.9	29.77	32.13	---
MULTIPLE COMPARE	MCMP	019	4	20.5	20.5	22.8	31.2	45.80	48.67	---
UNSIGNED BLOCK COMPARE	BCMP	068	4	21.5	21.5	23.7	32.6	47.93	51.67	---
EXPANDED BLOCK COMPARE	BCMP2	502	4	8.4	---	---	---	13.20	19.33	Number of data words: 1
				313.0	---	---	---	650.0	754.67	Number of data words: 255
AREA RANGE COMPARE	ZCP	088	3	5.3	5.3	5.4	---	11.53	12.43	---
DOUBLE AREA RANGE COMPARE	ZCPL	116	3	5.5	5.5	6.7	---	11.28	11.90	---

Note 1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.

2. Supported only by CPU Units Ver. 2.0 or later.

10-5-6 Data Movement Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
MOVE	MOV	021	3	0.14	0.18	0.20	0.29	0.30	0.30	---
	!MOV	021	7	+21.38	21.38	21.40	42.36	+35.1	43.0	Increase for immediate refresh
DOUBLE MOVE	MOVL	498	3	0.26	0.32	0.34	0.50	0.60	0.60	---
MOVE NOT	MVN	022	3	0.14	0.18	0.20	0.29	0.35	0.35	---
DOUBLE MOVE NOT	MVNL	499	3	0.26	0.32	0.34	0.50	0.60	0.60	---
MOVE BIT	MOVB	082	4	0.19	0.24	0.34	7.5	0.50	0.50	---
MOVE DIGIT	MOVD	083	4	0.19	0.24	0.34	7.3	0.50	0.50	---
MULTIPLE BIT TRANSFER	XFRB	062	4	10.1	10.1	10.8	13.6	20.9	22.1	Transferring 1 bit
				186.4	186.4	189.8	269.2	253.3	329.7	Transferring 255 bits
BLOCK TRANSFER	XFER	070	4	0.29	0.36	0.44	11.2	0.8	0.8	Transferring 1 word
				240.1	300.1	380.1	633.5	650.2	650.2	Transferring 1,000 words
BLOCK SET	BSET	071	4	0.21	0.26	0.28	8.5	0.55	0.55	Setting 1 word
				142.2	200.1	220.1	278.3	400.2	400.2	Setting 1,000 words
DATA EXCHANGE	XCHG	073	3	0.32	0.40	0.56	0.7	0.80	0.80	---
DOUBLE DATA EXCHANGE	XCGL	562	3	0.61	0.76	1.04	1.3	1.5	1.5	---
SINGLE WORD DISTRIBUTE	DIST	080	4	5.1	5.1	5.4	7.0	6.6	12.47	---
DATA COLLECT	COLL	081	4	5.1	5.1	5.3	7.1	6.5	12.77	---
MOVE TO REGISTER	MOVR	560	3	0.064	0.08	0.08	0.50	0.60	0.60	---
MOVE TIMER/ COUNTER PV TO REGISTER	MOVRW	561	3	0.064	0.42	0.50	0.50	0.60	0.60	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-7 Data Shift Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
SHIFT REGISTER	SFT	010	3	7.4	7.4	10.4	10.4	11.9	15.3	Shifting 1 word
				187.3	433.2	488.0	763.1	1.39 ms	1.43 ms	Shifting 1,000 words
REVERSIBLE SHIFT REGISTER	SFTR	084	4	6.9	6.9	7.2	9.6	11.4	15.5	Shifting 1 word
				399.3	615.3	680.2	859.6	1.43 ms	1.55 ms	Shifting 1,000 words
ASYNCHRONOUS SHIFT REGISTER	ASFT	017	4	6.2	6.2	6.4	7.7	13.4	14.2	Shifting 1 word
				1.22 ms	1.22 ms	1.22 ms	2.01 ms	2.75 ms	2.99 ms	Shifting 1,000 words
WORD SHIFT	WSFT	016	4	4.5	4.5	4.7	7.8	9.6	12.3	Shifting 1 word
				171.5	171.5	171.7	781.7	928.0	933.3	Shifting 1,000 words
ARITHMETIC SHIFT LEFT	ASL	025	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE SHIFT LEFT	ASLL	570	2	0.32	0.40	0.56	0.67	0.80	0.80	---
ARITHMETIC SHIFT RIGHT	ASR	026	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE SHIFT RIGHT	ASRL	571	2	0.32	0.40	0.56	0.67	0.80	0.80	---
ROTATE LEFT	ROL	027	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE ROTATE LEFT	ROLL	572	2	0.32	0.40	0.56	0.67	0.80	0.80	---
ROTATE LEFT WITHOUT CARRY	RLNC	574	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE ROTATE LEFT WITHOUT CARRY	RLNL	576	2	0.32	0.40	0.56	0.67	0.80	0.80	---
ROTATE RIGHT	ROR	028	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE ROTATE RIGHT	RORL	573	2	0.32	0.40	0.56	0.67	0.80	0.80	---
ROTATE RIGHT WITHOUT CARRY	RRNC	575	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE ROTATE RIGHT WITHOUT CARRY	RRNL	577	2	0.32	0.40	0.56	0.67	0.80	0.80	---
ONE DIGIT SHIFT LEFT	SLD	074	3	5.9	5.9	6.1	8.2	7.6	12.95	Shifting 1 word
				561.1	561.1	626.3	760.7	1.15 ms	1.27 ms	Shifting 1,000 words
ONE DIGIT SHIFT RIGHT	SRD	075	3	6.9	6.9	7.1	8.7	8.6	15.00	Shifting 1 word
				760.5	760.5	895.5	1.07 ms	1.72 ms	1.82 ms	Shifting 1,000 words
SHIFT N-BIT DATA LEFT	NSFL	578	4	7.5	7.5	8.3	10.5	14.8	16.0	Shifting 1 bit
				34.5	40.3	45.4	55.5	86.7	91.3	Shifting 1,000 bits
SHIFT N-BIT DATA RIGHT	NSFR	579	4	7.5	7.5	8.3	10.5	14.7	15.9	Shifting 1 bit
				48.2	50.5	55.3	69.3	114.1	119.6	Shifting 1,000 bits
SHIFT N-BITS LEFT	NASL	580	3	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE SHIFT N-BITS LEFT	NSLL	582	3	0.32	0.40	0.56	0.67	0.80	0.80	---
SHIFT N-BITS RIGHT	NASR	581	3	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE SHIFT N-BITS RIGHT	NSRL	583	3	0.32	0.40	0.56	0.67	0.80	0.80	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-8 Increment/Decrement Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
INCREMENT BINARY	++	590	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE INCREMENT BINARY	++L	591	2	0.18	0.40	0.56	0.67	0.80	0.80	---
DECREMENT BINARY	– –	592	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE DECREMENT BINARY	– –L	593	2	0.18	0.40	0.56	0.67	0.80	0.80	---
INCREMENT BCD	++B	594	2	5.7	6.4	4.5	7.4	12.3	14.7	---
DOUBLE INCREMENT BCD	++BL	595	2	5.6	5.6	4.9	6.1	9.24	10.8	---
DECREMENT BCD	– –B	596	2	5.7	6.3	4.6	7.2	11.9	14.9	---
DOUBLE DECREMENT BCD	– –BL	597	2	5.3	5.3	4.7	7.1	9.0	10.7	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-9 Symbol Math Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
SIGNED BINARY ADD WITHOUT CARRY	+	400	4	0.18	0.18	0.20	0.37	0.30	0.30	---
DOUBLE SIGNED BINARY ADD WITHOUT CARRY	+L	401	4	0.18	0.32	0.34	0.54	0.60	0.60	---
SIGNED BINARY ADD WITH CARRY	+C	402	4	0.18	0.18	0.20	0.37	0.40	0.40	---
DOUBLE SIGNED BINARY ADD WITH CARRY	+CL	403	4	0.18	0.32	0.34	0.54	0.60	0.60	---
BCD ADD WITHOUT CARRY	+B	404	4	7.6	8.2	8.4	14.0	18.9	21.5	---
DOUBLE BCD ADD WITHOUT CARRY	+BL	405	4	9.2	13.3	14.5	19.0	24.4	27.7	---
BCD ADD WITH CARRY	+BC	406	4	8.0	8.9	9.1	14.5	19.7	22.6	---
DOUBLE BCD ADD WITH CARRY	+BCL	407	4	9.6	13.8	15.0	19.6	25.2	28.8	---
SIGNED BINARY SUBTRACT WITHOUT CARRY	–	410	4	0.18	0.18	0.20	0.37	0.3	0.3	---
DOUBLE SIGNED BINARY SUBTRACT WITHOUT CARRY	–L	411	4	0.18	0.32	0.34	0.54	0.60	0.60	---
SIGNED BINARY SUBTRACT WITH CARRY	–C	412	4	0.18	0.18	0.20	0.37	40	40	---
DOUBLE SIGNED BINARY SUBTRACT WITH CARRY	–CL	413	4	0.18	0.32	0.34	0.54	0.60	0.60	---
BCD SUBTRACT WITHOUT CARRY	–B	414	4	7.4	8.0	8.2	13.1	18.1	20.5	---
DOUBLE BCD SUBTRACT WITHOUT CARRY	–BL	415	4	8.9	12.8	14.0	18.2	23.2	26.7	---
BCD SUBTRACT WITH CARRY	–BC	416	4	7.9	8.5	8.6	13.8	19.1	21.6	---

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
DOUBLE BCD SUBTRACT WITH CARRY	–BCL	417	4	9.4	13.4	14.7	18.8	24.3	27.7	---
SIGNED BINARY MULTIPLY	*	420	4	0.26	0.38	0.40	0.58	0.65	0.65	---
DOUBLE SIGNED BINARYMULTIPLY	*L	421	4	5.93	7.23	8.45	11.19	13.17	15.0	---
UNSIGNED BINARYMULTIPLY	*U	422	4	0.26	0.38	0.40	0.58	0.75	0.75	---
DOUBLE UNSIGNED BINARYMULTIPLY	*UL	423	4	5.9	7.1	8.3	10.63	13.30	15.2	---
BCD MULTIPLY	*B	424	4	8.3	9.0	9.2	12.8	17.5	19.7	---
DOUBLE BCD MULTIPLY	*BL	425	4	12.8	23.0	24.2	35.2	36.3	45.7	---
SIGNED BINARY DIVIDE	/	430	4	0.29	0.40	0.42	0.83	0.70	0.70	---
DOUBLE SIGNED BINARY DIVIDE	/L	431	4	7.2	7.2	8.4	9.8	13.7	15.5	---
UNSIGNED BINARY DIVIDE	/U	432	4	0.29	0.40	0.42	0.83	0.8	0.8	---
DOUBLE UNSIGNED BINARY DIVIDE	/UL	433	4	6.9	6.9	8.1	9.1	12.8	14.7	---
BCD DIVIDE	/B	434	4	8.6	8.6	8.8	15.9	19.3	22.8	---
DOUBLE BCD DIVIDE	/BL	435	4	13.1	17.7	18.9	26.2	27.1	34.7	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-10 Conversion Instructions

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
BCD-TO-BINARY	BIN	023	3	0.18	0.22	0.24	0.29	0.40	0.40	---
DOUBLE BCD-TO-DOUBLE BINARY	BINL	058	3	6.1	6.5	6.8	9.1	12.3	13.7	---
BINARY-TO-BCD	BCD	024	3	0.19	0.24	0.26	8.3	7.62	9.78	---
DOUBLE BINARY-TO-DOUBLE BCD	BCDL	059	3	6.7	6.7	7.0	9.2	10.6	12.8	---
2'S COMPLEMENT	NEG	160	3	0.14	0.18	0.20	0.29	0.35	0.35	---
DOUBLE 2'S COMPLEMENT	NEGL	161	3	0.26	0.32	0.34	0.5	0.60	0.60	---
16-BIT TO 32-BIT SIGNED BINARY	SIGN	600	3	0.26	0.32	0.34	0.50	0.60	0.60	---
DATA DECODER	MLPX	076	4	0.32	0.32	0.42	8.8	0.85	0.85	Decoding 1 digit (4 to 16)
				0.98	0.98	1.20	12.8	1.60	1.60	Decoding 4 digits (4 to 16)
				3.30	3.30	4.00	20.3	4.70	4.70	Decoding 1 digit (8 to 256)
				6.50	6.50	7.90	33.4	8.70	8.70	Decoding 4 digits (8 to 256)
DATA ENCODER	DMPX	077	4	7.5	7.5	7.9	10.4	9.4	13.9	Encoding 1 digit (16 to 4)
				49.6	49.6	50.2	59.1	57.3	71.73	Encoding 4 digits (16 to 4)
				18.2	18.2	18.6	23.6	56.8	82.7	Encoding 1 digit (256 to 8)
				55.1	55.1	57.4	92.5	100.0	150.7	Encoding 2 digits (256 to 8)

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
ASCII CONVERT	ASC	086	4	6.8	6.8	7.1	9.7	8.3	14.6	Converting 1 digit into ASCII
				9.0	11.2	11.7	15.1	19.1	21.8	Converting 4 digits into ASCII
ASCII TO HEX	HEX	162	4	7.1	7.1	7.4	10.1	12.1	15.6	Converting 1 digit
COLUMN TO LINE	LINE	063	4	16.6	19.0	23.1	29.1	37.0	40.3	---
LINE TO COLUMN	COLM	064	4	18.4	23.2	27.5	37.3	45.7	48.2	---
SIGNED BCD-TO-BINARY	BINS	470	4	6.8	8.0	8.3	12.1	16.2	17.0	Data format setting No. 0
				6.8	8.0	8.3	12.1	16.2	17.1	Data format setting No. 1
				7.1	8.3	8.6	12.7	16.5	17.7	Data format setting No. 2
				7.4	8.5	8.8	13.0	16.5	17.6	Data format setting No. 3
DOUBLE SIGNED BCD-TO-BINARY	BISL	472	4	6.9	9.2	9.6	13.6	18.4	19.6	Data format setting No. 0
				7.0	9.2	9.6	13.7	18.5	19.8	Data format setting No. 1
				7.3	9.5	9.9	14.2	18.6	20.1	Data format setting No. 2
				7.6	9.6	10.0	14.4	18.7	20.1	Data format setting No. 3
SIGNED BINARY-TO-BCD	BCDS	471	4	6.6	6.6	6.9	10.6	13.5	16.4	Data format setting No. 0
				6.7	6.7	7.0	10.8	13.8	16.7	Data format setting No. 1
				6.8	6.8	7.1	10.9	13.9	16.8	Data format setting No. 2
				7.1	7.2	7.5	11.5	14.0	17.1	Data format setting No. 3
DOUBLE SIGNED BINARY-TO-BCD	BDSL	473	4	7.6	8.1	8.4	11.6	11.4	12.5	Data format setting No. 0
				6.7	8.2	8.6	11.8	11.7	12.73	Data format setting No. 1
				6.7	8.3	8.7	12.0	11.8	12.8	Data format setting No. 2
				6.9	8.8	9.2	12.5	11.9	13.0	Data format setting No. 3
GRAY CODE CONVERSION (See note 2.)	GRY	474	4	46.9	46.9	72.1	---	80.0	71.2	8-bit binary
				49.6	49.6	75.2	---	83.0	75.6	8-bit BCD
				57.7	57.7	87.7	---	95.9	86.4	8-bit angle
				61.8	61.8	96.7	---	104.5	91.6	15-bit binary
				64.5	64.5	99.6	---	107.5	96.1	15-bit BCD
				72.8	72.8	112.4	---	120.4	107.3	15-bit angle
				52.3	52.3	87.2	---	88.7	82.4	360° binary
				55.1	55.1	90.4	---	91.7	86.8	360° BCD
				64.8	64.8	98.5	---	107.3	98.1	360° angle
FOUR-DIGIT NUMBER TO ASCII (See note 3.)	STR4	601	3	13.79	13.79	20.24	---	22.16	19.88	
EIGHT-DIGIT NUMBER TO ASCII (See note 3.)	STR8	602	3	18.82	18.82	27.44	---	29.55	26.70	
SIXTEEN-DIGIT NUMBER TO ASCII (See note 3.)	STR16	603	3	30.54	30.54	44.41	---	48.16	44.10	
ASCII TO FOUR-DIGIT NUMBER (See note 3.)	NUM4	604	3	18.46	18.46	27.27	---	29.13	26.88	

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
ASCII TO EIGHT-DIGIT NUMBER (See note 3.)	NUM8	605	3	27.27	27.27	40.29	---	42.69	39.71	
ASCII TO SIX-TEEN-DIGIT NUMBER (See note 3.)	NUM16	606	3	52.31	52.31	78.25	---	82.21	74.23	

Note
1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.
2. Supported only by CPU Units Ver. 2.0 or later.
3. Supported only by CPU Units Ver. 4.0 or later.

10-5-11 Logic Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
LOGICAL AND	ANDW	034	4	0.14	0.18	0.20	0.37	0.30	0.30	---
DOUBLE LOGICAL AND	ANDL	610	4	0.26	0.32	0.34	0.54	0.60	0.60	---
LOGICAL OR	ORW	035	4	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE LOGICAL OR	ORWL	611	4	0.26	0.32	0.34	0.54	0.60	0.60	---
EXCLUSIVE OR	XORW	036	4	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE EXCLUSIVE OR	XORL	612	4	0.26	0.32	0.34	0.54	0.60	0.60	---
EXCLUSIVE NOR	XNRW	037	4	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE EXCLUSIVE NOR	XNRL	613	4	0.26	0.32	0.34	0.54	0.60	0.60	---
COMPLEMENT	COM	029	2	0.18	0.22	0.32	0.37	0.45	0.45	---
DOUBLE COMPLEMENT	COML	614	2	0.32	0.40	0.56	0.67	0.80	0.80	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-12 Special Math Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
BINARY ROOT	ROTB	620	3	49.6	49.6	50.0	530.7	56.5	82.7	---
BCD SQUARE ROOT	ROOT	072	3	13.7	13.7	13.9	514.5	59.3	88.4	---
ARITHMETIC PROCESS	APR	069	4	6.7	6.7	6.9	32.3	14.0	15.0	Designating SIN and COS
				17.2	17.2	18.4	78.3	32.2	37.9	Designating line-segment approximation
FLOATING POINT DIVIDE	FDIV	079	4	116.6	116.6	176.6	176.6	246.0	154.7	---
BIT COUNTER	BCNT	067	4	0.24	0.3	0.38	22.1	0.65	0.65	Counting 1 word

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-13 Floating-point Math Instructions

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
FLOATING TO 16-BIT	FIX	450	3	0.13	10.6	10.8	14.5	16.2	19.5	---
FLOATING TO 32-BIT	FIXL	451	3	0.13	10.8	11.0	14.6	16.6	21.7	---
16-BIT TO FLOATING	FLT	452	3	0.13	8.3	8.5	11.1	12.2	14.6	---
32-BIT TO FLOATING	FLTL	453	3	0.13	8.3	8.5	10.8	14.0	15.8	---
FLOATING-POINT ADD	+F	454	4	0.24	8.0	9.2	10.2	13.3	15.7	---
FLOATING-POINT SUBTRACT	–F	455	4	0.24	8.0	9.2	10.3	13.3	15.8	---
FLOATING-POINT DIVIDE	/F	457	4	0.4	8.7	9.9	12.0	14.0	17.6	---
FLOATING-POINT MULTIPLY	*F	456	4	0.24	8.0	9.2	10.5	13.2	15.8	---
DEGREES TO RADIANS	RAD	458	3	8.1	10.1	10.2	14.9	15.9	20.6	---
RADIANS TO DEGREES	DEG	459	3	8.0	9.9	10.1	14.8	15.7	20.4	---
SINE	SIN	460	3	42.0	42.0	42.2	61.1	47.9	70.9	---
HIGH-SPEED SINE (See note 2.)	SINQ	475	8	0.59	---	---	---	---	---	---
COSINE	COS	461	3	31.5	31.5	31.8	44.1	41.8	51.0	---
HIGH-SPEED COSINE (See note 2.)	COSQ	476	8	0.59	---	---	---	---	---	---
TANGENT	TAN	462	3	16.3	16.3	16.6	22.6	20.8	27.6	---
HIGH-SPEED TANGENT (See note 2.)	TANQ	477	15	1.18	---	---	---	---	---	---
ARC SINE	ASIN	463	3	17.6	17.6	17.9	24.1	80.3	122.9	---
ARC COSINE	ACOS	464	3	20.4	20.4	20.7	28.0	25.3	33.5	---
ARC TANGENT	ATAN	465	3	16.1	16.1	16.4	16.4	45.9	68.9	---
SQUARE ROOT	SQRT	466	3	0.42	19.0	19.3	28.1	26.2	33.2	---
EXPONENT	EXP	467	3	65.9	65.9	66.2	96.7	68.8	108.2	---
LOGARITHM	LOG	468	3	12.8	12.8	13.1	17.4	69.4	103.7	---
EXPONENTIAL POWER	PWR	840	4	125.4	125.4	126.0	181.7	134.0	201.0	---
Floating Symbol Comparison	LD, AND, OR +=F	329	3	0.13	6.6	8.3	---	12.6	15.37	---
	LD, AND, OR +<>F	330								
	LD, AND, OR +<F	331								
	LD, AND, OR +<=F	332								
	LD, AND, OR +>F	333								
	LD, AND, OR +>=F	334								
FLOATING-POINT TO ASCII	FSTR	448	4	48.5	48.5	48.9	---	58.4	85.7	---
ASCII TO FLOATING-POINT	FVAL	449	3	21.1	21.1	21.3	---	31.1	43.773	---
MOVE FLOATING-POINT (SINGLE) (See note 2.)	MOVF	469	3	0.18	---	---	---	---	---	---

Note
1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.
2. CJ1-H-R CPU Units only.

10-5-14 Double-precision Floating-point Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
DOUBLE SYMBOL COMPARISON	LD, AND, OR +=D	335	3	8.5	8.5	10.3	---	16.2	19.9	---
	LD, AND, OR +<>D	336								
	LD, AND, OR +<D	337								
	LD, AND, OR +<=D	338								
	LD, AND, OR +>D	339								
	LD, AND, OR +>=D	340								
DOUBLE FLOATING TO 16-BIT BINARY	FIXD	841	3	11.0	11.7	12.1	---	16.1	21.6	---
DOUBLE FLOATING TO 32-BIT BINARY	FIXLD	842	3	10.2	11.6	12.1	---	16.4	21.7	---
16-BIT BINARY TO DOUBLE FLOATING	DBL	843	3	9.9	9.9	10.0	---	14.3	16.5	---
32-BIT BINARY TO DOUBLE FLOATING	DBLL	844	3	9.8	9.8	10.0	---	16.0	17.7	---
DOUBLE FLOATING-POINT ADD	+D	845	4	11.2	11.2	11.9	---	18.3	23.6	---
DOUBLE FLOATING-POINT SUBTRACT	–D	846	4	11.2	11.2	11.9	---	18.3	23.6	---
DOUBLE FLOATING-POINT MULTIPLY	*D	847	4	12.0	12.0	12.7	---	19.0	25.0	---
DOUBLE FLOATING-POINT DIVIDE	/D	848	4	23.5	23.5	24.2	---	30.5	44.3	---
DOUBLE DEGREES TO RADIANS	RADD	849	3	11.5	27.4	27.8	---	32.7	49.1	---
DOUBLE RADIANS TO DEGREES	DEGD	850	3	11.2	11.2	11.9	---	33.5	48.4	---
DOUBLE SINE	SIND	851	3	45.4	45.4	45.8	---	67.9	76.7	---
DOUBLE COSINE	COSD	852	3	43.0	43.0	43.4	---	70.9	72.3	---
DOUBLE TANGENT	TAND	853	3	19.8	20.1	20.5	---	97.9	157.0	---
DOUBLE ARC SINE	ASIND	854	3	21.5	21.5	21.9	---	32.3	37.3	---
DOUBLE ARC COSINE	ACOSD	855	3	24.7	24.7	25.1	---	29.9	42.5	---
DOUBLE ARC TANGENT	ATAND	856	3	19.3	19.3	19.7	---	24.0	34.4	---
DOUBLE SQUARE ROOT	SQRTD	857	3	47.4	47.4	47.9	---	52.9	81.9	---
DOUBLE EXPONENT	EXPD	858	3	121.0	121.0	121.4	---	126.3	201.3	---
DOUBLE LOGARITHM	LOGD	859	3	16.0	16.0	16.4	---	21.6	29.3	---
DOUBLE EXPONENTIAL POWER	PWRD	860	4	223.9	223.9	224.2	---	232.3	373.4	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-15 Table Data Processing Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
SET STACK	SSET	630	3	8.0	8.0	8.3	8.5	14.2	20.3	Designating 5 words in stack area
				231.6	231.6	251.8	276.8	426.5	435.3	Designating 1,000 words in stack area
PUSH ONTO STACK	PUSH	632	3	6.5	6.5	8.6	9.1	15.7	16.4	---
FIRST IN FIRST OUT	FIFO	633	3	6.9	6.9	8.9	10.6	15.8	16.8	Designating 5 words in stack area
				352.6	352.6	434.3	1.13 ms	728.0	732.0	Designating 1,000 words in stack area
LAST IN FIRST OUT	LIFO	634	3	7.0	7.0	9.0	9.9	16.6	17.2	---
DIMENSION RECORD TABLE	DIM	631	5	15.2	15.2	21.6	142.1	27.8	27.1	---
SET RECORD LOCATION	SETR	635	4	5.4	5.4	5.9	7.0	12.8	13.2	---
GET RECORD NUMBER	GETR	636	4	7.8	7.8	8.4	11.0	16.1	18.3	---
DATA SEARCH	SRCH	181	4	15.5	15.5	19.5	19.5	29.1	26.4	Searching for 1 word
				2.42 ms	2.42 ms	3.34 ms	3.34 ms	4.41 ms	3.60 ms	Searching for 1,000 words
SWAP BYTES	SWAP	637	3	12.2	12.2	13.6	13.6	21.0	18.4	Swapping 1 word
				1.94 ms	1.94 ms	2.82 ms	2.82 ms	3.65 ms	3.15 ms	Swapping 1,000 words
FIND MAXIMUM	MAX	182	4	19.2	19.2	24.9	24.9	35.3	32.0	Searching for 1 word
				2.39 ms	2.39 ms	3.36 ms	3.36 ms	4.39 ms	3.57 ms	Searching for 1,000 words
FIND MINIMUM	MIN	183	4	19.2	19.2	25.3	25.3	35.4	31.9	Searching for 1 word
				2.39 ms	2.39 ms	3.33 ms	3.33 ms	4.39 ms	3.58 ms	Searching for 1,000 words
SUM	SUM	184	4	28.2	28.2	38.5	38.3	49.5	44.1	Adding 1 word
				14.2 ms	1.42 ms	1.95 ms	1.95 ms	2.33 ms	2.11 ms	Adding 1,000 words
FRAME CHECK-SUM	FCS	180	4	20.0	20.0	28.3	28.3	34.8	31.5	For 1-word table length
				1.65 ms	1.65 ms	2.48 ms	2.48 ms	3.11 ms	2.77 ms	For 1,000-word table length
STACK SIZE READ	SNUM	638	3	6.0	6.0	6.3	---	12.1	13.7	---
STACK DATA READ	SREAD	639	4	8.0	8.0	8.4	---	18.1	20.6	---
STACK DATA OVERWRITE	SWRIT	640	4	7.2	7.2	7.6	---	16.9	18.8	---
STACK DATA INSERT	SINS	641	4	7.8	7.8	9.9	---	18.2	20.5	---
				354.0	354.0	434.8	---	730.7	732.0	For 1,000-word table
STACK DATA DELETE	SDEL	642	4	8.6	8.6	10.6	---	19.3	22.0	---
				354.0	354.0	436.0	---	732.0	744.0	For 1,000-word table

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-16 Data Control Instructions

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
PID CONTROL	PID	190	4	436.2	436.2	678.2	678.2	612.0	552.6	Initial execution
				332.3	332.3	474.9	474.9	609.3	548.0	Sampling
				97.3	97.3	141.3	141.3	175.3	162.0	Not sampling
LIMIT CONTROL	LMT	680	4	16.1	16.1	22.1	22.1	27.1	26.1	---
DEAD BAND CONTROL	BAND	681	4	17.0	17.0	22.5	22.5	27.4	26.6	---
DEAD ZONE CONTROL	ZONE	682	4	15.4	15.4	20.5	20.5	28.0	26.4	---
TIME-PROPORTIONAL OUTPUT (See note 2.)	TPO	685	4	10.6	10.6	14.8	---	20.2	19.8	OFF execution time
				54.5	54.5	82.0	---	92.7	85.1	ON execution time with duty designation or displayed output limit
				61.0	61.0	91.9	---	102.5	95.3	ON execution time with manipulated variable designation and output limit enabled
SCALING	SCL	194	4	13.9	13.9	14.3	56.8	25.0	32.8	---
SCALING 2	SCL2	486	4	12.2	12.2	12.6	50.7	22.3	29.1	---
SCALING 3	SCL3	487	4	13.7	13.7	14.2	57.7	25.6	30.0	---
AVERAGE	AVG	195	4	36.3	36.3	52.6	53.1	62.9	59.1	Average of an operation
				291.0	291.0	419.9	419.9	545.3	492.7	Average of 64 operations
PID CONTROL WITH AUTOTUNING	PIDAT	191	4	446.3	446.3	712.5	---	765.3	700.0	Initial execution
				339.4	339.4	533.9	---	620.7	558.0	Sampling
				100.7	100.7	147.1	---	180.0	166.1	Not sampling
				189.2	189.2	281.6	---	233.7	225.1	Initial execution of autotuning
				535.2	535.2	709.8	---	575.3	558.2	Autotuning when sampling

Note
1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.
2. Supported only by CPU Units Ver. 2.0 or later.

10-5-17 Subroutine Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
SUBROUTINE CALL	SBS	091	2	0.90	1.26	1.96	17.0	2.04	2.04	---
SUBROUTINE ENTRY	SBN	092	2	---	---	---	---	---	---	---
SUBROUTINE RETURN	RET	093	1	0.43	0.86	1.60	20.60	1.80	1.80	---
MACRO	MCRO	099	4	23.3	23.3	23.3	23.3	47.9	50.3	---
GLOBAL SUBROUTINE CALL	GSBN	751	2	---	---	---	---	---	---	---
GLOBAL SUBROUTINE ENTRY	GRET	752	1	0.90	1.26	1.96	---	2.04	2.04	---
GLOBAL SUBROUTINE RETURN	GSBS	750	2	0.43	0.86	1.60	---	1.80	1.80	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-18 Interrupt Control Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
SET INTERRUPT MASK	MSKS	690	3	25.6	25.6	38.4	39.5	44.7	42.9	---
READ INTERRUPT MASK	MSKR	692	3	11.9	11.9	11.9	11.9	16.9	15.9	---
CLEAR INTERRUPT	CLI	691	3	27.4	27.4	41.3	41.3	42.7	44.5	---
DISABLE INTERRUPTS	DI	693	1	15.0	15.0	16.8	16.8	30.3	28.5	---
ENABLE INTERRUPTS	EI	694	1	19.5	19.5	21.8	21.8	37.7	34.4	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-19 High-speed Counter and Pulse Output Instructions (CJ1M CPU21/22/23 CPU Units only)

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
MODE CONTROL	INI	880	4	---	---	---	---	77.00	80.4	Starting high-speed counter comparison
				---	---	---	---	43.00	43.0	Stopping high-speed counter comparison
				---	---	---	---	43.40	48.8	Changing pulse output PV
				---	---	---	---	51.80	50.8	Changing high-speed counter PV
				---	---	---	---	31.83	28.5	Changing PV of counter in interrupt input mode
				---	---	---	---	45.33	49.8	Stopping pulse output
				---	---	---	---	36.73	30.5	Stopping PWM(891) output
HIGH-SPEED COUNTER PV READ	PRV	881	4	---	---	---	---	42.40	43.9	Reading pulse output PV
				---	---	---	---	53.40	65.9	Reading high-speed counter PV
				---	---	---	---	33.60	30.5	Reading PV of counter in interrupt input mode
				---	---	---	---	38.80	40.0	Reading pulse output status
				---	---	---	---	39.30	66.9	Reading high-speed counter status
				---	---	---	---	38.30	34.5	Reading PWM(891) status
				---	---	---	---	117.73	145.7	Reading high-speed counter range comparison results
				---	---	---	---	48.20	48.5	Reading frequency of high-speed counter 0

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
COMPARISON TABLE LOAD	CTBL	882	4	---	---	---	---	238.0	235.0	Registering target value table and starting comparison for 1 target value
				---	---	---	---	14.42 ms	9.97 ms	Registering target value table and starting comparison for 48 target values
				---	---	---	---	289.0	276.0	Registering range table and starting comparison
				---	---	---	---	198.0	183.0	Only registering target value table for 1 target value
				---	---	---	---	14.40 ms	9.61 ms	Only registering target value table for 48 target values
				---	---	---	---	259.0	239.0	Only registering range table
COUNTER FREQUENCY CONVERT (See note 2.)	PRV2	883	4	---	---	---	---	23.03	22.39	---
SPEED OUTPUT	SPED	885	4	---	---	---	---	56.00	89.3	Continuous mode
				---	---	---	---	62.47	94.9	Independent mode
SET PULSES	PULS	886	4	---	---	---	---	26.20	32.9	---
PULSE OUTPUT	PLS2	887	5	---	---	---	---	100.80	107.5	---
ACCELERATION CONTROL	ACC	888	4	---	---	---	---	90.80	114.8	Continuous mode
				---	---	---	---	80.00	122.1	Independent mode
ORIGIN SEARCH	ORG	889	3	---	---	---	---	106.13	116.0	Origin search
				---	---	---	---	52.00	102.1	Origin return
PULSE WITH VARIABLE DUTY FACTOR	PWM	891	4	---	---	---	---	25.80	33.0	---

Note 1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.

2. Supported only by CPU Units Ver. 2.0 or later.

10-5-20 Step Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
STEP DEFINE	STEP	008	2	17.4	17.4	20.7	27.1	35.9	37.1	Step control bit ON
				11.8	11.8	13.7	24.4	13.8	18.3	Step control bit OFF
STEP START	SNXT	009	2	6.6	6.6	7.3	10.0	12.1	14.0	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-21 Basic I/O Unit Instructions

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
I/O REFRESH	IORF	097	3	15.5	15.5	16.4	23.5	26.7	30.4	1-word refresh (IN) for Basic I/O Units
				17.20	17.20	18.40	25.6	29.7	35.0	1-word refresh (OUT) for Basic I/O Units
				319.9	319.9	320.7	377.6	291.0	100.0	60-word refresh (IN) for Basic I/O Units CJ1M-CPU 11/21: 10 words Other than CJ1M-CPU 11/21: 40 words
				358.00	358.00	354.40	460.1	325.0	134.7	60-word refresh (OUT) for Basic I/O Units CJ1M-CPU 11/21: 10 words Other than CJ1M-CPU 11/21: 40 words
SPECIAL I/O UNIT I/O REFRESH (See note 4.)	FIORF	225	2	--- (See note 2.)	---	---	---	---	---	---
CPU BUS I/O REFRESH	DLNK	226	4	287.8	287.8	315.5	---	321.3	458.7	Allocated 1 word
7-SEGMENT DECODER	SDEC	078	4	6.5	6.5	6.9	14.1	8.1	15.7	---
DIGITAL SWITCH INPUT (See note 3.)	DSW	210	6	50.7	50.7	73.5	---	77.7	77.6	4 digits, data input value: 0
				51.5	51.5	73.4	---	77.9	77.6	4 digits, data input value: F
				51.3	51.3	73.5	---	83.2	80.0	8 digits, data input value: 00
				50.7	50.7	73.4	---	77.9	77.7	8 digits, data input value: FF
TEN KEY INPUT (See note 3.)	TKY	211	4	9.7	9.7	13.2	---	18.7	18.6	Data input value: 00
				10.7	10.7	14.8	---	20.2	19.1	Data input value: FF
HEXADECIMAL KEY INPUT (See note 3.)	HKY	212	5	50.3	50.3	70.9	---	77.3	78.1	Data input value: 00
				50.1	50.1	71.2	---	76.8	77.3	Data input value: FF
MATRIX INPUT (See note 3.)	MTR	213	5	47.8	47.8	68.1	---	76.4	77.7	Data input value: 00
				48.0	48.0	68.0	---	77.7	76.9	Data input value: FF
7-SEGMENT DISPLAY OUTPUT (See note 3.)	7SEG	214	5	58.1	58.1	83.3	---	89.6	89.9	4 digits
				63.3	63.3	90.3	---	98.3	99.2	8 digits
INTELLIGENT I/O READ	IORD	222	4	--- (See note 2.)	--- (See note 2.)	--- (See note 2.)	--- (See note 2.)	225.3	217.7	First execution
								232.0	241.7	When busy
								223.0	215.3	At end
INTELLIGENT I/O WRITE	IOWR	223	4	--- (See note 2.)	--- (See note 2.)	--- (See note 2.)	--- (See note 2.)	245.3	219.7	First execution
								231.0	225.7	When busy
								244.0	218.7	At end

Note

1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.
2. Read/write times depend on the Special I/O Unit for which the instruction is being executed.
3. Supported only by CPU Units Ver. 2.0 or later.
4. CJ1-H-R CPU Units only.

10-5-22 Serial Communications Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
PROTOCOL MACRO	PMCR	260	5	100.1	100.1	142.1	276.8	158.4	206.0	Sending 0 words, receiving 0 words
				134.2	134.2	189.6	305.9	210.0	256.7	Sending 249 words, receiving 249 words
TRANSMIT	TXD	236	4	68.5	68.5	98.8	98.8	109.3	102.9	Sending 1 byte
				734.3	734.3	1.10 ms	1.10 ms	1.23 ms	1.16 ms	Sending 256 bytes
RECEIVE	RXD	235	4	89.6	89.6	131.1	131.1	144.0	132.1	Storing 1 byte
				724.2	724.2	1.11 ms	1.11 ms	1.31 ms	1.22 ms	Storing 256 bytes
TRANSMIT VIA SERIAL COMMUNICATIONS UNIT	TXDU	256	4	131.5	131.5	202.4	---	213.4	208.6	Sending 1 byte
RECEIVE VIA SERIAL COMMUNICATIONS UNIT	RXDU	255	4	131	131	200.8	---	211.8	206.8	Storing 1 byte
CHANGE SERIAL PORT SETUP	STUP	237	3	341.2	341.2	400.0	440.4	504.7	524.7	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-23 Network Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
NETWORK SEND	SEND	090	4	84.4	84.4	123.9	123.9	141.6	195.0	---
NETWORK RECEIVE	RECV	098	4	85.4	85.4	124.7	124.7	142.3	196.7	---
DELIVER COMMAND	CMND	490	4	106.8	106.8	136.8	136.8	167.7	226.7	---
EXPLICIT MESSAGE SEND	EXPLT	720	4	127.6	127.6	190.0	---	217.0	238.0	---
EXPLICIT GET ATTRIBUTE	EGATR	721	4	123.9	123.9	185.0	---	210.0	232.7	---
EXPLICIT SET ATTRIBUTE	ESATR	722	3	110.0	110.0	164.4	---	188.3	210.3	---
EXPLICIT WORD READ	ECHRD	723	4	106.8	106.8	158.9	---	176.3	220.3	---
EXPLICIT WORD WRITE	ECHWR	724	4	106.0	106.0	158.3	---	175.7	205.3	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-24 File Memory Instructions

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
READ DATA FILE	FREAD	700	5	391.4	391.4	632.4	684.1	657.3	641.3	2-character directory + file name in binary
				836.1	836.1	1.33 ms	1.35 ms	1.45 ms	1.16 ms	73-character directory + file name in binary

Instruction	Mnemonic	Code	Length (steps) (See note 1.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
WRITE DATA FILE	FWRIT	701	5	387.8	387.8	627.0	684.7	650.7	637.3	2-character directory + file name in binary
				833.3	833.3	1.32 ms	1.36 ms	1.44 ms	1.16 ms	73-character directory + file name in binary
WRITE TEXT FILE (See note 2.)	TWRIT	704	5	390.1	390.1	619.1	---	555.3	489.0	---

Note
1. When a double-length operand is used, add 1 to the value shown in the length column in the following table.
2. Supported only by CPU Units Ver. 4.0 or later.

10-5-25 Display Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
DISPLAY MESSAGE	MSG	046	3	10.1	10.1	14.2	14.3	16.8	17.3	Displaying message
				8.4	8.4	11.3	11.3	14.7	14.7	Deleting displayed message

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-26 Clock Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
CALENDAR ADD	CADD	730	4	34.0	38.3	201.9	209.5	217.0	194.0	---
CALENDAR SUBTRACT	CSUB	731	4	29.6	38.6	170.4	184.1	184.7	167.0	---
HOURS TO SECONDS	SEC	065	3	7.8	21.4	29.3	35.8	36.1	35.4	---
SECONDS TO HOURS	HMS	066	3	7.7	22.2	30.9	42.1	45.1	45.7	---
CLOCK ADJUSTMENT	DATE	735	2	216.0	216.0	251.5	120.0	118.7	128.3	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-27 Debugging Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
TRACE MEMORY SAMPLING	TRSM	045	1	80.4	80.4	120.0	120.0	207.0	218.3	Sampling 1 bit and 0 words
				848.1	848.1	1.06 ms	1.06 ms	1.16 ms	1.10 ms	Sampling 31 bits and 6 words

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-28 Failure Diagnosis Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
FAILURE ALARM	FAL	006	3	15.4	15.4	16.7	16.7	26.1	24.47	Recording errors
				179.8	179.8	244.8	244.8	294.0	264.0	Deleting errors (in order of priority)
				432.4	432.4	657.1	657.1	853.3	807.3	Deleting errors (all errors)
				161.5	161.5	219.4	219.4	265.7	233.0	Deleting errors (individually)
SEVERE FAILURE ALARM	FALS	007	3	---	---	---	---	---	---	---
FAILURE POINT DETECTION	FPD	269	4	140.9	140.9	202.3	202.3	220.7	250.0	When executed
				163.4	163.4	217.6	217.6	250.3	264.3	First time
				185.2	185.2	268.9	268.9	220.7	321.7	When executed
				207.5	207.5	283.6	283.6	320.7	336.0	First time

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-29 Other Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
SET CARRY	STC	040	1	0.048	0.06	0.06	0.12	0.15	0.15	---
CLEAR CARRY	CLC	041	1	0.048	0.06	0.06	0.12	0.15	0.15	---
SELECT EM BANK	EMBC	281	2	14.0	14.0	15.1	15.1	---	---	---
EXTEND MAXIMUM CYCLE TIME	WDT	094	2	15.0	15.0	19.7	19.7	23.6	22.0	---
SAVE CONDITION FLAGS	CCS	282	1	8.6	8.6	12.5	---	14.2	12.9	---
LOAD CONDITION FLAGS	CCL	283	1	9.8	9.8	13.9	---	16.3	15.7	---
CONVERT ADDRESS FROM CV	FRMCV	284	3	13.6	13.6	19.9	---	23.1	31.8	---
CONVERT ADDRESS TO CV	TOCV	285	3	11.9	11.9	17.2	---	22.5	31.4	---
DISABLE PERIPHERAL SERVICING	IOSP	287	---	13.9	13.9	19.8	---	21.5	21.5	---
ENABLE PERIPHERAL SERVICING	IORS	288	---	63.6	63.6	92.3	---	22.2	22.2	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-30 Block Programming Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
BLOCK PROGRAM BEGIN	BPRG	096	2	12.1	12.1	13.0	13.0	27.5	30.4	---
BLOCK PROGRAM END	BEND	801	1	9.6	9.6	12.3	13.1	23.2	27.1	---
BLOCK PROGRAM PAUSE	BPPS	811	2	10.6	10.6	12.3	14.9	16.0	21.7	---
BLOCK PROGRAM RESTART	BPRS	812	2	5.1	5.1	5.6	8.3	9.0	10.2	---

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
CONDITIONAL BLOCK EXIT	(Execution condition) EXIT	806	1	10.0	10.0	11.3	12.9	23.8	26.0	EXIT condition satisfied
				4.0	4.0	4.9	7.3	7.2	8.4	EXIT condition not satisfied
CONDITIONAL BLOCK EXIT	EXIT (bit address)	806	2	6.8	6.8	13.5	16.3	28.4	30.6	EXIT condition satisfied
				4.7	4.7	7.2	10.7	11.4	13.1	EXIT condition not satisfied
CONDITIONAL BLOCK EXIT (NOT)	EXIT NOT (bit address)	806	2	12.4	12.4	14.0	16.8	28.4	31.2	EXIT condition satisfied
				7.1	7.1	7.6	11.2	11.8	13.5	EXIT condition not satisfied
Branching	IF (execution condition)	802	1	4.6	4.6	4.8	7.2	6.8	8.5	IF true
				6.7	6.7	7.3	10.9	12.2	13.9	IF false
Branching	IF (relay number)	802	2	6.8	6.8	7.2	10.4	11.0	12.7	IF true
				9.0	9.0	9.6	14.2	16.5	18.5	IF false
Branching (NOT)	IF NOT (relay number)	802	2	7.1	7.1	7.6	10.9	11.5	13.1	IF true
				9.2	9.2	10.1	14.7	16.8	18.9	IF false
Branching	ELSE	803	1	6.2	6.2	6.7	9.9	11.4	12.6	IF true
				6.8	6.8	7.7	11.2	13.4	15.0	IF false
Branching	IEND	804	1	6.9	6.9	7.7	11.0	13.5	15.4	IF true
				4.4	4.4	4.6	7.0	6.93	8.1	IF false
ONE CYCLE AND WAIT	WAIT (execution condition)	805	1	12.6	12.6	13.7	16.7	28.6	34.0	WAIT condition satisfied
				3.9	3.9	4.1	6.3	5.6	6.9	WAIT condition not satisfied
ONE CYCLE AND WAIT	WAIT (relay number)	805	2	12.0	12.0	13.4	16.5	27.2	30.0	WAIT condition satisfied
				6.1	6.1	6.5	9.6	10.0	11.4	WAIT condition not satisfied
ONE CYCLE AND WAIT (NOT)	WAIT NOT (relay number)	805	2	12.2	12.2	13.8	17.0	27.8	30.6	WAIT condition satisfied
				6.4	6.4	6.9	10.1	10.5	11.8	WAIT condition not satisfied
COUNTER WAIT	CNTW	814	4	17.9	17.9	22.6	27.4	41.0	43.5	First execution
				19.1	19.1	23.9	28.7	42.9	45.7	Normal execution
	CNTWX	818	4	17.9	17.9	22.6	27.4	41.0	43.5	First execution
				19.1	19.1	23.9	28.7	42.9	45.7	Normal execution
HIGH-SPEED TIMER WAIT	TMHW	815	3	25.8	25.8	27.9	34.1	47.9	53.7	First execution
				20.6	20.6	22.7	28.9	40.9	46.2	Normal execution
	TMHWX	817	3	25.8	25.8	27.9	34.1	47.9	53.7	First execution
				20.6	20.6	22.7	28.9	40.9	46.2	Normal execution
Loop Control	LOOP	809	1	7.9	7.9	9.1	12.3	15.6	17.6	---
Loop Control	LEND (execution condition)	810	1	7.7	7.7	8.4	10.9	13.5	15.5	LEND condition satisfied
				6.8	6.8	8.0	9.8	17.5	19.8	LEND condition not satisfied
Loop Control	LEND (relay number)	810	2	9.9	9.9	10.7	14.4	17.5	19.9	LEND condition satisfied
				8.9	8.9	10.3	13.0	21.6	24.5	LEND condition not satisfied
Loop Control	LEND NOT (relay number)	810	2	10.2	10.2	11.2	14.8	21.9	24.9	LEND condition satisfied
				9.3	9.3	10.8	13.5	17.8	20.4	LEND condition not satisfied
TIMER WAIT	TIMW	813	3	22.3	22.3	25.2	33.1	47.4	52.0	Default setting
				24.9	24.9	27.8	35.7	46.2	53.4	Normal execution
	TIMWX	816	3	22.3	22.3	25.2	33.1	47.4	52.0	Default setting
				24.9	24.9	27.8	35.7	46.2	53.4	Normal execution

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-31 Text String Processing Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
MOV STRING	MOV$	664	3	45.6	45.6	66.0	84.3	79.3	72.7	Transferring 1 character
CONCATENATE STRING	+$	656	4	86.5	86.5	126.0	167.8	152.0	137.0	1 character + 1 character
GET STRING LEFT	LEFT$	652	4	53.0	53.0	77.4	94.3	93.6	84.8	Retrieving 1 character from 2 characters
GET STRING RIGHT	RGHT$	653	4	52.2	52.2	76.3	94.2	92.1	83.3	Retrieving 1 character from 2 characters
GET STRING MIDDLE	MID$	654	5	56.5	56.5	84.6	230.2	93.7	84.0	Retrieving 1 character from 3 characters
FIND IN STRING	FIND$	660	4	51.4	51.4	77.5	94.1	89.1	96.7	Searching for 1 character from 2 characters
STRING LENGTH	LEN$	650	3	19.8	19.8	28.9	33.4	33.8	30.1	Detecting 1 character
REPLACE IN STRING	RPLC$	661	6	175.1	175.1	258.7	479.5	300.7	267.7	Replacing the first of 2 characters with 1 character
DELETE STRING	DEL$	658	5	63.4	63.4	94.2	244.6	11.3	99.3	Deleting the leading character of 2 characters
EXCHANGE STRING	XCHG$	665	3	60.6	60.6	87.2	99.0	105.2	95.3	Exchanging 1 character with 1 character
CLEAR STRING	CLR$	666	2	23.8	23.8	36.0	37.8	42.0	36.8	Clearing 1 character
INSERT INTO STRING	INS$	657	5	136.5	136.5	200.6	428.9	204.0	208.0	Inserting 1 character after the first of 2 characters
String Comparison Instructions	LD, AND, OR +=$	670	4	48.5	48.5	69.8	86.2	79.9	68.5	Comparing 1 character with 1 character
	LD, AND, OR +<>$	671								
	LD, AND, OR +<$	672								
	LD, AND, OR +>$	674								
	LD, AND, OR +>=$	675								

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-32 Task Control Instructions

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU6□H	CPU4□H	CPU4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
TASK ON	TKON	820	2	19.5	19.5	26.3	26.3	33.1	32.5	---
TASK OFF	TKOF	821	2	13.3	13.3	19.0	26.3	19.7	20.2	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-33 Model Conversion Instructions (Unit Ver. 3.0 or Later Only)

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU-6□H	CPU-4□H	CPU-4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
BLOCK TRANSFER	XFERC	565	4	6.4	6.4	6.5	---	33.1	31.1	Transferring 1 word
				481.6	481.6	791.6	---	3056.1	2821.1	Transferring 1,000 words
SINGLE WORD DISTRIBUTE	DISTC	566	4	3.4	3.4	3.5	---	19	18.1	Data distribute
				5.9	5.9	7.3	---	39.5	38.5	Stack operation
DATA COLLECT	COLLC	567	4	3.5	3.5	3.85	---	24.9	29.7	Data collection
				8	8	9.1	---	22.1	25.3	Stack operation
				8.3	8.3	9.6	---	25.5	31	Stack operation 1 word FIFO Read
				2052.3	2052.3	2097.5	---	8310.1	7821.1	Stack operation 1,000 words FIFO Read
MOVE BIT	MOVBC	568	4	4.5	4.5	4.88	---	28.1	22.1	---
BIT COUNTER	BCNTC	621	4	4.9	4.9	5	---	30.6	28.8	Counting 1 word
				1252.4	1252.4	1284.4	---	5814.1	5223.8	Counting 1,000 words

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-34 Special Function Block Instructions (Unit Ver. 3.0 or Later Only)

Instruction	Mnemonic	Code	Length (steps) (See note.)	ON execution time (μs)						Conditions
				CPU6□H-R	CPU-6□H	CPU-4□H	CPU-4□	CJ1M excluding CPU11/21	CJ1M CPU11/21	
GET VARIABLE ID	GETID	286	4	14	14	22.2	---	23.4	21.3	---

Note When a double-length operand is used, add 1 to the value shown in the length column in the following table.

10-5-35 Function Block Instance Execution Time (CPU Units with Unit Version 3.0 or Later)

Use the following equation to calculate the effect of instance execution on the cycle time when function block definitions have been created and the instances copied into the user program using CS/CJ-series CPU Units with unit version 3.0 or later.

Effect of Instance Execution on Cycle Time
= Startup time (A)
+ I/O parameter transfer processing time (B)
+ Execution time of instructions in function block definition (C)

The following table shows the length of time for A, B, and C.

Operation			CPU Unit model			
			CJ1H-CPU6□H-R	CS1H-CPU6□H CJ1H-CPU6□H	CS1G-CPU4□H CJ1G-CPU4□H	CJ1M-CPU□□
A	Startup time	Startup time not including I/O parameter transfer	3.3 μs	6.8 μs	8.8 μs	15.0 μs

Operation			CPU Unit model			
			CJ1H-CPU6□H-R	CS1H-CPU6□H CJ1H-CPU6□H	CS1G-CPU4□H CJ1G-CPU4□H	CJ1M-CPU□□
B	I/O parameter transfer processing time The data type is indicated in parentheses.	1-bit I/O variable (BOOL)	0.24 μs	0.4 μs	0.7 μs	1.0 μs
		1-word I/O variable (INT, UINT, WORD)	0.19 μs	0.3 μs	0.6 μs	0.8 μs
		2-word I/O variable (DINT, UDINT, DWORD, REAL)	0.19 μs	0.5 μs	0.8 μs	1.1 μs
		4-word I/O variable (LINT, ULINT, LWORD, LREAL)	0.38 μs	1.0 μs	1.6 μs	2.2 μs
C	Function block definition instruction execution time	Total instruction processing time (same as standard user program)				

Example: CJ1H-CPU67H-R
Input variables with a 1-word data type (INT): 3
Output variables with a 1-word data type (INT): 2
Total instruction processing time in function block definition section: 10 μs
Execution time for 1 instance = 3.3 μs + (3 + 2) × 0.19 μs + 10 μs = 14.25 μs

Note The execution time is increased according to the number of multiple instances when the same function block definition has been copied to multiple locations.

Guidelines on Converting Program Capacities from Previous OMRON PLCs

Guidelines are provided in the following table for converting the program capacity (unit: words) of previous OMRON PLCs (SYSMAC C200HX/HG/HE, CVM1, or CV-series PLCs) to the program capacity (unit: steps) of the CS-series PLCs.

Add the following value (n) to the program capacity (unit: words) of the previous PLCs for each instruction to obtain the program capacity (unit: steps) of the CJ-series PLCs.

CJ-series steps = "a" (words) of previous PLC + n			
Instructions	**Variations**	**Value of n when converting from C200HX/HG/HE to CJ Series**	**Value of n when converting from CV-series PLC or CVM1 to CJ Series**
Basic instructions	None	OUT, SET, RSET, or KEEP(011): –1 Other instructions: 0	0
	Upward Differentiation	None	+1
	Immediate Refreshing	None	0
	Upward Differentiation and Immediate Refreshing	None	+2
Special instructions	None	0	–1
	Upward Differentiation	+1	0
	Immediate Refreshing	None	+3
	Upward Differentiation and Immediate Refreshing	None	+4

For example, if OUT is used with an address of CIO 000000 to CIO 25515, the program capacity of the previous PLC would be 2 words per instruction and that of the CJ-series PLC would be 1 (2 – 1) step per instruction.

For example, if !MOV is used (MOVE instruction with immediate refreshing), the program capacity of a CV-series PLC would be 4 words per instruction and that of the CJ-series PLC would be 7 (4 + 3) steps.

Number of Function Block Program Steps (CPU Units with Unit Version 3.0 or Later)

Use the following equation to calculate the number of program steps when function block definitions have been created and the instances copied into the user program using CS/CJ-series CPU Units with unit version 3.0 or later.

Number of steps = Number of instances × (Call part size m + I/O parameter transfer part size n × Number of parameters) + Number of instruction steps in the function block definition p (See note.)

Note The number of instruction steps in the function block definition (p) will not be diminished in subsequence instances when the same function block definition is copied to multiple locations (i.e., for multiple instances). Therefore, in the above equation, the number of instances is not multiplied by the number of instruction steps in the function block definition (p).

Contents			CS/CJ-series CPU Units with unit version 3.0 or later
m	Call part		57 steps
n	I/O parameter transfer part The data type is shown in parentheses.	1-bit I/O variable (BOOL)	6 steps
		1-word I/O variable (INT, UINT, WORD)	6 steps
		2-word I/O variable (DINT, UDINT, DWORD, REAL)	6 steps
		4-word I/O variable (LINT, ULINT, LWORD, LREAL)	12 steps
p	Number of instruction steps in function block definition	The total number of instruction steps (same as standard user program) + 27 steps.	

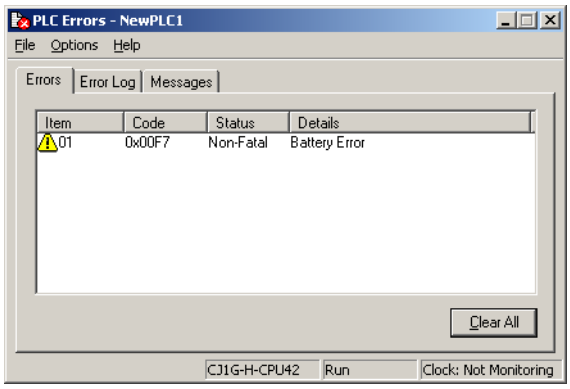
Example:
Input variables with a 1-word data type (INT): 5
Output variables with a 1-word data type (INT): 5
Function block definition section: 100 steps
Number of steps for 1 instance = 57 + (5 + 5) × 6 steps + 100 steps + 27 steps = 244 steps

SECTION 11
Troubleshooting

This section provides information on hardware and software errors that occur during PLC operation.

11-1 Error Log

Each time that an error occurs in a CJ PLC, the CPU Unit stores error information in the Error Log Area. The error information includes the error code (stored in A400), error contents, and time that the error occurred. Up to 20 records can be stored in the Error Log.



Errors Generated by FAL(006)/FALS(007)

In addition to system-generated errors, the PLC records user-defined FAL(006) and FALS(007) errors, making it easier to track the operating status of the system.

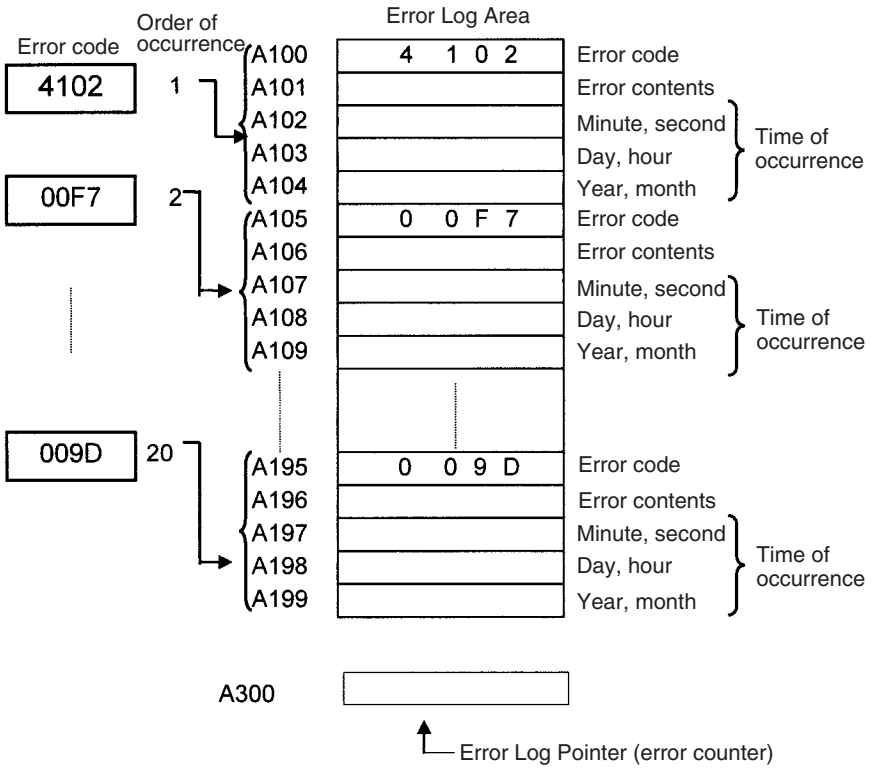
A user-defined error is generated when FAL(006) or FALS(007) is executed in the program. The execution conditions of these instructions constitute the user-defined error conditions. FAL(006) generates a non-fatal error and FALS(007) generates a fatal error that stops program execution.

The following table shows the error codes for FAL(006) and FALS(007).

Instruction	FAL numbers	Error codes
FAL(006)	#0001 to #01FF (1 to 511 decimal)	4101 to 42FF
FALS(007)	#0001 to #01FF (1 to 511 decimal)	C101 to C2FF

Error Log Structure

When more than 20 errors occur, the oldest error data (in A195 to A199) is deleted and the newest record is stored in A100 to A104.



Note The Error Log Pointer can be reset by turning ON the Error Log Pointer Reset Bit (A50014), effectively clearing the error log displays from the Programming Consoles or CX-Programmer. The contents of the Error Log Area will not be cleared by resetting the pointer.

11-2 Error Processing

11-2-1 Error Categories

Errors in CJ-series PLCs can be broadly divided into the following three categories.

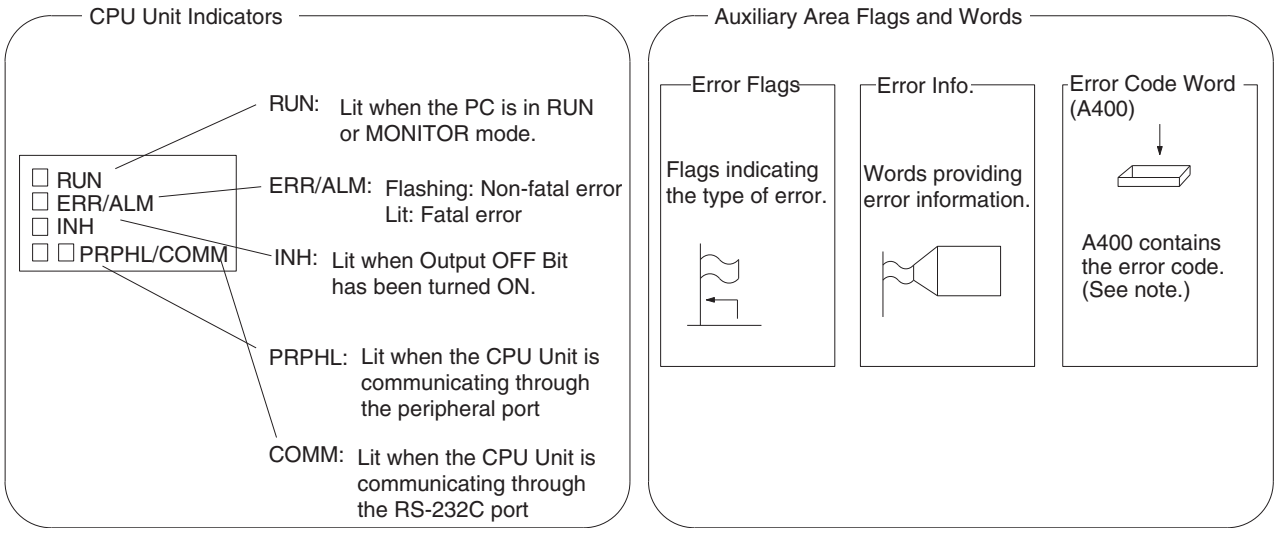
Category	Result	Indicators		Comments
		RUN	ERR/ALM	
CPU Standby	The CPU Unit will not start operation in RUN or MONITOR mode.	OFF	OFF	---
Non-fatal Errors (including FAL(006))	The CPU Unit will continue operating in RUN or MONITOR mode.	ON (Green)	Flashing (Red)	Other indicators will also operate when a communications error has occurred or the Output OFF Bit is ON.
Fatal Errors (including FALS(007))	The CPU Unit will stop operating in RUN or MONITOR mode.	OFF	ON (Red)	The indicators will all be OFF when there is a power interruption.

11-2-2 Error Information

There are basically four sources of information on errors that have occurred:

1,2,3...

1. The CPU Unit's indicators
2. The Auxiliary Area Error Flags
3. The Auxiliary Area Error Information Words
4. The Auxiliary Area Error Code Word



Note When two or more errors occur at the same time, the highest (most serious) error code will be stored in A400.

Indicator Status and Error Conditions

The following table shows the status of the CPU Unit's indicators for errors that have occurred in RUN or MONITOR mode.

Indicator*	CPU error	CPU reset	CPU standby	Fatal error	Non-fatal error	Communications error		Output OFF Bit ON
						Peripheral	RS-232C	
RUN	OFF	OFF	OFF	OFF	ON	ON	ON	ON
ERR/ALM	ON	OFF	OFF	ON	Flashing	---	---	---
INH	OFF	OFF	---	---	---	---	---	ON
PRPHL	---	---	---	---	---	OFF	---	---
COMM	---	---	---	---	---	---	OFF	---

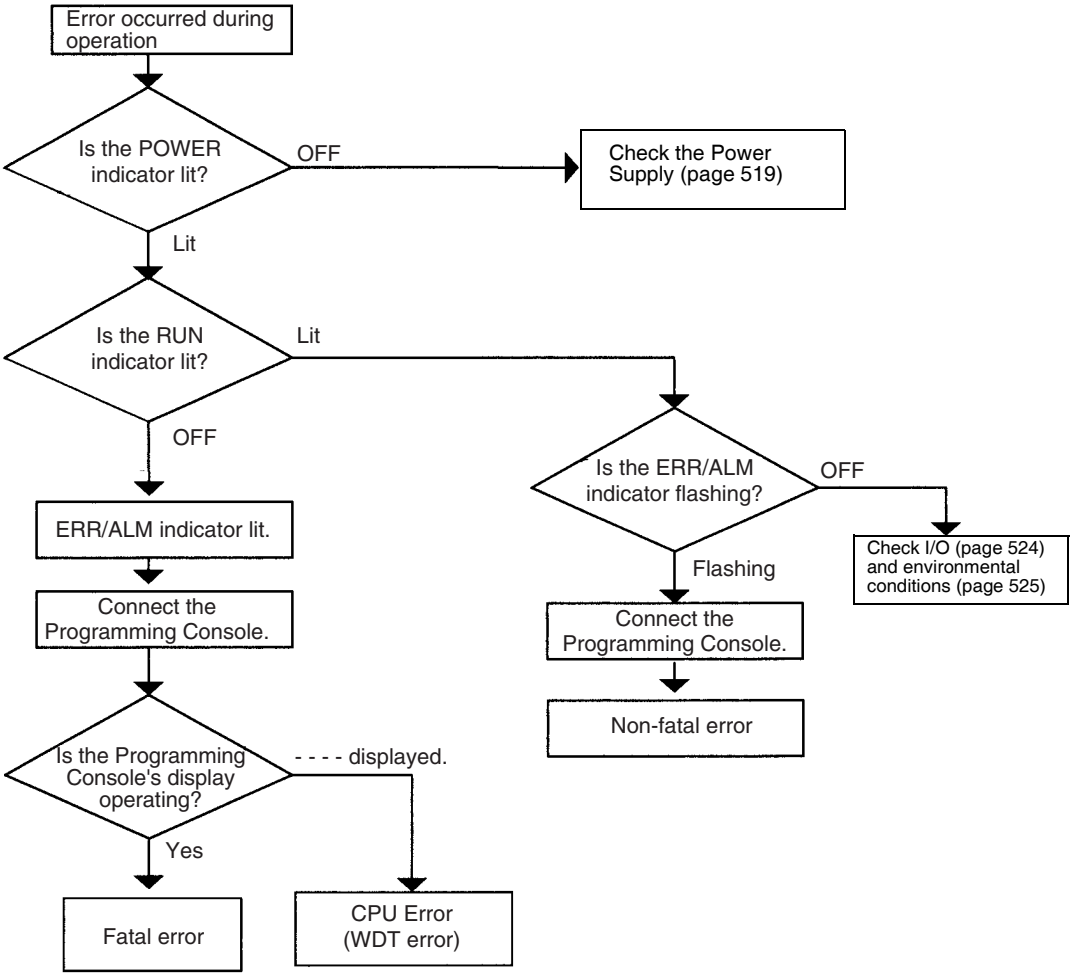
11-2-3 Error Codes and Error Flags

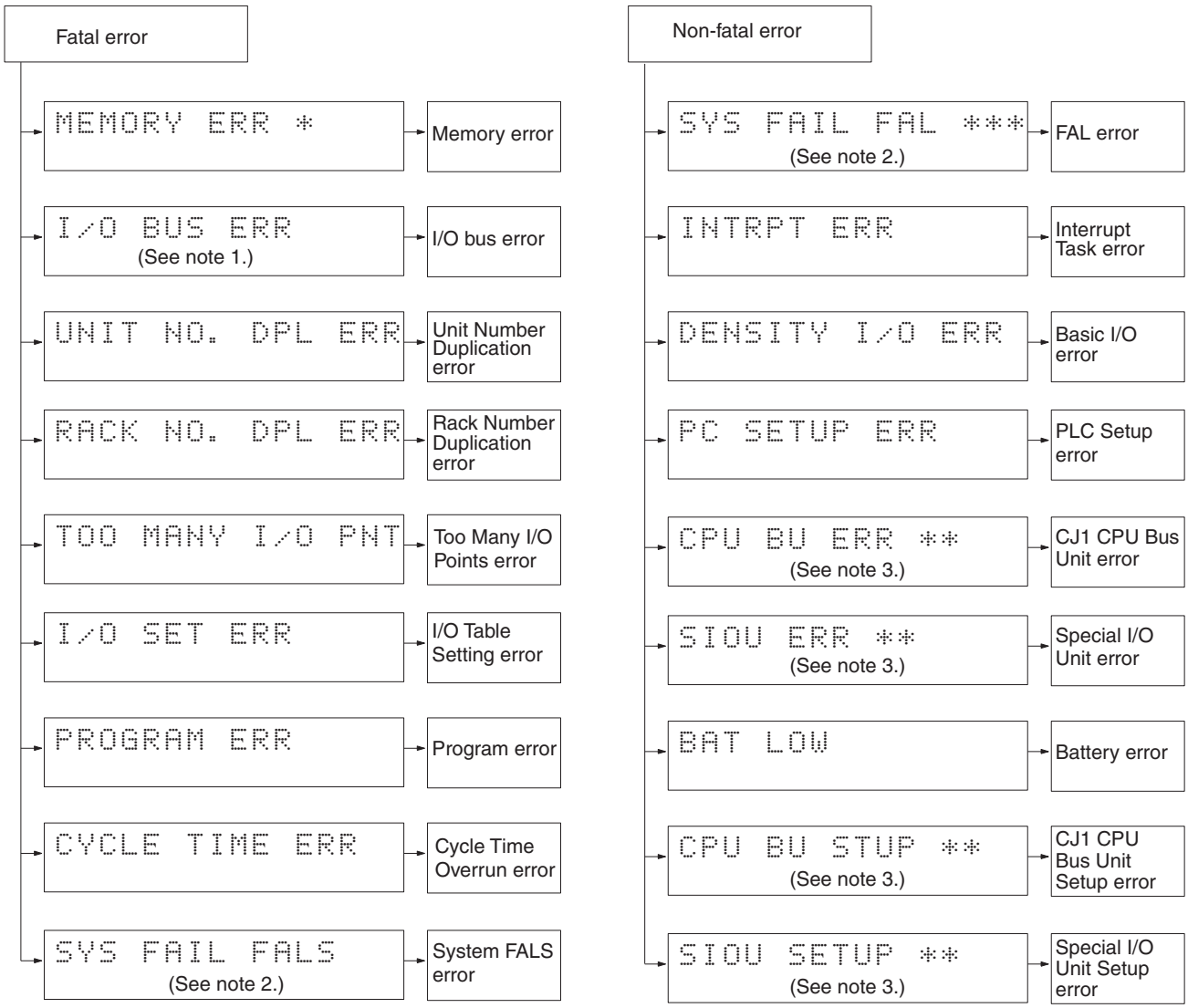
Classification	Error code	Error name	Page
Fatal system errors	80F1	Memory error	510
	80C0 to 80C7, 80CE, 80CF	I/O bus error	510
	80E9	Duplicated number error	511
	80E1	Too many I/O points	513
	80E0	I/O setting error	513
	80F0	Program error	512
	809F	Cycle time too long	514
Non-fatal system errors	008B	Interrupt task error	516
	009A	Basic I/O error	517
	009B	PLC Setup setting error	517
	0200 to 020F	CJ-series CPU Bus Unit error	517
	0300 to 035F, 03FF	Special I/O Unit error	517
	00F7	Battery error	517
	0400 to 040F	CJ-series CPU Bus Unit setting error	518
	0500 to 055F	Special I/O Unit setting error	518

Classification	Error code	Error name	Page
User-defined fatal errors	4101 to 42FF	FAL(006) error (4101 to 42FF are stored for FAL numbers 001 to 511)	516
User-defined non-fatal errors	C101 to C2FF	FALS(007) error (C101 to C2FF are stored for FALS numbers 001 to 511)	514

11-2-4 Error Processing Flowchart

Use the following flowchart as a guide for error processing with a Programming Console.





1. The rack number will be given at *.
2. The FAL/FALS number will be given at ***.
3. The unit number will be given at **.
4. The master number will be given at *.

11-2-5 Error Messages

The following tables show error messages for errors which can occur in CJ-series PLCs and indicate the likely cause of the errors.

Note Always confirm the safety of any related facilities and machines before turning OFF the power supply.

CPU Errors

A CPU error has occurred if the indicators have the following conditions in RUN or MONITOR mode. A Programming Device cannot be connected to the CPU if an CPU error has occurred.

Note If a fatal operating error occurs, the indicators will be the same as shown below for CPU errors, but a Programming Device can be connected. This will enable distinguishing between the two types of error.

Power Supply Unit Indicator	CPU Unit Indicators				
POWER	RUN	ERR/ALM	INH	PRPHL	COMM
ON	OFF	ON	---	---	---

Status	Error	Programming Console display	Error flags in Auxiliary Area	Error code (in A400)	Flags and word data	Probable cause	Possible remedy
Stopped	CPU error (WDT error)	– – – –	None	None	None	Watchdog timer has exceeded maximum setting. (This error does not normally occur)	Turn the power OFF and restart. The Unit may be damaged. Contact you OMRON representative.

CPU Reset

The following indicator status shows that the CPU Unit has been reset (not a CPU error). A Programming Device cannot be connected.

Power Supply Unit Indicator	CPU Unit Indicators				
POWER	RUN	ERR/ALM	INH	PRPHL	COMM
ON	---	---	---	---	---

Status	Error	Programming Console display	Error flags in Auxiliary Area	Error code (in A400)	Flags	Probable cause	Possible remedy
Stopped	CPU reset	– – – –	None	None	None	Power is not being supplied to an Expansion Rack.	Supply power to the Expansion Racks.
						I/O Control Unit is not connected correctly, e.g., more than one is connected or one is connected to an Expansion Rack.	Turn OFF the power supply, correct the connections, and turn the power supply back ON.
						The I/O Connecting cable is not connected correctly, e.g., the connections to the input and output connectors on the I/O Interface Unit are backward.	Turn OFF the power supply, correct the connections, and turn the power supply back ON.

Note When power supply is interrupted to an Expansion Rack, the CPU Unit will stop program execution and the same operations as are performed when the power supply to the CPU Unit is interrupted will be performed. For example, if the power OFF interrupt task is enabled, it will be executed. If power is then restored to the Expansion Rack, the CPU Unit will perform startup processing, i.e., the same operational status as existed before the power interrupt will not necessarily be continued.

CPU Standby Errors

A CPU standby error has occurred if the indicators have the following conditions in RUN or MONITOR mode.

When a CJ-series CPU Unit is turned ON, cyclic servicing is started and RUN mode is entered only after all Special I/O Units and CPU Bus Units have been detected. If the startup mode is RUN or MONITOR mode, the CPU will remain on standby until all Units have been directed.

Power Supply Unit Indicator	CPU Unit Indicators				
POWER	RUN	ERR/ALM	INH	PRPHL	COMM
ON	OFF	OFF	---	---	---

Status	Error	Programming Console display	Error flags in Auxiliary Area	Error code (in A400)	Flags	Probable cause	Possible remedy
Stopped	CPU standby error	CPU WAIT'G	None	None	None	A CPU Bus Unit has not started properly.	Check the settings of the CPU Bus Unit.
						A Special I/O Unit, or Interrupt Input Unit was not recognized.	Read the I/O table and replace any Special I/O Unit or Interrupt Input Units for which only "$" is displayed.

Startup Condition

The CJ1-H and CJ1M CPU Units support a Startup Condition setting.

To start the CPU Unit in MONITOR or PROGRAM mode even if there is one or more Units that has not completed startup processing, set the Startup Condition to 1.

PLC Setup

Programming Console setting address		Name	Settings	Default
Word	Bit			
83	15	Startup Condition	0: Wait for Units. 1: Don't wait.	0: Wait for Units.

Fatal Errors

A fatal error has occurred if the indicators have the following conditions in RUN or MONITOR mode.

Power Supply Unit Indicator	CPU Unit Indicators				
POWER	RUN	ERR/ALM	INH	PRPHL	COMM
ON	OFF	ON	---	---	---

Connect a Programming Console to display the error message or use the error log window on the CX-Programmer. The cause of the error can be determined from the error message and related Auxiliary Area flags and words.

Errors are listed in order of importance. When two or more errors occur at the same time, the more serious error's error code will be recorded in A400.

If the IOM Hold Bit hasn't been turned ON to protect I/O memory, all non-retained areas of I/O memory will be cleared when a fatal error other than FALS(007) occurs. If the IOM Hold Bit is ON, the contents of I/O memory will be retained but all outputs will be turned OFF.

If the IOM Hold Bit hasn't been turned ON to protect I/O memory, all non-retained areas of I/O memory will be cleared when a fatal error other than FALS(007) occurs. When the IOM Hold Bit is ON, the contents of I/O memory will be retained but all outputs will be turned OFF.

Error	Programming Console display	Error code (in A400)	Flag and word data	Probable cause	Possible remedy
Memory error	MEMORY ERR	80F1	A40115: Memory Error Flag A403: Memory Error Location	An error has occurred in memory. A bit in A403 will turn ON to show the location of the error as listed below.	See below.
				A checksum error has occurred in the user program memory.	Check the program and correct the error.
				A40304 ON: A checksum error has occurred in the PLC Setup.	Clear the entire PLC Setup to 0000 and reenter the settings.
				A40305 ON: A checksum error has occurred in the registered I/O table.	Initialize the registered I/O table and generate a new I/O table.
				A40307 ON: A checksum error has occurred in the routing tables.	Initialize the routing tables and reenter the tables.
				A40308 ON: A checksum error has occurred in the CPU Bus Unit setup.	Initialize the CPU Bus Unit setup and reenter the settings.
				A40309 ON: An error occurred during automatic transfer from the Memory Card at startup.	Make sure that the Memory Card is installed properly and that the correct file is on the Card.
				A40310 ON: An error occurred in flash memory (backup memory).	CPU Unit hardware is faulty. Replace the CPU Unit.
I/O Bus error	I/O BUS ERR	80C0 to 80CE or 80CF	A40114: I/O Bus Error Flag A404: I/O Bus Error Slot and Rack Numbers	Error has occurred in the bus line between the CPU and I/O Units or the End Cover is not connected to the CPU Rack or an Expansion Rack. A40400 to A40407 contain the error slot number (00 to 09) in binary. 0F hex indicates that the slot cannot be determined. If another error (such as a Special I/O Unit error) occurs at the same time or nearly the same time, the relevant Unit may have failed. 0E hex indicates the End Cover is not connected to the CPU Rack or an Expansion Rack. A40408 to A40415 contain the error rack number (00 to 03) in binary. 0F hex indicates that the rack cannot be determined. 0E hex indicates the End Cover is not connected to the CPU Rack or an Expansion Rack.	Try turning the power OFF and ON again. If the error isn't corrected, turn the power OFF and check cable connections between the I/O Units and Racks and the End Covers. If another error occurs at the same time or nearly the same time, implement countermeasures for the relevant errors. Check for damage to the cable or Units. Turn the Rack's power supply OFF and then ON again.

Error	Programming Console display	Error code (in A400)	Flag and word data	Probable cause	Possible remedy
Unit/Rack Number Duplication error	UNIT No. DPL ERR	80E9	A40113: Duplication Error Flag A410: CPU Bus Unit Duplicate Number Flags	The same number has been allocated to more than one CPU Bus Unit. Bits A41000 to A41015 correspond to unit numbers 0 to F.	Check the unit numbers, eliminate the duplications, and turn the Rack's power supply OFF and then ON again.
			A40113: Duplication Error Flag A411 to A416: Special I/O Unit Duplicate Number Flags	The same number has been allocated to more than one Special I/O Unit. Bits A41100 to A41615 correspond to unit numbers 0 to 95.	Check the unit numbers, eliminate the duplications, and turn the Rack's power supply OFF and then ON again.
	RACK No. DPL ERR	80EA	A409: Expansion Rack Duplicate Rack Number	The same I/O word has been allocated to more than one Basic I/O Unit.	Check allocations to Units on the rack number whose bit in ON in A40900 to A40903. Correct the allocations so that no words are allocated more than once, including to Units on other Racks, and turn the Rack's power supply OFF and then ON again.
				An Expansion Rack's starting word address exceeds CIO 0901. The corresponding bit in A40900 to A40903 (Racks 0 to 3) will be turned ON.	Check the first word setting for the Rack indicated in A40900 to A40903 and change the setting to a valid word address below CIO 0900 with a Programming Device.
Program error	PROGRAM ERR	80F0	A40109: Program Error Flag A294 to A299: Program error information	The program is incorrect. See the following rows of this table for details. The address at which the program stopped will be output to A298 and A299.	Check A295 to determine the type of error that occurred and check A298/A299 to find the program address where the error occurred. Correct the program and then clear the error.
				A29511: No END error	Be sure that there is an END(001) instruction at the end of the task specified in A294 (program stop task number). The address where the END(001)
				A29515: UM overflow error The last address in UM (user program memory) has been exceeded.	Use a Programming Device to transfer the program again.

Error	Programming Console display	Error code (in A400)	Flag and word data	Probable cause	Possible remedy
Program error (cont.)	PROGRAM ERR	80F0	A40109: Program Error Flag A294 to A299: Program error information	A29513: Differentiation overflow error Too many differentiated instructions have been inserted or deleted during online editing.	After writing any changes to the program, switch to PROGRAM mode and then return to MONITOR mode to continue editing the program.
				A29512: Task error A task error has occurred. The following conditions will generate a task error. 1) There isn't an executable cyclic task. 2) There isn't a program allocated to the task. Check A294 for the number of the task missing a program. 3) The task specified in a TKON(820), TKOF(821), or MSKS(690) instruction doesn't exist.	• Check the startup cyclic task attributes. • Check the execution status of each task as controlled by TKON(820) and TKOF(821). • Make sure that all of the task numbers specified in TKON(820), TKOF(821), and MSKS(690) instructions have corresponding tasks. Use MSKS(690) to mask any I/O or scheduled interrupt tasks that are not being used and that do not have programs set for them. • If the power OFF interrupt task is enables in the PLC Setup, make sure that the power OFF interrupt task has been created.
				A29510: Illegal access error An illegal access error has occurred and the PLC Setup has been set to stop operation for an instruction error. The following are illegal access errors: 1. Reading/writing a parameter area. 2. Writing memory that is not installed. 3. Writing an EM bank that is EM file memory. 4. Writing to a read-only area. 5. Indirect DM/EM address that is not in BCD when BCD mode is specified.	Find the program address where the error occurred (A298/A299) and correct the instruction.
				A29509: Indirect DM/EM BCD error An indirect DM/EM BCD error has occurred and the PLC Setup has been set to stop operation for an instruction error.	Find the program address where the error occurred (A298/A299) and correct the indirect addressing or change to binary mode.
				A29508: Instruction error An instruction processing error has occurred and the PLC Setup has been set to stop operation for an instruction error.	Find the program address where the error occurred (A298/A299) and correct the instruction.
				A29514: Illegal instruction error The program contains an instruction that cannot be executed.	Retransfer the program to the CPU Unit.

Error	Programming Console display	Error code (in A400)	Flag and word data	Probable cause	Possible remedy
Too Many I/O Points error	TOO MANY I/O PNT	80E1	A40111: Too Many I/O Points Flag A407: Too Many I/O Points, Details	The probable causes are listed below. The 3-digit binary value (000 to 101) in A40713 to A40715 indicates the cause of the error. The value of these 3 bits is also output to A40700 to A40712. 1) The total number of I/O points set in the I/O Table exceeds the maximum allowed for the CPU Unit 2) The number of Expansion Racks exceeds the maximum (bits: 101). 3) More than 10 I/O Units are connected to one Rack (bits: 111).	Correct the problem and then turn the power supply OFF and back ON.
I/O Table Setting error	I/O SET ERR	80E0	A40110: I/O Setting Error Flag	The Units that are connected do not agree with the registered I/O table or the number of Units that are connected does not agree with the number in the registered I/O table. (The following Units must be set as a 16-point Units in the I/O tables made on the CX-Programmer because they are allocated 1 word each even though they have only 8 points: CJ1W-ID201, CJ1W-OC201, CJ1W-IA201, CJ1W-OA201, and CJ1W-OD201/202/203/204. An I/O setting error will occur if this Unit is set as an 8-point Unit.)	Any discrepancies in the I/O table will be detected when the I/O verification operation is performed. If this error occurs even when the number Units is correct, there may be a faulty Unit. Automatically create the I/O tables and check for Units that are not being detected. If the number of Units is not correct, turn OFF the power supply and correctly connect the proper Units. If the number of Units is correct, confirm the Unit in discrepancy, turn OFF the power supply, and then correct the Unit connections. If there is a mistake in the I/O tables, recreate or edit them to correct the mistake.
				An Interrupt Input Unit has been connected in the wrong position, i.e., not in one of the five positions (CJ1 and CJ1-H) or three positions (CJ1M) next to the CPU Unit, or has been registered in the Registered I/O Tables in the wrong position.	A40508 will turn ON if an Interrupt Input Unit is in the wrong position (i.e., either physically in the wrong position in the system or registered in the wrong position in the Registered I/O Tables). Mount the Unit in the correct position or correct the Registered I/O Tables.

Error	Programming Console display	Error code (in A400)	Flag and word data	Probable cause	Possible remedy
Cycle Time Overrun error	CYCLE TIME ERR	809F	A40108: Cycle Time Too Long Flag	The cycle time has exceeded the maximum cycle time (watch cycle time) set in the PLC Setup.	Change the program to reduce the cycle time or change the maximum cycle time setting. Check the Maximum Interrupt Task Processing Time in A440 and see if the Cycle Time Watch Time can be changed. The cycle time can be reduced by dividing unused parts of the program into tasks, jumping unused instructions in tasks, and disabling cyclic refreshing of Special I/O Units that don't require frequent refreshing.
		809F	A40515: Peripheral Servicing Cycle Time Too Long	Turns ON when the peripheral servicing time in a Parallel Processing Mode exceeds 2 s.	Change the CPU Processing Mode in the PLC Setup to Normal Mode or Peripheral Servicing Priority Mode, or review the system to reduce the event load. Parallel processing may not be possible if the program execution time (given in A66) is too short (e.g., less than 0.2 ms).
System FALS error	SYS FAIL FALS	C101 to C2FF	A40106: FALS Error Flag	FALS(007) has been executed in the program. The error code in A400 will indicate the FAL number. The leftmost digit of the code will be C and the rightmost 3 digits of the code will be from 100 to 2FF hex and will correspond to FAL numbers 001 to 511.	Correct according to cause indicated by the FAL number (set by user).

Non-fatal Errors

A non-fatal error has occurred if the indicators have the following conditions in RUN or MONITOR mode.

Power Supply Unit Indicator	CPU Unit Indicators				
POWER	**RUN**	**ERR/ALM**	**INH**	**PRPHL**	**COMM**
ON	ON	Flashing	---	---	---

Connect a Programming Console to display the error message or use the error log window on the CX-Programmer. The cause of the error can be determined from the error message and related Auxiliary Area flags and words.

Errors are listed in order of importance. When two or more errors occur at the same time, the more serious error's error code will be recorded in A400.

Error	Programming Console display	Error code (in A400)	Flag and word data	Probable cause	Possible remedy
System FAL error	SYS FAIL FAL	4101 to 42FF	A40215: FAL Error Flag A360 to A391: Executed FAL Number Flags	FAL(006) has been executed in program. Executed FAL Number Flags A36001 to A39115 correspond to FAL numbers 001 to 511. The error code in A400 will indicate the FAL number. The leftmost digit of the code will be 4 and the rightmost 3 digits of the code will be from 100 to 2FF hex and will correspond to FAL numbers 001 to 511.	Correct according to cause indicated by FAL number (set by user).
Interrupt Task error	INTRPT ERR	008B	A40213: Interrupt Task Error Flag A426: Interrupt Task Error, Task Number	ON when the Detect Interrupt Task Errors setting in the PLC Setup is set to "Detect" and one of the following occurs for the same Special I/O Unit. IORF(097), FIORF(225) (CJ1-H-R CPU Units only), IORD(222) or IOWR(223) in a cyclic task are competing with FIORF(225), IORF(097), IORD(222) or IOWR(223) in an interrupt task. IORF(097), FIORF(225) (CJ1-H-R CPU Units only), IORD(222) or IOWR(223) was executed in an interrupt task when I/O was being refreshed. **Note** If cyclic refreshing is not disabled in the PLC Setup for a Special I/O Unit and IORF(097), FIORF(225) (CJ1-H-R CPU Units only), IORD(222) or IOWR(223) is executed for the same Special I/O Unit in an interrupt task, a duplicate refreshing status will occur and an interrupt task error will occur.	Check the program. Either disable detection of interrupt task errors in the PLC Setup (address 128, bit 14) or correct the problem in the program.

Error	Programming Console display	Error code (in A400)	Flag and word data	Probable cause	Possible remedy	
Basic I/O error	DENSITY I/O ERR	009A	A40212: Basic I/O Unit Error Flag A408: Basic I/O Unit Error, Slot Number	An error has occurred in a Basic I/O Unit. A408 contains the errant rack/slot number.	There is a fault in the internal interface circuits in the I/O Unit.	Replace the Unit.
					The external power supply is OFF (disconnected).	Turn ON the power supply.
PLC Setup error	PLC Setup ERR	009B	A40210: PLC Setup Error Flag A406: PLC Setup Error Location	There is a setting error in the PLC Setup. The location of the error is written to A406.	Change the indicated setting to a valid setting.	
CPU Bus Unit error	CPU BU ERR	0200 to 020F	A40207: CPU Bus Unit Error Flag A417: CPU Bus Unit Error, Unit Number Flags	An error occurred in a data exchange between the CPU Unit and a CPU Bus Unit. The corresponding flag in A417 is turned ON to indicate the problem Unit. Bits A41700 to A41715 correspond to unit numbers 0 to F.	Check the Unit indicated in A417. Refer to the Unit's operation manual to find and correct the cause of the error. Restart the Unit by toggling its Restart Bit or turn the power OFF and ON again. Replace the Unit if it won't restart.	
Special I/O Unit error	SIOU ERR	0300 to 035F, or 03FF	A40206: Special I/O Unit Error Flag A418 to A423: Special I/O Unit Error, Unit Number Flags	An error occurred in a data exchange between the CPU Unit and a Special I/O Unit. The corresponding flag in A418 to A423 is turned ON to indicate the problem Unit. Bits A41800 to A42315 correspond to unit numbers 0 to 95.	Check the Unit indicated in A418 to A423. Refer to the Unit's operation manual to find and correct the cause of the error. Restart the Unit by toggling its Restart Bit or turn the power OFF and ON again. Replace the Unit if it won't restart.	
Battery error	BATT LOW	00F7	A40204: Battery Error Flag	This error occurs when the PLC Setup has been set to detect battery errors and the CPU Unit's backup battery is missing or its voltage has dropped.	Check battery and replace if necessary. Change the PLC Setup setting if battery-free operation is being used.	

Error	Programming Console display	Error code (in A400)	Flag and word data	Probable cause	Possible remedy
CPU Bus Unit Setup error	CPU BU ST ERR	0400 to 040F	A40203: CPU Bus Unit Setting Error Flag A427: CPU Bus Unit Setting Error, Unit Number Flags	An installed CPU Bus Unit does not match the CPU Bus Unit registered in the I/O table. The corresponding flag in A427 will be ON. Bits 00 to 15 correspond to unit numbers 0 to F.	Change the registered I/O table.
Special I/O Unit Setup error	SIOU SETUP ERR	0500 to 055F	A40202: Special I/O Unit Setting Error Flag A428 to A433: Special I/O Unit Setting Error, Unit Number Flags	An installed Special I/O Unit does not match the Special I/O Unit registered in the I/O table. The corresponding flag in A428 to A433 will be ON. Bits A42800 to A43315 correspond to unit numbers 0 to 95.	Change the registered I/O table.

Other Errors

Peripheral Port Communications Error

A communications error has occurred in communications with the device connected to the peripheral port if the indicators have the following conditions.

Power Supply Unit Indicator	CPU Unit Indicators				
POWER	RUN	ERR/ALM	INH	PRPHL	COMM
ON	ON	---	---	OFF	---

Check the setting of pin 4 on the DIP switch and the peripheral port settings in the PLC Setup. Also check the cable connections.

RS-232C Port Communications Error

A communications error has occurred in communications with the device connected to the RS-232C port if the indicators have the following conditions.

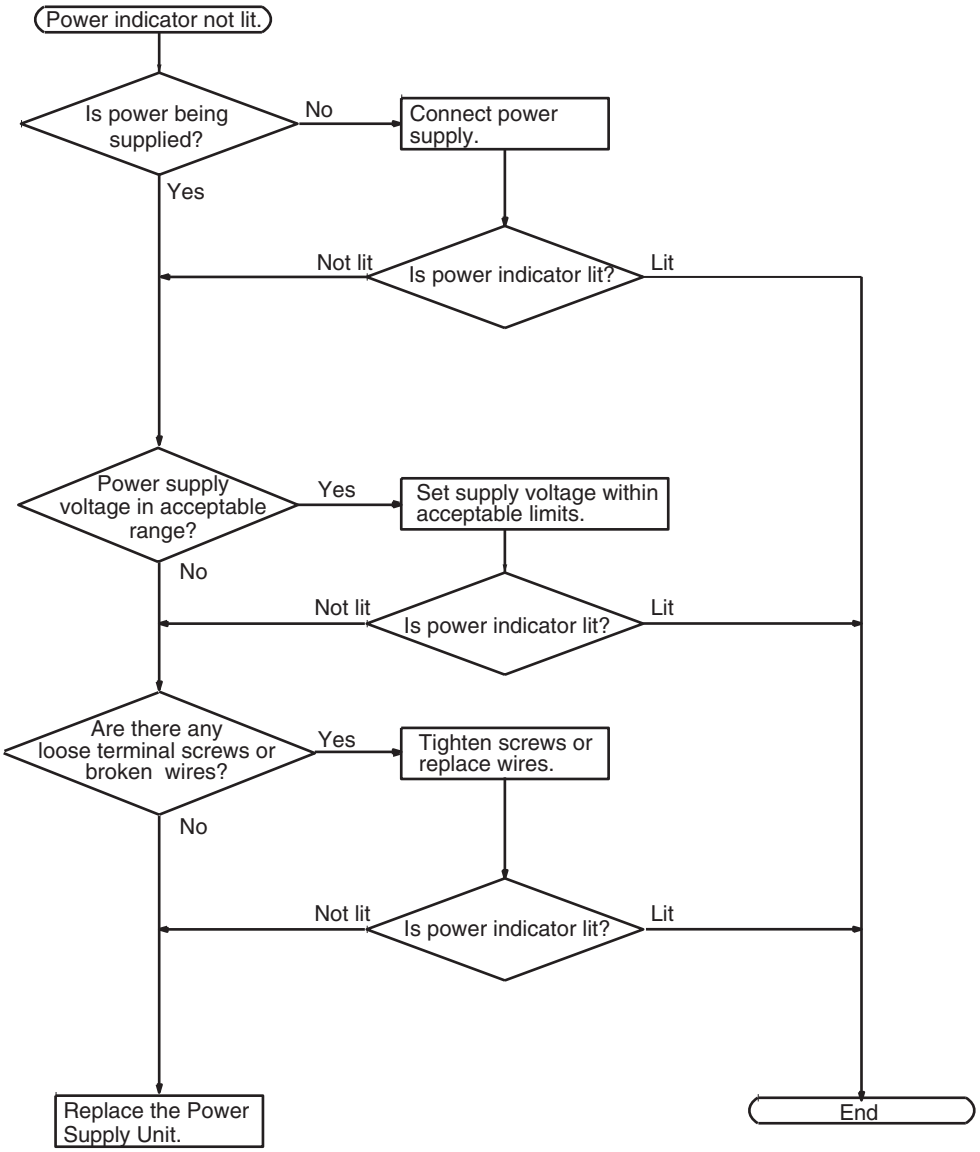
Power Supply Unit Indicator	CPU Unit Indicators				
POWER	RUN	ERR/ALM	INH	PRPHL	COMM
ON	---	---	---	---	OFF

Check the setting of pin 5 on the DIP switch and the RS-232C port settings in the PLC Setup. Also check the cable connections. If a host computer is connected, check the communications settings of the serial port on the host computer and the communications program in the host computer.

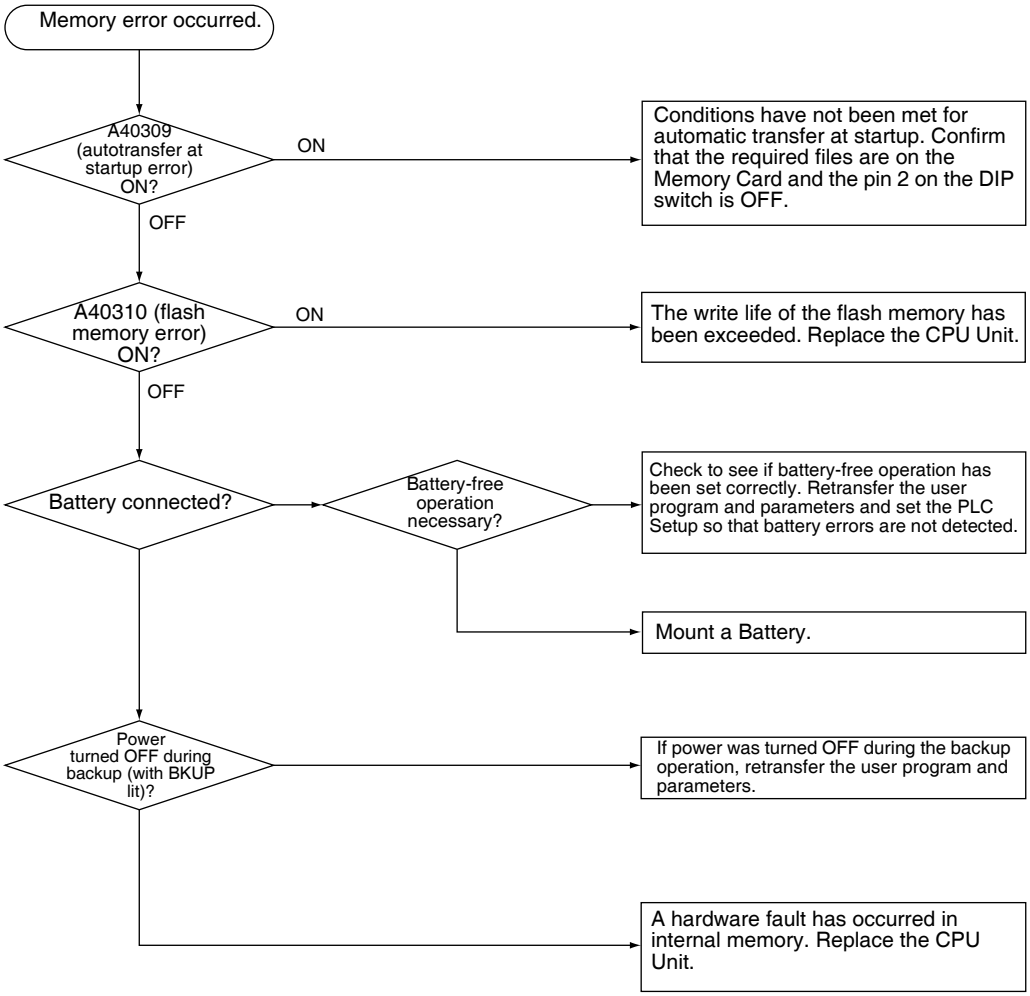
11-2-6 Power Supply Check

The allowable voltage ranges are shown in the following table.

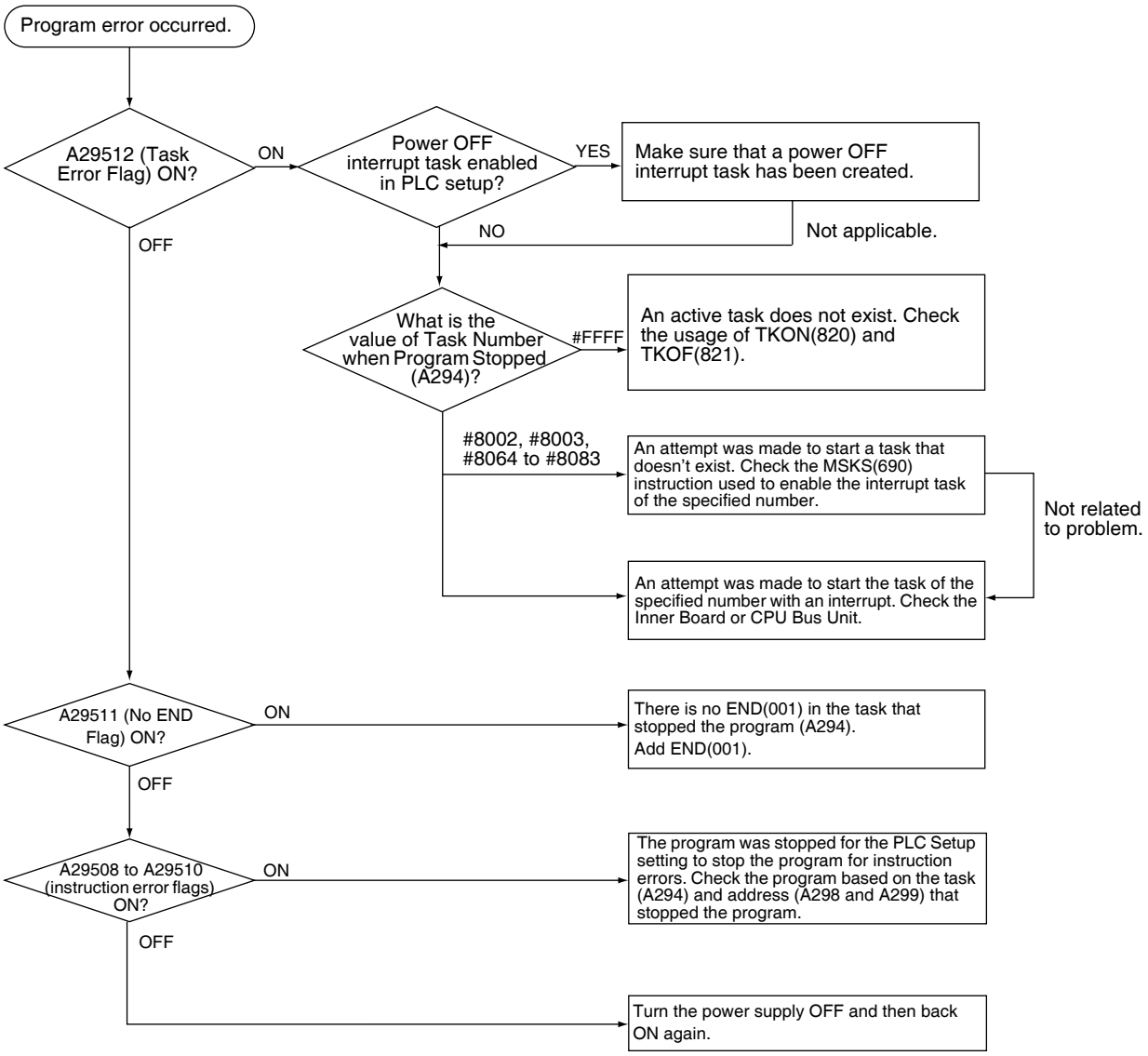
Power Supply Unit	Power supply voltage	Allowable voltage range
CJ1W-PA205R	100 to 240 V AC	85 to 264 V AC
CJ1W-PA205C	100 to 240 V AC	85 to 264 V AC
CJ1W-PA202	100 to 240 V AC	85 to 264 V AC
CJ1W-PD025	24 V DC	19.2 to 28.8 V DC
CJ1W-PD022	24 V DC	21.6 to 26.4 V DC



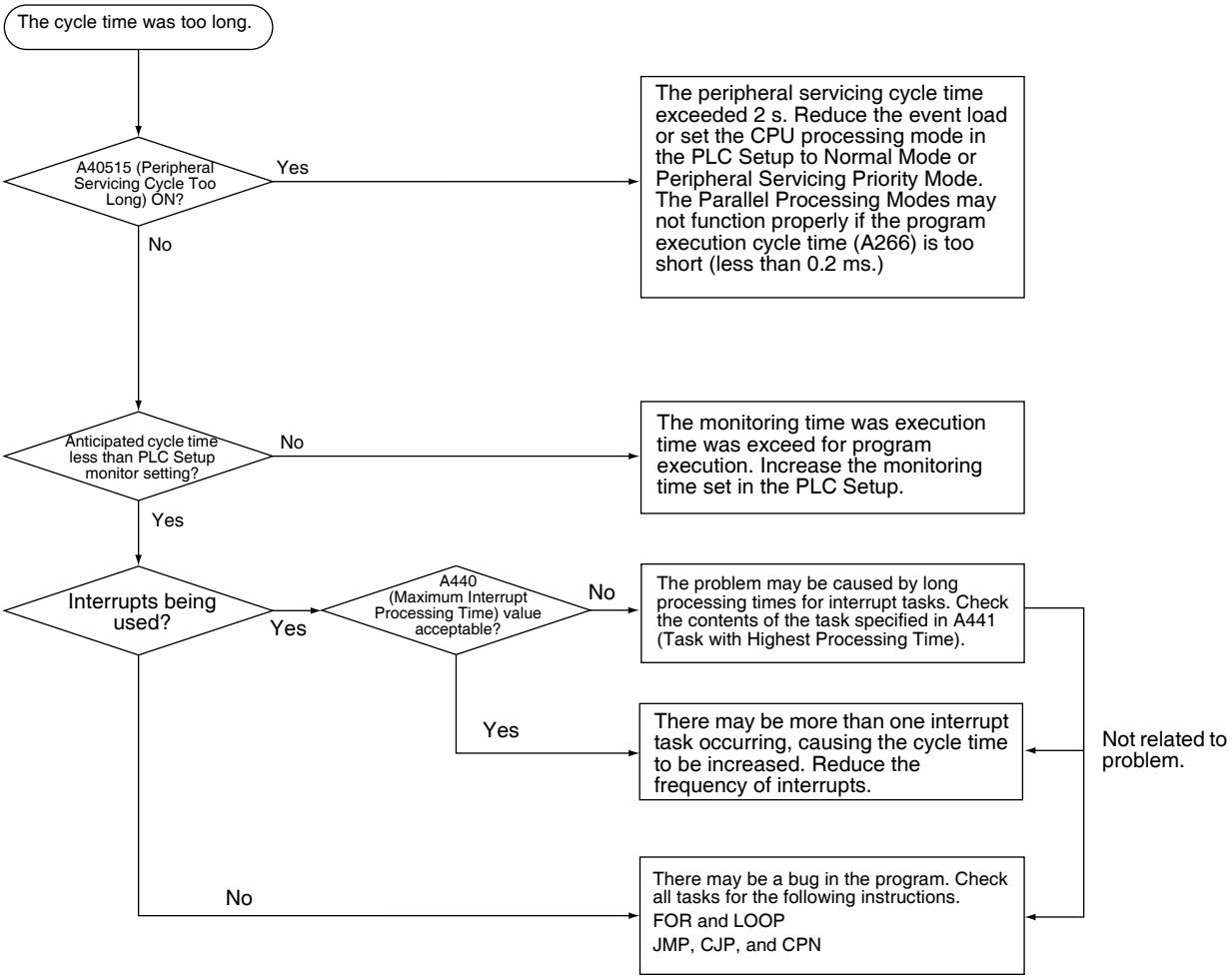
11-2-7 Memory Error Check



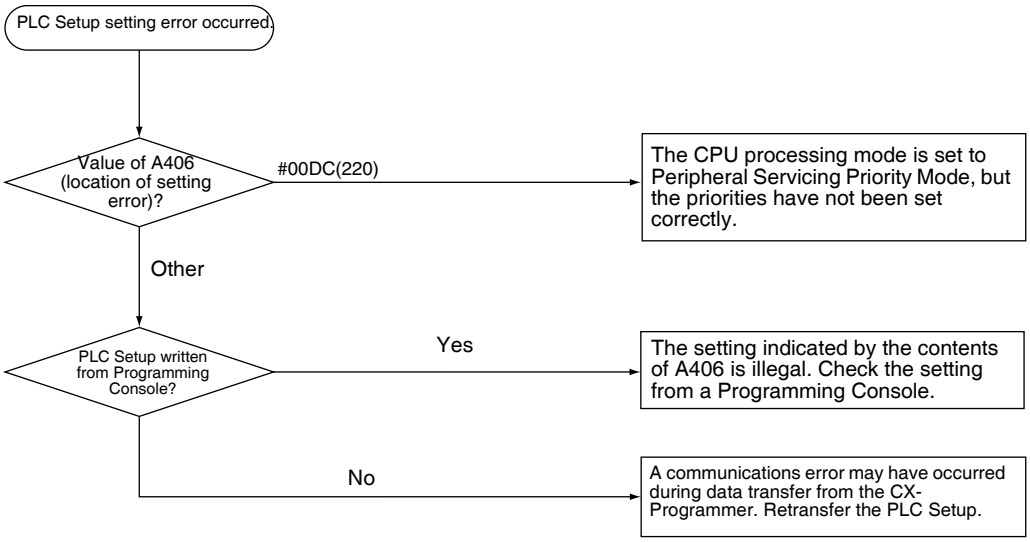
11-2-8 Program Error Check



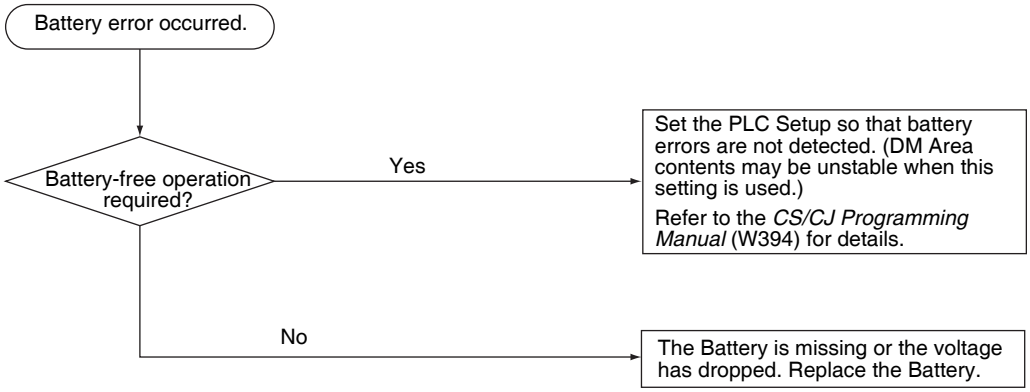
11-2-9 Cycle Time Too Long Error Check



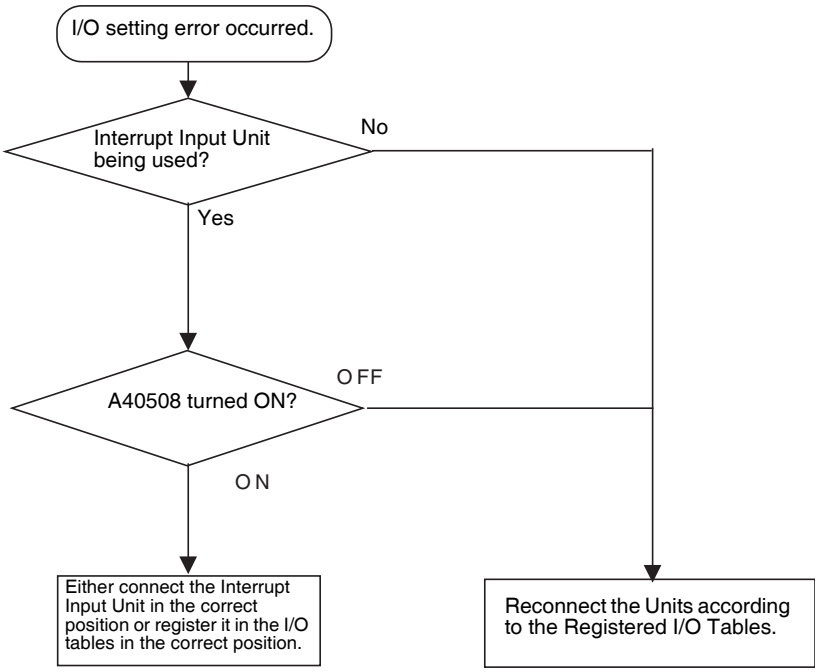
11-2-10 PLC Setup Setting Error Check



11-2-11 Battery Error Check

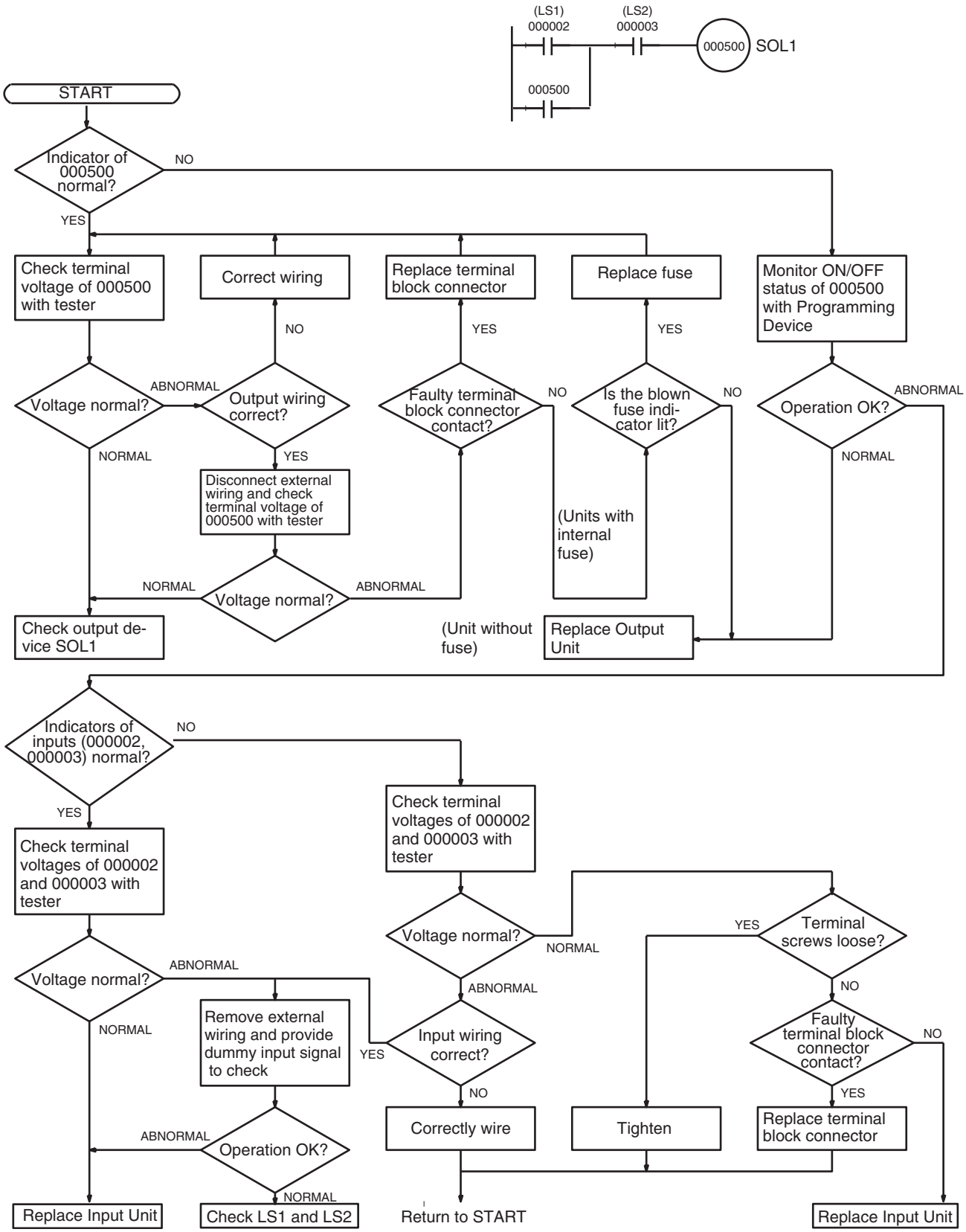


11-2-12 I/O Setting Error Check

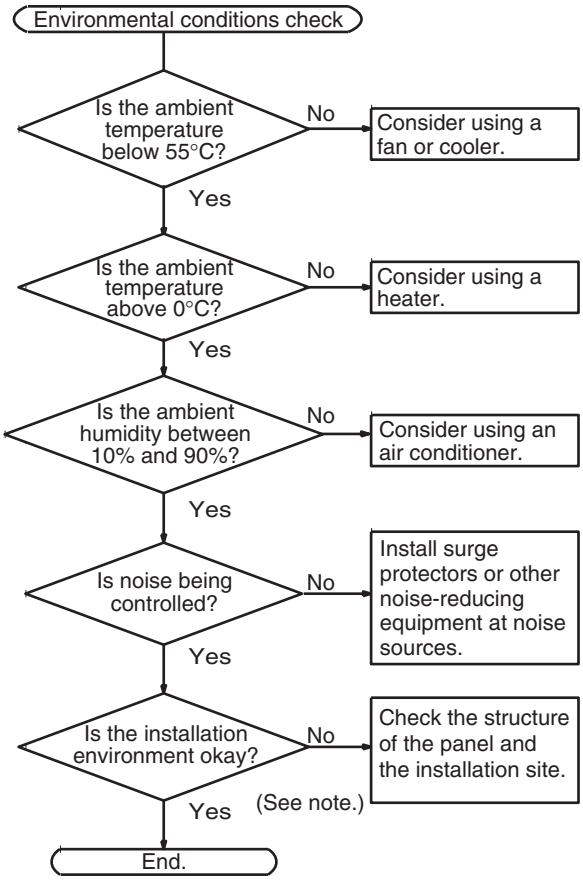


11-2-13 I/O Check

The I/O check flowchart is based on the following ladder diagram section assuming that SOL1 does not turn ON.



11-2-14 Environmental Conditions Check



Note Check for corrosive gases, flammable gases, dust, dirt, salts, metal dust, direct light, water, oils, and chemicals.

11-3 Troubleshooting Racks and Units

CPU Racks and Standard Expansion Racks

Symptom	Cause	Remedy
POWER indicator is not lit.	PCB short-circuited or damaged.	Replace Power Supply Unit.
	(1) Error in program.	Correct program
	(2) Power line is faulty.	Replace Power Supply Unit.
RUN output* does not turn ON. RUN indicator lit. (*CJ1W-PA205R)	Internal circuitry of Power Supply Unit is faulty.	Replace Power Supply Unit.
Serial Communications Unit or CPU Bus Unit does not operate or malfunctions.	(1) The I/O Connecting Cable is faulty. (2) The I/O bus is faulty.	Replace the I/O Connecting Cable Replace the I/O Control Unit or I/O Interface Unit.
Bits do not operate past a certain point.		
Error occurs in units of 8 points.		
I/O bit turns ON		
All bits in one Unit do not turn ON.		

Special I/O Units

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

Symptom	Cause	Remedy
The ERH and RUN indicators on the Special I/O Unit are lit.	I/O refreshing is not being performed for the Unit from the CPU Unit (CPU Unit monitoring error). It's possible that cyclic refreshing has been disabled for the Special I/O Unit in the Cyclic Refresh Disable Setting in the PLC Setup (i.e., the bit corresponding to the unit number has been set to 1).	Change the bit corresponding to the unit number to 0 to enable cyclic refreshing, or make sure that the Unit is refreshed from the program using IORF or FIORF (CJ1-H-R CPU Units only) at least once every 11 s.

CJ Long-distance Expansion Racks

Symptom	Cause	Remedy
CPU Unit won't operate. (No response to Programming Devices and no CPU Unit indicators are lit.)	(1) Power is not turned ON to an Expansion Rack.	Turn ON power to all Expansion Racks.
	(2) An Expansion Rack is not connected correctly.	Recheck the connections and configuration using information in 2-3-3 CJ-series Expansion Racks, 3-5 I/O Control Units and I/O Interface Units.
	(3) An I/O Connecting Cable is not wired correctly.	Reconnect the I/O Connecting Cables in the correct order for output and input connectors.
	(4) A Unit is faulty.	Gradually remove/replace Units to determine the Unit that is faulty, including the Power Supply Unit, I/O Units, I/O Control/ Interface Unit, and I/O Connecting Cable.
Expansion Rack not detected.	(1) A Terminator is not connected.	If the TERM indicator is lit, connect a Terminator.
	(2) An Expansion Rack is not connected correctly.	Recheck the connections and configuration using information in 2-3-3 CJ-series Expansion Racks, 3-5 I/O Control Units and I/O Interface Units.
	(3) A Unit is faulty.	Gradually remove/replace Units to determine the Unit that is faulty, including the Power Supply Unit, I/O Units, I/O Control/ Interface Unit, and I/O Connecting Cable.
I/O bus error or I/O verification error occurs.	(1) An I/O Connecting Cable or Terminator connection is faulty.	Check that I/O Connecting Cables and Terminators are connected correctly.
	(2) Expansion cable is not wired correctly	Rewire the terminals using the correct OUT-IN sequence.
	(3) Noise or other external factor.	Separate all cables from possible sources of noise or place them in metal ducts.
	(4) A Unit is faulty.	Gradually remove/replace Units to determine the Unit that is faulty, including the Power Supply Unit, I/O Units, I/O Control/ Interface Unit, and I/O Connecting Cable.
Cycle time is too long.	(1) A CPU Bus Unit that is allocated many words (e.g., Controller Link Unit) is mounted to a CJ Long-distance Expansion Rack.	Move the CPU Bus Unit to the CPU Rack.
	(2) A Unit is faulty.	Gradually remove/replace Units to determine the Unit that is faulty, including the Power Supply Unit, I/O Units, I/O Control/ Interface Unit, and I/O Connecting Cable.
I/O Control Unit and I/O Interface Units do not appear on CX-Programmer I/O table.	This is not an error. These Units are not allocated I/O words and thus are not registered in the I/O tables.	---

Input Units

Symptom	Cause	Remedy
Not all inputs turn ON or indicators are not lit.	(1) Power is not supplied to Input Unit.	Supply power
	(2) Supply voltage is low.	Adjust supply voltage to within rated range.
	(3) Terminal block mounting screws are loose.	Tighten screws.
	(4) Faulty contact of terminal block connector.	Replace terminal block connector.
Not all inputs turn ON (indicator lit).	Input circuit is faulty. (There is a short at the load or something else that caused an overcurrent to flow.)	Replace Unit.
Not all inputs turn OFF.	Input circuit is faulty.	Replace Unit.
Specific bit does not turn ON.	(1) Input device is faulty.	Replace input devices.
	(2) Input wiring disconnected.	Check input wiring
	(3) Terminal block screws are loose.	Tighten screws
	(4) Faulty terminal block connector contact.	Replace terminal block connector.
	(5) Too short ON time of external input.	Adjust input device
	(6) Faulty input circuit	Replace Unit.
	(7) Input bit number is used for output instruction.	Correct program.
Specific bit does not turn OFF.	(1) Input circuit is faulty.	Replace Unit.
	(2) Input bit number is used for output instruction.	Correct program.
Input irregularly turns ON/OFF.	(1) External input voltage is low or unstable.	Adjust external input voltage to within rated range.
	(2) Malfunction due to noise.	Take protective measures against noise, such as: (1) Increase input response time (PLC Setup) (2) Install surge suppressor. (3) Install insulation transformer. (4) Install shielded cables between the Input Unit and the loads.
	(3) Terminal block screws are loose.	Tighten screws
	(4) Faulty terminal block connector contact.	Replace terminal block connector.
Error occurs in units of 8 points or 16 points, i.e., for the same common.	(1) Common terminal screws are loose.	Tighten screws
	(2) Faulty terminal block connector contact.	Replace terminal block connector.
	(3) Faulty data bus	Replace Unit.
	(4) Faulty CPU	Replace CPU.
Input indicator is not lit in normal operation.	Faulty indicator or indicator circuit.	Replace Unit.

Output Units

Symptom	Cause	Remedy
Not all outputs turn ON	(1) Load is not supplied with power.	Supply power
	(2) Load voltage is low.	Adjust voltage to within rated range.
	(3) Terminal block screws are loose.	Tighten screws
	(4) Faulty terminal block connector contact.	Replace terminal block connector.
	(5) An overcurrent (possibly caused by a short at the load) resulted in a blown fuse in the Output Unit. (Some Output Units provide an indicator for blown fuses.)	Replace fuse or Unit.
	(6) Faulty I/O bus connector contact.	Replace Unit.
	(7) Output circuit is faulty.	Replace Unit.
	(8) If the INH indicator is lit, the Output OFF Bit (A50015) is ON.	Turn A50015 OFF.
Not all outputs turn OFF	Output circuit is faulty.	Replace Unit.
Output of a specific bit number does not turn ON or indicator is not lit	(1) Output ON time too short because of a mistake in programming.	Correct program to increase the time that the output is ON.
	(2) Bit status controlled by multiple instructions.	Correct program so that each output bit is controlled by only one instruction.
	(3) Faulty output circuit.	Replace Unit.
Output of a specific bit number does not turn ON (indicator lit).	(1) Faulty output device.	Replace output device.
	(2) Break in output wiring.	Check output wiring.
	(3) Loose terminal block screws.	Tighten screws.
	(4) Faulty terminal block connector faulty.	Replace terminal block connector.
	(5) Faulty output bit.	Replace relay or Unit.
	(6) Faulty output circuit.	Replace Unit.
Output of a specific bit number does not turn OFF (indicator is not lit).	(1) Faulty output bit.	Replace relay or Unit.
	(2) Bit does not turn OFF due to leakage current or residual voltage.	Replace external load or add dummy resistor.
Output of a specific bit number does not turn OFF (indicator lit).	(1) Bit status controlled by multiple instructions.	Correct program.
	(2) Faulty output circuit.	Replace Unit.
Output irregularly turns ON/OFF.	(1) Low or unstable load voltage.	Adjust load voltage to within rated range
	(2) Bit status controlled by multiple instructions.	Correct program so that each output bit is controlled by only one instruction.
	(3) Malfunction due to noise.	Protective measures against noise: (1) Install surge suppressor. (2) Install insulation transformer. (3) Use shielded cables between the Output Unit and the loads.
	(4) Terminal block screws are loose.	Tighten screws.
	(5) Faulty terminal block connector contact.	Replace terminal block connector.
Error occurs in units of 8 points or 16 points, i.e., for the same common.	(1) Loose common terminal screw.	Tighten screws.
	(2) Faulty terminal block connector contact.	Replace terminal block connector.
	(3) An overcurrent (possibly caused by a short at the load) resulted in a blown fuse in the Output Unit.	Replace fuse or Unit.
	(4) Faulty data bus.	Replace Unit.
	(5) Faulty CPU.	Replace CPU.
Output indicator is not lit (operation is normal).	Faulty indicator.	Replace Unit.

SECTION 12
Inspection and Maintenance

This section provides inspection and maintenance information.

12-1 Inspections

Daily or periodic inspections are required in order to maintain the PLC's functions in peak operating condition.

12-1-1 Inspection Points

Although the major components in CJ-series PLCs have an extremely long life time, they can deteriorate under improper environmental conditions. Periodic inspections are thus required to ensure that the required conditions are being kept.

Inspection is recommended at least once every six months to a year, but more frequent inspections will be necessary in adverse environments.

Take immediate steps to correct the situation if any of the conditions in the following table are not met.

No.	Item	Inspection	Criteria	Action
1	Source Power Supply	Check for voltage fluctuations at the power supply terminals.	The voltage must be within the allowable voltage fluctuation range. (See note.)	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring voltage fluctuations within limits.
2	I/O Power Supply	Check for voltage fluctuations at the I/O terminals.	Voltages must be within specifications for each Unit.	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring voltage fluctuations within limits.
3	Ambient environment	Check the ambient temperature. (Inside the control panel if the PLC is in a control panel.)	0 to 55°C	Use a thermometer to check the temperature and ensure that the ambient temperature remains within the allowed range of 0 to 55°C.
		Check the ambient humidity. (Inside the control panel if the PLC is in a control panel.)	Relative humidity must be 10% to 90% with no condensation.	Use a hygrometer to check the humidity and ensure that the ambient humidity remains within the allowed range.
		Check that the PLC is not in direct sunlight.	Not in direct sunlight	Protect the PLC if necessary.
		Check for accumulation of dirt, dust, salt, metal filings, etc.	No accumulation	Clean and protect the PLC if necessary.
		Check for water, oil, or chemical sprays hitting the PLC.	No spray on the PLC	Clean and protect the PLC if necessary.
		Check for corrosive or flammable gases in the area of the PLC.	No corrosive or flammable gases	Check by smell or use a sensor.
		Check the level of vibration or shock.	Vibration and shock must be within specifications.	Install cushioning or shock absorbing equipment if necessary.
		Check for noise sources near the PLC.	No significant noise sources	Either separate the PLC and noise source or protect the PLC.

No.	Item	Inspection	Criteria	Action
4	Installation and wiring	Check that each Unit is connected and locked to the next Unit securely.	No looseness	Press the connectors together completely and lock them with the sliders.
		Check that cable connectors are fully inserted and locked.	No looseness	Correct any improperly installed connectors.
		Check for loose screws in external wiring.	No looseness	Tighten loose screws with a Phillips-head screwdriver.
		Check crimp connectors in external wiring.	Adequate spacing between connectors	Check visually and adjust if necessary.
		Check for damaged external wiring cables.	No damage	Check visually and replace cables if necessary.
5	User-serviceable parts	Check whether the battery has reached its service life. CJ1 and CJ1-H CPU Units: CJ1W-BAT01 CJ1M CPU Units: CJ1W-BAT01 Battery	Service life expectancy is 5 years at 25°C, less at higher temperatures. (From 0.75 to 5 years depending on model, power supply rate, and ambient temperature.)	Replace the battery when its service life has passed even if a battery error has not occurred. (Battery life depends upon the model, the percentage of time in service, and ambient conditions.)

Note The following table shows the allowable voltage fluctuation ranges for source power supplies.

Power Supply Unit	Supply voltage	Allowable voltage range
CJ1W-PA205R/PA205C	100 to 240 V AC	85 to 264 V AC (+10%/–15%)
CJ1W-PA202		
CJ1W-PD025	24 V DC	19.2 to 28.8 V DC (±20%)
CJ1W-PD022		21.6 to 26.4 V DC (±10%)

Tools Required for Inspections

Required Tools

- Slotted and Phillips-head screwdrivers
- Voltage tester or digital voltmeter
- Industrial alcohol and clean cotton cloth

Tools Required Occasionally

- Synchroscope
- Oscilloscope with pen plotter
- Thermometer and hygrometer (humidity meter)

12-1-2 Unit Replacement Precautions

Check the following after replacing any faulty Unit.

- Do not replace a Unit until the power is turned OFF.
- Check the new Unit to make sure that there are no errors.
- If a faulty Unit is being returned for repair, describe the problem in as much detail as possible, enclose this description with the Unit, and return the Unit to your OMRON representative.
- For poor contact, take a clean cotton cloth, soak the cloth in industrial alcohol, and carefully wipe the contacts clean. Be sure to remove any lint prior to remounting the Unit.

Note 1. When replacing a CPU Unit, be sure that not only the user program but also all other data required for operation is transferred to or set in the new CPU Unit before starting operation, including DM Area and HR Area set-

tings. If data area and other data are not correct for the user program, unexpected accidents may occur. Be sure to include the routing tables, Controller Link Unit data link tables, network parameters, and other CPU Bus Unit data, which are stored as parameters in the CPU Unit. Refer to the CPU Bus Unit and Special I/O Unit operation manuals for details on the data required by each Unit.

2. The simple backup operation can be used to store the user program and all parameters for the CJ1-H CPU Unit, DeviceNet Units, Serial Communications Units, and other specific Units in a Memory Card as backup files. A Memory Card and the simple backup operation can be used to easily restore data after replacing any of these Units. Refer to the *CS/CJ Series Programming Manual* (W394) for details.

12-2 Replacing User-serviceable Parts

The following parts should be replaced periodically as preventative maintenance. The procedures for replacing these parts are described later in this section.

- Battery (backup for the CPU Unit's internal clock and RAM)

Battery Functions

The battery maintains the internal clock and the following data of the CPU Unit's RAM while the main power supply is OFF.

- Retained regions of I/O memory

If the battery is not installed or battery voltage drops too low, the internal clock will stop and the data in RAM will not be stable when the main power supply goes OFF.

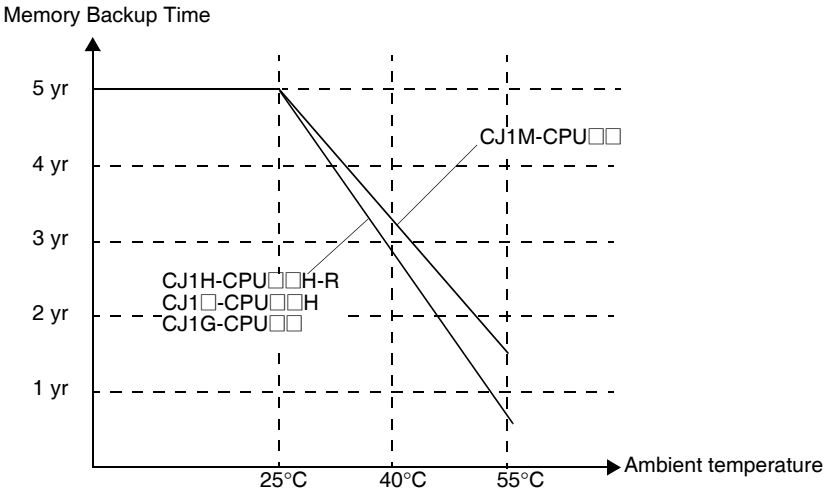
Battery Service Life and Replacement Period

At 25°C, the maximum service life for batteries is five years whether or not power is supplied to the CPU Unit while the battery is installed. The battery's lifetime will be shorter when it is used at higher temperatures and when power is not supplied to the CPU Unit for long periods.

The following table shows the approximate minimum lifetimes and typical lifetimes for the backup battery (total time with power not supplied).

Model	Approx. maximum lifetime	Approx. minimum lifetime (See note.)	Typical lifetime (See note.)
CJ1H-CPU□□H-R	5 years	6,500 hours (0.75 years)	43,000 hours (5 years)
CJ1□-CPU□□H	5 years	6,500 hours (0.75 years)	43,000 hours (5 years)
CJ1G-CPU□□	5 years	6,500 hours (0.75 years)	43,000 hours (5 years)
CJ1M-CPU□□	5 years	13,000 hours (1.5 years)	43,000 hours (5 years)

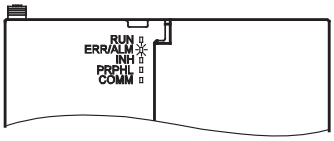
Note The minimum lifetime is the memory backup time at an ambient temperature of 55°C. The typical lifetime is the memory backup time at an ambient temperature of 25°C.



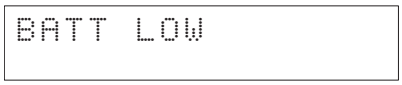
This graphic is for reference only.

Low Battery Indicators

If the PLC Setup has been set to detect a low-battery error, the ERR/ALM indicator on the front of the CPU Unit will flash when the battery is nearly discharged.



When the ERR/ALM indicator flashes, connect a Programming Console to the peripheral port and read the error message. If the message “BATT LOW” appears on the Programming Console* and the Battery Error Flag (A40204) is ON*, first check whether the battery is properly connected to the CPU Unit. If the battery is properly connected, replace the battery as soon as possible.



Once a low-battery error has been detected, it will take 5 days before the battery fails assuming that power has been supplied at lease once a day. Battery failure and the resulting loss of data in RAM can be delayed by ensuring that the CPU Unit power is not turned OFF until the battery has been replaced.

Note

1. *The PLC Setup must be set to detect a low-battery error (Detect Low Battery). If this setting has not been made, the BATT LOW error message will not appear on the Programming Console and the Battery Error Flag (A40204) will not go ON when the battery fails.
2. The battery will discharge faster at higher temperatures, e.g., 4 days at 40°C and 2 days at 55°C.

Replacement Battery

Use the CPM2A-BAT01 (for CJ1 and CJ1-H) or CJ1W-BAT01 (for CJ1M) Battery Set. Be sure to install a replacement battery within two years of the production date shown on the battery's label.

CJ1 and CJ1-H CPU Units

Production Date

OMRON
CPM2A-BAT01
01-04

Manufactured in April 2001.

CJ1M CPU Units

Production Date

OMRON
CJ1W-BAT01
02-06

Manufactured in June 2002.

Replacement Procedure

Use the following procedure to replace the battery when the previous battery has become completely discharged. You must complete this procedure within five minutes after turning OFF the power to the CPU Unit to ensure memory backup.

Note

1. We recommend replacing the battery with the power OFF to prevent the CPU Unit's sensitive internal components from being damaged by static electricity. The battery can be replaced without turning OFF the power supply. To do so, always touch a grounded piece of metal to discharge static electricity from your body before starting the procedure.
2. After replacing the battery, connect a Programming Device and clear the battery error.

Procedure

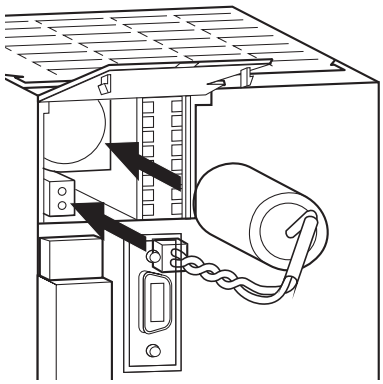
1,2,3...

1. Turn OFF the power to the CPU Unit.

or If the CPU Unit has not been ON, turn it ON for at least five minutes and then turn it OFF.

Note If power is not turned ON for at least five minutes before replacing the battery, the capacitor that backs up memory when the battery is removed will not be fully charged and memory may not be stable before the new battery is inserted.

2. Open the compartment on the upper left of the CPU Unit and carefully draw out the battery.
3. Remove the battery connector.
4. Connect the new battery, place it into the compartment, and close the cover.



The battery error will automatically be cleared when a new battery is inserted.

⚠WARNING Never short-circuit the battery terminals; never charge the battery; never disassemble the battery; and never heat or incinerate the battery. Doing any of these may cause the battery to leak, burn, or rupturing resulting in injury, fire, and possible loss of life or property. Also, never use a battery that has been dropped on the floor or otherwise subject to shock. It may leak.

UL standards require that batteries be replaced by experienced technicians. Always place an experienced technician in charge or battery replacement.

⚠Caution Turn ON the power after replacing the battery for a CPU Unit that has been unused for a long time. Leaving the CPU Unit unused again without turning ON the power even once after the battery is replaced may result in a shorter battery life.

Appendix A
Specifications of Basic I/O Units

Basic Input Units

Name	Specifications	Model	Number of input bits allocated	Page
DC Input Units	Terminal block 12 to 24 V DC	CJ1W-ID201	8 (16) (See note.)	541
	Terminal block, 24 V DC, 16 inputs	CJ1W-ID211	16	542
	Fujitsu-compatible connector,	CJ1W-ID231	32	544
	MIL connector, 24 V DC	CJ1W-ID232	32	545
	Fujitsu-compatible connector, 24 V DC	CJ1W-ID261	64	547
	MIL connector, 24 V DC	CJ1W-ID262	64	549
AC Input Units	Terminal block, 200 to 240 V AC	CJ1W-IA201	8 (16) (See note.)	550
	Terminal block, 100 to 120 V AC	CJ1W-IA111	16	551
Interrupt Input Unit	Terminal block, 24 V DC	CJ1W-INT01	16	552
Quick-response Input Unit	Terminal block, 24 V DC	CJ1W-IDP01	16	553

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

Basic Mixed I/O Units

Name		Specifications	Model	Number of bits allocated	Page
24-V DC Inputs/ Transistor Output Units	Sinking output	Fujitsu-compatible connector Inputs: 24 V DC Outputs: 12 to 24 V DC, 0.5 A, sinking	CJ1W-MD231	16 input 16 output	555
		MIL connector Inputs: 24 V DC Outputs: 12 to 24 V DC, 0.5 A, sinking	CJ1W-MD233		557
		Fujitsu-compatible connector Inputs: 24 V DC Outputs: 12 to 24 V DC, 0.3 A, sinking	CJ1W-MD261	32 input 32 output	561
		MIL connector Inputs: 24 V DC Outputs: 12 to 24 V DC, 0.3 A, sinking	CJ1W-MD263		563
	Sourcing output	MIL connector Input: 24 V DC Outputs: 24 V DC, 0.5 A, load short-circuit protection	CJ1W-MD232	16 input 16 output	559
TTL I/O Units		Inputs: 5 V DC Outputs: 5 V DC, 35 mA	CJ1W-MD563	32 input 32 output	565

Basic Output Units

Name		Specifications	Model	Number of bits allocated	Page
Relay Output Units		Terminal block, 250 V AC/24 V DC, 2 A, independent contacts	CJ1W-OC201	8 (16) (See note 2.)	567
		Terminal block, 250 V AC/24 V DC, 2 A	CJ1W-OC211	16	568
Triac Output Unit		Terminal block, 250 V AC, 0.6 A	CJ1W-OA201	8 (16) (See note 2.)	569
Transistor Output Units	Sinking outputs	Terminal block, 12 to 24 V DC, 2 A	CJ1W-OD201	8 (16) (See note 2.)	570
		Terminal block, 12 to 24 V DC, 0.5 A	CJ1W-OD203	8 (16) (See note 2.)	571
		Terminal block, 12 to 24 V DC, 0.5 A	CJ1W-OD211	16	572
		Fujitsu-compatible connector, 12 to 24 V DC, 0.5 A	CJ1W-OD231	32	573
		MIL connector, 12 to 24 V DC, 0.5 A	CJ1W-OD233	32	576
		Fujitsu-compatible connector, 12 to 24 V DC, 0.3 A	CJ1W-OD261	64	577
		MIL connector, 12 to 24 V DC, 0.3 A	CJ1W-OD263	64	579
	Sourcing outputs	Terminal block, 24 V DC, 2 A, load short-circuit protection, line disconnection detection	CJ1W-OD202	8 (16) (See note 2.)	580
		Terminal block, 24 V DC, 0.5 A, load short-circuit protection	CJ1W-OD204	8 (16) (See note 2.)	581
		Terminal block, 24 V DC, 0.5 A, load short-circuit protection	CJ1W-OD212	16	582
		MIL connector, 24 V DC, 0.5 A, load short-circuit protection	CJ1W-OD232	32	583
		MIL connector, 12 to 24 V DC, 0.3 A	CJ1W-OD262	64	586
About Contact Output Units					588
Load Short-circuit Protection and Line Disconnection Detection for CJ1W-OD202					590
Load short-circuit protection for CJ1W-OD204/OD212/OD232/MD232					592

Note 1. For details on the connectors included with the Unit, refer to the information provided under *Accessories* in the tables for Basic I/O Units in the following pages.

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

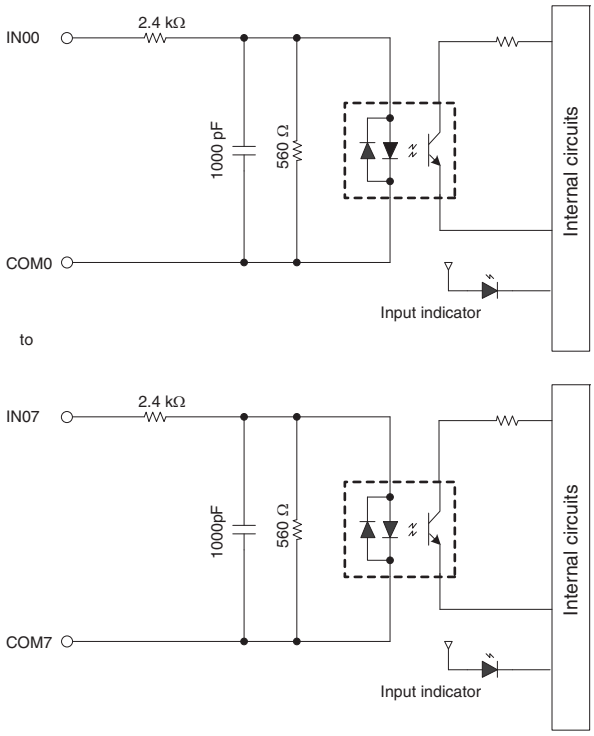
Reading Terminal Connection Diagrams

- I/O terminals in terminal connection diagrams are shown as viewed from the front panel of the Unit.
- Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on all Units.
- A0 to A20 and B0 to B20 are printed on the Units.

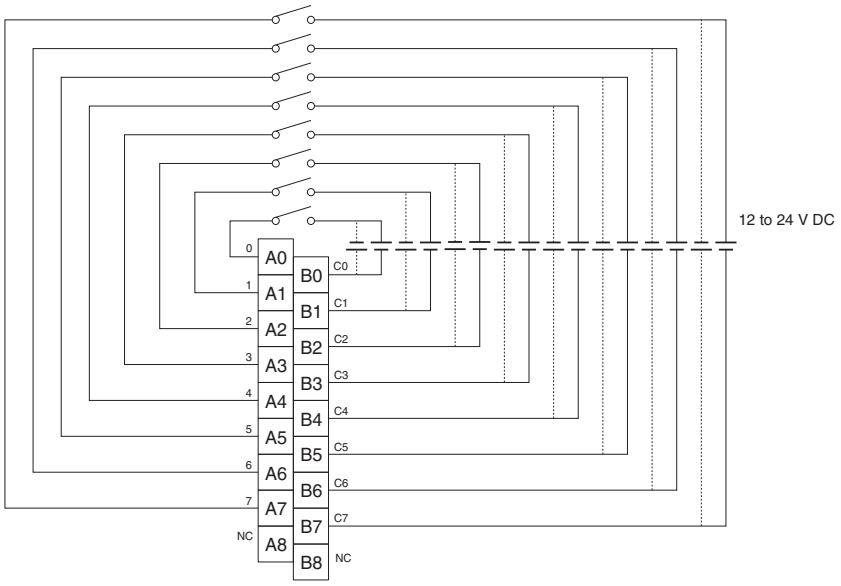
CJ1W-ID201 12 to 24-V DC Input Unit (Terminal Block, 8 Points)

Rated Input Voltage	12 to 24 V DC
Rated Input Voltage Range	10.2 to 26.4 V DC
Input Impedance	2.4 kΩ
Input Current	10 mA typical (at 24 V DC)
ON Voltage/ON Current	8.8 V DC min./3 mA min.
OFF Voltage/OFF Current	3 V DC max./1 mA max.
ON Response Time	8.0 ms max. (Possible to set to between 0 and 32 ms in the PLC Setup.)
OFF Response Time	8.0 ms max. (Possible to set to between 0 and 32 ms using PLC Setup)
Number of Circuits	8 (each common)
Number of Simultaneously ON Points	100% simultaneously ON
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 80 mA max.
Weight	110 g max.

Circuit Configuration



Terminal Connections



Polarity of the input power supply can be connected in either direction.

Note 1. The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response time are set to 0 ms due to internal element delays.

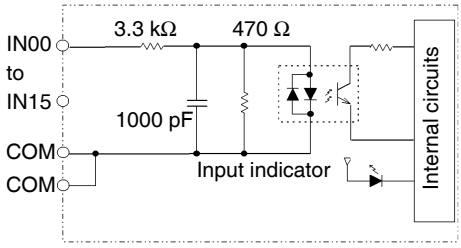
2. Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O.

3. Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

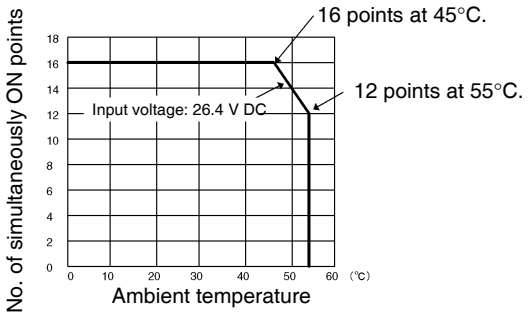
CJ1W-ID211 24-V DC Input Unit (Terminal Block, 16 Points)

Rated Input Voltage	24 V DC
Rated Input Voltage Range	20.4 to 26.4 V DC
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 V DC)
ON Voltage/ON Current	14.4 V DC min./3 mA min.
OFF Voltage/OFF Current	5 V DC max./1 mA max.
ON Response Time	8.0 ms max. (Possible to set to between 0 and 32 ms in the PLC Setup.)
OFF Response Time	8.0 ms max. (Possible to set to between 0 and 32 ms using PLC Setup)
Number of Circuits	16 (16 points/common, 1 circuit)
Number of Simultaneously ON Points	100% simultaneously ON (at 24 V DC) (Refer to the following illustration.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 80 mA max.
Weight	110 g max.

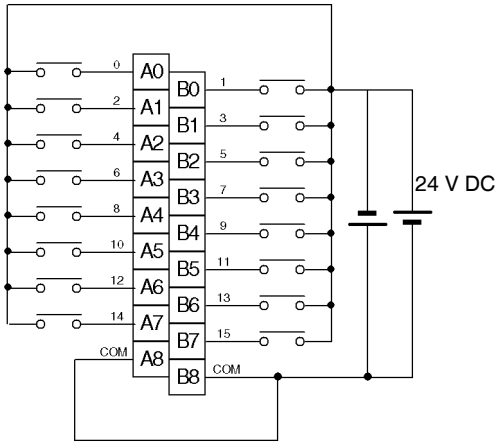
Circuit Configuration



Temperature characteristics for simultaneously ON points



Terminal Connections



Polarity of the input power supply can be connected in either direction.

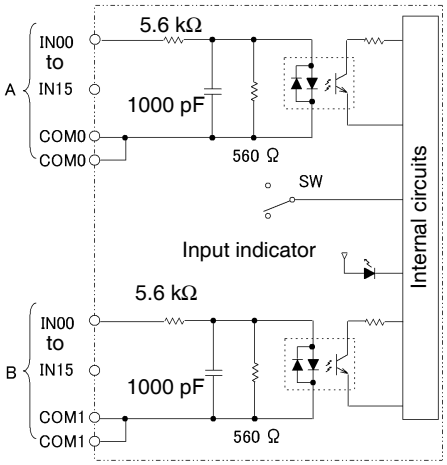
Note 1. The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response time are set to 0 ms due to internal element delays.

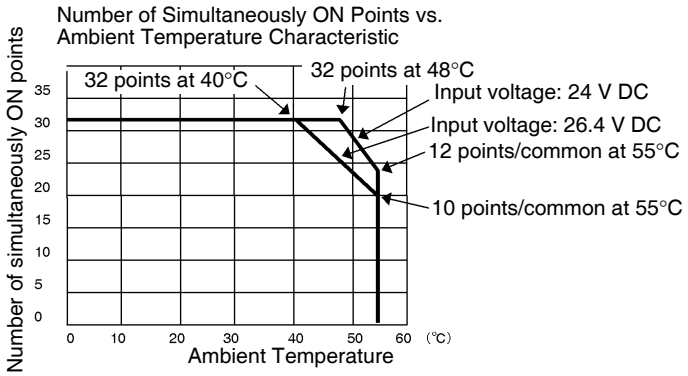
2. Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

CJ1W-ID231 DC Input Unit (Fujitsu Connector, 32 Points)

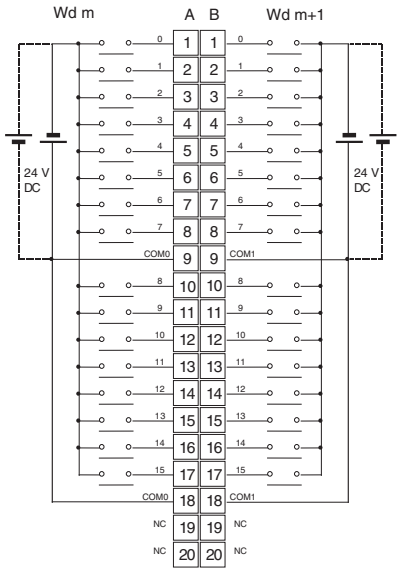
Rated Input Voltage	24 V DC
Rated Input Voltage Range	20.4 to 26.4 V DC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 V DC)
ON Voltage/ON Current	19.0 V DC min./3 mA min.
OFF Voltage/OFF Current	5 V DC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup)
Number of Circuits	32 (16 points/common, 2 circuits)
Number of Simultaneously ON Points	75% (12 points/common) (at 24 V DC) (Refer to the following illustration.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 90 mA max.
Weight	70 g max.
Accessories	None

Circuit Configuration





Terminal Connections



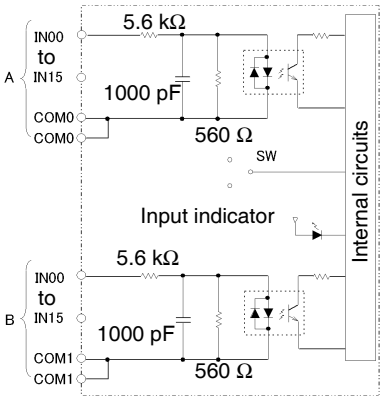
- The input power polarity can be connected in either direction.
- Be sure to wire both terminals A9 and A18 (COM0), and set the same polarity for both pins.
- Be sure to wire both terminals B9 and B18 (COM1), and set the same polarity for both pins.

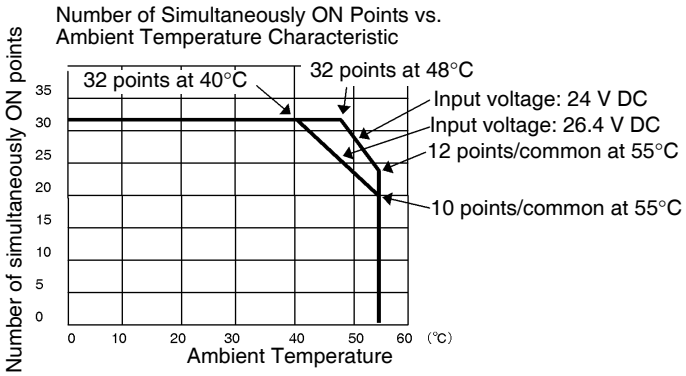
Note The ON response time will be 20 μs maximum and OFF response time will be 300 μs maximum even if the response times are set to 0 ms due to internal element delays.

CJ1W-ID232 DC Input Unit (MIL Connector, 32 Points)

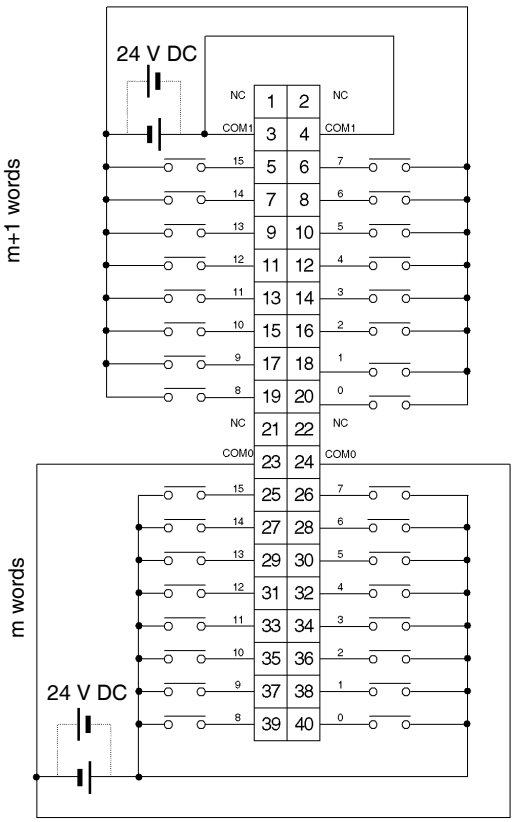
Rated Input Voltage	24 V DC
Rated Input Voltage Range	20.4 to 26.4 V DC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 V DC)
ON Voltage/ON Current	19.0 V DC min./3 mA min.
OFF Voltage/OFF Current	5 V DC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup)
Number of Circuits	32 (16 points/common, 2 circuits)
Number of Simultaneously ON Points	75% (12 points/common) (at 24 V DC) (Refer to the following illustration.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 90 mA max.
Weight	70 g max.
Accessories	None

Circuit Configuration





Terminal Connections



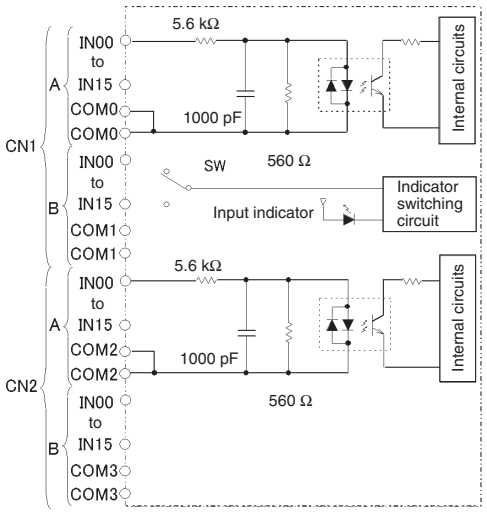
- The input power polarity can be connected in either direction.
- Be sure to wire both terminals 23 and 24 (COM0), and set the same polarity for both pins.
- Be sure to wire both terminals 3 and 4 (COM1), and set the same polarity for both pins.

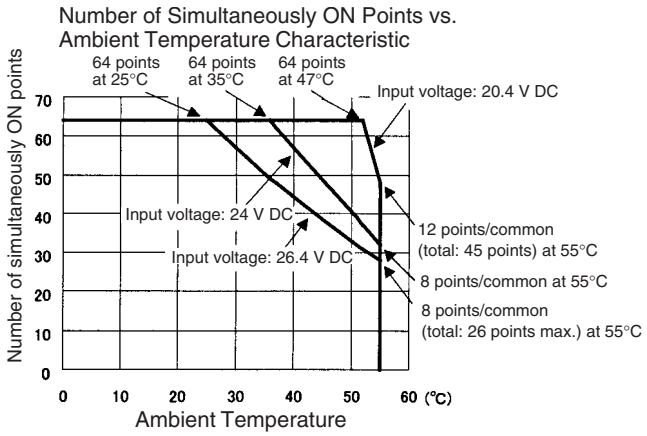
Note The ON response time will be 20 μs maximum and OFF response time will be 300 μs maximum even if the response times are set to 0 ms due to internal element delays.

CJ1W-ID261 DC Input Unit (Fujitsu Connectors, 64 Points)

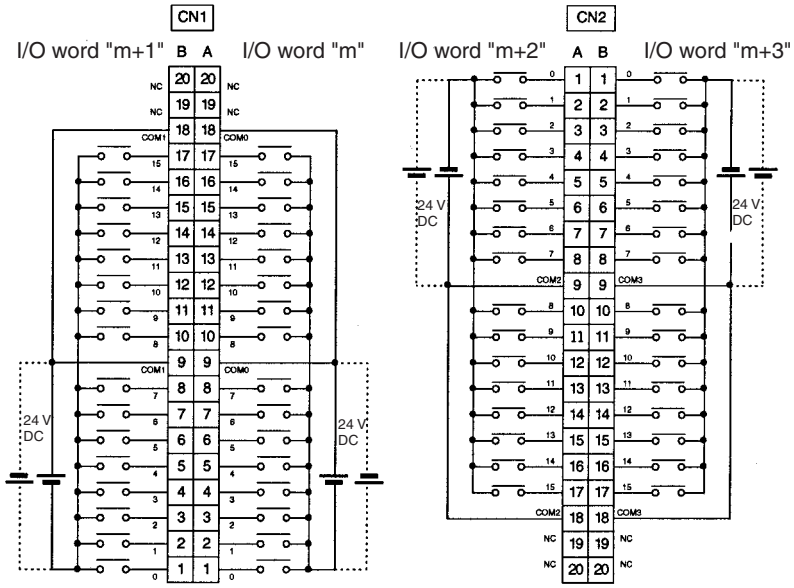
Rated Input Voltage	24 V DC
Rated Input Voltage Range	20.4 to 26.4 V DC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 V DC)
ON Voltage/ON Current	19.0 V DC min./3 mA min.
OFF Voltage/OFF Current	5 V DC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)
Number of Circuits	64 (16 points/common, 4 circuits)
Number of Simultaneously ON Points	50% (16 points/common) (at 24 V DC) (Refer to the following illustrations.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 90 mA max.
Weight	110 g max.
Accessories	None

Circuit Configuration





Terminal Connections



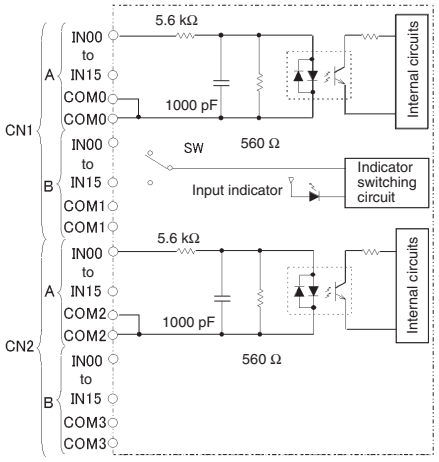
- The input power polarity can be connected in either direction.
- Be sure to wire both terminals A9 and A18 (COM0) of CN1, and set the same polarity for both pins.
- Be sure to wire both terminals B9 and B18 (COM1) of CN1, and set the same polarity for both pins.
- Be sure to wire both terminals A9 and A18 (COM2) of CN2, and set the same polarity for both pins.
- Be sure to wire both terminals B9 and B18 (COM3) of CN2, and set the same polarity for both pins.

Note The ON response time will be 120 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

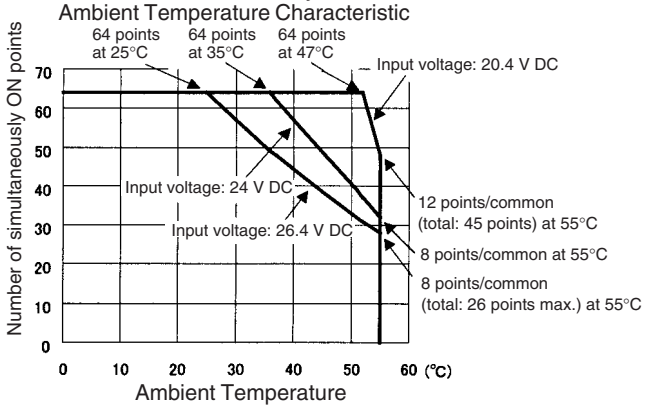
CJ1W-ID262 DC Input Unit (MIL Connectors, 64 Points)

Rated Input Voltage	24 V DC
Rated Input Voltage Range	20.4 to 26.4 V DC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 V DC)
ON Voltage/ON Current	19.0 V DC min./3 mA min.
OFF Voltage/OFF Current	5 V DC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)
Number of Circuits	64 (16 points/common, 4 circuits)
Number of Simultaneously ON Points	50% (8 points/common) (at 24 V DC) (Refer to the following illustrations.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 90 mA max.
Weight	110 g max.
Accessories	None

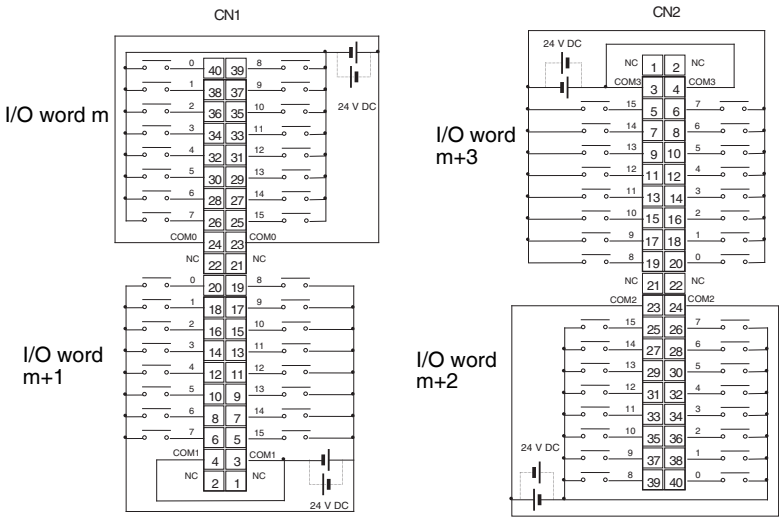
Circuit Configuration



Number of Simultaneously ON Points vs. Ambient Temperature Characteristic



Terminal Connections



- The input power polarity can be connected in either direction.
- Be sure to wire both terminals 23 and 24 (COM0) of CN1, and set the same polarity for both pins.
- Be sure to wire both terminals 3 and 4 (COM1) of CN1, and set the same polarity for both pins.
- Be sure to wire both terminals 23 and 24 (COM2) of CN2, and set the same polarity for both pins.
- Be sure to wire both terminals 3 and 4 (COM3) of CN2, and set the same polarity for both pins.

Note The ON response time will be 120 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

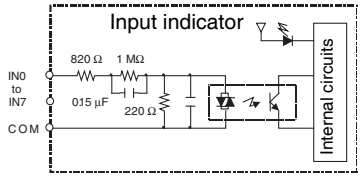
CJ1W-IA201 DC Input Unit (Terminal Block, 8 Points)

Rated Input Voltage	200 to 240 V AC$^{+10\%}/_{-15\%}$ 50/60 Hz
Rated Input Voltage Range	170 to 264 V AC
Input Impedance	21 kΩ (50 Hz), 18 kΩ (60 Hz)
Input Current	9 mA typical (at 200 V AC, 50 Hz), 11 mA typical (at 200 V AC, 60 Hz)
ON Voltage/ON Current	120 V AC min./4 mA min.
OFF Voltage/OFF Current	40 V AC max./2 mA max.
ON Response Time	18.0 ms max. (PLC Setup default setting: 8 ms) (See note.)
OFF Response Time	48.0 ms max. (PLC Setup default setting: 8 ms) (See note.)
Number of Circuits	8 (8 points/common)
Number of Simultaneously ON Points	100% (8 points/common)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (500 V DC)
Dielectric Strength	2,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 80 mA max.
Weight	130 g max.
Accessories	None

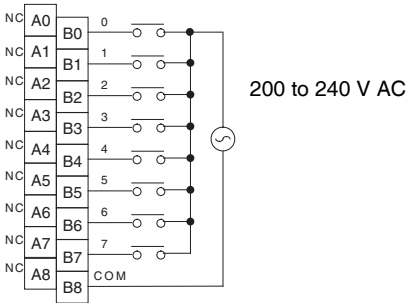
Note 1. The Input ON and OFF response times for Basic I/O Units can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup. When the response times have been set to 0 ms, the ON response time will be 10 ms maximum and the OFF response time will be 40 ms maximum due to internal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

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

Circuit Configuration



Terminal Connections



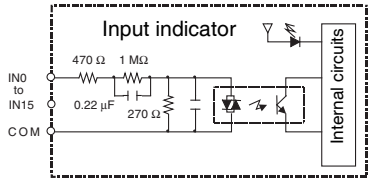
Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

CJ1W-IA111 100-V AC Input Unit (16 points)

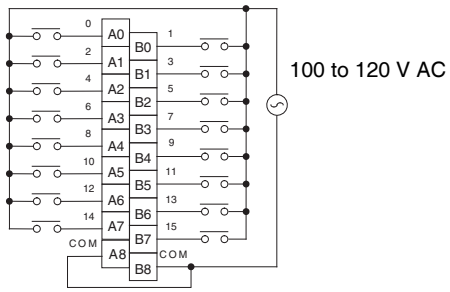
Rated input voltage	100 to 120 V AC 50/60 Hz
Rated Input Voltage Range	85 to 132 V AC
Input Impedance	14.5 kΩ (50 Hz), 12 kΩ (60 Hz)
Input Current	7 mA typical (at 100 V AC, 50 Hz), 8 mA typical (at 100 V AC, 60 Hz)
ON Voltage	70 V AC min./4 mA min
OFF Voltage	20 V AC max./2 mA min
ON Response Time	18 ms max. (PLC Setup default setting: 8 ms) (See note.)
OFF Response Time	63 ms max. (PLC Setup default setting: 8 ms) (See note.)
Number of Circuits	16 (16 points/common)
Number of Inputs ON Simultaneously	100% simultaneously ON (16 points/common)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (500 V DC)
Dielectric Strength	2,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 90 mA max.
Weight	130 g max.

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

Circuit Layout



Terminal Connections



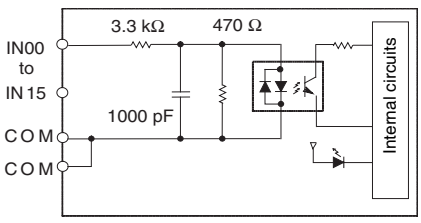
Note 1. Use an input voltage of 90 V AC or less when connecting 2-wire sensors.

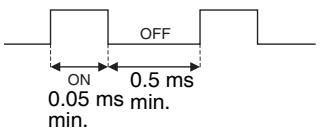
2. Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

CJ1W-INT01 Interrupt Input Unit (16 Points)

Rated Input Voltage	24 V DC
Rated Input Voltage Range	20.4 to 26.4 V DC
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 V DC)
ON Voltage/ON Current	14.4 V DC min./3 mA min.
OFF Voltage/OFF Current	5 V DC max./1 mA max.
ON Response Time	0.05 ms max.
OFF Response Time	0.5 ms max.
Number of Circuits	16 (16 points/common)
Number of Simultaneously ON Points	100% simultaneously ON (24 V DC)
Insulation Resistance	20 MΩ between external terminals and GR terminal (at 100 V DC)
Dielectric Strength	1,000 V AC between external terminals and GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 80 mA max.
Weight	110 g max.

Circuit Configuration

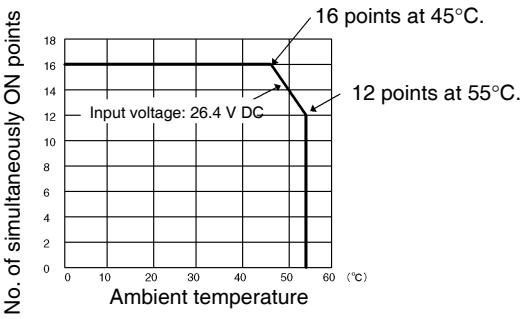




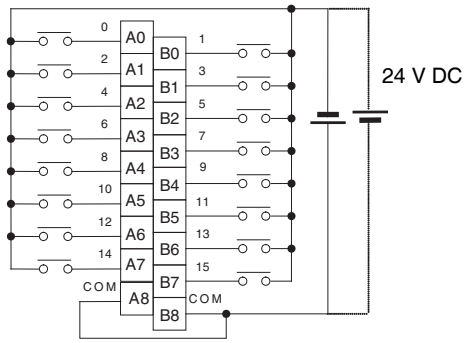
- Up to two Interrupt Input Units can be mounted to the CPU Rack, but they must be connected as one the five Unit immediately next to the CPU Unit. If an Interrupt Input Unit is connected in any other position, an I/O setting error will occur.
- Interrupts cannot be used when an Interrupt Input Unit is mounted to an Expansion Rack.

- Set the pulse width of signals input to the Interrupt Input Unit so they satisfy the above conditions.

Temperature characteristics for simultaneously ON points



Terminal Connections



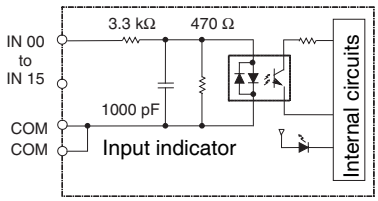
The polarity can be connected in either direction.

Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

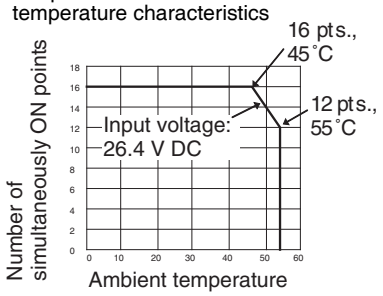
CJ1W-IDP01 Quick-response Input Unit (16 Points)

Rated Input Voltage	24 V DC
Rated Input Voltage Range	20.4 to 26.4 V DC
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 V DC)
ON Voltage/ON Current	14.4 V DC min./3 mA min.
OFF Voltage/OFF Current	5 V DC max./1 mA max.
ON Response Time	0.05 ms max.
OFF Response Time	0.5 ms max.
Number of Circuits	16 (16 points/common)
Number of Simultaneously ON Points	100% simultaneously ON (24 V DC)
Insulation Resistance	20 MΩ between external terminals and GR terminal (at 100 V DC)
Dielectric Strength	1,000 V AC between external terminals and GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	5 V DC: 80 mA max.
Weight	110 g max.
Accessories	None

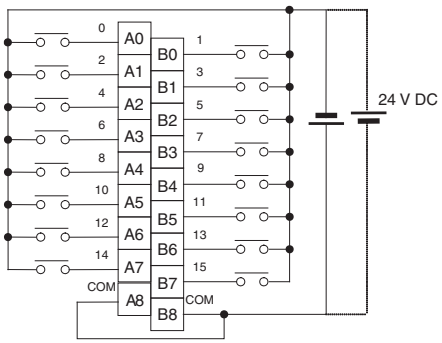
Circuit Configuration



Number of simultaneously ON points -- Ambient temperature characteristics



Terminal Connections



- The input power supply polarity can be connected in either direction.
- With quick-response inputs, pulse inputs shorter than the CPU Unit's cycle time can be read by the CPU Unit.
- The pulse width (ON time) that can be read by the Quick-response Input Unit is 0.05 ms.
- Inputs read by the internal circuits are cleared when inputs are refreshed.

Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

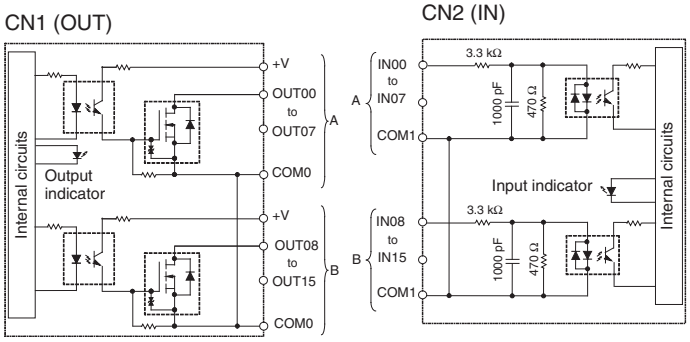
Mixed I/O Units

CJ1W-MD231 DC Input/Transistor Output Unit (Fujitsu Connector, 16 Inputs/16 Outputs, Sinking)

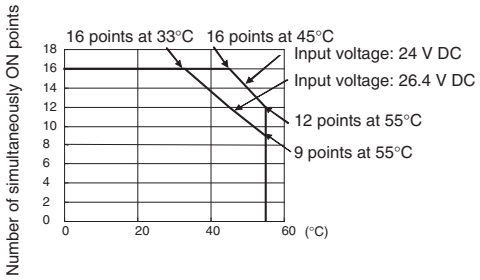
Output section (CN1)		Input section (CN2)	
Rated Voltage	12 to 24 V DC	Rated Input Voltage	24 V DC
		Operating Input Voltage	20.4 to 26.4 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC	Input Impedance	3.3 kΩ
Maximum Load Current	0.5 A/point, 2.0 A/Unit	Input Current	7 mA typical (at 24 V DC)
Maximum Inrush Current	4.0 A/point, 10 ms max.	ON Voltage/ON Current	14.4 V DC min./3 mA min.
Leakage Current	0.1 mA max.	OFF Voltage/OFF Current	5 V DC max./1 mA max.
Residual Voltage	1.5 V max.	ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
ON Response Time	0.1 ms max.		
OFF Response Time	0.8 ms max.	OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
No. of Circuits	16 (16 points/common, 1 circuit)		
Fuse	None	No. of Circuits	16 (16 points/common, 1 circuit)
External Power Supply	12 to 24 V DC, 20 mA min.	Number of Simultaneously ON Points	75% (at 24 V DC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 V DC)		
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 V DC 130 mA max.		
Weight	90 g max.		
Accessories	None		

Note The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

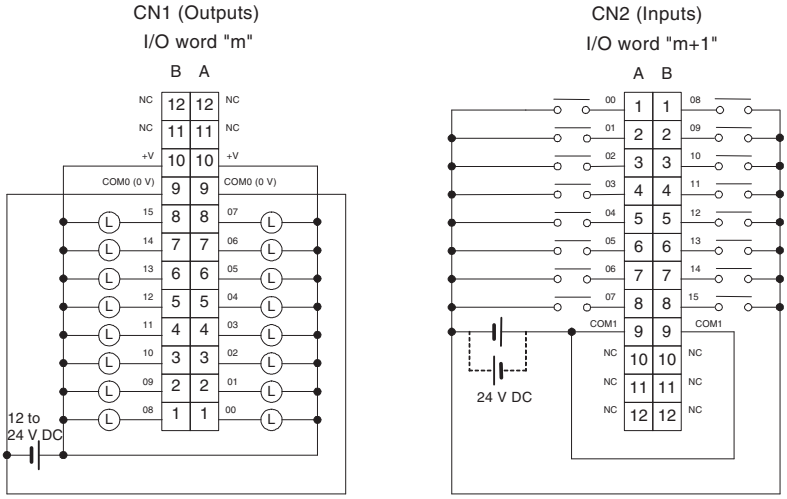
Circuit Configuration



Number of Simultaneously ON Points vs.
Ambient Temperature Characteristic



Terminal Connections



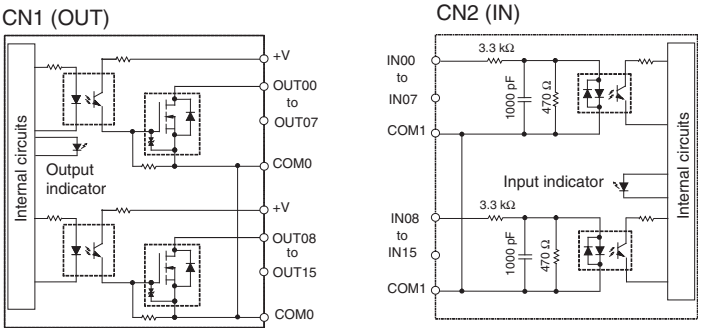
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if polarity is reversed.
- Be sure to wire both terminals A9 and B9 (COM (0 V)) of CN1.
- Be sure to wire both terminals A10 and B10 (+V) of CN1.
- Be sure to wire both terminals A9 and B9 (COM) of CN2, and set the same polarity for both pins.

CJ1W-MD233 DC Input/Transistor Output Unit (MIL Connector, 16 Inputs/16 Outputs, Sinking)

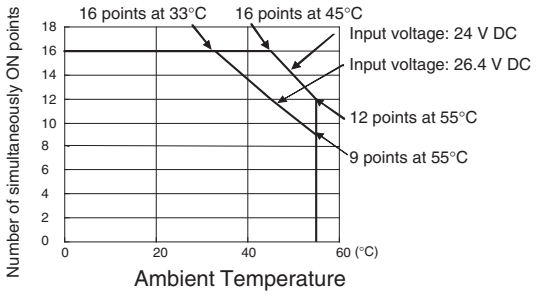
Output section (CN1)		Input section (CN2)	
Rated Voltage	12 to 24 V DC	Rated Input Voltage	24 V DC
		Operating Input Voltage	20.4 to 26.4 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC	Input Impedance	3.3 kΩ
Maximum Load Current	0.5 A/point, 2.0 A/Unit	Input Current	7 mA typical (at 24 V DC)
Maximum Inrush Current	4.0 A/point, 10 ms max.	ON Voltage/ON Current	14.4 V DC min./3 mA min.
Leakage Current	0.1 mA max.	OFF Voltage/OFF Current	5 V DC max./1 mA max.
Residual Voltage	1.5 V max.	ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
ON Response Time	0.1 ms max.		
OFF Response Time	0.8 ms max.	OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
No. of Circuits	16 (16 points/common, 1 circuit)		
Fuse	None	No. of Circuits	16 (16 points/common, 1 circuit)
External Power Supply	12 to 24 V DC, 20 mA min.	Number of Simultaneously ON Points	75% (at 24 V DC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 V DC)		
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 V DC 130 mA max.		
Weight	90 g max.		
Accessories	None		

Note The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

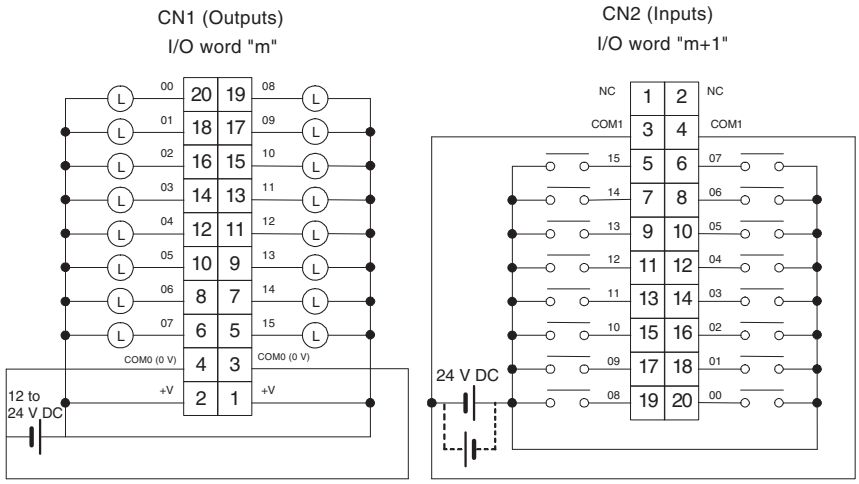
Circuit Configuration



Number of Simultaneously ON Points vs.
Ambient Temperature Characteristic



Terminal Connections



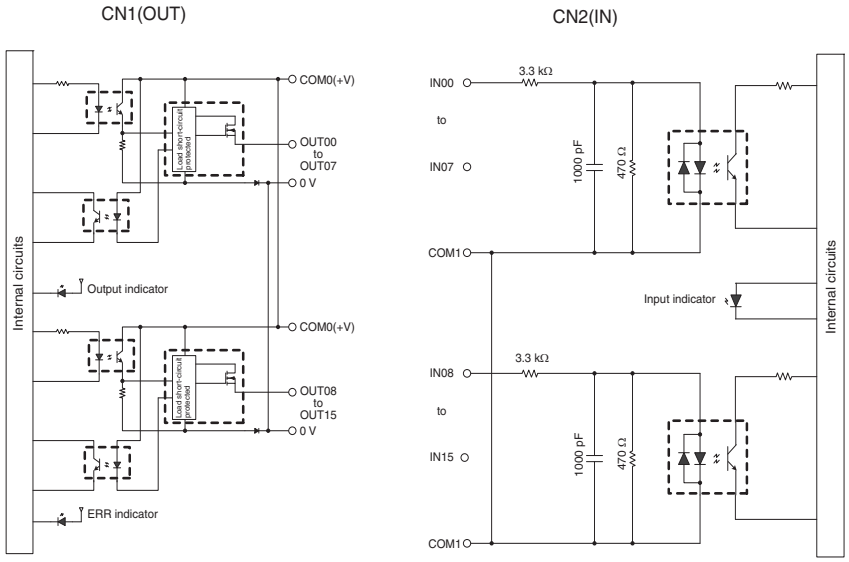
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if polarity is reversed.
- Be sure to wire both terminals 3 and 4 (COM0 (0 V)) of CN1.
- Be sure to wire both terminals 1 and 2 (+V) of CN1.
- Be sure to wire both terminals 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

CJ1W-MD232 DC Input/Transistor Output Unit (MIL Connector, 16 inputs/16 Outputs, Sourcing)

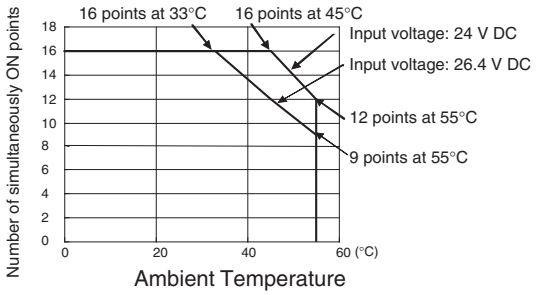
Output section (CN1)		Input section (CN2)	
Rated Voltage	24 V DC	Rated Input Voltage	24 V DC
		Operating Input Voltage	20.4 to 26.4 V DC
Operating Load Voltage Range	20.4 to 26.4 V DC	Input Impedance	3.3 kΩ
Maximum Load Current	0.5 A/point, 2.0 A/Unit	Input Current	7 mA typical (at 24 V DC)
Leakage Current	0.1 mA max.	ON Voltage/ON Current	14.4 V DC min./3 mA min.
Residual Voltage	1.5 V max.	OFF Voltage/OFF Current	5 V DC max./1 mA max.
ON Response Time	0.5 ms max.	ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
OFF Response Time	1.0 ms max.		
Load Short-circuit Protection	Detection current: 0.7 to 2.5 A min. Automatic restart after error clearance. (Refer to page 592.)	OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
No. of Circuits	16 (16 points/common, 1 circuit)	No. of Circuits	16 (16 points/common, 1 circuit)
External Power Supply	20.4 to 26.4 V DC, 40 mA min.	Number of Simultaneously ON Points	75% (at 24 V DC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 V DC)		
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 V DC 130 mA max.		
Weight	100 g max.		
Accessories	None		

Note The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

Circuit Configuration

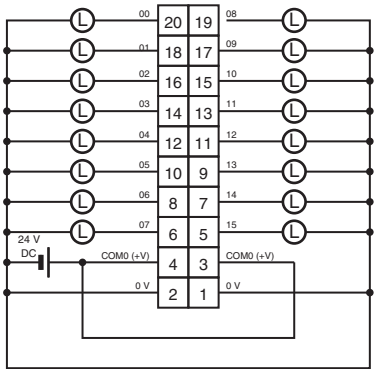


Number of Simultaneously ON Points vs.
Ambient Temperature Characteristic

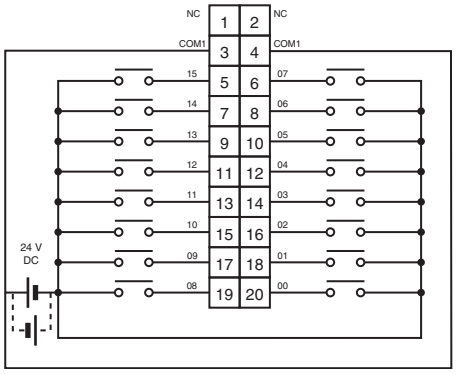


Terminal Connections

CN1 (Outputs)
I/O word "m"



CN2 (Inputs)
I/O word "m+1"



- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if polarity is reversed.
- Be sure to wire both terminals 3 and 4 (COM0 (+V)) of CN1.
- Be sure to wire both terminals 1 and 2 ((0 V)) of CN1.
- Be sure to wire both terminals 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

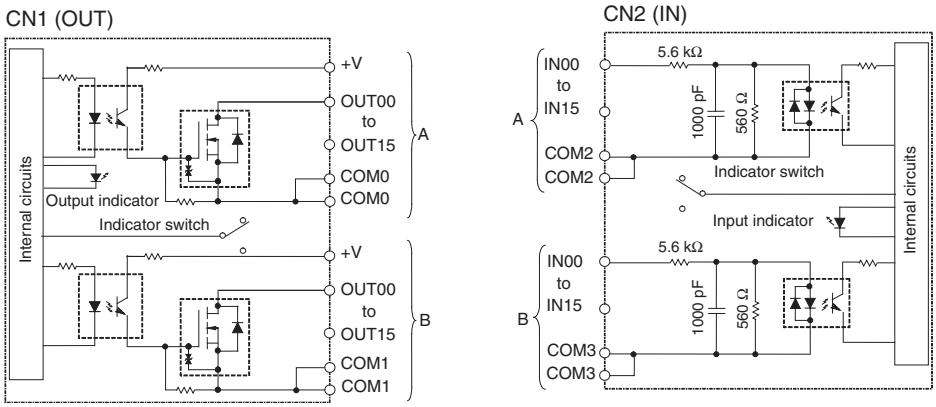
CJ1W-MD261 DC Input/Transistor Output Unit (Fujitsu Connector, 32 Inputs/32 Outputs, Sinking)

Output section (CN1)		Input section (CN2)	
Rated Voltage	12 to 24 V DC	Rated Input Voltage	24 V DC
		Operating Input Voltage	20.4 to 26.4 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC	Input Impedance	5.6 kΩ
Maximum Load Current	0.3 A/point, 1.6/common, 3.2 A/Unit	Input Current	4.1 mA typical (at 24 V DC)
Maximum Inrush Current	3.0 A/point, 10 ms max.	ON Voltage/ON Current	19.0 V DC min./3 mA min. (See note 2.)
Leakage Current	0.1 mA max.	OFF Voltage/OFF Current	5 V DC max./1 mA max.
Residual Voltage	1.5 V max.	ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
ON Response Time	0.5 ms max.		
OFF Response Time	1.0 ms max.	OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
No. of Circuits	32 (16 points/common, 2 circuits)		
Fuse	None	No. of Circuits	32 (16 points/common, 2 circuits)
External Power Supply	12 to 24 V DC, 30 mA min.	Number of Simultaneously ON Points	75% (24 points) (at 24 V DC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 V DC)		
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 V DC 140 mA max.		
Weight	110 g max.		
Accessories	None		

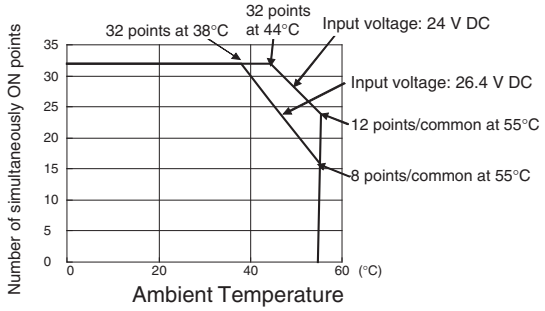
Note 1. The ON response time will be 120 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

2. The following restrictions apply when connecting 2-wire sensors.
   - Provide an input power supply voltage at least as high as the sum of the ON voltage (19 V) and the sensor's residual voltage (approximately 3 V).
   - Use a sensor with a minimum load current of 3 mA or higher.
   - When connecting a sensor with a minimum load current of 5 mA or higher, connect a bleeder resistor.

Circuit Configuration

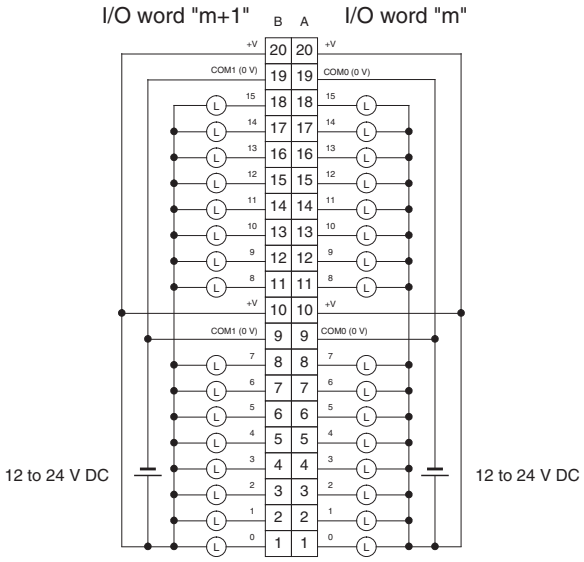


Number of Simultaneously ON Points vs.
Ambient Temperature Characteristic

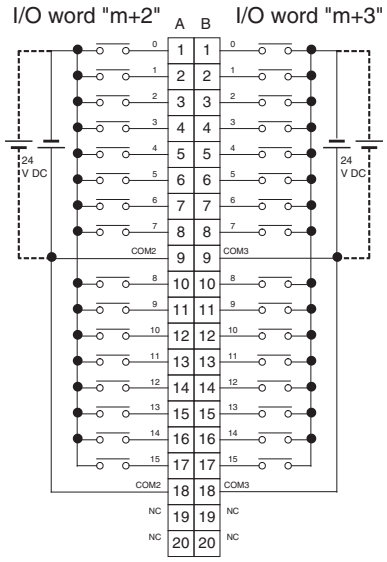


Terminal Connections

CN1 (Outputs)



CN2 (Inputs)



- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if polarity is reversed.
- Be sure to wire both terminals A19 and A9 (COM0 (0 V)) of CN1.
- Be sure to wire both terminals B19 and B9 (COM1 (0 V)) of CN1.
- Be sure to wire both terminals A20 and A10 (+V) of CN1.
- Be sure to wire both terminals B20 and B10 (+V) of CN1.
- Be sure to wire both terminals A9 and A18 (COM2) of CN2, and set the same polarity for both pins.
- Be sure to wire both terminals B9 and B18 (COM3) of CN2, and set the same polarity for both pins.

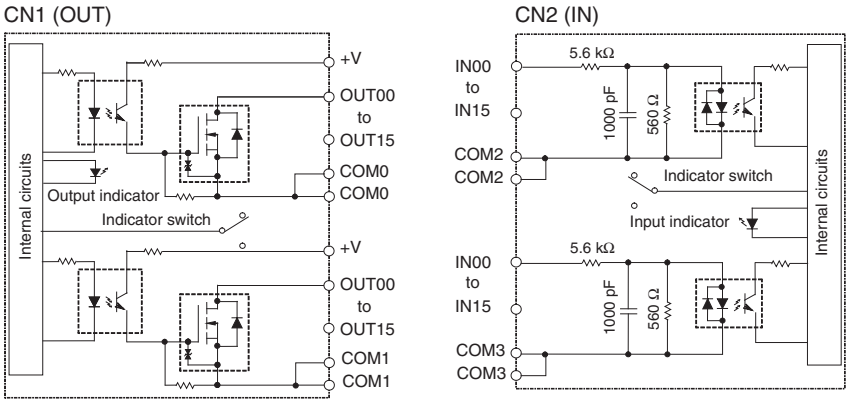
CJ1W-MD263 DC Input/Transistor Output Unit (MIL Connector, 32 Inputs/32 Outputs, Sinking)

Output section (CN1)		Input section (CN2)	
Rated Voltage	12 to 24 V DC	Rated Input Voltage	24 V DC
		Operating Input Voltage	20.4 to 26.4 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC	Input Impedance	5.6 kΩ
Maximum Load Current	0.3 A/point, 1.6/common, 3.2 A/Unit	Input Current	4.1 mA typical (at 24 V DC)
Maximum Inrush Current	3.0 A/point, 10 ms max.	ON Voltage/ON Current	19.0 V DC min./3 mA min. (See note 2.)
Leakage Current	0.1 mA max.	OFF Voltage/OFF Current	5 V DC max./1 mA max.
Residual Voltage	1.5 V max.	ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
ON Response Time	0.5 ms max.		
OFF Response Time	1.0 ms max.	OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
No. of Circuits	32 (16 points/common, 2 circuits)		
Fuse	None	No. of Circuits	32 (16 points/common, 2 circuits)
External Power Supply	12 to 24 V DC, 30 mA min.	Number of Simultaneously ON Points	75% (24 points) (at 24 V DC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 V DC)		
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 V DC 140 mA max.		
Weight	110 g max.		
Accessories	None		

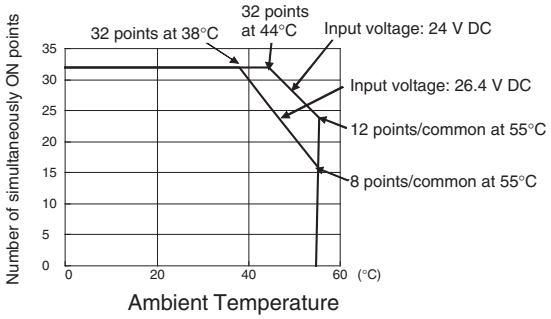
Note 1. The ON response time will be 120 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

2. The following restrictions apply when connecting 2-wire sensors.
   - Provide an input power supply voltage at least as high as the sum of the ON voltage (19 V) and the sensor's residual voltage (approximately 3 V).
   - Use a sensor with a minimum load current of 3 mA or higher.
   - When connecting a sensor with a minimum load current of 5 mA or higher, connect a bleeder resistor.

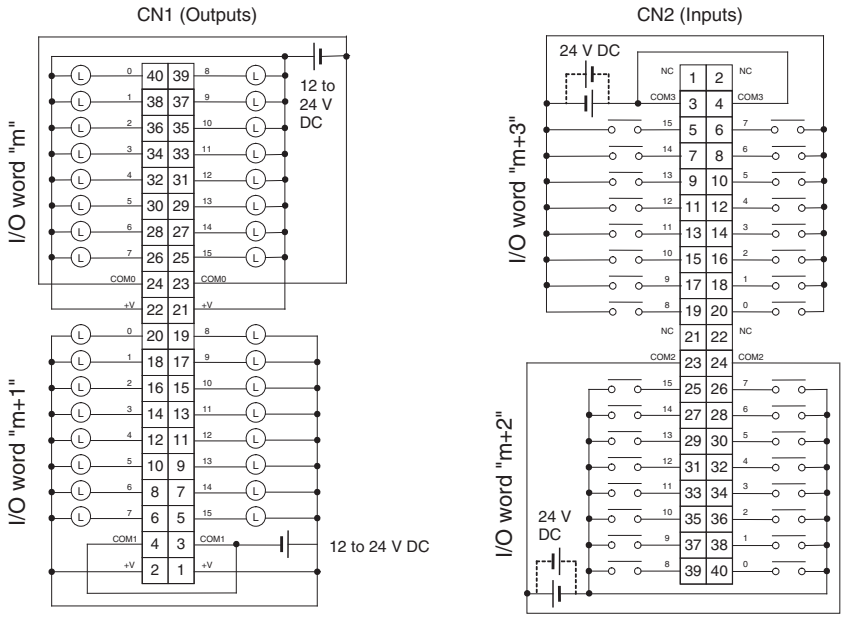
Circuit Configuration



Number of Simultaneously ON Points vs.
Ambient Temperature Characteristic



Terminal Connections



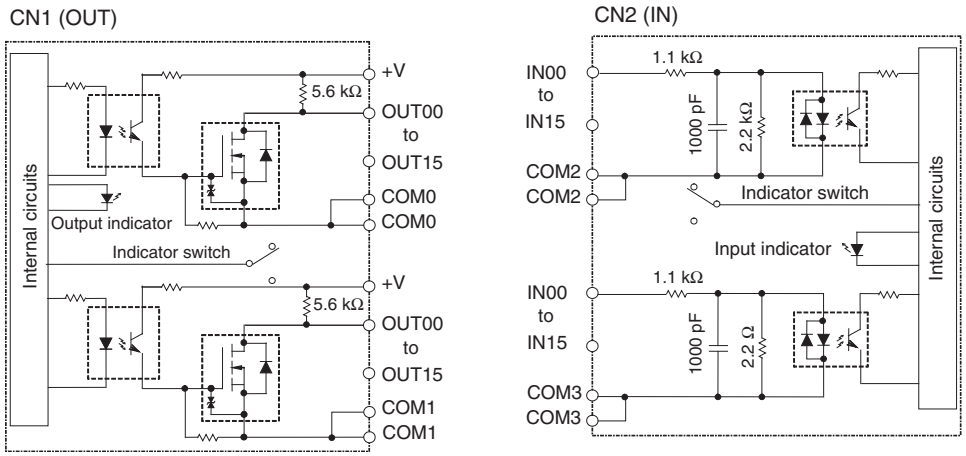
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if polarity is reversed.
- Be sure to wire both terminals 23 and 24 (COM0) of CN1.
- Be sure to wire both terminals 3 and 4 (COM1) of CN1.
- Be sure to wire both terminals 21 and 22 (+V) of CN1.
- Be sure to wire both terminals 1 and 2 (+V) of CN1.
- Be sure to wire both terminals 23 and 24 (COM2) of CN2, and set the same polarity for both pins.
- Be sure to wire both terminals 3 and 4 (COM3) of CN2, and set the same polarity for both pins.

CJ1W-MD563 TTL I/O Unit (MIL Connector, 32 Inputs/32 Outputs)

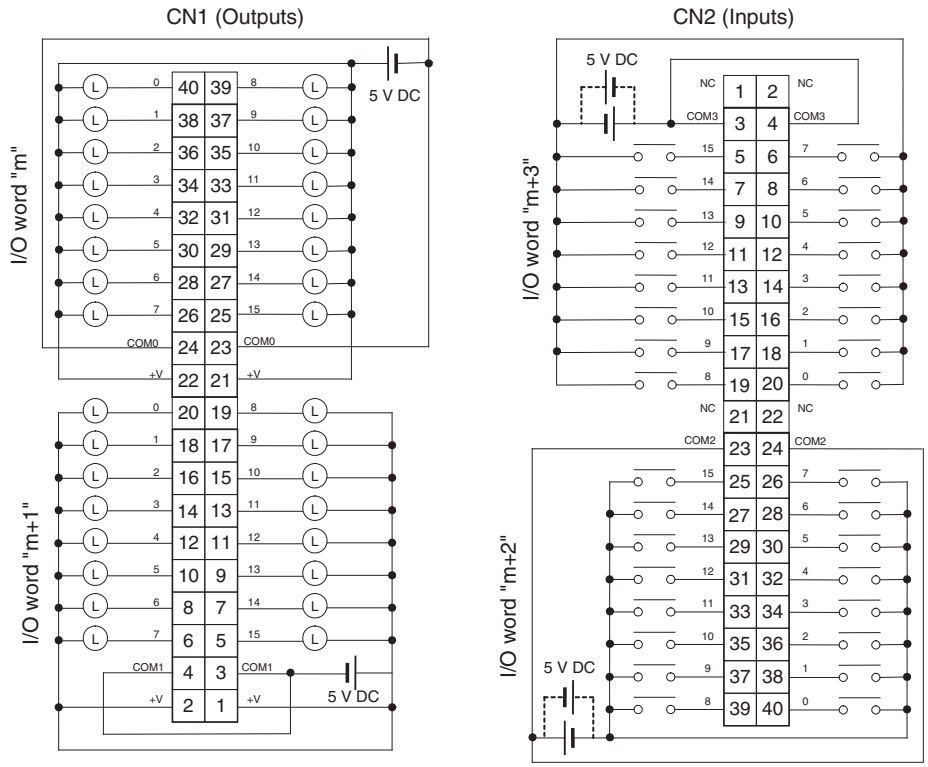
Output section (CN1)		Input section (CN2)	
Rated Voltage	5 V DC±10%	Rated Input Voltage	5 V DC±10%
Operating Load Voltage Range	4.5 to 5.5 V DC	Input Impedance	1.1 kΩ
Maximum Load Current	35 mA/point, 560 mA/common, 1.12 A/Unit	Input Current	Approx. 3.5 mA (at 5 V DC)
Leakage Current	0.1 mA max.	ON Voltage	3.0 V DC min.
Residual Voltage	0.4 V max.	OFF Voltage	1.0 V DC max.
ON Response Time	0.2 ms max.	ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
OFF Response Time	0.3 ms max.	OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) (See note.)
No. of Circuits	32 points (16 points/common, 2 circuits)	No. of Circuits	32 points (16 points/common, 2 circuits)
Fuse	None	Number of Simultaneously ON Points	100% (16 points/common)
External Power Supply	5 V DC±10%, 40 mA min. (1.2 mA × No. of ON points)		
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 V DC)		
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 V DC 190 mA max.		
Weight	110 g max.		
Accessories	None		

Note The ON response time will be 120 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

Circuit Configuration



Terminal Connections



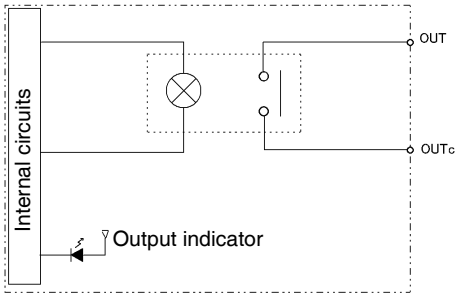
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if the polarity is reversed.
- Be sure to wire both terminals 23 and 24 (COM0) of CN1.
- Be sure to wire both terminals 3 and 4 (COM1) of CN1.
- Be sure to wire both terminals 21 and 22 (+V) of CN1.
- Be sure to wire both terminals 1 and 2 (+V) of CN1.
- Be sure to wire both terminals 23 and 24 (COM2) of CN2, and set the same polarity for both pins.
- Be sure to wire both terminals 3 and 4 (COM3) of CN2, and set the same polarity for both pins.

CJ1W-OC201 Contact Output Unit (Terminal Block, 8 Points)

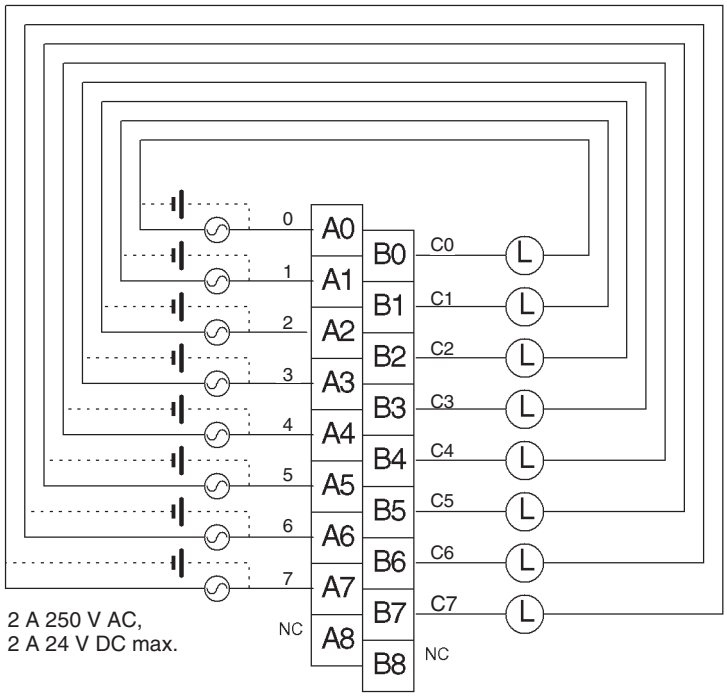
Max. Switching Capacity	2 A 250 V AC (cosϕ = 1), 2 A 250 V AC (cosϕ = 0.4), 2 A 24 V DC (16 A/Unit)
Min. Switching Capacity	1 mA 5 V DC
Service Life of Relay	Electrical: 150,000 operations (24 V DC, resistive load)/ 100,000 operations (240 V AC, cosϕ = 0.4, inductive load) Mechanical: 20,000,000 operations Service life will vary depending on the connected load. Refer to page 588 for information on service life according to the load.
Relay replacement	NY-24W-K-IE (Fujitsu Takamizawa Component Ltd.) Relays cannot be replaced by users.
ON Response Time	15 ms max.
OFF Response Time	15 ms max.
Number of Circuits	8 independent contacts
Insulation Resistance	20 MΩ between external terminals and the GR terminal (500 V DC)
Dielectric Strength	2,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA 5 V DC max. 48 mA 24 V DC (6 mA × No. points ON)
Weight	140 g max.

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

Circuit Configuration



Terminal Connections

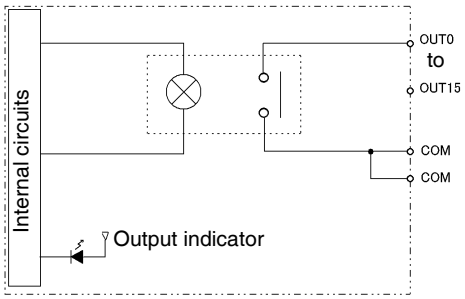


Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

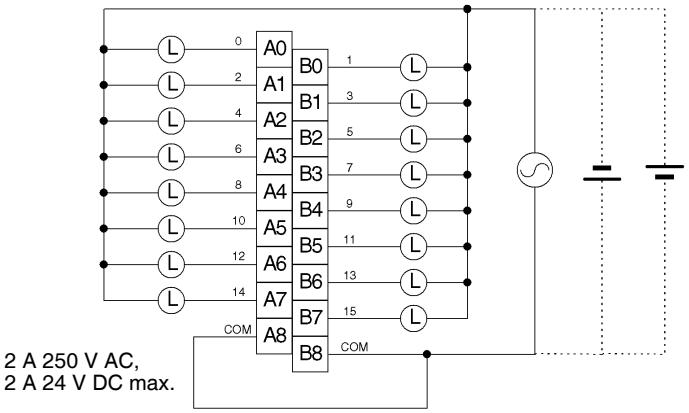
CJ1W-OC211 Contact Output Unit (Terminal Block, 16 Points)

Max. Switching Capacity	2 A 250 V AC (cosϕ = 1), 2 A 250 V AC (cosϕ = 0.4), 2 A 24 V DC (8 A/Unit)
Min. Switching Capacity	1 mA 5 V DC
Service Life of Relay	Electrical: 150,000 operations (24 V DC, resistive load)/ 100,000 operations (250 V AC, cosϕ = 0.4, inductive load) Mechanical: 20,000,000 operations Service life will vary depending on the connected load. Refer to page 588 for information on service life according to the load.
Relay replacement	NY-24W-K-IE (Fujitsu Takamizawa Component Ltd.) Relays cannot be replaced by users.
ON Response Time	15 ms max.
OFF Response Time	15 ms max.
Number of Circuits	16 points/common, 1 circuit
Insulation Resistance	20 MΩ between external terminals and the GR terminal (500 V DC)
Dielectric Strength	2,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	110 mA 5 V DC max. 96 mA 24 V DC (6 mA × No. points ON)
Weight	170 g max.

Circuit Configuration



Terminal Connections



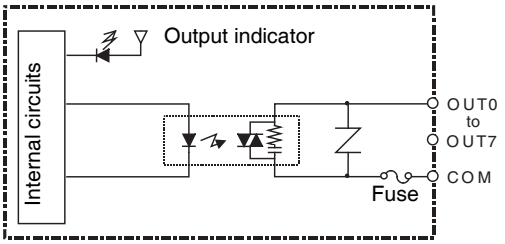
Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

CJ1W-OA201 Triac Output Unit (8 Points)

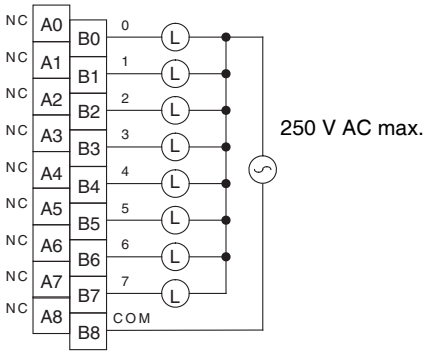
Max. Switching Capacity	0.6 A 250 V AC, 50/60 Hz (2.4 A/Unit)
Max. Inrush Current	15 A (pulse width: 10 ms)
Min. Switching Capacity	50 mA 75 V AC
Leakage Current	1.5 mA (200 V AC) max.,
Residual Voltage	1.6 V AC max.
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency+1 ms or less.
Number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

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

Circuit Configuration



Terminal Connections

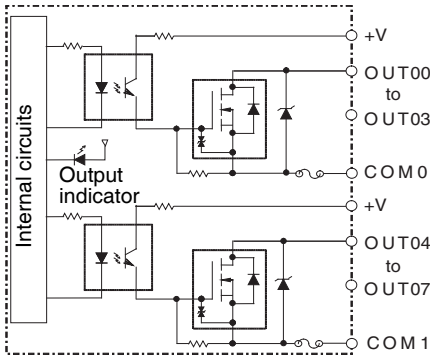


CJ1W-OD201 Transistor Output Unit (Terminal Block, 8 Points, Sinking)

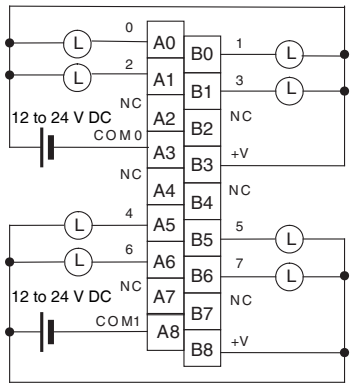
Rated Voltage	12 to 24 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC
Maximum Load Current	2.0 A/point, 8.0 A/Unit
Maximum Inrush Current	10 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (4 points/common, 2 circuits)
Internal Current Consumption	5 V DC: 90 mA max.
Fuse	6.3 A (1/common, 2 used) The fuse cannot be replaced by the user.
External Power Supply	12 to 24 V DC, 10 mA min.
Weight	110 g max.

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

Circuit Configuration



Terminal Connections



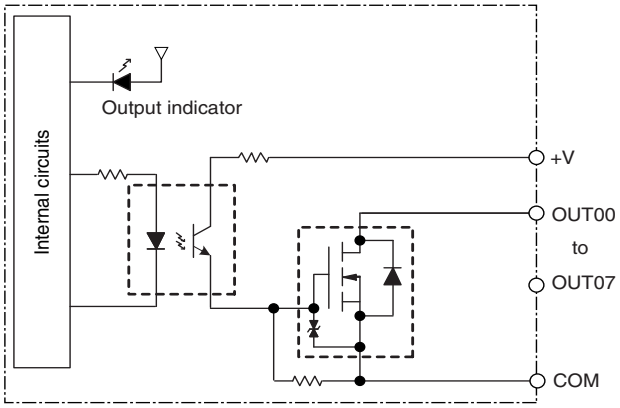
When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

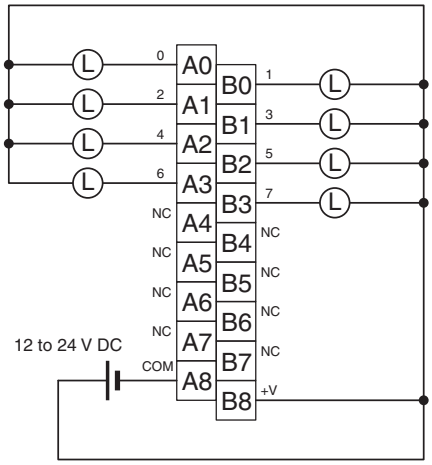
CJ1W-OD203 Transistor Output Unit (Terminal Block, 8 Points, Sinking)

Rated Voltage	12 to 24 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC
Maximum Load Current	0.5 A/point, 4.0 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (8 points/common, 1 circuit)
Internal Current Consumption	5 V DC 100 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 V DC, 20 mA min.
Weight	110 g max.

Circuit Configuration



Terminal Connections



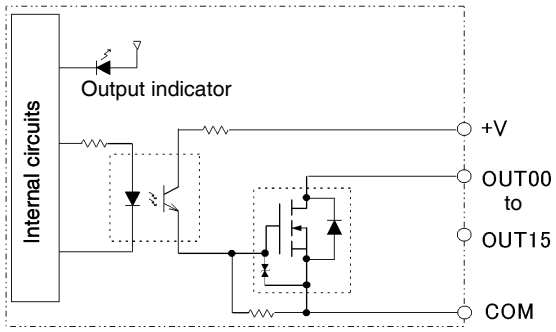
When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

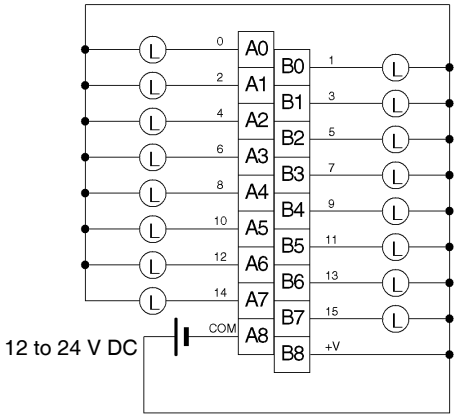
CJ1W-OD211 Transistor Output Unit (Terminal Block, 16 Points, Sinking)

Rated Voltage	12 to 24 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC
Maximum Load Current	0.5 A/point, 5.0 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	16 (16 points/common, 1 circuit)
Internal Current Consumption	5 V DC 100 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 V DC, 20 mA min.
Weight	110 g max.

Circuit Configuration



Terminal Connections



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

Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

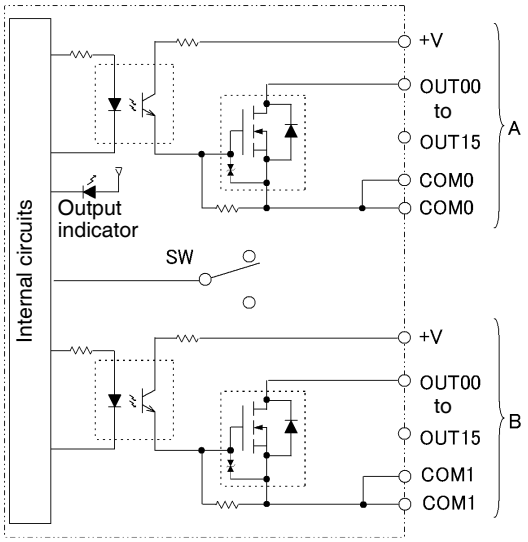
CJ1W-OD231 Transistor Output Unit (Fujitsu Connector, 32 Points, Sinking)

Rated Voltage	12 to 24 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC
Maximum Load Current	0.5 A/point, 2.0 A/common, 4.0 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.

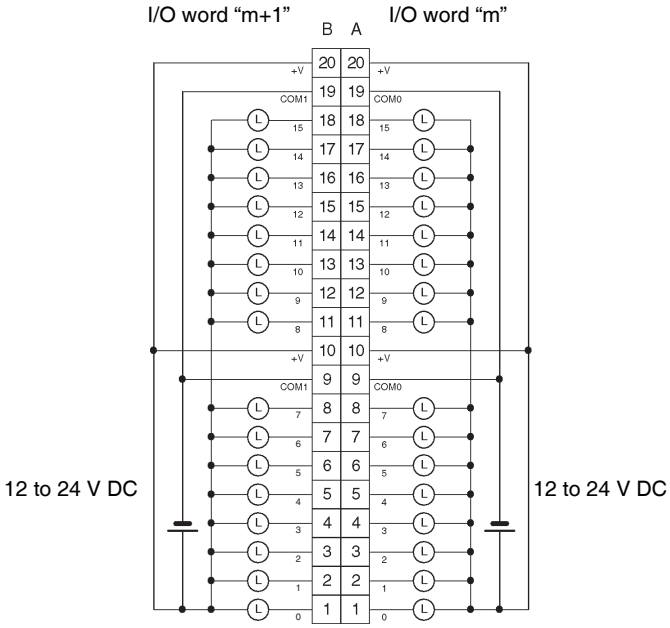
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	32 (16 points/common, 2 circuits)
Internal Current Consumption	5 V DC 140 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 V DC, 30 mA min.
Weight	70 g max.
Accessories	None

Note The maximum load currents will be 2.0 A/common and 4.0 A/Unit if a pressure-welded connector is used.

Circuit Configuration



Terminal Connections

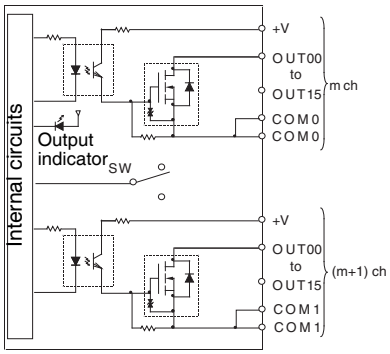


- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if the polarity is reversed.
- Be sure to wire both terminals A9 and A19 (COM0).
- Be sure to wire both terminals B9 and B19 (COM1).
- Be sure to wire both terminals A10 and A20 (+V).
- Be sure to wire both terminals B10 and B20 (+V).

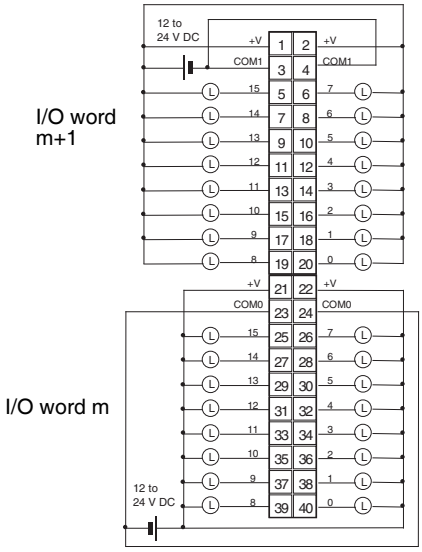
CJ1W-OD233 Transistor Output Unit (MIL Connector, 32 Points, Sinking)

Rated Voltage	12 to 24 V DC
Operating Load Voltage Range	10.2 to 26.4 V DC
Maximum Load Current	0.5 A/point, 2 A/common, 4 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	32 (16 points/common, 2 circuits)
Internal Current Consumption	5 V DC: 140 mA max.
Fuse	None
External Power Supply	12 to 24 V DC, 30 mA min.
Weight	70 g max.
Accessories	None

Circuit Configuration



Terminal Connections



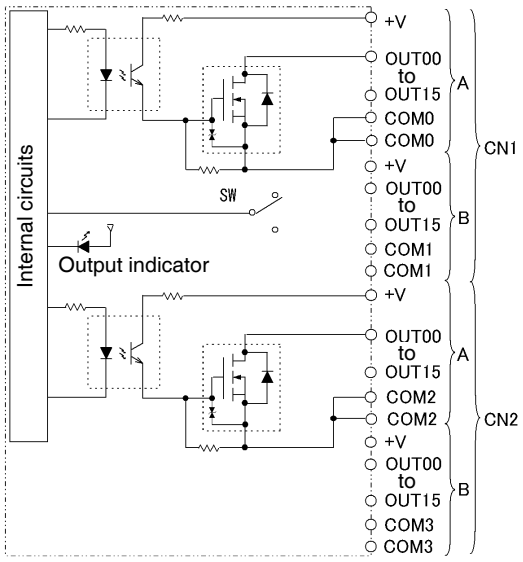
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if the polarity is reversed.
- Be sure to wire both terminals 23 and 24 (COM0).

- Be sure to wire both terminals 3 and 4 (COM1).
- Be sure to wire both terminals 21 and 22 (+V).
- Be sure to wire both terminals 1 and 2 (+V).

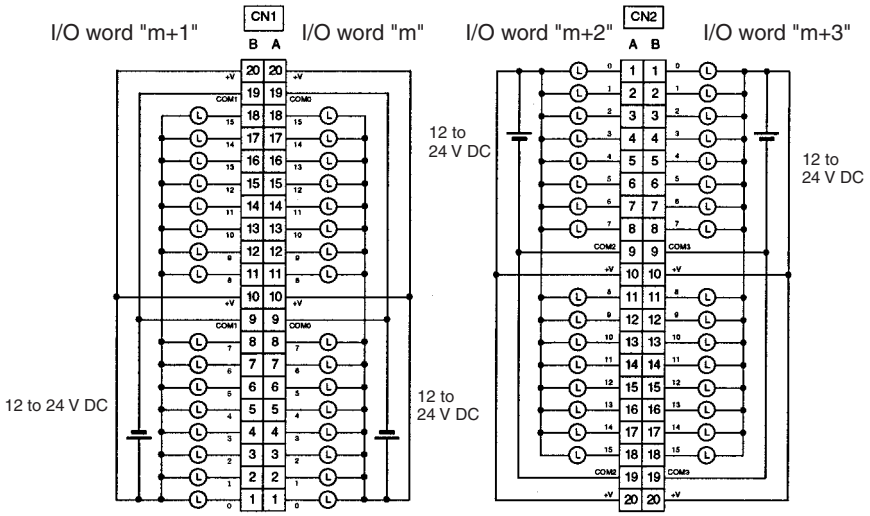
CJ1W-OD261 Transistor Output Unit (Fujitsu Connectors, 64 Points, Sinking)

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

Circuit Configuration



Terminal Connections

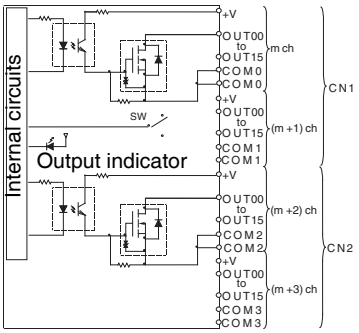


- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if the polarity is reversed.
- Be sure to wire both terminals A9 and A19 (COM0) of CN1.
- Be sure to wire both terminals B9 and B19 (COM1) of CN1.
- Be sure to wire both terminals A10 and A20 (+V) of CN1.
- Be sure to wire both terminals B10 and B20 (+V) of CN1.
- Be sure to wire both terminals A9 and A19 (COM2) of CN2.
- Be sure to wire both terminals B9 and B19 (COM3) of CN2.
- Be sure to wire both terminals A10 and A20 (+V) of CN2.
- Be sure to wire both terminals B10 and B20 (+V) of CN2.

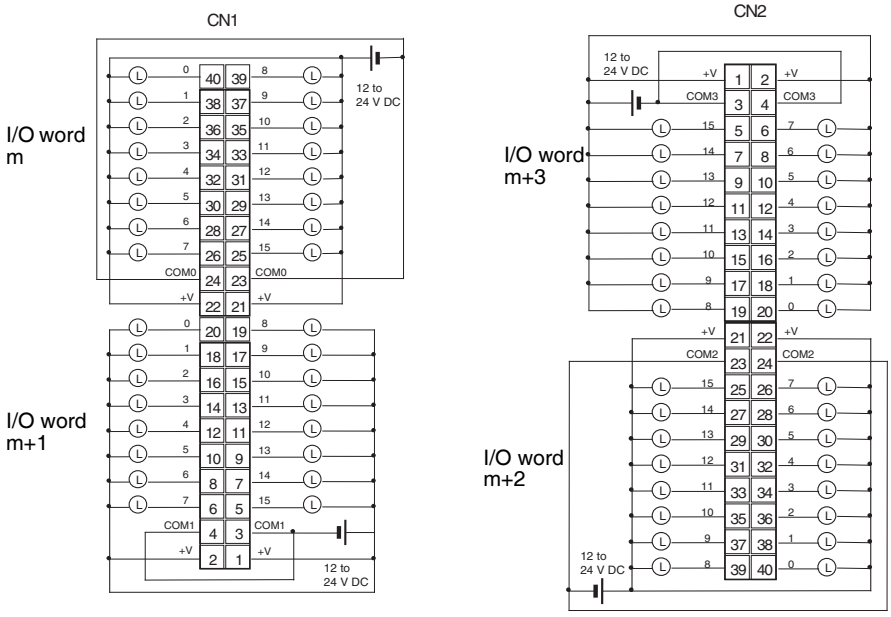
CJ1W-OD263 Transistor Output Unit (MIL Connectors, 64 Points, Sinking)

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

Circuit Configuration



Terminal Connections



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

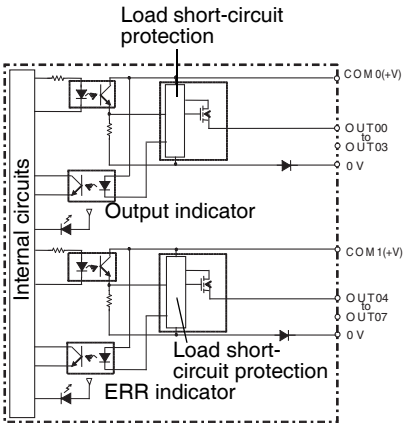
- Be sure to wire both terminals 23 and 24 (COM0) of CN1.
- Be sure to wire both terminals 3 and 4 (COM1) of CN1.
- Be sure to wire both terminals 21 and 22 (+V) of CN1.
- Be sure to wire both terminals 1 and 2 (+V) of CN1.
- Be sure to wire both terminals 23 and 24 (COM2) of CN2.
- Be sure to wire both terminals 3 and 4 (COM3) of CN2.
- Be sure to wire both terminals 21 and 22 (+V) of CN2.
- Be sure to wire both terminals 1 and 2 (+V) of CN2.

CJ1W-OD202 Transistor Output Unit (Terminal Block, 8 Points, Sourcing)

Rated Voltage	24 V DC
Operating Load Voltage Range	20.4 to 26.4 V DC
Maximum Load Current	2 A/point, 8 A/Unit
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Load Short-circuit Protection	Detection current: 6.0 A min. Automatic restart after error clearance. (Refer to page 590.)
Line Disconnection Detection	Detection current: 200 mA (Refer to page 592.)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (4 points/common)
Internal Current Consumption	5 V DC: 110 mA max.
Fuse	None
External Power Supply	24 V DC, 50 mA min.
Weight	120 g max.

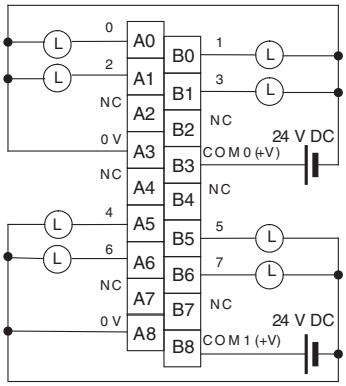
Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O.

Circuit Configuration



- The ERR indicator will light and the corresponding bit in A050 to A069 (Basic I/O Unit Information, two points per bit) will turn ON if an overcurrent or line disconnection is detected.

Terminal Connections



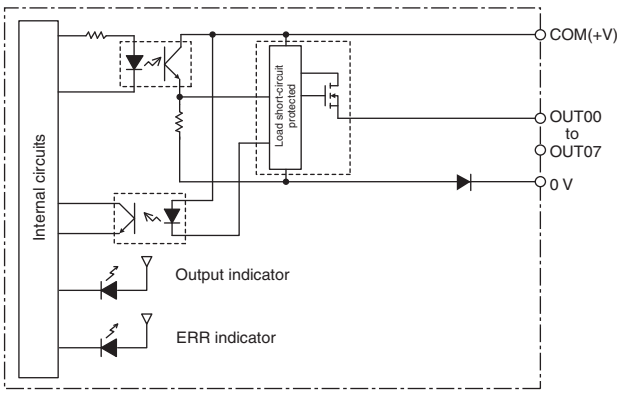
- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if the polarity is reversed.

Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

CJ1W-OD204 Transistor Output Unit (Terminal Block, 8 Points, Sourcing)

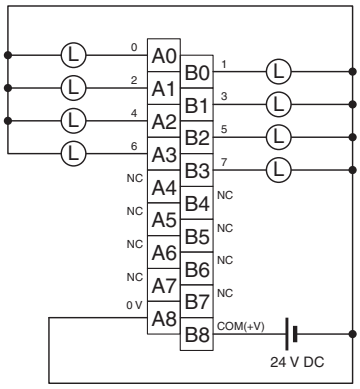
Rated Voltage	24 V DC
Operating Load Voltage Range	20.4 to 26.4 V DC
Maximum Load Current	0.5 A/point, 4.0 A/Unit
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Load Short-circuit Prevention	Detection current: 0.7 to 2.5 A Automatic restart after error clearance. (Refer to page 592.)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (8 points/common, 1 circuit)
Internal Current Consumption	5 V DC, 100 mA max.
External Power Supply	20.4 to 26.4 V DC, 40 mA min.
Weight	120 g max.

Circuit Configuration



When overcurrent is detected, the ERR indicator will light, and the corresponding flag in the Basic I/O Unit Information Area will turn ON.

Terminal Connections



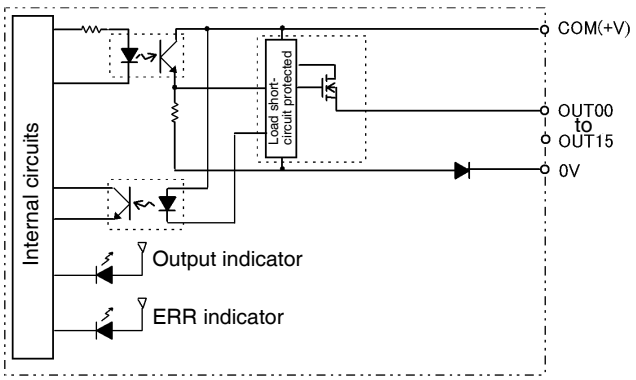
When wiring, pay careful attention to the polarity of the external power supply. The load may operate if the polarity is reversed.

Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

CJ1W-OD212 Transistor Output Unit (Terminal Block, 16 Points, Sourcing)

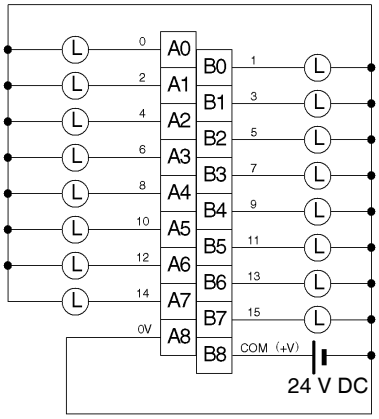
Rated Voltage	24 V DC
Operating Load Voltage Range	20.4 to 26.4 V DC
Maximum Load Current	0.5 A/point, 5.0 A/Unit
Maximum Inrush Current	0.1 mA max.
Leakage Current	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Load Short-circuit Prevention	Detection current: 0.7 to 2.5 A Automatic restart after error clearance. (Refer to page 592.)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	16 (16 points/common, 1 circuits)
Internal Current Consumption	5 V DC, 100 mA max.
External Power Supply	20.4 to 26.4 V DC, 40 mA min.
Weight	120 g max.

Circuit Configuration



When overcurrent is detected, the ERR indicator will light, and the corresponding flag in the Basic I/O Unit Information Area (A050 to A069) will turn ON.

Terminal Connections



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

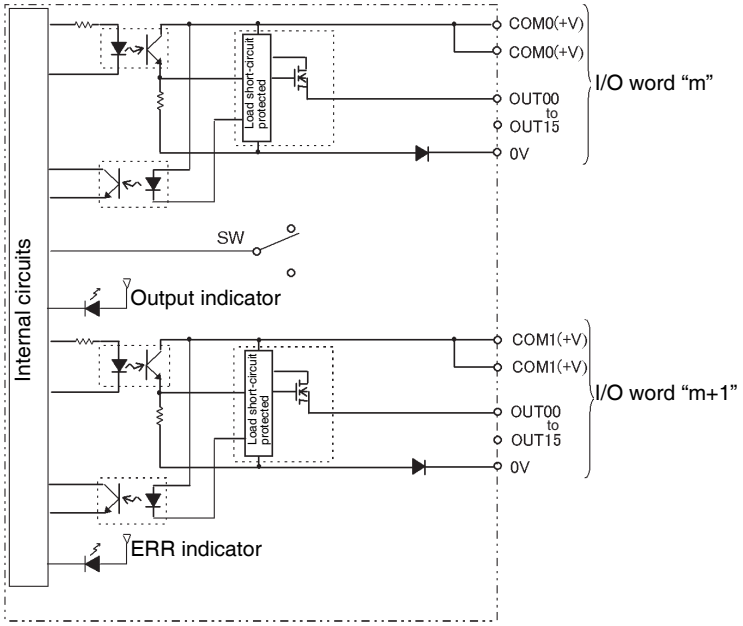
Note Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on the Unit.

CJ1W-OD232 Transistor Output Unit (MIL Connector, 32 Points, Sourcing)

Rated Voltage	24 V DC
Operating Load Voltage Range	20.4 to 26.4 V DC
Maximum Load Current	0.5 A/point, 2.0 A/common, 4.0 A/Unit
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Load Short-circuit Prevention	Detection current: 0.7 to 2.5 A Automatic restart after error clearance. (Refer to page 592.)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 V DC)
Dielectric Strength	1,000 V AC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	32 (16 points/common, 2 circuits)
Internal Current Consumption	5 V DC 150 mA max.
External Power Supply	20.4 to 26.4 V DC, 70 mA min.
Weight	80 g max.
Accessories	None

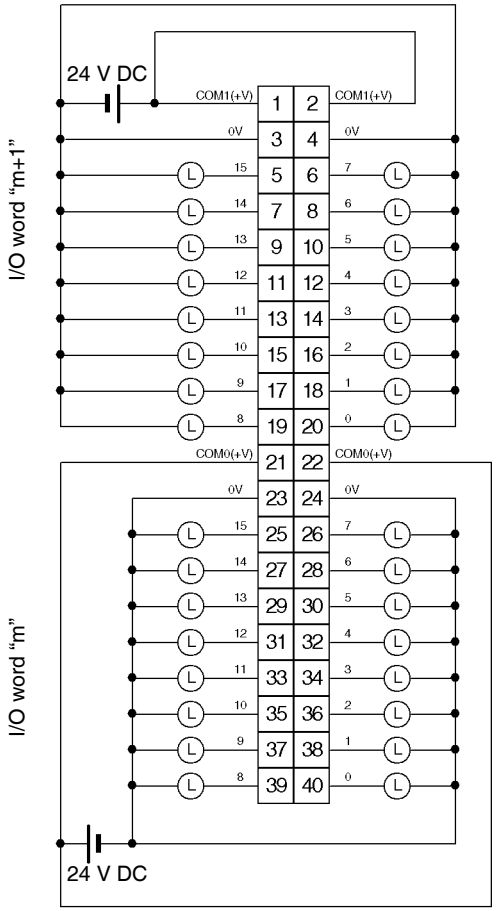
Note The maximum load currents will be 2.0 A/common and 4.0 A/Unit if a pressure-welded connector is used.

Circuit Configuration



When the output current of any output exceeds the detection current, the output for that point will turn OFF. At the same time, the ERR indicator will light and the corresponding flag (one for each common) in the Basic I/O Unit Information Area (A050 to A069) will turn ON.

Terminal Connections

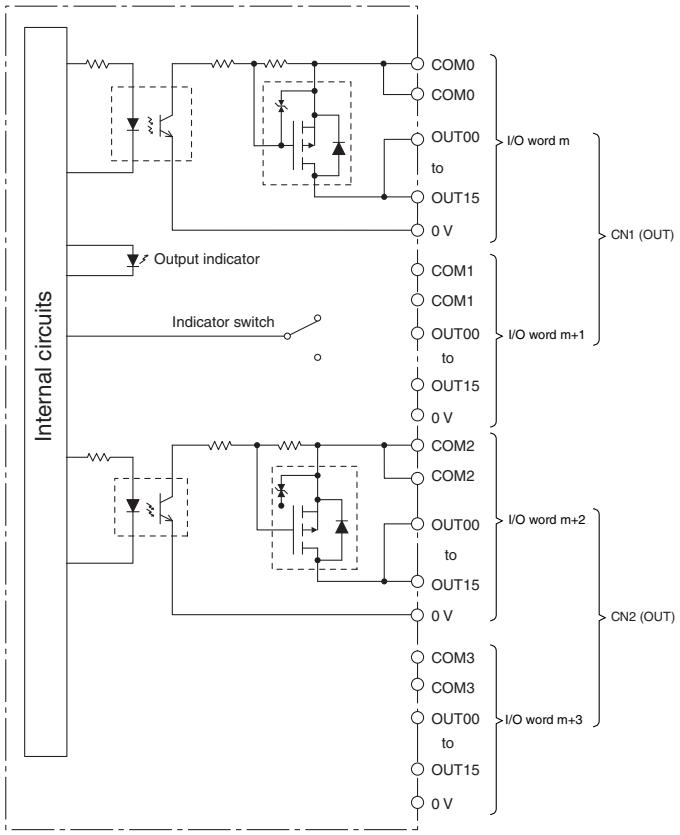


- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if the polarity is reversed.
- Be sure to wire both terminals 21 and 22 (COM0 (+V)).
- Be sure to wire both terminals 1 and 2 (COM1 (+V)).
- Be sure to wire both terminals 3 and 4 (0 V).
- Be sure to wire both terminals 23 and 24 (0 V).

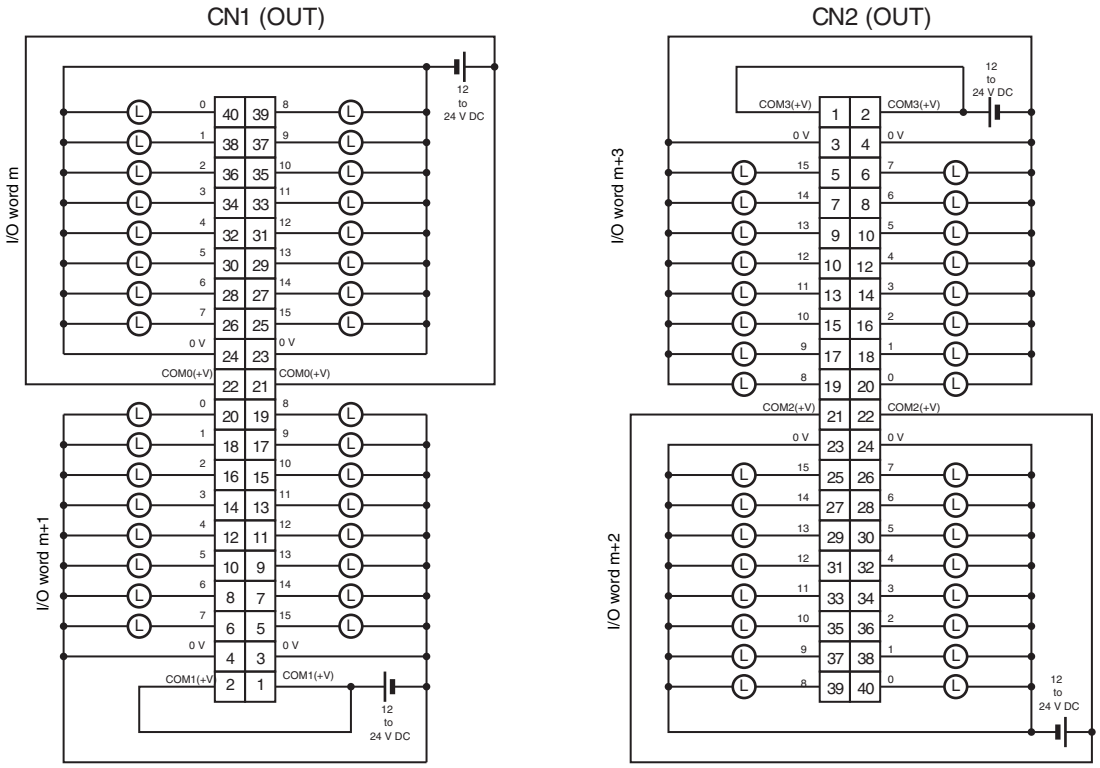
CJ1W-OD262 Transistor Output Unit (MIL Connectors, 64 Points, Sourcing)

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

Circuit Configuration



Terminal Connections



- When wiring, pay careful attention to the polarity of the external power supply. The load may operate if the polarity is reversed.
- Be sure to wire both terminals 21 and 22 (COM0 (+V)) of CN1.
- Be sure to wire both terminals 1 and 2 (COM1 (+V)) of CN1.
- Be sure to wire both terminals 23 and 24 (0 V) of CN1.
- Be sure to wire both terminals 3 and 4 (0 V) of CN1.
- Be sure to wire both terminals 21 and 22 (COM2 (+V)) of CN2.
- Be sure to wire both terminals 1 and 2 (COM3 (+V)) of CN2.
- Be sure to wire both terminals 23 and 24 (0 V) of CN2.
- Be sure to wire both terminals 3 and 4 (0 V) of CN2.

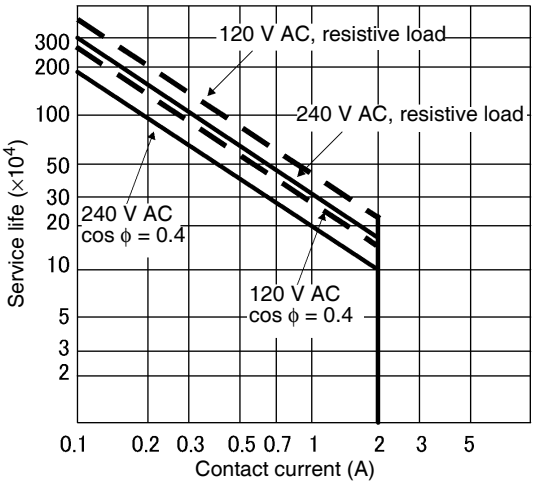
About Contact Output Units

Service Life Expectancy of CJ1W-OC201/211 Relays

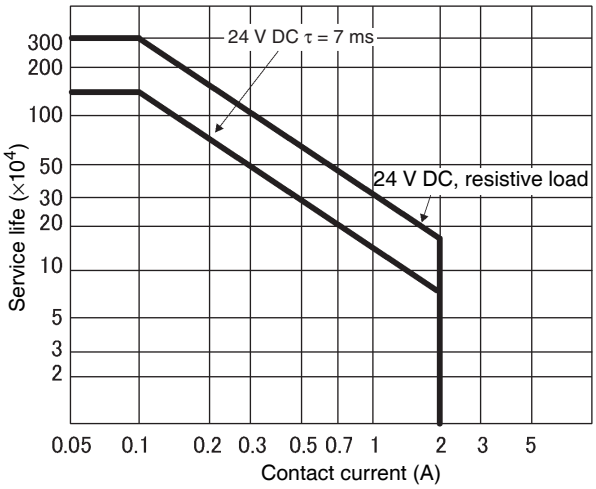
The service life expectancy of the relays (NY-24W-K-IE) in the CJ1W-OC201/211 Contact Output Units is shown in the following diagrams. Use the diagrams to calculate the relay service life based on the operating conditions, and replace the relay before the end of its service life.

Note The diagrams show the life expectancy of the relay itself. Do not use a contact current, therefore, that exceeds the maximum switching capacity specified in the specifications for each Contact Output Unit. If a switching capacity exceeding the specifications is used, the reliability and life expectancy of other parts will be reduced and the Unit may malfunction.

Service Life with AC Load



Service Life with DC Load



Inductive Load

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

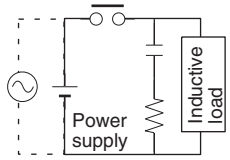
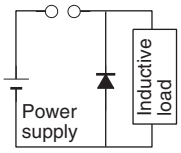
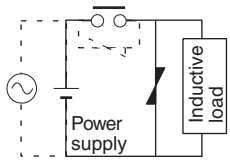
Be sure to connect a diode in parallel with every DC inductive load that is connected to the Contact Output Unit.

Contact Protection Circuit

Arc killers are used with the Contact Output Unit in order to prolong the life of each Relay mounted to the Contact Output Unit, prevent noise, and reduce the generation of carbide and nitrate deposits. Arc killers can, however, reduce relay life if not use correctly.

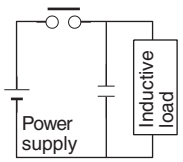
Note Arc killers used with the Contact Output Unit can delay the resetting time required by each Relay mounted to the Contact Output Unit.

Arc killer circuit examples are listed in the following table.

Circuit	Current		Characteristic	Required element
	AC	DC		
CR method 	Yes	Yes	If the load is a relay or solenoid, there is a time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 or 48 V, insert the arc killer in parallel with the load. If the supply voltage is 100 to 200 V, insert the arc killer between the contacts.	The capacitance of the capacitor must be 1 to 0.5 μF per contact current of 1 A and resistance of the resistor must be 0.5 to 1 Ω per contact voltage of 1 V. These values, however, vary with the load and the characteristics of the relay. Decide these values from experiments, and take into consideration that the capacitance suppresses spark discharge when the contacts are separated and the resistance limits the current that flows into the load when the circuit is closed again. The dielectric strength of the capacitor must be 200 to 300 V. If the circuit is an AC circuit, use a capacitor with no polarity.
Diode method 	No	Yes	The diode connected in parallel with the load changes energy accumulated by the coil into a current, which then flows into the coil so that the current will be converted into Joule heat by the resistance of the inductive load. This time lag, between the moment the circuit is opened and the moment the load is reset, caused by this method is longer than that caused by the CR method.	The reversed dielectric strength value of the diode must be at least 10 times as large as the circuit voltage value. The forward current of the diode must be the same as or larger than the load current. The reversed dielectric strength value of the diode may be two to three times larger than the supply voltage if the arc killer is applied to electronic circuits with low circuit voltages.
Varistor method 	Yes	Yes	The varistor method prevents the imposition of high voltage between the contacts by using the constant voltage characteristic of the varistor. There is time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 or 48 V, insert the varistor in parallel with the load. If the supply voltage is 100 to 200 V, insert the varistor between the contacts.	---

Note Do not connect a capacitor as an arc killer in parallel with an inductive load as shown in the following diagram. This arc killer is very effective for preventing spark discharge at the moment when the circuit is opened. However when the contacts are closed, the contacts may be welded due to the current charged in the capacitor.

DC inductive loads can be more difficult to switch than resistive loads. If appropriate arc killers are used, however, DC inductive loads will be as easy to switch as resistive loads.

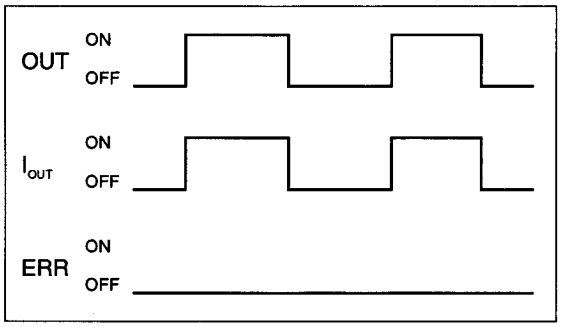


Load Short-circuit Protection and Line Disconnection Detection for CJ1W-OD202

This section describes the load short-circuit protection of the CJ1W-OD202 Output Units.

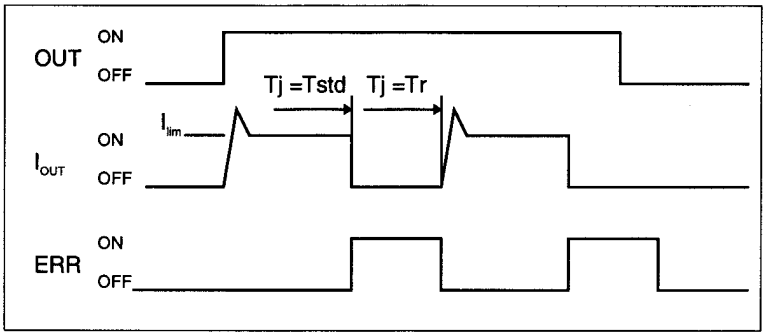
As shown below, normally when the output bit turns ON (OUT), the transistor will turn ON and then output current (Iout) will flow. If the output (Iout) is overloaded or short-circuited exceeding the detection current (Ilim), the output current (Iout) will be limited as shown in *Figure 2* below. When the junction temperature (Tj) of the output transistor reaches the thermal shutdown temperature (Tstd), the output will turn OFF to protect the transistor from being damaged, and the alarm output bit will turn ON to light the ERR indicator. When the junction temperature (Tj) of the transistor drops down to the reset temperature (Tr), the ERR indicator will be automatically reset and the output current will start flowing.

Figure 1: Normal Condition



OUT: OUTPUT instruction
I_{OUT}: Output current
ERR: Alarm output, ERR indicator
I_{lim}: Detection current
Tj: Junction temperature of transistor
Tstd: Thermal shutdown temperature
Tr: Reset temperature

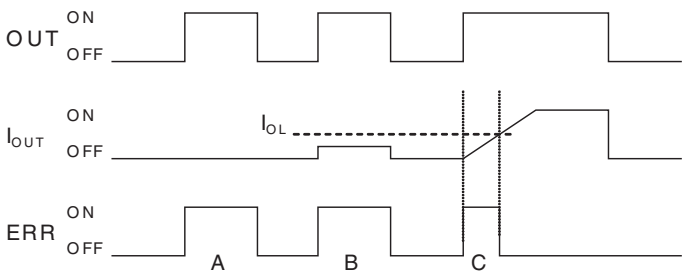
Figure 2: Overload or Short-circuit



Line Disconnection

If the line is disconnected and the output current (Iout) drops below the line disconnection detection current (I_{OL}), the ERR indicator will light as shown in Figure 3.

Figure 3: Line Disconnections



A: Load not connected or load line broken.

B: Current to load at or below line disconnection detection current.

C: Rise of current to load too slow and error detected before the disconnection detection current was reached.

When load L is connected, the ERR indicator may light and the Alarm Output Bit may turn ON for approximately 100 ms. The programming example given later in this section can be used so that an error is not detected in this case.

Operating Restrictions

Although the CJ1W-OD202 is provided with short-circuit protection, these are for protecting internal circuits against momentary short-circuiting in the load. As shown in *Figure 2* below, the short-circuit protection is automatically released when the Tj equals to Tr. Therefore, unless the cause of short-circuit is removed, ON/OFF operations will be repeated in the output. Leaving short-circuits for any length of time will cause internal temperature rise, deterioration of elements, discoloration of the case or PCBs, etc. Therefore, observe the following restrictions.

Restrictions

If a short-circuit occurs in an external load, immediately turn OFF the corresponding output and remove the cause. The CJ1W-OD202 turns ON an alarm output bit that corresponds to the external load output number. There is an alarm output bit for every common.

When an alarm output bit turns ON, use a self-holding bit for the alarm in the user program and turn OFF the corresponding output.

The alarm output bit is allocated in the Basic I/O Unit Information Area (A050 to A089) for every Unit mounting slot.

The following table shows the correspondence between output bits and bits in the Basic I/O Unit Information Area.

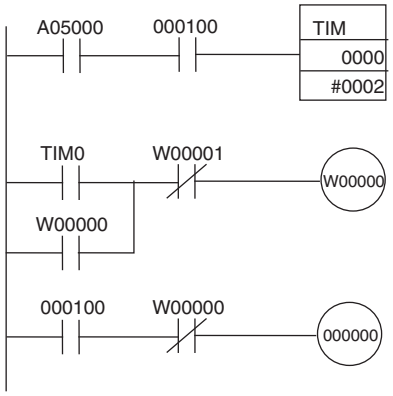
Output bit		0 or 1	2 or 3	4 0r 5	6 or 7
CJ1W-OD202	Mounted in even slot	0	1	2	3
	Mounted in odd slot	8	9	10	11

For example, when the CJ1W-OD202 is mounted in slot 0 on Rack 0, A05000 will turn ON if the output 8 is short-circuited. When the CJ1W-OD202 is mounted in slot 1 of Rack 0, A05011 will turn ON if the output m+3 is short-circuited

Programming Example

In this example, CJ1W-OD202 is mounted in slot 0 of the Rack 0.

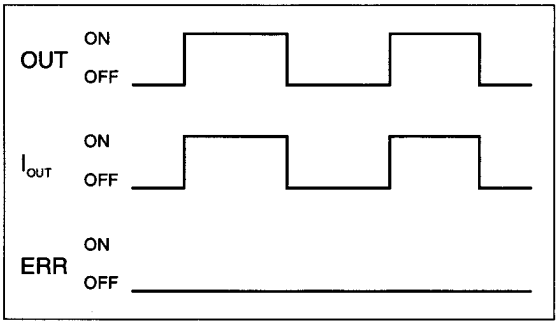
This example shows how to turn OFF output bits CIO 000000 to CIO 000007 immediately if the alarm output bit A05000 turns ON and how to keep the output bits OFF until the cause is removed and the bit is reset using work bit W000001.



Load Short-circuit Protection for CJ1W-OD204/OD212/OD232/MD232 Output Units

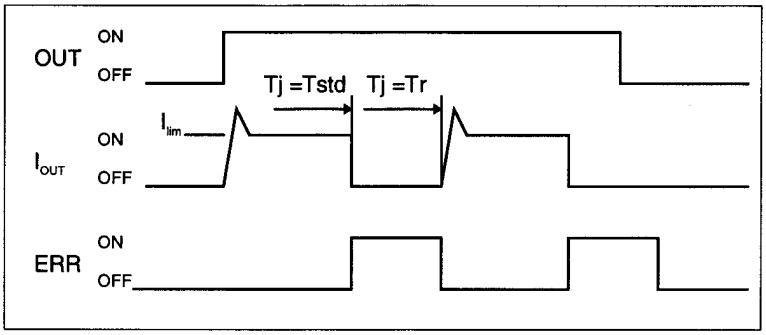
As shown below, normally when the output bit turns ON (OUT), the transistor will turn ON and then output current (Iout) will flow. If the output (Iout) is overloaded or short-circuited exceeding the detection current (Ilim), the output current (Iout) will be limited as shown in *Figure 2* below. When the junction temperature (Tj) of the output transistor reaches the thermal shutdown temperature (Tstd), the output will turn OFF to protect the transistor from being damaged, and the alarm output bit will turn ON to light the ERR indicator. When the junction temperature (Tj) of the transistor drops down to the reset temperature (Tr), the ERR indicator will be automatically reset and the output current will start flowing.

Figure 1: Normal Condition



OUT: OUTPUT instruction
I_{OUT}: Output current
ERR: Alarm output, ERR indicator
I_{lim}: Detection current
Tj: Junction temperature of transistor
Tstd: Thermal shutdown temperature
Tr: Reset temperature

Figure 2: Overload or Short-circuit



Operating Restrictions for the CJ1W-OD204/OD212/OD232/MD232

These Units are provided with short-circuit protection, these are for protecting internal circuits against momentary short-circuiting in the load. As shown in *Figure 2* below, the short-circuit protection is automatically released when the Tj equals to Tr. Therefore, unless the cause of short-circuit is removed, ON/OFF operations will be repeated in the output. Leaving short-circuits for any length of time will cause internal temperature rise, deterioration of elements, discoloration of the case or PCBs, etc. Therefore, observe the following restrictions.

Restrictions

If a short-circuit occurs in an external load, immediately turn OFF the corresponding output and remove the cause. An an alarm output bit that corresponds to the external load output number is turned ON. There is an alarm output bit for every common.

When an alarm output bit turns ON, use a self-holding bit for the alarm in the user program and turn OFF the corresponding output.

The alarm output bit is allocated in the Basic I/O Unit Information Area (A050 to A069) for every Unit mounting slot.

The following table shows the correspondence between output bits and bits in the Basic I/O Unit Information Area.

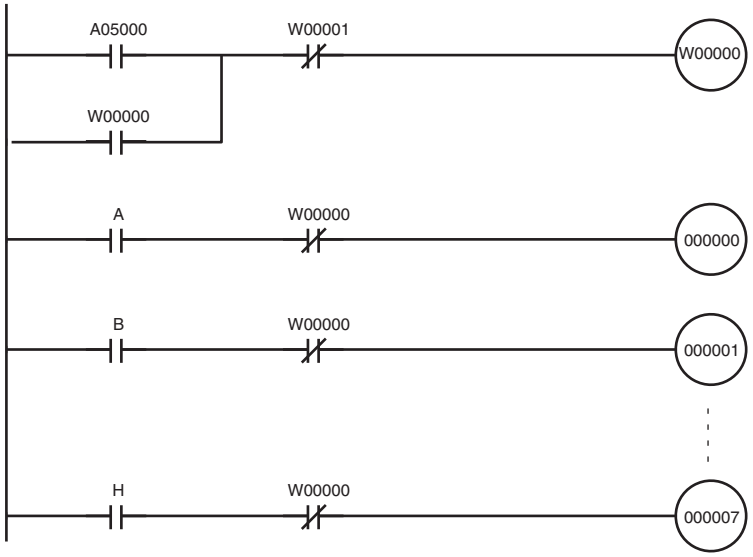
Output bit		m		m+1	m+2	m+3
		0 to 7	8 to 15	0 to 15	0 to 15	0 to 15
CJ1W-OD204	Mounted in even slot	0	---	---	---	---
	Mounted in odd slot	8	---	---	---	---
CJ1W-OD212	Mounted in even slot	0		---	---	---
	Mounted in odd slot	8		---	---	---
CJ1W-MD232	Mounted in even slot	0		---	---	---
	Mounted in odd slot	8		---	---	---
CJ1W-OD232	Mounted in even slot	0		1	---	---
	Mounted in odd slot	8		9	---	---

For example, when the CJ1W-OD212 is mounted in slot 0 on Rack 0, A05000 will turn ON if the output 8 is short-circuited. When the CJ1W-OD232 is mounted in slot 1 of Rack 0, A05009 will turn ON if the output m+1 is short-circuited

Programming Example

In this example, CJ1W-OD212 is mounted in slot 0 of the Rack 0.

This example shows how to turn OFF output bits CIO 000000 to CIO 000007 immediately if the alarm output bit A05000 turns ON and how to keep the output bits OFF until the cause is removed and the bit is reset using work bit W000001.



Appendix B

CJ1M CPU Unit Built-in I/O Specifications

Built-in Inputs (CJ1M-CPU2□)

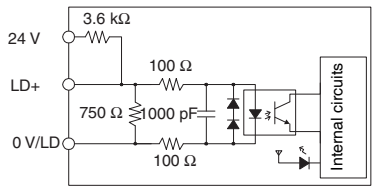
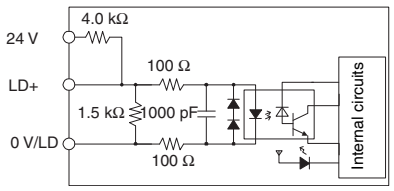
General-purpose Inputs

Inputs	IN0 to IN5	IN6 to IN9	IN0 to IN5	IN6 to IN9
Input Device	2-wire sensor		Line driver	
Input Current	6 mA typical	5.5 mA typical	13 mA typical	10 mA typical
Input Voltage Range	24 V DC $^{+10\%}/_{-15\%}$		RS-422A Line Driver, AM26LS31 or equivalent (See note 1.)	
Input Resistance	3.6 kΩ	4.0 kΩ	---	
Number of Circuits	1 common per circuit			
ON Voltage/ON Current	17.4 V DC min./3 mA min.		---	
OFF Voltage/OFF Current	5 V DC max./1 mA max.		---	
ON Response Time	8 ms max. (Can be switched to 0, 0.5, 1, 2, 4, 8, 16, or 32 ms. See note 2.)			
OFF Response Time	8 ms max. (Can be switched to 0, 0.5, 1, 2, 4, 8, 16, or 32 ms. See note 2.)			

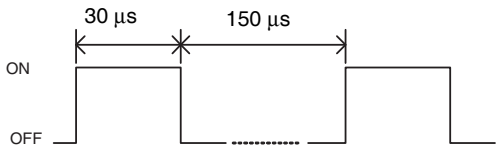
Note 1. The power supply at the line driver must be 5 V ±5%.

2. When 0 ms is set, the ON response time due to internal components delay will be 30 μs max. for IN0 to IN5 or 2 μs max. for IN6 to IN9. The OFF response time will be 150 μs max. for IN0 to IN5 or 2 μs max. for IN6 to IN9.

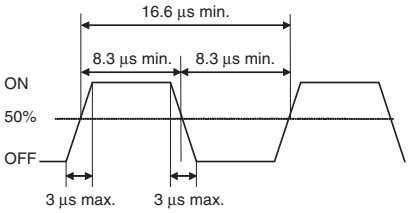
Circuit Configuration

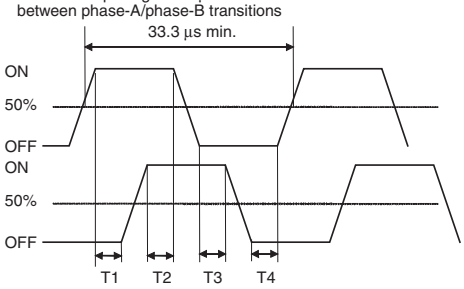
Inputs	IN0 to IN5	IN6 to IN9
Circuit Configuration		

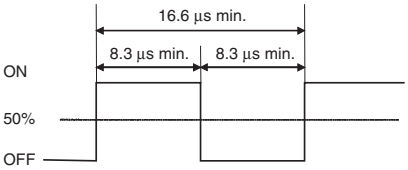
Interrupt Inputs and Quick-response Inputs (IN0 to IN3)

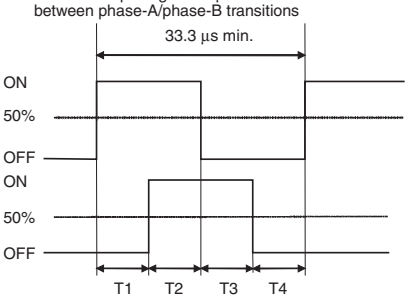
Item	Specifications
ON Response Time	30 μs max.
OFF Response Time	150 μs max.
Response pulses	

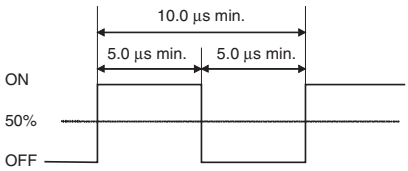
High-speed Counter Inputs (IN6 to IN9)

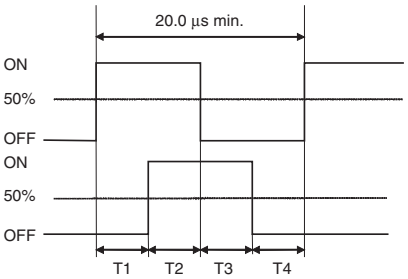
<table>
<tr><th></th><th>24-V DC Input</th><th>Line Driver Input</th></tr>
<tr><td>When 60 kHz is set.</td><td>Phase-A/Phase-B encoder input, Single-phase 60-kHz pulse input with 50% duty ratio
Rise time and fall time: 3.0 μs max.
 

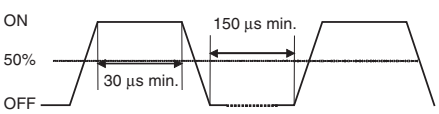
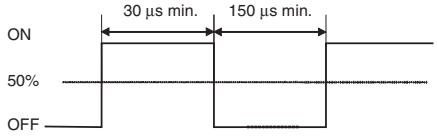
Phase-A/Phase-B encoder input, Differential-phase 30-kHz pulse input
Maintain a spacing of 4.0 μs min. between phase-A/phase-B transitions
 

T1, T2, T3, and T4: 4.0 μs min.</td><td>Phase-A/Phase-B encoder input, Single-phase 60-kHz pulse input with 50% duty ratio
 

Phase-A/Phase-B encoder input, Differential-phase 50-kHz pulse input
Maintain a spacing of 4.0 μs min. between phase-A/phase-B transitions
 

T1, T2, T3, and T4: 4.0 μs min.</td></tr>
<tr><td>When 100 kHz is set.</td><td>Count operation cannot be assured above 60 kHz.</td><td>Single-phase 100-kHz pulse input with 50% duty ratio
 

Differential-phase 50-kHz pulse input
Maintain a spacing of 2.5 μs min. between Phase A/Phase B transitions
 

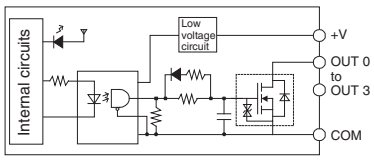
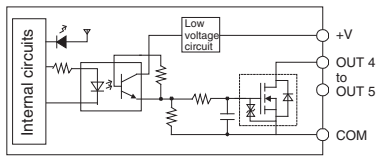
T1, T2, T3, and T4: 2.5 μs min.</td></tr>
<tr><td></td><td>Phase-Z encoder input (IN2 and IN3)
Maintain an ON time of 30 μs min. and an OFF time of 150 μs min.
 
</td><td>Phase-Z encoder input (IN2 and IN3)
Maintain an ON time of 30 μs min. and an OFF time of 150 μs min.
 
</td></tr>
</table>

Note In order for the counter inputs to satisfy the specifications shown in the table above, it will be necessary to check the factors that can affect the pulses, such as the type of output driver in the encoder, encoder cable length, and count pulse frequency. In particular, the rise time and fall time may be too long and the input waveform may not be within specifications when a long encoder cable is used to connect an encoder that has 24-V open collector outputs. When a long cable is connected, either shorten the encoder cable or use an encoder with line driver outputs.

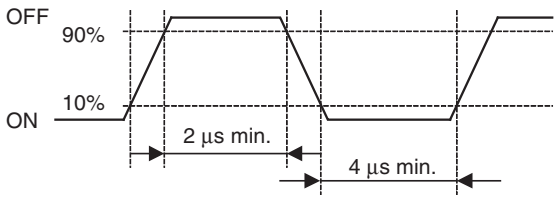
Built-in Outputs (CJ1M-CPU2□)

Transistor Outputs (Sinking)

General-purpose Outputs

Outputs	OUT0 to OUT3	OUT4 to OUT5
Rated Voltage	5 to 24 V DC	
Operating Load Voltage Range	4.75 to 26.4 V DC	
Maximum Switching Current	0.3 A/point, 1.8 A/Unit	
Number of Circuits	6 points (6 points/common)	
Maximum Inrush Current	3.0 A/point, 10 ms max.	
Leakage Current	0.1 mA max.	
Residual Voltage	0.6 V max.	
ON Response Time	0.1 ms max.	
OFF Response Time	0.1 ms max.	
Fuse	None	
External Power Supply	10.2 to 26.4 V DC, 50 mA min.	
Circuit Configuration		

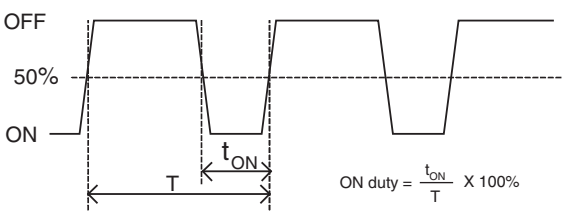
Pulse Outputs (OUT0 to OUT3)

Item	Specifications
Maximum Switching Capacity	30 mA, 4.75 to 26.4 V DC
Minimum Switching Capacity	7 mA, 4.75 to 26.4 V DC
Maximum Output Frequency	100 kHz
Output Pattern	

Note 1. The load at the above values is taken as the resistance load, and the connecting cable impedance is not taken into account.

2. The pulse width during actual operation may be smaller than the above values as a result of pulse pattern distortion due to connecting cable impedance.

PWM Output Specifications (OUT4 to OUT5)

Item	Specifications
Maximum Switching Capacity	300 mA, 4.75 to 26.4 V DC
Maximum Output Frequency	1 kHz
PWM Output Precision	ON duty +5% -0% during 1 kHz output
Output Pattern	

Note The CJ1M-CPU21 supports only OUT4.

Appendix C
Auxiliary Area

A000 to A447: Read-only Area, A448 to A959: Read/Write Area
Read-only Area (Set by System)

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A000	---	10-ms Incrementing Free Running Timer	This word contains the system timer used after the power is turned ON. 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 10 ms. The value returns to 0000 hex after reaching FFFF hex (655,350 ms), and then continues to be automatically incremented by 1 every 10 ms. **Note:** The timer will continue to be incremented when the operating mode is switched to RUN mode. Example: The interval can be counted between processing A and processing B without requiring timer instructions. This is achieved by calculating the difference between the value in A000 for processing A and the value in A000 for processing B. The interval is counted in 10 ms units.	Retained	Cleared	Every 10 ms after power is turned ON CPU Unit with unit version. 3.0 or later
A001	---	100-ms Incrementing Free Running Timer	This word contains the system timer used after the power is turned ON. 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 100 ms. The value returns to 0000 hex after reaching FFFF hex (6,553,500 ms), and then continues to be automatically incremented by 1 every 100 ms. **Note:** The timer will continue to be incremented when the operating mode is switched to RUN mode.	Retained	Cleared	Every 100 ms after power is turned ON CPU Unit with unit version. 3.0 or later
A002	---	1-s Incrementing Free Running Timer	This word contains a system timer used after the power is turned ON 0000 hex is set when the power is turned ON and this value is automatically incremented by 1 every 1 s. The value returns to 0000 hex after reaching FFFF hex (65,535 s), and then continues to be automatically incremented by 1 every 1 s. **Note:** The timer will continue to be incremented when the operating mode is switched to RUN mode.	Retained	Cleared	Every 1 s after power is turned ON CPU Unit with unit version. 4.0 or later
A050	A05000 to A05007	Basic I/O Unit Information, Rack 0 Slot 0	A bit will turn ON to indicate when the load short-circuit protection function alarm output has been given. Only the 4 most LSB are used for the CJ1W-OD202 (2 points per bit), only the LSB is used for the CJ1W-OD212, OD204, MD232 and only the two most LSB are used for the CJ1W-OD232. Each bit indicates the status for one circuit. 1: Short circuited 0: Normal	---	---	Refreshed each cycle.
	A05008 to A05015	Basic I/O Unit Information, Rack 0 Slot 1		---	---	
A051 to A069	A05100 to A06915	Basic I/O Unit Information, Racks 2 to 7		---	---	
A090 to A093	---	User Program Date	These words contain in BCD the date and time that the user program was last overwritten. A09000 to A09007: Seconds (00 to 59) A09008 to A09015: Minutes (00 to 59) A09100 to A09107: Hour (00 to 23) A09108 to A09115: Day of month (01 to 31) A09200 to A09207: Month (01 to 12) A09208 to A09215: Year (00 to 99) A09308 to A09307: Day of the week (00: Sunday, 01: Monday, 02: Tuesday, 03: Wednesday, 04: Thursday, 05: Friday, 06: Saturday)	Retained	Retained	Not supported by CJ1G-CPU□□ CPU Units
A094 to A097	---	Parameter Date	These words contain in BCD the date and time that the parameters were last overwritten. The format is the same as above	Retained	Retained	Not supported by CJ1G-CPU□□ CPU Units

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A099	A09900	UM Read Protection Status	Indicates whether the entire user program in the PLC is read-protected. 0: UM not read-protected. 1: UM read-protected.	Retained	Retained	When protection is set or cleared CPU Unit with unit version 2 or later
	A09901	Task Read Protection Status	Indicates whether read protection is set for individual tasks. 0: Tasks not read-protected. 1: Tasks read-protected.	Retained	Retained	When protection is set or cleared CPU Unit with unit version 2 or later
	A09902	Program Write Protection Status when Read Protection Is Set	Indicates whether the program is write-protected. 0: Write-enabled. 1: Write-protected.	Retained	Retained	When protection is set or cleared CPU Unit with unit version 2 or later
	A09903	Enable/Disable Status for Backing Up the Program to a Memory Card	Indicates whether creating a backup program file (.OBJ) is enabled or disabled. 0: Enabled. 1: Disabled.	Retained	Retained	When protection is set or cleared CPU Unit with unit version 2 or later
	A09914	IR/DR Operation between Tasks	Turn ON this bit to share index and data registers between all tasks. Turn OFF this bit to use separate index and data registers between in each task. 0: Independent 1: Shared (default)	Retained	Retained	Not supported by CJ1G-CPU□□ CPU Units
	A09915	Timer/Counter PV Refresh Mode Flag	Indicates whether the CPU Unit is operating in BCD mode or binary mode. 0: BCD mode 1: Binary mode	Retained	Retained	Not supported by CJ1G-CPU□□ CPU Units
A100 to A199	All	Error Log Area	When an error has occurred, the error code, error contents, and error's time and date are stored in the Error Log Area. Information on the 20 most recent errors can be stored. Each error record occupies 5 words; the function of these 5 words is as follows: 1) Error code (bits 0 to 15) 2) Error contents (bits 0 to 15) Error contents: Address of Aux. Area word with details or 0000. 3) Minutes (bits 8 to 15), Seconds (bits 0 to 7) Seconds: 00 to 59, BCD Minutes: 00 to 59, BCD 4) Day of month (bits 8 to 15), Hours (bits 0 to 7) Hours: 00 to 23, BCD Day of month: 01 to 31, BCD 5) Year (bits 8 to 15), Month (bits 0 to 7) Year: 00 to 99, BCD Month: 00 to 12, BCD Errors generated by FAL(006) and FALS(007) will also be stored in this Error Log. The Error Log Area can be reset from a Programming Device. If the Error Log Area is full (20 records) and another error occurs, the oldest record in A100 to A104 will be cleared, the other 19 records are shifted down, and the new record is stored in A195 to A199.	Retained	Retained	Refreshed when error occurs. A50014 A300 A400

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A200	A20011	First Cycle Flag	ON for one cycle after PLC operation begins (after the mode is switched from PROGRAM to RUN or MONITOR, for example). ON for the first cycle	---	---	---
	A20012	Step Flag	ON for one cycle when step execution is started with STEP(008). This flag can be used for initialization processing at the beginning of a step. ON for the first cycle after execution of STEP(008).	Cleared	---	---
	A20014	Task Started Flag	When a task switches from WAIT or INI to RUN status, this flag will be turned ON within the task for one cycle only. 1: ON for first cycle (including transitions from WAIT and IN) 0: Other The only difference between this flag and A20015 is that this flag also turns ON when the task switches from WAIT to RUN status.	Cleared	Cleared	Not supported by CJ1G-CPU□□ CPU Units
	A20015	First Task Startup Flag	ON when a task is executed for the first time. This flag can be used to check whether the current task is being executed for the first time so that initialization processing can be performed if necessary. 1: First execution 0: Not executable for the first time or not being executed.	Cleared	---	---
A201	A20110	Online Editing Wait Flag	ON when an online editing process is waiting. 1: Waiting for online editing 0: Not waiting for online editing (If another online editing command is received while waiting, the other command won't be recorded and an error will occur.)	Cleared	Cleared	A527
	A20111	Online Editing Flag	ON when an online editing process is being executed. 1: Online editing in progress 0: Online editing not in progress	Cleared	Cleared	A527
A202	A20200 to A20207	Communications Port Enabled Flags	ON when a network instruction (SEND, RECV, CMND, PMCR, TXDU, or RXDU) or background execution (CJ1-H and CJ1M CPU Units only) can be executed with the corresponding port number. Bits 00 to 07 correspond to communications ports 0 to 7. 1: Network instruction is not being executed 0: Network instruction is being executed (port busy) When two or more network instructions are programmed with the same port number, use the corresponding flag as an execution condition to prevent the instructions from being executed simultaneously. (The flag for a given port is turned OFF while a network instruction with that port number is being executed.) (When the simple backup operation is used to performed a write or compare operation for a Memory Card on a CJ1-H or CJ1M CPU Unit, a communications port will be automatically allocated, and the corresponding Flag will be turned OFF.)	Cleared	---	---
	A20215	Network Communications Port Allocation Enabled Flag	ON when there is a communications port available for automatic allocation when executing communications instructions (SEND, RECV, CMND, PMCR, TXDU, or RXDU). 1: Communications port available 0: Communications port not available Note: Use this flag to confirm whether a communications port is available for automatic allocation before executing communications instructions when using 9 or more communications instructions simultaneously.	Cleared	---	---

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A203 to A210	All	Communications Port Completion Codes	These words contain the completion codes for the corresponding port numbers when network instructions (SEND, RECV, CMND, or PMCR) or background execution (CJ1-H CPU Units only) have been executed. (The corresponding word will be cleared when background execution has been completed for CJ1-H CPU Units.) Words A203 to A210 correspond to communications ports 0 to 7. Non-zero: Error code 0000: Normal condition The following codes will be stored when an Explicit Message Instruction (EXPLT, EGATR, ESATR, ECHRD, or ECHWR) has been executed. If the Explicit Communications Error Flag turns OFF, 0000 hex is stored. If the Explicit Communications Error Flag is ON and the Network Communications Error Flag is ON, the FINS end code is stored. If the Explicit Communications Error Flag is ON and the Network Communications Error Flag is OFF, the explicit message end code is stored. During communications, 0000 hex will be stored and the suitable code will be stored when execution has been completed. The code will be cleared when operation is started. (The completion code for a given port is cleared to 0000 when a network instruction with that port number is executed.) (When the simple backup operation is used to performed a write or compare operation for a Memory Card on a CS1-H CPU Unit, a communications port will be automatically allocated, and a completion code will be stored in the corresponding word.) (The completion code for a given port is cleared to 0000 when a network instruction with that port number is executed.) (When the simple backup operation is used to performed a write or compare operation for a Memory Card on a CJ1-H or CJ1M CPU Unit, a communications port will be automatically allocated, and a completion code will be stored in the corresponding word.)	Cleared	---	---
A213	A21300 to A21307	Explicit Communications Error Flag	Turn ON when an error occurs in executing an Explicit Message Instruction (EXPLT, EGATR, ESATR, ECHRD, or ECHWR). Bits 00 to 07 correspond to communications ports 0 to 7. 1: Error end 0: Normal end The corresponding bit will turn ON both when the explicit message cannot be sent and when an error response is returned for the explicit message. The status will be maintained until the next explicit message communication is executed. The bit will always turn OFF when the next Explicit Message Instruction is executed.	Cleared	---	A21900 to A21907 A203 to A210
A214	A21400 to A21407	First Cycle Flags after Network Communications Finished	Each flag will turn ON for just one cycle after communications have been completed. Bits 00 to 07 correspond to ports 0 to 7. Use the Used Communications Port Number stored in A218 to determine which flag to access. 1: First cycle after communications finish only 2: Other status **Note:** These flags are not effective until the next cycle after the communications instruction is executed. Delay accessing them for at least one cycle.	Retained	Cleared	---

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A215	A21500 to A21507	First Cycle Flags after Network Communications Error	Each flag will turn ON for just one cycle after a communications error occurs. Bits 00 to 07 correspond to ports 0 to 7. Use the Used Communications Port Number stored in A218 to determine which flag to access. Determine the cause of the error according to the Communications Port Completion Codes stored in A203 to A210. 1: First cycle after communications error only 0: Other status **Note:** These flags are not effective until the next cycle after the communications instruction is executed. Delay accessing them for at least one cycle.	Retained	Cleared	---
A216 to A217	All	Network Communications Completion Code Storage Address	The completion code for a communications instruction is automatically stored at the address with the I/O memory address given in these words. Place this address into an index register and use indirect addressing through the index register to read the communications completion code.	Retained	Cleared	---
A218	All	Used Communications Port Numbers	Stores the communications port numbers used when a communications instruction is executed using automatic communication port allocations. 0000 to 0007 hex: Communications port 0 to 7	Retained	Cleared	---
A219	A21900 to A21907	Communications Port Error Flags	ON when an error occurred during execution of a network instruction (SEND, RECV, CMND, or PMCR). Bits 00 to 07 correspond to communications ports 0 to 7. 1: Error occurred 0: Normal condition (When the simple backup operation is used to performed a write or compare operation for a Memory Card on a CJ1-H or CJ1M CPU Unit, a communications port will be automatically allocated, and the corresponding Flag will be turned OFF if an error occurs.)	Retained	---	---
A220 to A259	A22000 to 25915	Basic I/O Unit Input Response Times	These words contain the actual input response times. 0 to 17 hexadecimal When the Basic I/O Unit input response time setting is changed in the PLC Setup while the PLC is in PROGRAM mode, the setting in the PLC Setup will not match the actual value in the Basic I/O Unit unless the power is turned OFF and then ON again. In that case, the actual value can be monitored in these words.	Retained	See function column.	PLC Setup (Basic I/O Unit Input response time settings)
A260	All	I/O Allocation Status	Indicates the current status of I/O allocation, i.e., Automatic I/O Allocation at Startup or User-set I/O Allocations. 0000 hex: Automatic I/O Allocation at Startup BBBB hex: User-set I/O Allocations	Retained	Retained	---

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A261	A26100	I/O Table Creation Error Details (Not supported by CJ1G-CPU□□ CPU Units.)	ON: Error in CPU Bus Unit Setup Turns OFF when I/O tables are generated normally. ON: Error in CPU Bus Unit Setup OFF: I/O tables generated normally	Retained	Cleared	When I/O tables are generated
	A26102		ON: Overflow in maximum number of I/O points Turns OFF when I/O tables are generated normally. ON: Overflow in maximum number of I/O points OFF: I/O tables generated normally			A40111 (Too many I/O points)
	A26103		ON: The same unit number was used more than once. Turns OFF when I/O tables are generated normally. ON: The same unit number was used more than once. OFF: I/O tables generated normally			A40113 (duplicated number)
	A26104		ON: I/O bus error Turns OFF when I/O tables are generated normally. ON: I/O bus error OFF: I/O tables generated normally			A40114 (I/O but error)
	A26107		ON: Error in a Special I/O Unit Turns OFF when I/O tables are generated normally. ON: Error in a Special I/O Unit OFF: I/O tables generated normally			
	A26109		ON: I/O detection has not been completed. Turns OFF when I/O tables are generated normally. ON: I/O detection has not been completed. OFF: I/O tables generated normally			
A262 and A263	All	Maximum Cycle Time	These words contain the maximum cycle time (the maximum cycle time of the program execution cycle for a Parallel Processing Mode) since the start of PLC operation. The cycle time is recorded in 8-digit hexadecimal with the leftmost 4 digits in A263 and the rightmost 4 digits in A262. 0 to FFFFFFFF: 0 to 429,496,729.5 ms (0.1 ms units)	Cleared	Cleared	---
A264 and A265	All	Present Cycle Time	These words contain the present cycle time (the maximum cycle time of the program execution cycle for a Parallel Processing Mode) in 8-digit hexadecimal with the leftmost 4 digits in A265 and the rightmost 4 digits in A264. 0 to FFFFFFFF: 0 to 429,496,729.5 ms	Cleared	Cleared	---
A266 and A267	All	Program Execution Time+ Priority Peripheral Servicing Time	Total of all slice times for program execution and all slice times for peripheral servicing. 00000000 to FFFFFFFF hex 0.0 to 429,496,729.5 ms (0.1-ms increments)	Cleared	Cleared	---
A268	All	Peripheral Servicing Cycle Time (CJ1-H CPU Units only)	In Parallel Processing with Synchronous or Asynchronous Memory Access, this word contains the peripheral servicing cycle time. The time is updated every cycle and is recorded in 16-bit binary. 0 to 4E20 hex, (0.0 to 2,000.0 ms in units of 0.1 ms)	Cleared	Cleared	Refreshed each peripheral processing cycle A40515
A270 to A271 (See note.)	All	High-speed Counter 0 PV	Contains the PV of high-speed counter 0. A271 contains the leftmost 4 digits and A270 contains the rightmost 4 digits.	Cleared	Cleared	Refreshed each cycle during oversee process. Refreshed when PRV(881) instruction is executed.
A272 to A273 (See note.)	All	High-speed Counter 1 PV	Contains the PV of high-speed counter 1. A273 contains the leftmost 4 digits and A272 contains the rightmost 4 digits.	Cleared	Cleared	Refreshed each cycle during oversee process. Refreshed when PRV(881) instruction is executed.

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A274 (See note.)	A27400	High-speed Counter 0 Range 1 Comparison Condition Met Flag	These flags indicate whether the PV is within the specified ranges when high-speed counter 0 is being operated in range-comparison mode. Cleared at beginning of operation. Cleared when range comparison table is registered. 0: PV not in range 1: PV in range	Cleared	Cleared	Refreshed each cycle during oversee process. Refreshed when PRV(881) instruction is executed.
	A27401	High-speed Counter 0 Range 2 Comparison Condition Met Flag				
	A27402	High-speed Counter 0 Range 3 Comparison Condition Met Flag				
	A27403	High-speed Counter 0 Range 4 Comparison Condition Met Flag				
	A27404	High-speed Counter 0 Range 5 Comparison Condition Met Flag				
	A27405	High-speed Counter 0 Range 6 Comparison Condition Met Flag				
	A27406	High-speed Counter 0 Range 7 Comparison Condition Met Flag				
	A27407	High-speed Counter 0 Range 8 Comparison Condition Met Flag				
	A27408	High-speed Counter 0 Comparison In-progress Flag	This flag indicates whether a comparison operation is being executed for high-speed counter 0. Cleared at beginning of operation. 0: Stopped. 1: Being executed.	Retained	Cleared	Refreshed when comparison operation starts or stops.
	A27409	High-speed Counter 0 Overflow/ Underflow Flag	This flag indicates when an overflow or underflow has occurred in the high-speed counter 0 PV. (Used with the linear mode counting range only.) Cleared when operation starts. Cleared when PV is changed. 0: Normal 1: Overflow or underflow	Cleared	Cleared	Refreshed when an overflow or underflow occurs.
	A27410	High-speed Counter 0 Count Direction	This flag indicates whether the high-speed counter is currently being incremented or decremented. The counter PV for the current cycle is compared with the PLC in last cycle to determine the direction. 0: Decrementing 1: Incrementing	Retained	Cleared	Setting used for high-speed counter, valid during counter operation.

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A275 (See note.)	A27500	High-speed Counter 1 Range 1 Comparison Condition Met Flag	These flags indicate whether the PV is within the specified ranges when high-speed counter 1 is being operated in range-comparison mode. Cleared when operation starts. Cleared when range comparison table is registered. 0: PV not in range 1: PV in range	Cleared	Cleared	Refreshed each cycle during overseeing process. Refreshed when PRV(881) instruction is executed for the corresponding counter.
	A27501	High-speed Counter 1 Range 2 Comparison Condition Met Flag				
	A27502	High-speed Counter 1 Range 3 Comparison Condition Met Flag				
	A27503	High-speed Counter 1 Range 4 Comparison Condition Met Flag				
	A27504	High-speed Counter 1 Range 5 Comparison Condition Met Flag				
	A27505	High-speed Counter 1 Range 6 Comparison Condition Met Flag				
	A27506	High-speed Counter 1 Range 7 Comparison Condition Met Flag				
	A27507	High-speed Counter 1 Range 8 Comparison Condition Met Flag				
	A27508	High-speed Counter 1 Comparison In-progress Flag	This flag indicates whether a comparison operation is being executed for high-speed counter 1. Cleared when operation starts. 0: Stopped. 1: Being executed	Retained	Cleared	Refreshed when comparison operation starts or stops.
	A27509	High-speed Counter 1 Overflow/ Underflow Flag	This flag indicates when an overflow or underflow has occurred in the high-speed counter 1 PV. (Used with the linear mode counting range only.) Cleared when operation starts. Cleared when the PV is changed. 0: Normal 1: Overflow or underflow	Cleared	Cleared	Refreshed when an overflow or underflow occurs.
	A27510	High-speed Counter 1 Count Direction	This flag indicates whether the high-speed counter is currently being incremented or decremented. The counter PV for the current cycle is compared with the PC in last cycle to determine the direction. 0: Decrementing 1: Incrementing	Retained	Cleared	Setting used for high-speed counter, valid during counter operation.

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A276 to A277 (See note.)	All	Pulse Output 0 PV	Contain the number of pulses output from the corresponding pulse output port. PV range: 80000000 to 7FFFFFFF hex (-2,147,483,648 to 2,147,483,647) When pulses are being output in the CW direction, the PV is incremented by 1 for each pulse. When pulses are being output in the CCW direction, the PV is decremented by 1 for each pulse. PV after overflow: 7FFFFFFF hex PV after underflow: 80000000 hex A277 contains the leftmost 4 digits and A276 contains the rightmost 4 digits of the pulse output 0 PV. A279 contains the leftmost 4 digits and A278 contains the rightmost 4 digits of the pulse output 1 PV. Cleared when operation starts. **Note** If the coordinate system is relative coordinates (undefined origin), the PV will be cleared to 0 when a pulse output starts, i.e. when a pulse output instruction (SPED(885), ACC(888), or PLS2(887)) is executed.	Retained	Cleared	Refreshed each cycle during oversee process. Refreshed when the INI(880) instruction is executed (PV change).
A278 to A279 (See note.)	All	Pulse Output 1 PV				
A280 (See note.)	A28000	Pulse Output 0 Accel/Decel Flag	This flag will be ON when pulses are being output from pulse output 0 according to an ACC(888) or PLS2(887) instruction and the output frequency is being changed in steps (accelerating or decelerating). Cleared when operation starts or stops. 0: Constant speed 1: Accelerating or decelerating	Retained	Cleared	Refreshed each cycle during oversee process.
	A28001	Pulse Output 0 Overflow/ Underflow Flag	This flag indicates when an overflow or underflow has occurred in the pulse output 0 PV. Cleared when operation starts. 0: Normal 1: Overflow or underflow	Retained	Cleared	Cleared when the PV is changed by the INI(880) instruction. Refreshed when an overflow or underflow occurs.
	A28002	Pulse Output 0 Output Amount Set Flag	ON when the number of output pulses for pulse output 0 has been set with the PULS(886) instruction. Cleared when operation starts or stops. 0: No setting 1: Setting made	Retained	Cleared	Refreshed when the PULS(886) instruction is executed. Refreshed when pulse output stops.
	A28003	Pulse Output 0 Output Completed Flag	ON when the number of output pulses set with the PULS(886) or PLS2(887) instruction has been output through pulse output 0. Cleared when operation starts or stops. 0: Output not completed. 1: Output completed.	Retained	Cleared	Refreshed at the start or completion of pulse output in independent mode.
	A28004	Pulse Output 0 Output In-progress Flag	ON when pulses are being output from pulse output 0. Cleared when operation starts or stops. 0: Stopped 1: Outputting pulses.	Retained	Cleared	Refreshed when pulse output starts or stops.
	A28005	Pulse Output 0 No-origin Flag	ON when the origin has not been determined for pulse output 0 and goes OFF when the origin has been determined. Turned ON when power is turned ON. Turned ON when operation starts. 0: Origin established. 1: Origin not established.	Retained	ON	Refreshed each cycle during the overseeing processes.
	A28006	Pulse Output 0 At-origin Flag	ON when the pulse output PV matches the origin (0). 0: Not stopped at origin. 1: Stopped at origin.	Retained	Cleared	Refreshed each cycle during the overseeing processes.
	A28007	Pulse Output 0 Output Stopped Error Flag	ON when an error occurred while outputting pulses in the pulse output 0 origin search function. The Pulse Output 0 Output Stop Error code will be written to A444. 0: No error 1: Stop error occurred.	Retained	Cleared	Refreshed when origin search starts. Refreshed when a pulse output stop error occurs.

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A281 (See note.)	A28100	Pulse Output 1 Accel/Decel Flag	This flag will be ON when pulses are being output from pulse output 1 according to an ACC(888) or PLS2(887) instruction and the output frequency is being changed in steps (accelerating or decelerating). Cleared when operation starts or stops. 0: Constant speed 1: Accelerating or decelerating	Retained	Cleared	Refreshed each cycle during oversee process.
	A28101	Pulse Output 1 Overflow/ Underflow Flag	This flag indicates when an overflow or underflow has occurred in the pulse output 1 PV. Cleared when operation starts. 0: Normal 1: Overflow or underflow	Retained	Cleared	Refreshed when the PV is changed by the INI(880) instruction. Refreshed when an overflow or underflow occurs.
	A28102	Pulse Output 1 Output Amount Set Flag	ON when the number of output pulses for pulse output 1 has been set with the PULS(886) instruction. Cleared when operation starts or stops. 0: No setting 1: Setting made	Retained	Cleared	Refreshed when the PULS(886) instruction is executed.
	A28103	Pulse Output 1 Output Completed Flag	ON when the number of output pulses set with the PULS(886) or PLS2(887) instruction has been output through pulse output 1. Cleared when operation starts or stops. 0: Output not completed. 1: Output completed.	Retained	Cleared	Refreshed when PULS(886)(886) instruction is executed. Refreshed at the start or completion of pulse output.
	A28104	Pulse Output 1 Output In-progress Flag	ON when pulses are being output from pulse output 1. Cleared when operation starts or stops. 0: Stopped 1: Outputting pulses.	Retained	Cleared	Refreshed when pulse output starts or stops.
	A28105	Pulse Output 1 No-origin Flag	ON when the origin has not been determined for pulse output 1 and goes OFF when the origin has been determined. Turned ON when power is turned ON. Turned ON when operation starts. 0: Origin established. 1: Origin not established.	Retained	ON	Refreshed each cycle during overseeing processes.
	A28106	Pulse Output 1 At-origin Flag	ON when the pulse output PV matches the origin (0). 0: Not stopped at origin. 1: Stopped at origin.	Retained	Cleared	Refreshed each cycle during overseeing processes.
	A28107	Pulse Output 1 Output Stopped Error Flag	ON when an error occurred while outputting pulses in the pulse output 1 origin search function. The Pulse Output 1 Output Stop Error code will be written to A445. 0: No error 1: Stop error occurred.	Retained	Cleared	Refreshed when origin search starts. Refreshed when pulse output stop error occurs.
A283 (See note.)	A28300	PWM(891) Output 0 Output In-progress Flag	ON when pulses are being output from PWM(891) output 0. 0: Stopped 1: Outputting pulses.	Retained	Cleared	Refreshed when pulse output starts or stops.
	A28308	PWM(891) Output 1 Output In-progress Flag	ON when pulses are being output from PWM(891) output 1. 0: Stopped 1: Outputting pulses.	Retained	Cleared	
A294	All	Task Number when Program Stopped	This word contains the task number of the task that was being executed when program execution was stopped because of a program error. Normal tasks: 0000 to 001F (task 0 to 31) Interrupt tasks: 8000 to 80FF (task 0 to 255) (A298 and A299 contain the program address where program execution was stopped.)	Cleared	Cleared	A298/A299

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A295	A29508	Instruction Processing Error Flag	This flag and the Error Flag (ER) will be turned ON when an instruction processing error has occurred and the PLC Setup has been set to stop operation for an instruction error. CPU Unit operation will stop and the ERR/ALM indicator will light when this flag goes ON. 1: Error Flag ON 0: Error Flag OFF	Cleared	Cleared	PLC Setup (Operation when instruction error has occurred) The task number where the error is stored in A294 and the program address is stored in A298 and A299.
	A29509	Indirect DM/ EM BCD Error Flag	This flag and the Access Error Flag (AER) will be turned ON when an indirect DM/EM BCD error has occurred and the PLC Setup has been set to stop operation an indirect DM/EM BCD error. (This error occurs when the content of an indirectly addressed DM or EM word is not BCD although BCD mode has been selected.) CPU Unit operation will stop and the ERR/ALM indicator will light when this flag goes ON. 1: Not BCD 0: Normal	Cleared	Cleared	
	A29510	Illegal Access Error Flag	This flag and the Access Error Flag (AER) will be turned ON when an illegal access error has occurred and the PLC Setup has been set to stop operation an illegal access error. (This error occurs when a region of memory is access illegally.) CPU Unit operation will stop and the ERR/ALM indicator will light when this flag goes ON. The following operations are considered illegal access: 1) Reading/writing the system area 2) Reading/writing EM File Memory 3) Writing to a write-protected area 4) Indirect DM/EM BCD error (in BCD mode) 1: Illegal access occurred 0: Normal condition	Cleared	Cleared	
A295	A29511	No END Error Flag	ON when there isn't an END(001) instruction in each program within a task. CPU Unit operation will stop and the ERR/ALM indicator will light when this flag goes ON. 1: No END 0: Normal condition	Cleared	Cleared	The task number where the error is stored in A294 and the program address is stored in A298 and A299.
	A29512	Task Error Flag	ON when a task error has occurred. The following conditions generate a task error. There isn't even one regular task that is executable (started). There isn't a program allocated to the task. 1: Error 0: Normal	Cleared	Cleared	
	A29513	Differentiation Overflow Error Flag	The allowed value for Differentiation Flags which correspond to differentiation instructions has been exceeded. CPU Unit operation will stop and the ERR/ALM indicator will light when this flag goes ON. 1: Error 0: Normal	Cleared	Cleared	
	A29514	Illegal Instruction Error Flag	ON when a program that cannot be executed has been stored. CPU Unit operation will stop and the ERR/ALM indicator will light when this flag goes ON. 1: Error 0: Normal	Cleared	Cleared	
	A29515	UM Overflow Error Flag	ON when the last address in UM (User Memory) has been exceeded. CPU Unit operation will stop and the ERR/ALM indicator will light when this flag goes ON. 1: Error 0: Normal	Cleared	Cleared	

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A298 to A299	All	Program Address Where Program Stopped	These words contain the 8-digit binary program address of the instruction where program execution was stopped due to a program error.	Cleared	Cleared	(A294 contains the task number of the task where program execution was stopped.)
A300	All	Error Log Pointer	When an error occurs, the Error Log Pointer is incremented by 1 to indicate the location where the next error record will be recorded as an offset from the beginning of the Error Log Area (A100 to A199). 00 to 14 hexadecimal The Error Log Pointer can be cleared to 00 by turning A50014 (the Error Log Reset Bit) from OFF to ON. When the Error Log Pointer has reached 14 (20 decimal), the next record is stored in A195 to A199 when the next error occurs.	Retained	Retained	Refreshed when error occurs. A50014
A301	All	Current EM Bank	This word contains the current EM bank number in 4-digit hexadecimal. The current bank number can be changed with the EMBC(281) instruction. 0000 to 000C hexadecimal	Cleared	Cleared	---
A302	A30200 to A30215	CPU Bus Unit Initializing Flags	These flags are ON while the corresponding CPU Bus Unit is initializing after its CPU Bus Unit Restart Bit (A50100 to A50115) is turned from OFF to ON or the power is turned ON. Bits 00 to 15 correspond to unit numbers 0 to 15. Use these flags in the program to prevent the CPU Bus Unit's refresh data from being used while the Unit is initializing. IORF(097) and FIORF(225) (CJ1-H-R CPU Units only) cannot be executed while an CPU Bus Unit is initializing. 0: Not initializing 1: Initializing (Reset to 0 automatically after initialization.) These bits are turned OFF automatically when initialization is completed.	Retained	Cleared	Written during initialization A50100
A310		Rightmost Digits of Production Lot Number Information	These words contain the production lot number in 6 binary digits. Example: Lot No. 150701 A310 = 0701 A311 = 0015	Retained	Retained	Written when power is turned ON.
A311		Leftmost Digits of Production Lot Number Information				
A330 to A335	A33000 to A33515	Special I/O Unit Initializing Flags	These flags are ON while the corresponding Special I/O Unit is initializing after its Special I/O Unit Restart Bit (A50200 to A50715) is turned from OFF to ON or the power is turned ON. The bits in these words correspond to unit numbers 0 to 95 as follows: A33000 to A33015: Units 0 to 15 A33100 to A33115: Units 16 to 31 ---- A33500 to A33515: Units 80 to 95 Use these flags in the program to prevent the Special I/O Unit's refresh data from being used while the Unit is initializing. Also, IORF(097) and FIORF(225) (CJ1-H-R CPU Units only) cannot be executed while a Special I/O Unit is initializing. 0: Not initializing 1: Initializing (Reset to 0 automatically after initialization.) These bits are turned OFF automatically when initialization is completed.	Retained	Cleared	A50200 to A50715

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A336	A33600 to A33616	Units Detected at Startup (Racks 0 to 3) (CJ1-H and CJ1M CPU Units only)	The number of Units detected on each Rack is stored in 1-digit hexadecimal (0 to A hex). Rack 0: A33600 to A33603 Rack 1: A33604 to A33607 Rack 2: A33608 to A33611 Rack 3: A33612 to A33615 Example: The following would be stored if Rack 0 had 1 Unit, Rack 1 had 4 Units, Rack 2 had 8 Units and Rack 3 had 10 Units: A336 = A 8 4 1	Retained	Cleared	Not supported by CJ1G-CPU□□ CPU Units.
A339 and A340	All	Maximum Differentiation Flag Number	These words contain the maximum value of the differentiation flag numbers being used by differentiation instructions.	See Function column.	Cleared	Written at the start of operation A29513
A343	A34300 to A34302	Memory Card Type	Indicates the type of Memory Card, if any, installed. 0: None 4: Flash ROM This information is recorded when the PLC power is turned ON or the Memory Card power switch is turned ON.	Retained	See Function column.	See Function column.
	A34306	EM File Memory Format Error Flag	ON when a format error occurs in the first EM bank allocated for file memory. 1: Format error 0: No format error (The flag is turned OFF when formatting is completed normally.)	Retained	Cleared	---
	A34307	Memory Card Format Error Flag	ON when the Memory Card is not formatted or a formatting error has occurred. (The flag is turned OFF when formatting is completed normally.) 1: Format error 0: No format error This flag is written when the PLC power is turned ON or the Memory Card power switch is turned ON.	Retained	See Function column.	See Function column.
	A34308	File Transfer Error Flag	ON when an error occurred while writing data to file memory. 1: Error 0: No error	Retained	Cleared	Refreshed when file data is written.
	A34309	File Write Error Flag	ON when data cannot be written to file memory because it is write-protected or the data exceeds the capacity of the file memory. 1: Write not possible 0: Normal condition	Retained	Cleared	Refreshed when file data is written.
	A34310	File Read Error	ON when a file could not be read because of a malfunction (file is damaged or data is corrupted). 1: Read not possible 0: Normal condition	Retained	Cleared	Refreshed when file data is read.
	A34311	File Missing Flag	ON when an attempt is made to read a file that doesn't exist, or an attempt is made to write to a file in a directory that doesn't exist. 1: Specified file or directory is missing 0: Normal condition	Retained	Cleared	Refreshed when file data is read.

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A343	A34313	File Memory Operation Flag	ON while any of the following operations is being executed. OFF when none of them are being executed. CMND instruction sending a FINS command to the local CPU Unit. Execution of a File Memory instruction. Program replacement using the control bit in the Auxiliary Area. Easy backup operation. 1: Instruction being executed. 0: Instruction not being executed.	Retained	Cleared	Refreshed when file memory instruction is executed.
	A34314	Accessing File Data Flag	ON while file data is being accessed. Use this flag to prevent two file memory instructions from being executed at the same time. 1: File being accessed 0: File not being accessed	Retained	Cleared	---
	A34315	Memory Card Detected Flag	ON when a Memory Card has been detected. OFF when a Memory Card has not been detected. 1: Memory Card detected 0: Memory Card not detected	Retained	Cleared	Refreshed when Memory Card is inserted, or the power is turned ON.
A344	All	EM File Memory Starting Bank (CJ1 and CJ1-H CPU Units only.)	Contains the starting bank number of EM file memory (bank number of the first formatted bank). All EM banks from this starting bank to the last bank in EM are formatted for use as file memory. To convert the EM Area for use as file memory, first set the PLC Setup's EM File Memory Function setting to 1, set the PLC Setup's EM File Memory Starting Bank setting, and then format the EM Area from a Programming Device The PLC Setup's EM file memory settings won't agree with the actual settings unless the EM Area is formatted after the PLC Setup's EM file memory settings have been changed. In that case, the actual settings can be determined with this word.	Retained	Retained	Refreshed when EM file formatting is performed. PLC Setup (EM File Memory Function setting and EM File Memory Starting Bank setting)
A345	A34500	FB Program Data Flag	Turns ON if the FB program memory contains FB program data.	Retained	Retained	When program is downloaded
	A34501	Program Index File Flag	Turns ON when the comment memory contains a program index file.			When program is downloaded
	A34502	Comment File Flag	Turns ON when the comment memory contains a comment file.			
	A34503	Symbol Table File Flag	Turns ON when the comment memory contains a symbol table file.			
A346 and A347	All	Number of Remaining Words to Transfer	These words contain the 8-digit hexadecimal number of words remaining to be transferred by FREAD(700) or FWRIT(701). When one of these instructions is executed, the number of words to be transferred is written to A346 and A347. While the data is being transferred, the value in these words is decremented. A326 contains the rightmost 4-digits and A347 contains the leftmost 4-digits. Check the content of these words to determine whether or not the planned number of words have been transferred successfully.	Retained	Cleared	Written as FREAD or FWRIT is being executed. Decremented as data is actually transferred.

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A351 to A354	All	Calendar/ Clock Area	These words contain the CPU Unit's internal clock data in BCD. The clock can be set from a Programming Device such as a Programming Console, with the DATE(735) instruction, or with a FINS command (CLOCK WRITE, 0702).	Retained	Retained	Written every cycle
	A35100 to A35107		Seconds (00 to 59) (BCD)			
	A35108 to A35115		Minutes (00 to 59) (BCD)			
	A35200 to A35207		Hours (00 to 23) (BCD)			
	A35208 to A35215		Day of the month (01 to 31) (BCD)			
	A35300 to A35307		Month (01 to 12) (BCD)			
	A35308 to A35315		Year (00 to 99) (BCD)			
	A35400 to A35407		Day of the week (00 to 06) (BCD) 00: Sunday, 01: Monday, 02: Tuesday, 03: Wednesday, 04: Thursday, 05: Friday, 06: Saturday			
A360 to A391	A36001 to A39115	Executed FAL Number Flags	The flag corresponding to the specified FAL number will be turned ON when FAL(006) is executed. Bits A36001 to A39115 correspond to FAL numbers 001 to 511. The flag will be turned OFF when the error is cleared. 1: That FAL was executed 0: That FAL wasn't executed	Retained	Cleared	Refreshed when error occurs. A40215

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A392	A39204	RS-232C Port Error Flag	ON when an error has occurred at the RS-232C port. (Not valid in Peripheral Bus Mode, 1:N NT Link mode or PLC Link Master/Slave mode.) 1: Error 0: No error	Retained	Cleared	Refreshed when error occurs.
	A39205	RS-232C Port Send Ready Flag (No-protocol mode)	ON when the RS-232C port is able to send data in no-protocol mode. 1: Able-to-send 0: Unable-to-send	Retained	Cleared	Written after transmission
	A39206	RS-232C Port Reception Completed Flag (No-protocol mode)	ON when the RS-232C port has completed the reception in no-protocol mode. • When the number of bytes was specified: ON when the specified number of bytes is received. • When the end code was specified: ON when the end code is received or 256 bytes are received.	Retained	Cleared	Written after reception
	A39207	RS-232C Port Reception Overflow Flag (No-protocol mode)	ON when a data overflow occurred during reception through the RS-232C port in no-protocol mode. • When the number of bytes was specified: ON when more data is received after the reception was completed but before RXD(235) was executed. • When the end code was specified: ON when more data is received after the end code was received but before RXD(235) was executed. ON when 257 bytes are received before the end code. 1: Overflow 0: No overflow	Retained	Cleared	---
	A39212	Peripheral Port Communications Error Flag	• ON when a communications error has occurred at the peripheral port. (Not valid in Peripheral Bus Mode or NT Link mode.) 1: Error 0: No error	Retained	Cleared	Refreshed when error occurs.
A393	A39300 to A39307	RS-232C Port PT Communications Flag	The corresponding bit will be ON when the RS-232C port is communicating with a PT in NT Link or Serial PLC Link mode. Bits 0 to 7 correspond to units 0 to 7. 1: Communicating 0: Not communicating	Retained	Cleared	Refreshed when there is a normal response to the token.
	A39308 to A39315	RS-232C Port PT Priority Registered Flags	The corresponding bit will be ON for the PT that has priority when the RS-232C port is communicating in NT link mode. Bits 0 to 7 correspond to units 0 to 7. These flags are written when the priority registration command is received. 1: Priority registered 0: Priority not registered	Retained	Cleared	See *Function* column.
	A39300 to A39315	RS-232C Port Reception Counter (No-protocol mode)	Indicates (in binary) the number of bytes of data received when the RS-232C port is in no-protocol mode.	Retained	Cleared	Refreshed when data is received.

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A394	A39400 to A39407	Peripheral Port PT Communications Flag	The corresponding bit will be ON when the peripheral port is communicating with a PT in NT link mode. Bits 0 to 7 correspond to units 0 to 7. 1: Communicating 0: Not communication	Retained	Cleared	Refreshed when there is a normal response to the token.
	A39408 to 39415	Peripheral Port PT Priority Registered Flags	The corresponding bit will be ON for the PT that has priority when the peripheral port is communicating in NT link mode. Bits 0 to 7 correspond to units 0 to 7. 1: Priority registered 0: Priority not registered These flags are written when the priority registration command is received.	Retained	Cleared	See *Function* column.
A395	A39506	File Deleted Flags	The system deleted the remainder of a Memory Card file that was being updated when a power interruption occurred. 1: File deleted 0: No files deleted	Cleared	Cleared	Refreshed when the system deletes the file.
	A39507		The system deleted the remainder of an EM file memory file that was being updated when a power interruption occurred. 1: File deleted 0: No files deleted	Cleared	Cleared	Refreshed when the system deletes the file.
	A39510	ER/AER Flag for Background Execution	ON when an instruction processing error or an illegal area access error occurs during background processing. 1: Error. OFF (0) when power is turned ON. OFF (0) when operation starts. 0: No errors. OFF (0) when background processing starts.	Cleared	Cleared	Not supported by CJ1G-CPU□□ CPU Units.
	A39511	Memory Corruption Detected Flag	ON when memory corruption is detected when the power supply is turned ON. 1: Memory corruption 0: Normal operation	Retained	See Function column.	Refreshed when power is turned ON.
	A39512	DIP Switch Pin 6 Status Flag	The status of pin 6 on the DIP switch on the front of the CPU Unit is written to this flag every cycle. 1: Pin 6 ON 0: Pin 6 OFF	Retained	See Function column.	Written every cycle.
A397	---	Simple Backup Write Capacity	If a write for a simple backup operation fails, A397 will contain the Memory Card capacity that would have been required to complete the write operation. The value is in Kbytes. (This indicates that the Memory Card did not have the specified capacity when the write operation was started.) A397 will be cleared to 0000 hex when the write is completed successfully for a simple backup operation.	Retained	Retained	Refreshed when write is executed. Not supported by CJ1G-CPU□□ CPU Units.
A400	All	Error code	When a non-fatal error (user-defined FALS(006) or system error) or a fatal error (user-defined FALS(007) or system error) occurs, the 4-digit hexadecimal error code is written to this word. (*Refer to Details on Auxiliary Area Operation*) When two or more errors occur simultaneously, the highest error code will be recorded. Refer to page 635 for details on error codes.	Cleared	Cleared	Refreshed when error occurs.

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A401	A40106	FALS Error Flag (Fatal error)	ON when a non-fatal error is generated by the FALS(006) instruction. The CPU Unit will continue operating and the ERR/ALM indicator will flash. The corresponding error code will be written to A400. Error codes C101 to C2FF correspond to FALS numbers 001 to 511. 1: FALS(006) executed 0: FALS(006) not executed This flag will be turned OFF when the FALS errors are cleared.	Cleared	Cleared	Refreshed when error occurs. A400
	A40108	Cycle Time Too Long Flag (Fatal error)	ON if the cycle time exceeds the maximum cycle time set in the PLC Setup (the cycle time monitoring time). CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. 0: Cycle time under max. 1: Cycle time over max. This flag will be turned OFF when the error is cleared.	Cleared	Cleared	Refreshed when the cycle time exceeds maximum. PLC Setup (Cycle time monitoring time)
	A40109	Program Error Flag (Fatal error)	ON when program contents are incorrect. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. The task number where the error occurred will be stored in A294 and the program address will be stored in A298 and A299. The type of program error that occurred will be stored in bits 8 to 15 of A295. Refer to the description of A295 for more details on program errors. 1: Error 0: No error This flag will be turned OFF when the error is cleared.	Cleared	Cleared	A294, A295, A298 and A299
	A40110	I/O Setting Error Flag (Fatal error)	ON when a the registered I/O tables do not match the actual I/O tables (i.e., the Units actually installed in the PLC) or, for a CJ1-H CPU Unit, when an Interrupt Input Unit is connected in the wrong position (not slot 0 to 4, i.e., the 5 slots to the right of the CPU Unit). CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. 1: Error 0: No error This flag will be turned OFF when the error is cleared.	Cleared	Cleared	A40508
	A40111	Too Many I/O Points Flag (Fatal error)	ON when the number of I/O points being used in Basic I/O Units exceeds the maximum allowed for the PLC or when there are more than 11 Units connected in one Rack. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. 1: Error 0: No error This flag will be turned OFF when the error is cleared.	Cleared	Cleared	A407

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A401	A40113	Duplication Error Flag (Fatal error)	ON in the following cases: • Two CPU Bus Units have been assigned the same unit number. • Two Special I/O Units have been assigned the same unit number. • Two Basic I/O Units have been allocated the same data area words. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. The duplicated unit number is indicated in A409 to A416. 1: Duplication error 0: No duplication (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A410 to A416
	A40114	I/O Bus Error Flag (Fatal error)	ON when an error occurs in a data transfer between the CPU Unit and a Unit mounted to a slot or when the End Cover is not connected to the CPU Rack or an Expansion Rack. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. The slot number (00 to 09) where the I/O Bus Error occurred is written to A40400 to A40407 in binary and the rack number (00 to 03) is written to A40408 to A40415 in binary. When the End Cover is not connected to the CPU Rack or an Expansion Rack, 0E hex will be stored in both locations. 1: Error 0: No error (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A404
	A40115	Memory Error Flag (Fatal error)	ON when an error occurred in memory or there was an error in automatic transfer from the Memory Card when the power was turned ON. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. 1: Error 0: No error The location where the error occurred is indicated in A40300 to A40308, and A40309 will be turned ON if there was an error during automatic transfer at start-up. This flag will be turned OFF when the error is cleared. (The automatic transfer at start-up error cannot be cleared without turning OFF the PLC.)	Cleared	Cleared	A403
A402	A40202	Special I/O Unit Setting Error Flag (Non-fatal error)	ON when an installed Special I/O Unit does not match the Special I/O Unit registered in the I/O table. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 1: Error 0: No error The unit number of the Unit where the setting error occurred is indicated in A428 to A433. (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A428 to A433

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A402	A40203	CPU Bus Unit Setting Error Flag (Non-fatal error)	ON when an installed CPU Bus Unit does not match the CPU Bus Unit registered in the I/O table. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 1: Error 0: No error The unit number of the Unit where the setting error occurred is written to A427. (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A427
	A40204	Battery Error Flag (Non-fatal error)	ON if the CPU Unit's battery is disconnected or its voltage is low and the Detect Battery Error setting has been set in the PLC Setup. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 1: Error 0: No error This flag can be used to control an external warning light or other indicator to indicate that the battery needs to be replaced. (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	PLC Setup (Detect Battery Error)
	A40206	Special I/O Unit Error Flag (Non-fatal error)	ON when an error occurs in a data exchange between the CPU Unit and a Special I/O Unit (including an error in the Special I/O Unit itself). 1: Error 0: No error The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. The Special I/O Unit where the error occurred will stop operating and the unit number of the Unit where the data exchange error occurred is indicated in A418 through A423. (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A418 to A423
	A40207	CPU Bus Unit Error Flag (Non-fatal error)	ON when an error occurs in a data exchange between the CPU Unit and an CPU Bus Unit (including an error in the CPU Bus Unit itself). The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. The CPU Bus Unit where the error occurred will stop operating and the unit number of the Unit where the data exchange error occurred is indicated in A417. 1: Error 0: No error (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A417
	A40210	PLC Setup Error Flag (Non-fatal error)	ON when there is a setting error in the PLC Setup. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. The location of the error will be written to A406. 1: Error 0: No error (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A406
	A40212	Basic I/O Unit Error Flag (Non-fatal error)	ON when an error has occurred in a Basic I/O Unit. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. The location of the error will be written to A408. 1: Error 0: No error (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A408

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A402	A40213	Interrupt Task Error Flag (Non-fatal error)	ON when the Detect Interrupt Task Errors setting in the PLC Setup is set to “Detect” and one of the following occurs for the same Special I/O Unit. FIORF(225), IORF(097) (CJ1-H-R CPU Units only), IORD(222) or IOWR(223) in a cyclic task are competing with FIORF(225), IORF(097), IORD(222) or IOWR(223) in an interrupt task. FIORF(225), IORF(097), IORD(222) or IOWR(223) was executed in an interrupt task when I/O was being refreshed. If cyclic refreshing is not disabled in the PLC Setup for a Special I/O Unit and FIORF(225), IORF(097), IORD(222) or IOWR(223) is executed for the same Special I/O Unit in an interrupt task, a duplicate refreshing status will occur and an interrupt task error will occur.	Cleared	Cleared	A426, PLC Setup (Detect Interrupt Task Errors setting)
	A40215	FAL Error Flag (Non-fatal error)	ON when a non-fatal error is generated by executing FAL(006). The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. The bit in A360 to A391 that corresponds to the FAL number specified in FALS(006) will be turned ON and the corresponding error code will be written to A400. Error codes 4101 to 42FF correspond to FAL numbers 001 to 2FF (0 to 511). 1: FALS(006) error occurred 0: FALS(006) not executed (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A360 to A391, A400
A403	A40300 to A40308	Memory Error Location	When a memory error occurs, the Memory Error Flag (A40115) is turned ON and one of the following flags is turned ON to indicate the memory area where the error occurred A40300: User program A40304: PLC Setup A40305: Registered I/O Table A40307: Routing Table A40308: CPU Bus Unit Settings When a memory error occurs, the CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 1: Error 0: No error (The corresponding flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A40115
	A40309	Memory Card Start-up Transfer Error Flag	ON when automatic transfer at start-up has been selected and an error occurs during automatic transfer. An error will occur if there is a transfer error, the specified file does not exist, or the Memory Card is not installed. 1: Error 0: No error (This flag will be turned OFF when the error is cleared by turning the power off. The error cannot be cleared without turning the power off.)	Cleared	Cleared	Refreshed when power is turned ON.
	A40310	Flash Memory Error Flag	ON when the flash memory is physically destroyed. 1: Error 0: No error	Cleared	Cleared	Refreshed when error is detected. Not supported by CJ1G-CPU□□ CPU Units

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A404	A40400 to A40407	I/O Bus Error Slot Number	Contains the 8-bit binary slot number (00 to 09) where an I/O Bus Error occurred. When the End Cover is not connected to the CPU Rack or an Expansion Rack, 0E hex will be stored. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. The I/O Bus Error Flag (A40114) will be ON. 00 to 09 (slot number 00 to 09) (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A40114
	A40408 to A40415	I/O Bus Error Rack Number	Contains the 8-bit binary rack number (00 to 03) where an I/O Bus Error occurred. When the End Cover is not connected to the CPU Rack or an Expansion Rack, 0E hex will be stored. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. The I/O Bus Error Flag (A40114) will be ON. 00 to 03 (rack number 00 to 03) (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A40114
A405	A40508	Interrupt Input Unit Position Error Flag	ON when the Interrupt Input Unit is not connected in one of the five positions (slots 0 to 4) next to the CPU Unit on the CPU Rack. Even if a Unit is physically in one of the first 5 positions, a Dummy Unit can be registered in the I/O table, causing a Unit to be defined in a position different from its physical position. 1: Position not correct 0: Position correct (This flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A40110 Not supported by CJ1G-CPU□□ CPU Units
	A40515	Peripheral Servicing Too Long Flag	Turns ON when the peripheral servicing time in a Parallel Processing Mode exceeds 2 s. This will also cause a cycle time error and operation will stop. 1: Too long (Parallel processing cannot be used.) 0: Not too long (Parallel processing can be used.)	Cleared	Cleared	A268 (CJ1-H CPU Units only)
A406	All	PLC Setup Error Location	When there is a setting error in the PLC Setup, the location of that error is written to A406 in 4-digit hexadecimal. The location is given as the address displayed on a Programming Console. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. (A406 will be cleared when the cause of the error is eliminated.) 0000 to 01FF hexadecimal	Cleared	Cleared	A40210

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A407	A40700 to A40712	Too Many I/O Points, Details	The 6 possible causes of the Too Many I/O Points Error are listed below. The 3-digit binary value in A40713 to A40715 indicates the cause of the error (values 0 to 5 correspond to causes 1 to 6, below). The 13-bit binary value in A40700 to A40712 indicates the details: the excessive value or the duplicated unit number. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. 1) The number of I/O points will be written here when the total number of I/O points set in the I/O Table (excluding Slave Racks) exceed the maximum allowed for the CPU Unit. 2) The number of Racks will be written here when the number of Expansion Racks exceeds the maximum. (The relevant value will be written here (A40700 to A40712) when the error occurs. These bits will be cleared when the error is cleared.)	Cleared	Cleared	A40111, A40713 to A40715
	A40713 to A40715	Too Many I/O Points, Cause	The 3-digit binary value of these bits indicates the cause of the Too Many I/O Points Error and shows the meaning of the value written to bits A40700 to A40712. Values of 000 to 101 (0 to 5) correspond to causes 1 through 6 described in "Too Many I/O Points, Cause 1," above. 000: Too many I/O total 101: Too many Racks 111: Too many Units on a Rack (These bits will be cleared when the error is cleared.)	Cleared	Cleared	---
A408	A40800 to A40807	Basic I/O Unit Error, Slot Number	When an error has occurred in a Basic I/O Unit, A40212 will be turned ON and the slot number where the error occurred will be written here in binary. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 00 to 09 hexadecimal (Slots 0 to 9) (These bits will be cleared when the error is cleared.)	Cleared	Cleared	A40212
	A40808 to A40815	Basic I/O Unit Error, Rack Number	When an error has occurred in a Basic I/O Unit, A40212 will be turned ON and the Rack number where the error occurred will be written here in binary. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 00 to 03 hexadecimal (Racks 0 to 3) (These bits will be cleared when the error is cleared.)	Cleared	Cleared	A40212
A409	A40900 to A40903	Expansion Rack Number Duplication Flags	The corresponding flag will be turned ON when an Expansion Rack's starting word address was set from a Programming Device and two Racks have overlapping word allocations or a Rack's starting address exceeds CIO 0901. Bits 00 to 03 correspond to Racks 0 to 3. 1: Same words allocated to two different Racks or Rack starting address exceeds CIO 0901. 0: No error (The corresponding flag will be cleared when the error is cleared.)	Cleared	Cleared	---
A410	A41000 to A41015	CPU Bus Unit Number Duplication Flags	The Duplication Error Flag (A40113) and the corresponding flag in A410 will be turned ON when an CPU Bus Unit's unit number has been duplicated. Bits 00 to 15 correspond to unit numbers 0 to F. CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. 1: Duplication detected 0: No duplication	Cleared	Cleared	A40113

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	Bits					
A411 to A416	A41100 to A41615	Special I/O Unit Number Duplication Flags	The Duplication Error Flag (A40113) and the corresponding flag in A411 through A416 will be turned ON when a Special I/O Unit's unit number has been duplicated. Bits 00 to 15 correspond to unit numbers 0 to F. (Bits A41100 to A41615 correspond to unit numbers 000 to 05F (0 to 95).) CPU Unit operation will stop and the ERR/ALM indicator on the front of the CPU Unit will light. The corresponding bit will also be turned ON when the Special I/O Unit's words are also allocated to a Basic I/O Unit on an Expansion Rack because of the Expansion Rack's starting word setting. 1: Duplication detected 0: No duplication	Cleared	Cleared	A40113
A417	A41700 to A41715	CPU Bus Unit Error, Unit Number Flags	When an error occurs in a data exchange between the CPU Unit and an CPU Bus Unit, the CPU Bus Unit Error Flag (A40207) is turned ON and the bit in A417 corresponding to the unit number of the Unit where the error occurred is turned ON. Bits 00 to 15 correspond to unit numbers 0 to F. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 1: Error 0: No error	Cleared	Cleared	A40207
A418 to A423	A41800 to A42315	Special I/O Unit Error, Unit Number Flags	When an error occurs in a data exchange between the CPU Unit and a Special I/O Unit, the Special I/O Unit Error Flag (A40206) will be turned ON. Each bit corresponds to a unit number. Bit 00 in A418 to bit 15 in A423 correspond to unit numbers 0 to 95. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 1: Error 0: No error If the unit number of the Unit is uncertain, none of the flags will be turned ON. (The flag will be turned OFF when the error is cleared.)	Cleared	Cleared	A40206
A426	A42600 to A42611	Interrupt Task Error, Unit Number	An attempt was made to refresh a Special I/O Unit's I/O from an interrupt task with IORF(097) while the Unit's I/O is being refreshed by cyclic I/O refreshing (duplicate refreshing). A42600 to A42611: contain the Special I/O Unit's unit number. These bits will be cleared when the error is cleared. Unit number: 000 to 05F (0 to 95)	Cleared	Cleared	A40213 A42615
	A42615	Interrupt Task Error Cause Flag	When A40213 (the Interrupt Task Error Flag) is ON, this flag indicates the cause of the error. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 1: Duplicated refreshing	Cleared	Cleared	A40213, A42600 to A42611
A427	A42700 to A42715	CPU Bus Unit Setting Error, Unit Number Flags	When an CPU Bus Unit Setting Error occurs, A40203 and the bit in this word corresponding to the Unit's unit number are turned ON. Bits 00 to 15 correspond to unit numbers 0 to F. The CPU Unit will continue operating and the ERR/ALM indicator on the front of the CPU Unit will flash. 1: Setting error 0: No setting error	Cleared	Cleared	Refreshed when power is turned ON or I/O is recognized. A40203

Address		Name	Function	Status after mode change	Status at start-up	Write timing/ Related flags, settings
Words	**Bits**					
A428 to A433	A42800 to A43315	Special I/O Unit Setting Error, Unit Number Flags	When a Special I/O Unit Setting Error occurs, A40202 and the bit in these words corresponding to the Unit's unit number are turned ON. Bits 00 to 15 correspond to unit numbers 0 to F. 1: Setting error 0: No setting error (Bits A42800 to A43315 correspond to unit numbers 000 to 05F (0 to 95).) The CPU Unit will continue operating and the ERR/ ALM indicator on the front of the CPU Unit will flash.	Cleared	Cleared	Refreshed when power is turned ON or I/O is recognized. A40202
A440	All	Max. Interrupt Task Processing Time	Contains the Maximum Interrupt Task Processing Time in units of 0.1 ms. (This value is written after the interrupt task with the max. processing time is executed and cleared when PLC operation begins.)	Cleared	Cleared	See Function column.
A441	All	Interrupt Task With Max. Processing Time	Contains the task number of the interrupt task with the maximum processing time. Hexadecimal values 8000 to 80FF correspond to task numbers 00 to FF. Bit 15 is turned ON when an interrupt has occurred. (This value is written after the interrupt task with the max. processing time is executed and cleared when PLC operation begins.)	Cleared	Cleared	See Function column.
A444 (See note.)	All	Pulse Output 0 Stop Error Code	When a pulse output stop error occurred with pulse output 0, the corresponding error code is written to this word.	Cleared	Cleared	Refreshed when origin search starts. Refreshed when a pulse output stop error occurs.
A445 (See note.)		Pulse Output 1 Stop Error Code	When a pulse output stop error occurred with pulse output 1, the corresponding error code is written to this word.			

Note CJ1M CPU Units with built-in I/O only.

Read/Write Area (Set by User)

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A500	A50012	IOM Hold Bit	Turn this bit ON to preserve the status of the I/O Memory when shifting from PROGRAM to RUN or MONITOR mode or vice versa. The I/O Memory includes the CIO Area, Transition Flags, Timer Flags and PVs, Index Registers, Data Registers, and the Current EM Bank Number. (If the status of the IOM Hold Bit itself is preserved in the PLC Setup (IOM Hold Bit Status), the status of the I/O Memory Area will be retained when the PLC is turned ON or power is interrupted.)	1: Retained 0: Not retained	Retained	Cleared (PLC Setup can be set to retain status.)	See Function column. PLC Setup (IOM Hold Bit Status setting)
	A50013	Forced Status Hold Bit	Turn this bit ON to preserve the status of bits that have been force-set or force-reset when shifting from PROGRAM to MONITOR mode or vice versa. Bits that have been force-set or force-reset will always return to their default status when shifting to RUN mode. (If the status of the Forced Status Hold Bit itself is preserved in the PLC Setup (Forced Status Hold Bit Status), the status of force-set and force-reset bits will be retained when the PLC is turned ON or power is interrupted.)	1: Retained 0: Not retained	Retained	Cleared (PLC Setup can be set to retain status.)	See Function column. PLC Setup (Forced Status Hold Bit Status setting)
	A50014	Error Log Reset Bit	Turn this bit ON to reset the Error Log Pointer (A300) to 00. The contents of the Error Log Area itself (A100 to A199) are not cleared. (This bit is automatically reset to 0 after the Error Log Pointer is reset.)	0 → 1: Clear	Retained	Cleared	A100 to A199, A300
	A50015	Output OFF Bit	Turn this bit ON to turn OFF all outputs from Basic I/O Units and Special I/O Units. The INH indicator on the front of the CPU Unit will light while this bit is ON. (The status of the Output OFF Bit is retained through power interruptions.)	---	Retained	Retained	---
A501	A50100 to A50115	CPU Bus Unit Restart Bits	Turn these bits ON to restart (initialize) the CPU Bus Unit with the corresponding unit number. Bits 00 to 15 correspond to unit numbers 0 to F. When a restart bit is turned ON, the corresponding CPU Bus Unit Initializing Flag (A30200 to A30215) will be turned ON. Both the restart bit and initializing flag will be turned OFF automatically when initialization is completed.	0 to 1: Restart 1 to 0: Restart completed Turned OFF by the system when the Unit has been restarted.	Retained	Cleared	A30200 to A30215
A502 to A507	A50200 to A50715	Special I/O Unit Restart Bits	Turn these bits ON to restart (initialize) the Special I/O Unit with the corresponding unit number. Bits A50200 to A50715 correspond to unit numbers 0 to 95. When a restart bit is turned ON, the corresponding Special I/O Unit Initializing Flag (A33000 to A33515) will be turned ON. Both the restart bit and initializing flag will be turned OFF automatically when initialization is completed.	0 to 1: Restart 1 to 0: Restart completed Turned OFF by the system when the Unit has been restarted.	Retained	Cleared	A33000 to A33515

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A508	A50809	Differentiate Monitor Completed Flag	ON when the differentiate monitor condition has been established during execution of differentiation monitoring. (This flag will be cleared to 0 when differentiation monitoring starts.)	1: Monitor condition established 0: Not yet established	Retained	Cleared	---
	A50811	Trace Trigger Monitor Flag	ON when a trigger condition is established by the Trace Start Bit (A50814). OFF when the next Data Trace is started by the Sampling Start bit (A50815).	1: Trigger condition established 0: Not yet established or not tracing	Retained	Cleared	---
	A50812	Trace Completed Flag	ON when sampling of a region of trace memory has been completed during execution of a Trace. OFF when the next time the Sampling Start Bit (A50815) is turned from OFF to ON.	1: Trace completed 0: Not tracing or trace in progress	Retained	Cleared	------
	A50813	Trace Busy Flag	ON when the Sampling Start Bit (A50815) is turned from OFF to ON. OFF when the trace is completed.	1: Trace in progress 0: Not tracing (not sampling)	Retained	Cleared	---
	A50814	Trace Start Bit	Turn this bit from OFF to ON to establish the trigger condition. The offset indicated by the delay value (positive or negative) determines which data samples are valid.	1: Trace trigger condition established 0: Not established	Retained	Cleared	---
	A50815	Sampling Start Bit	When a data trace is started by turning this bit from OFF to ON from a Programming Device, the PLC will begin storing data in Trace Memory by one of the three following methods: 1) Data is sampled at regular intervals (10 to 2,550 ms). 2) Data is sampled when TRSM(045) is executed in the program. 3) Data is sampled at the end of every cycle. The operation of A50815 can be controlled only from a Programming Device.	0 to 1: Starts data trace (sampling) Turned ON from Programming Device.	Retained	Cleared	---
A510 to A511		Start-up Time	These words contain the time at which the power was turned ON. The contents are updated every time that the power is turned ON. The data is stored in BCD. A51000 to A51007: Second (00 to 59) A51008 to A51015: Minute (00 to 59) A51100 to A51107: Hour (00 to 23) A51108 to A51115: Day of month (01 to 31)	See Function column.	Retained	See Function column.	Refreshed when power is turned ON.
A512 to A513		Power Interruption Time	These words contain the time at which the power was interrupted. The contents are updated every time that the power is interrupted. The data is stored in BCD. A51200 to A51207: Second (00 to 59) A51208 to A51215: Minute (00 to 59) A51300 to A51307: Hour (00 to 23) A51308 to A51315: Day of month (01 to 31) (These words are not cleared at start-up.)	See Function column.	Retained	Retained	Written at power interruption

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A514		Number of Power Interruptions	Contains the number of times that power has been interrupted since the power was first turned ON. The data is stored in binary. To reset this value, overwrite the current value with 0000. (This word is not cleared at start-up, but it is cleared when the Memory Corruption Detected Flag (A39511) goes ON.)	0000 to FFFF hexadecimal	Retained	Retained	Refreshed when power is turned ON. A39511
A515 to A517		Operation Start Time	The time that operation started as a result of changing the operating mode to RUN or MONITOR mode is stored here in BCD. A51500 to A51507: Seconds (00 to 59) A51508 to A51515: Minutes (00 to 59) A51600 to A51607: Hour (00 to 23) A51608 to A51615: Day of month (01 to 31) A51700 to A51707: Month (01 to 12) A51708 to A51715: Year (00 to 99) Note: The previous start time is stored after turning ON the power supply until operation is started.	See at left.	Retained	Retained	See at left. Not supported by CJ1G-CPU□□ CPU Units
A518 to A520		Operation End Time	The time that operation stopped as a result of changing the operating mode to PROGRAM mode is stored here in BCD. A51800 to A51807: Seconds (00 to 59) A51808 to A51815: Minutes (01 to 59) A51900 to A51907: Hour (00 to 23) A51908 to A51915: Day of month (01 to 31) A52000 to A52007: Month (01 to 12) A52008 to A52015: Year (00 to 99) Note: If an error occurs in operation, the time of the error will be stored. If the operating mode is then changed to PROGRAM mode, the time that PROGRAM mode was entered will be stored.	See at left.	Retained	Retained	See at left. Not supported by CJ1G-CPU□□ CPU Units.
A523		Total Power ON Time	Contains the total time that the PLC has been on in 10-hour units. The data is stored in binary and it is updated every 10 hours. To reset this value, overwrite the current value with 0000. (This word is not cleared at start-up, but it is cleared to 0000 when the Memory Corruption Detected Flag (A39511) goes ON.)	0000 to FFFF hexadecimal	Retained	Retained	---
A526	A52600	RS-232C Port Restart Bit	Turn this bit ON to restart the RS-232C port. (Do not use this bit when the port is operating in Peripheral Bus Mode.) This bit is turned OFF automatically when the restart processing is completed.	0 to 1: Restart	Retained	Cleared	---
	A52601	Peripheral Port Restart Bit	Turn this bit ON to restart the peripheral port. This bit is turned OFF automatically when the restart processing is completed.	0 to1: Restart	Retained	Cleared	---

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A527	A52700 to A52707	Online Editing Disable Bit Validator	The Online Editing Disable Bit (A52709) is valid only when this byte contains 5A. To disable online editing from a Programming Device, set this byte to 5A and turn ON A52709. (Online editing refers to changing or adding to the program while the PLC is operating in MONITOR mode.)	5 A: A52709 enabled Other value: A52709 disabled	Retained	Cleared	A52709
	A52709	Online Editing Disable Bit	Turn this bit ON to disable online editing. The setting of this bit is valid only when A52700 to A52707 have been set to 5 A.	1: Disabled 0: Not disabled	Retained	Cleared	A52700 to A52707
A528	A52800 to A52807	RS-232C Port Error Flags	These flags indicate what kind of error has occurred at the RS-232C port; they are automatically turned OFF when the RS-232C port is restarted. (These flags are valid in Serial Gateway mode. They are not valid in peripheral bus mode and only bit 5 is valid in NT Link mode.) Polling Unit: Bit 5: ON for timeout error. Polled Unit: Bit 3: ON for framing error. Bit 4: ON for overrun error. Bit 5: ON for timeout error. These bits can be cleared by a Programming Device.	Bits 0 and 1: Not used. Bit 2: ON for parity error. Bit 3: ON for framing error. Bit 4: ON for overrun error. Bit 5: ON for timeout error. Bits 6 and 7: Not used.	Retained	Cleared	---
	A52808 to A52815	Peripheral Port Error Code	These flags indicate what kind of error has occurred at the peripheral port; they are automatically turned OFF when the peripheral port is restarted. (These flags are valid in Serial Gateway mode. They are not valid in peripheral bus mode and only bit 13 (timeout error) is valid in NT Link mode.) Bits 8 and 9: Not used. Bit 10: ON when there was a parity error. Bit 11: ON when there was a framing error. Bit 12: ON when there was an overrun error. Bit 13: ON when there was a timeout error. Bits 14 and 15: Not used.	Bits 8 and 9: Not used. Bit 10: ON for parity error. Bit 11: ON for framing error. Bit 12: ON for overrun error. Bit 13: ON for timeout error. Bits 14 and 15: Not used.	Retained	Cleared	---
A529	---	FAL/FALS Number for System Error Simulation	Set a dummy FAL/FALS number to use to simulate the system error using FAL(006) or FALS(007). When FAL(006) or FALS(007) is executed and the number in A529 is the same as the one specified in the operand of the instruction, the system error given in the operand of the instruction will be generated instead of a user-defined error.	0001 to 01FF hex: FAL/FALS numbers 1 to 511 0000 or 0200 to FFFF hex: No FAL/FALS number for system error simulation. (No error will be generated.)	Retained	Cleared	Not supported by CJ1G-CPU□□ CPU Units.

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A530	---	Power Interrupt Disabled Area Setting	Set to A5A5 hex to disable power interrupts (except the Power OFF Interrupt task) between DI(693) and EI(694) instructions.	A5A5 hex: Masking power interruption processing enabled Other: Masking power interruption processing not enabled.	Cleared	Cleared	Not supported by CJ1G-CPU□□ CPU Units.
A531 (See note 1.)	A53100	High-speed Counter 0 Reset Bit	When the reset method is set to Phase-Z signal + Software reset, the corresponding high-speed counter's PV will be reset if the phase-Z signal is received while this bit is ON. When the reset method is set to Software reset, the corresponding high-speed counter's PV will be reset in the cycle when this bit goes from OFF to ON.	---	Retained	Cleared	---
	A53101	High-speed Counter 1 Reset Bit		---	Retained	Cleared	---
	A53108	High-speed Counter 0 Gate Bit	When a counter's Gate Bit is ON, the counter's PV will not be changed even if pulse inputs are received for the counter. When the bit is turned OFF again, counting will restart and the high-speed counter's PV will be refreshed. When the reset method is set to Phase-Z signal + Software reset, the Gate Bit is disabled while the corresponding Reset Bit (A53100 or A53101) is ON.	---	Retained	Cleared	---
	A53109	High-speed Counter 1 Gate Bit		---	Retained	Cleared	---
A532 (See note 1.)		Interrupt Counter 0 Counter SV	Used for interrupt input 0 in counter mode. Sets the count value at which the interrupt task will start. Interrupt task 140 will start when interrupt counter 0 has counted this number of pulses. Retained when operation starts.	---	Retained	Retained	---
A533 (See note 1.)		Interrupt Counter 1 Counter SV	Used for interrupt input 1 in counter mode. Sets the count value at which the interrupt task will start. Interrupt task 141 will start when interrupt counter 1 has counted this number of pulses.	---	Retained	Retained	---
A534 (See note 1.)		Interrupt Counter 2 Counter SV	Used for interrupt input 2 in counter mode. Sets the count value at which the interrupt task will start. Interrupt task 142 will start when interrupt counter 2 has counted this number of pulses.	---	Retained	Retained	---
A535 (See note 1.)		Interrupt Counter 3 Counter SV	Used for interrupt input 3 in counter mode. Sets the count value at which the interrupt task will start. Interrupt task 143 will start when interrupt counter 3 has counted this number of pulses.	---	Retained	Retained	---
A536 (See note 1.)		Interrupt Counter 0 Counter PV	These words contain the interrupt counter PVs for interrupt inputs operating in counter mode. In increment mode, the counter PV starts incrementing from 0. When the counter PV reaches the counter SV, the PV is automatically reset to 0. In decrement mode, the counter PV starts decrementing from the counter SV. When the counter PV reaches the 0, the PV is automatically reset to the SV. Cleared when operation starts.	---	Cleared	Cleared	Refreshed when interrupt is generated. Refreshed when INI(880) instruction is executed.
A537 (See note 1.)		Interrupt Counter 1 Counter PV		---			
A538 (See note 1.)		Interrupt Counter 2 Counter PV		---			
A539 (See note 1.)		Interrupt Counter 3 Counter PV		---			

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A540 (See note 1.)	A54000	Pulse Output 0 Reset Bit	The pulse output 0 PV (contained in A276 and A277) will be cleared when this bit is turned from OFF to ON.	---	Retained	Cleared	---
	A54008	Pulse Output 0 CW Limit Input Signal Flag	This is the CW limit input signal for pulse output 0, which is used in the origin search. To use this signal, write the input from the actual sensor as an input condition in the ladder program and output the result to this flag.	---			---
	A54009	Pulse Output 0 CCW Limit Input Signal Flag	This is the CCW limit input signal for pulse output 0, which is used in the origin search. To use this signal, write the input from the actual sensor as an input condition in the ladder program and output the result to this flag.	---			---
A541 (See note 1.)	A54100	Pulse Output 1 Reset Bit	The pulse output 1 PV (contained in A278 and A279) will be cleared when this bit is turned from OFF to ON.	---	Retained	Cleared	---
	A54108	Pulse Output 1 CW Limit Input Signal Flag	This is the CW limit input signal for pulse output 1, which is used in the origin search. To use this signal, write the input from the actual sensor as an input condition in the ladder program and output the result to this flag.	---			---
	A54109	Pulse Output 1 CCW Limit Input Signal Flag	This is the CCW limit input signal for pulse output 1, which is used in the origin search. To use this signal, write the input from the actual sensor as an input condition in the ladder program and output the result to this flag.	---			---
A580 (See note 2.)	A58000 to A58003	FB Communications Instruction Retries	Automatically stores the number of retries in the FB communications instruction settings specified in the PLC Setup.	0 to F hex	As set in PLC Setup	Cleared	Written at start of operation
A581 (See note 2.)		FB Communications Instruction Response Monitoring Time	Automatically stores the FB communications instruction response monitoring time set in the PLC Setup.	0001 to FFFF hex (Unit: 0.1 s; Range: 0.1 to 6553.5) 0000 hex: 2 s	As set in PLC Setup	Cleared	Written at start of operation
A582 (See note 2.)		FB DeviceNet Communications Instruction Response Monitoring Time	Automatically stores the FB DeviceNet communications instruction response monitoring time set in the PLC Setup.	0001 to FFFF hex (Unit: 0.1 s; Range: 0.1 to 6553.5) 0000 hex: 2 s	As set in PLC Setup	Cleared	Written at start of operation
A595 and A596	---	IR00 Output for Background Execution	When an index register is specified as the output for an instruction processed in the background, A595 and A596 receive the output instead of IR00.	0000 0000 to FFFF FFFF hex (A596 contains the leftmost digits.)	Cleared	Cleared	Not supported by CJ1G-CPU□□ CPU Units.

Note 1. CJ1M CPU Units with built-in I/O only.

2. These Auxiliary Area bits/words are not to be written by the user. The number of resends and response monitoring time must be set by the user in the FB communications instructions settings in the PLC Setup, particularly when using function blocks from the OMRON FB Library to execute FINS messages or DeviceNet explicit messages communications. The values set in the Settings for OMRON FB Library in the PLC Setup will be automatically stored in the related Auxiliary Area words A580 to A582 and used by the function blocks from the OMRON FB Library.

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A597	---	DR00 Output for Background Execution	When a data register is specified as the output for an instruction processed in the background, A597 receives the output instead of DR00.	0000 to FFFF hex	Cleared	Cleared	Not supported by CJ1G-CPU□□ CPU Units
A598	A59800	FPD Teaching Bit	Turn this bit ON to set the monitoring time automatically with the teaching function. While A59800 is ON, FPD(269) measures how long it takes for the diagnostic output to go ON after the execution condition goes ON. If the measured time exceeds the monitoring time, the measured time is multiplied by 1.5 and that value is stored as the new monitoring time. (The teaching function can be used only when a word address has been specified for the monitoring time operand.)	1: Teach monitoring time 0: Teaching function off	Cleared	Cleared	---
	A59801	Equals Flag for Background Execution	Turns ON if matching data is found for an SRCH(181) instruction executed in the background.	1: Search data found in table 0: Search data not found	Cleared	Cleared	Not supported by CJ1G-CPU□□ CPU Units
A600 to A603		Macro Area Input Words	When MCRO(099) is executed, the contents of the four specified source words (starting from the 1st input parameter word) are copied here. The contents of the four copied words are then passed to the subroutine.	Input data: 4 words	Cleared	Cleared	---
A604 to A607		Macro Area Output Words	After the subroutine specified in MCRO(099) has been executed, the results of the subroutine are transferred from A604 through A607 to the specified destination words. (output parameter words)	Output data: 4 words	Cleared	Cleared	---
A619	A61901	Peripheral Port Settings Changing Flag	ON while the peripheral port's communications settings are being changed. This flag will be turned ON when STUP(237) is executed and it will be turned OFF after the settings have been changed.	1: Changing 0: Not changing	Retained	Cleared	---
	A61902	RS-232C Port Settings Changing Flag	ON while the RS-232C port's communications settings are being changed. This flag will be turned ON when STUP(237) is executed and it will be turned OFF after the settings have been changed.	1: Changing 0: Not changing	Retained	Cleared	---
A620	A62001	Communications Unit 0, Port 1 Settings Changing Flag	The corresponding flag will be ON when the settings for that port are being changed. The flag will be turned ON when STUP(237) is executed and it will be turned OFF by an event issued from the Serial Communications Unit after the settings have been changed. It is also possible for the user to indicate a change in serial port settings by turning these flags ON.	1: Changing 0: Not changing	Retained	Cleared	---
	A62002	Communications Unit 0, Port 2 Settings Changing Flag		1: Changing 0: Not changing	Retained	Cleared	---
	A62003	Communications Unit 0, Port 3 Settings Changing Flag		1: Changing 0: Not changing	Retained	Cleared	---
	A62004	Communications Unit 0, Port 4 Settings Changing Flag		1: Changing 0: Not changing	Retained	Cleared	---

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A621 to A635	A62100 to A63504	Communications Units 0 to 15, Ports 1 to 4 Settings Changing Flag	Same as above.	1: Changing 0: Not changing	Retained	Cleared	---
A650	A65000 to A65007	Program Replacement End Code	Normal End (i.e., when A65014 is OFF) 01 hex: Program file (.OBJ) replaced. Error End (i.e., when A65014 is ON) 00 hex: Fatal error 01 hex: Memory error 11 hex: Write-protected 12 hex: Program replacement password error 21 hex: No Memory Card 22 hex: No such file 23 hex: Specified file exceeds capacity (memory error). 31 hex: One of the following in progress: File memory operation User program write Operating mode change	---	Retained	Cleared	---
	A65014	Replacement Error Flag	ON when the Replacement Start Bit (A65015) is turned ON to replace the program, but there is an error. If the Replacement Start Bit is turned ON again, the Replacement Error Flag will be turned OFF.	1: Replacement error 0: No replacement error, or the Replacement Start Bit (A65015) is ON.	Retained	Cleared	---
	A65015	Replacement Start Bit	Program replacement starts when the Replacement Start Bit is turned ON if the Program Password (A651) is valid (A5A5 hex). Do not turn OFF the Replacement Start Bit during program replacement. When the power is turned ON or program replacement is completed, the Replacement Start Bit will be turned OFF, regardless of whether replacement was completed normally or in error. It is possible to confirm if program replacement is being executed by reading the Replacement Start Bit using a Programming Device, PT, or host computer.	1: Program replaced 0: Replacement completed, or after power is turned ON	Retained	Cleared	---
A651	---	Program Password	Type in the password to replace a program. A5A5 hex: Replacement Start Bit (A65015) is enabled. Any other value: Replacement Start Bit (A65015) is disabled. When the power is turned ON or program replacement is completed, the Replacement Start Bit will be turned OFF, regardless of whether replacement was completed normally or in error.	---	Retained	Cleared	---

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A654 to 657	---	Program File Name	When program replacement starts, the program file name will be stored in ASCII. File names can be specified up to eight characters in length excluding the extension. File names are stored in the following order: A654 to A657 (i.e., from the lowest word to the highest), and from the highest byte to the lowest. If a file name is less than eight characters, the lowest remaining bytes and the highest remaining word will be filled with spaces (20 hex). Null characters and space characters cannot be used within file names. Example: File name is ABC.OBJ 15 0 A654: 41 42 A655: 43 20 A656: 20 20 A657: 20 20	---	Retained	Cleared	---
A720 to A722		Power ON Clock Data 1 (See note.)	These words contain the same time data as the startup time stored in words A510 to A511, as well as the month and year information. A72000 to A72007: Seconds (00 to 59) A72008 to A72015: Minutes (00 to 59) A72100 to A72107: Hour (00 to 23) A72108 to A72115: Day of month (00 to 31) A72200 to A72207: Month (01 to 12) A72208 to A72215: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.
A723 to A725		Power ON Clock Data 2 (See note.)	These words contain the time at which the power was turned ON one time before the startup time stored in words A510 to A511. A72300 to A72307: Seconds (00 to 59) A72308 to A72315: Minutes (00 to 59) A72400 to A72407: Hour (00 to 23) A72408 to A72415: Day of month (00 to 31) A72500 to A72507: Month (01 to 12) A72508 to A72515: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.
A726 to A728		Power ON Clock Data 3 (See note.)	These words contain the time at which the power was turned ON two times before the startup time stored in words A510 to A511. A72600 to A72607: Seconds (00 to 59) A72608 to A72615: Minutes (00 to 59) A72700 to A72707: Hour (00 to 23) A72708 to A72715: Day of month (00 to 31) A72800 to A72807: Month (01 to 12) A72808 to A72815: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.

Note This data is supported by CPU Units with unit version 3.0 or later.

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A729 to A731		Power ON Clock Data 4 (See note.)	These words contain the time at which the power was turned ON three times before the startup time stored in words A510 to A511. A72900 to A72907: Seconds (00 to 59) A72908 to A72915: Minutes (00 to 59) A73000 to A73007: Hour (00 to 23) A73008 to A73015: Day of month (00 to 31) A73100 to A73107: Month (01 to 12) A73108 to A73115: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.
A732 to A734		Power ON Clock Data 5 (See note.)	These words contain the time at which the power was turned ON four times before the startup time stored in words A510 to A511. A73200 to A73207: Seconds (00 to 59) A73208 to A73215: Minutes (00 to 59) A73300 to A73307: Hour (00 to 23) A73308 to A73315: Day of month (00 to 31) A73400 to A73407: Month (01 to 12) A73408 to A73415: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.
A735 to A737		Power ON Clock Data 6 (See note.)	These words contain the time at which the power was turned ON five times before the startup time stored in words A510 to A511. A73500 to A73507: Seconds (00 to 59) A73508 to A73515: Minutes (00 to 59) A73600 to A73607: Hour (00 to 23) A73608 to A73615: Day of month (00 to 31) A73700 to A73707: Month (01 to 12) A73708 to A73715: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.
A738 to A740		Power ON Clock Data 7 (See note.)	These words contain the time at which the power was turned ON six times before the startup time stored in words A510 to A511. A73800 to A73807: Seconds (00 to 59) A73808 to A73815: Minutes (00 to 59) A73900 to A73907: Hour (00 to 23) A73908 to A73915: Day of month (00 to 31) A74000 to A74007: Month (01 to 12) A74008 to A74015: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.
A741 to A743		Power ON Clock Data 8 (See note.)	These words contain the time at which the power was turned ON seven times before the startup time stored in words A510 to A511. A74100 to A74107: Seconds (00 to 59) A74108 to A74115: Minutes (00 to 59) A74200 to A74207: Hour (00 to 23) A74208 to A74215: Day of month (00 to 31) A74300 to A74307: Month (01 to 12) A74308 to A74315: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.

Note This data is supported by CPU Units with unit version 3.0 or later.

Addresses		Name	Function	Settings	Status after mode change	Status at startup	Write timing/ Related Flags, Settings
Word	Bit						
A744 to A746		Power ON Clock Data 9 (See note.)	These words contain the time at which the power was turned ON eight times before the startup time stored in words A510 to A511. A74400 to A74407: Seconds (00 to 59) A74408 to A74415: Minutes (00 to 59) A74500 to A74507: Hour (00 to 23) A74508 to A74515: Day of month (00 to 31) A74600 to A74607: Month (01 to 12) A74608 to A74615: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.
A747 to A749		Power ON Clock Data 10 (See note.)	These words contain the time at which the power was turned ON nine times before the startup time stored in words A510 to A511. A74700 to A74707: Seconds (00 to 59) A74708 to A74715: Minutes (00 to 59) A74800 to A74807: Hour (00 to 23) A74808 to A74815: Day of month (00 to 31) A74900 to A74907: Month (01 to 12) A74908 to A74915: Year (00 to 99)	See at left.	Retained	Retained	Written when power is turned ON.

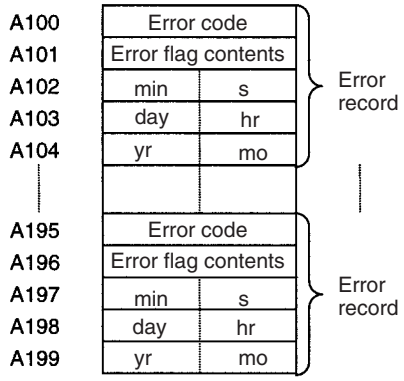
Note This data is supported by CPU Units with unit version 3.0 or later.

Note In CJ-series PLCs, the following flags are provided in a special read-only area and can be specified with the labels given in the table. These flags are not contained in the Auxiliary Area.

Flag area	Name	Label	Meaning
Condition Code Area	Error Flag	**ER**	Turns ON when an error occurs in processing an instructions, indicating an error end to the instruction.
	Access Error Flag	**AER**	Turns ON when an attempt is made to access an illegal area. The status of this flag is maintain only during the current cycle and only in the task in which it occurred.
	Carry Flag	**CY**	Turns ON when there is a carry or borrow in a math operation, when a bit is shifted into the Carry Flag, etc.
	Greater Than Flag	**>**	Turns ON when the result of comparing two values is "greater than," when a value exceeds a specified range, etc.
	Equals Flag	**=**	Turns ON when the result of comparing two values is "equals," when the result of a math operation is 0, etc.
	Less Than Flag	**<**	Turns ON when the result of comparing two values is "less than," when a value is below a specified range, etc.
	Negative Flag	**N**	Turns ON when the MSB in the result of a math operation is 1.
	Overflow Flag	**OF**	Turns ON when the result of a math operation overflows.
	Underflow Flag	**UF**	Turns ON when the result of a math operation underflows.
	Greater Than or Equals Flag	**>=**	Turns ON when the result of comparing two values is "greater than or equals."
	Not Equal Flag	**<>**	Turns ON when the result of comparing two values is "not equal."
	Less than or Equals Flag	**<=**	Turns ON when the result of comparing two values is "less than or equals."
	Always ON Flag	**A1**	This flag is always ON.
	Always OFF Flag	**A0**	This flag is always OFF.
Clock Pulse Area	0.02-s clock pulse	**0.02s**	Repeatedly turns ON for 0.01 s and OFF for 0.01 s.
	0.1-s clock pulse	**0.1s**	Repeatedly turns ON for 0.05 s and OFF for 0.05 s.
	0.2-s clock pulse	**0.2s**	Repeatedly turns ON for 0.1 s and OFF for 0.1 s.
	1-s clock pulse	**1s**	Repeatedly turns ON for 0.5 s and OFF for 0.5 s.
	1-min clock pulse	**1min**	Repeatedly turns ON for 30 s and OFF for 30 s.

Details on Auxiliary Area Operation

A100 to A199: Error Log Area



The following data would be generated in an error record if a memory error (error code 80F1) occurred on 1 April 1998 at 17:10:30 with the error located in the PLC Setup (04 hex).

80	F1
00	04
10	30
01	17
98	04

The following data would be generated in an error record if an FALS error with FALS number 001 occurred on 2 May 1997 at 8:30:15.

C1	01
00	00
30	15
02	08
97	05

Error Codes and Error Flags

Classification	Error code	Meaning	Error flags
System-defined fatal errors	80F1	Memory error	A403
	80C0 to 80C7 80CE, 80CF	I/O bus error	A404
	80E9	Duplicate number error	A410, A411 to 416 (See note 3.)
	80E1	Too many I/O error	A407
	80E0	I/O setting error	---
	80F0	Program error	A295 to 299 (See note 4.)
	809F	Cycle time too long error	---
	80EA	Duplicate Expansion Rack number error	A40900 to 40907
User-defined fatal errors	C101 to C2FF	FALS instruction executed (See note 1.)	---
User-defined non-fatal errors	4101 to 42FF	FAL instruction executed (See note 2.)	---
System-defined non-fatal errors	008B	Interrupt task error	A426
	009A	Basic I/O error	A408
	009B	PLC Setup setting error	A406
	0200 to 020F	CPU Bus Unit error	A417
	0300 to 035F	Special I/O Unit error	A418 to 423 (See note 5.)
	00F7	Battery error	---
	0400 to 040F	CPU Bus Unit setup error	A427
	0500 to 055F	Special I/O Unit setup error	A428 to 433 (See note 5.)

Note 1. C101 to C2FF will be stored for FALS numbers 001 to 511.

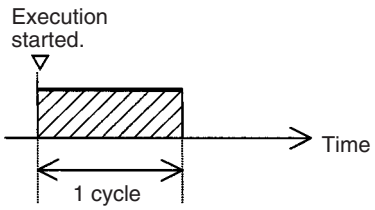
2. 4101 to 42FF will be stored for FAL numbers 001 to 511.

3. The contents of the error flags for a duplicate number error are as follows:
Bits 0 to 7: Unit number (binary), 00 to 5F hex for Special I/O Units, 00 to 0F hex for CPU Bus Units
Bits 8 to 14: All zeros.
Bit 15: Unit type, 0 for CPU Bus Units and 1 for Special I/O Units.

4. Only the contents of A295 is stored as the error flag contents for program errors.

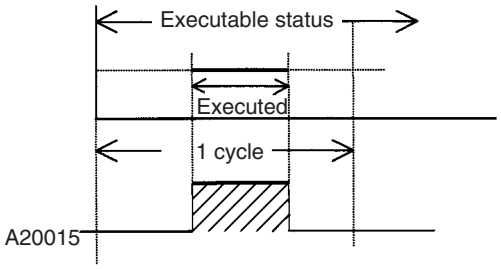
5. 0000 hex will be stored as the error flag contents.

A20011: First Cycle Flag

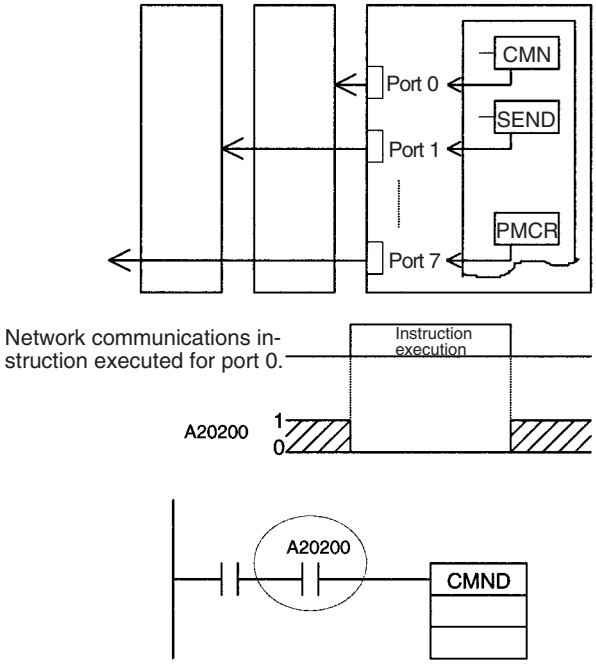


A20015: Initial Task Flag

A20015 will turn ON during the first time a task is executed after it has reached executable status. It will be ON only while the task is being executed and will not turn ON if following cycles.

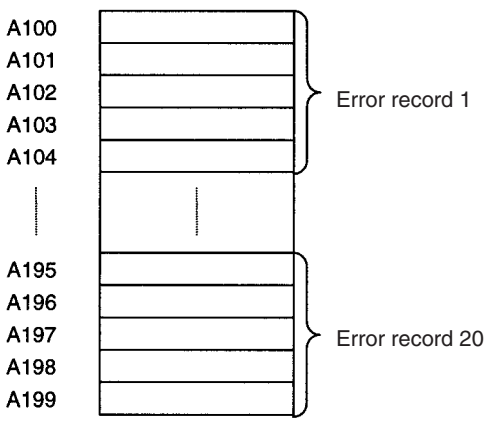


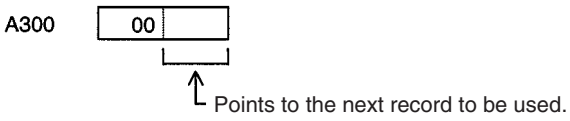
A20200 to A20207: Communications Port Enabled Flags



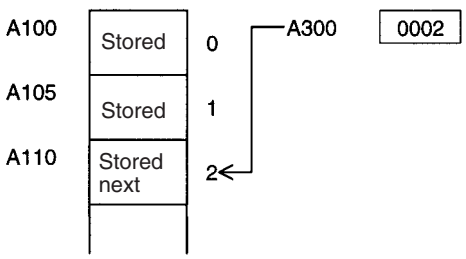
The program is designed so that CMND(490) will be executed only when A20200 is ON.

A300: Error Record Pointer

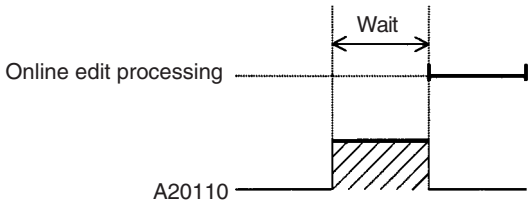




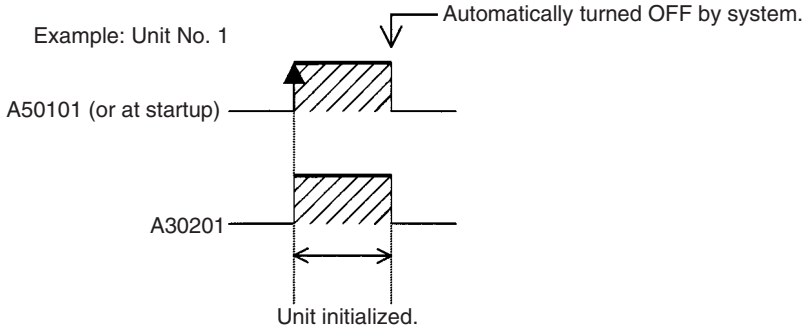
Example



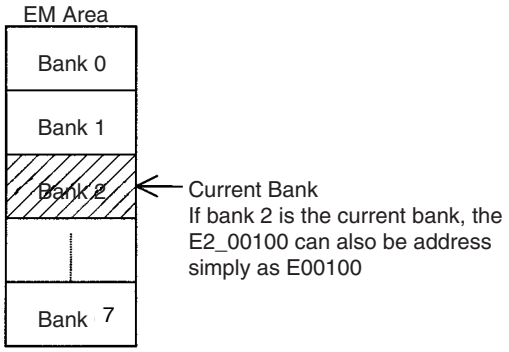
A20110: Online Editing Wait Flag



A50100 to A50115: CPU Bus Unit Restart Bits and A30200 to A30215: CPU Bus Unit Initialization Flags



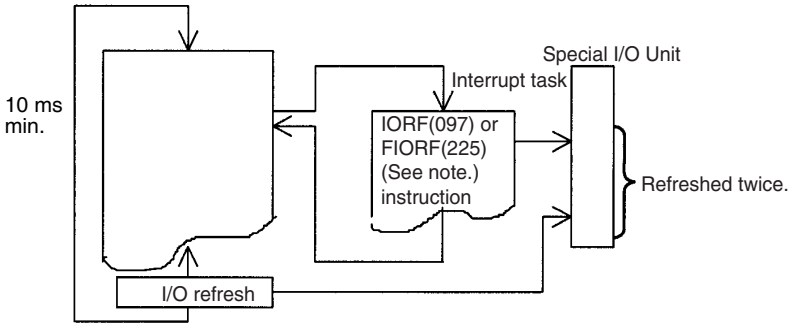
A301: Current EM Bank



A40109: Program Error

Error	Address
UM Overflow Error Flag	A29515
Illegal Instruction Flag	A29514
Distribution Overflow Error Flag	A29513
Task Error Flag	A25912
No END(001) Error Flag	A29511
Illegal Area Access Error Flag	A29510
Indirect DM/EM Addressing Error Flag	A29509
Instruction Processing Error Flag (ER Flag goes ON)	A29508

A42615: Interrupt Task Error Cause Flag



Note CJ1-H-R CPU Units only.

Appendix D
Memory Map of PLC Memory Addresses

PLC Memory Addresses

PLC memory addresses are set in Index Registers (IR00 to IR15) to indirectly address I/O memory. Normally, use the MOVE TO REGISTER (MOVR(560)) and MOVE TIMER/COUNTER PV TO REGISTER (MOVRW(561)) instructions to set PLC memory addresses into the Index Registers.

Some instructions, such as DATA SEARCH (SRCH(181)), FIND MAXIMUM (MAX(182)), and FIND MINIMUM (MIN(183)), output the results of processing to an Index Register to indicate an PLC memory address.

There are also instructions for which Index Registers can be directly designated to use the PLC memory addresses stored in them by other instructions. These instructions include DOUBLE MOVE (MOVL(498)), some symbol comparison instructions (=L,<>L, <L, >L,<=L, and >=L), DOUBLE COMPARE (CMPL(060)), DOUBLE DATA EXCHANGE (XCGL(562)), DOUBLE INCREMENT BINARY (++L(591)), DOUBLE DECREMENT BINARY (—L(593)), DOUBLE SIGNED BINARY ADD WITHOUT CARRY (+L(401)), DOUBLE SIGNED BINARY SUBTRACT WITHOUT CARRY (–L(411)), SET RECORD LOCATION (SETR(635)), and GET RECORD LOCATION (GETR(636)).

The PLC memory addresses all are continuous and the user must be aware of the order and boundaries of the memory areas. As reference, the PLC memory addresses are provided in a table at the end of this appendix.

Note Directly setting PLC memory addresses in the program should be avoided whenever possible. If PLC memory addresses are set in the program, the program will be less compatible with new CPU Unit models or CPU Units for which changed have been made to the layout of the memory.

Memory Configuration

There are two classifications of the RAM memory (with battery backup) in a CJ-series CPU Unit.

Parameter Areas: These areas contain CPU Unit system setting data, such as the PLC Setup, CJ-series CPU Bus Unit Setups, etc. An illegal access error will occur if an attempt is made to access any of the parameter areas from an instruction in the user program.

I/O Memory Areas: These are the areas that can be specified as operands in the instructions in user programs.

Memory Map

Note Do not access the areas indicated *Reserved for system.*

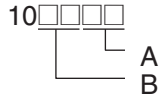
Classification	PLC memory addresses (hex)	User addresses	Area
I/O memory areas	0B100 to 0B1FF	---	Reserved for system.
	00000 to 0B7FF	---	Reserved for system.
	0B800 to 0B801	TK00 to TK31	Task Flag Area
	0B802 to 0B83F	---	Reserved for system.
	0B840 to 0B9FF	A000 to A447	Read-only Auxiliary Area
	0BA00 to 0BBFF	A448 to A959	Read/Write Auxiliary Area
	0BC00 to 0BDFF	---	Reserved for system.
	0BE00 to 0BEFF	T0000 to T4095	Timer Completion Flags
	0BF00 to 0BFFF	C0000 to C4095	Counter Completion Flags
	0C000 to 0D7FF	CIO 0000 to CIO 6143	CIO Area
	0D800 to 0D9FF	H000 to H511	Holding Area
	0DA00 to 0DDFF	H512 to H1535	Holding Area These words are used for function blocks only.
	0DE00 to 0DFFF	W000 to W511	Work Area
	0E000 to 0EFFF	T0000 to T4095	Timer PVs
	0F000 to 0FFFF	C0000 to C4095	Counter PVs
	10000 to 17FFF	D00000 to D32767	DM Area
	18000 to 1FFFF	E0_00000 to E0_32767	EM Area bank 0
	20000 to 27FFF	E1_00000 to E1_32767	EM Area bank 1
	Etc.	Etc.	Etc.
	78000 to 7FFFF	EC_00000 to EC_32767	EM Area bank C
	Etc.	Etc.	Etc.
	F8000 to FFFFF	E00000 to E32767	EM Area, current bank (See note.)

Note The contents of the EM Area bank currently specified in the program is stored at these addresses. For example, if bank 1 is specified, the same contents as at 20000 to 27FFF will be stored at F8000 to FFFFF.

Appendix E
PLC Setup Coding Sheets for Programming Console

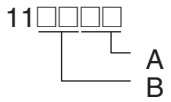
Use the following coding sheets when setting the PLC Setup from a Programming Console.

Address



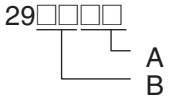
	Value (hex)	Rack 0, Slot 0 I/O Response Time
A	00	8 ms
	10	No filter
	11	0.5 ms
	12	1 ms
	13	2 ms
	14	4 ms
	15	8 ms
	16	16 ms
	17	32 ms
B	00	8 ms
	10	No filter
	11	0.5 ms
	12	1 ms
	13	2 ms
	14	4 ms
	15	8 ms
	16	16 ms
	17	32 ms

Address



	Value (hex)	Rack 0, Slot 2 I/O Response Time
A	00	8 ms
	10	No filter
	11	0.5 ms
	12	1 ms
	13	2 ms
	14	4 ms
	15	8 ms
	16	16 ms
	17	32 ms
	Value (hex)	**Rack 0, Slot 3 I/O Response Time**
B	00	8 ms
	10	No filter
	11	0.5 ms
	12	1 ms
	13	2 ms
	14	4 ms
	15	8 ms
	16	16 ms
	17	32 ms

Address



	Value (hex)	Rack 7, Slot 8 I/O Response Time
A	00	8 ms
	10	No filter
	11	0.5 ms
	12	1 ms
	13	2 ms
	14	4 ms
	15	8 ms
	16	16 ms
	17	32 ms
	Value (hex)	**Rack 7, Slot 9 I/O Response Time**
B	00	8 ms
	10	No filter
	11	0.5 ms
	12	1 ms
	13	2 ms
	14	4 ms
	15	8 ms
	16	16 ms
	17	32 ms

Address

50□□□□
- A
- B
- C
- D

High-speed Counter 0 Operation Settings

	Value (hex)	Pulse input method
A	0	Differential phase inputs
	1	Pulse + direction inputs
	2	Up/Down inputs
	3	Increment pulse input
	Value (hex)	**Reset method**
B	0	Z Phase and software reset, stop comparing
	1	Software reset, stop comparing
	2	Z Phase and software reset, continue comparing
	3	Software reset, continue comparing
	Value (hex)	**Number range mode**
C	0	Linear mode
	1	Ring mode
	Value (hex)	**Usage**
D	0	Don't Use Counter
	1	Use Counter (60 kHz)
	2	Use Counter (100 kHz)

Address

51□□□□ (Lower)
52□□□□ (Upper)
- A

	Value (hex)	High-speed Counter 0 Circular Max. Count (Max. ring counter value)
A	00000000	0
	to	
	FFFFFFFF	4294967295

Address

53□□□□ High-speed counter 1: Operation settings
to
55□□□□ (Same as operation settings for
60□□□□ high-speed counter 0.)

A
B
C
D

Built-in Inputs IN0 to IN3 Operation Settings

	Value (hex)	IN0 operation settings
A	0	Normal (General-purpose inputs)
	1	Interrupt (Interrupt inputs)
	2	Quick (Quick-response inputs
	Value (hex)	**IN1 operation settings**
B	Same as for IN0.	
	Value (hex)	**IN2 operation settings**
C	Same as for IN0.	
	Value (hex)	**IN3 operation settings**
D	Same as for IN0.	

Address

61□□□□

A **Input Time Constant Setting for General-purpose Inputs**

	Value (hex)	Input time constant
A	0000	Default (8 ms)
	0010	0 ms (No filter)
	0011	0.5 ms
	0012	1 ms
	0013	2 ms
	0014	4 ms
	0015	8 ms
	0016	16 ms
	0017	32 ms

Address

80□□□□

A

	Value (hex)	IOM Hold Bit Status at Startup	Forced Status Hold Bit Status at Startup
A	C000	Retained	Retained
	8000	Retained	Cleared
	4000	Cleared	Retained
	0000	Cleared	Cleared

Address

81□□□□
└── A

	Display	Startup Mode
A	PRCN	Mode on Programming Console's mode switch
	PRG	PROGRAM mode
	MON	MONITOR mode
	RUN	RUN mode

Address

128□□□□
└── A

	Value (hex)	Low Battery Voltage Detection	Interrupt Task Error Detection
A	C000	Do not detect.	Do not detect.
	8000	Do not detect.	Detect.
	4000	Detect.	Do not detect.
	0000	Detect.	Detect.

Address

136□□□□
└── A

	Value (hex)	EM File Memory Conversion
A	0000	None
	0080	EM File Memory Enabled: Bank No. 0
	0081	EM File Memory Enabled: Bank No. 1
	0082	EM File Memory Enabled: Bank No. 2

Address

144□□□□
├── A
└── B

Peripheral Port

	Value (hex)	Data bits	Stop bits	Parity
A	00	7 bits	2 bits	Even
	01	7 bits	2 bits	Odd
	02	7 bits	2 bits	None
	04	7 bits	1 bit	Even
	05	7 bits	1 bit	Odd
	06	7 bits	1 bit	None
	08	8 bits	2 bits	Even
	09	8 bits	2 bits	Odd
	0A	8 bits	2 bits	None
	0C	8 bits	1 bit	Even
	0D	8 bits	1 bit	Odd
	0E	8 bits	1 bit	None

	Value (hex)	Communications mode
B	00	Default (Rightmost 2 digits ignored.)
	80	Host link
	82	NT link
	84	Peripheral bus
	85	Host link

Address

145□□□□
└── A

Peripheral Port

	Value (hex)	Baud rate
A	0000	9,600 bps
	0001	300 bps
	0002	600 bps
	0003	1,200 bps
	0004	2,400 bps
	0005	4,800 bps
	0006	9,600 bps
	0007	19,200 bps
	0008	38,400 bps
	0009	57,600 bps
	000A	115,200 bps

Note Set 0000 to 0009 hex for standard NT Links and 000A hex for high-speed NT Links.

Address

147□□□□
└── A

Peripheral Port

	Value (hex)	Host link Unit No.
A	0000	No. 0
	0001	No. 1
	0002	No. 2
	to	to
	001F	No. 31

Address

150□□□□
└── A

Peripheral Port

	Value (hex)	NT Link Mode Maximum Unit No.
A	0000	No. 0
	0001	No. 1
	to	to
	0007	No. 7

Address

160□□□□

A

B

RS-232C Port

	Value (hex)	Data bits	Stop bits	Parity
A	00	7 bits	2 bits	Even
	01	7 bits	2 bits	Odd
	02	7 bits	2 bits	None
	04	7 bits	1 bit	Even
	05	7 bits	1 bit	Odd
	06	7 bits	1 bit	None
	08	8 bits	2 bits	Even
	09	8 bits	2 bits	Odd
	0A	8 bits	2 bits	None
	0C	8 bits	1 bit	Even
	0D	8 bits	1 bit	Odd
	0E	8 bits	1 bit	None

	Value (hex)	Communications mode
B	00	Default (Rightmost 2 digits ignored.)
	80	Host link
	82	NT link
	83	No-protocol
	84	Peripheral bus
	85	Host link
	87	Serial PLC Link Polled Unit
	88	Serial PLC Link Polling Unit

Address

161□□□□

A

RS-232C Port

	Value (hex)	Baud rate
A	0000	9,600 bps
	0001	300 bps
	0002	600 bps
	0003	1,200 bps
	0004	2,400 bps
	0005	4,800 bps
	0006	9,600 bps
	0007	19,200 bps
	0008	38,400 bps
	0009	57,600 bps
	000A	115,200 bps

Note Set 0000 to 0009 hex for standard NT Link and 000A hex for high-speed NT Link. Set 0000 hex for standard Serial PLC Link and 000A hex for high-speed Serial PLC Link.

Address

162□□□□
└── A

RS-232C Port

	Value (hex)	No-protocol mode delay
A	0000	0 ms
	0001	10 ms
	to	to
	270F	99,990 ms

Address

163□□□□
└── A

RS-232C Port

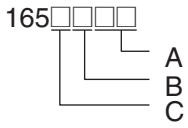
	Value (hex)	Host link Unit No.
A	0000	No. 0
	0001	No. 1
	0002	No. 2
	to	to
	001F	No. 31

Address

164□□□□
├── A
└── B

	Value (hex)	No-protocol Mode End Code
A	00	00
	to	to
	FF	FF
	Value (hex)	**No-protocol Mode Start Code**
B	00	00
	to	to
	FF	FF

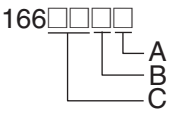
Address



RS-232C Port

	Value (hex)	No-protocol Mode reception data volume
A	00	256
	01	1
	to	to
	FF	256
	Value (hex)	**No-protocol Mode end code setting**
B	0	None (Specify the amount of data being received)
	1	Yes (Specify the end code)
	2	End code is set to CF+LF
	Value (hex)	**No-protocol Mode start code setting**
C	0	None
	1	Yes

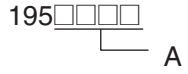
Address



RS-232C Port

	Value (hex)	Maximum Unit No. in NT Link/Serial PLC Link Mode
A	0000	No. 0
	0001	No. 1
	to	to
	0007	No. 7
	Value (hex)	**Number of link words in Serial PLC Link (Polling Unit) Mode**
B	0	10
	1	1
	to	to
	A	10
	Value (hex)	**Link method in Serial PLC Link (Polling Unit) Mode**
C	00	Complete link method
	80	Polling Unit link method

Address



	Value (hex)	Scheduled interrupt time unit
A	0000	10 ms
	0001	1.0 ms
	0002	0.1 ms (CJ1M CPU Units only)

Address

197□□□□
└── A

	Value (hex)	Instruction Error Operation
A	0000	Continue operation
	8000	Stop operation

Address

208□□□□
└── A

	Value (hex)	Minimum Cycle Time
A	0000	Cycle time not fixed
	0001	Cycle time fixed: 1 ms
	to	to
	7D00	Cycle time fixed: 32,000 ms

Address

209□□□□
└── A

	Value (hex)	Watch Cycle Time
A	0000	Default: 1,000 ms (1 s)
	8001	10 ms
	to	to
	8FA0	40,000 ms

Address

218□□□□
└── A

	Value (hex)	Fixed Peripheral Servicing Time
A	0000	Default (4% of the cycle time)
	8000	00 ms
	8001	0.1 ms
	to	to
	80FF	25.5 ms

Address

219□□□□
├── A
└── B

	Value (hex)	Slice Time for Peripheral Servicing
A	00	Disable Peripheral Servicing Priority Mode.
	01 to FF	0.1 to 25.5 ms (in 0.1-ms increments)
	Value (hex)	**Slice Time for Program Execution**
B	00	Disable Peripheral Servicing Priority Mode.
	05 to FF	5 to 255 (in 1-ms increments)

Address

220□□□□

A

B

	Value (hex)	Unit/Port for Priority Servicing
A	00	Disable Peripheral Servicing Priority Mode.
	10 to 1F	CPU Bus Unit unit number (0 to 15) + 10 hex
	20 to 7F	CPU Special I/O Unit unit number (0 to 96) + 20 hex
	FC	RS-232C port
	FD	Peripheral port
	Value (hex)	**Unit/Port for Priority Servicing**
B	00	Disable Peripheral Servicing Priority Mode.
	10 to 1F	CPU Bus Unit unit number (0 to 15) + 10 hex
	20 to 7F	CPU Special I/O Unit unit number (0 to 96) + 20 hex
	FC	RS-232C port
	FD	Peripheral port

Address

221□□□□

A

B

	Value (hex)	Unit/Port for Priority Servicing
A	00	Disable Peripheral Servicing Priority Mode.
	10 to 1F	CPU Bus Unit unit number (0 to 15) + 10 hex
	20 to 7F	CPU Special I/O Unit unit number (0 to 96) + 20 hex
	FC	RS-232C port
	FD	Peripheral port
	Value (hex)	**Unit/Port for Priority Servicing**
B	00	Disable Peripheral Servicing Priority Mode.
	10 to 1F	CPU Bus Unit unit number (0 to 15) + 10 hex
	20 to 7F	CPU Special I/O Unit unit number (0 to 96) + 20 hex
	FC	RS-232C port
	FD	Peripheral port

Address

222□□□□

Not used.

A

	Value (hex)	Unit/Port for Priority Servicing
A	00	Disable Peripheral Servicing Priority Mode.
	10 to 1F	CPU Bus Unit unit number (0 to 15) + 10 hex
	20 to 7F	CPU Special I/O Unit unit number (0 to 96) + 20 hex
	FC	RS-232C port
	FD	Peripheral port

Address

225□□□□
└── A

	Value (hex)	Power OFF Interrupt Task	Power OFF Detection Delay Time
A	0000	Disabled	0 ms
	0001		1 ms
	to		to
	000A		10 ms
	8000	Enabled	0 ms
	8001		1 ms
	to		to
	800A		10 ms

Address

226□□□□
└── A

	Value (hex)	Special I/O Unit Cyclic Refreshing 0: Yes 1: No															
		Unit number															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
A	0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	0003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	0004	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	0005	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	to																
	FFFF	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Addresses 227 through 231 are the same as 226.

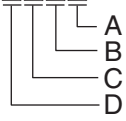
Address

256□□□□
└── A
└── B
└── C

	Value (hex)	Pulse Output 0 Use Origin Operation Setting (Origin Search Function)
A	0	Disabled
	1	Enabled
	Value (hex)	**Pulse Output 0 Limit Input Signal Operation (CJ1M CPU Unit Ver. 2.0 or later)**
B	0	Search only
	1	Always
	Value (hex)	**Pulse Output 0 Speed Curve (CJ1M CPU Unit Ver. 2.0 or later)**
C	0	Trapezium (linear)
	1	S-shaped

Address

257□□□□



	Value (hex)	Origin Search Operating Mode
A	0	Mode 0
	1	Mode 1
	2	Mode 2
	Value (hex)	**Origin Search Operation Setting**
B	0	Inverse 1 (Reversal Mode 1)
	1	Inverse 2 (Reversal Mode 2)
	Value (hex)	**Origin Detection Method**
C	0	Method 0
	1	Method 1
	2	Method 2
	Value (hex)	**Origin Search Direction**
D	0	CW direction
	1	CCW direction

Address

258□□□□ (Lower)
259□□□□ (Upper)

	Value (hex)	Origin Search/Return Initial Speed
A	00000000	0 pps
	00000001	1 pps
	to	to
	000186A0	100,000 pps

Address

260□□□□ (Lower)
261□□□□ (Upper)

	Value (hex)	Origin Search High Speed
A	00000000	0 pps
	00000001	1 pps
	to	to
	000186A0	100,000 pps

Address

262□□□□ (Lower)
263□□□□ (Upper)

	Value (hex)	Origin Search Proximity Speed
A	00000000	0 pps
	00000001	1 pps
	to	to
	000186A0	100,000 pps

Address

264□□□□ (Lower)
265□□□□ (Upper)
└─A

	Value (hex)	Origin Compensation Value
A	80000000	–2,147,483,648
	to	to
	00000000	0
	to	to
	7FFFFFFF	2,147,483,647

Address

266□□□□
└─A

	Value (hex)		Origin Search Acceleration Rate
A	---	0001	1 pulse / 4 ms
		to	to
	CJM1 CPU Unit Ver. 2.0	07D0	2,000 pulses / 4 ms
	Pre-Ver. 2.0 CJ1M CPU Unit	FFFF	65,535 pulses / 4 ms

Address

267□□□□
└─A

	Value (hex)		Origin Search Deceleration Rate
A	---	0001	1 pulse / 4 ms
		to	to
	CJM1 CPU Unit Ver. 2.0	07D0	2,000 pulses / 4 ms
	Pre-Ver. 2.0 CJ1M CPU Unit	FFFF	65,535 pulses / 4 ms

Address

268□□□□
└─A
└─B
└─C

	Value (hex)	Limit Signal Input Type
A	0	N.C.
	1	N.O.
B	Origin proximity input signal class (Same as for limit input signal.)	
C	Origin input signal class (Same as for limit input signal.)	

Address

269□□□□

A

	Value (hex)	Positioning Monitor Time
A	0000	0 ms
	to	to
	270F	9,999 ms

Note The settings for origin search 1 (addresses 274 to 287) are the same as for origin search 0 (addresses 256 to 269).

Appendix F
Connecting to the RS-232C Port on the CPU Unit

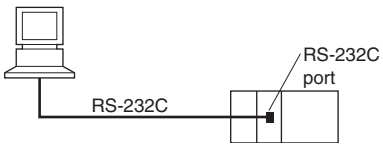
Connection Examples

The wiring diagrams for connecting to the RS-232C port are provided in this appendix. In actual wiring, we recommend the use of shielded twisted-pair cables and other methods to improve noise resistance. Refer to *Recommended Wiring Methods* later in this appendix for recommended wiring methods.

Connections to Host Computers

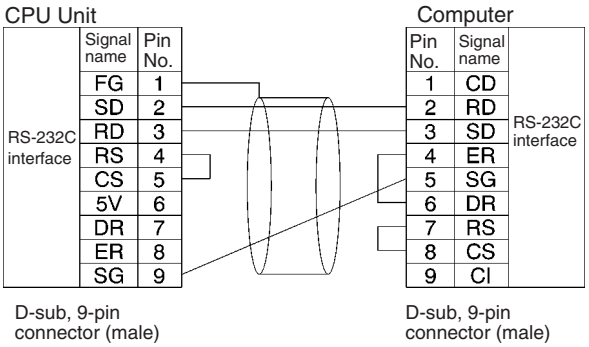
Note Connections to a computer running the CX-Programmer are the same as those shown here.

1:1 Connections via RS-232C Port

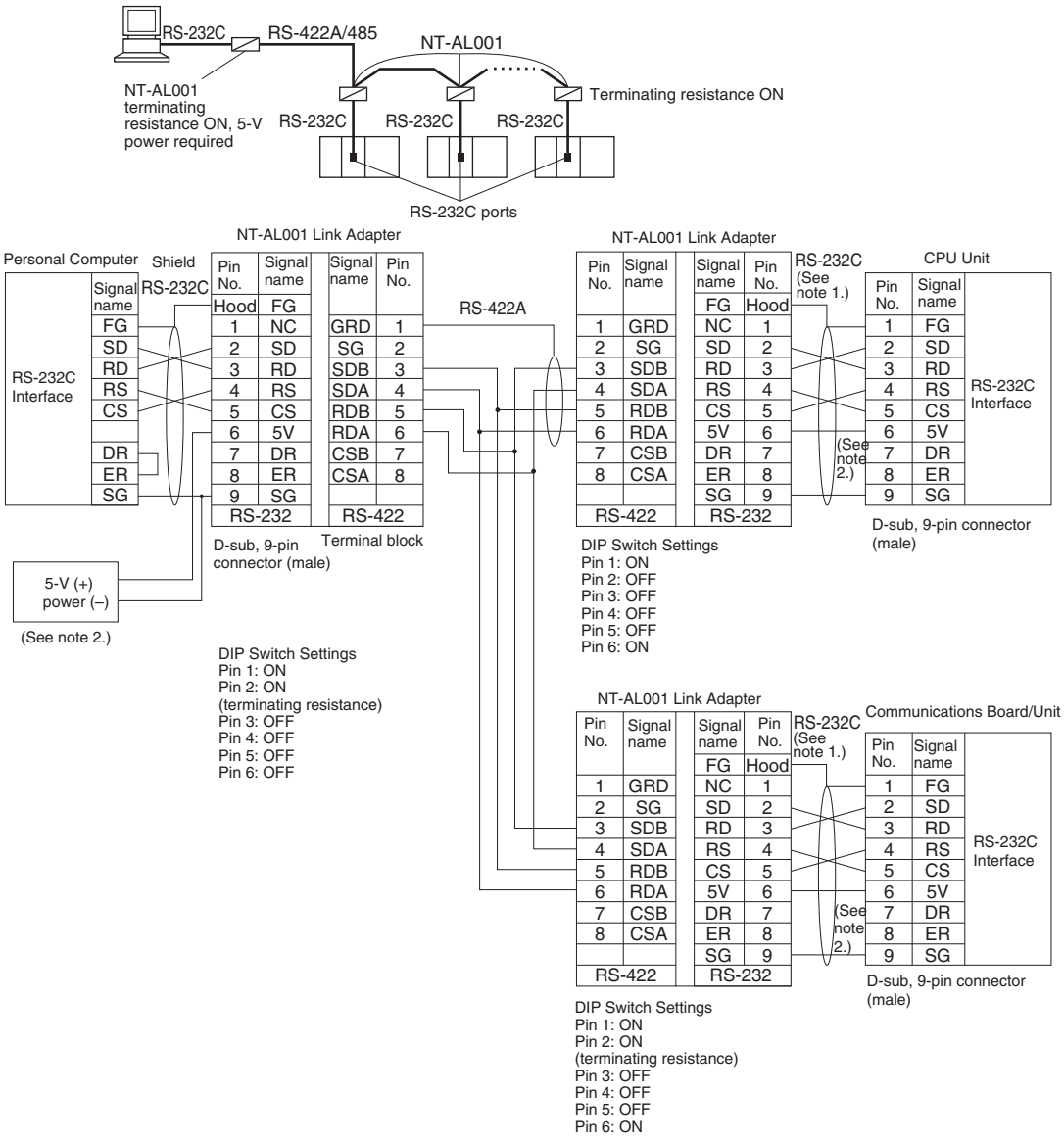


Note The maximum cable length for an RS-232C connection is 15 m. RS-232C communications specifications, however, do not cover transmissions at 19.2 Kbps. Refer to documentation of the device being connected when using this baud rate.

IBM PC/AT or Compatible Computer



1:N Connections via RS-232C Port

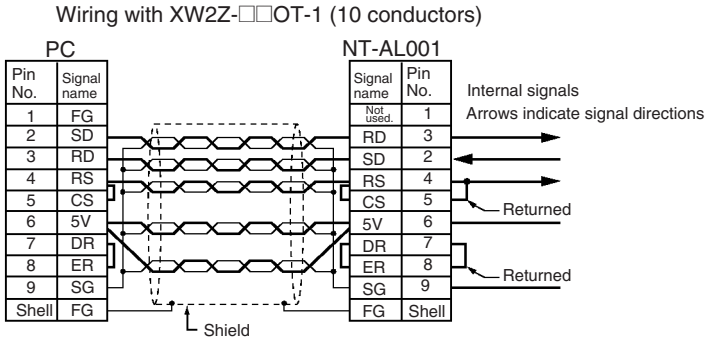


Note 1. We recommend using the following NT-AL001 Link Adapter Connecting Cables to connect to NT-AL001-E Link Adapters.

XW2Z-070T-1: 0.7 m
XW2Z-200T-1: 2 m

The recommended cables should be wired as shown below. Each signal wire should be twisted with the SG (signal ground) wire and placed in a shielded cable to prevent the effects of noise in noise-prone environments. The 5-V wires can also be twisted with the SG wire to increase noise immunity.

Although this wiring is different from that shown in the example above, it can be used to increase noise immunity if required.



2. When the NT-AL001 Link Adapter is connected to the RS-232C port on the CPU Unit, 5 V is supplied from pin 6, eliminating the need for a 5-V power supply.
3. Do not use the 5-V power from pin 6 of the RS-232C port for anything other than an NT-AL001, CJ1W-CIF11 Link Adapter, or NV3W-M□20L Programmable Terminal. Using this power supply for any other external device may damage the CPU Unit or the external device.
4. The XW1Z-□□0T-1 Cable is designed to connect the NT-AL001 and contains special wiring for the CS and RS signals. Do not use this cable for any other application. Connecting this cable to other devices can damage them.

DIP Switch Settings on the NT-AL001 Link Adapter

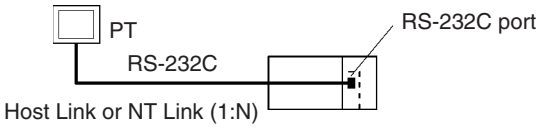
There is a DIP switch on the NT-AL001 Link Adapter that is used to set RS-422A/485 communications parameters. Set the DIP switch as required for the serial communications mode according to the following table.

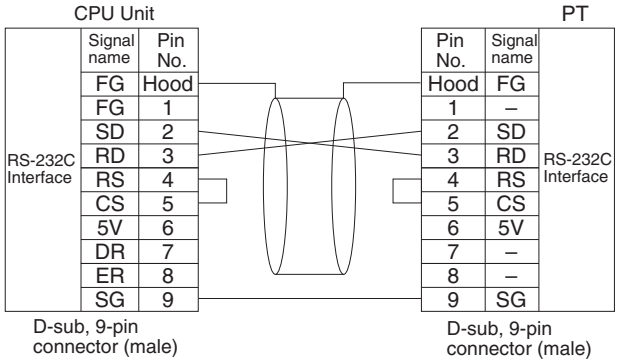
Pin	Function	Default setting
1	Not used. (Leave set to ON.)	ON
2	Internal terminating resistance setting. ON: Terminating resistance connected. OFF: Terminating resistance not connected.	ON
3	2-wire/4-wire setting Both pins ON: 2-wire communications Both pins OFF: 4-wire communications	OFF
4		OFF
5	Communications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

Note Turn OFF pin 5 and turn ON pin 6 when connected to a CJ-series CPU Unit.

Connection Example to Programmable Terminal (PT)

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



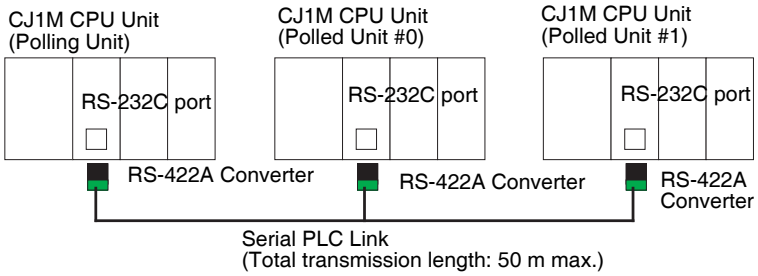


- Communications Mode: Host Link (unit number 0 only for Host Link)
  NT Link (1:N, N = 1 Unit only)
- OMRON Cables with Connectors:
  XW2Z-200T-1: 2 m
  XW2Z-500T-1: 5 m

Serial PLC Link Connection Examples (CJ1M CPU Units Only)

This section provides connection examples for using Serial PLC Link. The communications mode used here is Serial PLC Link.

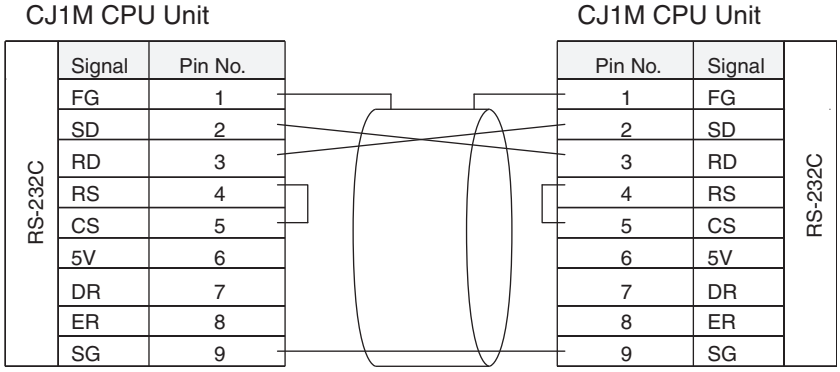
Connecting an RS-422A Converter (CJ1W-CIF11)



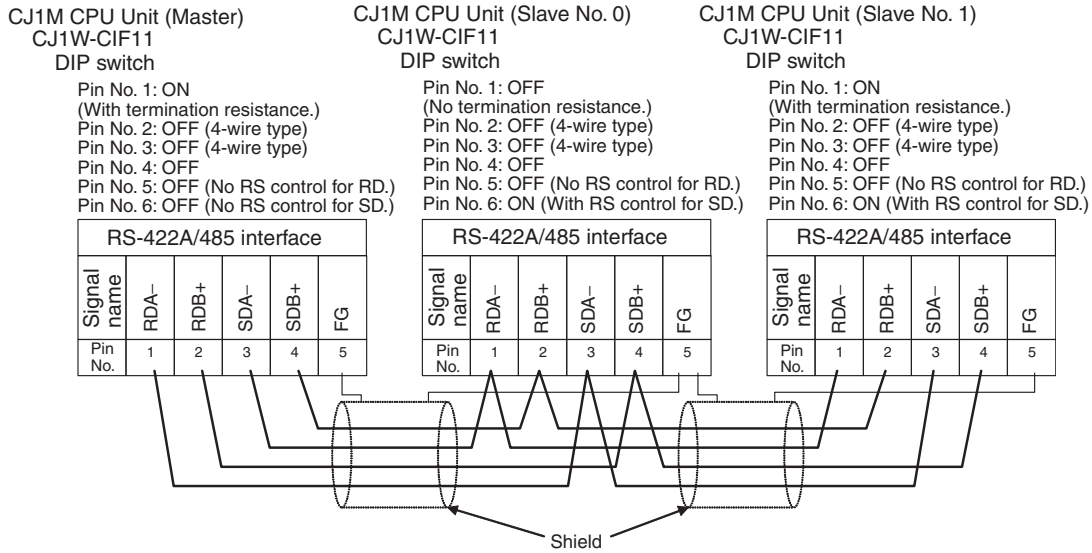
Note The CJ1W-CIF11 is not insulated, so the total transmission distance for the whole transmission path is 50 m max. If the total transmission distance is greater than 50 m, use the insulated NT-AL001, and do not use the CJ1W-CIF11. If only the NT-AL001 is used, the total transmission distance for the whole transmission path is 500 m max. Refer to the wiring examples in *Appendix G CJ1W-CIF11 RS-422A Converter* for wiring diagrams and settings when combining the CJ1W-CIF11 with the NT-AL001. When the CJ1W-CIF11 is combined with the NT-AL001, however, the total transmission length is 50 m max.

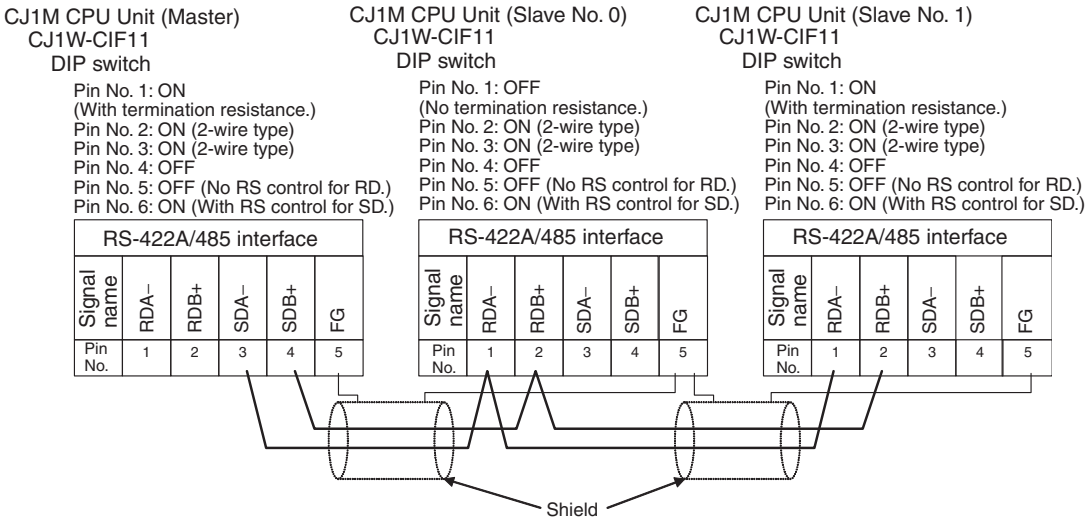
Connection with an RS-232C Port

RS-232C connection is also possible when using a Serial PLC Link to connect two CJ1M CPU Units.



Connection Examples





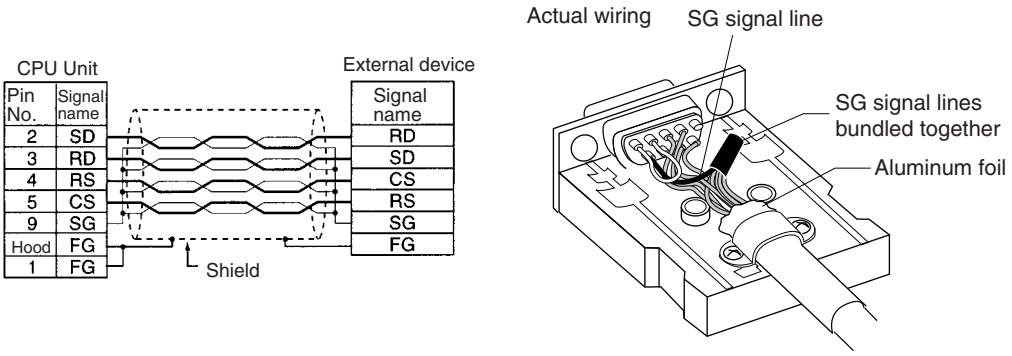
Recommended Wiring Methods

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

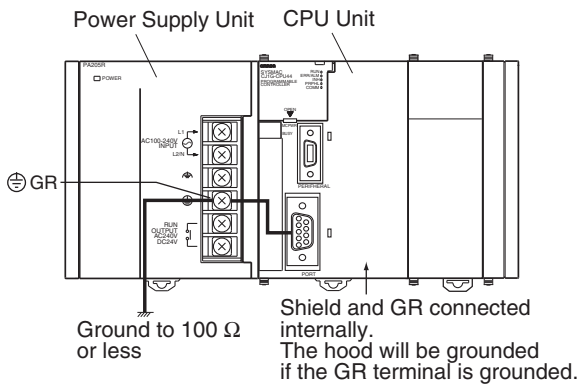
1. Use shielded twisted-pair cable for communications cables. The following RS-232C cables are recommended.

Model	Manufacturer
UL2464 AWG28×5P IFS-RVV-SB (UL approved) AWG28×5P IFVV-SB (not UL approved)	Fujikura Ltd.
UL2464-SB (MA) 5P×28AWG (7/0.127) (UL approved) CO-MA-VV-SB 5P×28AWG (7/0.127) (not UL approved)	Hitachi Cable, Ltd.

2. Use a twisted-pair cable for each signal line and SG (signal ground) to connect the CPU Unit to a communications partner. Also, bundle all the SG lines at the Unit and at the other device and connect them together.
3. Connect the shield line of the communications cable to the hood (FG) of the RS-232C connector at the Unit. Also, ground the protective earth (GR) terminal of the Power Supply Units on the CPU Rack and the CJ-series Expansion Racks to a resistance of 100 Ω or less. The following example shows connecting SD-SG, RD-SG, RS-SG, and CS-SG for Serial Communications Mode using a twisted-pair cable using the peripheral bus.



Note The hood (FG) is internally connected to the protective earth (GR) terminal on the Power Supply Unit through the CPU Rack or CJ-series Expansion Rack. FG can thus be connected by connecting the protective earth (GR) terminal on the Power Supply Unit. The hood (FG) is also electrically connected to pin 1 (FG), but the connection resistance between the shield and the FG is smaller for the hood. To reduce contact resistance between the hood (FG) and the FG, connect the shield both to the hood (FG) and to pin 1 (FG).



Wiring Connectors

Use the following procedures to wire connectors.

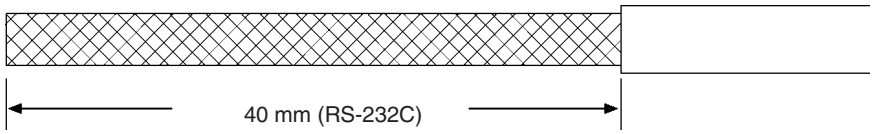
Preparing the Cable

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

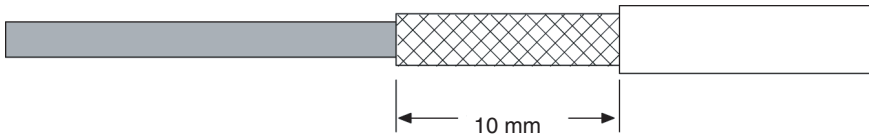
Connecting the Shield Line to the Hood (FG)

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

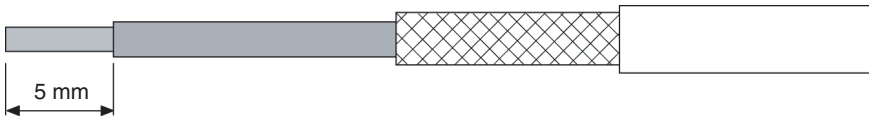
2. Use a razor blade to cut away the sheath, being careful not to damage the braiding.



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

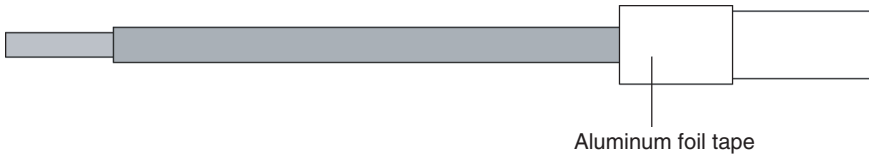


4. Use wire strippers to remove the insulation from the end of each wire.



5. Fold the braiding back over the end of the sheath.

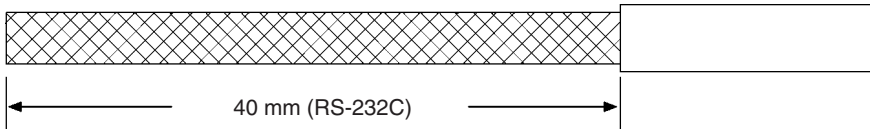
6. Wrap aluminum foil tape over the top of the braiding for one and a half turns.



Not Connecting the Shield to the Hood (FG)

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

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



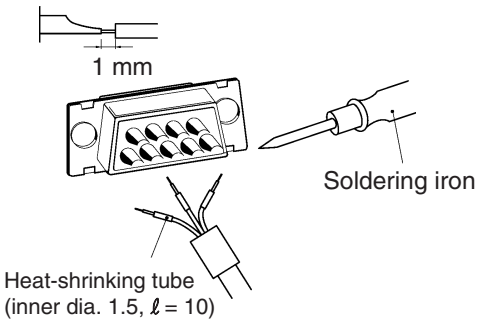
3. Use scissors to cut away the exposed braiding.

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

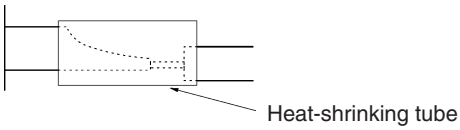
5. Wrap electrician's tape over the top and end of the cut sheath.

Soldering

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

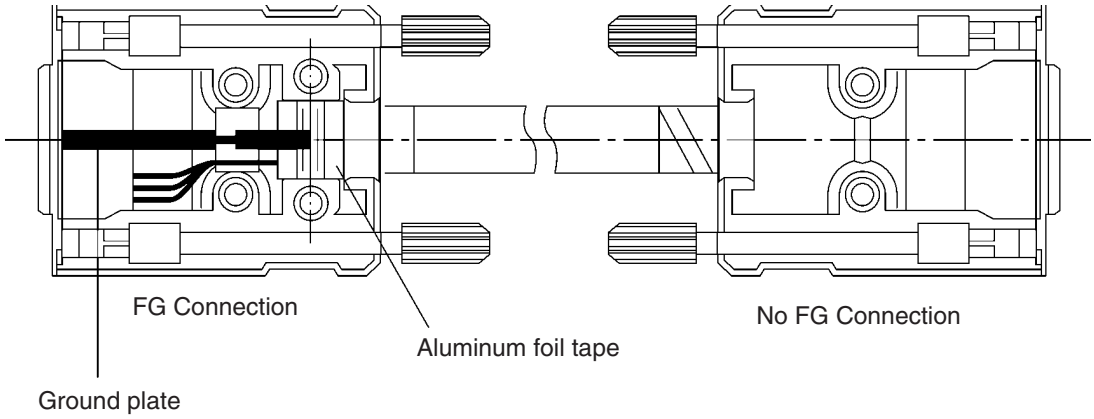


4. Move the heat-shrinking tubes onto the soldered area and shrink them into place.

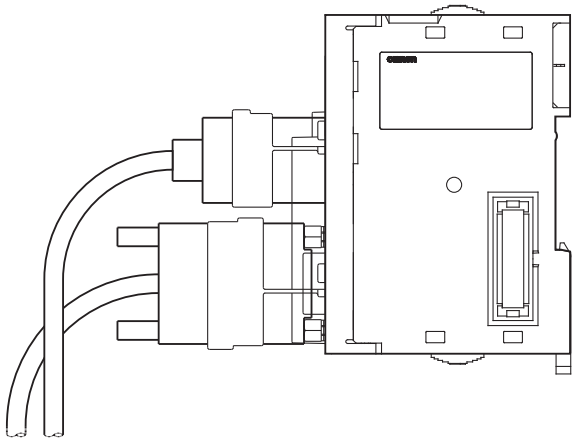


Assembling the Hood

Assemble the connector hood as shown.



Connections to the CPU Unit



- Always turn OFF the power supply to the PLC before connecting or disconnecting communications cables.
- Tighten the communications connector attachment screws to 0.4 N·m.

Appendix G
CJ1W-CIF11 RS-422A Converter

The CJ1W-CIF11 RS-422A Converter connects directly to a CS/CJ-series RS-232C port and converts RS-232C to RS-422A/485.

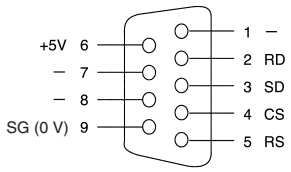
Specifications

General Specifications

Item	Specification	
Dimensions	18.2 × 34.0 × 38.8 (W × H × D)	
Weight	20 g max.	
Ambient operating temperature	0 to 55°C	
Ambient storage temperature	–20 to 75°C	
Ambient operating humidity	10% to 90% (with no condensation)	
Rated power supply voltage	5 V	(Supplied from pin 6 of the RS-232C connector.)
Current consumption	40 mA max.	
Operating atmosphere	No corrosive gases	
Vibration resistance	Same as SYSMAC CS/CJ Series.	
Shock resistance	Same as SYSMAC CS/CJ Series.	
Isolation method	Not isolated	
Maximum communications distance	50 m	

RS-232C Connector

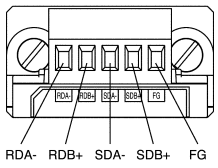
Connector Pin Arrangement for RS-232C Port



Pin number	Signal
1	FG
2	RD
3	SD
4	CS
5	RS
6	+5V
7, 8	NC
9	SG (0 V)
Hood	NC

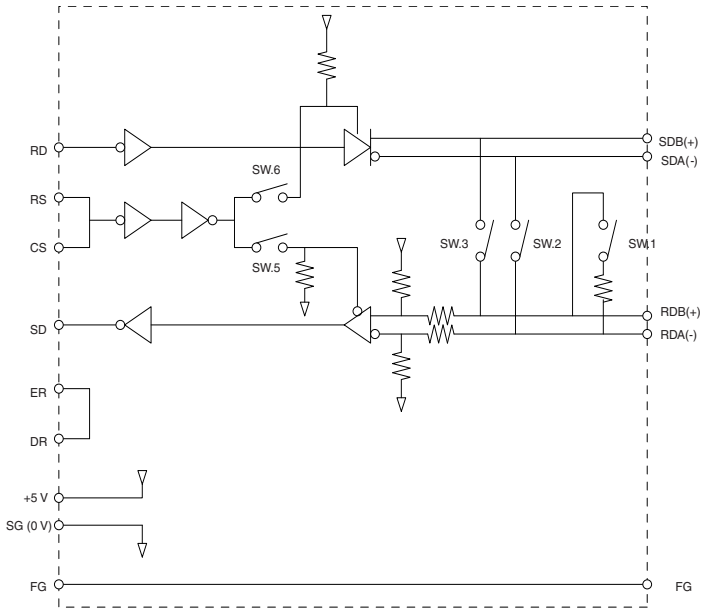
Note The hood will have the same electrical potential as the connector on the other end of the cable.

RS-422A/485 Terminal Block



Signal
RDA–
RDB+
SDA–
SDB+
FG

Block Diagram



DIP Switch Settings

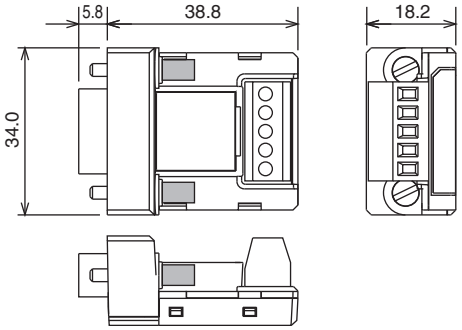
Pin number	Function	ON	OFF
1	Terminating resistance	With (at both ends of the communications path)	Without
2	Two-wire/four-wire method selection (See note 1.)	Two-wire method	Four-wire method
3	Two-wire/four-wire method selection (See note 1.)	Two-wire method	Four-wire method
4	Not used.	---	---
5	Selection of RS control for RD (See note 2.)	With RS control	Without RS control (always ready to receive)
6	Selection of RS control for SD (See note 3.)	With RS control	Without RS control (always ready to send)

Note 1. Set pins 2 and 3 to the same setting. (ON for the two-wire method or OFF for the four-wire method.)

2. To prohibit echoback, set pin 5 to ON (with RS control).

3. When connecting to several devices using the four-wire method in a 1:N connection, set pin 6 to ON (with RS control). When connecting using the two-wire method, set pin 6 to ON (with RS control).

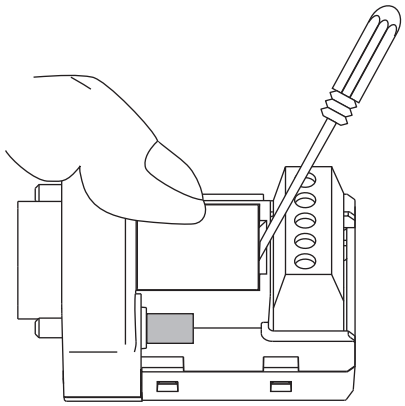
Dimensions



DIP Switch Settings, Wiring, and Installation

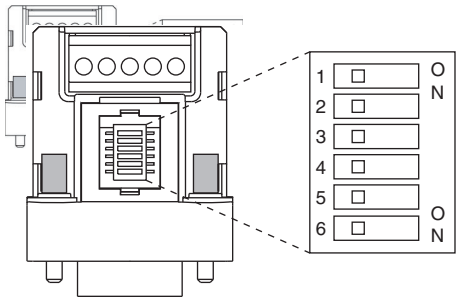
The DIP switch settings must be changed to perform communications according to settings other than the default settings.

1. Remove the DIP switch cover using a flat-bladed screwdriver in the way shown below.



Note Press the cover gently while removing it to prevent it from popping out suddenly.

2. Using a fine pair of tweezers or other tool with a fine point, change the settings of the DIP switch pins to match the desired communications conditions.
3. Be sure to remount the cover after finishing the DIP switch settings.

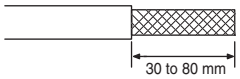


All the pins are factory-set to OFF.

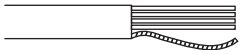
Wiring the RS-422A/485 Terminal Block

- Use either two-wire or four-wire shielded cable.
  Recommended cable: CO-HC-ESV-3P×7/0.2 (Hirakawa Hewtech)
- Connect the shield wire at both ends of the cable carrying RS-422A/485 signals to ground, and ground the ground terminal on the Power Supply Unit of the CPU or Expansion Rack to 100 Ω max.

1. Taking care not to damage the shield, strip between 30 and 80 mm of sheath off the end of the cable.

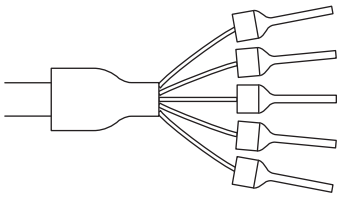


2. Carefully twist the shield mesh together to form a single wire, and carefully cut off the material surrounding the signal wires and any unnecessary signal wires.



3. Strip the sheath off the signal wires to a length sufficient to attach crimp terminals. Apply vinyl tape or heat–shrinking tube to the sheathes and stripped parts of communications lines.

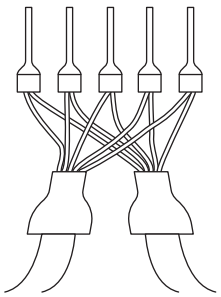
4. Attach sticktype crimp terminals to ends of the signal lines and crimp them using a crimp tool.
   - Recommend crimp terminals:
     Phoenix Contact
     AI Series
     AI-0.5-8WH-B (serial number: 3201369)
   - Recommended crimp tool:
     Phoenix Contact ZA3



With four-wire cables, insert two signal lines into each crimp terminal together before crimping.

- Recommend crimp terminals:
  Phoenix Contact
  AI Series
  AI-TWIN2×0.5-8WH (serial number: 3200933)
- Recommended crimp tool:
  Phoenix Contact
  UD6 (serial number: 1204436)

5. Connect the signal lines and the shield line to the RS-422A/485 terminal block.

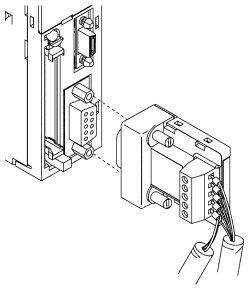


Mounting to the Unit

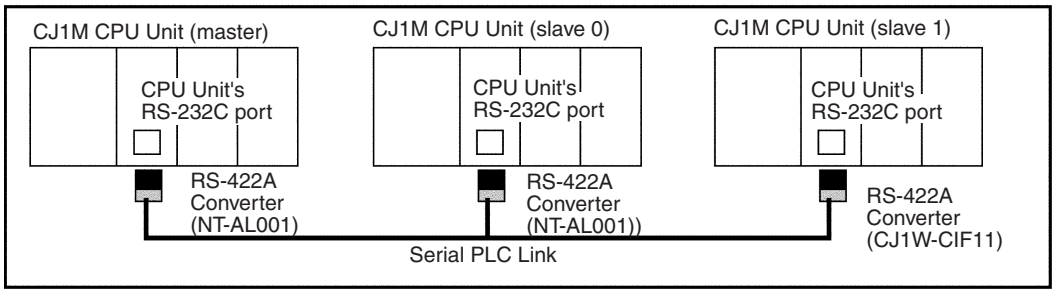
Mount the Converter to the RS-232C port (D-Sub, 9-pin) of the Unit to be connected in the following way.

1. Align the Converter's connector with that of the Unit and push it into the Unit's connector as far as possible.
2. Tighten the mounting screws on either side of the Converter. (Tightening torque: 0.3 N·m.)

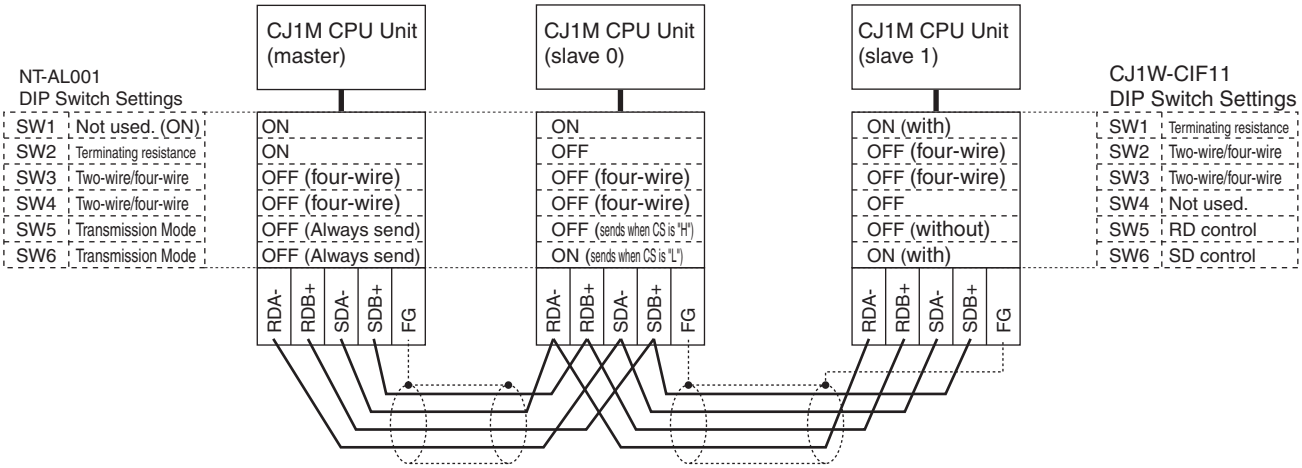
   As an example, connection to a CJ1 CPU Unit is shown below.



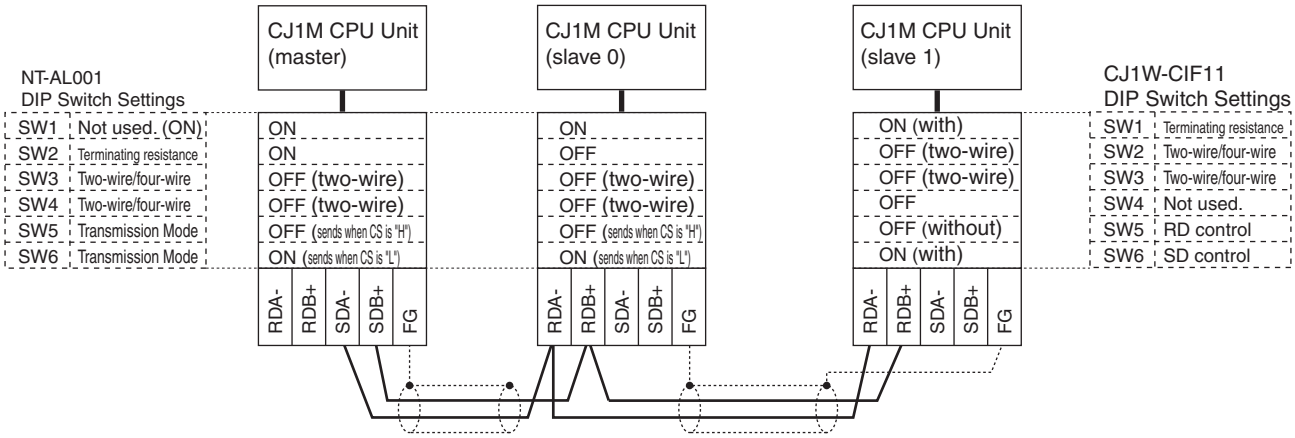
Wiring Example (CJ1M CPU Units Connected via Serial PLC Link)



Wiring for Four-wire Cable



Wiring for Two-wire Cable



Note Refer to *Serial PLC Link Connection Examples (CJ1M CPU Units Only) on page 662* for wiring diagrams and settings when using CJ1W-CIF RS-422A Converters only.

Index

Numerics

A

B

C

D

E

F

G

H

I

J-L

M

Q

R

S

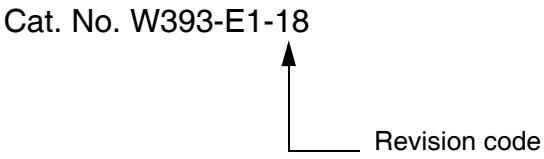
T

U

V–W

Revision History

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



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
01	April 2001	Original production
02	October 2001	New products added to the manual, including the new High-speed CPU Units (CJ1-H CPU Units). (Extensive changes too numerous to list.)
03	July 2002	New product (CJ1M CPU Unit) added to the manual. (Extensive changes too numerous to list.) Added information on Serial PLC Link, Built-in I/O, and Quick-response Input Units. Changed abbreviation of Programmable Controller from “PC” to “PLC.” throughout manual. **Page xxi:** Added two new precautions. **Page 3:** Changed CX-Programmer version information. Changed information on PLC instruction times. **Page 4:** Added information on Expansion Racks. **Page 11:** Added information on binary refreshing. **Section 12:** Added information on internal clock. **Appendix B:** Added Built-in I/O specifications. **Appendix C:** Added information on new addresses in Auxiliary Area.
04	February 2003	Mixed I/O Units (CJ1W-MD231/MD261/MD233/MD263/MD563) and B7A Interface Units (CJ1W-B7A14/B7A04/B7A22 were added at various places throughout the manual. Other changes are as follows: **Pages xv and xix:** Precaution added. **Page 110:** Note added to table. **Page 125:** Model number changed to CJ1W-□D□6□. **Pages 128 and 129:** Headings reworked for addition of new models. **Page 130:** Section added on B7A Interface Units. **Page 161:** Page reworked and new models added. **Pages 180 and 181:** Connection patterns added for new models. **Page 190:** Note changed. **Page 191:** Note changed. **Page 208:** Settings added. **Page 377:** *CPU reset* column added to table. **Page 381:** Note added. **Page 393:** Top left box in flowchart changed. **Page 408:** Notes added. **Pages 61 and 100:** HMC-EF861 and HMC-EF571 removed and other Memory Card model numbers corrected. **Page 87:** Consumption of DeviceNet Unit corrected. **Page 97:** Page reworked. **Page 177:** Tables expanded. **Pages 206 and 207:** Baud rate settings changed and note added. **Page 437:** “A” and “B” removed from graphic. **Page 490:** Note added.

Revision code	Date	Revised content
05	September 2003	Basic I/O Units (CJ1W-ID201/OD203/OD204/OD262/MD232) and Analog I/O Units (CJ1W-DA08V/MAD42) were added at various places throughout the manual. Extensive changes throughout the manual include corrections, changes, and additions on the following pages: **Page 38:** Corrected bits “A53102” and “A53103” to “A53108” and “A53109,” respectively. **Page 39:** Added note on transmission length **Page 44:** Corrected current consumption from “0.82” to “0.99” and from “0.78” to “0.91.” “Asynchronous” corrected to “synchronous” in common specifications table. **Page 48:** Changed EM Area to “7 banks max.: E0_00000 to E6_32767 max.” **Page 52:** Changed information for Serial PLC Link. **Page 59:** Changed “left” to “right” in note. **Page 61:** Corrected “32 Kwords” to “64 Kwords” for CJ1G-CPU43H/CPU42H data memory size. **Page 66:** Changed “CPU Rack” to “Expansion Rack” in rack configurations table. **Page 67, 124:** Corrected “DC” to “AC” in specifications for AC Input Units. **Page 68:** Changed “output” to “input” in Note 2. **Page 87:** Removed “CX/Programmer” from table. **Page 88:** Removed note from CJ-series Communications Adapters table. **Page 89:** Corrected “Output” to “Input” for AC Input Units. **Page 108:** Corrected “right” to “left” in step 2. **Page 109:** Corrected “Remove” to “Install” in step 4. **Page 124:** Added new Units to table and removed output specifications for Transistor Output Unit. **Page 126:** Removed “CJ1” from subheading of *Application Precautions*. **Page 135, 136:** Corrected “G79-I□-□-DI” to “G79-O□-□-D1” and also changed final “I” to “1” in other Connecting Cable model numbers. **Page 143:** Corrected “n+4” to “n+3” in table. **Page 171:** Corrected “100 to 240” to “24” for the CJ1W-PD025. **Page 185:** Changed “CPU Unit” to “I/O Interface Unit” in diagram. **Page 187:** Corrected “28-15x4.5” to “28-25x4” in diagram. **Pages 191, 192, 193, 195:** Changed “M3.5” to “M4” self-raising terminals. **Pages 195, 196:** Corrected “Power Supply Unit” to “I/O Unit” for information on crimp terminals. **Page 196:** Changed “3.5 mm” to “M3” in diagram and changed related sentence above. **Page 198:** Changed “32” to “64” for CJ1W-OD261 **Page 207:** Changed “AC/DC” to “DC” and “voltage current” to “voltage” in diagram. **Page 214:** Swapped ON/OFF functions for pin 4 and also for pin 6. **Pages 253, 254:** Changed “0 (OFF)” to “1 (ON)” in bottom right box of bottom diagram. **Page 293:** Changed “CIO 0079” to “CIO 0159,” “007915” to “015915,” and “1,280 (80 words)” to “2,560 (60 words).” **Page 307:** Changed “A08915” to “A06915” in address for Basic I/O Unit Status Area, and changed description. **Page 355:** Removed “RUN” from note 2. **Page 358:** Changed note. **Page 362:** Modified diagram **Page 368:** Corrected “DC” to “AC” in table for CJ1W-IA201 **Page 374:** Changed top diagram. **Page 408:** Corrected “CS1” to “CJ1” in diagram **Page 423:** Changed diagram. **Pages 439, 440:** Reworked tables and added notes. **Page 442:** Changed diagram and added note. **Pages 443, 445, 447, 448, 449:** Changed and added notes. **Pages 449, 450:** Corrected “100 V DC” to “500 V DC” in table. **Pages 452, 453, 455, 457, 459, 461, 463, 464:** Added/changed notes **Pages 464, 465, 466:** Corrected “100 V DC” to “500 V DC” in table. **Pages 466, 467:** Added notes. **Page 468:** Diagram changed. **Pages 470, 471, 473,475, 478:** Changed and added notes. **Page 474:** Changed diagram. Corrected “62” to “64” in heading. **Page 486:** Corrected “3.0 s” to “3.0 μs” in diagram. **Page 487:** Corrected “open collector inputs” to “open collector outputs.” **Page 527:** Corrected “Bank C” to “Bank 7” in diagram. **Page 530:** Added row to table and note. **Page 548:** Added note and information on RS-232C port connections. **Page 555:** Added block diagram. **Page 559:** Changed diagram.

Revision code	Date	Revised content
06	December 2003	Information was added on CPU Units Ver. 2.0, on the CJ1M-CPU11/CPU21, on the CS1W-CIF31, and on the PLS2(887) throughout the manual (see *1-3-7* for overview). **Pages xiii to xxii:** PLP information updated. **Section 7:** Reworked to include settings for CPU Units Ver. 2.0. **Section 8**: Completely reworked. **Page 22:** Upper right cell of table corrected. **Page 71, 88, 89, 91, 369, and 370:** New products added. **Page 84:** Communications specifications added. **Page 218:** Note added. **Page 317:** Day of month specifications corrected.
07	July 2004	Extensive changes too numerous to list in detail were added for new functionality and new models. **Page xv:** Added information on Loop-control CPU Units. **Pages 17 to 18 and Section 1-4:** Added information on CJ1H/CJ1M CPU Unit version 3.0 upgrade. **Sections 2-3 and 3-1:** Added new CPU Unit model CJ1H-CPU67H. **Sections 2-5:** Added information on Serial Gateway. **Section 3-2:** Added information on comment memory. **Section 7-1:** Added FB communications instructions settings and Serial Gateway settings. **Section 8-2:** Added precautions when changing I/O allocation. **Section 9-11 and Appendix C:** Added Free Running Timer (A000 and A001) and functions block information (A34500, A580 to A582) to Auxiliary Area. **Section 10-5:** Added new instructions TXDU(256) and RXDU(255), model conversion instructions XFERC(565), DISTC(566), COLLC(567), MOVBC(568), and BCNTC(621) and special function block instruction GETID(286). Function block instance execution time and the number of function block program steps was also added.
08	December 2004	Revisions and additions were made throughout the manual for functionality supported by Power Supply Units with CS1W-PA205C/PD022, including the following changes. **Page xxiv:** Changed table of reference manuals. **Pages xxviii, xxxi, and xxxii:** Added precautionary information. **Pages 12 and 14:** Added information on battery replacement notification. **Page 22:** Added diagram **Pages 89, 97, 104, 127, 164, 217, 228, 490, and 503:** Added information to table. **Pages 90, 214, and 272:** Added notes. **Page 165:** Added diagrams and information on components and dimensions diagrams. **Page 166:** Added dimensions diagrams, information on power supply confirmation, and added models to table. **Page 167:** Added models to table and added a new sub section on battery replacement notification. **Pages 222 and 223:** Added dimensions diagrams. **Page 237:** Changed diagram and added model number to information on power supply capacity. **Page 238:** Changed diagram. **Page 239:** Changed diagram, and added information on power supplies and new models. **Page 241:** Added information on alarm output. **Page 359**: Corrected address from “CIO 23189” to “CIO 3189” for the Serial PLC Link Area. **Pages 419, 421, and 422:** Added information on power OFF operation and power interruptions. **Page 538:** Changed diagram.
09	October 2006	Information was added on CJ1M CPU Units with unit version 4.0. Information was added on CJ1-H CPU Units with unit version 4.0. Descriptions and contents were improved. The 15-Mbyte flash memory was deleted.
10	April 2007	Information was added on the CJ1H-CPU□□H-R CPU Units.
11	October 2007	**Page xi:** Added sentence at top of page and added two lines to table. **Page xv:** Added note and changed reference to note in table. **Page 54:** Changed right two column entries for *Overhead time.* **Page 76:** Corrected EM bank number in fourth column for *Extended Data Memory.* **Page 109:** Corrected number of outputs for *Analog I/O Units.* **Page 187:** Added CJ1W-MD23□ 32-point Units. **Page 206:** Removed dot from figure. **Page 207:** Corrected wiring diagram. **Page 371:** Corrected addresses at the end of the I/O Area. **Page 404:** Added paragraph at the bottom of the page. **Page 438:** Added columns for names on Programming Console. **Page 439:** Corrected symbols in figure and added two minor sections. **Page 512:** Removed “CYCLE TIME OVER.” **Page 537:** Corrected output specification in next to last row of bottom table. **Page 563:** Corrected voltage for input current of input section. **Page 665:** Added “(0 V)” to signal name. **Page 666:** Corrected two signal names at lower left of block diagram.

Revision code	Date	Revised content
12	January 2008	Added information on unit version 4.1 of the CJ1H-CPU□□H-R CPU Units (CJ1-H-R). **Page x:** Added row to table. **Page xv:** Added information to note. **Page xvii:** Changed unit version in top table. Added note and information on specifications change. **Page xviii:** Added note on CX-Programmer versions. **Pages 13 and 277:** Added note. **Page 438:** Added information to high-speed clock pulse table.
13	August 2008	**Page x:** Added unit version 4.2. **Pages xv:** Changed note 2. **Page xvii:** Changed note 2 and changed unit version to 4.2. **Page xviii:** Changed note 2 and added sentence at top of page. **Page xxix:** Added the CJ2 CPU Units. **Pages xxx and xxxi:** Changed name of W446, W447, W464, and W463, and removed version number from description of W447. **Page 13:** Changed note. **Page 45:** Removed note. **Page 57:** Changed “input comparison” to “symbol comparison.” **Page 79:** Changed programming specifications. **Page 86:** Changed remote programming and monitoring specifications. **Page 88:** Removed “at room temperature” from some of the inrush current specifications. **Page 163:** Added XW2Z-200S-V and XW2Z-500S-V. **Pages 184 and 187 to 190:** Changed headings and callouts. **Page 303:** Removed last line of table. **Page 307:** Replaced screen capture **Page 438:** Changed lower left cell of table. **Page 539 and other pages:** Added “5 V DC:” or added a colon to the internal current consumption specifications for all Units. **Pages 557, 577 to 579:** Added “load” to “short-circuit protection” in callouts.
14	September 2009	**Page xxx:** Updated manual W340 to W474. **Pages xliv and 657:** Updated note on pin 6. **Page 85:** Added serial communications modes. **Pages 97, 131, 258, 405, 406, 629, and 630:** Added notes. **Page 103:** Removed information from first paragraph and notes added. **Page 105:** Changed first paragraph. **Page 133:** Changed current consumption for Ethernet Unit. **Pages 134 and 168:** Changed note. **Pages 150 and 151:** Added note and reference to it. **Page 164:** Changed model numbers under “Cable 1.” **Pages 256, 257, 260, and 262:** Changed information on crimp terminals. **Page 264:** Added “/F” to two model numbers. **Page 288:** Added paragraph. **Page 338:** Added information to note. **Pages 370 and 371:** Added note and references to it. **Page 377:** Changed bottom two cells in table. **Page 454:** Added text to figure and changed table. **Page 464:** Changed I/O refresh time for CJ1W-NC321/233 for CJ1. **Pages 546, 548, 559, 561, and 563:** Changed time in note. **Page 628:** Added A6000 to A6007.

Revision code	Date	Revised content
15	January 2015	Information on copyrights and trademarks updated in front matter. **Page x:** Added CJ1 CPU Units and changed “CJ1□-CPU□□P” to “CJ1G-CPU□□P.” **Pages xxiii, 31, 53, 58, 59, 61, and 63:** Changed "W340" to "W474." **Pages xxx and xxxi:** Updated manual names. **Pages xxxiii to xxxv:** Updated information. **Page 63:** Removed section numbers from two references. **Pages 76 and 78:** Changed connector information at bottom of table. **Page 88:** Added references to note in last three rows of table. **Page 89:** Added withstand voltage category to table and changed "JIS" to "IEC." **Page 107:** Corrected amp value for CJ1W-OD233. **Pages 112 and 133:** Added EtherNet/IP Unit to table. **Page 141:** Corrected labels on Unit illustration. **Page 143:** Changed left column cell for BKUP indicator. **Page 144:** Changed note 2. **Page 168:** Changed models in bottom table. **Page 169:** Changed models in top table and illustration after it. **Page 230:** Added paragraph at bottom of page. **Page 235:** Changed illustration. **Page 262:** Changed first two paragraphs in section 5-3-2. **Page 263:** Changed paragraph toward beginning of section 5-3-3. **Page 282:** Changed note 5. **Pages 291, 292, 293, 294, 392, 393, 394, 399, 400, 402, 404, 407, 412, 597 to 599, 602, 608, 612, 616, 617, and 623 to 627:** Changed “CJ1□-CPU□□” to “CJ1G-CPU□□.” **Page 422:** Removed first row from table and changed left column cell for RS-232C Port Error Flags. **Page 508:** Changed second and last cells in Probable cause column and last cell in Possible remedy column. **Page 510:** Changed second cell in Possible remedy column. **Page 515:** Changed first cell in Possible remedy column. **Page 519:** Changed flowchart. **Page 537:** Deleted last sentence from note. **Page 538:** Deleted voltage specification for Triac Output Unit and removed second sentence from note 2. **Pages 540 and 549:** Removed second sentence from note 2. **Pages 565, 567, 568, and 578:** Removed second sentence from note. **Page 579:** Removed note. **Page 580:** Removed word addresses from first sentence. **Page 631:** Changed left column cells for Clock Pulse Area. **Page 656:** Changed labels for some of the pin 1's in the illustration. **Page 658:** Changed left part of second illustration. **Page 660:** Removed callout from first illustration. **Page 666:** Changed labels on the left of the block diagram. **Page 669:** Corrected model numbers in middle illustration.
16	October 2015	Added CJ1G-CPU□□P CPU Units with unit version 4.1 and corrected mistakes.
17	September 2016	Changed accessories. Corrected mistakes.
18	February 2020	Added information and corrected mistakes.

OMRON Corporation **Industrial Automation Company**
Kyoto, JAPAN

Contact: www.ia.omron.com

Regional Headquarters
OMRON EUROPE B.V.
Wegalaan 67-69, 2132 JD Hoofddorp
The Netherlands
Tel: (31)2356-81-300/Fax: (31)2356-81-388

OMRON ELECTRONICS LLC
2895 Greenspoint Parkway, Suite 200
Hoffman Estates, IL 60169 U.S.A.
Tel: (1) 847-843-7900/Fax: (1) 847-843-7787

OMRON ASIA PACIFIC PTE. LTD.
No. 438A Alexandra Road # 05-05/08 (Lobby 2),
Alexandra Technopark,
Singapore 119967
Tel: (65) 6835-3011/Fax: (65) 6835-2711

OMRON (CHINA) CO., LTD.
Room 2211, Bank of China Tower,
200 Yin Cheng Zhong Road,
PuDong New Area, Shanghai, 200120, China
Tel: (86) 21-5037-2222/Fax: (86) 21-5037-2200

Authorized Distributor:

Cat. No. W393-E1-18 0220