OMRON

omron

SYSMAC CS1 Programmable Controllers

New   Controllers
Take   Center   Stage
at   the   Factory

SYSMAC
CS1
Programmable Controllers

A New Revolution

Factories are facing an age of challenges: Supporting product and quantity changes, Short deadlines, Reducing costs, Increasing quality for PLP and ISO requirements, and More. A company's chances of surviving depend on how well it can handle these challenges.

OMRON now provides a valuable means to help you meet these challenges: The SYSMAC CS1 Series of Programmable Controllers. Windows-run tools for rapid software design and development combined with Flexible Networking accelerate the handling of both factory information and standardization. These are PLCs designed to handle a new age in factory automation.

Windows Support Software

Consistent Windows-based Development Environment Increases Design and Development Efficiency

The SYSMAC CS1 Series provides a Windows software development environment that greatly accelerates factory control system standardization. Develop software using various Windows tools, or edit multiple projects at the same time. However you use it, the Windows Support Software will increase overall efficiency from system design and program development through debugging, maintenance, and operation.

Flexible Networking

Create Seamless Networks to Promote Factory Information Applications

The SYSMAC CS1 Series also supports Flexible Networking. The CS1 Series supports Ethernet, Controller Link Networks, and DeviceNet (CompoBus/D Networks), as well as protocol macros. These networks can be used flexibly to create transparent information networks and facilitate application of factory information.

Contents

Five Revolutionary Trends Provided by the SYSMAC CS1 Series for Factory Standardization and Information Application

CS1

Better Basic Performance

The greater capacity and more complex control required from PLCs for constant product and quantity changes and short deadlines create a demand for improved basic performance. The CS1 Series provides more than sufficient speed and capacity in CPU performance, memory, and expandability to meet not only today's needs, but also future needs.

Program Capacity 250 Ksteps

I/O Capacity 5,120 points

LD Speed 0.04 ∝s

DM Capacity 448 Kwords
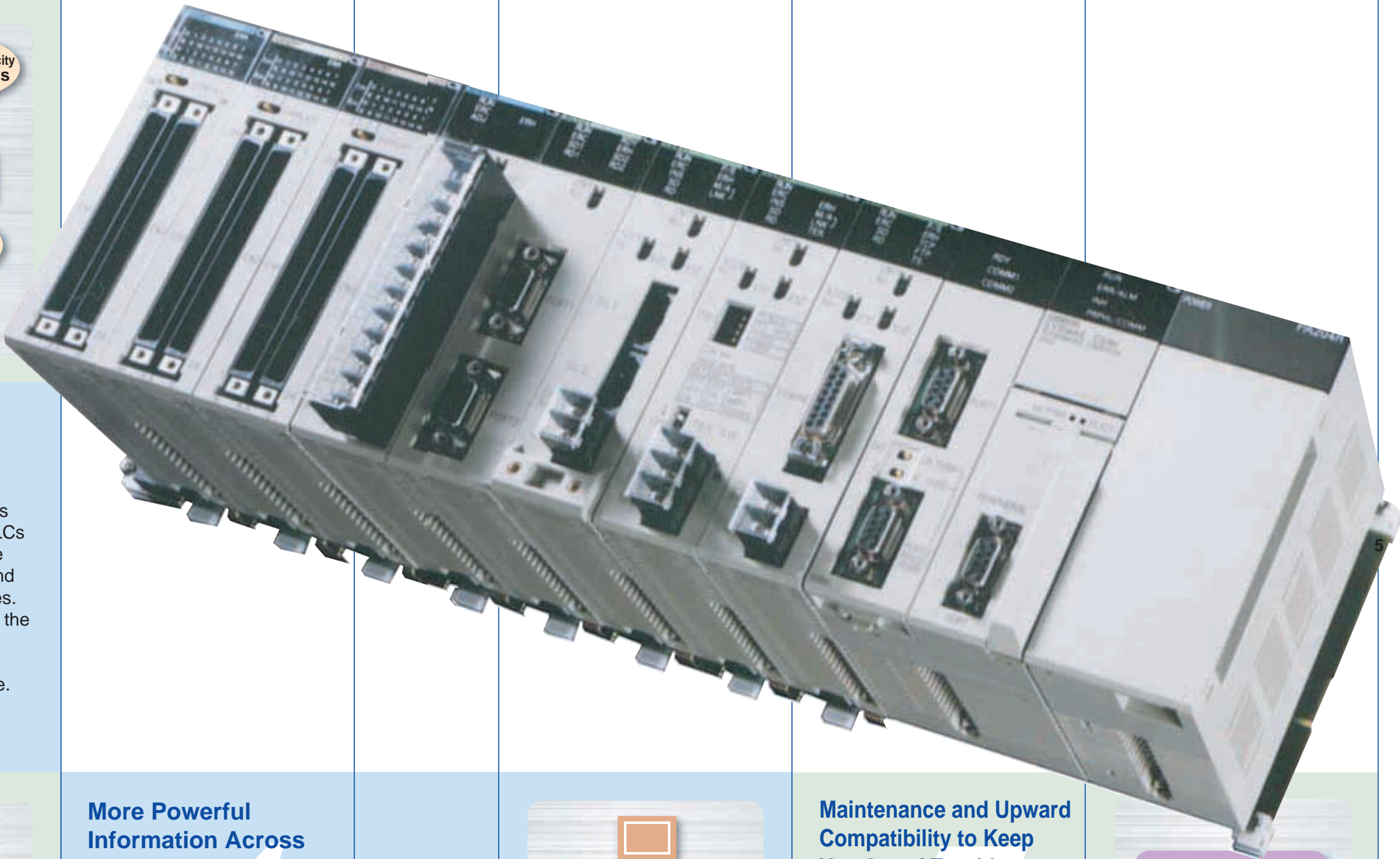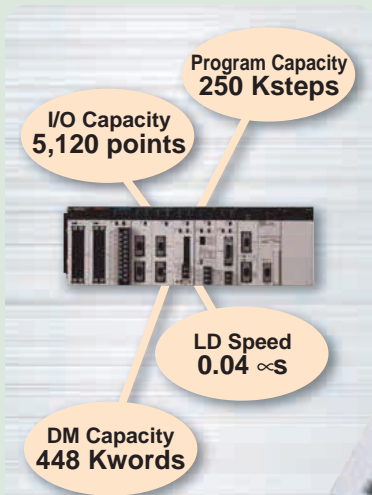
Higher Efficiency in Design and Development

The size of PLC programs continues to grow and PLCs are asked to handle more data, communications, and human-machine interfaces. The CS1 Series provides the functionality to develop efficient, value-added programs in a limited time.

Consistent Windows Environment

Structured Programming

Name Programming

etc.

Greater Connectivity and Compatibility

The amount of data a PLC must process has greatly increased as peripherals have become more intelligent. The CS1 Series provides multiple ports to connect peripherals in serial communications. It also provides far greater compatibility with peripherals.
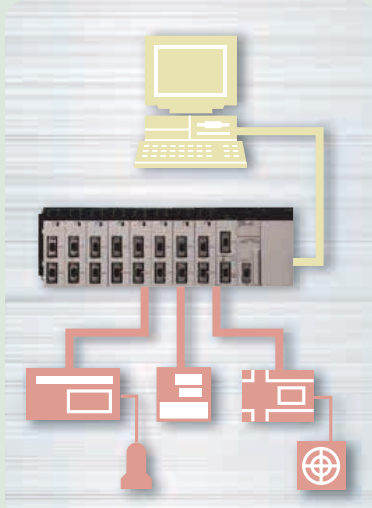
More Powerful Information Across Networks

Seamless message communications across multiple OA and FA networks are vital to using factory information. The CS1 Series supports communications across three network levels, even different types of networks, such as information networks and controller networks.

Information Network Ethernet

Controller Network Controller Link
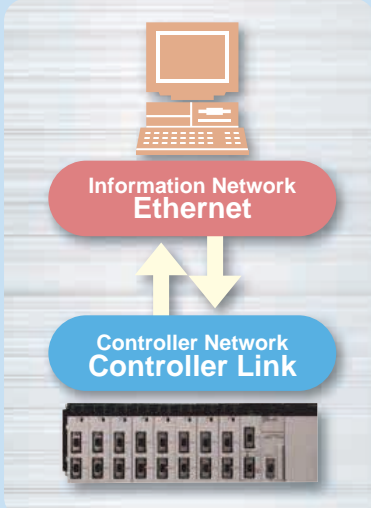
Maintenance and Upward Compatibility to Keep You Out of Trouble

Faster trial operation, shorter downtimes, and reductions in expenses for maintenance trips, as well as system operation and maintenance efficiency, are vital to the future of factory automation. The CS1 Series provides more advanced management functions and superior upward compatibility.

Memory Cards

Remote Maintenance

Error Logs

C/CV-series Upward Compatibility

etc.
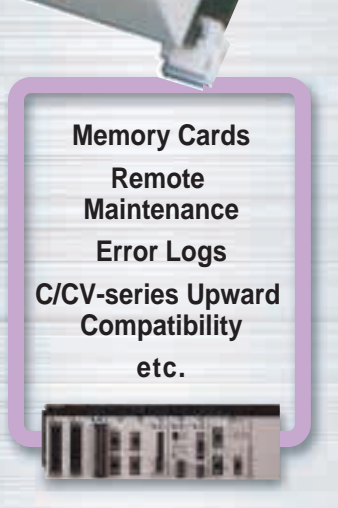
SYSMAC CS1
Factory Automation Solutions

CS1

Better Basic Performance to Revolutionize Control

Fastest PLC Processing Speed in Industry

The development of a dedicated LSI to execute instructions and the application of a high-speed RISC microcomputer make CS1-series PLCs 2.5 times faster than previous OMRON PLCs. A wide variety of special instructions can be executed as easily as the basic instructions. Furthermore, programming task control enables execution of only required programming, further increasing processing speed.

Processing Speed: 2.5 Times (Ex.: LD Instruction)

SYSMAC C200HX/HG/HE — 0.1 ∞s

SYSMAC CS1 — 0.04 ∞s

Program Capacity: 4 Times

SYSMAC C200HX/HG/HE — 63.2 Kwords

SYSMAC CS1 — 250 Ksteps

Larger Capacity CPU for Ample Control Power

The CS1 CPUs boast amazing capacity with up to 5,120 I/O points, 250 Ksteps of programming, 448 Kwords of data memory (including expanded data memory), and 4,096 timers/counters (each). With ample programming capacity, CS1 PLCs easily handle added-value applications and other advanced data processing.

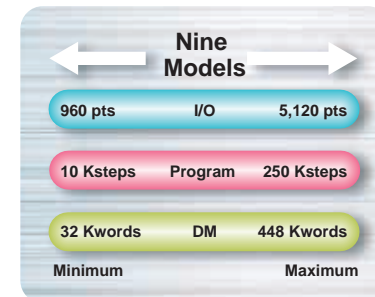### Complete Lineup for All Applications

A total of nine CPU Unit models provides for a range of applications, from small-scale systems to large. The product lineup also includes high-capacity Power Supply Units and High-density I/O Units (96 pts). Memory Cards and Serial Communications Boards are also available and can be used with any CPU Unit to

build a flexible system that meets your needs.

Nine Models

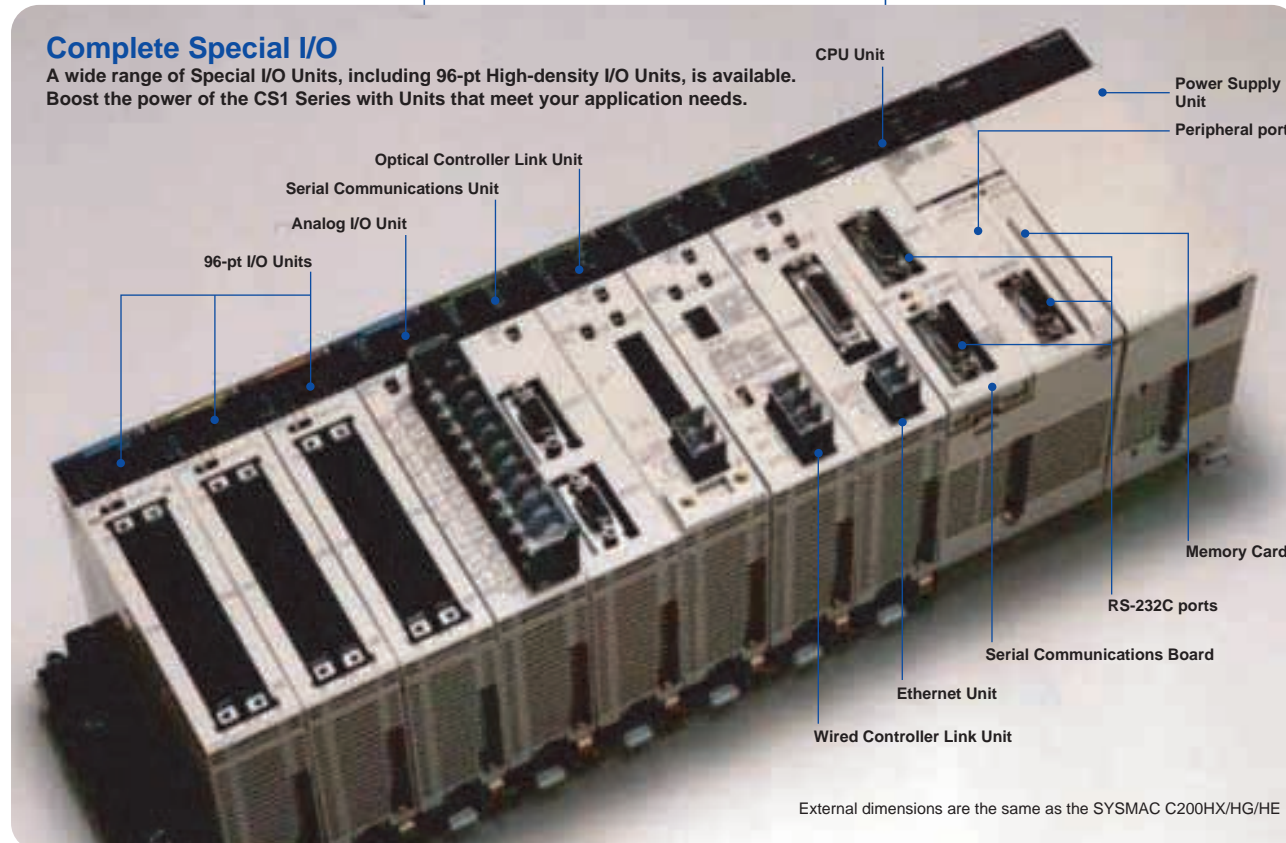| 960 pts | I/O | 5,120 pts |
10 Ksteps	Program	250 Ksteps
32 Kwords	DM	448 Kwords
Minimum		Maximum

Better Information Processing with Index Registers and Data Processing Instructions

Repeat loops (FOR-NEXT), index registers, data registers, text string instructions (e.g., LEN$, LEFT$, MID$), record processing, table data operations, and many other instructions provide the power you need to handle factory information efficiently.
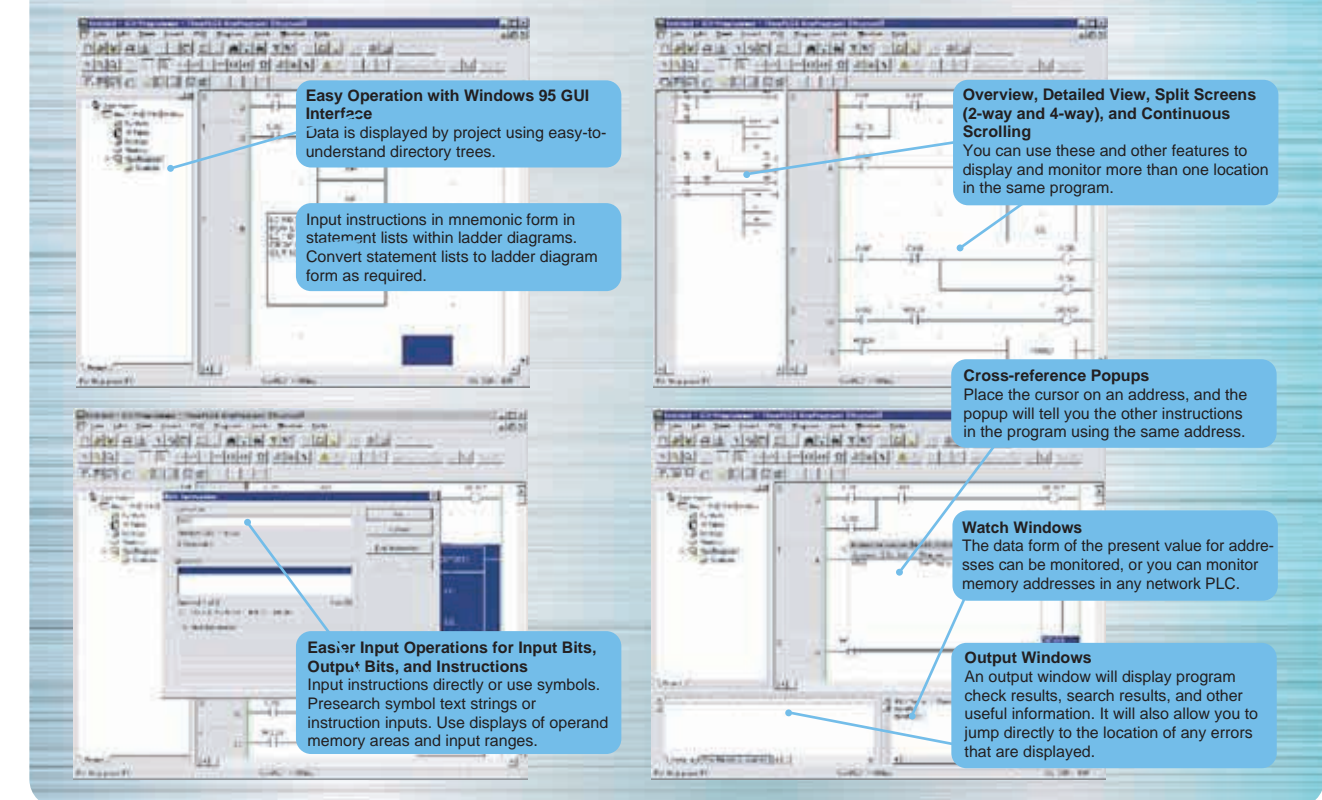
Complete Special I/O

A wide range of Special I/O Units, including 96-pt High-density I/O Units, is available. Boost the power of the CS1 Series with Units that meet your application needs.


CPU Unit
Optical Controller Link Unit
Serial Communications Unit
Analog I/O Unit
96-pt I/O Units
Power Supply Unit
Peripheral port
Memory Card
RS-232C ports
Serial Communications Board
Ethernet Unit
Wired Controller Link Unit

External dimensions are the same as the SYSMAC C200HX/HG/HE

Unified Development Environment to Revolutionize Design and Development

Complete Monitoring and Debugging Functions for Easy Program Development

Easy Operation with Windows 95 GUI Interface
Data is displayed by project using easy-to-understand directory trees.

Input instructions in mnemonic form in statement lists within ladder diagrams. Convert statement lists to ladder diagram form as required.

Overview, Detailed View, Split Screens (2-way and 4-way), and Continuous Scrolling
You can use these and other features to display and monitor more than one location in the same program.

Cross-reference Popups
Place the cursor on an address, and the popup will tell you the other instructions in the program using the same address.

Watch Windows
The data form of the present value for addresses can be monitored, or you can monitor memory addresses in any network PLC.

Easier Input Operations for Input Bits, Output Bits, and Instructions
Input instructions directly or use symbols. Presearch symbol text strings or instruction inputs. Use displays of operand memory areas and input ranges.

Output Windows
An output window will display program check results, search results, and other useful information. It will also allow you to jump directly to the location of any errors that are displayed.

Structured Programming Vastly Increases Design Efficiency

Although previously a PLC program was just one long program, something like a scroll, the CS1-series PLCs provide task programs that can be controlled individually. Separate programs (tasks) for different processing allow more than one programmer to develop and debug at the same time.

Process C
Previous Ladder Program
Process A   Process B
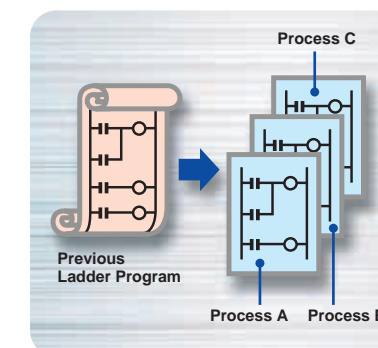
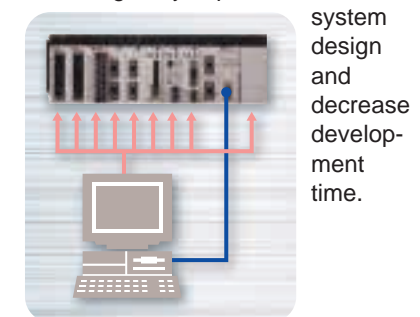### Name Programming to Standardize Programs

Programs can be written with names rather than allocated addresses, allowing programs to be developed before terminals are actually assigned to I/O or addresses. The CX-Programmer allows programs and I/O with names to be easily used in other systems: It's as easy as drag and drop.

Unified Windows Development for Easy Operation

Various tools can be used in the Windows environment to cut and paste programming and other data between different programs while developing them simultaneously. Easy-to-use Windows operations (GUI) will allow you to quickly learn procedures to effortlessly start design and development work.

Simultaneously Debug the CPU Unit and Special I/O Unit from one Host Link Connection

Connect a personal computer to one Host Link port on the CPU Unit, Serial Communications Unit, or Serial Communications Board and you're ready to use any or all of the Windows tools (CX-Programmer, CX-Protocol, etc.) for the required Units to greatly improve overall system design and decrease development time.
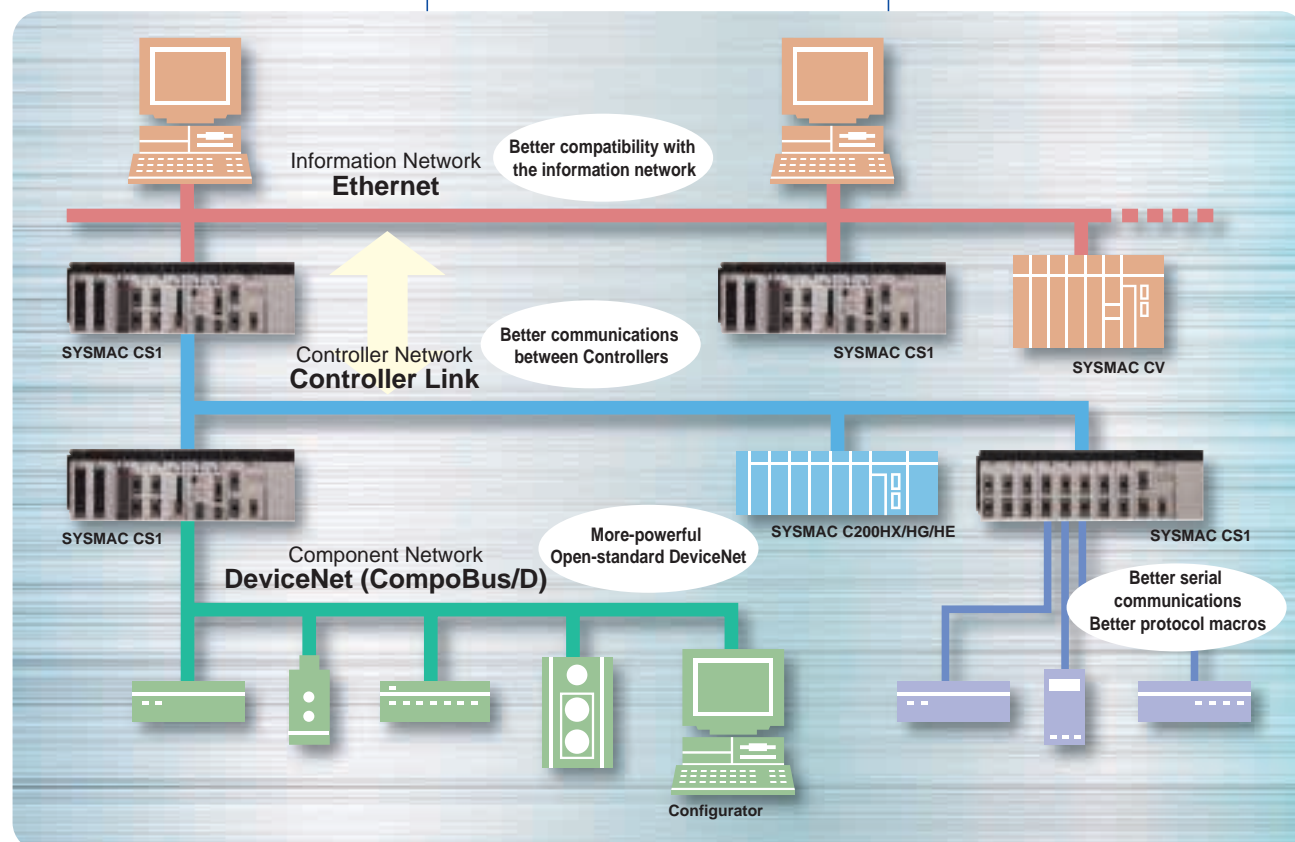
SYSMAC CS1
Factory Automation Solutions II

CS1

Better Serial Communications and Compatibility to Revolutionize Systems

Information Network
Ethernet

Better compatibility with the information network

SYSMAC CS1

Controller Network
Controller Link

Better communications between Controllers

SYSMAC CS1

SYSMAC CV

SYSMAC CS1

Component Network
DeviceNet (CompoBus/D)

More-powerful Open-standard DeviceNet

SYSMAC C200HX/HG/HE

SYSMAC CS1

Better serial communications Better protocol macros

Configurator

Greatly Expanded Protocol Macro Function

Each PLC supports up to 16 Serial Communications Units and one Serial Communications Board, each of which provides two serial ports. You can thus connect up to 34 devices with serial communications, and at speeds of up to 38.4 Kbps. Message length has been increased from 256 to 1,000 bytes to give communications more power than ever before.

Up to 34 ports
(two ports per Unit/Board)

Components/devices with serial communications
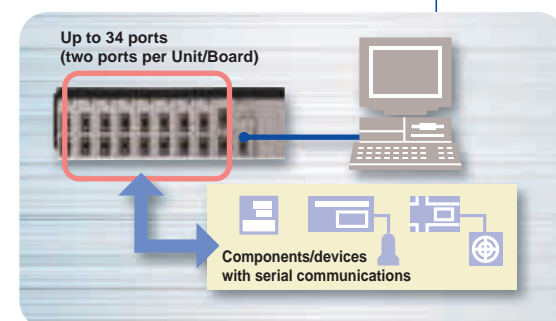
Seamless Networks and Inter-network Communications

Networks are available for every system level: Ethernet for information, Controller Link Network for controllers, and DeviceNet (CompoBus/D) for components. And communications between Ethernet and Controller Link Networks can be performed across three network levels as easily as if you were communicating on the same network.

Better Ethernet Support

Ethernet is becoming an increasingly important standard for information networks. The Ethernet Unit supports up to eight socket interfaces each for TCP/IP and UDP/IP. It also supports FINS messages, FTP file

transfers, and mail notification so that you can now organically link production management with the production site.

Better Controller Link Functions

A new Optical Controller Link Network joins the previous Wired Controller Link Network. You get greater data link capacity and communications distance to support more communications applications between Controllers.

DeviceNet Multivendor Bus Support

The CS1 Series supports the DeviceNet field device network with CompoBus/D. The increasing number of devices that can be connected to this industry standard network provides a flexible means of building systems using such products as the MULTIPLE I/O TERMINAL.

Superior Management Functions and Upward Compatibility to Revolutionize Maintenance and Operations

Memory Cards for Data File Management

User programs, I/O memory, or system parameters can be converted to files and stored in Memory Cards or in EM file memory (in CPU Unit). You can also automatically read the user program and other data from the Memory Card to the CPU Unit at startup. Change programs on-site using only a Memory Card and Programming Console, or use Memory Cards to store variable tables or I/O comments.

Autoboot files, such as those used in PCMCIA cards with personal computers, cannot be used.

Remote Maintenance

1. Program or monitor a remote PLC via a modem connection.
2. Program or monitor a network PLC via a Host Link connection.
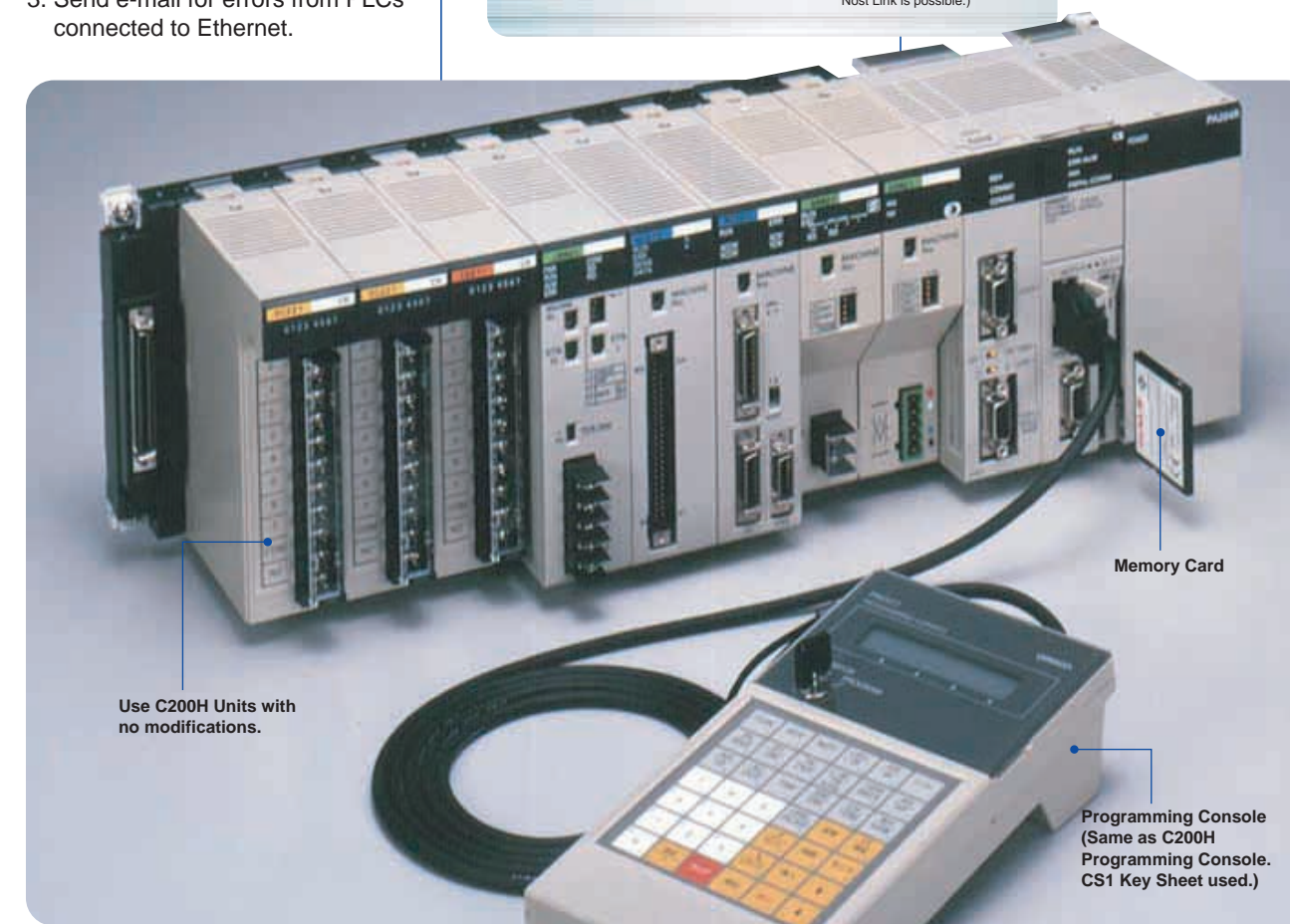3. Send e-mail for errors from PLCs connected to Ethernet.

Power Maintenance Functions

Error logs, power interruption time stamps, power interruption counts, power ON timers in 10-hr

3. Mail

Ethernet

1. Remote programming/ monitoring via modem.

Modem

Host Link

Phone line

Modem

2. Remote programming/ monitoring via Host Link.

(Programming/monitoring equivalent to the one via normal Nost Link is possible.)

increments: These and other maintenance functions provide what's needed to handle unexpected trouble.

Support for SYSMAC C/CV-series Units

You can continue using the C200H Units, Programming Consoles, and programs to take advantage of your investment in C/CV-series PLCs.

Use C200H Units with no modifications.

Memory Card

Programming Console
(Same as C200H Programming Console. CS1 Key Sheet used.)

A Complete Lineup of Units for Optimum Control

CS1

CPU Rack

NEW

Note: Connection is not possible to a 2-slot CPU Backplane.
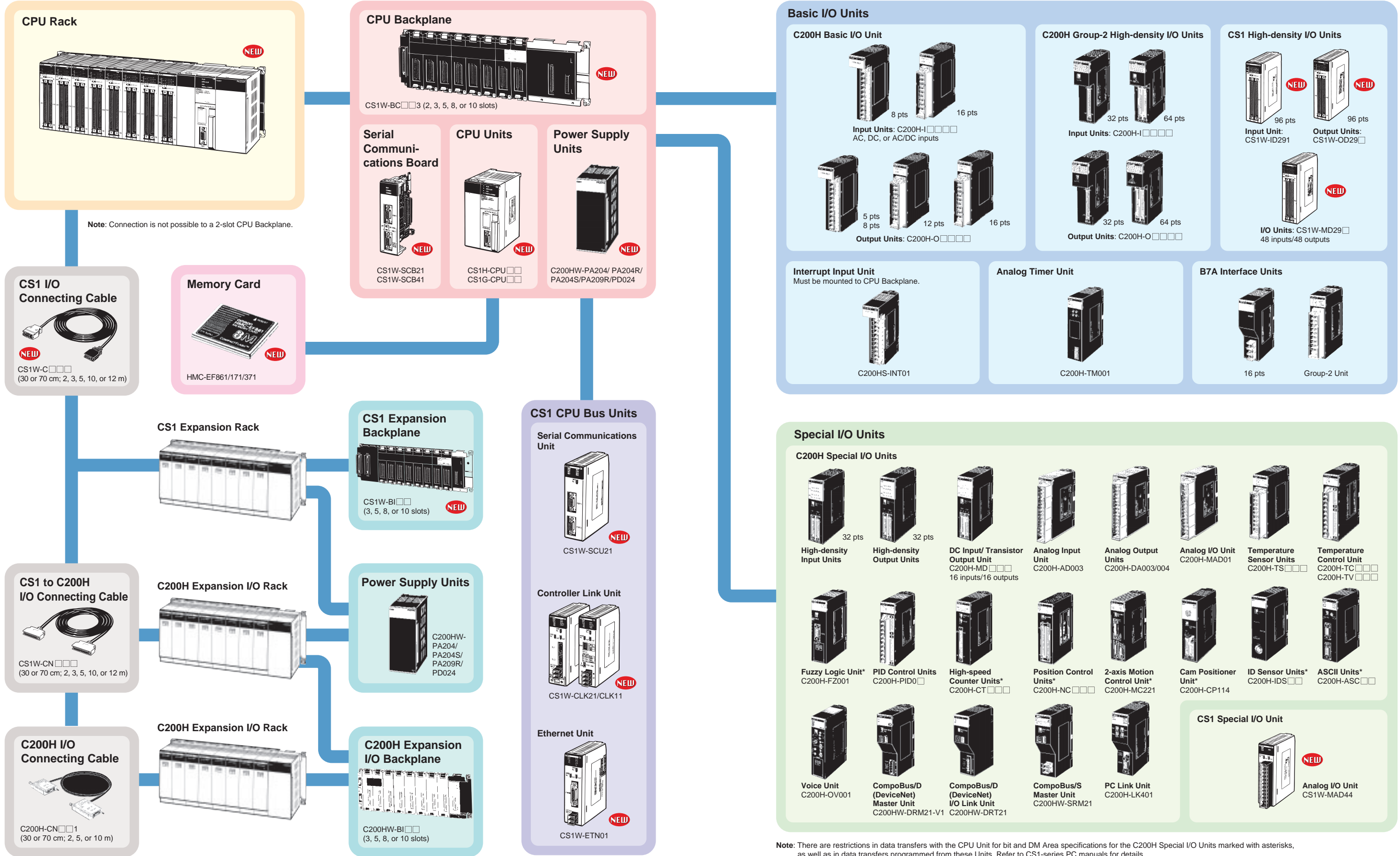
CPU Backplane

NEW

CS1W-BC□□3 (2, 3, 5, 8, or 10 slots)

Serial Communications Board
NEW
CS1W-SCB21
CS1W-SCB41

CPU Units
NEW
CS1H-CPU□□
CS1G-CPU□□

Power Supply Units
NEW
C200HW-PA204/ PA204R/
PA204S/PA209R/PD024

CS1 I/O Connecting Cable
NEW
CS1W-C□□□
(30 or 70 cm; 2, 3, 5, 10, or 12 m)

Memory Card
NEW
HMC-EF861/171/371

Basic I/O Units

C200H Basic I/O Unit
8 pts   16 pts
Input Units: C200H-I□□□□
AC, DC, or AC/DC inputs

5 pts
8 pts   12 pts   16 pts
Output Units: C200H-O□□□□

C200H Group-2 High-density I/O Units
32 pts   64 pts
Input Units: C200H-I□□□□

32 pts   64 pts
Output Units: C200H-O□□□□

CS1 High-density I/O Units
NEW   NEW
96 pts   96 pts
Input Unit: **Output Units**:
CS1W-ID291   CS1W-OD29□

NEW
I/O Units: CS1W-MD29□
48 inputs/48 outputs

Interrupt Input Unit
Must be mounted to CPU Backplane.
C200HS-INT01

Analog Timer Unit
C200H-TM001

B7A Interface Units
16 pts   Group-2 Unit

CS1 Expansion Rack

CS1 Expansion Backplane
CS1W-BI□□
(3, 5, 8, or 10 slots)   NEW

CS1 CPU Bus Units

Serial Communications Unit
NEW
CS1W-SCU21

Controller Link Unit
NEW
CS1W-CLK21/CLK11

Ethernet Unit
NEW
CS1W-ETN01

CS1 to C200H I/O Connecting Cable
CS1W-CN□□□
(30 or 70 cm; 2, 3, 5, 10, or 12 m)

C200H Expansion I/O Rack

Power Supply Units
C200HW-
PA204/
PA204S/
PA209R/
PD024

C200H I/O Connecting Cable
C200H-CN□□1
(30 or 70 cm; 2, 5, or 10 m)

C200H Expansion I/O Rack

C200H Expansion I/O Backplane
C200HW-BI□□
(3, 5, 8, or 10 slots)

Special I/O Units

C200H Special I/O Units

32 pts   32 pts

High-density Input Units   **High-density Output Units**   **DC Input/ Transistor Output Unit** C200H-MD□□□ 16 inputs/16 outputs   **Analog Input Unit** C200H-AD003   **Analog Output Units** C200H-DA003/004   **Analog I/O Unit** C200H-MAD01   **Temperature Sensor Units** C200H-TS□□□   **Temperature Control Unit** C200H-TC□□□ C200H-TV□□□

Fuzzy Logic Unit* C200H-FZ001   **PID Control Units** C200H-PID0□   **High-speed Counter Units*** C200H-CT□□□   **Position Control Units*** C200H-NC□□□   **2-axis Motion Control Unit*** C200H-MC221   **Cam Positioner Unit*** C200H-CP114   **ID Sensor Units*** C200H-IDS□□   **ASCII Units*** C200H-ASC□□

Voice Unit C200H-OV001   **CompoBus/D (DeviceNet) Master Unit** C200HW-DRM21-V1   **CompoBus/D (DeviceNet) I/O Link Unit** C200HW-DRT21   **CompoBus/S Master Unit** C200HW-SRM21   **PC Link Unit** C200H-LK401

CS1 Special I/O Unit
NEW
Analog I/O Unit CS1W-MAD44

Note: There are restrictions in data transfers with the CPU Unit for bit and DM Area specifications for the C200H Special I/O Units marked with asterisks, as well as in data transfers programmed from these Units. Refer to CS1-series PC manuals for details.

CPU Unit Components

Inner Board Compartment
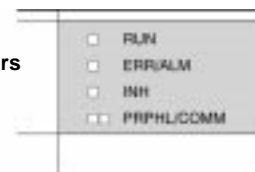
An Inner Board can be mounted here.

Peripheral Port

The peripheral port is connected to Programming Devices, such as a Programming Console or host computer.

RS-232C Port

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

Indicators

Memory Card Indicators

The MCPWR indicator flashes green when power is being supplied. The BUSY indicator flashes orange when the Memory Card is being accessed.

Memory Card Power Supply Switch

The Memory Card power supply switch is pressed to turn OFF power before removing the Memory Card.

Memory Card Eject Button

Press the Memory Card eject button to remove the Memory Card.

Memory Card Connector

Memory Card

With the CS1-series PCs, Memory Cards and specified ranges of the EM Area can be used as file memory. File memory can be used to store the entire user program, I/O memory contents, and/or parameter area contents.

File memory	Memory type	Capacity	Model
Memory Cards	Flash memory	8 MB	HMC-EF861
		15 MB	HMC-EF171
		30 MB	HMC-EF371
EM File Memory EM area Bank 0 Bank n Bank C EM File Memory	RAM	EM Area capacity of CPU Unit (Max. capacity for CS1H-CPU67: 832 KB).	From the specified bank in the EM area of I/O memory to the last bank (specified in PC Setup).

Note: Memory Card Adapter: HMC-AP001 (The Memory Card Adapter can be used to mount Memory Cards in PC card slots to use the Cards on a personal computer. Refer to page 45 for details.)

Connection with Peripheral Devices

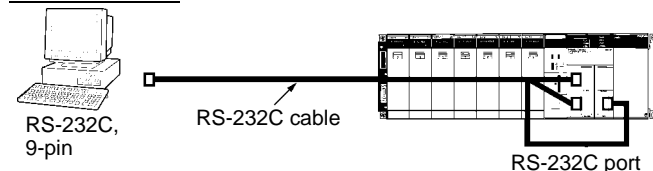## CX-Programmer Windows Programming Software (DOS)

Peripheral Port

RS-232C, 9-pin

Peripheral port

Peripheral Port Connecting Cable
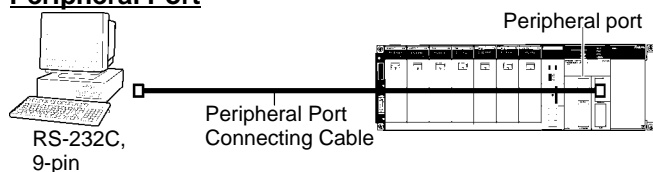
Peripheral Port Connecting Cables

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

RS-232C Port

RS-232C, 9-pin

RS-232C cable

RS-232C port

RS-232C Port Connecting Cables

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

Programming Consoles

CQM1-PRO01-E

CS1W-KS001-E Key Sheet

+

CQM1-PRO01-E Programming Console

Cable provided with CQM1-PRO01-E.

Peripheral port
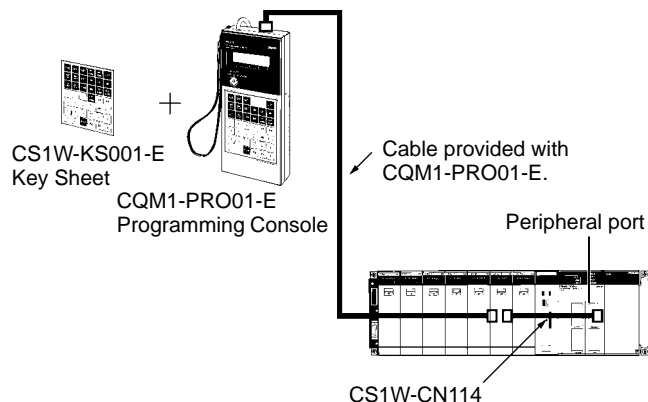
CS1W-CN114

Model	Cable	Cable length
CQM1-PRO01-E	CS1W-CN114	0.05 m

C200H-PRO27-E

CS1W-KS001-E Key Sheet

+

C200H-PRO27-E Programming Console

CS1W-CN224: 2.0 m
CS1W-CN624: 6.0 m

Peripheral port
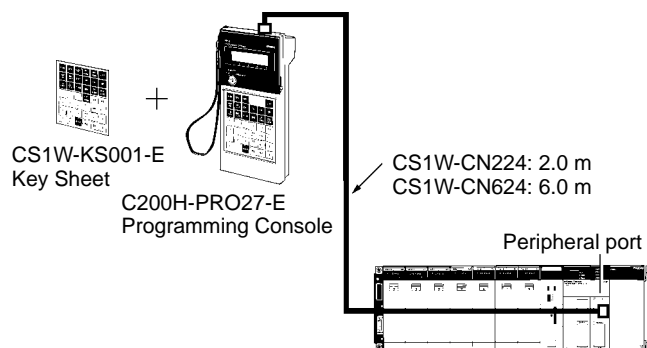
Model	Cable	Cable length
C200H-PR027-E	CS1W-CN224	2.0 m
	CS1W-CN624	6.0 m

13

Specifications

CPU Units

Model	I/O bits	Program capacity	Data memory capacity (See Note.)	LD instruction processing speed	Built-in ports	Options
CS1H-CPU67-E	5,120 bits (Up to 7 Expansion Racks)	250K steps	448K words	0.04 µs	Peripheral port and RS-232C port.	Memory Cards Inner Board such as Serial Communications Board
CS1H-CPU66-E		120K steps	256K words			
CS1H-CPU65-E		60K steps	128K words			
CS1H-CPU64-E		30K steps	64K words			
CS1H-CPU63-E		20K steps	32K words			
CS1G-CPU45-E	5,120 bits (Up to 7 Expansion Racks)	60K steps	128K words	0.08 µs		
CS1G-CPU44-E	1,280 bits (Up to 3 Expansion Racks)	30K steps	64K words			
CS1G-CPU43-E	960 bits (Up to 2 Expansion Racks)	20K steps	32K words			
CS1G-CPU42-E		10K steps	32K words			

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

Common Specifications

Item		Specification
Control method		Stored program
I/O control method		Cyclic scan and immediate processing are both possible.
Programming		Ladder diagram
Instruction length		1 to 7 steps per instruction
Ladder instructions		Approx. 400 (3-digit function codes)
Execution time		Basic instructions: 0.04 µs min., Special instructions: 0.12 µs min.
Number of tasks		288 (cyclic tasks: 32, interrupt tasks: 256)
		Cyclic tasks are executed each cycle and are controlled with TKON(820) and TKOF(821) instructions.
		The following 4 types of interrupt tasks are supported: Power OFF tasks:1 max., Scheduled interrupt tasks: 2 max., I/O interrupt tasks: 32 max., External interrupt tasks: 256 max.
Interrupt types		Scheduled Interrupts: Interrupts generated at a time scheduled by CPU Unit's built-in timer.
		I/O Interrupts: Interrupts from Interrupt Input Units.
		Power OFF Interrupts: Interrupts executed when CPU Unit's power is turned OFF.
		External I/O Interrupts: Interrupts from Special I/O Units, CS1 Special Units, or Inner Board.
CIO (Core I/O) Area (The CIO Area can be used as work bits if not used as shown here.)	I/O Area	5,120 : CIO 000000 to CIO 031915 (320 words from CIO 0000 to CIO 0319)
		Setting of first rack words can be changed from default (CIO 0000) so that CIO 0000 to CIO 0999 can be used.
		I/O bits are allocated to Basic I/O Units, such as CS1 Basic I/O Units, C200H Basic I/O Units, and C200H Group-2 High-density I/O Units.
	Link Area	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 and PC Link Systems.
	CS1 CPU Bus Unit Area	6,400 (400 words): CIO 150000 to CIO 189915 (words CIO 1500 to CIO 1899)
		CS1 CPU Bus Unit bits store operating status of CS1 CPU Bus Units. (25 words per Unit, 16 Units max.)
	Special I/O Unit Area	15,360 (960 words): CIO 200000 to CIO 295915 (words CIO 2000 to CIO 2959)
		Special I/O Unit bits are allocated to CS1 Special I/O Units and C200H Special I/O Units. (See Note.)
		(10 words per Unit, 96 Units max.) The maximum number of slots, however, is limited to 80 including expansion slots, so maximum number of Units is actually 80.)
		Note Some I/O Units are classified as Special I/O Units.
	Inner Board Area	1,600 (100 words): CIO 190000 to CIO 199915 (words CIO 1900 to CIO 1999)
		Inner Board bits are allocated to Inner Boards. (100 I/O words max.)
	SYSMAC BUS Area	800 (50 words): CIO 300000 to CIO 304915 (words CIO 3000 to CIO 3049)
		SYSMAC BUS bits are allocated to Slave Racks connected to SYSMAC BUS Remote I/O Master Units. (10 words per Rack, 5 Racks max.)

Specifications

Item			Specification
CIO (Core I/O) Area, contd. (The CIO Area can be used as work bits if not used as shown here.)	I/O Terminal Area		512 (32 words): CIO 310000 to CIO 313115 (words CIO 3100 to CIO 3131)
			I/O Terminal bits are allocated to I/O Terminal Units (but not to Slave Racks) connected to SYSMAC BUS Remote I/O Master Units. (1 word per Terminal, 32 Terminals max.)
	C200H Special I/O Unit Area		8,196 (512 words): CIO 000000 to CIO 051115 (words CIO 0000 to CIO 0511)
			C200H Special I/O Unit bits are allocated to C200H Special I/O Units and allow access separate from I/O refreshing.
		CompoBus/D Area	1,600 (100 words): Outputs: CIO 005000 to CIO 009915 (words CIO 0050 to CIO 0099) Inputs: CIO 035000 to CIO 039915 (words CIO 0350 to CIO 0399)
			CompoBus/D bits are allocated to Slaves according to CompoBus/D remote I/O communications.
		PC Link Area	64 bits (4 words): CIO 027400 to CIO 025015 (words CIO 0247 to CIO 0250)
			When a PC Link Unit is used in a PC Link, use these bits to monitor PC Link errors and operating status of other CPU Units in PC Link.
	Internal I/O Area		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 CIO Area are used as work bits in programming to control program execution. They cannot be used for external I/O.
Work Area			8,192 bits (512 words): W00000 to W51115 (words W000 to W511)
			Control programs only. (I/O from external I/O terminals is not possible.)
			Note When using work bits in programming, use bits in Work Area first before using bits from other areas.
Holding Area			8,192 bits (512 words): H00000 to H51115 (words H000 to H511)
			Holding bits are used to control execution of program, and maintain their ON/OFF status when PC is turned OFF or operating mode is changed.
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.
Temporary Area			16 bits (TR00 to TR15) Temporary bits are used to store ON/OFF execution conditions at program branches.
Timer Area			4,096: T0000 to T4095 (used for timers only)
Counter Area			4,096: C0000 to C4095 (used for counters only)
DM Area			32K words: D00000 to D32767
			Used as a general-purpose data area for reading and writing data in word units (16 bits). Words in DM Area maintain their status when PC is turned OFF or operating mode is changed.
			Internal Special I/O Unit DM Area: D20000 to D29599 (100 words × 96 Units). Used to set parameters.
			CS1 CPU Bus Unit DM Area: D30000 to D31599 (100 words × 16 Units). Used to set parameters.
			Inner Board DM Area: D32000 to D32099. Used to set parameters for Inner Boards.
EM Area			32K words per bank, 13 banks max.: E0_00000 to EC_32767 max. (Not available on some CPU Units.)
			Used as a general-purpose data area for reading and writing data in word units (16 bits). Words in EM Area maintain their status when PC is turned OFF or operating mode is changed.
			The EM Area is divided into banks, and addresses can be set by either of following methods.
			Changing current bank using EMBC(281) instruction and setting addresses for current bank.
			Setting bank numbers and addresses directly.
			EM data can be stored in files by specifying number of first bank. (EM file memory)
Data Registers			DR0 to DR15. Store offset values for indirect addressing. Data registers can be used independently in each task. One register is 16 bits (1 word).
Index Registers			IR0 to IR15. Store PC memory addresses for indirect addressing. Index registers can be used independently in each task. One register is 32 bits (2 words).
Task Flag Area			32 (TK0000 to TK0031). Task Flags are read-only flags that are ON when corresponding cyclic task is executable and OFF when corresponding task is not executable or in standby status.
Trace Memory			4000 words (trace data: 31 bits, 6 words)
File Memory			Memory Cards: Compact flash memory cards can be used (MS-DOS format).
			EM file memory: Part of EM Area can be converted to file memory (MS-DOS format).
			OMRON Memory Cards with 8-MB, 15-MB, or 30-MB capacities can be used.

Specifications

Function Specifications

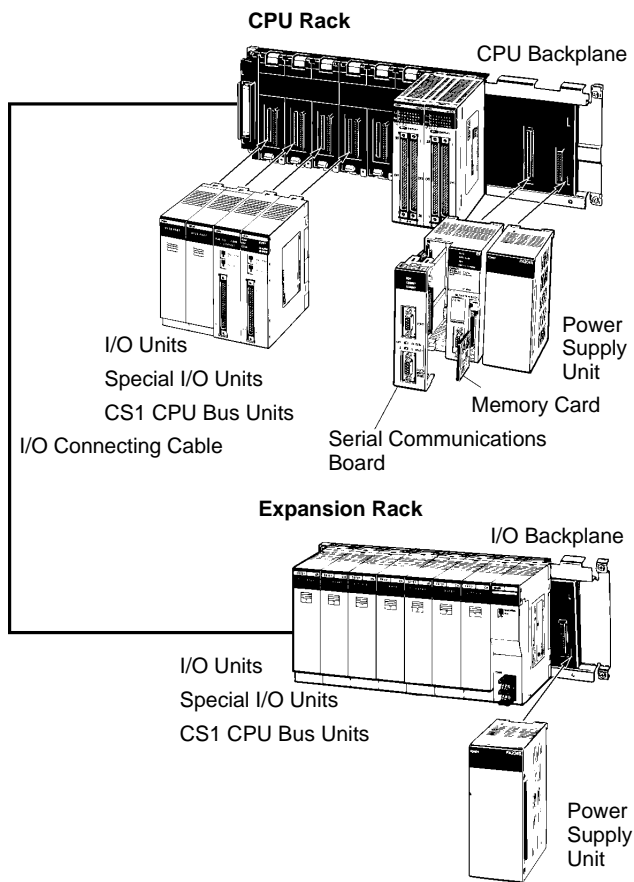| Item	Specification
Constant cycle time	1 to 32,000 ms (Unit: 1 ms)
Cycle time monitoring	Possible (Unit stops operating if cycle is too long): 1 to 40,000 ms (Unit: 10 ms)
I/O refreshing	Cyclic refreshing, immediate refreshing, refreshing by IORF(097).
I/O memory holding when changing operating modes	Depends on ON/OFF status of IOM Hold Bit in Auxiliary Area.
Load OFF	All outputs on Output Units can be turned OFF when CPU Unit is operating in RUN or MONITOR mode.
Input time constant setting	Time constants can be set for inputs from CS1 Basic I/O Units. The time constant can be increased to reduce influence of noise and chattering or it can be decreased to detect shorter pulses on inputs.
Mode setting at power-up	Possible
Memory Card functions	Automatic reading programs from Memory Card (autoboot).
	Memory Card Storage Data User program: Program file format
	I/O memory, PC Setup: Data file format (binary)
	Memory Card Read/Write
	User program instructions , Peripheral Devices (such as Programming Console), Host Link computer.
Filing	Memory Card data and EM (Extended Data Memory) Area can be handled as files.
Debugging	Force-set/reset, differential monitoring, data tracing (scheduled, each cycle, or when instruction is executed), instruction error tracing.
Online editing	User programs can be overwritten in program-block units when CPU Unit is in MONITOR mode. This function is not available for block programming areas.
Program protection	Overwrite protection: Set using DIP switch.
	Copy protection: Password set using Peripheral Device.
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 execution time and logic of each programming block.
Error log	Up to 20 errors are stored in error log. Information includes error code, error details, and time error occurred.
Serial communications	Built-in peripheral port: Peripheral Device (including Programming Console), Host Links, NT Links
	Built-in RS-232C port: Peripheral Device (excluding Programming Console), Host Links, no-protocol communications, NT Links
	Communications Board (sold separately): Protocol macros, Host Links, NT Links
Clock	Provided on all models.
	Note Used to store time when power is turned ON and when errors occur.
Power OFF detection time	10 to 25 ms (not fixed)
Power OFF detection delay time	0 to 10 ms (user-defined, default: 0 ms)
Memory protection	Held Areas: Holding bits, contents of Data Memory and Extended Data Memory, and status of counter Completion Flags and present values.
	Note If IOM Hold Bit in Auxiliary Area is turned ON, and PC Setup is set to maintain IOM Hold Bit status when power to PC is turned ON, contents of CIO Area, Work Area, part of Auxiliary Area, timer Completion Flag and PVs, Index Registers, and Data Registers will be saved for up to 20 days.
Sending commands to a Host Link computer	FINS commands can be sent to a computer connected via Host Link System by executing Network Communications Instructions from PC.
Remote programming and monitoring	Host Link communications can be used for remote programming and remote monitoring through a Controller Link System or Ethernet network.
Three-level communications	Host Link communications can be used for remote programming and remote monitoring from devices on networks up to two levels away (Controller Link Network, Ethernet Network, or other network).
Storing comments in CPU Unit	I/O comments can be stored in CPU Unit in Memory Cards or EM file memory.
Program check	Program checks are performed at beginning of operation for items such as no END instruction and instruction errors. A Peripheral Device can also be used to check programs.
Control output signals	RUN output: The contacts will turn ON (close) while CPU Unit is operating. These terminals are provided only on C200HW-PA204R and C200HW-PA209R Power Supply Units.
Battery life	Battery Set: CS1W-BAT01
Self-diagnostics	CPU errors (watchdog timer), I/O verification errors, I/O bus errors, memory errors, and battery errors.
Other functions	Storage of number of times power has been interrupted, the times of the interrupts, and system operation time (in Auxiliary Area).

Specifications

General Specifications

Item	Specifications				
Power Supply Unit	C200HW-PA204	C200HW-PA204S	C200HW-PA204R	C200HW-PA209R	C200HW-PD024
Supply voltage	100 to 120 VAC or 200 to 240 VAC, 50/60 Hz				24 VDC
Operating voltage range	85 to 132 VAC or 170 to 264 VAC				19.2 to 28.8 VDC
Power consumption	120 VA max.			180 VA max.	40 W max.
Inrush current	30 A max.			30 A max./100 to 120 VAC 40 A max./200 to 240 VAC	30 A max.
Output capacity	4.6 A, 5 VDC (including CPU Unit power)			9 A, 5 VDC (including CPU Unit power)	4.6 A, 5 VDC (including CPU Unit power)
	0.625 A, 26 VDC Total: 30 W	0.625 A, 26 VDC or 0.8 A, 24 VDC Total: 30 W		1.3 A, 26 VDC Total: 45 W	0.625 A, 26 VDC Total: 30 W
Output terminal (service supply)	Not provided	24 VDC load current consumption Less than 0.3 A: +17%/11% 0.3 A or greater: +10%/11% (Lot No. 0187 or higher)	Not provided		Not provided
RUN output (See Note 2.)	Not provided		Contact configuration: SPST-NO Switch capacity: 250 VAC, 2 A (resistive load) 250 VAC, 0.5 A (induction load), 24 VDC, 2 A	Contact configuration: SPST-NO Switch capacity: 240 VAC, 2 A (resistive load) 120 VAC, 0.5 A (inductive load) 24 VDC, 2 A (resistive load) 24 VDC, 2 A (inductive load)	Not provided
Insulation resistance	20 MΩ min. (at 500 VDC) between AC external and GR terminals (See Note 1.)				20 MΩ min. (at 500 VDC) between DC external and GR terminals (See Note 1.)
Dielectric strength	2,300 VAC 50/60 Hz for 1 min between AC external and GR terminals (See Note 1.) Leakage current: 10 mA max.				1,000 VAC 50/80 Hz for 1 min between DC external and GR terminals, leakage current: 10 mA max. (See Note 1.)
	1,000 VAC 50/60 Hz for 1 min between AC external and GR terminals (See Note 1.) Leakage current: 10 mA max.				
Noise immunity	1,500 Vp-p, pulse width: 100 ns to 1μs, rise time: 1 ns pulse (via noise simulation)				
Vibration resistance	10 to 57 Hz, 0.075-mm amplitude, 57 to 150 Hz, acceleration: 1G (9.8 m/s^2) in X, Y, and Z directions for 80 minutes (Time coefficient: 8 minutes × coefficient factor 10 = total time 80 min.) CPU Unit mounted to a DIN track: 2 to 55 Hz, 0.3 G in X, Y, and Z directions for 20 minutes				
Shock resistance	15G (147 m/s^2)3 times each in X, Y, and Z directions (according to JIS CO912)				
Ambient operating temperature	0 to 55°C				
Ambient operating humidity	10% to 90% (with no condensation)				
Atmosphere	Must be free from corrosive gases.				
Ambient storage temperature	−20 to 70°C (excluding battery)				
Grounding	Less than 100 Ω				
Enclosure	Mounted in a panel.				
Weight	All models are each 6 kg max.				
CPU Rack Dimensions (mm) (See note 3.)	2 slots: 198.5 × 157 × 123 (W x H x D) 3 slots: 260 × 130 × 123 (W x H x D) 5 slots: 330 × 130 × 123 (W x H x D)			8 slots: 435 × 130 × 123 (W x H x D) 10 slots: 505 × 130 × 123 (W x H x D)	
Safety measures	Conforms to UL, CSA, NK, and EC directives.				

Note: 1. Disconnect the Power Supply Unit's LG terminal from the GR terminal when testing insulation and dielectric strength.

2. Only when mounted to a Backplane.

3. Depth is 153 mm for C200H-PA209R.

Basic System Configuration

CPU Rack

CPU Backplane

I/O Units
Special I/O Units
CS1 CPU Bus Units
I/O Connecting Cable

Serial Communications
Board

Memory Card

Power
Supply
Unit

Expansion Rack

I/O Backplane

I/O Units
Special I/O Units
CS1 CPU Bus Units

Power
Supply
Unit

CPU Unit

A CPU Rack consists of a CPU Unit, Power Supply Unit, CPU Backplane, Basic I/O Units, Special I/O Units, and CPU Bus Units. The Serial Communications Board and Memory Cards are optional.

Note: 1. The Backplane depends on the type of CPU Rack, Expansion I/O Racks, and Slave Racks that are used.

2. A maximum of four C200HS-INT01 Interrupt Input Units can be mounted under one CPU Unit.

Expansion Racks
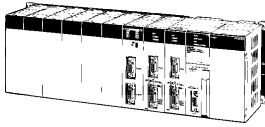
Both C200H and CS1 Expansion Racks can be used.

- C200H Expansion I/O Racks can be connected to CPU Racks, CS1 Expansion Racks, or other C200H Expansion I/O Racks.

- CS1 Expansion Racks can be connected to CPU Racks or other CS1 Expansion Racks.
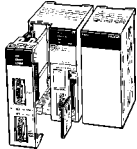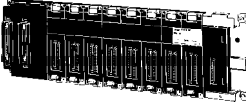
An Expansion Rack consists of a Power Supply Unit, a CS1 or C200H Expansion I/O Backplane , Basic I/O Units, Special I/O Units, and a CS1 CPU Bus Units.

CPU Rack

■ Configuration

Name	Configuration	Remarks
CPU Rack	CPU Backplane	One of each Unit required for every CPU Rack.
	CPU Unit	Refer to the following table for model number.
	Power Supply Unit	
	Memory Card	Install as required.
	Serial Communications Board	Refer to the following table for model number.

■ Products Used in CPU Racks

Name	Model	Specifications
CPU Units	CS1H-CPU67-E	I/O bits: 5,120, Program capacity: 250K steps Data Memory: 448K words (DM: 32K words, EM: 32K words x 13 banks)
	CS1H-CPU66-E	I/O bits: 5,120, Program capacity: 120K steps Data Memory: 256K words (DM: 32K words, EM: 32K words x 7 banks)
	CS1H-CPU65-E	I/O bits: 5,120, Program capacity: 60K steps Data Memory: 128K words (DM: 32K words, EM: 32K words x 3 banks)
	CS1H-CPU64-E	I/O bits: 5,120, Program capacity: 30K steps Data Memory: 64K words (DM: 32K words, EM: 32K words x 1 bank)
	CS1H-CPU63-E	I/O bits: 5,120, Program capacity: 20K steps Data Memory: 32K words (DM: 32K words, EM: None)
	CS1G-CPU45-E	I/O bits: 5,120, Program capacity: 60K steps Data Memory: 128K words (DM: 32K words, EM: 32K words x 3 banks)
	CS1G-CPU44-E	I/O bits: 1,280, Program capacity: 30K steps Data Memory: 64K words (DM: 32K words, EM: 32K words x 1 banks)
	CS1G-CPU43-E	I/O bits: 960, Program capacity: 20K steps Data Memory: 32K words (DM: 32K words, EM: None)
	CS1G-CPU42-E	I/O bits: 960, Program capacity: 10K steps Data Memory: 32K words (DM: 32K words, EM: None)
CPU Backplanes	CS1W-BC023	2 slots (Connection is not possible to Expansion Backplane)
	CS1W-BC033	3 slots
	CS1W-BC053	5 slots
	CS1W-BC083	8 slots
	CS1W-BC103	10 slots
Power Supply Units	C200HW-PA204	100 to 120 VAC or 200 to 240 VAC, Output capacity: 4.6 A, 5 VDC
	C200HW-PA204S	100 to 120 VAC or 200 to 240 VAC (0.8 A 24 VDC service power) Output capacity: 4.6 A, 5 VDC
	C200HW-PA204R	100 to 120 VAC or 200 to 240 VAC (with RUN output) Output capacity: 4.6 A, 5 VDC
	C200HW-PD024	24 VDC, Output capacity: 4.6 A, 5 VDC
	C200HW-PA209R	100 to 120 VAC or 200 to 240 VAC (with RUN output) Output capacity: 9 A, 5 VDC
Memory Cards	HMC-EF861	Flash memory, 8 MB
	HMC-EF171	Flash memory, 15 MB
	HMC-EF371	Flash memory, 30 MB
	HMC-AP001	Memory Card adapter
Serial Communications Boards	CS1W-SCB21	2 x RS-232C ports, protocol macro function
	CS1W-SCB41	1 x RS-232C port + 1 x RS-422/485 port, protocol macro function
Programming Consoles	CQM1-PRO01-E	An English Keyboard Sheet (CS1W-KS001-E) is required.
	C200H-PRO27-E	
Programming Console Connection 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)

CPU Rack

Name	Model	Specifications
Peripheral Device Connecting Cables (for peripheral port)	CS1W-CN118	Connects DOS computer, D-Sub 9-pin receptacle (Length: 0.1 m)
	CS1W-CN226	Connects DOS computer, D-Sub 9-pin (Length: 2.0 m)
	CS1W-CN626	Connects DOS computer, D-Sub 9-pin (Length: 6.0 m)
Peripheral Device Connecting Cables (for RS-232C port)	XW2Z-200S-V	Connects DOS computer, D-Sub 9-pin (Length: 2.0 m)
	XW2Z-500S-V	Connects DOS computer, D-Sub 9-pin (Length: 5.0 m)
Battery Set	CS1W-BAT01	For CS1 Series only.

Expansion Racks

■ Expansion Rack Configuration

Rack	Configuration		Remarks
CS1 Expansion Rack	CS1 Expansion I/O Backplane		One of each Unit is required.
	Power Supply Unit		
	CPU Backplane or CS1 Expansion I/O Backplane	CS1 I/O Connecting Cable	
	C200H Expansion I/O Backplane	CS1 to C200H I/O Connecting Cable	
C200H Expansion I/O Rack	C200H Expansion I/O Backplane		One of each Unit is required.
	Power Supply Unit		A CS1 Expansion Rack cannot be connected after a C200H Expansion I/O Rack.
	CPU Backplane or CS1 Expansion I/O Backplane	CS1 to C200H I/O Connecting Cable	
	C200H Expansion I/O Backplane	C200H I/O Connecting Cable	

■ Products Used in Expansion Racks

Name	Model	Specifications	Cable Length
CS1 Expansion I/O Backplanes	CS1W-BI033	3 slots	---
	CS1W-BI053	5 slots	
	CS1W-BI083	8 slots	
	CS1W-BI103	10 slots	
C200H Expansion I/O Backplanes	C200HW-BI031	3 slots	
	C200HW-BI051	5 slots	
	C200HW-BI081	8 slots	
	C200HW-BI101	10 slots	
Power Supply Units	C200HW-PA204	100 to 120 VAC or 200 to 240 VAC	
		Output capacity: 4.6 A, 5 VDC	
	C200HW-PA204S	100 to 120 VAC or 200 to 240 VAC (with power output terminal: 0.8 A, 24 VDC)	
		Output capacity: 4.6 A, 5 VDC	
	C200HW-PA204R	100 to 120 VAC or 200 to 240 VAC (with RUN output)	
		Output capacity: 4.6 A, 5 VDC	
	C200HW-PD024	24 VDC	
	C200HW-PA209R	100 to 120 VAC or 200 to 240 VAC (with RUN output)	
		Output capacity: 9 A, 5 VDC	
CS1 I/O Connecting Cables	CS1W-CN313	Connects CS1 Expansion I/O Backplanes to CPU Backplanes or other CS1 Expansion I/O Backplanes.	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-CN133-B2		12 m
CS1-C200H I/O Connecting Cables	CS1W-CN311	Connects C200H Expansion I/O Backplanes to CPU Backplanes or CS1 Expansion I/O Backplanes.	0.3 m
	CS1W-CN711		0.7 m
	CS1W-CN221		2 m
	CS1W-CN321		3 m
	CS1W-CN521		5 m
	CS1W-CN131		10 m
	CS1W-CN131-B2		12 m
C200H I/O Connecting Cables	CS1W-CN311	Connects C200H Expansion I/O Backplanes to other C200H Expansion I/O Backplanes.	0.3 m
	CS1W-CN711		0.7 m
	CS1W-CN221		2 m
	CS1W-CN521		5 m
	CS1W-CN131		10 m

Expansion Racks

■ Expansion Rack Patterns

The following diagrams show the 3 possible patterns of Expansion Racks.

CPU Rack with CS1 Expansion Racks

CPU Rack

CS1 I/O
Connecting
Cable

CS1 Expansion Rack

CS1 I/O
Connecting
Cable

CS1 Expansion Rack

7 Racks max.

CS1 I/O
Connecting
Cable
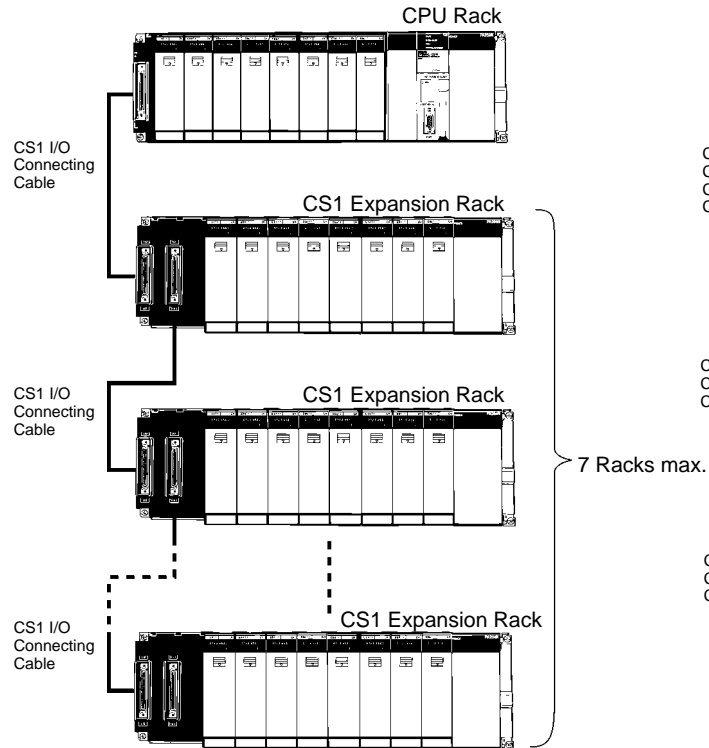
CS1 Expansion Rack

CPU Rack with C200H Expansion I/O Racks

CPU Rack

CS1 to
C200H I/O
Connecting
Cable

C200H Expansion
I/O Rack

C200H I/O
Connecting
Cable

C200H Expansion
I/O Rack

3 Racks max.

C200H I/O
Connecting
Cable

C200H Expansion
I/O Rack

CPU Rack with CS1 Expansion Racks and C200H Expansion I/O Racks

CPU Rack

CS1 I/O
Connecting
Cable

CS1 Expansion Rack

CS1 to C200H
I/O Connecting
Cable

C200H Expansion
I/O Rack

C200H I/O
Connecting
Cable

C200H I/O
Connecting
Cable
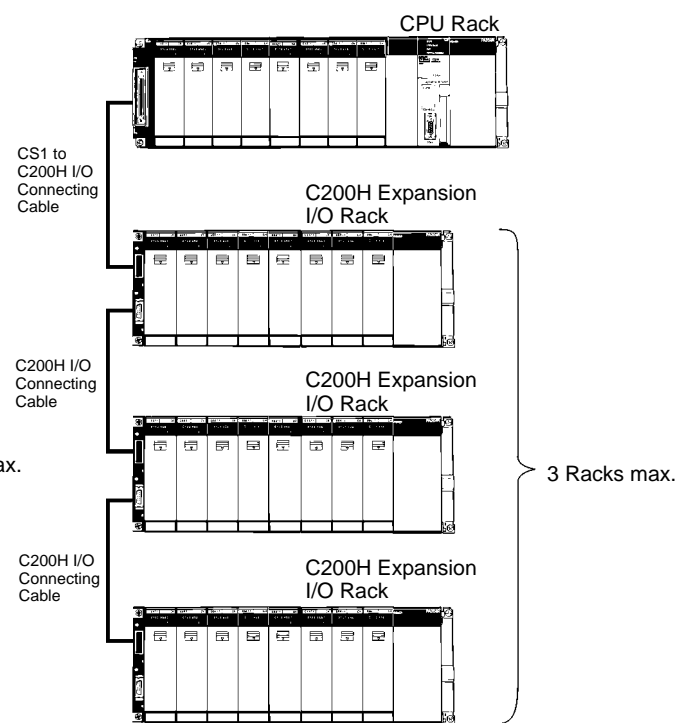
C200H Expansion
I/O Rack

7 Racks max. (3 C200H
Expansion I/O Racks max.)
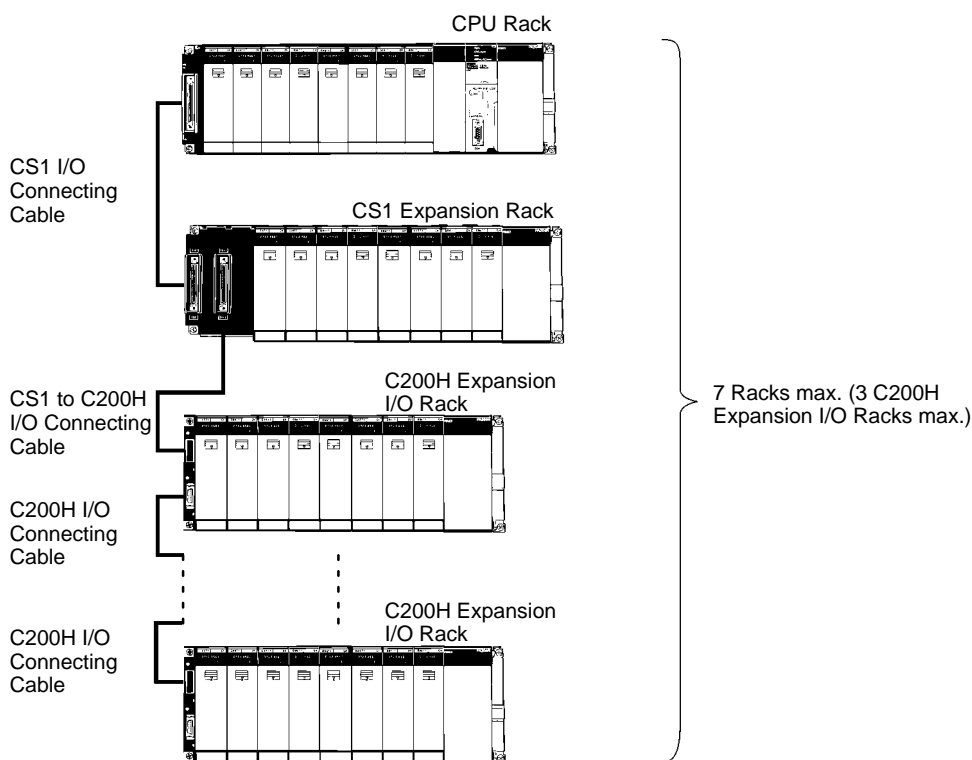
Mounting Dimensions

■ Dimensions
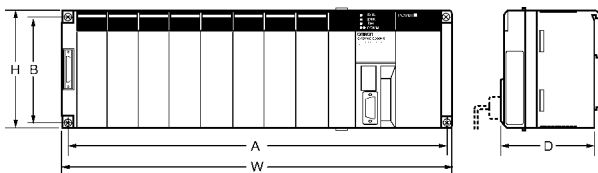
Unit: mm

Backplane	A	B	W	H	D
CS1W-BC023 (2 slots)	172.3	145	198.5	157	123
CS1W-BC033 (3 slots)	246	118	260	130	
CS1W-BC053 (5 slots)	316		330		
CS1W-BC083 (8 slots)	421		435		
CS1W-BC103 (10 slots)	491		505		

■ Backplanes

CPU Backplane with 2 Slots
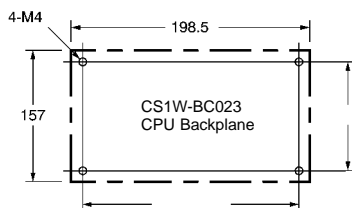
Note: Expansion Backplanes cannot be connected to 2-slot CPU Backplanes.

CPU Backplane with 3, 5, 8, or 10 Slots
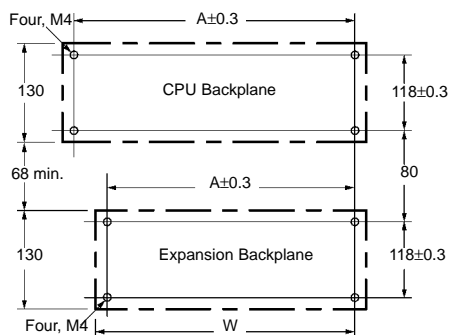
Unit: mm

Backplane	Model	A	W
CPU Backplanes	C200HW-BC033 (3 slots)	246	260
	C200HW-BC053 (5 slots)	316	330
	C200HW-BC083 (8 slots)	421	435
	C200HW-BC103 (10 slots)	491	505
C200H Expansion I/O Backplanes	C200HW-BI033 (3 slots)	246	260
	C200HW-BI053 (5 slots)	316	330
	C200HW-BI083 (8 slots)	421	435
	C200HW-BI103 (10 slots)	491	505
CS1 Expansion Backplanes	CS1W-BI031 (3 slots)	175	189
	CS1W-BI051 (5 slots)	245	259
	CS1W-BI081 (8 slots)	350	364
	CS1W-BI101 (10 slots)	420	434

■ Mounting Height

The height of all Racks is from 118 to 153 mm depending on the Units that are mounted. Additional height is required to connect Peripheral Devices and Cables. Be sure to allow sufficient mounting height.
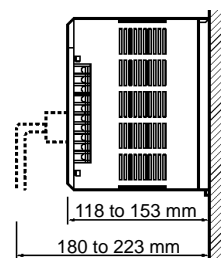
Note: I/O Connecting Cables are 12 m long max. and require sufficient space to maintain the min. bending radius.

CS1 I/O Connecting Cable (Cable diameter: 8.6 mm)

R ≧ 69 mm
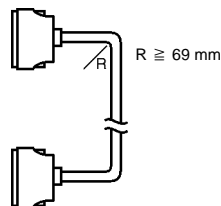
C200H I/O Connecting Cable (Cable diameter: 5.1 mm)

R ≧ 41 mm
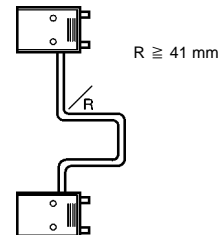
CS1 to C200H I/O Connecting Cable (Cable diameter: 5.1 mm)

R ≧ 41 mm
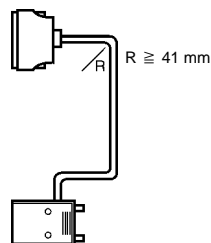
Better Basic Performance

Large Program, Memory, and I/O Capacity; High-speed Instructions and Peripheral Servicing

■ Better Machine Performance with High-speed Processing

CS1-series PLCs provide ample speed for advanced machine interfaces, communications, and data processing.

4 Times the Execution Speed

Faster instruction processing includes 0.04 μs for LD (2.5 to 5 times faster), 0.25 μs for MOV (1.7 to 2.5 times faster), and 0.17 μs for CMP (2.5 to 3 times faster). And special instructions are processed almost as fast as basic ones (e.g., as fast as 0.25 μs for some instructions).

C200HX/HG/HE

⊣ ⊢	0.104 to 0.208 μs
MOV	0.417 to 0.625 μs
CMP	0.417 to 0.521 μs

CS1

⊣ ⊢	0.04 μs
MOV	0.25 μs
CMP	0.17 μs
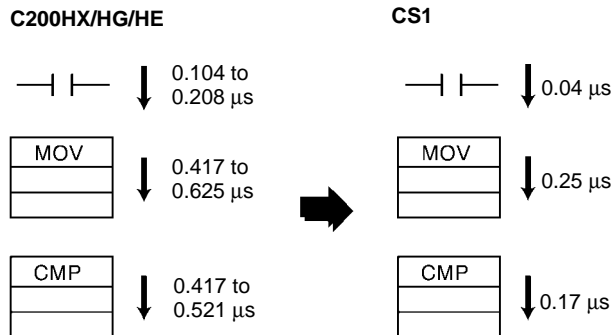
4 Times the Peripheral Servicing and I/O Refresh Speed

CS1 refresh time for 96 input points: 0.02 ms (15 times faster)
For 96 output points: 0.02 ms (10 times faster)
For 256 words for Communications Unit: 0.02 ms 4 times faster)

C200HX/HG/HE

I/O refresh
- 64-pt Input Unit — 0.2ms
- 32-pt Input Unit — 0.1ms
- 64-pt Output Unit — 0.13ms
- 32-pt Output Unit — 0.1ms
- Communications Unit (256 words) — 1.7ms

CS1

I/O refresh
- 96-pt Input Unit — 0.02ms
- 96-pt Output Unit — 0.02ms
- Communications Unit (256 words) — 0.45ms
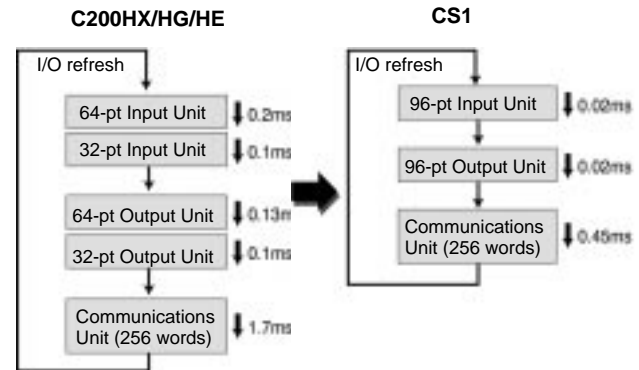
3 Times the Overall Cycle Speed

The following examples are for 20K-step programs.

C200HX/HG/HE

I/O refresh
Peripheral service
15 ms

CS1

I/O refresh
Peripheral service
5 ms
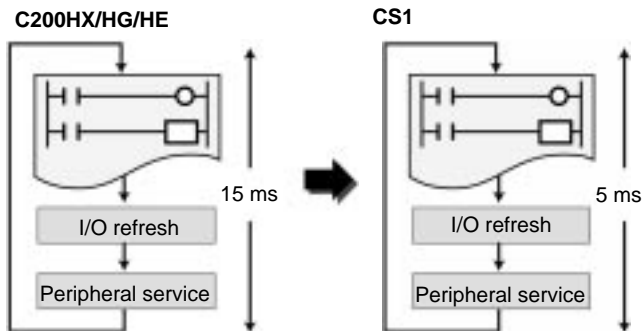
■ Large Capacities to Do the Job

CS1-series PCs also provide ample capacity for advanced machine interfaces, communications, and data processing.

4 Times the Program Capacity

Create programs with up to 250K steps.

C200HX/HG/HE
63.2K words max.

CS1
250K steps max.
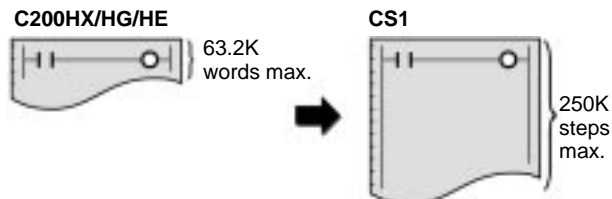
4.3 Times the I/O Capacity

Handle up to 5,120 I/O points.

C200HX/HG/HE
1,184 I/O points

CS1
5,120 I/O points
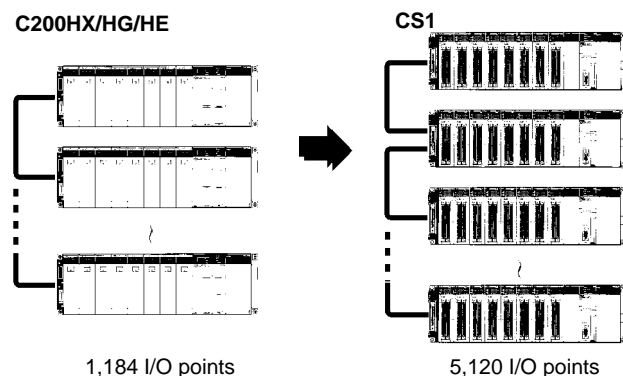
Better Basic Performance

4.5 Times the Data Memory

Use up to 448K words of data memory (word data).

C200HX/HG/HE

```
DM000
        ┊
DM6143        } 100K
EM0000          words
        ┊
EM6143
```

CS1

```
D0000
        ┊     } 32K
D32767    words
E0_00000
        ┊     } Up to 13 banks
EC_00000    (416K words)
```
} 448K words
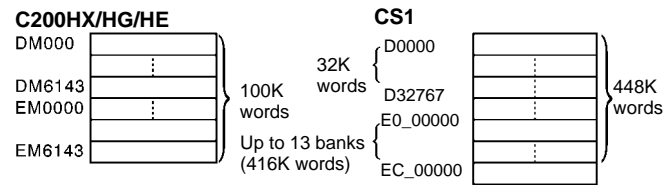
16 Times the Number of Timers/Counters

Program up to 4,096 timers and 4,096 counters.

C200HX/HG/HE

TIM2 TIM1 CNT3

512 timers and counters total

CS1

TIM3 CNT3 TIM4 TM2 CNT2 TIM1 CNT1

4,096 timers and 4,096 counters
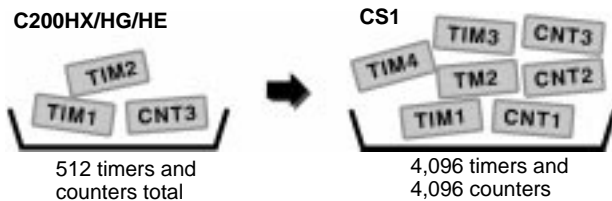
■ Expansive Instruction Set

Symbol Comparison, Data Control, Network Communications, Text String Processing, and many other new instructions.

New Instructions for Medium-size PC

Text String Processing, FIFO and LIFO and Record Processing for Table Data, File Memory Processing, Repeat Processing (FOR/NEXT), Command Send (CMND), Index Register Processing, High-speed Transfers, Floating-point Decimal, and many others.

■ Use Legacy Programs

The CX-Programmer can be used to convert programs from other OMRON PCs.

C200H
C200HS
C200HX/HG/HE
CV Series
C1000H

➡ CX-Programmer conversion ➡ CS1
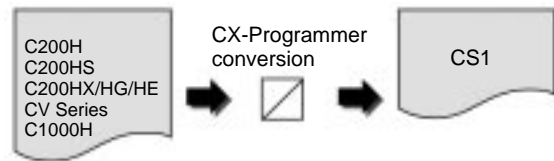
■ Large Capacity Data Handling with Each Instruction

The basic operand specifications have been converted from BCD to binary to increase data handling capacity.

Item	C200HX/HG/HE	CS1
Block transfers	0 to 9999 words	0 to 65535 words
Indirect addressing range	DM 00000 to DM 9999	D00000 to D32767
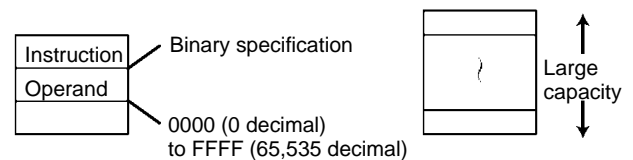
Instruction / Binary specification
Operand
0000 (0 decimal) to FFFF (65,535 decimal)

Large capacity

■ Use C200H Units

All of the I/O Units and Special I/O Units and a portion of the Communications Units used for the C200H, C200HS, and C200HX/HG/HE can be used, as can C200H Expansion I/O Racks.

All C200H I/O Units (except for C200H-ID001/002)

All C200H Special I/O Units

C200H Communications Units: SYSMAC BUS Remote I/O Master Unit, CompoBus/D Master Unit, CompoBus/S Master Unit, PC Link UNit, and B7A Link Unit

CS1 I/O Units

CS1 Special I/O Units

CS1 CPU Bus Units (including Communications Units)

Note: There are restrictions in data transfers with the CPU Unit for bit and DM Area specifications for the C200H Special I/O Units marked with asterisks, as well as in data transfers programmed from these Units. Refer to CS1-series PC manuals for details.

Better Design/Development Efficiency

Structured Programming and Team Program Development with Tasks

■ Task Programming

With CS1-series PCs, programs can be divided into programming units called tasks. There are both cyclic tasks, which are executed each cycle in a specified order, and interrupt tasks, which are executed when an interrupt occurs.
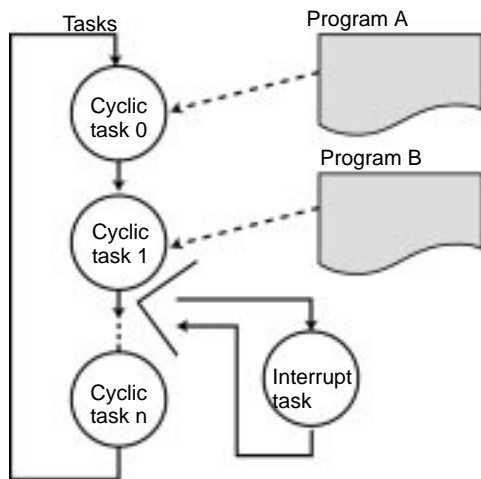
Comparison to Previous PCs

Although previously a PC program was something like one long scroll, task programs more like separate cards arranged in order of execution.
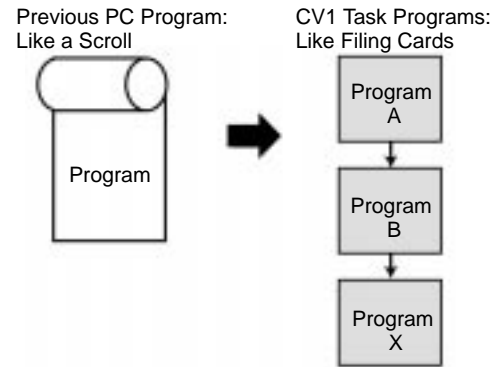
Advantages

Program Standardization

Task programs are created in units divided by functionally by purpose. These functional units can be easily reused when programming new PCs or systems with the same functionality.
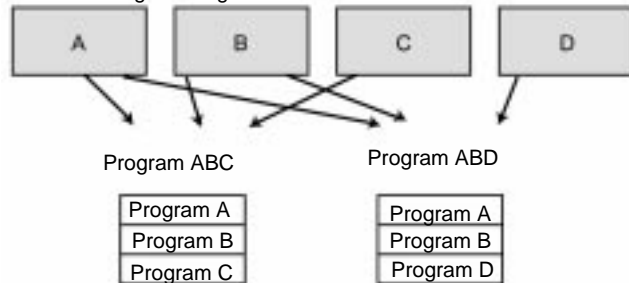
Easier-to-understand Programs

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

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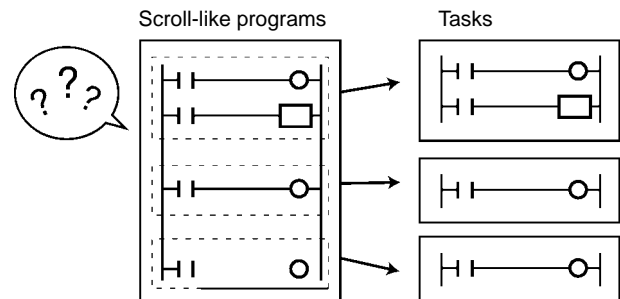
Shorter Cycle Times

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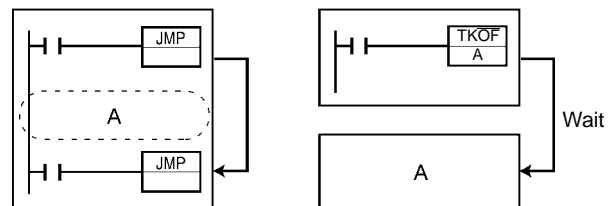
Better Design/Development Efficiency

■ CX-Programmer Windows® Programming Software

CX-Programmer provides a wealth of monitoring and debugging functions in an efficient multi-program development environment.

Windows 95 GUI guideline-based operations provide an easy-to-understand environment with project windows that clearly show the data structure.

Mnemonic inputs are possible in statement lists on ladder diagram displays and can later be conveyed to ladder diagram form.

Programs can be viewed and scrolled in both overview and detailed modes on split screens (2-way or 4-way) so that you can monitor different parts of the same program in separate windows.

Features

Easy Operation

- Operate without using the mouse.
- Navigate using directory tree displays.
- Enter bit input/output instructions with function keys.
- Presearch function for special instructions to reduce candidates for text inputs.
- Operand input ranges displayed.
- Split the screen 2 ways or 4 ways.
- Convert from text inputs to ladder diagrams. (Either input mnemonics into ladder diagram displays or convert text input with text editors or word processors.)
- Program with names rather than specific addresses.

Many Display and Monitoring Functions

- Present value monitoring and editing by memory area.
- Operand present value monitoring and editing on ladder diagrams.
- Present value monitoring of specified addresses.
- Watch Windows: Monitor specified address in specified PC.
- Output Windows: Display compiling errors, search results, file read errors, and program comparison results.

Numerous Debugging Functions

- Force-setting/resetting.
- Differential monitoring.
- Timer/Counter set value changes.
- Cross-references.
- Data traces and time chart monitoring.
- Online editing at multiple locations.
- Online editing of different tasks from CX-Programer running on different computers.

Remote Programming and Monitoring

- Easily access network PCs through the connected PC.
- Access PCs on remote networks.
- Access remove PCs via modem connections.

Maintenance Functions

- Store/read comments inside Units (256 characters).
- Handle CPU Unit data (programs, parameters, memory contents, or comments) in memory files on Memory Cards or in EM file memory.
- Drag and drop DOS files between Memory Cards in the computer and in the PC.
- Display error histories (including user-generated logs) from the CPU Unit with time stamps.
- Protect programs from access using passwords.

Data Compatibility with Windows Applications

- Use name, address, I/O comment, and other data from Microsoft Excel.

CX-Programmer

Useful Functions

■ Use I/O Allocations Input with MS-Excel and Other Spreadsheets

I/O allocations tables, including symbols, address, and I/O comments, can be input into a standard spreadsheets, such as MS-Excel, and then used with the CX-Programmer.

MS-Excel or other spreadsheet

Numeric table in CX-Programmer

1. Copy I/O allocations tables and other data input with MS-Excel

2. Paste the data into a numeric table.

3. Selected from the numeric table when inputting instruction operands. Use the presearch function to make inputs even easier.

Inputting operands for instructions

■ Create Programs from Data Input with a Text Editor

Mnemonic programs can be input with any standard text editor, such as the memo pad, and then pasted into the CX-Programmer as a statement list to use it as part of the program. The data can also be converted to ladder-diagram form.

1. Copy mnemonics input with a text editor.

Text editor
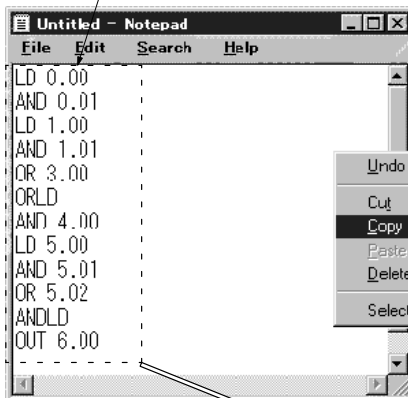
2. Paste the text into statement list block.

```
LD 0.00
AND 0.01
LD 1.00
AND 1.01
OR 3.00
ORLD
AND 4.00
LD 5.00
AND 5.01
OR 5.02
ANDLD
OUT 6.00
```

Untitled – Notepad
File Edit Search Help

Undo
Cut
Copy
Paste
Delete
Select All

.MonitorDemo [Diagram]

No_Org_NC...   X_Org_NC1_n0 X_Busy_NC1_n0   X_Zone_0_NC
_Origin(Xax... Origin_Stop(X... Busy_flag(Xaxi...   Zone_0(Xaxis

NewPLC1.MonitorDemo [Diagram]

8   X_No_Org_NC... X_Org_NC1_n0 X_Busy_NC1_n0   X_Zone_0_NC
    No_Origin(Xax... Origin_Stop(X... Busy_flag(Xaxi...   Zone_0(Xaxis

4
```
AND 0.01
LD 1.00
AND 1.01
OR 3.00
ORLD
AND 4.00
LD 5.00
AND 5.01
OR 5.02
ANDLD
OUT 6.00
```
Statement list

Ladder window

Ladder window

NewPLC1.MonitorDemo [Diagram]

3   X_No_Org_NC...   X_Org_NC1_n0 X_Busy_NC1_n0   X_Zone_0_NC...
8   No_Origin(Xax... Origin_Stop(X... Busy_flag(Xax...   Zone_0(Xaxis)...
4   0.00   0.01   4.00   5.00   5.01   6.00
12

        1.00   1.01   5.02

        3.00

On-Line Edit
Normalise Rung
Cut
Copy
Paste
Delete
Properties

3. Then convert to ladder-diagram form.
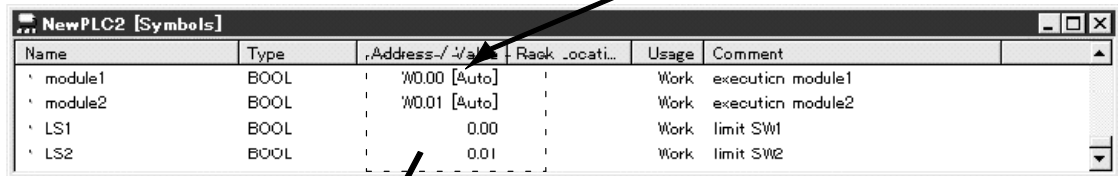
CX-Programmer

■ Automatic Address Allocations for Increased Efficiency

Symbols can be input for later conversion automatically to addresses.
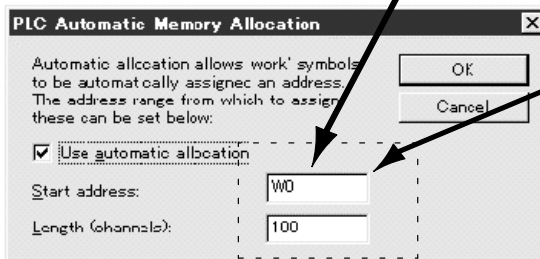
1. Input symbols into the variable table, omitting specific addresses.

Local or global variable table

Name	Type	Address-/ Value	Rack Locati...	Usage	Comment
module1	BOOL	W0.00 [Auto]		Work	execution module1
module2	BOOL	W0.01 [Auto]		Work	execution module2
LS1	BOOL	0.00		Work	limit SW1
LS2	BOOL	0.01		Work	limit SW2

Automatic address allocation dialog box

PLC Automatic Memory Allocation

Automatic allocation allows work' symbols to be automatically assigned an address. The address range from which to assign these can be set below:

OK

Cancel

☑ Use automatic allocation

Start address: W0

Length (channels): 100

2. Specify allocation word ranges in the automatic address allocation dialog box.

3. Addresses will be automatically allocated to local or global variables.

NewPLC2.NewProgram2 [Diagram]

```
0
        m_1              m_2              m_3                        MOV(021)
     W0.02 [Auto]    W0.03 [Auto]    W0.04 [Auto]
                        m_4                                             4
                     W0.05 [Auto]
                                                                    m_work1
                                                                    W1 [Auto]
```
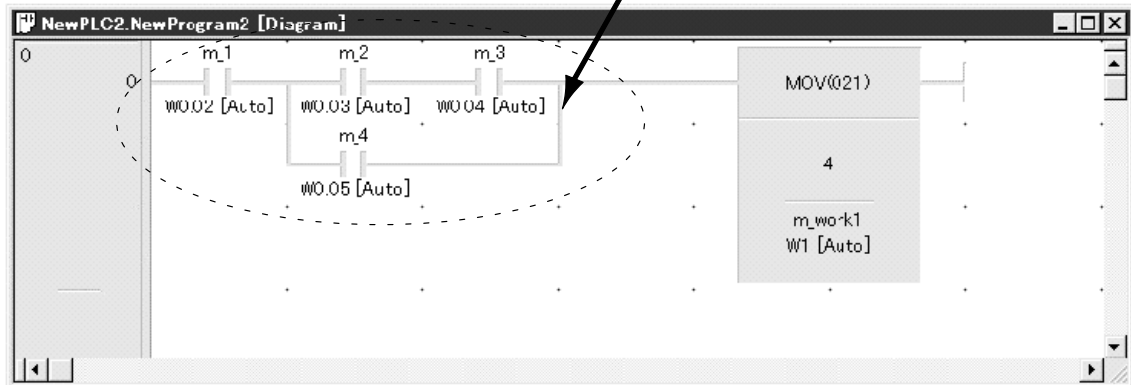
Programs can be easily reused simply by dragging and dropping

Copy and paste programs to easily reuse them using menu commands or drag and drop.

If addresses have been automatically allocated when programs are copied, the automatic allocations will still be effective, allowing similar program sections to be easily created.
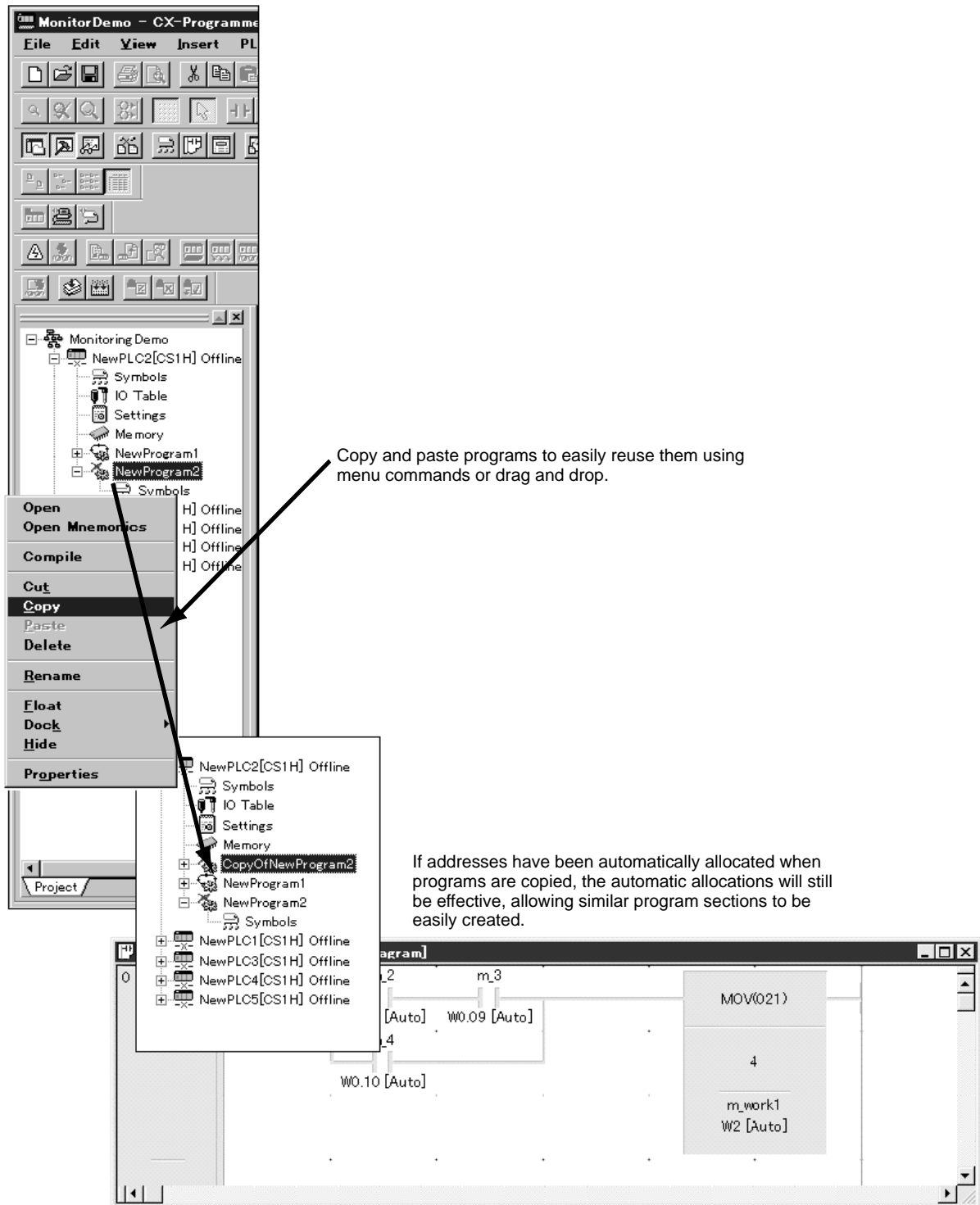
CX-Programmer

■ Split Program Displays to Monitor Multiple Locations

A program can be displayed on split screens vertically and horizontally, allowing up to 4 areas of the same program to be displayed at the same time to let you monitor the overall program while also monitoring or inputting specific instructions.

1. Select the split command from the window menu.

2. Monitoring more than one location at the same time.

3. See the overall program while inputting or monitoring specific instructions.

4. They scroll together
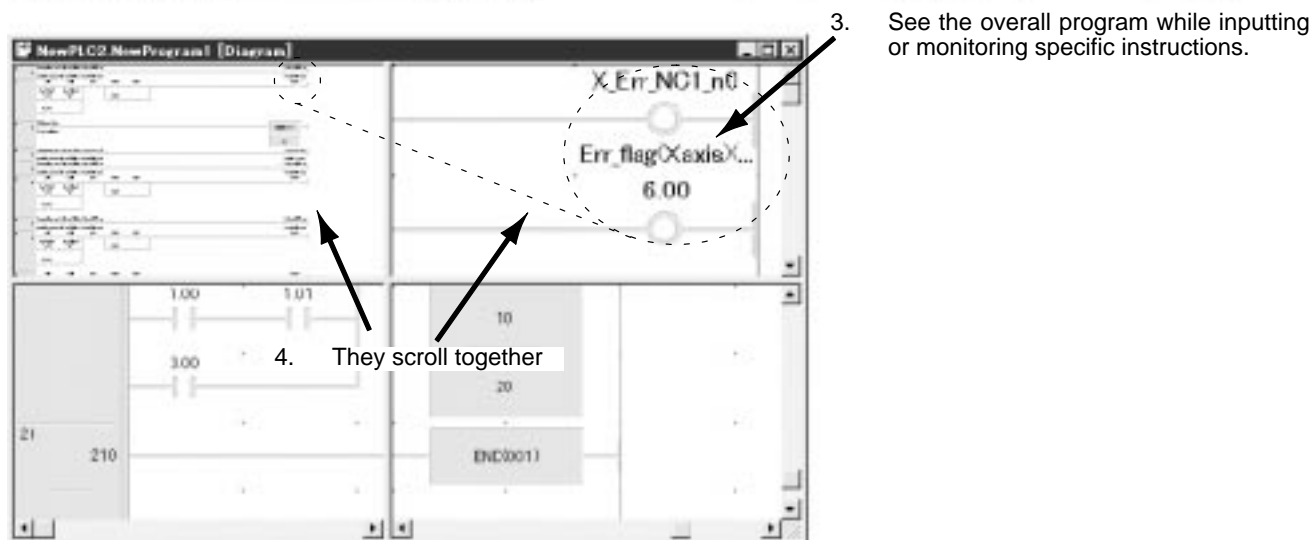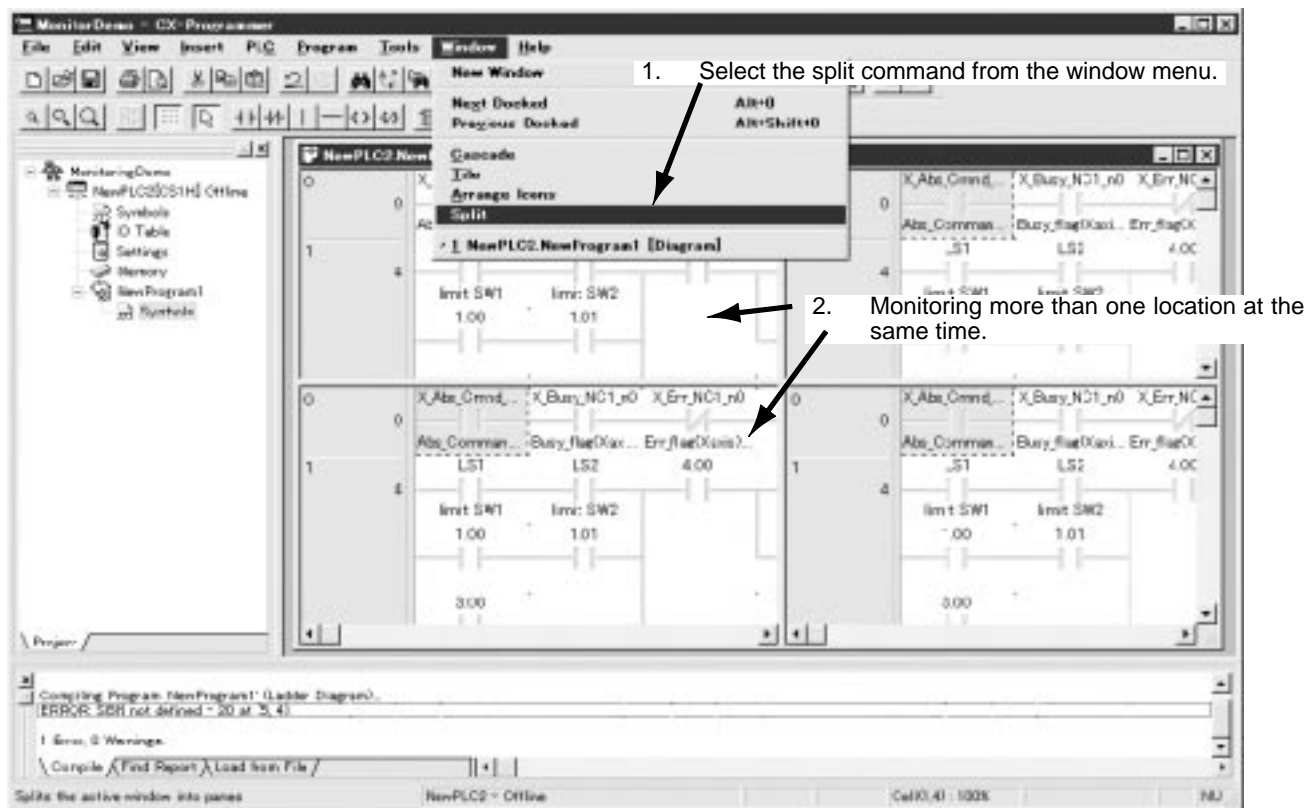
■ Automatically Jump to Error Location or Address Cross-references

The location of an error in the program can be jumped to directly from the program check results.

2. Automatically jump to the error.
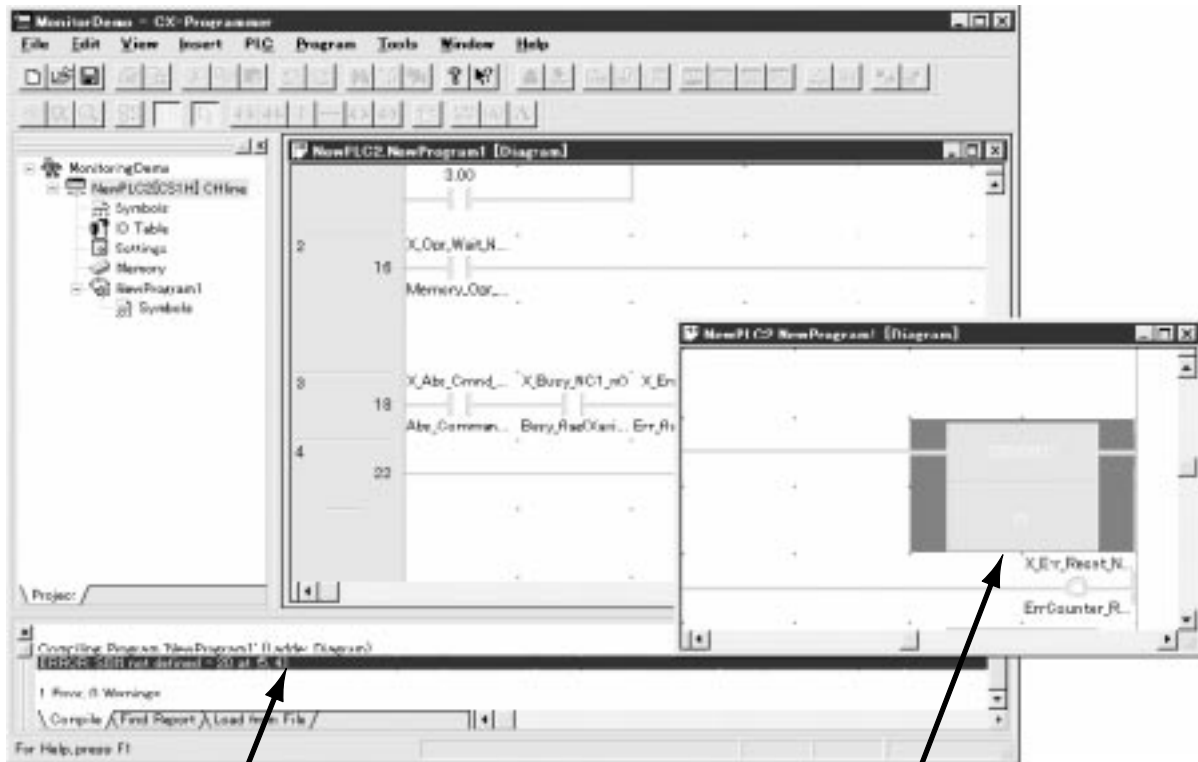
1. Double-click the program check results.

CX-Programmer

■ On-key Instruction Inputs for Better Input Efficiency

Input conditions and basic output instruction can be input with a single key stroke.

Input with a single key.
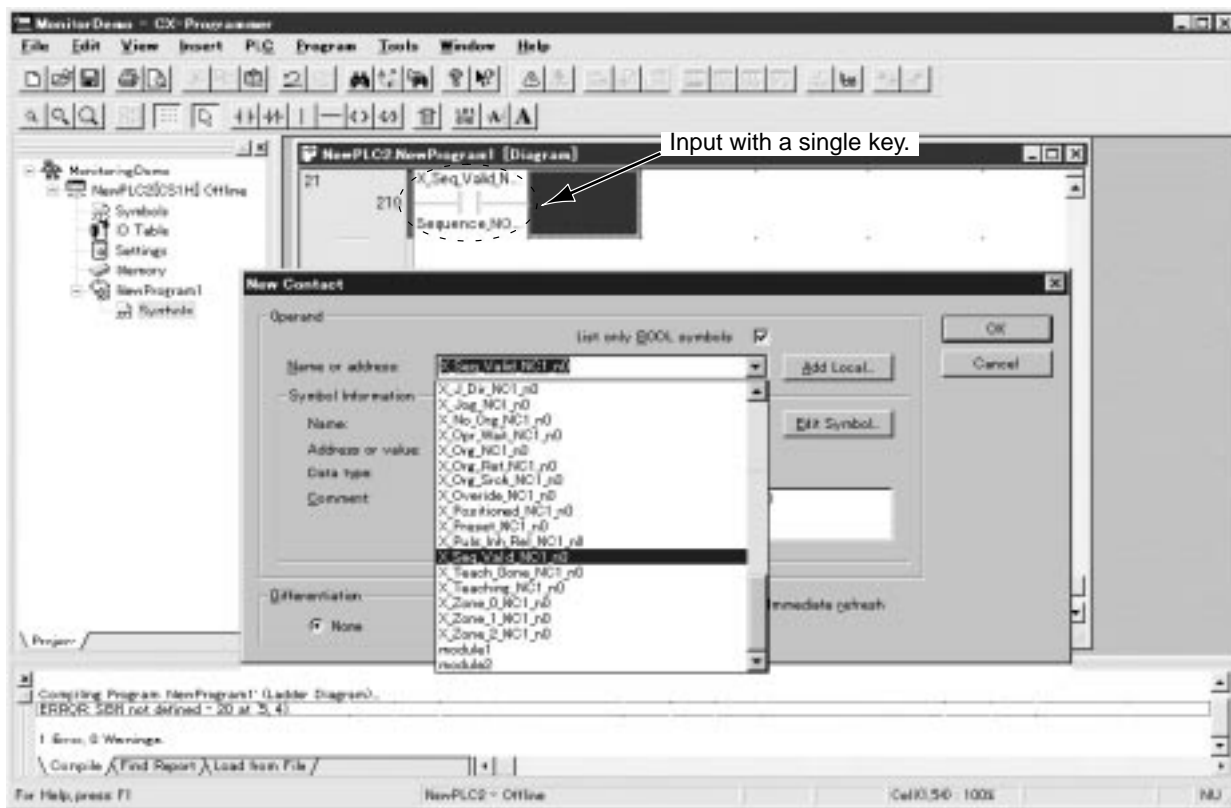
■ Undo Programming Actions

1. If you delete programming by mistake....

2. Just select the Undo command.

3. The deleted instruction will be restored.
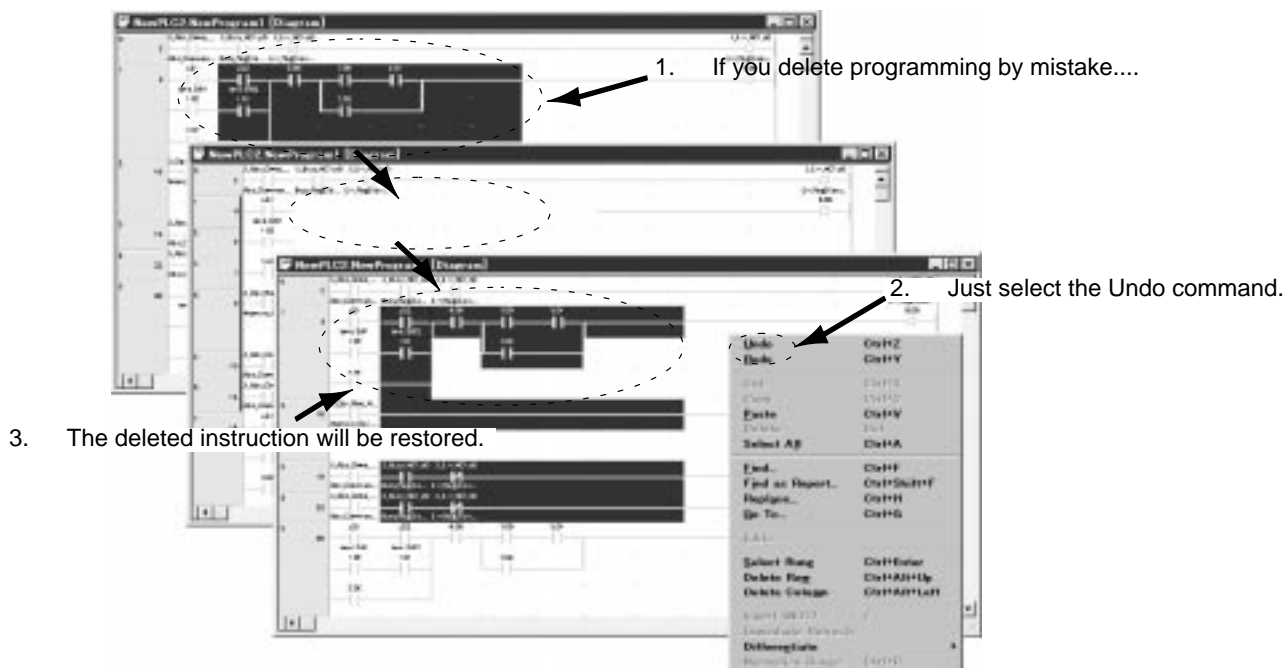
■ Easy Online Connections

You can connect to any PC on a network simply by inputting the PLC name of the target and gateway PLC to access or monitor not only the local, but also remote PLCs.
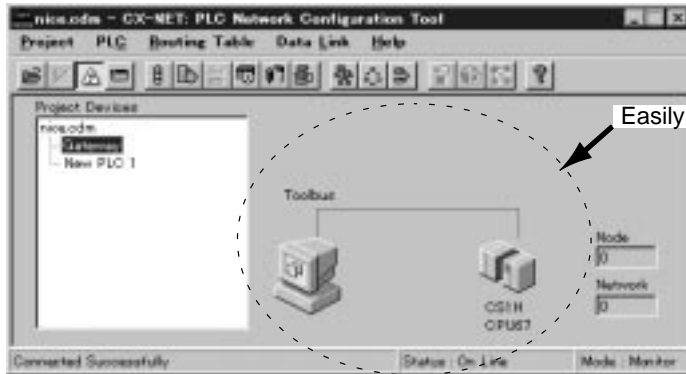
Easily connect to local PLCs...
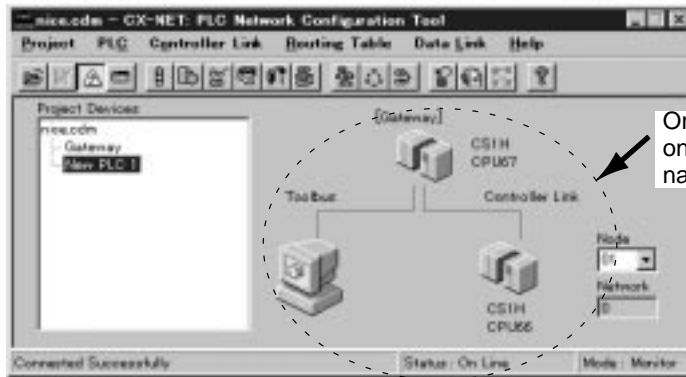
Or connect just as easily to PLCs on complex networks using PLC names.

Simple, Easy-to-Understand Programs

Index Registers, Table Data, Repeat Instructions, Block Programs, Text Strings, and More.

■ Simplify Programs with Index Registers

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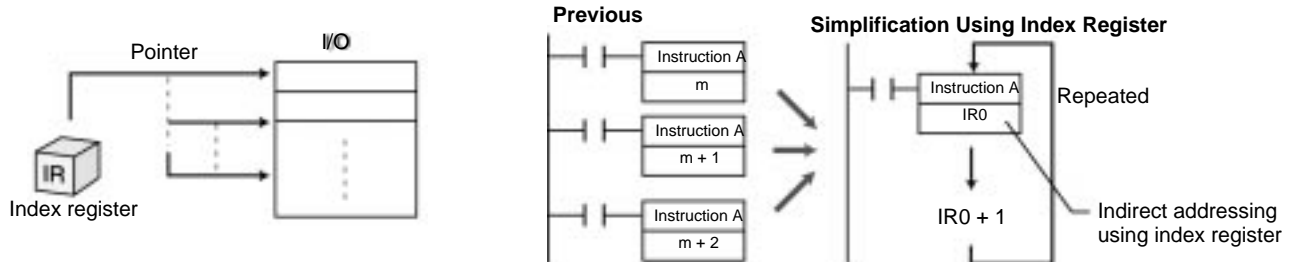
■ Easily Handle Table Data

Table Data Instructions

One-word Records

Instructions are provided to find the maximum value, minimum value, and search values.
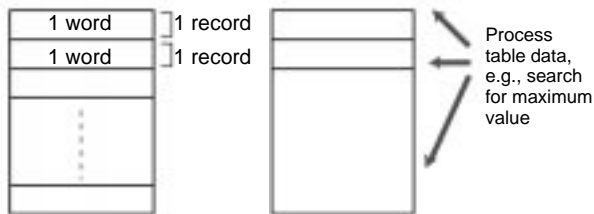
Multi-word Records

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

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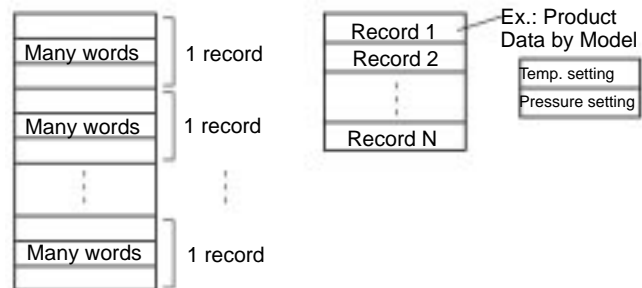
Simple, Easy-to-Understand Programs

■ Easily Repeat Processing

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

Repeated n times.
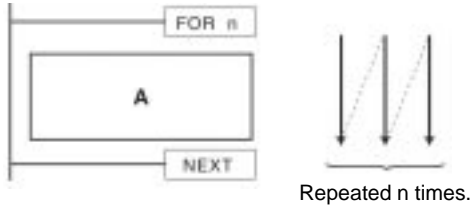
■ Easily Program Logic Flow Control with Block Programming Sections

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

Block programming section
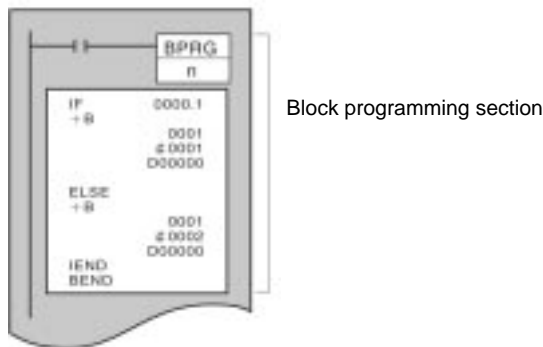
■ Macro (MCRO) Instruction

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

Operands

Operands

Subroutine
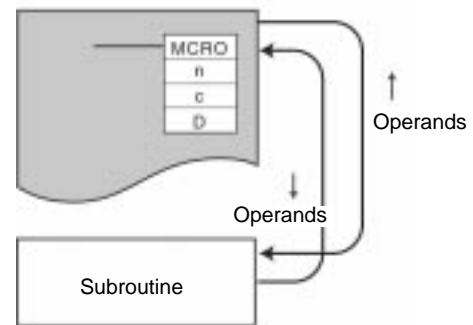
■ Easily Handle Text Strings

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

Host computer

PC

Text processing in the CPU Unit.

Manufacturing instructions in text form.
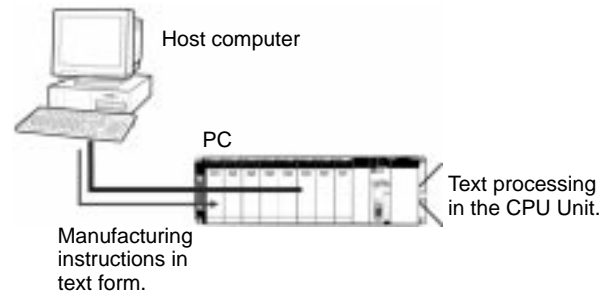
Seamless Communications between Information and Control Systems

Seamless Network Communications

Network hierarchies stretch from component networks through top-level Ethernet networks and, with FINS commands, provide seamless inter-network communications. Multi-vendor support is also now better than ever before.

Information Networks

Ethernet FinsGateway

FA network middleware that supports FINS message communications.

Ethernet: OA Network

Ethernet Unit

Message Communications

Host computer to PC.

PC to PC or PC to host computer.

FTP Server Function

Host computer to PC.

File transfers from host computer to Memory Card installed in CPU Unit.

Socket Service

Data transfers using TCP or UDP protocol.

Mail Notification

Mail notification from PC to host computer for errors and other events.

Controller Link Units

Controller Link FinsGateway

Controller Link Support Board

Controller Link: FA Network

- Simple Network configuration (twisted-pair or optical fiber cable).
- Data link and message communications.
  - Large-capacity, flexible, and effective data links.
  - Message communications and large-capacity data transfers.
- Links between PCs and personal computers.
- Optical Controller Link Units provide a bypass function for faulty nodes.

Configurator

Control Networks

CompoBus/D (DeviceNet)

CompoBus/S

- Multi-vendor DeviceNet network.
- Remote I/O message communications.
  - Remote I/O: Many points, free allocation
  - Message communications between PCs, Explicit DeviceNet messages
- Multi-level networks
- Various connection methods
- Wide Range of Slaves
  I/O Terminals, Remote Adapters, Analog I/O Terminals, Sensor Terminals, I/O Link Units, Temperature Input Terminals, MULTIPLE I/O TERMINAL,

- High-speed remote I/O
- Various connection methods
- Many Master Units Communications Units CPU Units
- Many Types of Slaves
  I/O Terminals, Remote I/O Modules, Sensor Amp Terminals, Sensor Terminals, Bit Chain Terminals

Seamless Communications between Information and Control Systems

■ Ethernet: Information Network

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

Remote Programming and Monitoring

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

Socket Service

Transfer data using either UDP or TCP protocol.

Mail Service

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

FINS Message Service

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

FTP Service

Use the FTP to transfer files between Memory Cards in the CPU Unit and computer memory.
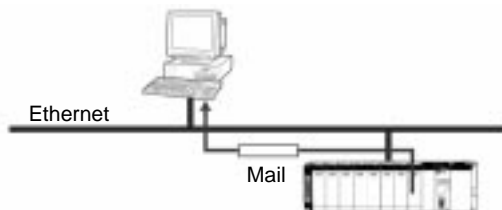
Seamless Communications between Information and Control Systems

∎ Controller Link: Control Network

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

Easy Network Construction with Twisted-pair or Optical Cable

Data Links

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

way can be used to handle messages from applications without having to program FINS commands directly.
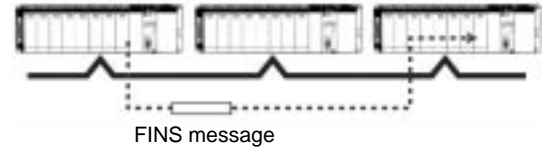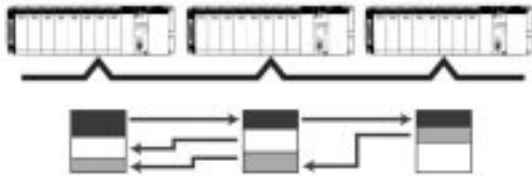
FINS message

Remote Programming and Monitoring

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

CX-Programmer

Controller Link

RS-232C
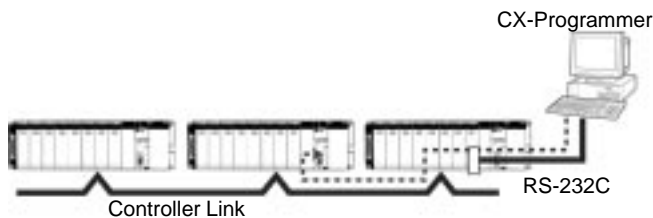
FINS Message Communications

Large volumes of data can be transferred between PCs and host computers whenever necessary. The Controller LInk FinsGate-

Seamless Communications between Information and Control Systems

■ CompoBus/D (DeviceNet): Component Network

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

Remote I/O Communications

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

Select from a Wide Range of Slaves

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

Connect to DeviceNet Products from Other Manufacturers
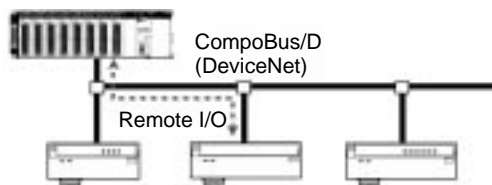
Message Communications

Send FINS messages between OMRON PCs and Explicit message between OMRON PCs and devices from other makers.
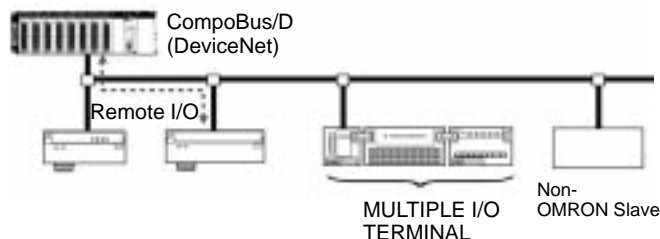
Use MULTIPLE I/O TERMINALs as CompoBus/D Slaves

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

■ CompoBus/S: High-speed ON/OFF Bus

Create a high-speed remote I/O system connected under a PC to reduce wiring to sensors and actuators in machines.

High-speed Remote I/O Communications: 1 ms Maximum

Link up to 32 slaves with 128 inputs and 128 outputs and a communications cycle time of 1 ms or less. (Cycle time is 0.5 ms for 16 slaves with 64 inputs and 64 outputs.)
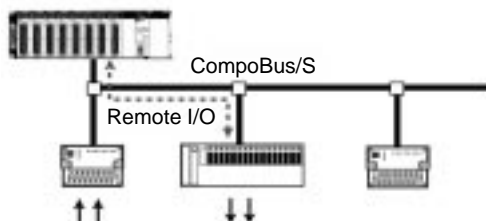
Faster Wiring with Special Cables

Connects are easily made with special flat cables or VCTF cables.

Many Slaves Available

Connect contact I/O, contact I/O modules, and sensor (photoelectric or proximity) inputs.

Better Connectivity and Compatibility

More Serial Communications Ports, More Protocols.
Up to 34 Port Connections with Protocol Setting for Each Port.
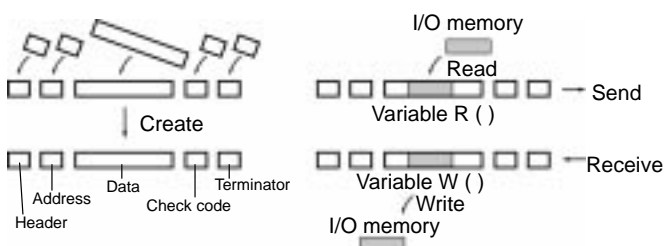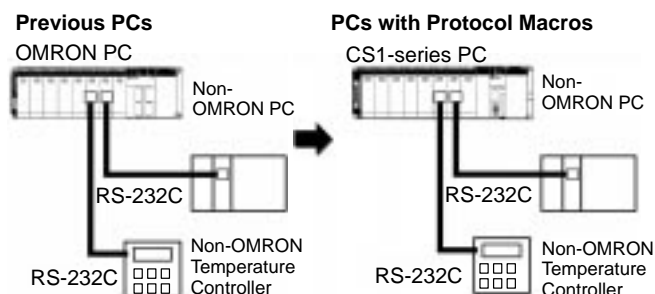
■ Protocol Macros

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

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

Previous PCs

OMRON PC

Non-OMRON PC

RS-232C

RS-232C — Non-OMRON Temperature Controller

PCs with Protocol Macros

CS1-series PC

Non-OMRON PC

RS-232C

RS-232C — Non-OMRON Temperature Controller

The Two Main Functions of Protocol Macros

1. Creating Communications Frames

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

Create

Header · Address · Data · Check code · Terminator

I/O memory

Read — Variable R ( ) — Send

Variable W ( ) — Receive
Write
I/O memory

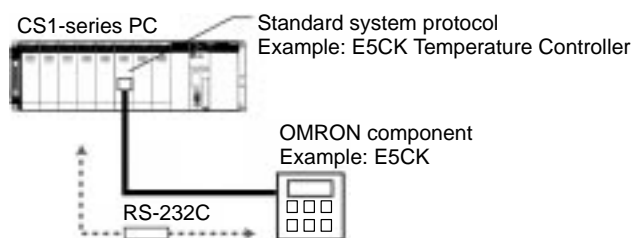### 2. Creating Frame Send/Receive Procedures

The required processing, including sending and receiving communications frames, can be performed one step at a time according to the results of the previous step.

CPU Unit — PMCR

Port/Unit — Required processing

Connected device

Step 0

Step n (as required)
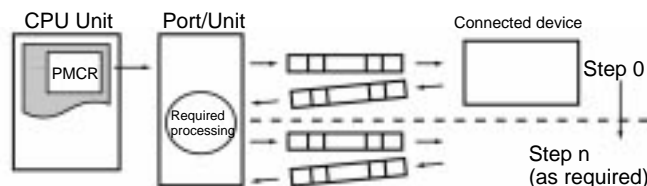
Application Examples

Standard System Protocols

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

CS1-series PC — Standard system protocol
Example: E5CK Temperature Controller

OMRON component
Example: E5CK

RS-232C

User-created Protocols

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

CX-Protocol
Creates protocols.

CS1-series PC

CD-ROM

Non-OMRON component
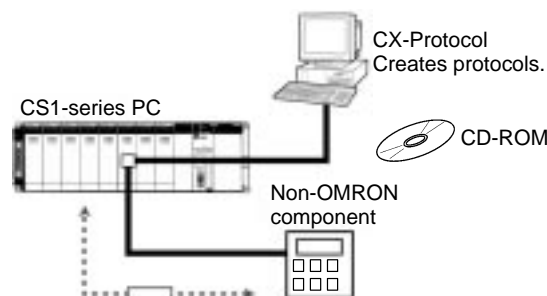
# Better Connectivity and Compatibility

■ Other Protocols

OMRON provides all of the capabilities and capacity you need for the advanced programming required for human-machine interfaces, communications, data processing, and other required applications.

• Host Links

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

Unsolicited messages can also be sent from the PC to the host computer by sending FINS commands from the ladder program using the SEND(090), RECV(098), and CMND(490) instructions.
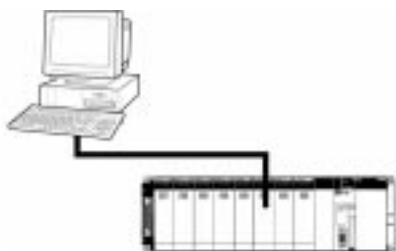
• 1:N NT Links

The PC can be connected to a Programmable Terminal (PT) via RS-232C or RS422A/485 ports, and I/O memory in the PLC can be allocated to various PT functions, including status control areas, status notifications areas, touch switches, lamps, memory tables, and other objects.
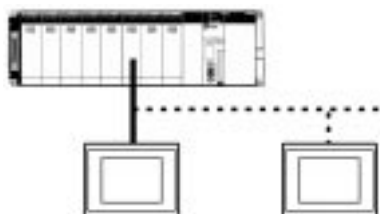
Note: Either one or up to eight PTs can be connected to a PLC in for 1:N NT Links.

• Custom Protocols

I/O instructions for communications ports (TXD(236) and RXD(235)) can be used for simple data transfers (custom protocols), such as to input data from bar code readers or output data to a printer. Start/end codes can be specified, and RS, CS, and other control signals can be handled. (Customer protocols can be used only for the CPU Unit's built-in RS-232C port.)

CPU Unit

TXD

or

RXD
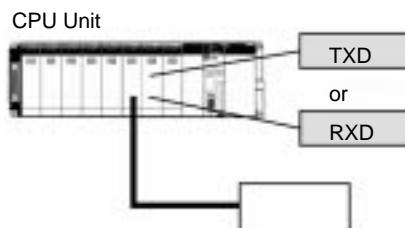
• General-purpose Protocols Using BASIC

An ASCII Unit can be used to create essentially any protocol for an external device using the BASIC language, providing the ability to handle applications for which protocol macros cannot be created.

ASCII Unit
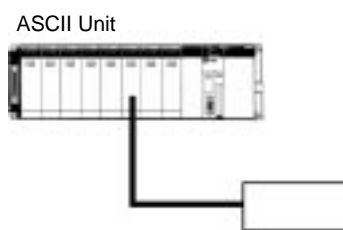
Better Connectivity and Compatibility

Protocol List

The following protocols are supported for serial communications

Protocol	Main destinations	Outline	Commands/Instructions
Host Link (SYSMAC WAY)	Computers, OMRON Programmable Terminals (PTs)	Communications between host computers and PCs.	Host Link commands or FINS commands (unsolicited messages supported)
Custom	General-purpose devices	Custom communications with general-purpose external devices.	TXD and RXD instructions
Protocol Macros	General-purpose devices (including OMRON components)	Sending/receiving messages (communications frames) matched to the communications specifications of external devices.	PMCR instruction
1:N NT Links	OMRON Programmable Terminals (PTs)	High-speed communications using direct access with Programmable Terminals.	None
Peripheral bus	Support Software	Communications with Support Software tools running on host computers.	None
General (written in BASIC)	General-purpose devices	Unrestricted communications with external devices.	BASIC

Note: Refer to *Serial Communications* on page 91 for the ports that can be used for each protocol.

Overview of Serial Communications
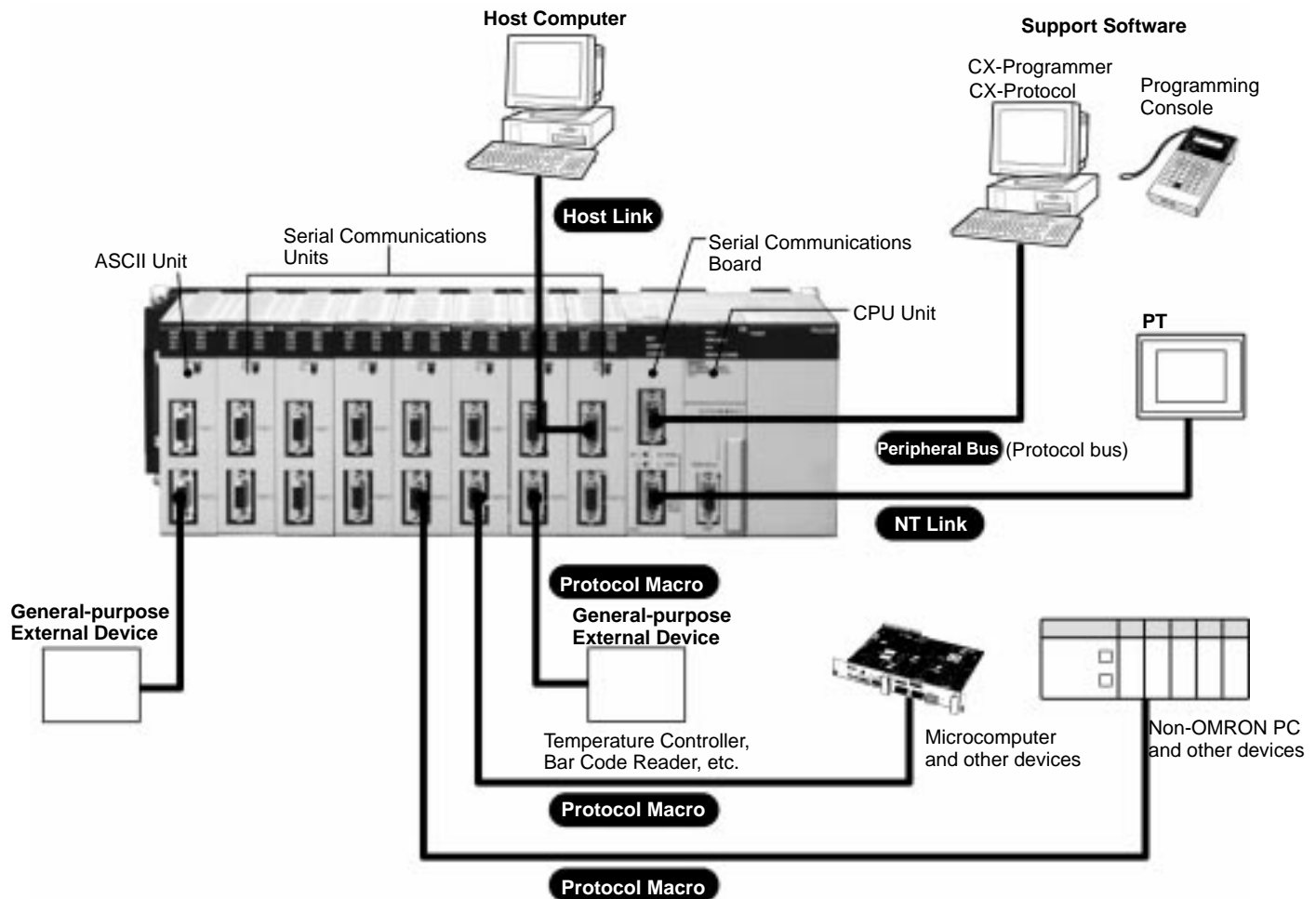
Maintenance and Management

Large Program, Memory, and I/O Capacities.
High-speed Instruction Execution and Peripheral Servicing.

■ File Applications

### Manipulate PC File Data Using Windows Files

- The user program, parameters, I/O memory, names, I/O comments, and block comments can all be handled as file data. File data can be used to standardize programs and initialization data for each system, and comments can be stored as file data on Memory Cards.

- The CX-Programmer or a Programming Console can be connected to a CS1-series PC to transfer files between the CPU Unit's memory and Memory Cards (or EM File Memory).

- As Windows files, file icons can be dragged and dropped to a Memory Card or computer storage device to easily copy the files.

- **Note:** A Memory Card Adapter can be used to mount Memory Cards into a PC card slot on a computer to use them as computer storage devices.
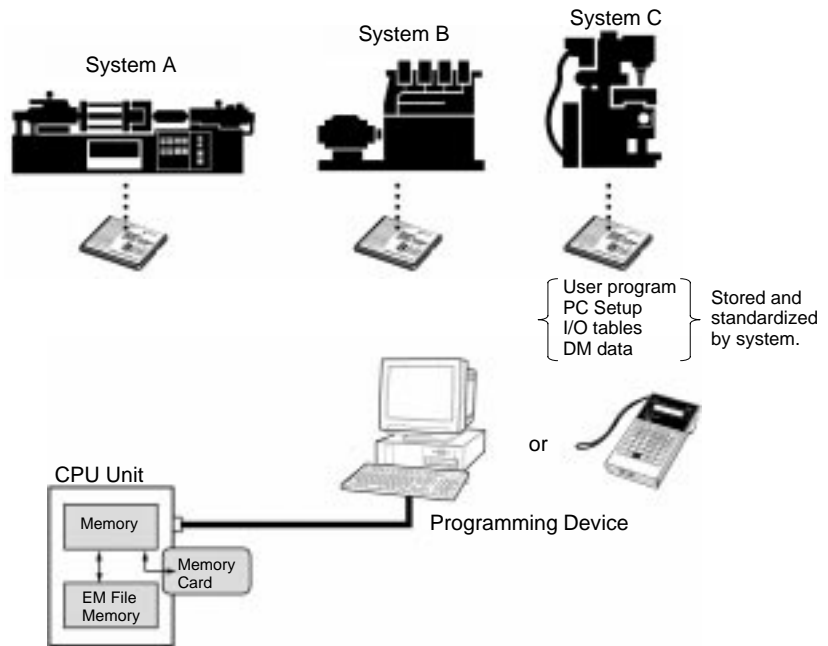
Handle File Data Onsite with Programming Consoles

- A Programming Console can be connected to the PC to transfer files between between the CPU Unit's memory and Memory Cards (or EM File Memory).
  A Programming Console and Memory Cards are all you need to change data onsite.
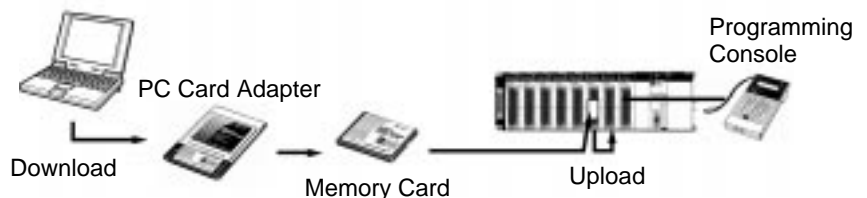
Change Program Simply by Changing Cards

- File data can be automatically transferred from Memory Card to the CPU Unit when power is turned ON, enabling Memory Cards to be used for operation in the same was as is possible with ROM.
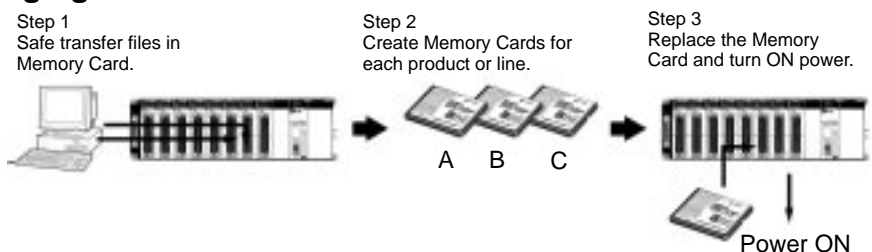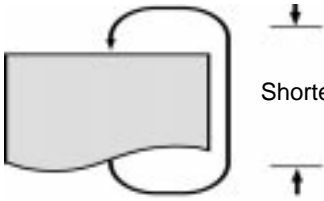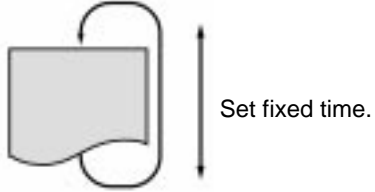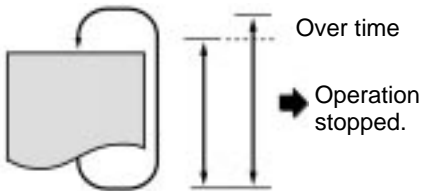
Manipulate Files During Operation
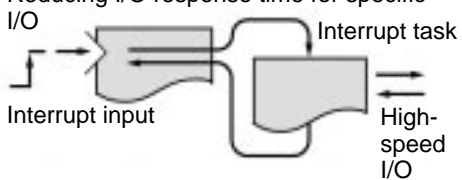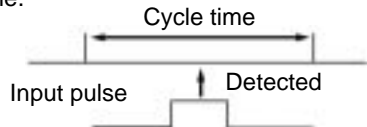
- File read and write instructions can be used during operation to transfer files between between the CPU Unit's memory and Memory Cards (or EM File Memory). Trend data, quality control data, other other data from memory can be stored during operation in Memory Cards or EM File Memory.
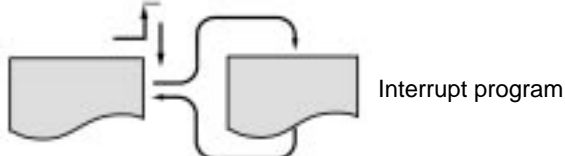
45
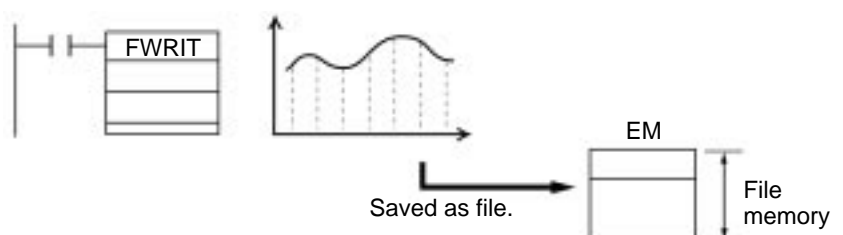
Maintenance and Management

■ A Wide Range of Special Functions

Cycle Time Functions

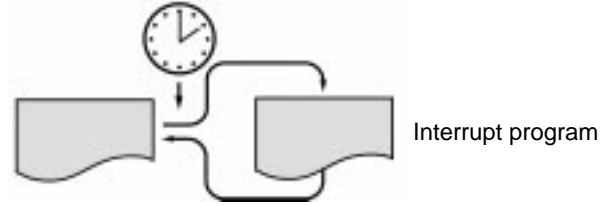| Requirements	Solutions
Reducing the cycle time Shorter cycle time	• Place tasks that are not being executed on standby. • Create subroutines for portions of tasks executed only under special conditions. • Disable cyclic refreshing for Special I/O Units when not required each cycle.
Eliminating deviations in I/O response time	• Set the cycle time to a fixed time. Set fixed time.
Stopping operation for long cycle times Over time Operation stopped.	• Use the cycle time monitoring function to stop operation when the cycle time is too long.
Reducing I/O response time for specific I/O Interrupt task Interrupt input High-speed I/O	• Use an I/O interrupt task to execute an interrupt program when a specific input turns ON and then directly refresh external I/O when the appropriate instruction is executed in the interrupt program. External I/O can be directly refreshed either by using immediate refreshing for instruction operands or by using the IORF instruction to refresh all or a specified portion of external I/O.
Inputting signals (e.g., from photomicro-sensors) that are shorter than the cycle time. Cycle time Input pulse Detected	• Use the high-speed pulse input function of the C200H High-density I/O Units (C200H Special I/O Units). These Units can detect 1-ms or 4-ms pulses (except C200H-0D501/OD215,) • Use the IORF instruction to refresh inputs during program execution to further increase processing speed.

Interrupt Functions

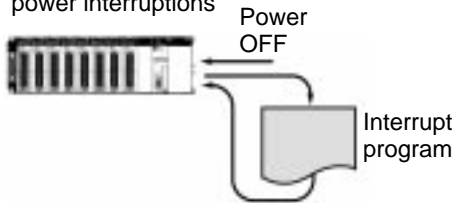| Requirements	Solutions
Executing programming without being affected by the cycle time	• Use I/O interrupt tasks to execute interrupt programs when specific inputs turn ON. Interrupt program

| Monitoring operating conditions at a specific interval | • Use a scheduled interrupt task to execute an interrupt program at a specific interval. |

Interrupt program
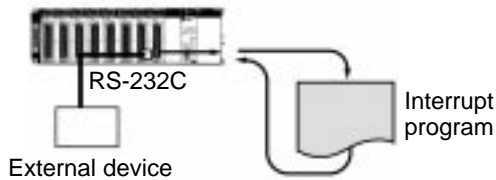
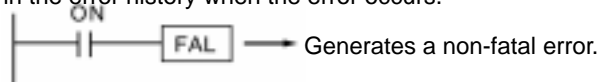| Requirements	Solutions
Executing emergency processing for power interruptions Power OFF Interrupt program	• Use the power OFF interrupt task to execute an interrupt program before the CPU stops. Immediate refreshing can be used inside this interrupt program to refresh specified outputs.
Generating CPU Unit interrupts when data is received from a serial port	• Use an interrupt from the Serial Communications Board to execute an interrupt program when a specific message s received by the Board.

RS-232C

External device

Interrupt program

Maintenance and Debugging Functions

Requirements	Solutions
Creating a user-defined error for specific conditions (e.g., errors or specific signals from the controlled system) but allow the CPU Unit to continue running.	• Use the FAL instruction to create a non-fatal user-defined error. An entry can also be left in the error history when the error occurs. ON FAL → Generates a non-fatal error. • FAL can also be used just to leave error history records for specific conditions that are not necessarily errors.
Creating a user-defined error for specific conditions (e.g., errors or specific signals from the controlled system) and stop the CPU Unit as a result.	• Use the FALS instruction to create a fatal user-defined error. An entry can also be left in the error history when the error occurs. ON FALS → Generates a fatal error. • FALS can also be used to automatically stop operation for specific conditions that are not necessarily errors.
Determining if a specific output turns ON within a specified time after an input turns ON, generating an error if the output does not turn ON, and determining the address in the program responsible for the output not turning ON.	• Use the FPD instruction to perform time or logic diagnosis of a specified portion of the program. Time diagnosis Program section Logic diagnosis
Creating a history of user-defined and system errors that have occurred.	• Use the error log to record up to 20 time-stamped error records.
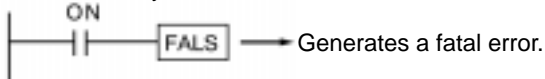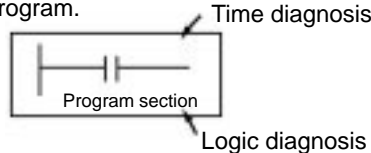
Maintenance and Management

Creating an external output when a non-fatal error occurs.	• Use the Non-fatal Error Flag.
	Error → Error contents → Placed in time-stamped error log. — 20 records
Turning OFF all output from Output Units for specific conditions.	• Use the Load OFF Bit.
Turning OFF all output from Output Units during trial system operation.	Non-fatal error occurs. ON OFF
Maintaining I/O memory status when starting operation	• Use the I/O memory hold function to start program execution with the same I/O memory status as the last time the program was executed. Operation started. Status held.
Correcting the program during operation	• Use the CX-Programmer to change the program as required during operation. Program Continuous instructions Changes
Sampling specified I/O memory bits or word data. • Scheduled sampling • Sampling once per cycle • User-defined sampling	• Use the data tracing function. Scheduled traces Cyclic traces Sampling instruction I/O memory Trace memory I/O memory Trace memory I/O memory Trace memory
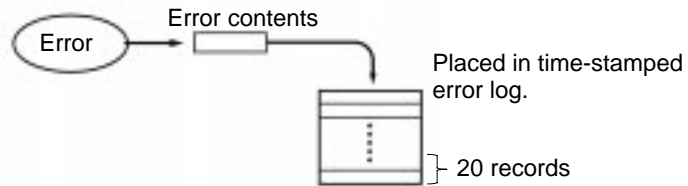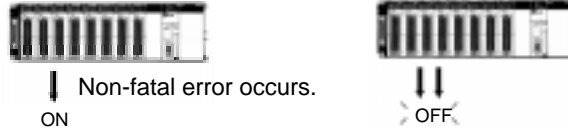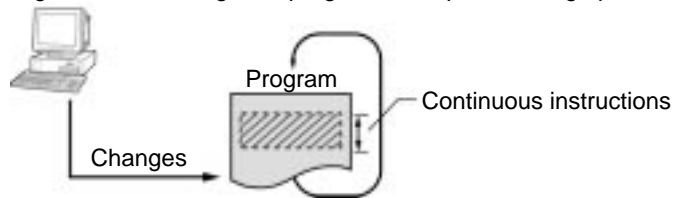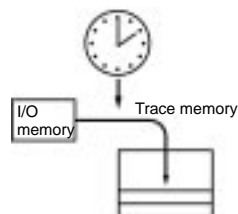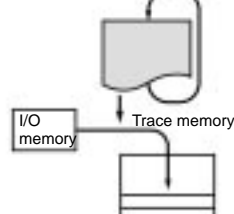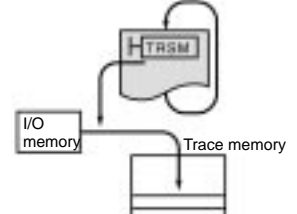
Remote Programming and Monitoring

Requirements	Solutions
Monitoring and editing online for remote PCs using telephone lines	• Perform online programming and monitoring from a CX-Programmer running on a computer connected to the PC via a modem. Modem Modem RS-232C RS-232C
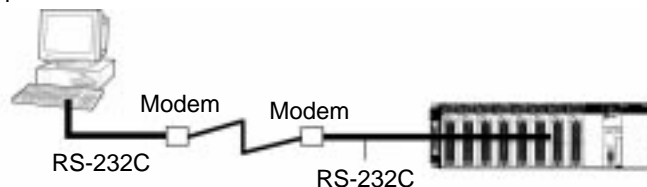
Maintenance and Management

Monitoring and editing online from the CX-Programmer for a remote PC connected to a network	• Use a Serial Communications Board or Unit, connect to a PC via a modem, use an instruction to switch to host link mode, and then program or monitor from the CX-Programmer. (It's not necessary to cut the connection during the procedure.) • Use the host link gateway function to program or monitor any PC connected to a Controller Link or Ethernet Network to which the PC connected to the computer running the CX-Programmer is connected (via RS-232C). Host Link Network
Programming and editing a PC on a remote network	• Use the gateway function to edit any PC connect to a network up to two networks away (3 networks including the local network). For example, a PC on the Controller Link Network shown below can be accessed from the CX-Programmer running on a computer connected to a PC on the Ethernet Network. Network 2 Network 1: Ethernet Network 3: Controller Link
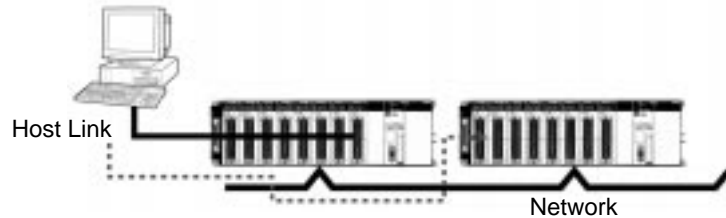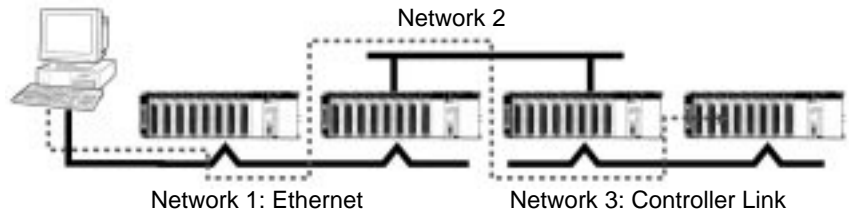
A Complete Range of Special I/O Units

Handle Analog Processing at All System Levels
Analog I/O Units

Input Analog Signals

Analog Input and Analog Output Units

- Analog signals can be handled with Units that provide 4 or 8 analog input points or Units that provide 2, 4, or 8 output points.
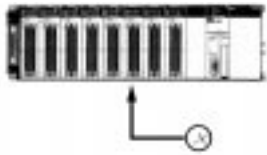
Input Temperatures Directly from Temperature Sensors

Temperature Sensor Units

- Up to 4 analog inputs can be directly input for each Unit from thermocouples or from platinum resistance thermometers.

Analog Controls

Analog controls programmed in the CPU Unit provide more power to Analog I/O Units.

Combining CPU Unit Controls and Analog I/O Units

- The PID instruction can be used with Analog I/O Units to perform processing on analog measurement and produce 4 to 20 mA outputs.

- Instructions are also provided for deadbands, dead zones, data averaging, scaling, and upper/lower limits.
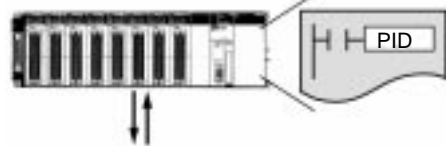
Controlling Temperatures

Using Temperature Control Units

- Two-loop temperature is possible with PID or ON/OFF control.

- Eight memory banks of target settings, alarm values, and other setup data can be recorded in the Unit and switched during operation.
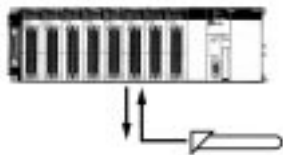
Heating/Cooling Control

Using Heat/Cool Control Units

- Two-loop temperature is possible with PID or ON/OFF control.

- Eight memory banks of target settings, alarm values, and other setup data can be recorded in the Unit and switched during operation.
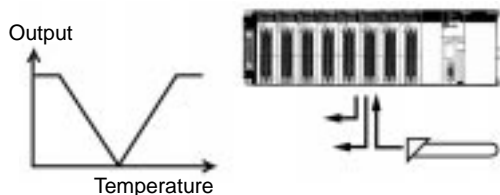
High-precision PID Control

Using PID Control Unit with Analog Inputs

- Two-loop temperature with 0.1-s sampling period.

- Eight memory banks of target settings, alarm values, and other setup data can be recorded in the Unit and switched during operation.

A Complete Range of Special I/O Units

■ Simple or Advance Position Control: A Wide Range or Choices

Simple Control by Writing Position Data from the CPU Unit when Required.

Position Control Units

Open-loop Control, Automatic Trapezoid or S-curve Acceleration/Deceleration, Pulse Outputs

Use a direct control operation for the Position Control Unit.

Use high-speed pulse outputs for CPU Unit commands (10 ms for C200HW-NC113).

Setup the system quickly with Windows-based Support Software and store setup data in files.

Save position data in flash memory in the Position Control Unit; No backup battery maintenance required.

- **High-speed Position Control**
- **Easy Creation of Position Control Data**
- **No Maintenance for Position Data in Position Control Unit**

Multi-task G Language; Absolute or Incremental Encoder

Motion Control Unit

Semiclosed-loop Control, Automatic Trapezoid or S-curve Acceleration/Deceleration, Analog Outputs

Control machines with rectangular coordinate systems. (Multi-jointed horizontal robots and cylindrical robots cannot be controlled because coordinate conversion is not supported.)

Use the multi-task G language to simplify writing motion control programs.

Supports general-purpose inputs.

Connect to motors and drivers with absolute encoders.

Use the automatic pulse generator.

- **Advanced Position Control Not Possible with Position Control Unit**
- **Reduced Load on CPU Unit Ladder Program for Position Control**
- **Start and Stop Directly with General-purpose Input**
- **Start System without Origin Search**
- **Manual Positioning and Easy Sync Control**

I/O Allocations

∎ I/O Allocations

In CS1-series PCs, part of the I/O memory is allocated to each Unit. Units are divided into the following 3 groups for allocations.

- Basic I/O Units
- Special I/O Units
- CS1 CPU Bus Units

Basic I/O Units
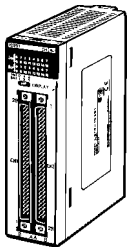
CS1 Basic I/O Units
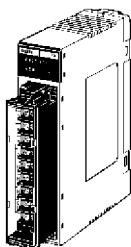
C200H Basic I/O Units
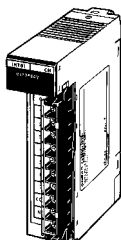
C200H Group-2 High-density I/O Units
(See Note 2.)

Allocations

CIO Area:
CIO 0000 to CIO 0319 (See Note 1.)
(Memory is allocated in word units based on mounting position in the Racks.)

Note 1. The Rack's first word setting can be changed from the default setting (CIO 0000) to any word from CIO 0000 to CIO 9999. The first word setting can be changed only with a Programming Device other than a Programming Console.

2. The unit number setting on the front of C200H Group-2 High-density I/O Units is ignored. Words are allocated to these Units based on their location in the Rack.

Special I/O Units
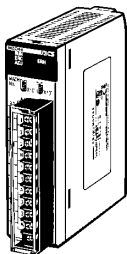
CS1 Special I/O Units

C200H Special I/O Units
(See Note 2.)

Allocations

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

Note 1. Although there are 96 unit number settings, a maximum of 80 Units can actually be mounted to a PC because that is the maximum number of slots possible.

2. Some Units classified as I/O Units (namely C200H High-density I/O Units) are actually treated as Special I/O Units.
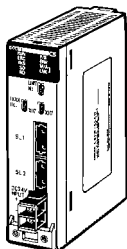
CS1 CPU Bus Units

CS1 CPU Bus Units

Allocations

CS1 CPU Bus Unit Area:
CIO 1500 to CIO 1899
(Each Unit is allocated 25 words based on its unit number.)

■ Allocations to Basic I/O Unit Groups

Basic I/O Units include CS1 Basic I/O Units, C200H Basic I/O Units, and C200H Group-2 High-density I/O Units.

Allocated words in the CIO Area:CIO 0000 to CIO 0319

Basic I/O Units can be mounted to the CPU Rack, CS1 Expansion Racks, and C200H Expansion I/O Racks.

Note: CS1 Basic I/O Units cannot be mounted to C200H Expansion I/O Racks.

Allocation Methods

1. CPU Rack

Basic I/O Units on the CPU Rack are allocated words left to right; Units are allocated as many words as required in word units.

Slot numbers 2, 3, 5, 8, and 10

Example

0	1	2	3	4
IN 8	IN 16	IN 64	OUT 8	OUT 32
CIO 0000	CIO 0001	CIO 0002 to 0005	CIO 0006	CIO 0007 to 0008
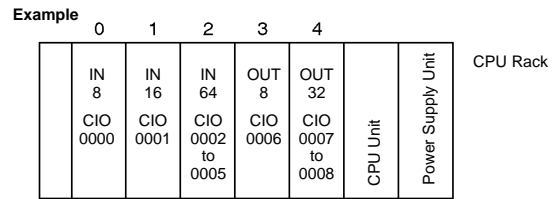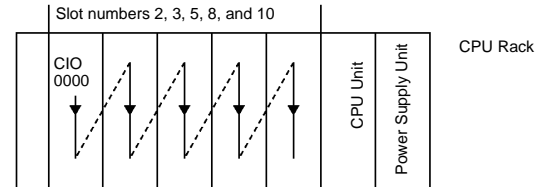
2. Allocations to CS1 Expansion and C200H Expansion I/O Racks

I/O allocations to Basic I/O Units continues from the CPU Rack to the Expansion Racks. Words are allocated from left to right and each Unit is allocated as many words as it requires in word units, just like Units in the CPU Rack.

Words allocated in order from Rack nearest CPU Rack.
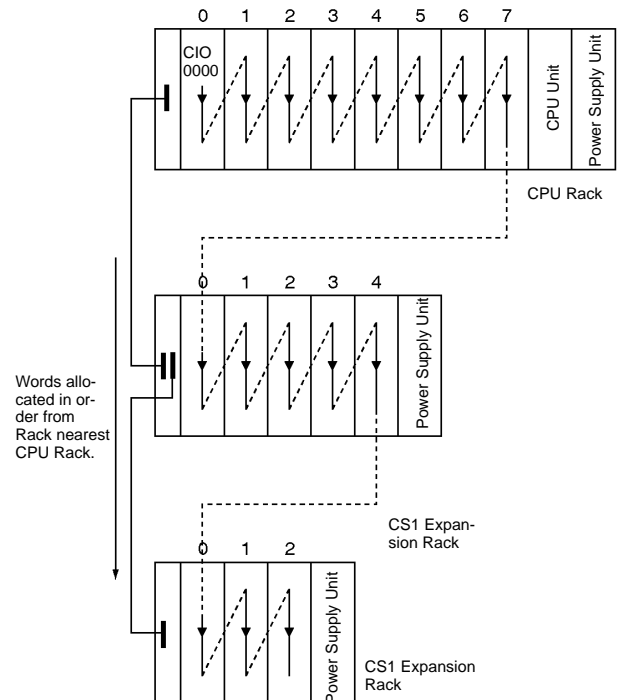
I/O Allocations

■ Allocations to Special I/O Units

Special I/O Units include CS1 Special I/O Units and C200H Special I/O Units.

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

Special /O Units can be mounted to the CPU Rack, CS1 Expansion Racks, and C200H Expansion I/O Racks*.

Note: *CS1 Special I/O Units cannot be mounted to C200H Expansion I/O Racks.

Each Unit is allocated 10 words in the Special I/O Unit Area, as shown in the following table.

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

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

■ Allocations to CS1 CPU Bus Units

Each CS1 CPU Bus Unit is allocated 25 words in the CS1 CPU Bus Unit Area (CIO 1500 to CIO 1899).

CS1 CPU Bus Units can be mounted to the CPU Rack or CS1 Expansion Racks.

Each Unit is allocated 25 words in the CPU Bus Unit Area, as shown in the following table.

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

Note: CS1 CPU Bus Units are ignored during I/O allocation to Basic I/O Units. Slots containing CS1 CPU Bus Units are treated as empty slots.

■ Allocations on SYSMAC Bus Racks

Each SYSMAC BUS Remote I/O Slave Rack is allocated 10 words in the SYSMAC BUS Area (CIO 3000 to CIO 3049) according the unit number (0 to 4) set on the Slave Unit. No words in the I/O Area are allocated to Units on Slave Racks.

Each slot in the Slave Rack is allocated one of the Rack's 10 words. The words are allocated from left to right. One word is allocated to every slot even if the slot is empty and the last two words allocated to each Rack are not used because the Slave Racks have only 8 slots.

The Master Unit and Slave Unit themselves do not require any words.

SYSMAC BUS Remote I/O Master Unit

SYSMAC BUS Remote I/O

0	1	2	3	4	5	6	7
1	2	3	4	5	6	7	8

Remote I/O Slave Rack

Slave Unit with unit number 0

0	1	2	3	4	5	6	7
17	18	19	20	21	22	23	24

Slave Unit with unit number 2

0	1	2	3	4	5	6	7
9	10	11	12	13	14	15	16

Slave Unit with unit number 1
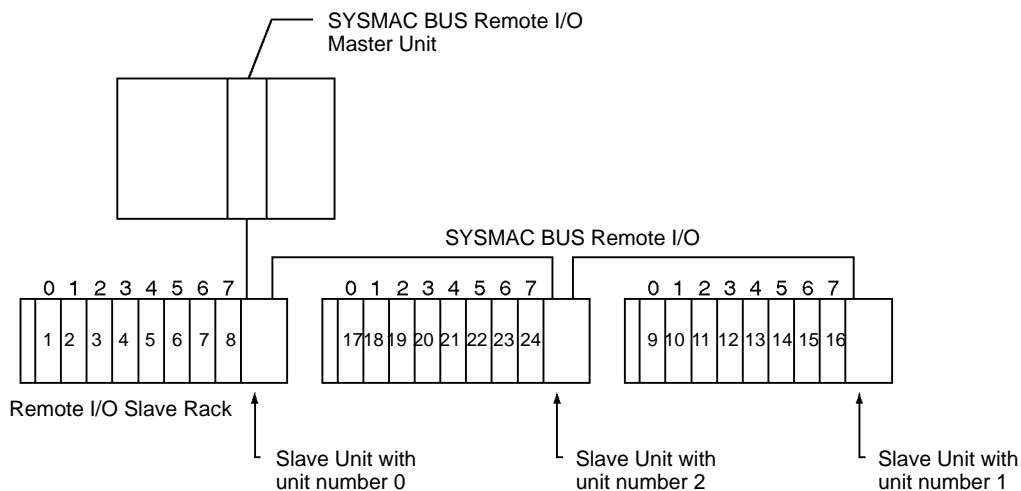
Address	Value	
3000	1	
3001	2	
3002	3	Slave Unit with unit number 0
:	:	
3007	8	
3008	Not used.	
3009	Not used.	
3010	9	
3011	10	
:	:	Slave Unit with unit number 1
3017	16	
3018	Not used.	
3019	Not used.	
3020	17	
3021	18	
:	:	Slave Unit with unit number 2
3027	24	
3028	Not used.	
3029	Not used.	

Current Consumption

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

■ CPU Racks and Expansion Racks

The following table shows the maximum currents and power that can be supplied by Power Supply Units on CPU Racks and Expansion Racks (both CS1 Expansion Racks and C200H Expansion I/O Racks).

Note: 1. When calculating current/power consumption in a CPU Rack, be sure to include the power required by the CPU Backplane and CPU Unit themselves.

2. Likewise, be sure to include the power required by the Expansion Backplane itself When calculating current/power consumption in an Expansion Rack.

Power Supply Unit	Max. Current Consumption			Max. Total Power Consumption
	5-V group	26-V group	24-V group	
C200HW-PA204	4.6 A	0.6 A	None	30 W
C200HW-PA204S	4.6 A	0.6 A	0.8 A	30 W
C200HW-PA204R	4.6 A	0.6 A	None	30 W
C200HW-PD204	4.6 A	0.6 A	None	30 W
C200HW-PA209R	9 A	1.3 A	None	45 W

■ SYSMAC BUS Slave Racks

The following table shows the maximum current and power supplied by Power Supply Units in SYSMAC BUS Slave Racks.

Note: Be sure to include the power required by the Rack itself When calculating current/power consumption.

Slave Unit	Max. Current Consumption			Max. Total Power Consumption
	5-V group	26-V group	24-V group	
C200H-RT201 (Wired)	2.7 A	0.6 A	0.3 A	28 W
C200H-RT202 (Wired)	2.7 A	0.6 A	None	23 W
C200H-RT001-P (Optical)	2.7 A	0.6 A	0.3 A	28 W
C200H-RT002-P (Optical)	2.7 A	0.6 A	None	23 W

Note: The current consumed by each voltage group must not exceed the maximum current shown in the table above.

Be sure both Condition 1 and Condition 2 are met.

Condition 1: Maximum Current Supply

1. Current required at 5 VDC by all Units (A) ≤ Max. Current shown in table

2. Current required at 26 VDC by all Units (B) ≤ Max. Current shown in table

3. Current required at 24 VDC by all Units (C) ≤ Max. Current shown in table

Condition 2: Maximum Total Current Supply

1. A × 5 VDC + B × 26 VDC + C × 24 VDC ≤ Max. Power shown in table

■ Example Calculations

Example 1

In this example, the following Units are mounted to a CPU Rack with a C200HW-PA204S Power Supply Unit.

Unit	Model	Quantity	5-VDC	26-VDC	24-VDC
CPU Backplane (8 slots)	CS1W-BC083	1	0.11 A	---	---
CPU Unit	CS1H-CPU67-E	1	1.10 A	---	---
Input Units	C200H-ID216	2	0.10 A	---	---
	CS1W-ID291	2	0.20 A	---	---
Output Units	C200H-OC221	2	0.01 A	0.075 A	---
Special I/O Unit	C200H-NC213	1	0.30 A	---	---
CS1 CPU Bus Unit	CS1W-CLK21	1	0.40 A	---	---
Service Power Supply Unit (24 VDC)		0.3 A used	---	---	0.3 A
Total current/power consumption **13.15 x 3.9 x 7.2 = 24.25 (≤30 W)**			2.63 A (≤4.6) x 5 V = 13.15W	0.15 A (≤0.6A) x 26 V = 3.9 W	0.3 A (≤0.8A) x 24 V = 7.2 W

Current Consumption

■ Current Consumption Tables
5-VDC Voltage Group

Name	Model	Consumption
CPU Units (These values include current consumption by a Programming Console or CX-Programmer.)	CS1H-CPU67-E	1.10 A
	CS1H-CPU66-E	1.10 A
	CS1H-CPU65-E	1.10 A
	CS1H-CPU64-E	1.10 A
	CS1H-CPU63-E	1.10 A
	CS1H-CPU45-E	0.95 A
	CS1H-CPU44-E	0.95 A
	CS1H-CPU43-E	0.95 A
	CS1H-CPU42-E	0.95 A
Communication Boards	CS1W-SCB21	0.28 A (See Note.)
	CS1W-SCB41	0.36 A (See Note.)
CPU Backplanes	CS1W-BC023	0.11 A
	CS1W-BC033	0.11 A
	CS1W-BC053	0.11 A
	CS1W-BC083	0.11 A
	CS1W-BC103	0.11 A
CS1 Expansion Backplanes	CS1W-BI023	0.23 A
	CS1W-BI033	0.23 A
	CS1W-BI053	0.23 A
	CS1W-BI083	0.23 A
	CS1W-BI103	0.23 A
C200H Expansion I/O Backplanes	C200HW-BI031	1.15 A
	C200HW-BI051	1.15 A
	C200HW-BI081	1.15 A
	C200HW-BI101	1.15 A

Note: Add 0.15 A per port when the NT-AL001-E is connected.

Basic I/O Units

Category	Name	Model	Consumption (A)
C200H Input Units	DC Input Units	C200H-ID211	0.01
		C200H-ID212	0.01
	AC Input Units	C200H-IA121	0.01
		C200H-IA122	0.01
		C200H-IA122V	0.01
		C200H-IA221	0.01
		C200H-IA222	0.01
		C200H-IA222V	0.01
	AC/DC Input Units	C200H-IM211	0.01
		C200H-IM212	0.01
	B7A Interface Units	C200H-B7AI1	0.10
		C200H-B7A12	0.10
	Interrupt Input Unit	C200HS-INT01	0.02

Category	Name	Model	Consumption (A)
C200H Group-2 High-density Input Units	DC Input Units	C200H-ID216	0.10
		C200H-ID217	0.12
		C200H-ID218	0.10
		C200H-ID219	0.12
		C200H-ID111	0.12
CS1 High-Density Input Units	DC Input Units	CS1W-ID291	0.20
C200H Output Units	Relay Output Units	C200H-OC221	0.01
		C200H-OC222	0.01
		C200H-OC222V	0.008
		C200H-OC225	0.05
		C200H-OC226	0.03
		C200H-OC223	0.01
		C200H-OC224	0.01
		C200H-OC224V	0.01
	Transistor Output Units	C200H-OD411	0.14
		C200H-OD213	0.14
		C200H-OD214	0.14
		C200H-OD216	0.01
		C200H-OD211	0.16
		C200H-OD217	0.01
		C200H-OD212	0.18
		C200H-OD21A	0.16
	B7A Interface Units	C200H-B7A01	0.10
		C200H-B7A02	0.10
	Triac Output Units	C200H-OA223	0.18
		C200H-OA222V	0.20
		C200H-OA224	0.27
C200H Group-2 High-density Output Units	Transistor Output Units	C200H-OD218	0.18
		C200H-OD219	0.27
CS1 High-Density Output Units	Transistor Output Units	CS1W-OD291	0.48
		CS1W-OD292	0.48
CS1 High-Density I/O Units	DC Input/Transistor Output Units	CS1W-MD291	0.35
		CS1W-MD292	0.35
C200H I/O Units	B7A Interface Units	C200H-B7A21	0.10
		C200H-B7A22	0.10
	Analog Timer Unit	C200H-TM001	0.06

Current Consumption

Special I/O Units

Category	Name	Model	Consumption(A)
C200H High-density I/O Units (Special I/O Units)	DC Input Unit	C200H-ID215	0.13
	TTL Input Unit	C200H-ID501	0.13
	Transistor Output Unit	C200H-OD215	0.22
	TTL Output Unit	C200H-OD501	0.22
	TTL I/O Unit	C200H-MD501	0.18
	DC Input Transistor Output Unit	C200H-MD215	0.18
		C200H-MD115	0.18
C200H Special I/O Units	Temperature Control Units	C200H-TC001	0.33
		C200H-TC002	0.33
		C200H-TC003	0.33
		C200H-TC101	0.33
		C200H-TC102	0.33
		C200H-TC103	0.33
	Heat/Cool Temperature Control Units	C200H-TV001	0.33
		C200H-TV002	0.33
		C200H-TV003	0.33
		C200H-TV101	0.33
		C200H-TV102	0.33
		C200H-TV103	0.33
	Temperature Sensor Units	C200H-TS001	0.45
		C200H-TS002	0.45
		C200H-TS101	0.45
		C200H-TS102	0.45
	PID Control Units	C200H-PID01	0.33
		C200H-PID02	0.33
		C200H-PID03	0.33
	Cam Positioner Unit	C200H-CP114	0.30
	ASCII Units	C200H-ASC02	0.20
		C200H-ASC11	0.25
		C200H-ASC21	0.30
		C200H-ASC31	0.30
	Analog Input Units	C200H-AD001	0.55
		C200H-AD002	0.45
		C200H-AD003	0.10
	Analog Output Units	C200H-DA001	0.65
		C200H-DA002	0.60
		C200H-DA003	0.10
		C200H-DA004	0.10
	Analog I/O Units	C200H-MAD01	0.10
	High-speed Counter Units	C200H-CT001-V1	0.30
		C200H-CT002	0.30
		C200H-CT021	0.45
	Motion Control Unit	C200H-MC221	0.65 (0.85 for Teaching Box)
	Position Control Units	C200H-NC211	0.50
		C200H-NC111	0.15
		C200H-NC112	0.15
		C200HW-NC113	0.30
		C200HW-NC213	0.30
		C200HW-NC413	0.50

Category	Name	Model	Consumption(A)
C200H Special I/O Units	ID Sensor Units	C200H-IDS01-V1	0.25
		C200H-IDS21	0.25
	Fuzzy Logic Unit	C200H-FZ001	0.30
	CompoBus/D Master Unit	C200HW-DRM21-V1	0.25
	CompoBus/D I/O Link Unit	C200HW-DRT21	0.25
	CompoBus/S Master Unit	C200HW-SRM21	0.15
	PC Link Unit	C200H-LK401	0.35
	SYSMAC BUS Remote I/O Slave Units	C200H-RM201	0.20
		C200H-RM001-PV1	0.20
CS1 Special I/O Unit	Analog I/O Unit	CS1W-MAD44	0.20

CS1 CPU Bus Units

Category	Name	Model	Consumption (A)
CS1 CPU Bus Units	Controller Link Units	CS1W-CLK21	0.35
		CS1W-CLK11	0.50
	Serial Communications Unit	CS1W-SCU21	0.30 (See Note.)
	Ethernet Unit	CS1W-ETN01	0.40

Note: Add 0.15 A per port when the NT-AL001-E is connected.

26-V Units

Category	Name	Model	Consumption (A)
C200H Output Units	Relay Output Units	C200H-OC221	0.075 for 8 points ON at the same time
		C200H-OC222	
		C200H-OC223	
		C200H-OC224	
		C200H-OC225	
		C200H-OC222V	0.09 for 8 points ON at the same time
		C200H-OC226	
		C200H-OC224V	
	Transistor Output Units	C200H-OD216	0.075 for 8 points ON at the same time
		C200H-OD217	
C200H Special I/O Units	Analog Intput Unit	C200H-AD003	0.10
	Analog Output Units	C200H-DA003	0.20
		C200H-DA004	0.25
	Analog I/O Unit	C200H-MAD01	0.20
	ID Sensor Units	C200H-IDS01-V1	0.12
		C200H-IDS21	0.12
CS1 Special I/O Unitsf	Analog I/O Unit	CS1W-MAD44	0.20

Instructions

■ Sequence Input Instructions

Name	Mnemonic	Function code	Function
LOAD	LD	---	Indicates a logical start and creates an ON/OFF execution condition based on the ON/OFF status of the specified operand bit.
LOAD NOT	LD NOT	---	Indicates a logical start and creates an ON/OFF execution condition based on the reverse of the ON/OFF status of the specified operand bit.
AND	AND	---	Takes a logical AND of the status of the specified operand bit and the current execution condition.
AND NOT	AND NOT	---	Reverses the status of the specified operand bit and takes a logical AND with the current execution condition.
OR	OR	---	Takes a logical OR of the ON/OFF status of the specified operand bit and the current execution condition.
OR NOT	OR NOT	---	Reverses the status of the specified bit and takes a logical OR with the current execution condition.
AND LOAD	AND LD	---	Takes a logical AND between logic blocks.
OR LOAD	OR LD	---	Takes a logical OR between logic blocks.
NOT	NOT	520	Reverses the execution condition.
CONDITION ON	UP	521	UP(521) turns ON the execution condition for one cycle when the execution condition goes from OFF to ON.
CONDITION OFF	DOWN	522	DOWN(522) turns ON the execution condition for one cycle when the execution condition goes from ON to OFF.
BIT TEST	LD TST	350	LD TST(350), AND TST(350), and OR TST(350) are used in the program like LD, AND, and OR; the execution condition is ON when the specified bit in the specified word is ON and OFF when the bit is OFF.
BIT TEST NOT	LD TSTN	351	LD TSTN(351), AND TSTN(351), and OR TSTN(351) are used in the program like LD NOT, AND NOT, and OR NOT; the execution condition is OFF when the specified bit in the specified word is ON and ON when the bit is OFF.
BIT TEST	AND TST	350	LD TST(350), AND TST(350), and OR TST(350) are used in the program like LD, AND, and OR; the execution condition is ON when the specified bit in the specified word is ON and OFF when the bit is OFF.
BIT TEST NOT	AND TSTN	351	LD TSTN(351), AND TSTN(351), and OR TSTN(351) are used in the program like LD NOT, AND NOT, and OR NOT; the execution condition is OFF when the specified bit in the specified word is ON and ON when the bit is OFF.
BIT TEST	OR TST	350	LD TST(350), AND TST(350), and OR TST(350) are used in the program like LD, AND, and OR; the execution condition is ON when the specified bit in the specified word is ON and OFF when the bit is OFF.
BIT TEST NOT	OR TSTN	351	LD TSTN(351), AND TSTN(351), and OR TSTN(351) are used in the program like LD NOT, AND NOT, and OR NOT; the execution condition is OFF when the specified bit in the specified word is ON and ON when the bit is OFF.

■ Sequence Output Instructions

Name	Mnemonic	Function code	Function
OUTPUT	OUT	---	Outputs the result (execution condition) of the logical processing to the specified bit.
OUTPUT NOT	OUT NOT	---	Reverses the result (execution condition) of the logical processing, and outputs it to the specified bit.
KEEP	KEEP	011	Operates as a latching relay.
DIFFERENTIATE UP	DIFU	013	DIFU(013) turns the designated bit ON for one cycle when the execution condition goes from OFF to ON (rising edge).
DIFFERENTIATE DOWN	DIFD	014	DIFD(014) turns the designated bit ON for one cycle when the execution condition goes from ON to OFF (falling edge).
SET	SET	---	SET turns the operand bit ON when the execution condition is ON.
RESET	RSET	---	RSET turns the operand bit OFF when the execution condition is ON.
MULTIPLE BIT SET	SETA	530	SETA(530) turns ON the specified number of consecutive bits.
MULTIPLE BIT RESET	RSTA	531	RSTA(531) turns OFF the specified number of consecutive bits.

Instructions

■ Sequence Control Instructions

Name	Mnemonic	Function code	Function
END	END	001	Indicates the end of a program. END(001) completes the execution of a program for that cycle. No instructions written after END(001) will be executed. Execution proceeds to the program with the next task number. When the program being executed has the highest task number in the program, END(001) marks the end of the overall main program.
NO OPERATION	NOP	000	This instruction has no function. (No processing is performed for NOP(000).)
INTERLOCK	IL	002	Interlocks all outputs between IL(002) and ILC(003) when the execution condition for IL(002) is OFF. IL(002) and ILC(003) are normally used in pairs.
INTERLOCK CLEAR	ILC	003	Interlocks all outputs between IL(002) and ILC(003) when the execution condition for IL(002) is OFF. IL(002) and ILC(003) are normally used in pairs.
JUMP	JMP	004	When the execution condition for JMP(004) is OFF, program execution jumps directly to the first JME(005) in the program with the same jump number. When the execution condition is ON, all instructions are executed normally.
JUMP END	JME	005	JME(005) indicates the destination of jumps made for JMP(004), CJP(510), and CJPN(511).
CONDITIONAL JUMP	CJP	510	The operation of CJP(510) is the basically the opposite of JMP(004). When the execution condition for CJP(510) is ON, program execution jumps directly to the first JME(005) in the program with the same jump number. When the execution condition is OFF, all instructions are executed normally.
CONDITIONAL JUMP	CJPN	511	The operation of CJPN(511) is almost identical to JMP(004). When the execution condition for CJP(004) is OFF, program execution jumps directly to the first JME(005) in the program with the same jump number. When the execution condition is ON, all instructions are executed normally.
MULTIPLE JUMP	JMP0	515	When the execution condition for JMP0(515) is OFF, all instructions from JMP0(515) to the next JME0(516) in the program are processed as NOP(000). When the execution condition is ON, all instructions are executed normally. Use JMP0(515) and JME0(516) in pairs. There is no limit on the number of pairs that can be used in the program.
MULTIPLE JUMP END	JME0	516	JME0(516) indicates the destination of jumps made for JMP0(515).
FOR-NEXT LOOPS	FOR	512	The instructions between FOR(512) and NEXT(513) are repeated a specified number of times. FOR(512) and NEXT(513) are used in pairs.
BREAK LOOP	BREAK	514	Programmed in a FOR-NEXT loop to cancel the execution of the loop for a given execution condition. The remaining instructions in the loop are processed as NOP(000) instructions.
FOR-NEXT LOOPS	NEXT	513	The instructions between FOR(512) and NEXT(513) are repeated a specified number of times. FOR(512) and NEXT(513) are used in pairs.

■ Timer and Counter Instructions

Name	Mnemonic	Function code	Function
TIMER	TIM	---	TIM operates a decrementing timer with units of 0.1-s. The setting range for the set value (SV) is 0 to 999.9 s.
COUNTER	CNT	---	CNT operates a decrementing counter. The setting range for the set value (SV) is 0 to 9,999.
HIGH-SPEED TIMER	TIMH	015	TIMH(015) operates a decrementing timer with units of 10-ms. The setting range for the set value (SV) is 0 to 99.99 s.
ONE-MS TIMER	TMHH	540	TMHH(540) operates a decrementing timer with units of 1-ms. The setting range for the set value (SV) is 0 to 9.999 s. The timing charts for TMHH(540) are the same as those given above for TIMH(015).
ACCUMULATIVE TIMER	TTIM	087	TTIM(087) operates an incrementing timer with units of 0.1-s. The setting range for the set value (SV) is 0 to 999.9 s.
LONG TIMER	TIML	542	TIML(542) operates a decrementing timer with units of 0.1-s that can time up to 9999999.9 S (approx. 115 days).
MULTI-OUTPUT TIMER	MTIM	543	MTIM(543) operates a 0.1-s incrementing timer with eight independent SVs and Completion Flags. The setting range for the set value (SV) is 0 to 999.9 s.
REVERSIBLE COUNTER	CNTR	012	CNTR(012) operates a reversible counter.
RESET TIMER/COUNTER	CNR	545	Resets the timers or counters within the specified range of timer or counter numbers. Sets the set value (SV) to the maximum of 9999.

■ Symbol Comparison Instructions

Name	Mnemonic	Function code	Function
Symbol Comparison (Unsigned)	LD, AND, OR + =, <>, <, <=, >, >=	300 (=) 305 (<>) 310 (<>) 315 (<=) 320 (>) 325(>=)	Symbol comparison instructions (unsigned) compare two values (constants and/or the contents of specified words) in 16-bit binary data and create an ON execution condition when the comparison condition is true. There are three types of symbol comparison instructions, LD (LOAD), AND, and OR.
Symbol Comparison (Double-word, unsigned)	LD, AND, OR + =, <>, <, <=, >, >= + L	301 (=) 306 (<>) 311 (<>) 316 (<=) 321 (>) 326 (>=)	Symbol comparison instructions (double-word, unsigned) compare two values (constants and/or the contents of specified double-word data) in unsigned 32-bit binary data and create an ON execution condition when the comparison condition is true. There are three types of symbol comparison instructions, LD (LOAD), AND, and OR.
Symbol Comparison (Signed)	LD, AND, OR + =, <>, <, <=, >, >= +S	302 (=) 307 (<>) 312 (<>) 317 (<=) 322 (>) 327 (>=)	Symbol comparison instructions (signed) compare two values (constants and/or the contents of specified words) in signed 16-bit binary (4-digit hexadecimal) and create an ON execution condition when the comparison condition is true. There are three types of symbol comparison instructions, LD (LOAD), AND, and OR.
Symbol Comparison (Double-word, signed)	LD, AND, OR + =, <>, <, <=, >, >= +SL	303 (=) 308 (<>) 313 (<>) 318 (<=) 323 (>) 328 (>=)	Symbol comparison instructions (double-word, signed) compare two values (constants and/or the contents of specified double-word data) in signed 32-bit binary (8-digit hexadecimal) and create an ON execution condition when the comparison condition is true. There are three types of symbol comparison instructions, LD (LOAD), AND, and OR.
COMPARE	CMP	020	Compares two unsigned binary values (constants and/or the contents of specified words) and outputs the result to the Arithmetic Flags in the Auxiliary Area.
DOUBLE COMPARE	CMPL	060	Compares two double unsigned binary values (constants and/or the contents of specified words) and outputs the result to the Arithmetic Flags in the Auxiliary Area.
SIGNED BINARY COMPARE	CPS	114	Compares two signed binary values (constants and/or the contents of specified words) and outputs the result to the Arithmetic Flags in the Auxiliary Area.
DOUBLE SIGNED BINARY COMPARE	CPSL	115	Compares two double signed binary values (constants and/or the contents of specified words) and outputs the result to the Arithmetic Flags in the Auxiliary Area.
TABLE COMPARE	TCMP	085	Compares the source data to the contents of 16 consecutive words and turns ON the corresponding bit in the result word when the contents of the words **are** equal.
MULTIPLE COMPARE	MCMP	019	Compares 16 consecutive words with another 16 consecutive words and turns ON the corresponding bit in the result word where the contents of the words **are not** equal.
BLOCK COMPARE	BCMP	068	Compares the source data to 16 ranges (defined by 16 lower limits and 16 upper limits) and turns ON the corresponding bit in the result word when the source data is within the range.

■ Data Movement Instructions

Name	Mnemonic	Function code	Function
MOVE	MOV	021	Transfers a word of data to the specified word.
DOUBLE MOVE	MOVL	498	Transfers two words of data to the specified words.
MOVE NOT	MVN	022	Transfers the complement of a word of data to the specified word.
DOUBLE MOVE NOT	MVNL	499	Transfers the complement of two words of data to the specified words.
MOVE BIT	MOVB	082	Transfers the specified bit.
MOVE DIGIT	MOVD	083	Transfers the specified digit or digits. (Each digit is made up of 4 bits.)
MULTIPLE BIT TRANSFER	XFRB	062	Transfers the specified number of consecutive bits.
BLOCK TRANSFER	XFER	070	Transfers the specified number of consecutive words.
BLOCK SET	BSET	071	Copies the same word to a range of consecutive words.
DATA EXCHANGE	XCHG	073	Exchanges the contents of the two specified words.
DOUBLE DATA EXCHANGE	XCGL	562	Exchanges the contents of a pair of consecutive words with another pair of consecutive words.

Instructions

Name	Mnemonic	Function code	Function
SINGLE WORD DISTRIBUTE	DIST	080	Transfers the source word to a destination word calculated by adding an offset value to the base address.
DATA COLLECT	COLL	081	Transfers the source word (calculated by adding an offset value to the base address) to the destination word.
MOVE TO REGISTER	MOVR	560	Sets the PC memory address of the specified word, bit, or timer/counter Completion Flag in the specified Index Register. (Use MOVRW(561) to set the PC memory address of a timer/counter PV in an Index Register.)
MOVE TIMER/COUNTER PV TO REGISTER	MVRW	561	Sets the PC memory address of the specified timer or counter's PV in the specified Index Register. (Use MOVR(560) to set the PC memory address of a word, bit, or timer/counter Completion Flag in an Index Register.)

■ Data Shift Instructions

Name	Mnemonic	Function code	Function
SHIFT REGISTER	SFT	010	Operates a shift register.
REVERSIBLE SHIFT REGISTER	SFTR	084	Creates a shift register that shifts data to either the right or the left.
ASYNCHRONOUS SHIFT REGISTER	ASFT	017	Shifts all non-zero word data within the specified word range either towards St or toward E, replacing 0000Hex word data.
WORD SHIFT	WSFT	016	Shifts data between St and E in word units.
ARITHMETIC SHIFT LEFT	ASL	025	Shifts the contents of Wd one bit to the left.
DOUBLE SHIFT LEFT	ASLL	570	Shifts the contents of Wd and Wd +1 one bit to the left.
ARITHMETIC SHIFT RIGHT	ASR	026	Shifts the contents of Wd one bit to the right.
DOUBLE SHIFT RIGHT	ASRL	571	Shifts the contents of Wd and Wd +1 one bit to the right.
ROTATE LEFT	ROL	027	Shifts all Wd bits one bit to the left including the Carry Flag (CY).
DOUBLE ROTATE LEFT	ROLL	572	Shifts all Wd and Wd +1 bits one bit to the left including the Carry Flag (CY).
ROTATE LEFT WITHOUT CARRY	RLNC	574	Shifts all Wd bits one bit to the left not including the Carry Flag (CY).
DOUBLE ROTATE LEFT WITHOUT CARRY	RLNL	576	Shifts all Wd and Wd +1 bits one bit to the left not including the Carry Flag (CY).
ROTATE RIGHT	ROR	028	Shifts all Wd bits one bit to the right including the Carry Flag (CY).
DOUBLE ROTATE RIGHT	RORL	573	Shifts all Wd and Wd +1 bits one bit to the right including the Carry Flag (CY).
ROTATE RIGHT WITHOUT CARRY	RRNC	575	Shifts all Wd bits one bit to the right not including the Carry Flag (CY). The contents of the rightmost bit of Wd shifts to the leftmost bit and to the Carry Flag (CY).
DOUBLE ROTATE RIGHT WITHOUT CARRY	RRNL	577	Shifts all Wd and Wd +1 bits one bit to the right not including the Carry Flag (CY). The contents of the rightmost bit of Wd +1 is shifted to the leftmost bit of Wd, and to the Carry Flag (CY).
ONE DIGIT SHIFT LEFT	SLD	074	Shifts data by one digit (4 bits) to the left.
ONE DIGIT SHIFT RIGHT	SRD	075	Shifts data by one digit (4 bits) to the right.
SHIFT N-BIT DATA LEFT	NSFL	578	Shifts the specified number of bits to the left.
SHIFT N-BIT DATA RIGHT	NSFR	579	Shifts the specified number of bits to the right.
SHIFT N-BITS LEFT	NASL	580	Shifts the specified 16 bits of word data to the left by the specified number of bits.
DOUBLE SHIFT N-BITS LEFT	NSLL	582	Shifts the specified 32 bits of word data to the left by the specified number of bits.
SHIFT N-BITS RIGHT	NASR	581	Shifts the specified 16 bits of word data to the right by the specified number of bits.
DOUBLE SHIFT N-BITS RIGHT	NSRL	583	Shifts the specified 32 bits of word data to the right by the specified number of bits.

Instructions

■ Increment/Decrement Instructions

Name	Mnemonic	Function code	Function
INCREMENT BINARY	++	590	Increments the 4-digit hexadecimal content of the specified word by 1.
DOUBLE INCREMENT BINARY	++L	591	Increments the 8-digit hexadecimal content of the specified words by 1.
DECREMENT BINARY	—	592	Decrements the 4-digit hexadecimal content of the specified word by 1.
DOUBLE DECREMENT BINARY	—L	593	Decrements the 8-digit hexadecimal content of the specified words by 1.
INCREMENT BCD	++B	594	Increments the 4-digit BCD content of the specified word by 1.
DOUBLE INCREMENT BCD	++BL	595	Increments the 8-digit BCD content of the specified words by 1.
DECREMENT BCD	—B	596	Decrements the 4-digit BCD content of the specified word by 1.
DOUBLE DECREMENT BCD	—BL	597	Decrements the 8-digit BCD content of the specified words by 1.

■ Symbol Math Instructions

Name	Mnemonic	Function code	Function
SIGNED BINARY ADD WITHOUT CARRY	+	400	Adds 4-digit (single-word) hexadecimal data and/or constants.
DOUBLE SIGNED BINARY ADD WITHOUT CARRY	+L	401	Adds 8-digit (double-word) hexadecimal data and/or constants.
SIGNED BINARY ADD WITH CARRY	+C	402	Adds 4-digit (single-word) hexadecimal data and/or constants with the Carry Flag (CY).
DOUBLE SIGNED BINARY ADD WITH CARRY	+CL	403	Adds 8-digit (double-word) hexadecimal data and/or constants with the Carry Flag (CY).
BCD ADD WITHOUT CARRY	+B	404	Adds 4-digit (single-word) BCD data and/or constants.
DOUBLE BCD ADD WITHOUT CARRY	+BL	405	Adds 8-digit (double-word) BCD data and/or constants.
BCD ADD WITH CARRY	+BC	406	Adds 4-digit (single-word) BCD data and/or constants with the Carry Flag (CY).
DOUBLE BCD ADD WITH CARRY	+BCL	407	Adds 8-digit (double-word) BCD data and/or constants with the Carry Flag (CY).
SIGNED BINARY SUBTRACT WITHOUT CARRY	–	410	Subtracts 4-digit (single-word) hexadecimal data and/or constants.
DOUBLE SIGNED BINARY SUBTRACT WITHOUT CARRY	–L	411	Subtracts 8-digit (double-word) hexadecimal data and/or constants.
SIGNED BINARY SUBTRACT WITH CARRY	–C	412	Subtracts 4-digit (single-word) hexadecimal data and/or constants with the Carry Flag (CY).
DOUBLE SIGNED BINARY WITH CARRY	–CL	413	Subtracts 8-digit (double-word) hexadecimal data and/or constants with the Carry Flag (CY).
BCD SUBTRACT WITHOUT CARRY	–B	414	Subtracts 4-digit (single-word) BCD data and/or constants.
DOUBLE BCD SUBTRACT WITHOUT CARRY	–BL	415	Subtracts 8-digit (double-word) BCD data and/or constants.
BCD SUBTRACT WITH CARRY	–BC	416	Subtracts 4-digit (single-word) BCD data and/or constants with the Carry Flag (CY).
DOUBLE BCD SUBTRACT WITH CARRY	–BCL	417	Subtracts 8-digit (double-word) BCD data and/or constants with the Carry Flag (CY).
SIGNED BINARY MULTIPLY	*	420	Multiplies 4-digit signed hexadecimal data and/or constants.
SIGNED BINARY MULTIPLY	*L	421	Multiplies 8-digit signed hexadecimal data and/or constants.
UNSIGNED BINARY MULTIPLY	*U	422	Multiplies 4-digit unsigned hexadecimal data and/or constants.
DOUBLE UNSIGNED BINARY MULTIPLY	*UL	423	Multiplies 8-digit unsigned hexadecimal data and/or constants.

Instructions

Name	Mnemonic	Function code	Function
BCD MULTIPLY	*B	424	Multiplies 4-digit (single-word) BCD data and/or constants.
DOUBLE BCD MULTIPLY	*BL	425	Multiplies 8-digit (double-word) BCD data and/or constants.
SIGNED BINARY DIVIDE	/	430	Divides 4-digit (single-word) signed hexadecimal data and/or constants.
DOUBLE SIGNED BINARY DIVIDE	/L	431	Divides 8-digit (double-word) signed hexadecimal data and/or constants.
UNSIGNED BINARY DIVIDE	/U	432	Divides 4-digit (single-word) unsigned hexadecimal data and/or constants.
DOUBLE UNSIGNED BINARY DIVIDE	/UL	433	Divides 8-digit (double-word) unsigned hexadecimal data and/or constants.
BCD DIVIDE	/B	434	Divides 4-digit (single-word) BCD data and/or constants.
DOUBLE BCD DIVIDE	/BL	435	Divides 8-digit (double-word) BCD data and/or constants.

■ Conversion Instructions

Name	Mnemonic	Function code	Function
BCD-TO BINARY	BIN	023	Converts BCD data to binary data.
DOUBLE BCD-TO-DOUBLE BINARY	BINL	058	Converts 8-digit BCD data to 8-digit hexadecimal (32-bit binary) data.
BINARY-TO-BCD	BCD	024	Converts a word of binary data to a word of BCD data.
DOUBLE BINARY-TO-DOUBLE BCD	BCDL	059	Converts 8-digit hexadecimal (32-bit binary) data to 8-digit BCD data.
2'S COMPLEMENT	NEG	160	Calculates the 2's complement of a word of hexadecimal data.
DOUBLE 2'S COMPLEMENT	NEGL	161	Calculates the 2's complement of two words of hexadecimal data.
16-BIT TO 32-BIT SIGNED BINARY	SIGN	600	Expands a 16-bit signed binary value to its 32-bit equivalent.
DATA DECODER	MLPX	076	Reads the numerical value in the specified digit (or byte) in the source word, turns ON the corresponding bit in the result word (or 16-word range), and turns OFF all other bits in the result word (or 16-word range). 4-to-16 bit conversion
DATA ENCODER	DMPX	077	FInds the location of the first or last ON bit within the source word (or 16-word range), and writes that value to the specified digit (or byte) in the result word. 16-to-4 bit conversion
ASCII CONVERT	ASC	086	Converts 4-bit hexadecimal digits in the source word into their 8-bit ASCII equivalents.
ASCII TO HEX	HEX	162	Converts up to 4 bytes of ASCII data in the source word to their hexadecimal equivalents and writes these digits in the specified destination word.
COLUMN TO LINE	LINE	063	Converts a column of bits from a 16-word range (the same bit number in 16 consecutive words) to the 16 bits of the destination word.
LINE TO COLUMN	COLM	064	Converts the 16 bits of the source word to a column of bits in a 16-word range of destination words (the same bit number in 16 consecutive words).
SIGNED BCD-TO-BINARY	BINS	470	Converts one word of signed BCD data to one word of signed binary data.
DOUBLE SIGNED BCD-TO-BINARY	BISL	472	Converts double signed BCD data to double signed binary data.
SIGNED BINARY-TO-BCD	BCDS	471	Converts one word of signed binary data to one word of signed BCD data.
DOUBLE SIGNED BINARY-TO-BCD	BDSL	473	Converts double signed binary data to double signed BCD data.

■ Logic Instructions

Name	Mnemonic	Function code	Function
LOGICAL AND	ANDW	034	Takes the logical AND of corresponding bits in single words of word data and/or constants.
DOUBLE LOGICAL AND	ANDL	610	Takes the logical AND of corresponding bits in double words of word data and/or constants.

Name	Mnemonic	Function code	Function
LOGICAL OR	ORW	035	Takes the logical OR of corresponding bits in single words of word data and/or constants.
DOUBLE LOGICAL OR	ORWL	611	Takes the logical OR of corresponding bits in double words of word data and/or constants.
EXCLUSIVE OR	XORW	036	Takes the logical exclusive OR of corresponding bits in single words of word data and/or constants.
DOUBLE EXCLUSIVE OR	XORL	612	Takes the logical exclusive OR of corresponding bits in double words of word data and/or constants.
EXCLUSIVE NOR	XNRW	037	Takes the logical exclusive NOR of corresponding single words of word data and/or constants.
DOUBLE EXCLUSIVE NOR	XNRL	613	Takes the logical exclusive NOR of corresponding bits in double words of word data and/or constants.
COMPLEMENT	COM	029	Turns OFF all ON bits and turns ON all OFF bits in Wd.
DOUBLE COMPLEMENT	COML	614	Turns OFF all ON bits and turns ON all OFF bits in Wd and Wd+1.

■ Special Math Instructions

Name	Mnemonic	Function code	Function
BINARY ROOT	ROTB	620	Computes the square root of the 32-bit binary content of the specified words and outputs the integer portion of the result to the specified result word.
BCD SQUARE ROOT	ROOT	072	Computes the square root of an 8-digit BCD number and outputs the integer portion of the result to the specified result word.
ARITHMETIC PROCESS	APR	069	Calculates the sine, cosine, or a linear extrapolation of the source data. The linear extrapolation function allows any relationship between X and Y to be approximated with line segments.
FLOATING POINT DIVIDE	FDIV	079	Divides one 7-digit floating-point number by another. The floating-point numbers are expressed in scientific notation (7-digit mantissa and 1-digit exponent).
BIT COUNTER	BCNT	067	Counts the total number of ON bits in the specified word(s).

■ Floating-point Math Instructions

Name	Mnemonic	Function code	Function
FLOATING TO 16-BIT	FIX	450	Converts a 32-bit floating-point value to 16-bit signed binary data and places the result in the specified result word.
FLOATING TO 32-BIT	FIXL	451	Converts a 32-bit floating-point value to 32-bit signed binary data and places the result in the specified result words.
16-BIT TO FLOATING	FLT	452	Converts a 16-bit signed binary value to 32-bit floating-point data and places the result in the specified result words.
32-BIT TO FLOATING	FLTL	453	Converts a 32-bit signed binary value to 32-bit floating-point data and places the result in the specified result words.
FLOATING POINT ADD	+F	454	Adds two 32-bit floating-point numbers and places the result in the specified result words.
FLOATING POINT SUBTRACT	–F	455	Subtracts one 32-bit floating-point number from another and places the result in the specified result words.
FLOATING-POINT DIVIDE	/F	457	Divides one 32-bit floating-point number by another and places the result in the specified result words.
FLOATING-POINT MULTIPLY	*F	456	Multiplies two 32-bit floating-point numbers and places the result in the specified result words.
DEGREES TO RADIANS	RAD	458	Converts a 32-bit floating-point number from degrees to radians and places the result in the specified result words.
RADIANS TO DEGREES	DEG	459	Converts a 32-bit floating-point number from radians to degrees and places the result in the specified result words.

Instructions

Name	Mnemonic	Function code	Function
SINE	SIN	460	Calculates the sine of a 32-bit floating-point number (in radians) and places the result in the specified result words.
COSINE	COS	461	Calculates the cosine of a 32-bit floating-point number (in radians) and places the result in the specified result words.
TANGENT	TAN	462	Calculates the tangent of a 32-bit floating-point number (in radians) and places the result in the specified result words.
ARC SINE	ASIN	463	Calculates the arc sine of a 32-bit floating-point number and places the result in the specified result words. (The arc sine function is the inverse of the sine function; it returns the angle that produces a given sine value between −1 and 1.)
ARC COSINE	ACOS	464	Calculates the arc cosine of a 32-bit floating-point number and places the result in the specified result words. (The arc cosine function is the inverse of the cosine function; it returns the angle that produces a given cosine value between −1 and 1.)
ARC TANGENT	ATAN	465	Calculates the arc tangent of a 32-bit floating-point number and places the result in the specified result words. (The arc tangent function is the inverse of the tangent function; it returns the angle that produces a given tangent value.)
SQUARE ROOT	SQRT	466	Calculates the square root of a 32-bit floating-point number and places the result in the specified result words.
EXPONENT	EXP	467	Calculates the natural (base e) exponential of a 32-bit floating-point number and places the result in the specified result words.
LOGARITHM	LOG	468	Calculates the natural (base e) logarithm of a 32-bit floating-point number and places the result in the specified result words.
EXPONENTIAL POWER	PWR	840	Raises a 32-bit floating-point number to the power of another 32-bit floating-point number.

■ Table Data Processing Instructions

Name	Mnemonic	Function code	Function
SET STACK	SSET	630	Defines a stack of the specified length beginning at the specified word and initializes the words in the data region to all zeroes.
PUSH ONTO STACK	PUSH	632	Writes one word of data to the specified stack.
FIRST IN FIRST OUT	FIFO	633	Reads the first word of data written to the specified stack (the oldest data in the stack).
LAST IN FIRST OUT	LIFO	634	Reads the last word of data written to the specified stack (the newest data in the stack).
DIMENSION RECORD TABLE	DIM	631	Defines a record table by declaring the length of each record and the number of records. Up to 16 record tables can be defined.
SET RECORD LOCATION	SETR	635	Writes the location of the specified record (the PC memory address of the beginning of the record) in the specified Index Register.
GET RECORD NUMBER	GETR	636	Returns the record number of the record at the PC memory address contained in the specified Index Register.
DATA SEARCH	SRCH	181	Searches for a word of data within a range of words.
SWAP BYTES	SWAP	637	Switches the leftmost and rightmost bytes in all of the words in the range.
FIND MAXIMUM	MAX	182	Finds the maximum value in the range.
FIND MINIMUM	MIN	183	Finds the minimum value in the range.
SUM	SUM	184	Adds the bytes or words in the range and outputs the result to two words.
FRAME CHECKSUM	FCS	180	Calculates the ASCII FCS value for the specified range.

■ Data Control Instructions

Name	Mnemonic	Function code	Function
PID CONTROL	PID	190	Executes PID control according to the specified parameters.
LIMIT CONTROL	LMT	680	Controls output data according to whether or not input data is within upper and lower limits.

Name	Mnemonic	Function code	Function
DEAD BAND CONTROL	BAND	681	Controls output data according to whether or not input data is within the dead band range.
DEAD ZONE CONTROL	ZONE	682	Adds the specified bias to input data and outputs the result.
SCALING	SCL	194	Converts unsigned binary data into unsigned BCD data according to the specified linear function.
SCALING 2	SCL2	486	Converts signed binary data into signed BCD data according to the specified linear function. An offset can be input in defining the linear function.
SCALING 3	SCL3	487	Converts signed BCD data into signed binary data according to the specified linear function. An offset can be input in defining the linear function.
AVERAGE	AVG	195	Calculates the average value of an input word for the specified number of cycles.

■ Subroutines Instructions

Name	Mnemonic	Function code	Function
SUBROUTINE CALL	SBS	091	Calls the subroutine with the specified subroutine number and executes that program.
SUBROUTINE ENTRY	SBN	092	Indicates the beginning of the subroutine program with the specified subroutine number.
SUBROUTINE RETURN	RET	093	Indicates the end of a subroutine program.
MACRO	MCRO	099	Calls the subroutine with the specified subroutine number and executes that program using the input parameters in S to S+3 and the output parameters in D to D+3.

■ Interrupt Control Instructions

Name	Mnemonic	Function code	Function
SET INTERRUPT MASK	MSKS	690	Sets up interrupt processing for I/O interrupts or scheduled interrupts. Both I/O interrupt tasks and scheduled interrupt tasks are masked (disabled) when the PC is first turned on. MSKS(690) can be used to unmask or mask I/O interrupts and set the time intervals for scheduled interrupts.
READ INTERRUPT MASK	MSKR	692	Reads the current interrupt processing settings that were set with MSKS(690).
CLEAR INTERRUPT	CLI	691	Clears or retains recorded interrupt inputs for I/O interrupts or sets the time to the first scheduled interrupt for scheduled interrupts.
DISABLE INTERRUPTS	DI	693	Disables execution of all interrupt tasks except the power OFF interrupt.
ENABLE INTERRUPTS	EI	694	Enables execution of all interrupt tasks that were disabled with DI(693).

■ Step Instructions

Name	Mnemonic	Function code	Function
STEP DEFINE	STEP	008	STEP(008) functionS in following 2 ways, depending on its position and whether or not a control bit has been specified. (1)Starts a specific step. (2)Ends the step programming area (i.e., step execution).
STEP START	SNXT	009	SNXT(009) is used in the following three ways: (1)To start step programming execution. (2)To proceed to the next step control bit. (3)To end step programming execution.

Instructions

■ Basic I/O Unit Instructions

Name	Mnemonic	Function code	Function
I/O REFRESH	IORF	097	Refreshes the specified I/O words.
7-SEGMENT DECODER	SDEC	078	Converts the hexadecimal contents of the designated digit(s) into 8-bit, 7-segment display code and places it into the upper or lower 8-bits of the specified destination words.
INTELLIGENT I/O READ	IORD	222	Reads the contents of the I/O Unit's memory area.
INTELLIGENT I/O WRITE	IOWR	223	Outputs the contents of the CPU Unit's I/O memory area to the Special I/O Unit.

■ Serial Communications Instructions

Name	Mnemonic	Function code	Function
PROTOCOL MACRO	PMCR	260	Calls and executes a communications sequence registered in a Serial Communications Board or Serial Communications Unit.
TRANSMIT	TXD	236	Outputs the specified number of bytes of data from the RS-232C port built into the CPU Unit.
RECEIVE	RXD	235	Reads the specified number of bytes of data from the RS-232C port built into the CPU Unit.
CHANGE SERIAL PORT SETUP	STUP	237	Changes the communications parameters of a serial port on the CPU Unit, Serial Communications Unit (CPU Bus Unit), or Serial Communications Board. STUP(237) thus enables the protocol mode to be changed during PC operation.

■ Network Instructions

Name	Mnemonic	Function code	Function
NETWORK SEND	SEND	090	Transmits data to a node in the network.
NETWORK RECEIVE	RECV	098	Requests data to be transmitted from a node in the network and receives the data.
DELIVER COMMAND	CMND	490	Sends FINS commands and receives the response.

■ File Memory Instructions

Name	Mnemonic	Function code	Function
READ DATA FILE	FREAD	700	Reads the specified data or amount of data from the specified data file in file memory to the specified data area in the CPU Unit.
WRITE DATA FILE	FWRIT	701	Overwrites or appends data in the specified data file in file memory with the specified data from the data area in the CPU Unit. If the specified file doesn't exist, a new file is created with that filename.

■ Display Instructions

Name	Mnemonic	Function code	Function
DISPLAY MESSAGE	MSG	046	Reads the specified sixteen words of extended ASCII and displays the message on a Peripheral Device such as a Programming Console.

■ Clock Instructions

Name	Mnemonic	Function code	Function
CALENDAR ADD	CADD	730	Adds time to the calendar data in the specified words.
CALENDAR SUBTRACT	CSUB	731	Subtracts time from the calendar data in the specified words.
HOURS TO SECONDS	SEC	065	Converts time data in hours/minutes/seconds format to an equivalent time in seconds only.

Name	Mnemonic	Function code	Function
SECONDS TO HOURS	HMS	066	Converts seconds data to an equivalent time in hours/minutes/seconds format.
CLOCK ADJUSTMENT	DATE	735	Changes the internal clock setting to the setting in the specified source words.

■ Debugging Instructions

Name	Mnemonic	Function code	Function
TRACE MEMORY SAMPLING	TRSM	045	When TRSM(045) is executed, the status of a preselected bit or word is sampled and stored in Trace Memory. TRSM(045) can be used anywhere in the program, any number of times.

■ Failure Diagnosis Instructions

Name	Mnemonic	Function code	Function
FAILURE ALARM	FAL	006	Generates or clears user-defined non-fatal errors. Non-fatal errors do not stop PC operation.
SEVERE FAILURE ALARM	FALS	007	Generates user-defined fatal errors. Fatal errors stop PC operation.
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.

■ Other Instructions

Name	Mnemonic	Function code	Function
SET CARRY	STC	040	Sets the Carry Flag (CY).
CLEAR CARRY	CLC	041	Turns OFF the Carry Flag (CY).
SELECT EM BANK	EMBC	281	Changes the current EM bank.
EXTEND MAXIMUM CYCLE TIME	WDT	094	Extends the maximum cycle time, but only for the cycle in which this instruction is executed.

■ Block Programming Instructions

Name	Mnemonic	Function code	Function
BLOCK PROGRAM BEGIN	BPRG	096	Define a block programming area. For every BPRG(096) there must be a corresponding BEND(801).
BLOCK PROGRAM END	BEND	801	Define a block programming area. For every BPRG(096) there must be a corresponding BEND(801).
BLOCK PROGRAM PAUSE	BPPS	811	Pause and restart the specified block program from another block program.
BLOCK PROGRAM RESTART	BPRS	812	Pause and restart the specified block program from another block program.
CONDITIONAL BLOCK EXIT	*input_condition* EXIT	806	EXIT(806) without an operand bit exits the program if the execution condition is ON.
CONDITIONAL BLOCK EXIT	EXIT *bit_address*	806	EXIT(806) without an operand bit exits the program if the execution condition is ON.
CONDITIONAL BLOCK EXIT (NOT)	EXIT NOT *bit_address*	806	EXIT(806) without an operand bit exits the program if the execution condition is ON.
CONDITIONAL BLOCK BRANCHING	*input_condition* IF	802	If the execution condition is ON, the instructions between IF(802) and ELSE(803) will be executed and if the execution condition is OFF, the instructions between ELSE(803) and IEND(804) will be executed.
CONDITIONAL BLOCK BRANCHING	IF *bit_address*	802	If the operand bit is ON, the instructions between IF(802) and ELSE(803) will be executed. If the operand bit is OFF, the instructions between ELSE(803) and IEND(804) will be executed.

Instructions

Name	Mnemonic	Function code	Function
CONDITIONAL BLOCK BRANCHING (NOT)	IF NOT *bit_address*	802	The instructions between IF(802) and ELSE(803) will be executed and if the operand bit is ON, the instructions be ELSE(803) and IEND(804) will be executed is the operand bit is OFF.
CONDITIONAL BLOCK BRANCHING (ELSE)	ELSE	803	If the ELSE(803) instruction is omitted and the operand bit is ON, the instructions between IF(802) and IEND(804) will be executed
CONDITIONAL BLOCK BRANCHING END	IEND	804	If the operand bit is OFF, only the instructions after IEND(804) will be executed.
ONE CYCLE AND WAIT	*input_condition* WAIT	805	If the execution condition is ON for WAIT(805), the rest of the instruction in the block program will be skipped.
ONE CYCLE AND WAIT	WAIT *bit_address*	805	If the operand bit is OFF (ON for WAIT NOT(805)), the rest of the instructions in the block program will be skipped. In the next cycle, none of the block program will be executed except for the execution condition for WAIT(805) or WAIT(805) NOT. When the execution condition goes ON (OFF for WAIT(805) NOT), the instruction from WAIT(805) or WAIT(805) NOT to the end of the program will be executed.
ONE CYCLE AND WAIT (NOT)	WAIT NOT *bit_address*	805	If the operand bit is OFF (ON for WAIT NOT(805)), the rest of the instructions in the block program will be skipped. In the next cycle, none of the block program will be executed except for the execution condition for WAIT(805) or WAIT(805) NOT. When the execution condition goes ON (OFF for WAIT(805) NOT), the instruction from WAIT(805) or WAIT(805) NOT to the end of the program will be executed.
TIMER WAIT	TIMW	813	Delays execution of the rest of the block program until the specified time has elapsed. Execution will be continued from the next instruction after TIMW(813) when the timer times out.
COUNTER WAIT	CNTW	814	Delays execution of the rest of the block program until the specified count has been achieved. Execution will be continued from the next instruction after CNTW(814) when the counter counts out.
HIGH-SPEED TIMER WAIT	TMHW	815	Delays execution of the rest of the block program until the specified time has elapsed. Execution will be continued from the next instruction after TMHW(815) when the timer times out.
LOOP	LOOP	809	LOOP(809) designates the beginning of the loop program.
LEND	*input_condition* LEND	810	LEND(810) or LEND(810) NOT specifies the end of the loop. When LEND(810) or LEND(810) NOT is reached, program execution will loop back to the next previous LOOP(809) until the operand bit for LEND(810) or LEND(810) NOT turns ON or OFF (respectively) or until the execution condition for LEND(810) turns ON.
LEND	LEND *bit_address*	810	If the operand bit is OFF for LEND(810) (or ON for LEND(810) NOT), execution of the loop is repeated starting with the next instruction after LOOP(809). If the operand bit is ON for LEND(810) (or OFF for LEND(810) NOT), the loop is ended and execution continues to the next instruction after LEND(810) or LEND(810) NOT.
LEND NOT	LEND NOT *bit_address*	810	LEND(810) or LEND(810) NOT specifies the end of the loop. When LEND(810) or LEND(810) NOT is reached, program execution will loop back to the next previous LOOP(809) until the operand bit for LEND(810) or LEND(810) NOT turns ON or OFF (respectively) or until the execution condition for LEND(810) turns ON.

■ Text String Processing Instructions

Name	Mnemonic	Function code	Function
MOV STRING	MOV$	664	Transfers a text string.
CONCATENATE STRING	+$	656	Links one text string to another text string.
GET STRING LEFT	LEFT$	652	Fetches a designated number of characters from the left (beginning) of a text string.
GET STRING RIGHT	RGHT$	653	Reads a designated number of characters from the right (end) of a text string.
GET STRING MIDDLE	MID$	654	Reads a designated number of characters from any position in the middle of a text string.
FIND IN STRING	FIND$	660	Finds a designated text string from within a text string.
STRING LENGTH	LEN$	650	Calculates the length of a text string.
REPLACE IN STRING	RPLC$	661	Replaces a text string with a designated text string from a designated position.
DELETE STRING	DEL$	658	Deletes a designated text string from the middle of a text string.
EXCHANGE STRING	XCHG$	665	Replaces a designated text string with another designated text string.
CLEAR STRING	CLR$	666	Clears an entire text string with NUL (00 hex).
INSERT INTO STRING	INS$	657	Deletes a designated text string from the middle of a text string.
String Comparison	LD, AND, OR + =$, <>$, <$, <=$, >$, >=$	670 (=$) 671 (<>$) 672 (<$) 673 (<=$) 674 (>$) 675 (>=$	Sting comparison instructions (=$, <>$, <$, <=$, >$, >=$) compare two text strings from the beginning, in terms of value of the ASCII codes. If the result of the comparison is true, an ON execution condition is created for a LOAD, AND, or OR.

■ Task Control Instructions

Name	Mnemonic	Function code	Function
TASK ON	TKON	820	Makes the specified task executable.
TASK OFF	TKOF	821	Puts the specified task into standby status.

Unit Index

Unit		Classification	Model	Page
I/O Units	Input Units	C200H Basic I/O Unit	C200H-ID211/212	73
			C200H-IA□□	
			C200H-IM211/212	
		C200H Group-2 High Density Units	C200H-ID216/217/111	
		C200H Special I/O Unit	C200H-ID501/215	
		CS1 Basic I/O Unit	CS1W-ID291	
	Output Units	C200H Basic I/O Unit	C200H-OC22□ (□)	
			C200H-OD□□□	
			C200H-OA22□ (□)	
		C200H Group-2 High Density Units	C200H-OD218/219	
		C200H Special I/O Unit	C200H-OD215	
			C200H-OD501	
		CS1 Basic I/O Unit	CS1W-OD291/292	
	I/O Units	C200H Special I/O Unit	C200H-MD501/215/115	75
		CS1 Basic I/O Unit	C200H-MD291/292	
Interrupt Input Unit		C200H Special I/O Unit	C200H-INT01	76
Analog Timer Unit		C200H Special I/O Unit	C200H-TM001	
Analog I/O Unit	Analog Input Units	C200H Special I/O Unit	C200H-AD00□	77
	Analog Output Units	C200H Special I/O Unit	C200H-DA00□	78
	Analog I/O Units	C200H Special I/O Unit	C200H-MAD01	79
		CS1 Basic I/O Unit	CS1W-MAD44	
Temperature Sensor Units		C200H Special I/O Unit	C200H-TS00□	80
Temperature Control Units		C200H Special I/O Unit	C200H-TC□□□	82
Heat/Cool Control Units		C200H Special I/O Unit	C200H-TV□□□	83
PID Control Units		C200H Special I/O Unit	C200H-PID□□□	84
Position Control Units		C200H Special I/O Unit	C200H-NC□□3	87
Motion Control Unit		C200H Special I/O Unit	C200H-MC221	88
High-speed Counter Units		C200H Special I/O Unit	C200H-CT□□□ (-V1)	89
ID Sensor Units		C200H Special I/O Unit	C200H-IDS□□□ (-V1)	90
Serial Communications Boards/Unit	Serial Communications Boards	Inner Board	CS1W-SCB21/41	92
	Serial Communications Unit	CS1 CPU Bus Unit	CS1W-SCU21	
ASCII Units		C200H Special I/O Unit	C200H-ASC11/21/31/02	93
Ethernet Unit		CS1 CPU Bus Unit	CS1W-ETN01	96
Controller Link Boards/Unit	Controller Link Unit	CS1 CPU Bus Unit	CS1W-CLK11/21	97
	Controller Link Boards	Personal compute board	3F8F5-CLK11/21	
			3F8F6-CLK21	
CompoBus/D (DeviceNet) and CompoBus/S Units	CompoBus/D Master Unit	C200H Special I/O Unit	C200HW-DRM21-V1	98
	I/O Link Unit	C200H Special I/O Unit	C200HW-DRT21	
	CompoBus/D Slaves	---	DRT1 Series	
	MULTIPLE I/O TERMI-NALs	---	GT1 Series	100
	CompoBus/S Master Unit	C200H Special I/O Unit	C200H-SRM21	103
	CompoBus/S Slaves	---	SRT1 Series	

Unit Descriptions

I/O Units
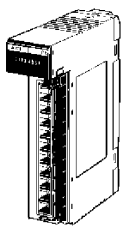
Input Units
C200H-I□□□□
8-pt Units

Output Units
C200H-O□□□□
5-/8-pt Units
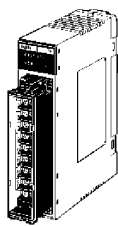
Input Units
C200H-I□□□□
16-pt Units

Output Units
C200H-O□□□□
16-pt Units
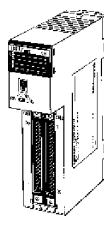
Input Units
C200H-ID□□□□
32-/64-pt Units

Output Units
C200H-OD□□□□
32-/64-pt Units
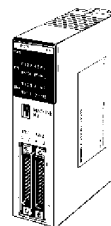
Input Units
C200H-ID□□□□
32-pt Units
(Special I/O Units)

Output Units
C200H-OD□□□□
32-pt Units

I/O Units
C200H-MD□□□□
16-/16-pt Units
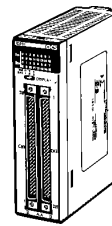
Input Units
CS1W-ID291
96-pt Units

Output Units
CS1W-OD29□
96-pt Units

I/O Units
CS1W-MD29□
48-/48-pt Units

■ DC Input Units

Classification	Input voltage	Inputs	Connections	Model	Remarks
C200H Basic I/O Unit	12 to 24 VDC	8 pts	Removeable terminal block	C200H-ID211	---
	24 VDC	16 pts		C200H-ID212	---
C200H Group-2 I/O Units	24 VDC	32 pts	Connector	C200H-ID216	---
	24 VDC	64 pts		C200H-ID217	---
	24 VDC	64 pts		C200H-ID111	---
	24 VDC	32 pts		C200H-ID218	Input current: 6 mA
	24 VDC	64 pts		C200H-ID219	Input current: 6 mA
CS1 Basic I/O Unit	24 VDC	96 pts		CS1W-ID291	---
C200H Special I/O Unit	24 VDC	32 pts		C200H-ID215	High-speed inputs

■ TTL Input Units

Classification	Input voltage	Inputs	Connections	Model	Remarks
C200H Special I/O Unit	5 VDC	32 pts	Connector	C200H-ID501	High-speed inputs

■ AC Input Units

Classification	Input voltage	Inputs	Connections	Model
C200H Basic I/O Units	100 to 120 VAC	8 pts	Removeable terminal block	C200H-IA121
	100 to 120 VAC	16 pts		C200H-IA122
	100 to 120 VAC	16 pts		C200H-IA122V
	200 to 240 VAC	8 pts		C200H-IA221
	200 to 240 VAC	16 pts		C200H-IA222
	200 to 240 VAC	16 pts		C200H-IA222V

■ AC/DC Input Units

Classification	Input voltage	Inputs	Connections	Model
C200H Basic I/O Units	12 to 24 VAC/VDC	8 pts	Removeable terminal block	C200H-IM211
	24 VAC/VDC	16 pts		C200H-IM212

Unit Descriptions

■ Relay Contact Output Units

Classifica-tion	Outputs	Connections	Model
C200H Basic I/O Units	8 pts	Removeable terminal block	C200H-OC221
	12 pts		C200H-OC222
	12 pts		C200H-OC222V
	16 pts		C200H-OC225
	16 pts		C200H-OC226
	5 pts		C200H-OC223
	8 pts	Removeable terminal block	C200H-OC224
	8 pts		C200H-OC224V

■ Transistor Output Units

Classification	Outputs	Max. switching capacity	Connections	Model	Remarks
C200H Basic I/O Units	8 pts	12 to 48 VDC, 1 A sinking	Removeable terminal block	C200H-OD411	---
	8 pts	24 VDC, 2.1 A, sinking		C200H-OD213	---
	8 pts	24 VDC, 0.8 A, sourcing, load short protection		C200H-OD214	---
	8 pts	5 to 24 VDC, 0.3 A, sourcing		C200H-OD216	---
	12 pts	24 VDC, 2.1 A, sinking		C200H-OD211	---
	12 pts	5 to 24 VDC, 0.3 A, sourcing		C200H-OD217	---
	16 pts	24 VDC, 0.3 A, sinking		C200H-OD212	---
	16 pts	24 VDC, 1.0 A, sourcing, load short protection		C200H-OD21A	---
C200H Group-2 I/O Units	32 pts	16 mA at 4.5 V to 100 mA at 26.4 V, sinking	Connector	C200H-OD218	---
	64 pts			C200H-OD219	---
C200H Special I/O Unit	32 pts	16 mA at 4.5 V to 100 mA at 26.4 V, sinking		C200H-OD215	128-pt dynamic outputs possible
CS1 Basic I/O Units	96 pts	12 to 24 VDC, 0.1 A sinking		CS1W-OD291	---
		12 to 24 VDC, 1 A sourcing		CS1W-OD292	---

■ TTL Output Unit

Classification	Outputs	Max. switching capacity	Connections	Model	Remarks
C200H Special I/O Unit	32 pts	5 VDC, 35 mA	Connector	C200H-OD501	128-pt dynamic outputs possible

■ Triac Output Units

Classification	Outputs	Max. switching capacity	Connections	Model
C200H Basic I/O Units	8 pts	250 VAC, 1.2 A, 50/60 HZ	Removeable terminal block	C200H-OA223
	12 pts	250 VAC, 0.3 A, 50/60 HZ		C200H-OA222V
	12 pts	250 VAC, 0.3 A, 50/60 HZ		C200H-OA224

■ I/O Units

Name	Classification	Inputs/Outputs	Input voltage	Max. switching capacity	Connections	Model	Remarks
TTL I/O Unit	C200H Special I/O Units	16 inputs/16 outputs	5 VDC	5 VDC, 35 mA	Connector	C200H-MD501	High-speed inputs, 128-pt dynamic outputs possible
DC Input/Transistor Output Units		16 inputs/16 outputs	24 VDC	16 mA at 4.5 V to 100 mA at 26.4 VDC, sinking		C200H-MD215	
		16 inputs/16 outputs	12 VDC	24 VDC, 50 mA, sinking		C200H-MD115	
	CS1 Basic I/O Units	48 inputs/48 outputs	24 VDC	12 to 24 VDC, 0.1 A, sinking		CS1W-MD291	---
		48 inputs/48 outputs		12 to 24 VDC, 0.1 A, sourcing		CS1W-MD292	---

Note: In addition to the normal I/O functions, C200H High-density I/O Units (Special I/O Units) provide the following functions.

- Dynamic I/O (except for OD501/OD502): In stead of normal static inputs and normal static outputs, dynamic outputs and dynamic inputs are used to increase I/O capacity to 128 inputs and 128 outputs through the use of strobe signal outputs. These functions can be used to reduce wiring to devices with more digits, such as displays and keyboards.

- High-speed Inputs (except OD501/OD215): Eight of the inputs can be set as high-speed inputs to accurately input short pulses from devices like photomicroswitches.

Unit Descriptions

Interrupt Input Unit

Execute an Interrupt Task within 1.2 ms after Input Turns ON
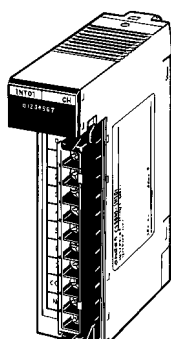
C200HS-INT01

■ System Configuration
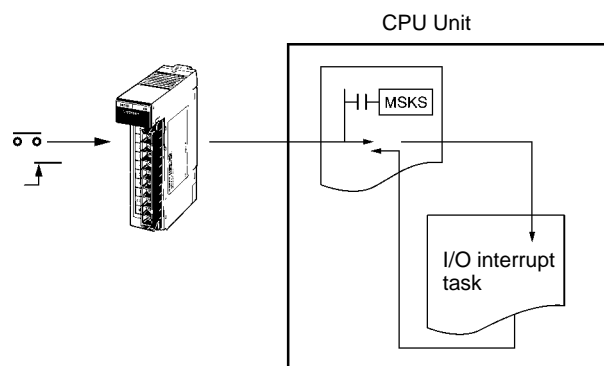
CPU Unit

When the input on the Interrupt Input Unit turns ON, the CPU Unit is notified immediately, cyclic task execution (normal programming) is interrupted and an I/O interrupt task is executed.

■ Specifications

Classifications	Input voltage	Inputs	Input pulse width	Connections	Allocations (CIO 0319 to CIO 2000)	Model
C200H Basic I/O Unit	12 to 24 VDC	8 pts	ON: 0.2 ms min. OFF: 0.52 ms min.	Removeable terminal block	16 bits	C200HS-INT01

Note: Interrupt response time = Input ON time of 0.2 ms + software interrupt response time of 1 ms max.

Analog Timer Unit (Interrupt Input Unit)

Easy On-site Time Adjustments
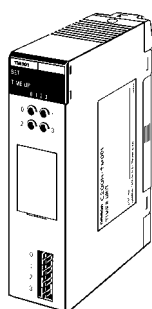
C200H-TM01

■ System Configuration

Analog Timer Unit

Timer set input

Timer pause input

Resistance

Time up outputs

4 pts

Resistance
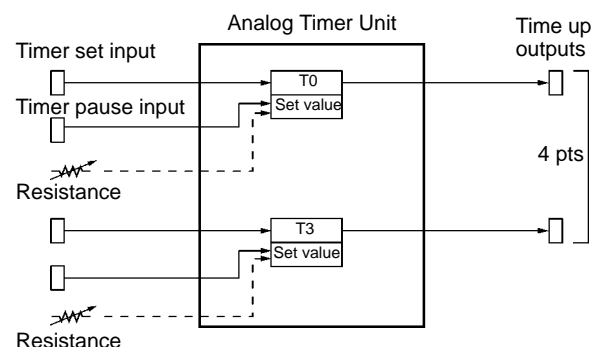
Provides four timers easily adjusted on-site via front-panel adjustments or external variable resistors: No Programming Device required. Using timer pause inputs enables applications as a accumulative timer.

■ Specifications

Classifi- cation	Timers	Setting range	Time setting method	CPU Unit bits	Allocations (CIO 0319 to CIO 2000)	Model
C200H Basic I/O Unit	4 pts	0.1 to 1.0 s, 1 to 10 s, 2 to 60 s, 1 to 10 min	Internal or external variable resistor	Timer set input, timer pause input, and time up ouput	16 bits	C200HS-TM001

Analog Input Units

Convert Analog Signals to Binary Data
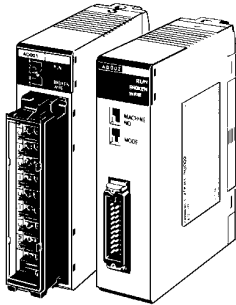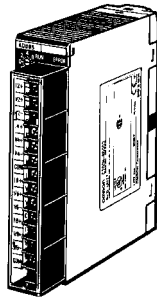
C200H-AD001/AD002   C200H-AD003

Convert input signals such as 1 to 5 V or 4 to 20 mA to binary values between 0000 and 0FA0 Hex and store the results in the allocated words each cycle. The ladder diagram can be used to transfer the data to the DM Area or the SCALING instructions (e.g., SCL(194)) can be sued to scale the data to the desired ranged (C200H-AD003).

■ Features

- Wire burnout detection
- Peak-hold function
- Mean function
- Scaling function
- Switching calculation functions

The functions provided depend in the model used.

■ Circuit Configuration
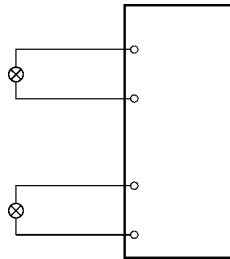
Note: Analog Input Terminals are also available as Compo-Bus/D Slaves and for MULTIPLE I/O TERMINALs.

■ Specifications

Model			C200H-AD001	C200H-AD002	C200H-AD003	DRT1-AD04	DRT1-AD04H	GT1-AD08MX
Classification			C200H Special I/O Units			CompoBus/D Slaves		MULTIPLE I/O TERMINAL Compobus/D Slaves
Inputs			4 pts	8pts	8 pts	2 or 4 pts	4 pts	4 or 8 pts
Signal range	**Voltages**	**1 to 5 V**	Yes	Yes	Yes	Yes	Yes	Yes
		0 to 10 V	Yes	Yes	Yes	Yes	Yes	Yes
		0 to 5 V	---	---	---	Yes	Yes	Yes
		–10 to 10 V	---	Yes	Yes	Yes	---	Yes
	Currents	**4 to 20 mA**	Yes	Yes	Yes	Yes	Yes	Yes
		0 to 20 mA	---	---	---	Yes	Yes	Yes
Signal range settings			Individual	Individual	Individual	2 pts at a time	2 pts at a time	2 pts at a time
Resolution			1/4000	1/4000	1/4000	1/6000	1/30000	1/30000
Conversion speed			2.5 ms/pt max.	2.5 ms/pt max.	1.0 ms/pt max.	8 ms/4 pts	250 ms/4 pts	8 ms/8 pts
Overall accuracy (at 25 °C)			±0.5%	Voltage: ±0.25% Current: ±0.4%	Voltage: ±0.2% Current: ±0.4%	Voltage: ±0.3% Current: ±0.4%	Voltage: ±0.3% Current: ±0.4%	Voltage: ±0.3% Current: ±0.4%
Connections			Terminal block	Connector	Terminal block	Terminal block	Terminal block	Connector
Features	**Wire burnout detection**		Yes	Yes	Yes	Yes	Yes	Yes
	Peak-hold function		Yes	Yes	Yes	---	---	---
	Mean function		Yes	Yes	Yes	Yes	---	Yes
	Scaling function		Yes	Yes	---	---	---	---
	Switching calculations		Yes	Yes	---	---	---	---

Unit Descriptions

Analog Output Units

Convert Binary Data to Analog Signals

Binary data between 0000 to 0FA0 Hex in the allocated words can be convert to analog signals such as 1 to 5 V or 4 to 20 mA for output. All that is required in the ladder diagram is to place the data in the allocated words.
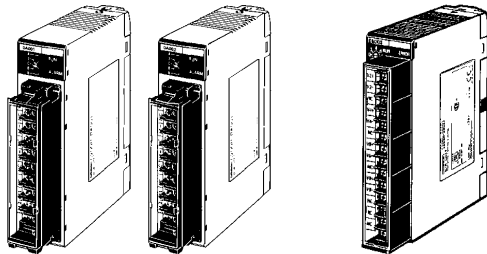
C200H-DA001/DA002

C200H-DA003 (voltage output)
C200H-DA004 (current output)

■ Features

- Output limit
- Upper/Lower limit alarms
- Pulse outputs (with duty ratio)
- Output hold function

The functions provided depend in the model used.

■ Circuit Configuration
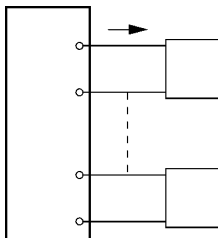
Note: Analog Output Terminals are also available as Compo-Bus/D Slaves and for MULTIPLE I/O TERMINALs.

■ Specifications

Model			C200H-DA001	C200H-DA002	C200H-DA003	C200H-DA004	DRT1-DA04H	GT1-DA08MX
Classification			C200H Special I/O Units				CompoBus/D Slaves	MULTIPLE I/O TERMINAL Compobus/D Slaves
Outputs			2 pts	4 pts	8 pts	8 pts	2 pts	4 pts
Signal range	**Voltages**	**1 to 5 V**	Yes	---	Yes	---	Yes	Yes
		0 to 10 V	Yes	---	Yes	---	Yes	Yes
		0 to 5 V	---	---	---	---	---	Yes
		−10 to 10 V	---	Yes	Yes	---	Yes	Yes
	Currents	**4 to 20 mA**	Yes	Yes	---	Yes	Yes	---
		0 to 20 mA	---	---	---	---	Yes	---
Signal range settings			Individual	Individual	Individual	Individual	Individual	2 pts at a time
Resolution			1/4095	Voltage: 1/8190 Current: 1/4095	1/4000	1/4000	1/6000	1/6000
Conversion speed			2.5 ms/pt max.	2.5 ms/pt max.	1.0 ms/pt max.	1.0 ms/pt max.	4 ms/pt	4 ms/4 pts
Overall accuracy (at 25 °C)			±0.5% FS	Voltage: ±0.3%FS Current: ±0.5%FS	±0.3% FS	±0.5% FS	±0.4% FS	±0.4% FS
Connections			Terminal block	Terminal block	Terminal block	Terminal block	Terminal block	Connector
Features	**Output limit**		Yes	Yes	---	---	---	---
	Upper/Lower limit alarms		Yes	Yes	---	---	---	---
	Pulse outputs (with duty ratio)		Yes	Yes	---	---	---	---
	Output hold function		---	---	Yes	Yes	Yes	Yes

Analog I/O Units

Analog Inputs and Outputs with One Unit
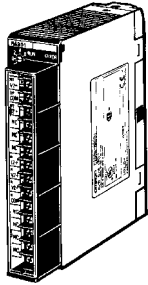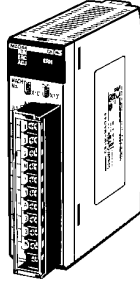
One Unit performs both analog input and analog output operations. The Unit can also be used for ratio and bias processing, which can be performed on analog inputs to output the results as analog outputs.

■ Features

- Mean function
- Peak hold function
- Wire burnout detection
- Output hold function
- Ratio conversions

C200H-MAD01

CS1W-MAD44

■ Circuit Configuration
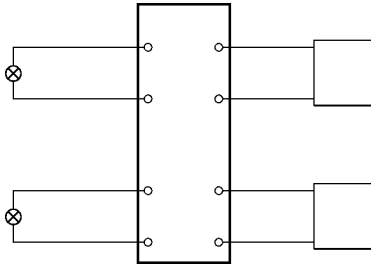
■ Specifications

Model			C200H-MAD01	CS1W-MAD44
Classification			C200H Special I/O Unit	CS1 Special I/O Unit
Inputs			2 pts	4 pts
Outputs			2 pts	4 pts
Input signal ranges	Voltages	1 to 5 V	Yes	Yes
		0 to 5 V	---	Yes
		0 to 10 V	Yes	Yes
		−10 to 10 V	Yes	Yes
		4 to 20 mA	Yes	Yes
Output signal ranges	Currents	1 to 5 V	Yes	Yes
		0 to 5 V	---	Yes
		0 to 10 V	Yes	Yes
		−10 to 10 V	Yes	Yes
		4 to 20 mA	Yes	---
Resolution			1/4000 (inputs/outputs)	1/4000 (inputs/outputs)
Conversion speed			1.0 ms/pt max (inputs/outputs)	1.0 ms/pt max (inputs/outputs)
Overall accuracy	Inputs		Voltage: ±0.2% Current: ±0.4%	Voltage: ±0.2% Current: ±0.4%
	Outputs		Voltage: ±0.3% Current: ±0.5%	Voltage: ±0.3% Current: ±0.5%
Connections			Terminal block	Terminal block
Features	Mean function		Yes	Yes
	Peak hold		Yes	Yes
	Wire burnout detection		Yes	Yes
	Output hold		Yes	Yes
	Ratio conversion		Yes	Yes

Unit Descriptions

Temperature Sensor Units

Directly Input from up to Four Temperature Sensors
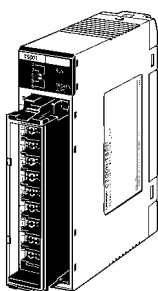
Input from up to four thermocouples or platinum resistance thermometers into the specified ranges of 4-digit BCD. The temperature are written to the allocated words every cycle, and can be transferred to the DM Area or other memory locations using the ladder program.

C200H-TS001
C200H-TS002
C200H-TS101
C200H-TS102

■ Features

- Input directly from up to four temperature sensors with one Unit. (The same type of temperature sensor and the same temperature ranges are used for all 4 inputs.)
- Values from temperature sensors placed in memory in the CPU Unit in 4-digit BCD.
- Line disconnection detection provided.

■ Circuit Configuration

Temperature sensors

4 points
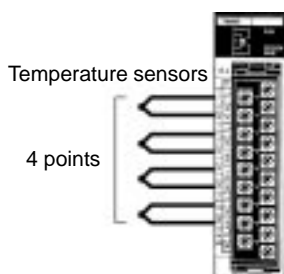
■ Specifications

Model			C200H-TS001	C200H-TS002	C200H-TS101	C200H-TS102	DRT1-TS04T	DRT1-TS04P
Classification			C200H Special I/O Units				CompoBus/D Slaves	
Inputs			4 pts				4 pts	
Input signals	**Thermocouples**	**K**	Yes	Yes	---	---	Yes	---
		J	Yes	---	---	---	Yes	---
		L	---	Yes	---	---	Yes	---
		R	---	---	---	---	Yes	---
		S	---	---	---	---	Yes	---
		T	---	---	---	---	Yes	---
		E	---	---	---	---	Yes	---
		B	---	---	---	---	Yes	---
		N	---	---	---	---	Yes	---
		W	---	---	---	---	Yes	---
		U	---	---	---	---	Yes	---
		PLII	---	---	---	---	Yes	---
	Platinum resistance thermometers	**JPt100**	---	---	Yes	---	---	Yes
		PT100	---	---	---	---	---	Yes
Input signal range settings			One setting for all 4 points				One setting for all 4 points	
Data stored in memory			4-digit BCD				16-bit binary	
Conversion speed			4.8 s max. (when 4 pts are set for Unit).				250 ms/4 points	
Overall accuracy (at 25°C)			±1% + 1°C				Larger of ±0.5% or ±2°C (depending on signal)	Larger of ±0.5% or ±1°C
Connections			Terminal block				Terminal block	

Analog Control Features

Feature	PID instruction in CPU Unit	Temperature Control Unit	Heat/Cool Control Unit	PID Control Unit
Number of loops	1 loop	2 loops	2 loops	2 loops
Measurement input signal	None (from Analog Input Unit)	Thermocouple or temperature resistance thermometer		4 to 20 mA, 1 to 5 V,0 to 5 V or 0 to 10 V

Measurement accuracy	Dependant on Analog Input Unit	Thermocouples:
		    (Larger of $\pm0.5\%$ or $\pm2°C$) ±1 digit max.
		Temperature resistance thermometers:
		    (Larger of $\pm0.5\%$ or $\pm1°C$) ±1 digit max.
				$\pm0.5\%$ FS ±1 digit max.

Sampling period	10 ms t0 99.99 s (sampling period can vary with cycle time)	500 ms		100 ms
Control	Continuous PID (with 2 degrees of freedom)	Continuous PID (with 2 degrees of freedom and autotuning), Time-ratio PID (with 2 degrees of freedom and autotuning), ON/OFF	Continuous PID (with 2 degrees of freedom and autotuning), Time-ratio PID (with 2 degrees of freedom and autotuning), ON/OFF, heating output, cooling output	Continuous PID (with 2 degrees of freedom and autotuning), Time-ratio PID (with 2 degrees of freedom and autotuning), ON/OFF
Control output signals	None (from Analog Output Unit)	Transistor, voltage, current		Transistor, voltage, current
Alarms	None	Selected from 9 types		
Auto/manual switching	Yes (By storing value in address of manipulated variable separate from instruction)	No	No	Yes
RUN/STOP switching	Yes (controlled by input conditions for PID instruction)	Yes	Yes	Yes
Data setting banks	None	8 banks		

Unit Descriptions

Temperature Control Units

One Unit Functions as Two Temperature Controllers
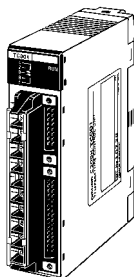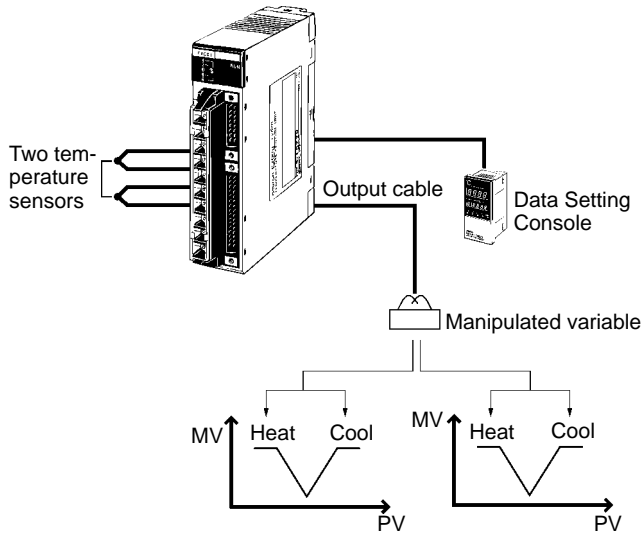

C200H-TC□□□
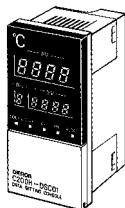
C200H-DSC01
Data Setting Console

Perform 2-loop PID control (two degrees of freedom) based on inputs from thermocouples or platinum resistance thermometers to control a transistor, voltage, or current output. Words allocated to the Unit in memory can be manipulated from the ladder diagram to start/stop operation, set the target value, read the process value, or perform other operations.

■ Features
- Supports 2-loop PID control (two degrees of freedom) or ON/OFF control.
- Input directly from two temperature sensors (thermocouples: R, S, K, J, T, E, B, N, L, or U) or platinum resistance thermometers (JPt00, Pt100).
- Open-collector, voltage, or current outputs
- Sampling period: 500 ms
- Run/start control.
- Two internal alarms per loop.
- Record up to eight sets of target values, alarm values, and PID parameters.
- Connects to Data Setting Console.

■ System Configuration

Two temperature sensors

Output cable

Data Setting Console

Manipulated variable
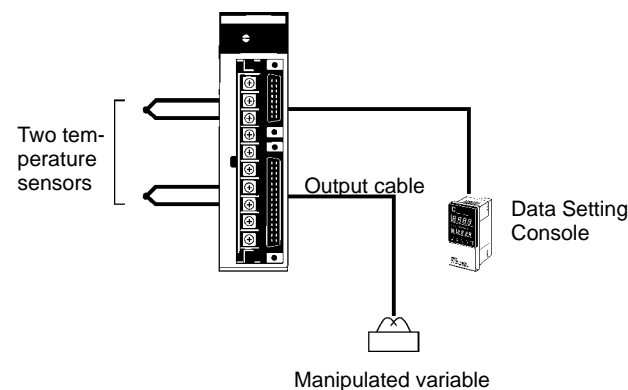
■ Specifications

Classification	Temperature sensor inputs	Control outputs	Model
C200H Special I/O Unit	Thermocouples (R, S, K, J, T, E, B, N, L, or U)	Open-collector (pulse)	C200H-TC001
		Voltage (pulse)	C200H-TC002
		Current (linear)	C200H-TC003
	Platinum resistance thermometers (JPt00, Pt100)	Open-collector (pulse)	C200H-TC101
		Voltage (pulse)	C200H-TC102
		Current (linear)	C200H-TC103

Data Setting Console

Specifications	Model
Monitoring, setting, and changing present values, set points, alarm values, PID parameters, bank numbers, etc.	C200H-DSC01

Heat/Cool Control Unit
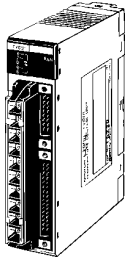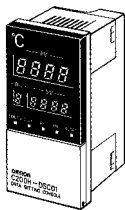
C200H-TV□□□   C200H-DSC01
                    Data Setting Console
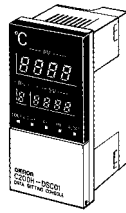
Perform 2-loop PID control (two degrees of freedom) based on inputs from thermocouples or platinum resistance thermometers to control heating and cooling through transistor, voltage, or current outputs. Words allocated to the Unit in memory can be manipulated from the ladder diagram to start/stop operation, set the set point, read the process value, or perform other operations.

■ System Configuration

Two temperature sensors

Output cable   Data Setting Console

Manipulated variable

MV Heat Cool   MV Heat Cool

        PV   PV

■ Features

- Supports 2-loop PID control (two degrees of freedom) or ON/OFF control.

- Input directly from two temperature sensors (thermocouples: R, S, K, J, T, E, B, N, L, or U) or platinum resistance thermometers (JPt00, Pt100).

- Open-collector, voltage, or current outputs

- Sampling period: 500 ms

- Run/start control.

- Detects heater burnout though current detectors for both loops.

- Record up to eight sets of set points, alarm values, and PID parameters.

- Connects to Data Setting Console.

■ Specifications

Classification	Temperature sensor inputs	Heating control output	Cooling control output	Model
C200H Special I/O Unit	Thermocouples (R, S, K, J, T, E, B, N, L, or U)	Open-collector (pulse)	Open-collector (pulse)	C200H-TV001
		Voltage (pulse)		C200H-TV002
		Current (linear)		C200H-TV003
	Platinum resistance thermometers (JPt00, Pt100)	Open-collector (pulse)		C200H-TV101
		Voltage (pulse)		C200H-TV102
		Current (linear)		C200H-TV103

Data Setting Console

Specifications	Model
Monitoring, setting, and changing present values, set points, alarm values, PID parameters, bank numbers, etc.	C200H-DSC01

Unit Descriptions

PID Control Units

Ideal for Analog Control of Pressures, Flows, and other Variables
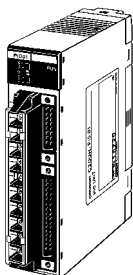
C200H-PID01/PID02/PID03

C200H-DSC01
Data Setting Console

Perform 2-loop PID control (two degrees of freedom) based on input ranges such as 4 to 20 mA or 1 to 5 V to control transistor, voltage, or current outputs. Words allocated to the Unit in memory can be manipulated from the ladder diagram to start/stop operation, set the set point, read the process value, or perform other operations.

■ Features

- Supports 2-loop PID control (two degrees of freedom) or ON/OFF control.
- Directly input analog signal.
- Open-collector, voltage, or current outputs
- Sampling period: 100 ms
- Run/start control.
- Manual outputs supported.
- Set two internal alarms for each loop.
- Record up to eight sets of set points, alarm values, and PID parameters.
- Digital filters can be set to dampen rapid changes in inputs.
- Connects to Data Setting Console.

■ System Configuration

Two analog inputs

Output cable

Data Setting Console

Manipulated variable
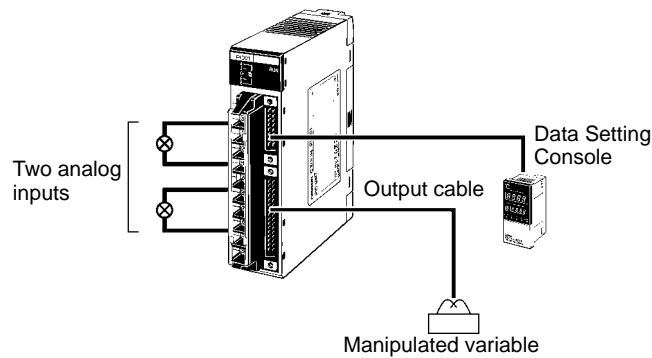
■ Specification

Classifications	Temperature sensor input	Control output	Model
C200H Special I/O Unit	4 to 20 mA, 1 to 5 V, 0 to 5 V or 0 to 10 V	Open-collector (pulse)	C200H-PID01
		Voltage (pulse)	C200H-PID02
		Current (linear))	C200H-PID03

Data Setting Console

Specifications	Model
Monitoring, setting, and changing present values, set points, alarm values, PID parameters, bank numbers, etc.	C200H-DSC01

Fuzzy Logic Unit

Take Advantage of High-speed Fuzzy Logic

C200H-FZ001

■ System Configuration

Fuzzy Logic Unit

C500-SU981-E
Fuzzy Support
Software

IBM PC/AT or compatible

Analog Output Unit
Analog Input Unit

CS1

Analog inputs
Analog outputs

RS-232C cable
(to 9-pin connector)
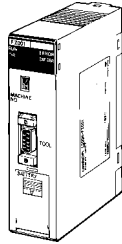
Use the Fuzzy Support Software to create rule, membership functions, and other fuzzy data and transfer then to the Unit after checking the knowledge. The ladder program in the CPU Unit can be used to set fuzzy inputs for processing by the Fuzzy Logic Unit and then the results can then be read using the ladder program.

■ Features
- Contains a high-performance fuzzy logic processor for high-speed fuzzy processing.
- Handles jobs that used to be performed by using the experience of skilled operators.
- Eight inputs and 4 outputs
- 8 conditions and 2 conclusions per rule, 128 rules total.

■ Specifications
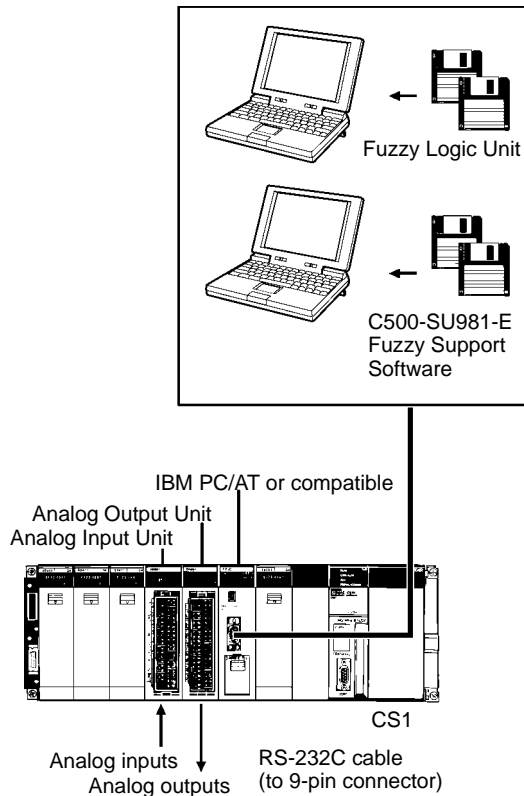
Classifi-cation	Model	Fuzzy logic		Inputs		Outputs		Processing time
		Rule form	Rules	Data	FS range	Data	FS range	
C200H Special I/O Unit	C200H-FZ001	8 conditions and 2 conclusions	128	8 words max.	0 to 4095	4 words max.	0 to 4095	6 ms max. for Unit, 3 to 4 times the cycle time for system

Unit Descriptions

Cam Positioner Unit

One Unit Functions as 48 Mechanical Cams
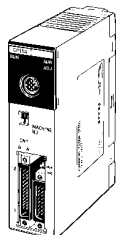
C200H-CP114
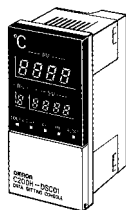
C200H-DSC01
Data Setting Console

Angles are detected though an externally connected resolver (angle detector) and cam outputs are produced for preset ON/OFF angle data.

■ Features
- Supports16 external outputs and 32 internal outputs for a total of 48 cam outputs.
- Set up to seven ON/OFF data for each cam.
- The Data Setting Console allows easy monitoring of cam data settings, present cam angles, or etc.

■ System Configuration
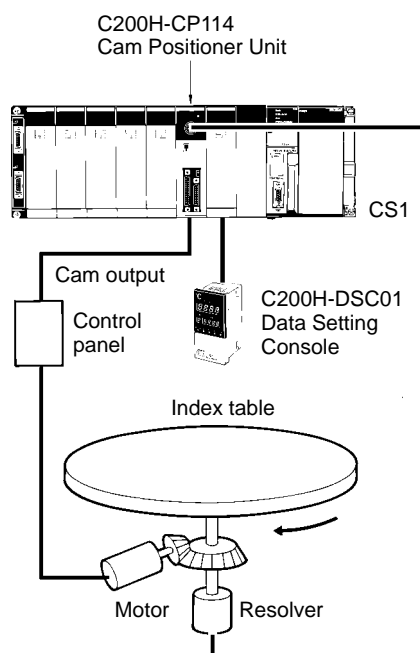
■ Specifications

Classification	Model	No. of cam outputs	Control unit	Resolver response speed	Resolver response time
C200H Special I/O Unit	C200H-CP114	48 (external outputs: 16, internal outputs: 32)	1°	800 r/min max.	200 μs (sampling frequency: 5 KHz)

Position Control Units

High-speed, High-precision Positioning with 1, 2, or 4 Axes
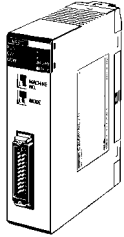
C200HW-NC113/213/413
C200H-NC211/112

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

■ Features

C200HW-NC113/NC213/NC413

- Simple positioning systems can be created by directly specifying operation from the CPU Unit when required.

- Positioning data is saved in internal flash memory, eliminating the need to maintain a backup battery.

- The SYSMAC-NCT Windows-based Support Software enables easy create of positioning data and storage of the data in files.

- S-curve acceleration/deceleration, forced starting, and other features also supported.

■ System Configuration

Servo Relay Unit

Inputs

Pulse-input Servo Driver

Servomotor
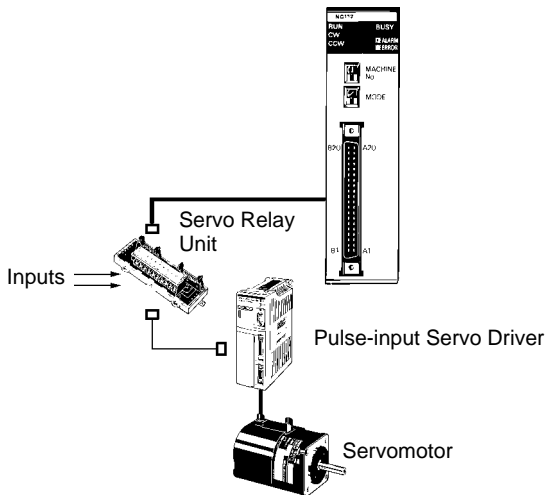
■ Specifications

Model	C200HW-NC113	C200HW-NC213	C200HW-NC413	C200H-NC112	C200H-NC211
Classification	C200H Special I/O Units				
Control method	Open-loop, automatic trapezoid acceleration/deceleration				
Control output signals	Pulse-train outputs				
Controlled axes	1	2	4	1	2
Position data	−9,999,999 to +9,999,999 pulses			−8,388,607 to 8,388,606 pulses	
No. of positions	100 per axis			20 per axis	53 per axis
Speed data	1 to 500 kpps			1 to 250kpps	
No. of speeds	100 per axis			15 per axis	
Acceleration/ deceleration times	0 t 250 s (time to max. speed)			2 to 2 kpps/ms	
Direct operation	Supported.			Not supported.	
S-curves	Supported.			Not supported	
Flash memory	Supported.			Not supported.	
Windows-based Support Software	Supported.			Not supported.	

Unit Descriptions

Motion Control Unit

High-precision, Two-axis Motion Control with Multi-tasking G-language Programming

C200H-MC221

■ System Configuration

MC Support Software
(IBM PC/AT or compatible)

Servomotor

Analog Input
Servo Driver

Teaching
Box

Terminal Block
Conversion Unit
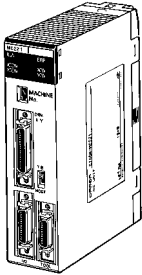
The Motion Controller provides semiclosed-loop control with analog outputs for up to 2 axes, and supports the G language for advanced position control. Multi-tasking allows you to run the two axes independently for a wider range of application.

■ Features

- High-speed control of up to 2 axes with one Unit.
- Multi-task programming with G language.
  The G language is ideal for motion control and enables easy creation of multi-axis programs. It also reduced the load on the CPU Unit.
- Compatible with absolute encoders
- High-speed response for commands from CPU Unit.
- Encoder response frequency: 250 kpps
- Operation also possible with manual pulse generator.
- Special cables available to connect to motor driver.
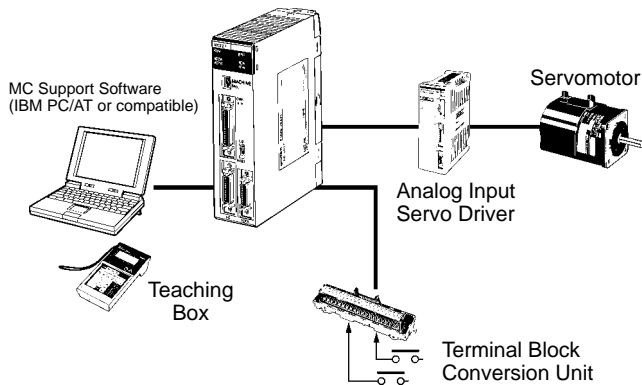
■ Specifications

Model	C200H-MC221
Classification	C200H Special I/O Unit
Control method	Semiclosed loop
Control output signals	Analog
Controlled axes	2 axes
Number of tasks	2 (task = unit of program execution)
Number of programs	100 max. when 1 task is used. 50 max. when 2 tasks are used.
Program capacity	800 blocks max. when 1 task is used. 400 blocks max. when 2 tasks are used.
Position data capacity	2,000 positions max.
Maximum command value	−39,999,999 to +39,999,999 pulses
Acceleration/deceleration times	0 to 9,998 ms (in 2-ms increments)
S-curve speed curves	Supported

High-speed Counter Units

Two External Inputs and Eight External Outputs with Many Operating Modes
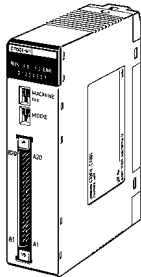
C200H-CT021
C200H-CT001-V1
C200H-CT002

High-speed Counter Units count high-speed pulses that are too fast for normal Input Units, and then will produce outputs according to the count value. Models are available with one or with two counter points.

The C200H-CT001-V1 connects to incremental encoders and other devices with open-collector outputs. It is a high-speed reversible counter that counts one pulse input up to 50 kcps. The C200H-CT002 connects to incremental encoders and other devices with RS-422 line driver outputs. It is a high-speed reversible counter that counts one pulse input up to 75 kcps.

The C200H-CT021 connects to incremental encoders and other devices with either open-collector or RS-422 line driver outputs (selected when wiring). It is a high-speed reversible counter that counts two pulse inputs up to 50 or 75 kcps.

■ System Configuration

Counter inputs

8 external outputs

Encoder
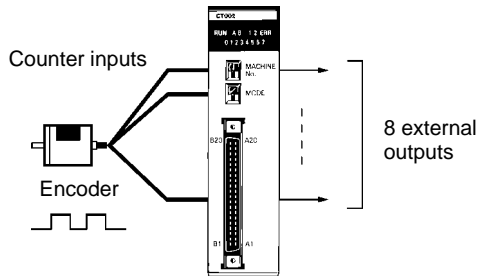
■ Features

- Three input modes: Differential phases, up/down inputs, pulse and direction inputs
- Multiplication function (x1/x4) for differential phase input
- External control inputs: 2
- External outputs: 8
- 3 functions and 6 counting modes**:**

    Drum Function: Linear mode, circular mode

    Preset Counter Function: Preset mode

    Counting Function**:** Gate mode (normal and cumulative), latch mode, sampling mode

- Long-distance inputs and noise resistance (line driver input).

■ Specifications

Classification	Number of counters	Encoder A and B input, pulse input, Z signal		Maximum counting speed	Model
C200H Special I/O Unit	1	Open-collector Input voltage: 5 VDC, 12 VDC, or 24 VDC		50 kcps	C200H-CT001-V1
		RS-422 line driver (equivalent to Am26LS31)		75 kcps	C200H-CT002
	2	Open-collector Input voltage: 12 VDC or 24 VDC		50 kcps	C200H-CT021
		RS-422 line driver (equivalent to Am26LS31)		75 kcps	

Unit Descriptions

ID Sensor Units

Connect an ID System to the PLC. Easily Started with a Programming Console.
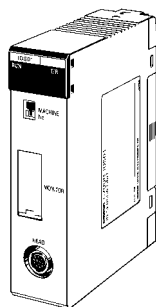
C200H-IDS01-V1
(electromagnetic,
for short distances)

C200H-IDS21
(microwave, for
long distances)

Read/write data in Data Carrier memory by sending read/write commands from the CPU Unit to the Read/Write Head. The C200H-IDS01-V1 is used with the V600 Series for short-distance communications with electromagnetic coupling, and the C200H-IDS21 is used with the V620 Series for long-distance communications with microwaves.

The Programming Console can be connected directly to the ID Sensor Unit to send commands to read/write Data Carriers and monitor the results. The Programming Console is particularly useful when initially starting up the system.
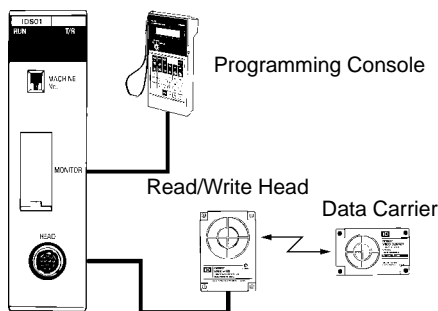
■ Features

- Connects and ID System to the Programmable Controller.
- Read data from Data Carriers simply by sending a read command.
- Read/write up to 1,024 bytes.
- Record error logs with up to 30 records.
- Use a Programming Console to monitor and control operation.

■ System Configuration

Programming Console

Read/Write Head

Data Carrier

■ Specifications

Classification	Connectable ID System	Model
C200H Special I/O Unit	V600 Series(electromagnetic, for short distances)	C200H-IDS01-V1
	V620 Series (microwave, for long distances)	C200H-IDS21

Unit Descriptions

Serial Communications Features

| Unit | Model | Ports | Serial communications mode | | | | | | BASIC program-ming | Message commu-nications |
| | | | Protocol macros | Host Link | NT Links | No-pro-tocol | Peripher-al bus | Program-ming Console bus | | |
			General-purpose external devices	Host comput-ers	OMRON PTs	General-purpose external devices	Program-ming De-vices	Program-ming Console		
CPU Units	All models	Port 1: Peripheral	No	Yes	Yes	No	Yes	Yes	No	No
		Port 2: RS-232C	No	Yes	Yes	Yes	Yes	No	No	No
Serial Commu-nications Boards/ Units	CS1W-SCB21	Port 1: RS-232C	Yes	Yes	Yes	No	No	No	No	No
		Port 2: RS-232C	Yes	Yes	Yes	No	No	No	No	No
	CS1W-SCB41	Port 1: RS-232C	Yes	Yes	Yes	No	No	No	No	No
		Port 2: RS-422A/485	Yes	Yes	Yes	No	No	No	No	No
	CS1W-SCU21	Port 1: RS-232C	Yes	Yes	Yes	No	No	No	No	No
		Port 2: RS-232C	Yes	Yes	Yes	No	No	No	No	No
ASCII Units	C200H-ASC02	Port 1: RS-232C	No	No	No	No	No	No	Yes	No
		Port 2: RS-232C	No	No	No	No	No	No	Yes	No
	C200H-ASC11	Port 1: RS-232C	No	No	No	No	No	No	Yes	No
		Port 2: RS-232C	No	No	No	No	No	No	Yes	No
	C200H-ASC21	Port 1: RS-232C	No	No	No	No	No	No	Yes	No
		Port 2: RS-422A/485	No	No	No	No	No	No	Yes	No
	C200H-ASC31	Port 1: RS-232C	No	No	No	No	No	No	Yes	No
		Port 2: RS-232C	No	No	No	No	No	No	Yes	No
Compo-Bus/D RS-232C Unit	DRT1-232C2	Port 1: RS-232C	No	No	No	No	No	No	No	Yes
		Port 2: RS-232C								

Unit Descriptions

Serial Communications Board
Serial Communications Units

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

Either an Inner Board or CPU Bus Unit can be used to increase the number of serial ports (RS-232C or RS-422A/485) two at a time. Specify Protocol Macros, Host Link Communications, or 1:N NT Links separately for each port. With the CS1 Series, you can easily provide the right number of serial ports for your system.
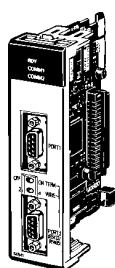
Serial Communications Boards
CS1W-SCB21
CS1W-SCB41

Serial Communications Unit
CS1W-SCU21

■ Features

- Serial Communications Board

  - Increase the number of serial ports without using I/O slots.

  - Connect general-purpose external devices 1:N using RS-422A/485.

  - Generate interrupts in CPU Unit when data is received.

- Serial Communications Board

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

■ System Configuration
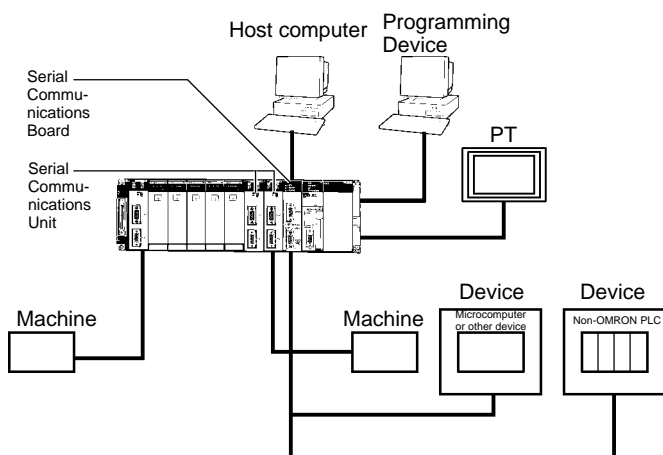
■ Specifications

Unit	Classification	Serial communications modes	Serial	Model
Serial Communications Board	Inner Board	Set separately for each port: Protocol Macro, Host Link, or 1:N NT Link	RS-232C x 2	CS1W-SCB21
			RS-232C x 1, RS-422A/485 x 1	CS1W-SCB41
Serial Communications Unit	CS1 CPU Bus Unit		RS-232C x 2	CS1W-SCU21

ASCII Units

Easily Perform ASCII Data Communications
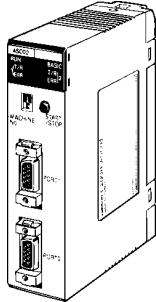
C200H-ASC11
C200H-ASC21
C200H-ASC31
C200H-ASC02
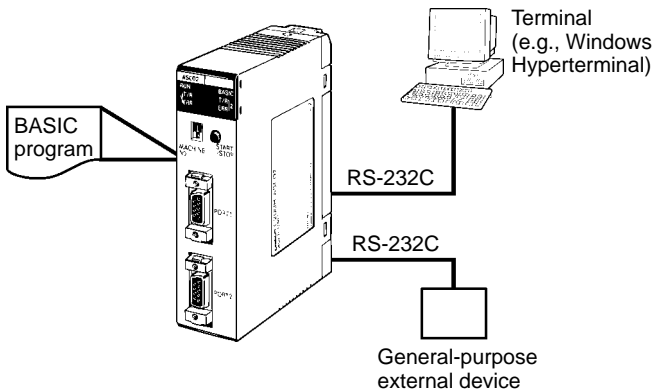
The ASCII Units support BASIC language programming and RS-232C and RS422A/485 serial communications. BASIC programming enables ASCII communications with essential any external device. It can also be used as a special processing unit to aid the CPU Unit without using external communications.

The C200H-ASC21/ASC21/ASC31 provided shared memory with the CPU Unit, and both the ASCII Unit and the CPU Unit can access the shared memory asynchronously, providing for high-speed data exchanges between the two Units without using interrupts.

■ System Configuration

Terminal
(e.g., Windows
Hyperterminal)

BASIC
program

RS-232C

RS-232C

General-purpose
external device

■ Features

- Perform ASCII communications with a wide range of external devices.
- The C200H-ASC11/ASC21/ASC31 function as special processing units with BASIC programming.
- Large-capacity user memory: 200 Kbytes
- Model available with RS422A/485 port.
- Various forms of data exchanges with CPU Unit: Select the best method for the read/write trigger and timing.
- High-speed data exchanges possible with shared memory (not dependant on I/O refresh).
- A wide range of interrupt processes: Interrupts fro CPU to ASCII Unit, communications interrupt,key interrupts, timer interrupts, error interrupts, etc.
- Easy control of transmission control signals.
- Calculation instructions for error check codes.
- Many BASIC debugging functions (break points, 1-step execution, execution stop monitoring, etc.)
- Error log supported with up to 30 error records.

■ Specifications

Classification	User memory	Shared memory	Serial communications ports	Model
C200H Special I/O Unit	200 Kbytes	Provided (90 words in I/O memory)	RS-232C x 2	C200H-ASC11
			RS-232C x 1, RS-422A/485 x 1	C200H-ASC21
			RS-232C x 2, RS-232C x 1 for terminal	C200H-ASC31
	24 Kbytes	None	RS-232C x 2	C200H-ASC02

Unit Descriptions

Protocol Macros

■ System Configuration

Easily Create Protocols for Data Exchange with External Devices; Execute with One Instruction

Standard system protocols (provided in Unit or Board)

OMRON component

CD-ROM

CX-Protocol

User-created protocols

Create and transfer protocols

General-purpose external device
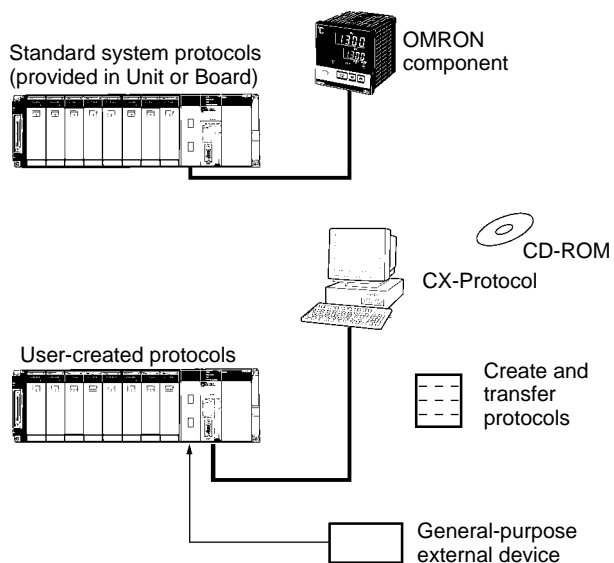
Protocols for communications with external devices can be easily created according to the communications standards required by the external device. Protocol macros enable communications with essentially any external device with an RS-232C or RS-422A/485 port without programming communications in the PLC.

Standard system protocols are provided as a standard feature for communications with OMRON components, such as Temperature Controllers, Panel Meters, Bar Code Readers, and Modems. A Windows-based tool called CX-Protocol is also available to enable creation of protocols for most any external device.

■ Types of Protocol

Protocols	External devices	Required products
Standard system protocols	OMRON components	Serial Communications Board or Unit
User-created protocols	General-purpose external device	Serial Communications Board or Unit + CX-Protocol (Windows-based protocol support software)

■ Standard System Protocols

Component		Model	Send/receive sequences
CompoWay/F-compatible components		OMRON CompoWay/F slave components	CompoWay/F command send/response receive
Digital Controllers and Temperature Controllers	Small Digital Controller with Communications (53 x 53 mm)	E5CK	Present value read, set point read, manipulated variable read, etc. Set point write, alarm write, PID parameter write, etc.
	Temperature Controllers with Digital Indications (Thermac J with communications) (96 x 96 mm or 48 x 96 mm)	E5□J-A2HO	
	Digital Controllers with Communications (96 x 96 mm)	ES100□	
	Multi-point Temperature Controller with communications (8 control points)	E5ZE	
Intelligent Signal Processors		K3T□	Display value read, comparison value read, write, etc.
Bar Code Readers	Laser Scanner type	V500	Read start, data read, read stop, etc.
	CCD type	V520	
Laser Micrometer		3Z4L	Measurement condition set, continuous measurement start, etc.
Visual Inspection Systems	High speed, high precision, low cost	F200	Measurement, continuous measurement, etc.
	High-precision inspection/positioning	F300	
	Character inspection software/positioning software	F350	Measurement, positioning, inspection, character inspection, etc.
ID Controllers	Electromagnetic coupling	V600	Carrier data read, autoread, write, etc.
	Microwave	V620	
Hayes Modem AT Command		---	Modem initialize, dial, send, etc.

Communications Networks

■ Overview

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

■ Communications Specifications

Network		Ethernet	Controller Link	PC Link	CompoBus/D (DeviceNet)	CompoBus/S
Commu-nications	Messages	Yes	Yes	---	Yes	---
	Data links	---	Yes	Yes	---	---
	Remote I/O	---	---	---	Yes	Yes
Maximum speed		10 Mbps	2 Mbps Comm cycle: Approx. 34 ms (Wired: 32 nodes, 2-Kbits + 2-Kword data links)	128 Kbps	500 Kbps Comm cycle: Approx. 5 ms (128 inputs and 128 outputs)	750 Kbps Comm cycle: Approx. 1 ms (128 inputs and 128 outputs)
Total distance		2.5 km	Twisted-pairs: 1 km (at 500 bps) Optical: 20 km	500 m	500 m (at 125 bps)	Trunk line: 100 m
Maximum nodes		100	32	32	63	32
Communications media		Coaxial cable	Special twisted-pairs cable or optical cable	Twisted-pairs cable or optical cable	Special DeviceNet cable	2-core VCTF cable, special flat cable
Data link capacity (for network)		---	32,000 words	64 words	---	---
Remote I/O capacity		---	---	---	4,800 pts (with Configurator) 1,600 pts (without Configurator)	256 pts
Supporting PLCs		CS1 Series, CVM1, CV Series, C200HX/HG/HE	CS1 Series, CVM1, CV Series, C200HX/HG/HE (Optical: CS1 only)	CS1 Series, C200HX/HG/HE, C200H, C200HS, C1000H, C2000H	CS1 Series, CVM1, CV Series, C200HX/HG/HE, CQM1 (with I/O Link)	CS1 Series, C200HX/HG/HE, CQM1, SRM1

Unit Descriptions

Ethernet Unit

Forms a Connections Between OA Information and FA Control
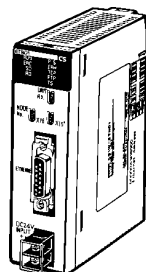
CS1W-ETN01

■ System Configuration

Ethernet network

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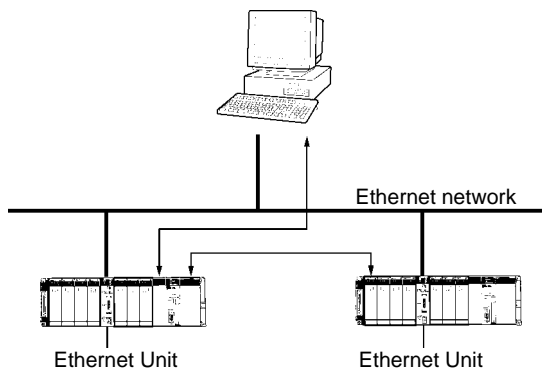
Achieve a wide range of communications from PLCs connected to an Ethernet network: Transfer data with TCP/IP or UDP/IP socket services, executed OMRON's standard FINS commands, transfer files with FTP, or send mail with SMTP. Select the communications services that are required and flexibly connect PLCs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

■ Features
- Access socket services simply by manipulating specific bits in memory.
- Take advantage of electronic mail.
- Interconnect to Controller Link and other networks.
- Use the Ethernet standard protocols, TCP/IP and UDP/IP.
- Use OMRON's standard FINS message communications.
- Transfer file with host computers using FTP.
- Set communications parameters with the CX-Programmer.

■ Specifications

Classification	Communications services	Model
CS1 CPU Bus Unit	FINS communications, FTP server, socket services, and mail services	CS1W-ETN01

Controller Link Units and Controller Link Support Board

OMRON's Main FA Network

The Controller Link is OMRON's main FA-level network. It supports automatic data links between PLCs and between PLCs and host computer, as well as programmed data transfers using a message service. You get high-capacity, flexible data links and high-capacity data transfers with messages. For a low-cost communications system, twisted-pair cables can be used.
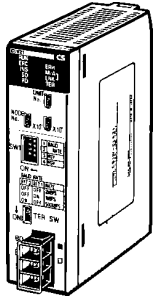
CS1W-CLK21
Wired Controller Link Unit
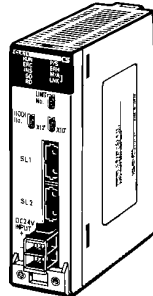
CS1W-CLK11
Optical Controller Link Unit
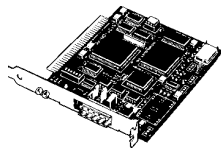
3G8F5-CLK21-E and
3G8F5-CLK11-E
Personal Computer Boards

■ Features

- Achieve high-capacity, flexible data links.
- Transfer large volumes of data through a message service.
- Connect through twisted-pair cables or optical fiber cables.
- Connect CS1, C200HX/HG/HE, CVM1, and CV PLCs.
- Complete error correction and troubleshooting functions.
- Set communications parameters with the CX-Programmer.

■ System Configuration

Data Links

Controller Link Unit

PLC   PLC   PLC

Shared memory data transfers (continuous)
I/O bits, link bits, DM Area words, etc.

Message Communications

Controller Link Unit

PLC   PLC   PLC

CS1

Programmed data transfers (as required)

SEND

Communications instruction in user program
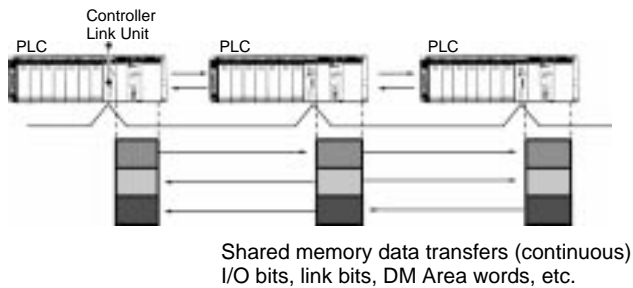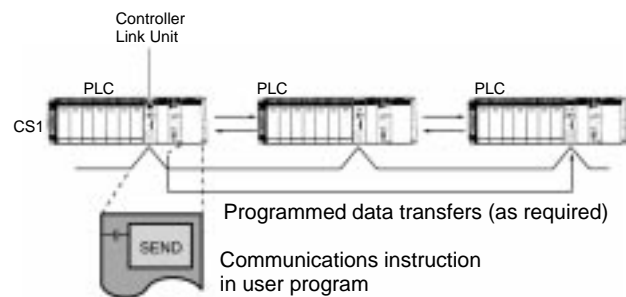
■ Specifications

Unit/Board	Classification	Communications	Media	Specifications	Model
Controller Link Units	CS1 Bus Unit	Data links and message communications	Wired	Up to 4 Units can be mounted to CPU Rack or CS1 Expansion Racks.	CS1W-CLK21
			Optical		CS1W-CLK11
Controller Support Boards	Personal computer board		Wired	CPU i386 or better, ISA bus IBM PC DOS Ver 7.0, MC DOS Ver. 6.2 Microsoft C Ver. 70A	3G8F5-CLK21-E
			Optical		3G8F5-CLK11-E

Unit Descriptions

CompoBus/D (DeviceNet) Units

Multivender, Multibit Network
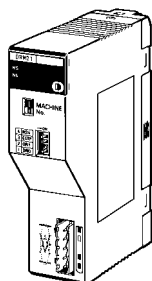
C200HW-DRM21-V1
CompoBus/D Master Unit
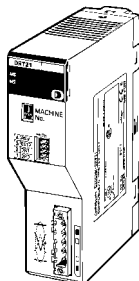
C200HW-DRT21
CompoBus/D I/O Link Unit

This is OMRON's implementation of the DeviceNet open field network, a multibit, multivender network for machine/line control and information. Remote I/O for automatic data transfers between the CPU Unit and Slaves (with no programming in the CPU Unit) combines with message communications that can be programmed in the CPU Unit to send read/write message to slaves and control slave operation.

One of the slaves that can be connected is the MULTIPLE I/O TERMINAL, a building-block terminal combining multiple I/O Units. The MULTIPLE I/O TERMINAL provides flexible expansion through easily connected distributed I/O Units.
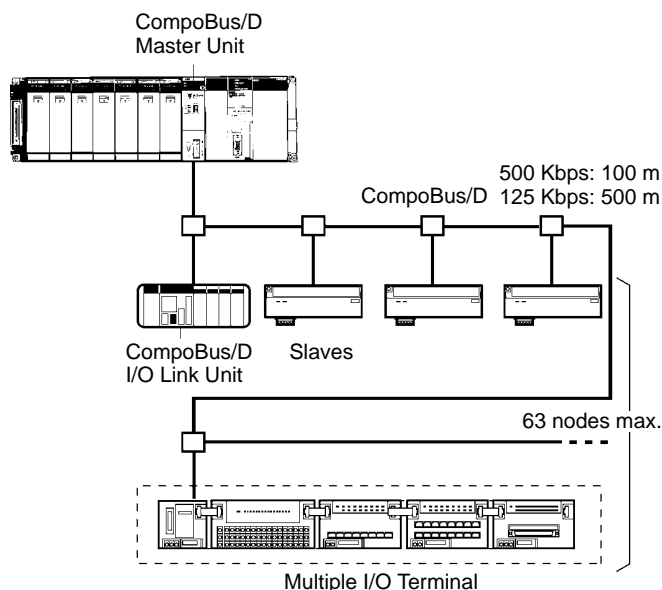
■ Features

- Multivender network compatible with other DeviceNet components.
- Use both remote I/O and message communications.
- Freely allocated up to 4,800 points of remote I/O (Configurator required).
- Connect up to 63 slaves.
- Network multiple PLCs with CompoBus/D Master Units.
- Ideal for multibit control and line expansions as a multi-level network.
- Maximum transmission distance of 500 m at 125 Kbps: Perfect for conveyor systems.
- A wide range of connection methods, including T-branches and multidrops, for flexible line expansions or alterations.
- Read C200HX/HG/HE memory as remote I/O by mounting a C200HW-DRT21 CompoBus/D I/O Link Unit.
- Use RS-232C to connect external devices for message communications.

■ System Configuration

CompoBus/D Master Unit

500 Kbps: 100 m
CompoBus/D 125 Kbps: 500 m

CompoBus/D I/O Link Unit

Slaves

63 nodes max.

Multiple I/O Terminal

■ Specifications

CompoBus/D Master Unit

Classification	Communications	Specifications	Model
C200H Special I/O Unit	Remote I/O and messages	Mount 1 Unit without Configurator and up to 16 Units using Configurator.	C200HW-DRM21-V1

Unit Descriptions

CompoBus/D Slaves

	Slave	I/O points	Model	Features	Mounting
Basic Terminals and Units	Remote Transistor Input Terminals	8 inputs	DRT1-ID08	---	DIN track or screws
		16 inputs	DRT1-ID16	---	
	Remote Transistor Output Terminals	8 outputs	DRT1-OD08	---	
		16 outputs	DRT1-OD16	---	
	Environmentally Resistant Transistor I/O Terminals	8 inputs	DRT1-ID08C	High water resistance. Connect I/O using XS2 Sensor I/O Connector.	Screws
		8 outputs	DRT1-OD08C		
		8 inputs and 8 outputs	DRT1-MD16C		
	Remote Adapters	16 inputs	DRT1-ID16X	---	DIN track or screws
		16 outputs	DRT1-OD16X	---	
	Sensor Terminals	16 inputs	DRT1-HD16S	Connect Photoelectric and Proximity Sensors with connectors.	
		8 inputs and 8 outputs (Note)	DRT1-ND16S		
	Temperature Input Terminals	4 inputs (4 words)	DRT1-TS04T	Thermocouple inputs	
			DRT1-TS04P	Platinum resistance thermometer inputs	
	B7AC Interface Unit	30 points (10 words/B7AC)	DRT1-B7AC	Connect to three B7ACs with one Unit (three ports).	M5 screws
	CQM1 I/O Link Unit	16 inputs and 16 outputs	CQM1-DRT21	Mount up to 3 or 7 Units to CQM1 (depending on model)	To CQM1
Analog Terminals	Analog Input Terminals	2 or 4 inputs (2 or 4 words) (voltage or current)	DRT1-AD04	Input ranges: 1 to 5 V, 0 to 5 V, 0 to 10 V, −10 to 10 V, 0 to 20 mA, 4 to 20 mA (selectable) 1/6,000 resolution	DIN track or screws
		4 inputs (4 words) (voltage or current)	DRT1-AD04H	Input ranges: 1 to 5 V, 0 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA (selectable) 1/30,000 resolution	
	Analog Output Terminals	2 outputs (2 words)	DRT1-DA02	Output ranges: 1 to 5 V, 0 to 10 V, −10 to 10 V, 0 to 20 mA, 4 to 20 mA (selectable) 1/6,000 resolution	
Special Units and Terminals	C200H I/O Link Unit	512 inputs (32 words) max. 512 outputs (32 words) max.	C200HW-DRT21	Mount up to 16 Units to C200HX/HG/HE	To C200HX/HG/HE
	RS-232C Unit	16 inputs (1 word)	DRT1-232C	Two RS-232C ports. Set and Control via explicit messages. RS-232C status input to memory	DIN track or screws
	B7AC Interface Terminal	30 points (10 words/B7AC)	DRT1-B7AC	Connect to three B7ACs with one Unit (three ports).	M5 screws

Note: I/O points for the I/O Link Unit are internal I/O points in the CQM1 CPU Unit.

Unit Descriptions

MULTIPLE I/O TERMINAL

Multibit Building-block CompoBus/D Slave

■ System Configuration

CompoBus/D Master Unit

MULTIPLE I/O TERMINAL

CompoBus/D network

I/O Unit Connecting Cables

Communications Unit   I/O Units

I/O Unit Interface: 8 Units max.
3 m total, 1 m between Units
1,024 I/O points max.
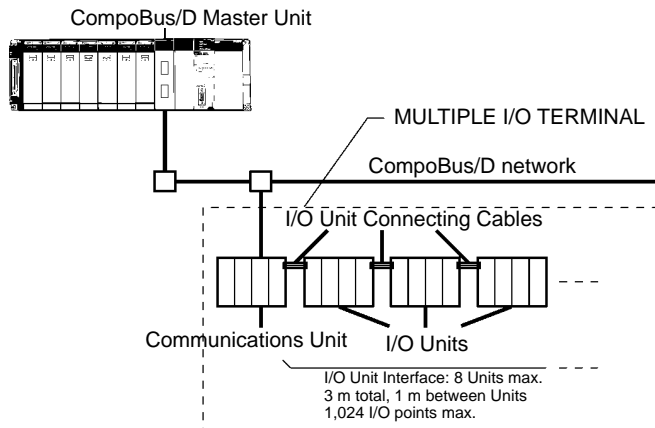
A Communications Unit can be connected to the CompoBus/D Master Unit (DeviceNet) to interface various types of I/O Units. Allocations and address settings are not required for the I/O Units, enabling flexible, simple distributed I/O.

■ Features

• To expand I/O, merely add I/O Units to the I/O interface.

• Create a low-cost multibit system.

• Select from a wide range of I/O Units.

■ MULTIPLE I/O TERMINAL Units

Communications Unit

Number of Slaves	Number of Slave I/O points	Rated voltage	Model	Standards
8	1,024 max., input and output combined	24 VDC	DRT1-COM	UL, CSA, EC

Digital I/O Units

Name	Classification	Internal I/O circuit common	I/O points	I/O Connections	Rated voltage	I/O specifications	Model	Stan-dards
Terminal Block-type Digital I/O Units	Digital input	NPN (+ common)	16	M3 terminal block	24 VDC	DC/Tr	GT1-ID16	UL, CSA, EC
		PNP (– common)					GT1-ID16-1	
	Digital output	NPN (– common)				0.5 A DC/Tr	GT1-OD16	
		PNP (+ common)					GT1-OD16-1	
Connector-type Digital I/O Units	Digital input	NPN (+ common)		Molex con-nectors		DC/Tr	GT1-ID16MX	
		PNP (– common)					GT1-ID16MX-1	
	Digital output	NPN (– common)				0.5 A DC/Tr	GT1-OD16MX	
		PNP (+ common)					GT1-OD16MX-1	
	Digital input	NPN (+ common)		Fujitsu con-nectors		DC/Tr	GT1-ID16ML	CE
		PNP (– common)					GT1-ID16ML-1	
	Digital output	NPN (– common)				0.5 A DC/Tr	GT1-OD16ML	
		PNP (+ common)					GT1-OD16ML-1	
	Digital input	NPN (+ common)		25-pint D-sub connectors		DC/Tr	GT1-ID16DS	
		PNP (– common)					GT1-ID16DS-1	
	Digital output	NPN (– common)				0.5 A DC/Tr	GT1-OD16DS	
		PNP (+ common)					GT1-OD16DS-1	
Multi-point Connector-type Digital I/O Units	Digital input	NPN (+ common)	32	Fujitsu con-nectors		DC/Tr	GT1-ID32ML	UL, CSA, EC
		PNP (– common)					GT1-ID32ML-1	
	Digital output	NPN (– common)				0.5 A DC/Tr	GT1-OD32ML	
		PNP (+ common)					GT1-OD32ML-1	

Relay Output Units

Classification	I/O points	I/O connection method	Supply voltage	I/O specifications	Model	Standards
Relay output	16 points	M3 terminal block	24 VDC	2 A, AC, DC, SPST-NO	GT1-ROS16	CE
	8 points			5 A, AC, DC, SPST-NO	GT1-ROP08	UL, CSA, EC

Unit Descriptions

Analog Input Units

Classification	I/O	I/O connections	Supply voltage	I/O specifications	Model	Standards
Analog input	8 inputs	Connectors	24 VDC	4 to 20 mA, 0 to 20 mA, 0 to 5 V, 1 to 5 V, 0 to 10 V, −10 to 10 V	GT1-AD08MX	UL, CSA, EC
	4 inputs	Terminal block			GT1-AD04	

Analog Output Units

Classification	I/O	I/O connections	Supply voltage	I/O specifications	Model	Standards
Analog output	4 outputs	Connector	24 VDC	0 to 5 V, 1 to 5 V, 0 to 10 V, −10 to 10 V	GT1-DA04MX	UL, CSA, EC
		Terminal block		0 to 5 V, 1 to 5 V, 0 to 10 V, −10 to 10 V, 4 to 20 mA	GT1-DA04	
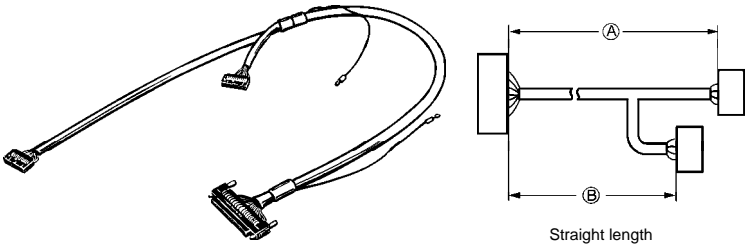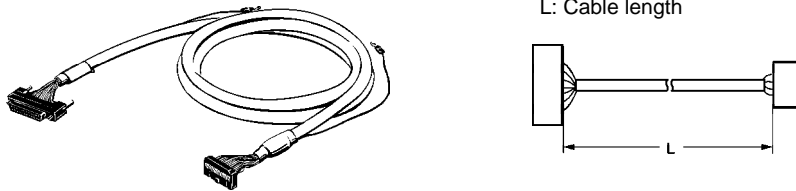
Counter Unit

Classification	External I/O	I/O connection method	Operating mode	Model	Standards
Counter unit	1 input, 2 outputs	Terminal block	Linear counter	GT1-CT01	EC

Optional Component
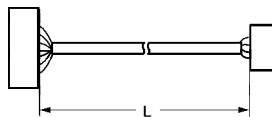
Name	Specification	Model
I/O Unit Connecting Cable	1 m	GCN1-100

■ G79-□C Cables with Connectors
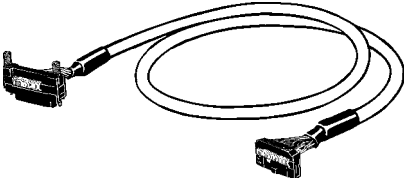
Length (mm)		Model		Dimensions
A	B	For input	For output	
1,000	750	G79-I100C-75	G79-O100C-75	
1,500	1,250	G79-I150C-125	G79-O150C-125	
2,000	1,750	G79-I200C-175	G79-O200C-175	
3,000	2,750	G79-I300C-275	G79-O300C-275	
5,000	4,750	G79-I500C-475	G79-O500C-475	

Straight length

Length L (mm)	Model	Dimensions
1,000	G79-100C	L: Cable length
1,500	G79-150C	
2,000	G79-200C	
3,000	G79-300C	
5,000	G79-500C	

■ XW2Z Cables with Connectors

Length L (mm)	Model	Dimensions
500	XW2Z-050B	L: Cable length
1,000	XW2Z-100B	
1,500	XW2Z-150B	
2,000	XW2Z-200B	
3,000	XW2Z-300B	
5,000	XW2Z-500B	

Unit Descriptions

Length L (mm)	Model	Dimensions
500	XW2Z-050A	
1,000	XW2Z-100A	
1,500	XW2Z-150A	
2,000	XW2Z-200A	
3,000	XW2Z-300A	
5,000	XW2Z-500A	

L: Cable length

CompoBus/S Master Unit

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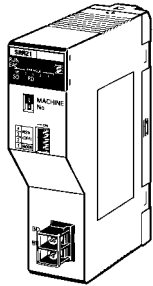
A high-speed ON/OFF bus that automatically transfers remote I/O status to the CPU Unit without any programming in the CPU Unit. High-speed remote I/O is supported by a communications cycle time of 1 ms maximum for 256 I/O points.

C200HW-SRM21

■ Features

- You get distributed machine control with a high-speed communications cycle.
- Use a 100 m trunk line for a wide range of machine control.
- Easy expansions at any location with T-branches.
- Reduce wiring with either VCTF cable or a special flat cable.
- Sensor connectors for easy wiring.

■ System Configuration

CompoBus/S Master Unit

CompoBus/S network   750 Kbps, 100 m

Remote I/O

Slaves
32 Terminals max.
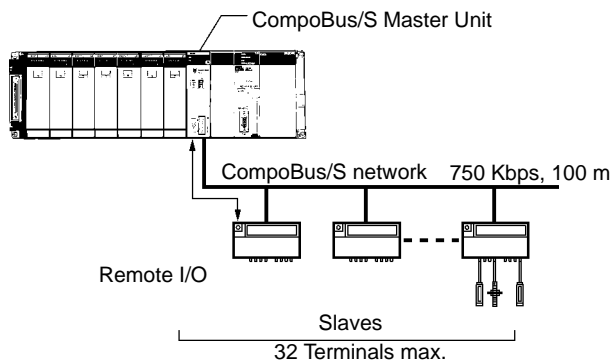
■ Specifications
CompoBus/S Master Unit

Classification	Communications	Specifications	Model
C200H Special I/O Unit	Remote I/O	Mount up to 16 Units	C200HW-SRM21

Unit Descriptions

CompoBus/S Slave Units

Slave	I/O Points	Model	Power supply
Remote I/O Transistor Terminals	4 inputs	SRT1-ID04	Separate power supplies
	4 inputs (PNP)	SRT1-ID04-1	
	8 inputs	SRT1-ID08	
	8 inputs (PNP)	SRT1-ID08-1	
	16 inputs	SRT1-ID16	
	16 inputs (PNP)	SRT1-ID16-1	
	4 outputs	SRT1-OD04	
	4 outputs (PNP)	SRT1-OD04-1	
	8 outputs	SRT1-OD08	
	8 outputs (PNP)	SRT1-OD08-1	
	16 outputs	SRT1-OD16	
	16 outputs (PNP)	SRT1-OD16-1	
Remote I/O Transistor Terminals with 3 Rows of Terminal Blocks	16 inputs (NPN, + common)	SRT1-ID16T	Local power supply
	16 inputs (PNP, – common)	SRT1-ID16T-1	
	16 inputs/outputs (NPN, – common)	SRT1-MD16T	
	16 inputs/outputs (PNP, + common)	SRT1-MD16T-1	
	16 outputs (NPN, – common)	SRT1-OD16T	
	16 outputs(PNP, + common)	SRT1-OD16T-1	
Remote I/O Transistor Terminal with Connector	8 outputs	SRT1-OD08-S	
Remote I/O Relay Terminals	8 outputs	SRT1-ROC08	
	16 outputs	SRT1-ROC16	
Remote I/O Power MOS FET Terminals	8 outputs	SRT1-ROF08	
	16 outputs	SRT1-ROF16	
Remote I/O Modules	16 inputs	SRT1-ID16P	---
	16 outputs	SRT1-OD16P	
Sensor Amp Terminals	4 inputs (1 word x 4 terminals)	SRT1-TID04S	Network power supply
	4 inputs (4 words x 1 terminal)	SRT1-TKD04S	
Expansion Sensor Amp Terminals	4 inputs (1 word x 4 terminals)	SRT1-XID04S	---
	4 inputs (4 words x 1 terminal)	SRT1-X,D04S	
Sensor Terminals	8 inputs	SRT1-ID08S	Network power supply
	8 outputs	SRT1-OD08S	
	4 inputs and 4 outputs	SRT1-ND08S	
Bit Chain Terminal	8 inputs or 8 outputs	SRT1-BIT	Local power supply
Position Drivers	---	FND-X06H-SRT FND-X12H-SRT FND-X25H-SRT FND-X06L-SRT FND-X12L-SRT	Local power supply

Note: Network Power Supply: Slaves that can be supply power from a CompoBus/S flat cable.
Separate Power Supplies: Slaves requiring both communications and I/O power supplies
(Communications power can come from a CompoBus/S flat cable.)
Local Power Supply: Slaves requiring an external power supply
(Communications power cannot come from a CompoBus/S flat cable.)

Communications Middleware

Compolet

Faster and Easier Development of PLC Communications with ActiveX Control

- **■ SYSMAC CS1 Compolet (To Be Released Soon)**
- **■ SYSMAC C Compolet**
- **■ SYSMAC CV Compolet**
- **■ System Configuration**
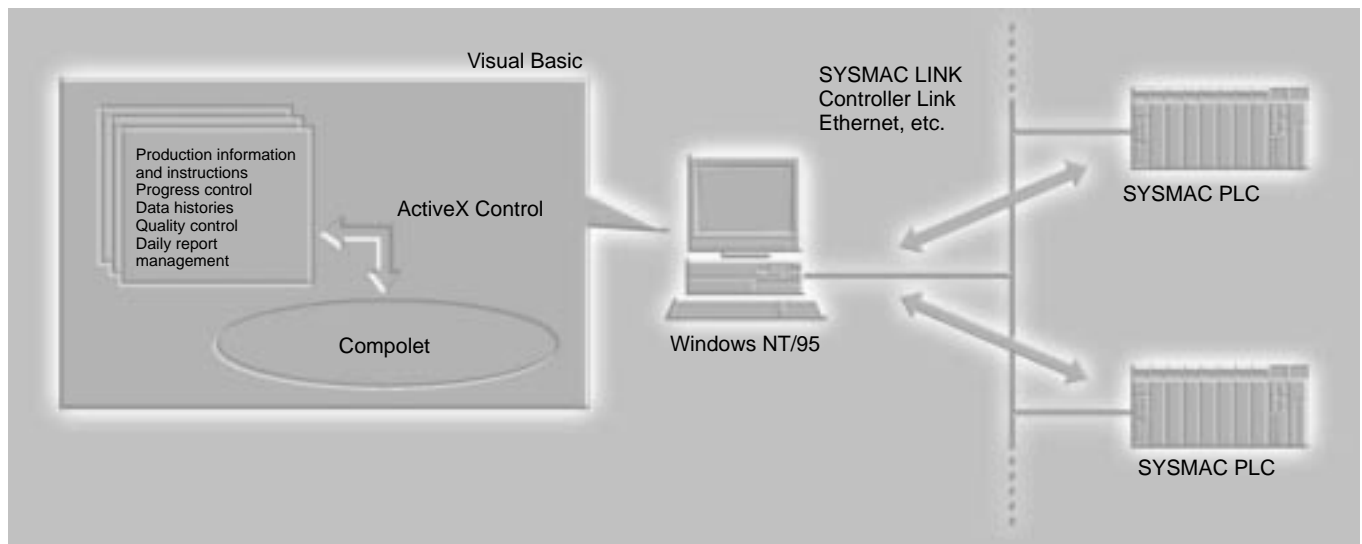
■ Features

Cut Development Time

Difficult, time-consuming communications programs can now be created far more easily. ActiveX Control directly manipulates SYSMAC PLC and other Controller operations, eliminating the need for knowledge of FINS PLC communications commands.

Designed for the Future

The Compolet Series currently support both SYSMAC C-series and CV-series PLCs, and new components will be added in the future for other Controllers to handle production site needs both now and in the future.

Interface	Functional area	Function
Properties	Communications with SYSMAC C-series PLCs	Specifying addresses and displaying routing tables.
	Accessing variable areas in SYSMAC C-series PLCs	Accessing the following areas as arrays: DM, IR, SR, Timer, Counter, HR, AR, LR, and EM.
	CPU Unit information	Accessing model information and the time.
	SYSMAC C-series PLC operating status	Dsiplaying operatinng status and changing operating modes.
	SYSMAC C-series PLC area information	Accessing program area sizes, DM Area word capacity, etc.
	SYSMAC C-series PLC error information	Clearing fatal and non-fatal errors or accessing error information as text strings.
Methods	Accessing variable areas in SYSMAC C-series PLCs	Accessing continuous word contents and using it as text strings, number arrays, variants, etc.
	Creating I/O tables	Creaing I/O tables remotely.
	Force-setting/resetting bits	Force-setting and force-resetting bits and clearing forced bit status.
	Executing FINS services	Sending low-level FINS commands and reading the results.

Note: The functionality of the SYSMAC C Compolet are shown above.

Communications Middleware

■ Operating Environment

Compolet Software

For C-series PLCS

SYSMAC C Compolet

(SCPL-SYSC)

For Cv-series PLCS

SYSMAC CV Compolet

(SCPL-SYCV)

+

FinsGateway

FinsGateway Version 2
Runtime versions: Ethernet,
SYSMAC LINK, Controller
Link, Serial Communications

(SFGW-RTN4-V2 (Windows NT4.0))
or
(SFGW-RT95-V2 (Windows 95))

FinsGateway Version 2
Runtime versions: Serial Commu-
nications only

(SFGW-RTN4-HLV2 (Windows NT4.0))
or
(SFGW-RT95-HLV2 (Windows 95))

Note: The following are required to use Compolet: FinsGateway for network being used, Microsoft Visual Basic (the application development environment for ActiveX Control), an HTML browser for the online manual (the online manual is provided in HTML so that it can be viewed with Microsoft Internet Explorer).

■ Specifications

Computer	IBM PC/AT or compatible (x86 or better) Approx. 5 MB of memory is required for installation.
CPU (memory)	Pentium 133 MHz or faster (32 MB min.)
OS	Microsoft Windows NT4.0 or Microsoft Windows 95
SYSMAC LINK Support Board	OMRON 3G8F5-SLK21/SLK22 One board per computer.
Controller Link Support Board	OMRON 3G8F5-CLK21 One board per computer.

Ethernet board	Any commerial Ethernet board for Windows NT/95.
Supported networks	SYSMAC LINK (FINS communications and data links), Controller Link (FINS communications and data links), Ethernet (OMRON FINS communications), RS-232C serial communications, CompoWay/F (RS-232C)
Required software	FinsGateway for the network being used.

■ Setting Methods

Active X Window

Tool Box Window

Data Read Settings Window

Property Settings Window
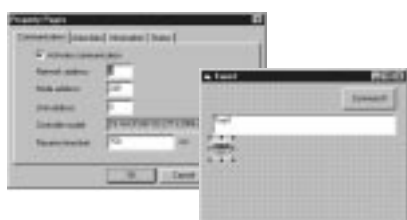
Programming Window
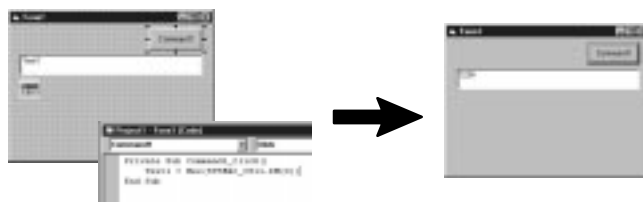
Programmable Terminals

■ NT631/31 Series

Supporting the CS1Series with More Power than Ever Before

The NC631 TFT Programmable Terminal uses high-luminance liquid crystals for the brightest displays.

NT31C
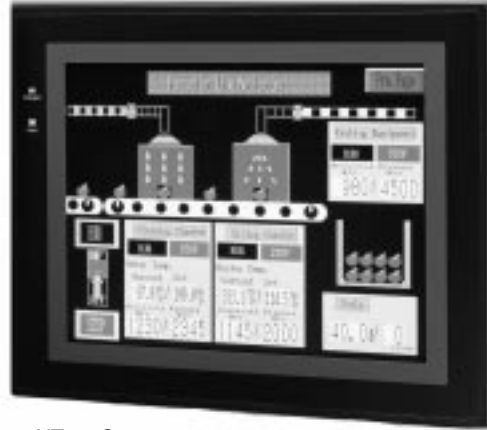
NT631C

Multi-window Functionality for More Efficient Screen Application

Up to three windows can be displayed at the same time and many more display components can be positioned. Just touch the screen to move a window, or open and close windows from the host by pressing on-screen PT control areas.

Programmable Terminals

More Powerful Graphics, Including Analog Meters

Analog meters have been added to graphic functions. You can display quarter, half, or whole pie charts with simple settings, or use trend graphs, line graphs, or bar graphs. Use the separately or together to display the required information in easy-to-understand form.
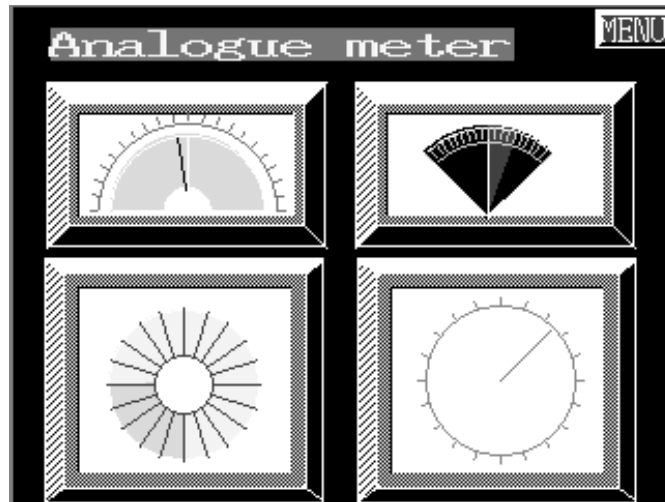
Easier to Operate

Previous operations are now joined by better keyboard operations and overall improvements in functionality to make precise work far easier to achieve.

- Better Keyboard Operations
- Component and Cursor Coordinate Displays
- Display or Hide Keyboard Screen during Operation

Programming Console Functionality on PT Screens

The same function as provided by the C200H-PRO27-E Programming Console can be accessed on a PT screen. Write or read ladder diagrams in mnemonic form and perform other operations to easily achieve onsite maintenance.

Programmable Terminals

1:N NT Links

- Connect up to Eight PT to a CS1-series PLC port.
- Give priority treatment to registered PT communications.

The number of PTs that can be connected depends on the model of Serial Communications Board and the model of CPU Unit being used.

Relay Terminal Blocks are required to connect more than one NT31(C) PT.

SYSMAC CS1-series PLC

RS-422A

Connect up to 8 PT per port

Relay Terminal Block

NT631 NT631 NT31 NT31 NT631
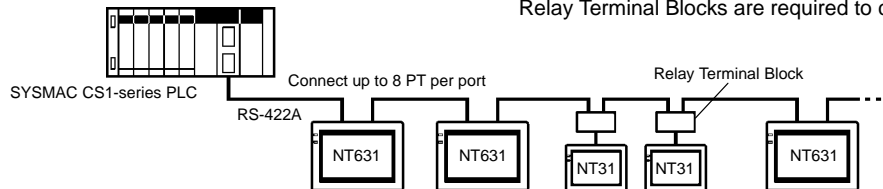
SYSMAC PLC Ports Supporting 1:N NT Links

- All 8 ports on the CS1H and CS1G

Programmable Terminals

Product	Specifications		Model
NT631 Programmable Terminals (See note 1.)	TFT color	Body color: Beige	NT631C-ST151-EV1
		Body color: Black	NT631C-ST151B-EV1
	STN color	Body color: Beige	NT631C-ST141-EV1
		Body color: Black	NT631C-ST141B-EV1
	EL	Body color: Beige	NT631-ST211-EV1
		Body color: Black	NT631-ST211B-EV1
NT31 Programmable Terminals (See note 1.)	STN color	Body color: Beige	NT31C-ST141-EV1
		Body color: Black	NT31C-ST141B-EV1
	STN black and white	Body color: Beige	NT31-ST121-EV1
		Body color: Black	NT31-ST121B-EV1
Support Software (See notes 1 and 2.)	English	Windows 95, floppy disks	NT-ZJ3AT-EV3
		Windows 95, CD-ROM	NT-ZJCAT-EV3
	Memory Unit for screen transfers	For both NT631 and NT31	NT-MF261
Cables	Screen transfers	IBM PC/AT or compatible	XW2Z-S002
	Printer	To print hard copies of screens	NT-CNT121
Options	Non-reflective Protective Sheets (display area only)	For NT631C/NT631 (5 sheets)	NT610-KBA04
		For NT31C/NT31 (5 sheets)	NT30-KBA04
	Chemical-resistive Cover (silicon cover)	For NT631C/NT631	NT625-KBA01
		For NT31C/NT31	NT30-KBA01
	Backlight Unit	For NT631C-ST151□	NT631C-CFL01
		For NT631C-ST141□	NT631C-CFL02
		For NT31C/31	NT31C-CFL01
	Bar Code Reader	Refer to the Bar Code Reader catalog.	V520-RH21-6

Note: 1. Ask your sales representative about Japanese and Chinese versions. English versions are scheduled for release in March 1998.

2. Models without "EV1" can support the new features described in this section by installing the new system program from the "EV3" Support Software. High-quality fonts and Memory Unit functions, however, cannot be used.

Mechatronics

■ 3G3EV Compact Low-noise Inverter (SYSDRIVE 3G3EV Series)

Easily Achieve Optimum Control

- **Easy to Operate**
  Basic constants are displayed on indicators and constant settings have been reduced to a minimum.

- **Compact Design**
  Installation is greatly simplified with easier wiring and DIN track mounting.

- **Networking and Reduced Wiring**
  Connect up to 16 Inverters to one SYSMAC BUS Remote I/O Master Unit with the SYSMAC BUS Inverter.

- **A Model for Every Applications**
  Standard, SYSMAC BUS, and Multi-function models are available, as are models with three-phase 200 VAC inputs, single/three-phase 200 VAC inputs, or single-phase 100 VAC inputs.

- **Standard and Multi-function Models Meeting EC Directives**
  Available both with three-phase 400 VAC inputs or single-phase 200 VAC inputs.

System Configuration

Inverter Options

English Digital Operator Sheets 3G3EV-PJVOP120ES

Variable Resistor Unit 3G3EV-PETX3200

DIN Track 3G3EV-PSPAT□

Adapter Panel 3G3EV-PJVOP122

Adapter Panel Extension Cable 3G3EV-PCN123/323

Digital Operator 3G3EV-PJVOP100

Special Options

Braking Resistor Unit

Braking Resistor

Stand-alone Options: Analog Operator/Meter

Analog Operator (Small, plastic) EGEIV-PJV0P95

Analog Operator (Standard copper plate) EGEIV-PJV0P96

Scaling Meter K3TJ

SYSDRIVE 3G3EV Series Inverter

R S T B1 B2

RUN

ALARM

Standard: 3G3EV-□□□□
Multi-function: 3G3EV-□□□□M
SYSMAC BUS: 3G3EV-□□□□R

R
S
T

U
V
W

Stand-alone Recommended Options

Input Noise Filter

Simple Input Noise Filter

AC Reactor

Stand-alone Recommended Options

Output Noise Filter

Power supply
1-phase, 100 VAC
3-phase, 200 VAC
1-phase, 200 VAC

3-phase motor M

Mechatronics

■ FND-X Position Drivers (OMNUC FND-X Series)

An Inverter with Built-in Positioner Functions for Easy Positioning Systems

- Both DIO and CompoBus/S models available.

- Connect to OMNUC U, H, and M Series or U Series UE Type AC Servomotors.

- Two Control Modes: Feeder control and PTP control

- Three Operating Modes: Independent operation, automatic incremental operation, and continuous operation.

- Easy Positioning: Just enter the point number and turn ON the start signal.

- S-curve acceleration/deceleration, backlash compensation, slip compensation, deceleration stops, and many other features.

System Configuration

DIO Type

SYSMAC CV or C-series Programmable Controller

I/O Signals

CompoBus/S Type

C200HX/HG/HE or CQM1 Programmable Controller

C200HW-SRM21 CompoBus/S Master Unit (256 pts)

CQM1-SRM21 CompoBus/S Master Unit (128pts)

S Controller SRM1-C01/-C02-V1

Position Driver OMNUC FND-X Series DIO Type CompoBus/S Type

Operation signals

Feedback signals

AC Servomotor OMNUC U, H, or M Series or U Series UE Type

RS-232C

IBM PC/AT or compatible

FND-X Series Monitoring Software (SCCF-302

Teaching Box CVM1-PRO01

ROM Cassette required. (CMV1-MP702 or CVM1-MP703)

Models
Position Drivers

Specifications			Model
DIO Type	200-VAC input	6 A	FND-X06H
		12 A	FND-X12H
		25 A	FND-X25H
	100-VAC input	6 A	FND-X06L
		12 A	FND-X12L
CompoBus/S Type	200-VAC input	6 A	FND-X06H-SRT
		12 A	FND-X12H-SRT
		25 A	FND-X25H-SRT
	100-VAC input	6 A	FND-X06L-SRT
		12 A	FND-X12L-SRT

Teaching Boxes

Specifications			Model
Teaching Box			CVM1-PRO01 (see note)
ROM Cassette	FND-X or MC/NC Units		CVM1-MP702
	FND-X only		CVM1-MP703
Connecting Cable		2 m	CV500-CN22A
		4 m	CV500-CN42A
		6 m	CV500-CN62A

Note: A ROM Cassette and Connecting cable are required for the Teaching Box.

■ R88M-U/R88D-U AC Servomotors/Servo Drivers

Powerful Functions in a Compact Design for High-speed, High-precision Control

AC Servo Drivers

- High-speed response of 250 Hz servo frequency characteristic to reduce positioning time.

- Auto-tuning to automatically adjust the control system gain.

- Read/write parameters via personal computer connection. Display current, speed, and I/O signals in graphic form to easily confirm operation.

AC Servomotors

- Speed control range of 1:5000 for smooth low-speed operation.

- Low rotor inertia for 5 times the power rate.

- Motors available with Incremental or absolute encoders with capacities from 30 V to 5 kW.

- Easy-to-use UE-type Servomotors added to the series.

System Configuration

Note: Motors with absolute encoders can be used with the CV500-MC221/MC421 Motion Control Units.

CVM1 or CV-series Programmable Controller + CV500-MC221/MC421 Motion Control Unit / C500-NC222 Position Control Unit

N115/N116 Positioner

Analog command voltages

Feedback pulses

R88D-UA AC Servo Driver (analog inputs and power supply included)

Operation signals

Feedback pulses

R88M-U AC Servomotor (30 to 750 W with incremental/absolute encoder)

R88D-UT AC Servo Driver (analog/pulse string inputs and power supply included)

Operation signals

Feedback pulses

R88M-U AC Servomotor (1 to 5 kW with incremental/absolute encoder)

CVM1 or CV-series Programmable Controller + C500-NC111-V1 Position Control Unit

Pulse string signals

C200HX/HG/HE Programmable Controller + C200H-NC111/NC211 Position Control Unit

R88D-UP AC Servo Driver (pulse string inputs and power supply included)

Operation signals

Feedback pulses

R88M-U AC Servomotor (30 to 750 W with incremental encoder)

Mechatronics

■ XW2B Servo Relay Units

Combinations of Servo Relay Units, Servo Drivers, and Position Control

Position Control Units

Position Control Unit
Connecting Cables

Servo Relay Units

Servo Driver
Connecting Cables

Servo Drivers

	U-series Connecting Cables	U-series Servo Drivers
	XW2Z-□□J-B1	R88D-UP□□□
	XW2Z-□□J-B4	R88D-UT□□□H
	XW2Z-□□J-B5	R88D-UEP□□□

Position Control	Connecting Cables	Servo Relay Units
C200H-NC112 (1 axis)	XW2Z-□□J-A1	XW2B-20J6-1B
	XW2Z-□□J-A4 (For R88D-UEP□ only)	
C200HW-NC113 (2 axes)	XW2Z-□□J-A6	
	XW2Z-□□J-A8 (For R88D-UEP□ only)	

	M-series Connecting Cables	M-series Servo Drivers
	XW2Z-□□J-B2	R88D-MT□□□

Position Control	Connecting Cables	Servo Relay Units
C200H-NC211 (2 axes)	XW2Z-□□J-A2	XW2B-40J6-2B
	XW2Z-□□J-A5 (For R88D-UEP□ only)	
C200HW-NC213 (2 axes) C200HW-NC413 (4 axes)	XW2Z-□□J-A7	
	XW2Z-□□J-A9 (For R88D-UEP□ only)	

	H-series Connecting Cables	H-series Servo Drivers
	XW2Z-□□J-B3	R88D-H□□□

Programming Devices

Serial Communications Units

Serial Communications Board

Peripheral port

RS-232C port

Connecting Cable	Hardware	Soft ware

IBM PC/AT or compatible

XW2Z-200S-V
XW2Z-500S-V

CX-Programmer

Programming Devices

Connecting Cable	Hardware	Software

| | IBM PC/AT or compatible | |
| CS1W-CN□□6 | | CX-Programmer |

| CS1W-CN□24 | C200H-PRO27-E | CS1W-KS001-E |

| CS1W-CN□114 | CQM1-PRO01-E | CS1W-KS001-E |

ORDERING GUIDE

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 confirmed by the customer.

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

Applicable EMC Standards

EMS (Electromagnetic Susceptibility):
  EN61131-2
EMI (Electromagnetic Interference):
  EN50081-2
  (Radiated emission: 10-m regulations)
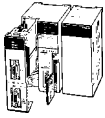
Low Voltage Directive

OMRON Power Supply Units and I/O Units have been determined safe when operating at voltages of 50 to 1,000 VAC and 75 to 1,500 VDC according to the safety standards in EN61131-2.

Ordering Guide

■ CPU Rack

Name	Specifications			Model	Standards
CPU Units	I/O bits	Program capacity	Data memory capacity	---	---
	5,120	250K steps	448K words (DM: 32K words, EM: 32K words ×13 banks)	CS1H-CPU67-E	U, C, N, CE
	5,120	120K steps	256K words (DM: 32K words, EM: 32K words ×7 banks)	CS1H-CPU66-E	
	5,120	60K steps	128K words (DM: 32K words, EM: 32K words ×3 banks)	CS1H-CPU65-E	
	5,120	30K steps	64K words (DM: 32K words, EM: 32K words ×1 bank)	CS1H-CPU64-E	
	5,120	20K steps	32K words (DM: 32K words, EM: None)	CS1H-CPU63-E	
	5,120	60K steps	128K words (DM: 32K words, EM: 32K words ×3 banks)	CS1G-CPU45-E	
	1,280	30K steps	64K words (DM: 32K words, EM: 32K words ×1 bank)	CS1G-CPU44-E	
	960	20K steps	32K words (DM: 32K words, EM: None)	CS1G-CPU43-E	
	960	10K steps	32K words (DM: 32K words, EM: None)	CS1G-CPU42-E	
CPU Backplanes	2 slots (Does not connect to Expansion Rack.)			CS1W-BC023	
	3 slots			CS1W-BC033	
	5 slots			CS1W-BC053	
	8 slots			CS1W-BC083	
	10 slots			CS1W-BC103	
Power Supply Units	100 to 120 VAC or 200 to 240 VAC			C200HW-PA204	U, C, N, L, CE
	100 to 120 VAC or 200 to 240 VAC (with 0.8 A 24 VDC service power supply) Output capacity: 4.6 A, 5 VDC			C200HW-PA204S	
	100 to 120 VAC or 200 to 240 VAC (with RUN output) Output capacity: 4.6 A, 5 VDC			C200HW-PA204R	U, C
	100 to 120 VAC or 200 to 240 VAC (with RUN output) Output capacity: 9 A, 5 VDC			C200HW-PA209R	CE
	24 VDC, Output capacity: 4.6 A, 5 VDC			C200HW-PD024	U, C, N, L, CE
Memory Cards	Flash memory, 8 MB			HMC-EF861	CE
	Flash memory, 15 MB			HMC-EF171	
	Flash memory, 30 MB			HMC-EF371	
	Memory Card adapter			HMC-AP001	
Serial Communications Boards	2 × RS-232C ports, protocol macro function			CS1W-SCB21	U, C, N, CE
	1 × RS-232C port + 1 × RS-422/485 port, protocol macro function			CS1W-SCB41	
Programming Consoles	An English Keyboard Sheet (CS1W-KS001-E) is required. (Connects on peripheral port on CPU Unit only.)			CQM1-PRO01-E	
				C200H-PRO27-E	
Programming Console Connecting Cables	Connects the CQM1-PRO01-E Programming Console. (Length: 0.05 m)			CS1W-CN114	CE
	Connects the CQM1-PRO27-E Programming Console. (Length: 2.0 m)			CS1W-CN224	
	Connects the CQM1-PRO27-E Programming Console. (Length: 6.0 m)			CS1W-CN624	
CX-Programmer	Windows-based Programming Software for Windows 95 (Connects to peripheral port on CPU Unit or RS-232C port on CPU Unit or Serial Communications Unit/Board.)			WS02-CXPC1-E	---
Peripheral Device Connecting Cables (for peripheral port)	Connects DOS computers, D-Sub 9-pin receptacle (Length: 0.1 m)			CS1W-CN118	CE
	Connects DOS computers, D-Sub 9-pin (Length: 2.0 m)			CS1W-CN226	
	Connects DOS computers, D-Sub 9-pin (Length: 6.0 m)			CS1W-CN626	
Peripheral Device Connecting Cables (for RS-232C port)	Connects DOS computers, D-Sub 9-pin (Length: 2.0 m)			XW2Z-200S-V	---
	Connects DOS computers, D-Sub 9-pin (Length: 5.0 m)			XW2Z-500S-V	
CX-Protocol	Windows-based Protocol Creation Software for Windows 95			WS02-PSTC1-E	
Battery Set	For CS1 Series only.			CS1W-BAT01	CE

■ Expansion Racks

Name	Specifications		Model	Standards
CS1 Expansion Backplanes	3 slots		CS1W-BI033	U, C, N, CE
	5 slots		CS1W-BI053	
	8 slots		CS1W-BI083	
	10 slots		CS1W-BI103	
C200H Expansion I/O Backplanes	3 slots		C200HW-BI031	U, C, N, L, CE
	5 slots		C200HW-BI051	
	8 slots		C200HW-BI081	
	10 slots		C200HW-BI101	
Power Supply Units	100 to 120 VAC or 200 to 240 VAC, Output capacity: 4.6 A, 5 VDC		C200HW-PA204	
	100 to 120 VAC or 200 to 240 VAC (with service supply: 0.8 A, 24 VDC), Output capacity: 4.6 A, 5 VDC		C200HW-PA204S	
	100 to 120 VAC or 200 to 240 VAC (with RUN output) Output capacity: 4.6 A, 5 VDC		C200HW-PA204R	U, C
	24 VDC,		C200HW-PD024	U, C, N, L, CE
	100 to 120 VAC or 200 to 240 VAC (with RUN output) Output capacity: 9 A, 5 VDC		C200HW-PA209R	CE
CS1 I/O Connecting Cables	Connects CS1 Expansion I/O Backplanes to CPU Backplanes or other CS1 Expansion I/O Backplanes.	Length: 0.3 m	CS1W-CN313	
		Length: 0.7 m	CS1W-CN713	
		Length: 2 m	CS1W-CN223	
		Length: 3 m	CS1W-CN323	
		Length: 5 m	CS1W-CN523	
		Length: 10 m	CS1W-CN133	
		Length: 12 m	CS1W-CN133-B2	
CS1 to C200H I/O Connecting Cables	Connects C200H Expansion I/O Backplanes to CPU Backplanes or CS1 Expansion I/O Backplanes.	Length: 0.3 m	CS1W-CN311	
		Length: 0.7 m	CS1W-CN711	
		Length: 2 m	CS1W-CN221	
		Length: 3 m	CS1W-CN321	
		Length: 5 m	CS1W-CN521	
		Length: 10 m	CS1W-CN131	
		Length: 12 m	CS1W-CN131-B2	
C200H I/O Connecting Cables	Connects C200H Expansion I/O Backplanes to other C200H Expansion I/O Backplanes.	Length: 0.3 m	C200H-CN311	N, L, CE
		Length: 0.7 m	C200H-CN711	
		Length: 2 m	C200H-CN221	
		Length: 5 m	C200H-CN521	L, CE
		Length: 10 m	C200H-CN131	

Ordering Guide

■ C200H Basic I/O Units

Name	Specifications	Model	Mountable Racks				Bits allocated (CIO 0000 to CIO 0319)	Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks		
DC Input Units	12 to 24 VDC, 8 inputs	C200H-ID211	Yes	Yes	Yes	Yes	16	U, C, N, L, CE
	24 VDC, 16 inputs	C200H-ID212	Yes	Yes	Yes	Yes	16	
AC Input Units	100 to 120 VAC, 8 inputs	C200H-IA121	Yes	Yes	Yes	Yes	16	U, C, N, L
	100 to 120 VAC, 16 inputs	C200H-IA122	Yes	Yes	Yes	Yes	16	
	100 to 120 VAC, 16 inputs	C200H-IA122V	Yes	Yes	Yes	Yes	16	U, C, N, L, CE
	200 to 240 VAC, 8 inputs	C200H-IA221	Yes	Yes	Yes	Yes	16	U, C, N, L
	200 to 240 VAC, 16 inputs	C200H-IA222	Yes	Yes	Yes	Yes	16	
	200 to 240 VAC, 16 inputs	C200H-IA222V	Yes	Yes	Yes	Yes	16	CE
AC/DC Input Units	12 to 24 VAC/VDC, 8 inputs	C200H-IM211	Yes	Yes	Yes	Yes	16	U, C, N, L, CE
	24 VAC/VDC, 16 inputs	C200H-IM212	Yes	Yes	Yes	Yes	16	
B7A Input Units	16 inputs	C200H-B7AI1	Yes	Yes	Yes	Yes	16	U, C, CE
	32 inputs (C200H group-2 Unit)	C200H-B7A12	Yes	Yes	Yes	No	32	U, C
Interrupt Input Unit	12 to 24 VDC, 8 inputs	C200HS-INT01	Yes	No	No	No	16	U, C, CE
Relay Bit Output Units	250 VAC/24 VDC, 2 A, 8 outputs max.	C200H-OC221	Yes	Yes	Yes	Yes	16	U, C, N, CE
	250 VAC/24 VDC, 2 A, 12 outputs max.	C200H-OC222	Yes	Yes	Yes	Yes	16	
	250 VAC/24 VDC, 2 A, 12 outputs max.	C200H-OC222V	Yes	Yes	Yes	Yes	16	CE
	250 VAC/24 VDC, 2 A, 16 outputs max.	C200H-OC225	Yes	Yes	Yes	Yes	16	U, C, N, L, CE
	250 VAC/24 VDC, 2 A, 16 outputs max.	C200H-OC226N	Yes	Yes	Yes	Yes	16	
	250 VAC/24 VDC, 2 A, independent contacts, 5 outputs max.	C200H-OC223	Yes	Yes	Yes	Yes	16	U, C, N, L
	250 VAC/24 VDC, 2 A, independent contacts, 8 outputs max.	C200H-OC224	Yes	Yes	Yes	Yes	16	
	250 VAC/24 VDC, 2 A, independent contacts, 8 outputs max.	C200H-OC224V	Yes	Yes	Yes	Yes	16	CE

Name	Specifications	Model	Mountable Racks				Bits allocated (CIO 0000 to CIO 0319)	Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYS-MAC BUS Slave Racks		
Transistor Output Units	12 to 48 VDC, 1 A, 8 sinking outputs	C200H-OD411	Yes	Yes	Yes	Yes	16	U, C, N, L
	24 VDC, 2.1 A, 8 sinking outputs	C200H-OD213	Yes	Yes	Yes	Yes	16	U, C, N, L, CE
	24 VDC, 0.8 A, 8 sourcing outputs, load short-circuit protection.	C200H-OD214	Yes	Yes	Yes	Yes	16	U, C, N, L
	5 to 24 VDC, 0.3 A, 8 sourcing outputs	C200H-OD216	Yes	Yes	Yes	Yes	16	
	5 to 24 VDC, 0.3 A, 12 sinking outputs	C200H-OD211	Yes	Yes	Yes	Yes	16	U, C, N, L, CE
	24 VDC, 0.3 A, 12 sourcing outputs	C200H-OD217	Yes	Yes	Yes	Yes	16	
	24 VDC, 0.3 A, 16 sinking outputs	C200H-OD212	Yes	Yes	Yes	Yes	16	
	24 VDC, 1 A, 16 sourcing outputs, load short-circuit protection.	C200H-OD21A	Yes	Yes	Yes	Yes	16	CE
B7A Output Units	16 outputs	C200H-B7AO1	Yes	Yes	Yes	Yes	16	U, C, CE
	32 outputs (C200H group-2 Unit)	C200H-B7A02	Yes	Yes	Yes	No	32	U, C
B7A I/O Units	16 inputs, 16 outputs (C200H group-2 Unit)	C200H-B7A21	Yes	Yes	Yes	No	16	U, C
	32 inputs, 32 outputs (C200H group-2 Unit)	C200H-B7A22	Yes	Yes	Yes	No	32	
Triac Output Units	250 VAC, 1.2 A, 8 outputs	C200H-OA223	Yes	Yes	Yes	Yes	16	CE
	250 VAC, 0.3 A, 12 outputs	C200H-OA222V	Yes	Yes	Yes	Yes	16	
	250 VAC, 0.5 A, 12 outputs	C200H-OA224	Yes	Yes	Yes	Yes	16	U, C, N, L
Analog Timer Unit	4-point timer	C200H-TM001	Yes	Yes	Yes	Yes	16	U, C
	External Variable Resistor Connector:	C4K-CN223	---					---

Note The C200H-ID001 (no-voltage contacts, 8 inputs, NPN) and C200H-ID002 (no-voltage contacts, 8 inputs, PNP) cannot be used.

■ C200H Group-2 High-density I/O Units

Name	Specifications	Model	Mountable Racks				Bits allocated (CIO 0000 to CIO 0319)	Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYS-MAC BUS Slave Racks		
DC Input Units	24 VDC, 32 inputs	C200H-ID216	Yes	Yes	Yes	No	32	U, C, N, L, CE
	24 VDC, 64 inputs	C200H-ID217	Yes	Yes	Yes	No	64	
	24 VDC, 32 inputs	C200H-ID218	Yes	Yes	Yes	No	32	U, C, CE
	24 VDC, 64 inputs	C200H-ID219	Yes	Yes	Yes	No	64	
	12 VDC, 64 inputs	C200H-ID111	Yes	Yes	Yes	No	64	U, C

Ordering Guide

Name	Specifications	Model	Mountable Racks				Bits allocated (CIO 0000 to CIO 0319)	Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYS-MAC BUS Slave Racks		
Transistor Output Units	16 mA/4.5 V to 100 mA/26.4 V, 32 sinking outputs	C200H-OD218	Yes	Yes	Yes	No	32	U, C, N, L, CE
	16 mA/4.5 V to 100 mA/26.4 V, 64 sinking outputs	C200H-OD219	Yes	Yes	Yes	No	64	
B7A Input Units	32 inputs	C200H-B7A12	Yes	Yes	Yes	No	32	U, C
B7A Output Units	32 outputs	C200H-B7A02	Yes	Yes	Yes	No	32	
B7A I/O Units	16 inputs, 16 outputs	C200H-B7A21	Yes	Yes	Yes	No	16	
	32 inputs, 32 outputs	C200H-B7A22	Yes	Yes	Yes	No	32	

Connectors for C200H Group-2 High-density I/O Units

Part	Connection		Model	Fujitsu parts	Standards
Applicable connector	Solder-type (included with Unit)		C500-CE404	Socket: FCN-361J040-AU Connector bar: FCN-360C040-J2	---
	Crimp-type		C500-CE405	Socket: FCN-363J040 Connector bar: FCN-360C040-J2 Contacts: FCN-363J-AU	
			C500-CE403	FCN-367J040-AU	
Terminal block connection parts	1:1 connections	Special Cable	XW2Z-☐☐☐D	For C200H-ID216/ID217	
		Terminal Block Unit	XW2C-20G5-IN16		
	1:2 connections	Special Cable	XW2Z-☐☐☐B	For C200H-ID216/ID217/ID218/OD219	
		Terminal Block Unit	XW2B-40G☐		

■ CS1 High-density Input Units

Name	Specifications	Model	Mountable Racks				Bits allocated (CIO 0000 to CIO 0319)	Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYS-MAC BUS Slave Racks		
DC Input Units	24 VDC, 96 inputs	CS1W-ID291	Yes	No	Yes	No	96	U, C, N, CE
Transistor Output Units	12 to 24 VDC, 0.1 A, 96 sinking outputs	CS1W-OD291	Yes	No	Yes	No	96	
	12 to 24 VDC, 0.1 A, 96 sourcing outputs	CS1W-OD292	Yes	No	Yes	No	96	
DC Input/ Transistor Output Units	24 VDC, 0.1 A, 48 inputs, 48 outputs, sinking inputs/outputs	CS1W-MD291	Yes	No	Yes	No	48-point I/O	
	24 VDC, 0.1 A, 48 inputs, 48 outputs, sourcing inputs/outputs	CS1W-MD292	Yes	No	Yes	No	48-point I/O	

Connectors for CS1 High-density I/O Units

Part	Connection		Model	Fujitsu parts	Standards
Applicable connectors	Solder-type (included with Unit)		CS1W-CE561	Socket: FCN-361J056-AU Connector bar: FCN-360C056-J2	---
	Crimp-type		CS1W-CE562	Socket: FCN-363J056 Connector bar: FCN-360C056-J2 Contacts: FCN-363J-AU	
			CS1W-CE563	FCN-367J056-AU	
Terminal block connection parts	1:1 connections	Special Cable	XW2Z-□□□	For CS1W-ID291/OD291/OD291/MD291/MD292	
		Terminal Block Unit	XW2B-56G□		
	1:2 connections	Special Cable	XW2Z-□□□		
		Terminal Block Unit	XW2B-40G□		
	1:13connections	Special Cable	XW2Z-□□□		
		Terminal Block Unit	XW2C-20G□		

■ C200H High-density I/O Units Classified as Special I/O Units

Name	Specifications	Model	CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks	Standards
DC Input Units	24 VDC, 32 inputs	C200H-ID215	Yes	Yes	Yes	Yes	U, C, N, L, CE
TTL Input Units	5 VDC, 32 inputs	C200H-ID501	Yes	Yes	Yes	Yes	
Transistor Output Units	24 VDC, 32 sinking outputs	C200H-OD215	Yes	Yes	Yes	Yes	
TTL Output Units	5 VDC, 32 sinking outputs	C200H-OD501	Yes	Yes	Yes	Yes	
TTL I/O Units	5 VDC, 16 inputs, 16 sinking outputs	C200H-MD501	Yes	Yes	Yes	Yes	
DC Input/Transistor Output Units	24 VDC, 16 inputs, 16 sinking outputs	C200H-MD215	Yes	Yes	Yes	Yes	
	12 VDC, 16 inputs, 16 sinking outputs	C200H-MD115	Yes	Yes	Yes	Yes	U, C

Connectors for C200H High-density I/O Units
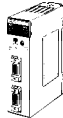
Part	Connection	Model	Fujitsu parts	Standards
Applicable connectors	Solder-type (included with Unit)	C500-CE241	Socket: FCN-361J024-AU Connector bar: FCN-360C024-J2	---
	Crimp-type	C500-CE242	Socket: FCN-363J024 Connector bar: FCN-360C024-J2 Contacts: FCN-363J-AU	
Terminal block connection parts	Special Cable	XW2Z-□□□A	For C200H1D215/ID501/OD215/MD115/MD215	
	Terminal Block Connector	XW2B-20G□		
		XW2B-20G5-D		
		XW2B-40G5-T		
	Special Cable	XW2Z-□□□A	For C200H1D215/ID501/MD115/MD215/MD501	
	Terminal Block Connector	XW2C-20G6-IN16		

Ordering Guide

■ C200H Special I/O Units

Name	Specifications	Model	Mountable Racks				Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks	
Temperature Control Units	Thermocouple input, time-proportioning PID, or ON/OFF transistor output	C200H-TC001	Yes	Yes	Yes	Yes	U, C
	Thermocouple input, time-proportioning PID, or ON/OFF voltage output	C200H-TC002	Yes	Yes	Yes	Yes	---
	Thermocouple input, PID current output	C200H-TC003	Yes	Yes	Yes	Yes	
	Temperature-resistance thermometer input, time-proportioning PID, or ON/OFF transistor output	C200H-TC101	Yes	Yes	Yes	Yes	
	Temperature-resistance thermometer input, time-proportioning PID, or ON/OFF voltage output	C200H-TC102	Yes	Yes	Yes	Yes	
	Temperature-resistance thermometer input, PID current output	C200H-TC103	Yes	Yes	Yes	Yes	
Data Setting Console	Used with Temperature Control Units. Monitoring, setting, and changing present values, set points, alarm values, PID parameters, bank numbers, etc.	C200H-DSC01	---				
	Connecting Cable, 2 m	C200H-CN225	---				
	Connecting Cable, 4 m	C200H-CN425	---				
Heat/Cool Temperature Control Units	Thermocouple input, time-proportioning PID, or ON/OFF transistor output	C200H-TV001	Yes	Yes	Yes	Yes	
	Thermocouple input, time-proportioning PID, or ON/OFF voltage output	C200H-TV002	Yes	Yes	Yes	Yes	
	Thermocouple input, PID current output	C200H-TV003	Yes	Yes	Yes	Yes	
	Temperature-resistance thermometer input, time-proportioning PID, or ON/OFF transistor output	C200H-TV101	Yes	Yes	Yes	Yes	
	Temperature-resistance thermometer input, time-proportioning PID, or ON/OFF voltage output	C200H-TV102	Yes	Yes	Yes	Yes	
	Temperature-resistance thermometer input, PID current output	C200H-TV103	Yes	Yes	Yes	Yes	
Temperature Sensor Units	Thermocouple input, K(CA) or J(IC), selectable	C200H-TS001	Yes	Yes	Yes	Yes	U, C
		C200H-TS002	Yes	Yes	Yes	Yes	
	Temperature-resistance thermometer, Pt 100 Ω, conforms to JIS standards	C200H-TS101	Yes	Yes	Yes	Yes	
	Temperature-resistance thermometer, Pt 100 Ω	C200H-TS102	Yes	Yes	Yes	Yes	
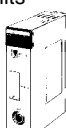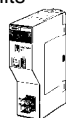
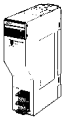| Name	Specifications	Model	Mountable Racks				Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks	
PID Control Units	Voltage output/current input, time-proportioning PID, or ON/OFF transistor output	C200H-PID01	Yes	Yes	Yes	Yes	---
	Voltage output/current input, time-proportioning PID, or ON/OFF voltage output	C200H-PID02	Yes	Yes	Yes	Yes	
	Voltage output/current input, PID current output	C200H-PID03	Yes	Yes	Yes	Yes	
Data Setting Console	Used with PID Control Units. Monitoring, setting, and changing present values, set points, alarm values, PID parameters, bank numbers, etc.	C200H-DSC01	---				
	Connecting Cable, 2 m	C200H-CN225	---				
	Connecting Cable, 4 m	C200H-CN425	---				
Cam Positioner Unit	48 cam outputs (16 external outputs and 32 internal outputs), Resolver speed: 20 μs (5 kHz)	C200H-CP114	Yes	Yes	Yes	Yes	U, C
Data Setting Console	Used with Cam Positioner Unit. Monitoring, setting, and changing present values, set points, alarm values, PID parameters, bank numbers, etc.	C200H-DSC01	---				---
	Connecting Cable, 2 m	C200H-CN225	---				
	Connecting Cable, 4 m	C200H-CN425	---				
ASCII Units	24-Kbyte RAM,k 2 RS-232C ports	C200H-ASC02	Yes	Yes	Yes	Yes	N, CE
	200-Kbyte RAM, 2 RS-232C ports	C200H-ASC11	Yes	Yes	Yes	Yes	U, C, CE
	200-Kbyte RAM, RS-232C port, RS-422/485 port	C200H-ASC21	Yes	Yes	Yes	Yes	
	200-Kbyte RAM, 3 RS-232C ports (1 terminal only)	C200H-ASC31	Yes	Yes	Yes	Yes	
Analog Input Units	4 to 20 mA, 1 to 5/0 to 10 V (selectable), 4 inputs, 1/4,000 resolution	C200H-AD001	Yes	Yes	Yes	Yes	U, C, N, L
	4 to 20 mA, 1 to 5/0 to 10 V/–10 to +10 V (selectable); 8 inputs; 1/4,000 resolution	C200H-AD002	Yes	Yes	Yes	Yes	U, C, N, L, CE
	4 to 20 mA, 1 to 5/0 to 10 V/–10 to +10 V (selectable); 8 inputs; 1/4,000 resolution	C200H-AD003	Yes	Yes	Yes	Yes	
Analog Output Units	4 to 20 mA, 1 to 5/0 to 10 V (selectable); 2 outputs; 1/4,000 resolution	C200H-DA001	Yes	Yes	Yes	Yes	U, C, N, L
	4 to 20 mA, –10 to +10 V (selectable), 4 outputs; 1/4,000 resolution	C200H-DA002	Yes	Yes	Yes	Yes	U, C, N, L, CE
	1 to 5 V, –10 to +10 V (selectable), 8 outputs; 1/4,000 resolution	C200H-DA003	Yes	Yes	Yes	Yes	
	4 to 20 mA, 8 outputs; 1/4,000 resolution	C200H-DA004	Yes	Yes	Yes	Yes	
Analog I/O Units	2 inputs (4 to 20 mA,1 to 5 V, etc.) 2 outputs (4 to 20 mA, 1 to 5 V, etc.)	C200H-MAD01	Yes	Yes	Yes	Yes	

Ordering Guide

Name	Specifications		Model	Mountable Racks				Standards
				CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks	
High-speed Counter Units	One-axis pulse input, counting rate: 50 kcps max.		C200H-CT001-V1	Yes	Yes	Yes	Yes	U, C, CE
	One-axis pulse input, counting rate: 75 kcps max., line driver compatible		C200H-CT002	Yes	Yes	Yes	Yes	
	Two-axis pulse input, counting rate: 75 kcps max., line driver compatible		C200H-CT021	Yes	Yes	Yes	Yes	
	Solder terminal; 40p and a Connector Cover		C500-CE401	---				---
	Solderless terminal; 40p and a Connector Cover (Crimp-type)		C500-CE402	---				
	Pressure welded terminal; 40p		C500-CE403	---				
	Solder terminal; 40p and a Connector Cover (Horizontal-type)		C500-CE404	---				
	Crimp-style terminal; 40p and a Connector Cover (Horizontal-type)		C500-CE405	---				
Motion Control Units	G-language programmable, two-axis analog outputs		C200H-MC221	Yes	Yes	Yes	Yes	U, C, CE
	MC Support Software IBM PC/AT or compatible		CV500-ZN3AT1-E	---				---
	Connecting Cable: 3.3 m		CQM1-CIF01	---				
	Teaching Box		CVM1-PRO01	---				U, C, CE
	Connection cable for Teaching Box: 2 m long		CV500-CN224	---				---
	Memory Pack (with key sheet)		CVM1-MP702	---				
	Terminal Block Conversion Unit Simplifies wiring.		XW2B-20J6-6	---				
	Connecting cable for Terminal Block Conversion Unit		XW2Z-100J-F1	---				

Name	Specifications	Model	Mountable Racks				Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks	
Position Control Units	Two-axis pulse output, speeds: 1 to 250,000 pps, directly connects to servomotor driver, line driver compatible	C200H-NC211	Yes	Yes	Yes	Yes	U, C
	One-axis pulse output, speed: 1 to 99990 pps	C200H-NC111	Yes	Yes	Yes	Yes	---
	One-axis pulse output, speeds 1 to 250,000 pps, directly connects to servomotor driver, line driver compatible (Z level)	C200H-NC112	Yes	Yes	Yes	Yes	CE
	One-axis pulse output, speeds 1 to 500,000 pps, directly connects to servomotor driver, line driver compatible (Z level)	C200H-NC113	Yes	Yes	Yes	Yes	U, C, CE
	Two-axis pulse output, speeds 1 to 500,000 pps, directly connects to servomotor driver, line driver compatible (Z level)	C200H-NC213	Yes	Yes	Yes	Yes	CE
	Four-axis pulse output, speeds 1 to 500,000 pps, directly connects to servomotor driver, line driver compatible (Z level)	C200H-NC413	Yes	Yes	Yes	Yes	
	1-axis cable for C200H-NC113/NC112	XW2Z-☐☐☐J-A1	---				---
	1-axis Servo Relay Unit for C200H-NC113/NC112	XW2B-20J6-1B	---				
	2-axis cable for C200H-NC213/NC211	XW2Z-☐☐☐J-A2	---				
	2-axis Servo Relay Unit for C200H-NC213/NC211	XW2B-40J6-2B	---				
ID Sensor Units	Electromagnetic coupling	C200H-IDS01-V1	Yes	Yes	Yes	Yes	U, C
	Microwave type	C200H-IDS21	Yes	Yes	Yes	Yes	---
CompoBus/D Master Unit	CompoBus/D Remote I/O Master, 300 bits max.	C200HW-DRM21-V1	Yes	Yes	Yes	No	U, C, N, L, CE
CompoBus/D I/O Link Unit	CompoBus/D Remote I/O Slave, 64 bits max.	C200HW-DRT21	Yes	Yes	Yes	No	U, C, N, CE
CompoBus/S Master Units	CompoBus/S Remote I/O, 256 bits max.	C200HW-SRM21	Yes	Yes	Yes	No	U, C, N, L, CE

Ordering Guide

Name	Specifications	Model	Mountable Racks				Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks	
PC Link Unit	PC Link, single level: 32 units, multi-level: 16 Units	C200H-LK401	Yes	Yes	Yes	No	N, L, CE
SYSMAC BUS Remote I/O Master Units	Wired	C200H-RM201	Yes	Yes	Yes	No	N, L, CE
	Optical	C200H-RM001-PV1	Yes	Yes	Yes	No	N, L

Note
1. The CompoBus/D Slaves are allocated up to 2,048 I/O bits (100 words) in the CompoBus/D Area.
2. PC Link Units are allocated up to 1,024 bits (64 words) in the Link Area.
3. Each Slave Rack connected to a Remote I/O Master Unit is allocated 10 words in the SYSMAC BUS Area. Each I/O Terminal is allocated 1 word in the I/O Terminal Area.

■ CS1 Special I/O Units

Name	Specifications	Model	Mountable Racks				Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks	
Analog I/O Unit	4 inputs (4 to 20 mA, 1 to 5 V, etc.) 4 outputs (1 to 5 V, 1 to 10 V, etc.)	CS1W-MAD44	Yes	No	Yes	No	U, C, N, CE

■ CS1 CPU Bus Units

Name	Specifications	Model	Mountable Racks				Words allocated (CIO 1500 to CIO 1899)	Standards
			CPU Rack	C200H Expansion I/O Racks	CS1 Expansion Racks	SYSMAC BUS Slave Racks		
Controller Link Units	Wired	CS1W-CLK21	Yes	No	No	No	25 words	U, C, N, CE
	Optical	CS1W-CLK11	Yes	No	No	No	25 words	
Communications Unit	Two RS-232C Ports	CS1W-SCU21	Yes	No	Yes	No	25 words	
Ethernet Unit	FINS communications, socket service, FTP server, and mail notification	CS1W-ETN01	Yes	No	Yes	No	25 words	

■ CompoBus/D Slaves

Group	Unit/Terminal	I/O points	Model	Standards
Basic Terminals and Units	Remote Transistor Input Terminals	8 inputs	DRT1-ID08	U, C
		16 inputs	DRT1-ID16	
	Remote Transistor Output Terminals	8 outputs	DRT1-OD08	
		16 outputs	DRT1-OD16	
	Environmentally Resistant Transistor I/O Terminals	8 inputs	DRT1-ID08C	CE
		8 outputs	DRT1-OD08C	
		8 inputs and 8 outputs	DRT1-MD16C	
	Remote Adapters	16 inputs	DRT1-ID16X	U, C
		16 outputs	DRT1-OD16X	
	Sensor Terminals	16 inputs	DRT1-HD16S	---
		8inputs and 8 outputs	DRT1-ND16S	
	Temperature Input Terminals	4 inputs (4 words)	DRT1-TS04T	
			DRT1-TS04P	
	CQM1 I/O Link Unit	16 inputs and 16 outputs	CQM1-DRT21	U, C, CE
Analog Terminals	Analog Input Terminals	2 or 4 inputs (2 or 4 words) (voltage or current)	DRT1-AD04	CE
		4 inputs (4 words) (voltage or current)	DRT1-AD04H	---
	Analog Output Terminals	2 outputs (2 words)	DRT1-DA02	CE
Special Units and Terminals	C200H I/O Link Unit	512 inputs (32 words) max. 512 outputs (32 words) max.	C200HW-DRT21	U, C, N, CE
	RS-232C Unit	16 inputs (1 word)	DRT1-232C2	U, C, CE
	B7AC Interface Terminal	30 points (10 words/B7AC)	DRT1-B7AC	CE
Optional Parts	T-branch Taps	1-branch Tap	DCN1-1	---
		1-branch Tap with Connectors	DCN1-1C	
		3-branch Tap	DCN1-3	
		3-branch Tap with Connectors	DCN1-3C	
	Special Cables	Thin	DCA1-5C10	
		Thick	DCA2-5C10	
	Terminal Block with Terminating Resistance	---	DRS1-T	

Ordering Guide

■ MULTIPLE I/O TERMINAL Units

Communications Unit

Number of Slaves	Number of Slave I/O points	Rated voltage	Model	Standards
8	1,024 max., input and output combined	24 VDC	DRT1-COM	U, C, CE

Digital I/O Units

Name	Classification	Internal I/O circuit common	I/O points	I/O Connections	I/O specifications	Model	Standards
Terminal Block-type Digital I/O Units	Digital input	NPN (+ common)	16	M3 terminal block	DC/Tr	GT1-ID16	U, C, CE
		PNP (– common)				GT1-ID16-1	
	Digital output	NPN (– common)			0.5 A DC/Tr	GT1-OD16	
		PNP (+ common)				GT1-OD16-1	
Connector-type Digital I/O Units	Digital input	NPN (+ common)		Molex connectors	DC/Tr	GT1-ID16MX	
		PNP (– common)				GT1-ID16MX-1	
	Digital output	NPN (– common)			0.5 A DC/Tr	GT1-OD16MX	
		PNP (+ common)				GT1-OD16MX-1	
	Digital input	NPN (+ common)		Fujitsu connectors	DC/Tr	GT1-ID16ML	CE
		PNP (– common)				GT1-ID16ML-1	
	Digital output	NPN (– common)			0.5 A DC/Tr	GT1-OD16ML	
		PNP (+ common)				GT1-OD16ML-1	
	Digital input	NPN (+ common)		25-pint D-sub connectors	DC/Tr	GT1-ID16DS	
		PNP (– common)				GT1-ID16DS-1	
	Digital output	NPN (– common)			0.5 A DC/Tr	GT1-OD16DS	
		PNP (+ common)				GT1-OD16DS-1	
Multi-point Connector-type Digital I/O Units	Digital input	NPN (+ common)	32	Fujitsu connectors	DC/Tr	GT1-ID32ML	U, C, CE
		PNP (– common)				GT1-ID32ML-1	
	Digital output	NPN (– common)			0.5 A DC/Tr	GT1-OD32ML	
		PNP (+ common)				GT1-OD32ML-1	

Relay Output Units

Classification	I/O points	I/O connection method	I/O specifications	Model	Standards
Relay output	16 points	M3 terminal block	2 A, AC, DC, SPST-NO	GT1-ROS16	CE
	8 points		5 A, AC, DC, SPST-NO	GT1-ROP08	U, L, CE
Analog input	8 inputs	Connectors	4 to 20 mA, 0 to 20 mA, 0 to 5 V, 1 to 5 V, 0 to 10 V, –10 to 10 V	GT1-AD08MX	
	4 inputs	Terminal block		GT1-AD04	

Analog I/O Units

Classification	I/O	I/O connections	I/O specifications	Model	Standards
Analog input	8 inputs	Connectors	4 to 20 mA, 0 to 20 mA, 0 to 5 V, 1 to 5 V, 0 to 10 V, –10 to 10 V	GT1-AD08MX	U, C, CE
	4 inputs	Terminal block		GT1-AD04	
Analog output	4 outputs	Connector	0 to 5 V, 1 to 5 V, 0 to 10 V, –10 to 10 V	GT1-DA04MX	
		Terminal block	0 to 5 V, 1 to 5 V, 0 to 10 V, –10 to 10 V, 4 to 20 mA	GT1-DA04	

Counter Unit

Classification	External I/O	I/O connection method	Operating mode	Model	Standards
Counter unit	1 input, 2 outputs	Terminal block (M3 terminals)	Linear counter	GT1-CT01	CE

■ CompoBus/S Slave Units

Slave	I/O Points	Model	Standards
Remote I/O Transistor Terminals	4 inputs	SRT1-ID04	U, C, CE
	4 inputs (PNP)	SRT1-ID04-1	
	8 inputs	SRT1-ID08	
	8 inputs (PNP)	SRT1-ID08-1	
	16 inputs	SRT1-ID16	
	16 inputs (PNP)	SRT1-ID16-1	
	4 outputs	SRT1-OD04	
	4 outputs (PNP)	SRT1-OD04-1	
	8 outputs	SRT1-OD08	
	8 outputs (PNP)	SRT1-OD08-1	
	16 outputs	SRT1-OD16	
	16 outputs (PNP)	SRT1-OD16-1	
Remote I/O Transistor Terminals with 3 Rows of Terminal Blocks	16 inputs (NPN, + common)	SRT1-ID16T	CE
	16 inputs (PNP, – common)	SRT1-ID16T-1	
	16 inputs/outputs (NPN, – common)	SRT1-MD16T	
	16 inputs/outputs (PNP, + common)	SRT1-MD16T-1	
	16 outputs (NPN, – common)	SRT1-OD16T	
	16 outputs(PNP, + common)	SRT1-OD16T-1	
Remote I/O Transistor Terminal with Connector	8 outputs	SRT1-OD08-S	---
Remote I/O Relay Terminals	8 outputs	SRT1-ROC08	U, C, CE
	16 outputs	SRT1-ROC16	
Remote I/O Power MOS FET Terminals	8 outputs	SRT1-ROF08	
	16 outputs	SRT1-ROF16	
Remote I/O Modules	16 inputs	SRT1-ID16P	---
	16 outputs	SRT1-OD16P	
Sensor Amp Terminals	4 inputs (1 word x 4 terminals)	SRT1-TID04S	
	4 inputs (4 words x 1 terminal)	SRT1-TKD04S	
Expansion Sensor Amp Terminals	4 inputs (1 word x 4 terminals)	SRT1-XID04S	
	4 inputs (4 words x 1 terminal)	SRT1-X,D04S	
Sensor Terminals	8 inputs	SRT1-SRT1-ID08S	
	8 outputs	SRT1-OD08S	
	4 inputs and 4 outputs	SRT1-ND08S	
Bit Chain Terminal	8 inputs or 8 outputs	SRT1-BIT	
Position Drivers	---	FND-X06H-SRT FND-X12H-SRT FND-X25H-SRT FND-X06L-SRT FND-X12L-SRT	---

Ordering Guide

■ Optional Products

Name	Specifications		Model	Standards
I/O Unit Cover	Cover for 10-pin terminal block		C200H-COV11	---
Terminal Block Covers	Short protection for 10-pin terminal block (package of 10 covers); 8 pts		C200H-COV02	
	Short protection for 19-pin terminal block (package of 10 covers); 12 pts		C200H-COV03	
C200H Unit Connector Cover	Protective cover for unused I/O Connecting Cable connectors		C500-COV02	
CS1 Special I/O Unit Connector Cover	Protective cover for unused I/O Connecting Cable connectors		CV500-COV01	
C200H Expansion I/O Backplane Insulation Plates	Electrically insulate C200H Expansion I/O Backplanes from the control panel to increase noise resistance.	For 3-slot Backplane	C200HW-ATT32	N, L, CE
		For 5-slot Backplane	C200HW-ATT52	
		For 8-slot Backplane	C200HW-ATT82	
		For 10-slot Backplane	C200HW-ATTA2	
Relay	24 VDC, For C200H-OC221/OC222/OC223/OC224/OC225		G6B-1174P-FD-US	---
Programming Console Mounting Bracket	Used to attach C200H-PRO27-E Hand-held Programming Console to a panel.		C200H-ATT01	

Mounting Rails and Accessories

Name	Specifications	Model number	Standards
DIN Track Mounting Bracket	1 set (2 included)	C200H-DIN01	---
DIN Tracks	Length: 50 cm; height: 7.3 cm	PFP-50N	
	Length: 1 m; height: 7.3 cm	PFP-100N	
	Length: 50 cm; height: 16 mm	PFP-100N2	
End Plate	---	PFP-M	
Spacer	---	PFP-S	