Machine performance improved with high-spe ed, high-precision, flexible motion control.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

7

Position Control Units

Two Types of Outputs and Control of 1, 2, or 4 Axes

Select from 1-axis, 2-axis, and 4-axis models with either open-collector output or line-driver output to suit a number of different applications.

A Variety of Positioning Functions

There are 2 operating modes: direct operation (position, speed, acceleration, and deceleration data specified from the ladder program), which is effective for setting target positions, speeds, and acceleration rates immediately or during operation, and memory operation, where fixed patterns are stored beforehand in the Unit and used for operation. There are also a variety of positioning functions, such as interrupt feeding, which is effective for feeder control, and forced interrupt, which is useful in emergencies.

Advanced Motion Control Units

Easy System Construction

Up to 30 physical axes and two virtual axes, making a total of 32, can be controlled, and the servo interface is handled by high-speed servo communications (MECHATROLINK-II, a registered trademark of Yaskawa Electric Corporation). This makes it possible to control multiple axes with less wiring.

Easy Data Control

High-speed servo communications lets you read programs and parameter settings from CX-Programmer on a PC. You can also read and track the operating status of parameter settings inside the Servo Driver.

Easy Motion Control

Motion control, including positioning, synchronizing (electronic gears, electronic cams, tracking), speed, and torque control, can all be handled by the CS1.
Eight motion tasks can be used for simultaneous motion program execution.

Motion Control Units

Easy Programming with G Language and Multitasking

The Motion Control Units use G language to ensure easy programming. The Units have a large programming capacity of up to 100 programs and 2,000 program blocks, and allow independent operation of 4 tasks.

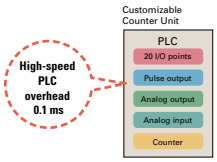
High-speed Interlocks

Interrupt programs can be executed from the motion control program using D codes (interrupt codes). Easy, fast interlocks ensure greater production efficiency.
Synchronous control (electronic gears, electronic cams) is also possible.

Customizable Counter Units

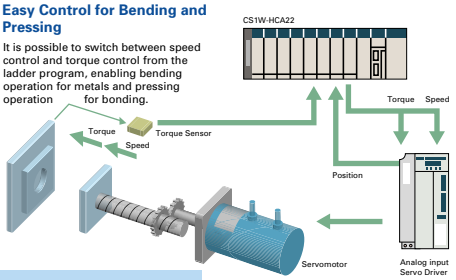
A Whole New Concept

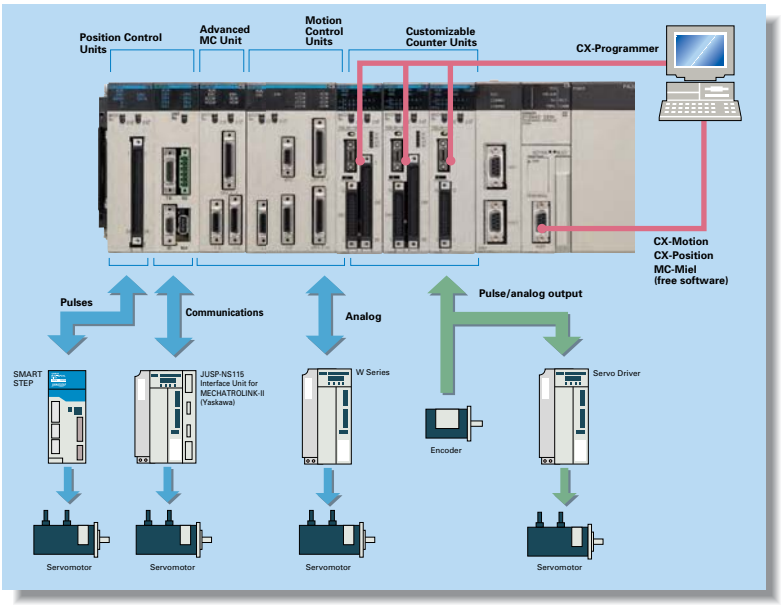
A high-speed PLC with 20 I/O points, a 2-axis high-speed counter, and 2 pulse or analog outputs have all been combined into 1 Unit. The Customizable Counter Units allow easy execution of complicated applications.



Easy Control for Bending and Pressing

It is possible to switch between speed control and torque control from the ladder program, enabling bending operation for metals and pressing operation for bonding.





Synchronous Control with Electronic Cam

Counter input and pulse output that previously could only be connected via a CPU Unit can now both be handled by the same Unit. The built-in high-speed PLC enables synchronous control of, for example, electronic cams. The cam curve that determines the relationship between counter input and pulse output can be defined freely using the line-segment approximation function from the ladder program.

Design Costs Reduced by Modularization

Ladder programs and I/O instructions to be re-used or shared by designers can be transferred from the main CPU Unit to the Units, allowing "modularization" that helps to reduce design costs. Up to 96 Units can be used, enabling easy system expansion in the future.

Motion Applications with High-speed Response

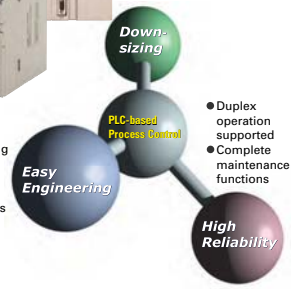
A wide range of interrupt functions and superior response performance enable motion applications requiring high-speed response using pulse I/O.

Smart Process Control
OMRON PLC-based Process Control brings Major Innovations to Process Automation

The evolution of the SYSMAC CS1 accelerates DCS downsizing.

7

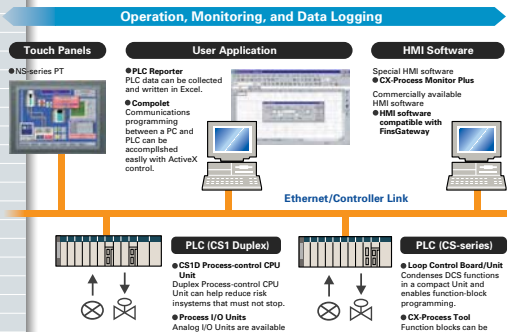
- DCS functionality in a PLC
- Analog Units with signal conversion functions
- A scaleable system configuration



- Function block programming
- Sequence programming using either step ladders or sequence tables
- A direct link to HMI products

- Duplex operation supported
- Complete maintenance functions

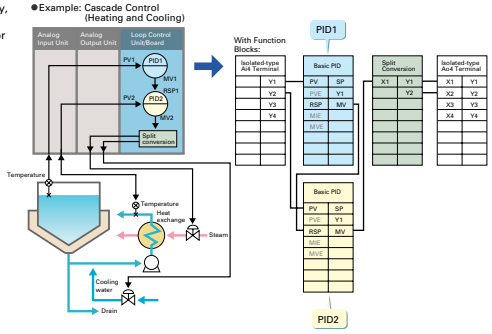
Provides an exceptionally open environment with PLC-based process control to advance standardization and IT integration of the process control system.



Diversified Loop Control is even easier to use.
Programming becomes even easier with function-block programming.

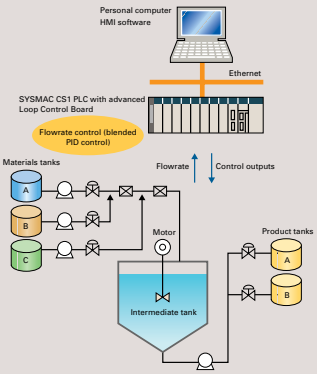
Packed with complete DCS functionality, the LCBs/LCUs are programmed with function blocks designed specifically for process control. Similar to preparing a flow sheet, function blocks are pasted and connections made using a graphic interface. A wide array of control methods, from basic PID control to cascade and feed-forward control, are possible.

- Example: Cascade Control (Heating and Cooling)

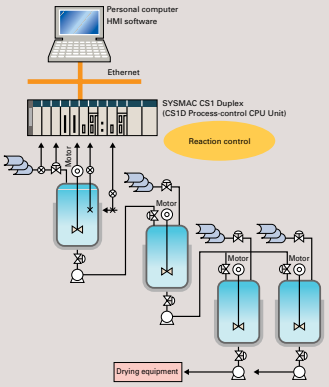


PLC-based Process Control Application Examples

In-line Blending in a Food Plant



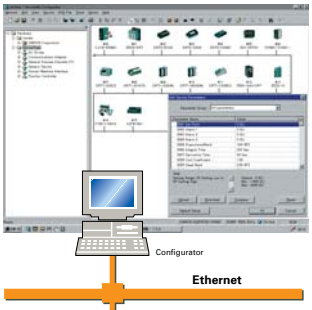
Batch Control in a Chemical Plant



DeviceNet Creates Many Advantages for D evelopment and Design, for Production and Startup, and for Operat ion and Maintenance.

The SYSMAC CS1 with DeviceNet capabilities get you even closer to the production site.

7



Advantages in Development and Design

Hardware Advantages

- Many compatible components for more options and easier system construction.
- No restrictions on Master, enabling equipment modularization at the Slaves.

Software Advantages

- Simple software standardization with profile specified for each component.
- Open network construction eliminates the need to consider communications protocols, allowing program development using ladder diagrams only.

Advantages in Production and Startup

Hardware Advantages

- Assembly time shortened by standardization and modularization.
- Number of work hours reduced by less wiring.
- Simple wiring checking process to help prevent wiring mistakes.
- Simple implementation of distributed equipment manufacturing.
- Distributed I/O for more compact control panels and equipment.

Startup Advantages

- Simple re-assembly at delivery site.
- Simple settings and communications work, shortening startup time.
- Establishing communications with components with plug-and-play simplicity.
- Simple identification of faults with complete monitoring tools.

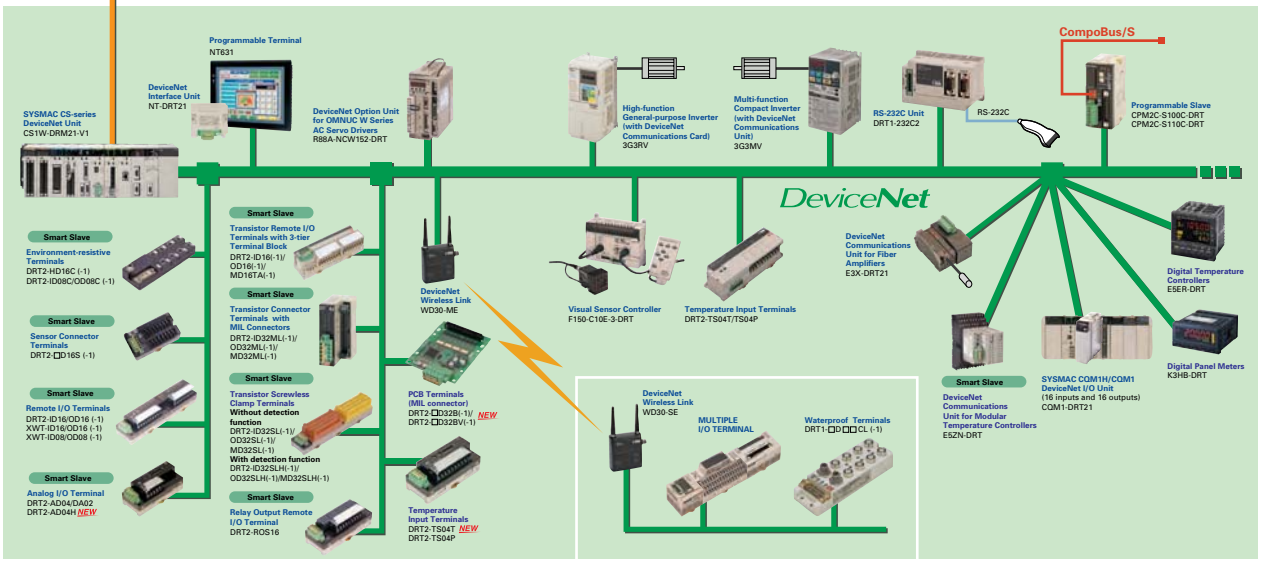
Advantages in Operation and Maintenance

Operation Advantages

- Recipe control quickly improves yields.
- Preventative maintenance to avoid system shutdowns and increase operating rates.
- Simple layout changes.
- Lines can be constructed for modular replacement.

Maintenance Advantages

- Easy identification of fault locations reduces time to restore operation.
- A wide variety of data can be collected from components, aiding preventative maintenance.
- Simple plug-and-play replacement using connectors.
- Online replacement for maintenance without stopping the system.



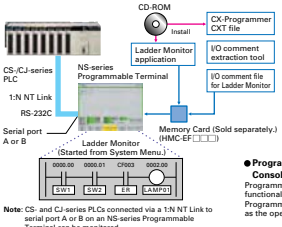
Greater Compatibility with PLCs
Multilingual Globalization for Greater Mach ine Flexibility

Faster Networking on the Factory Floor with the SYSMAC CS1 and NS-series Programmable Terminals

7

Ladder Monitor Function

Save the NS-EXT01 Ladder Monitor system program on a Memory Card (the NS-EXT01 is sold separately) and install the Memory Card to enable monitoring of a ladder program (I/O bit status monitor, address/instruction search, multiple I/O bit monitor, etc.) being executed in a CS/CJ-series PLC connected by a serial connection. It is also possible to display I/O comments created with the CX-Programmer.



Note: CS- and CJ-series PLCs connected via a 1:N NT Link to serial port A or B on an NS-series Programmable Terminal can be monitored.

Programming Console Function

(Using NS-EXT01-V2□□□ Ladder Monitor)

If a Programming Console is selected as the operating mode, a Programming Console is displayed on the Ladder Monitor screen. Operating methods are exactly the same as for a CS-/CJ-series Programming Console. Timer set values can be changed, bit addresses can be added or changed, and many other operations can be performed on-site, all from the screen of the NS-series PT.

The functionality of the Ladder Monitor and Programming Console can be used for primary on-site response without a personal computer.

● **Programming Console Function**
Programming Console functionality is displayed when Programming Console is selected as the operating mode.

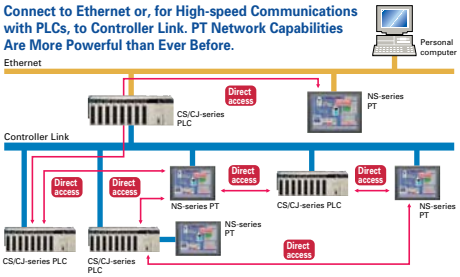
Switch Box Function

The Switch Box Function has been added to the NS-series Programmable Terminals. The Switch Box Function can be used to monitor the status of each bit in a word or a combination of user-selected bits organized like a ladder program section. The Switch Box Function makes it possible to perform basic troubleshooting on the factory floor even without a computer.

The Switch Box provides the following functions:

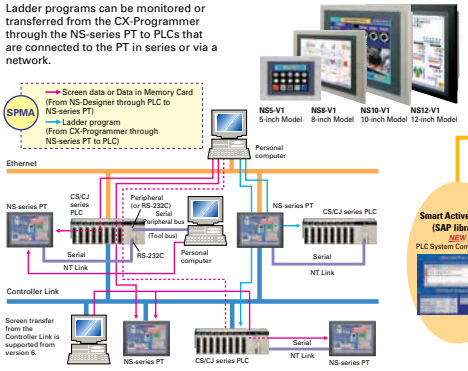
- Switching between Monitoring Contiguous or Noncontiguous Bits and Contiguous Words
  The I/O memory monitor function monitor words or combinations of specified bits. Bit/word comments are imported from the CX-Programmer.
- Register the Words or Bit Combinations To Be Monitored by Group
  Comments can be input for individual groups, e.g., so that the operating conditions of words or bits can be described in text.
- Same User Interface as the Switch Box Utility for Personal Computers
  The same displays can be monitors in the office on a personal computer and onsite at the NS-series PT, making discussions clearer.

Connect to Ethernet or, for High-speed Communications with PLCs, to Controller Link. PT Network Capabilities Are More Powerful than Ever Before.

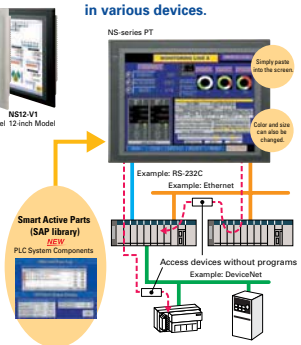


You may want to transfer screens to a PT through the PLC without changing computer connections or transfer a ladder program to the PLC through the PT by using the Ethernet or Controller Link.

Ladder programs can be monitored or transferred from the CX-Programmer through the NS-series PT to PLCs that are connected to the PT in series or via a network.



NS-series PTs provide Smart Active Parts (SAP library) enabling direct access to data in various devices.



Multilingual Version to Develop for Various Demands

- Create Chinese or Korean screens on your Windows system.
- Support multiple languages with the same screen data.
- Create the source language labels and let suppliers handle the other languages.

NS Series: Easily Create Multilingual Screens on Your Windows System

Multi-language Input with Japanese Windows

When Windows 2000 or XP is being used, Simplified Chinese, Traditional Chinese, Korean, and other language text can be input in NS-Designer. Select the desired language with Global IME to input a different language. You can also use this program together with RAKURAKU CHUUGOKUGO and RAKURAKU KANKOKUGO (Chinese and Korean input systems) to convert Japanese to Chinese and Korean.

For more information on this software, refer to the following site or send email to the following address.
URL: http://www.omronsoft.co.jp/SP/
E-mail: rakuraku@omuronsoft.co.jp

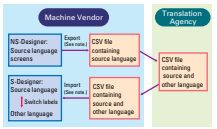
Label Switching to Select from Multiple Languages

Up to 16 groups of labels (labels 0 to 15) can be registered for functional objects such as buttons, lamps, labels, and alarm settings. (Each label can correspond to a different language, for example, label 0 = Japanese, label 1 = Simplified Chinese, label 2 = Korean, label 3 = English, etc.)
Once all of the labels have been input in each language with the multilingual input function, all of the labels can be switched to a different language at once just by specifying the corresponding label number from the PLC.

Example: The label switch function can be used to switch between English and Simplified Chinese.

Use Screen Import/Export Functions to Separate Translation Work

Property information for labels and other objects in screen data created using the NS-Designer can be exported to CSV files. These files can be edited in Excel and other programs. The screens can be created in the source language and then labels and other text exported to CSV files, which can be sent to translators for conversion to other languages. The translated CSV files can then be imported to automatically input the desired languages into labels.



Note: Refer to the operation manual for NS-Designer for information on importing and exporting.

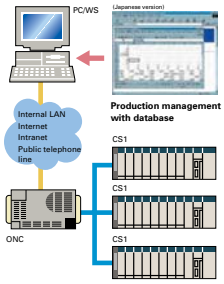
Dramatic improvements in on-site informati on management achieved with data collection functions.

The SYSMAC CS1 and ONC are accelerating advances in the production site.

7

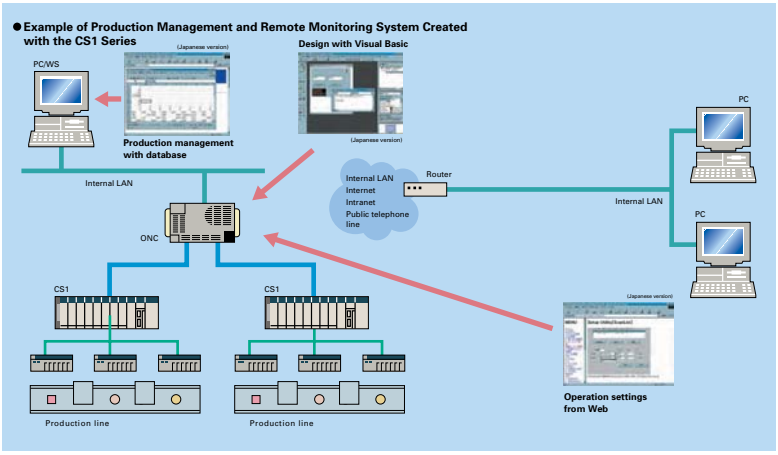
A High Level of Support for On-site Information Management

The Open Network Controller's (ONC) high-level information processing functions, such as Web server functions and functions for data collection, file management, automatic distribution, and automatic delivery of mail attachments, enable significant reductions in design costs. Also, using NX-Server for DeviceNet ONC Edition allows data on the DeviceNet network to be collected independently of I/O control at the CS1-series PLC. The ONC is capable of a high-level of interaction with the CS1 Series.



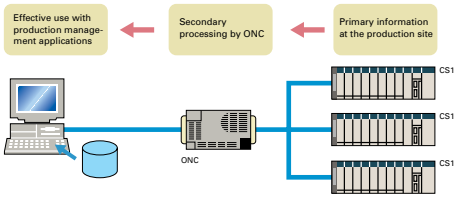
Ethernet – Creation of a Remote Monitoring Environment

The ONC's dial-up connection and PPP connection functions allow maintenance and monitoring of production site information from a computer in a remote location via an ordinary telephone line with, for example, a TA, modem, or dial-up router. The ONC, in combination with the CS1 Series, can be used for a variety of applications.



Use High-level Languages with Primary Production Information

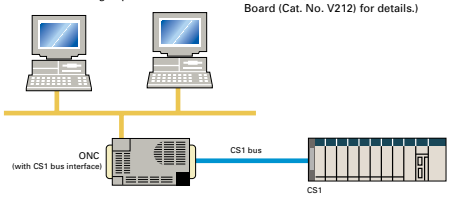
Using the ONC in combination with optional software (purchased separately), such as the Data Collection/Distribution Software or the RemoteKit Software, enables the processing, accumulation, and distribution of primary production site information. If a higher level of information processing is required, user applications can be created using high-level languages, such as Visual Basic, Java, C, or Perl (available soon). By transferring information after secondary processing at the production site end, distribution of the workload between the CS1 and production management system and links to the production management database enable a smooth flow of information.

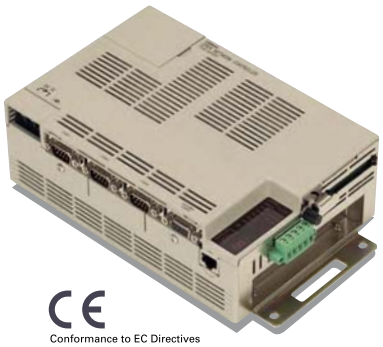


Expanded Role as CS1 Computer Unit

Using an expandable ONC model with a CS1 bus interface (ITNC-EIS01-CST and ITNC-EIX01-CST) allows connection to the CS1 via a high-speed CS1 bus.

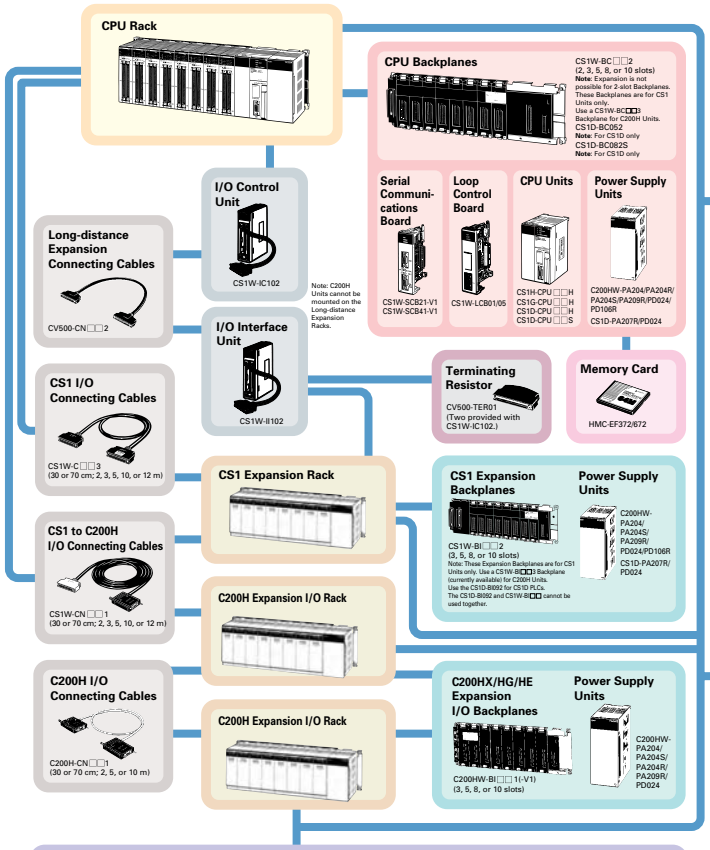
The ONC acts as a CS1 Computer Unit allowing the CS1 to be used in applications not possible with a CS1 PLC alone. (Refer to CS1 Bus Interface Board (Cat. No. V212) for details.)





Conformance to EC Directives

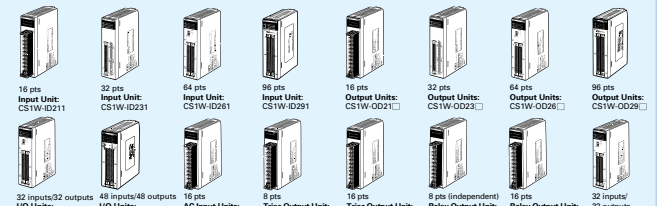
A Complete Lineup of Units for Optimum C ontrol.



Basic I/O Units

C200H Basic I/O Unit

C200H Basic I/O Units and C200H Group-2 High-density Units can also be used.



16 pts **Input Unit:** CS1W-ID211
32 pts **Input Unit:** CS1W-ID231
64 pts **Input Unit:** CS1W-ID261
96 pts **Input Unit:** CS1W-ID291
16 pts **Output Units:** CS1W-OD21□
32 pts **Output Units:** CS1W-OD23□
64 pts **Output Units:** CS1W-OD26□
96 pts **Output Units:** CS1W-OD29□
32 inputs/32 outputs **I/O Units:** CS1W-MD26□
48 inputs/48 outputs **I/O Units:** CS1W-MD29□/561
16 pts **AC Input Units:** CS1W-IA111/211
8 pts **Triac Output Unit:** CS1W-OA201
16 pts **Triac Output Unit:** CS1W-OA211
8 pts (independent) **Relay Output Unit:** CS1W-OC201
16 pts **Relay Output Unit:** CS1W-OC211
32 inputs/32 outputs **TTL I/O Unit:** CS1W-MD561

Interrupt Input Unit
Interrupt function supported on CPU Rack only. (Two Units mountable on CPU Rack.)
C200H Interrupt Input Unit can also be used.
16 pts CS1W-INT01

Analog Timer Unit
C200H-TM001

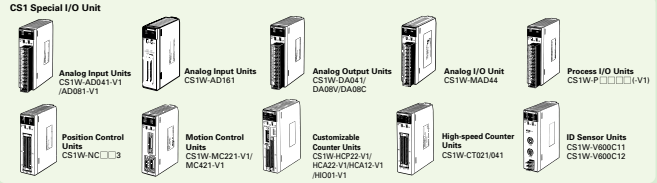
B7A Interface Units
16 pts C200H-B7A11/O1
Group-2 Unit C200H-B7A02/12/21/22

High-speed Input Unit
16 pts CS1W-IDP01

Safety Relay Unit
CS1W-SF200

Special I/O Units

CS1 Special I/O Unit



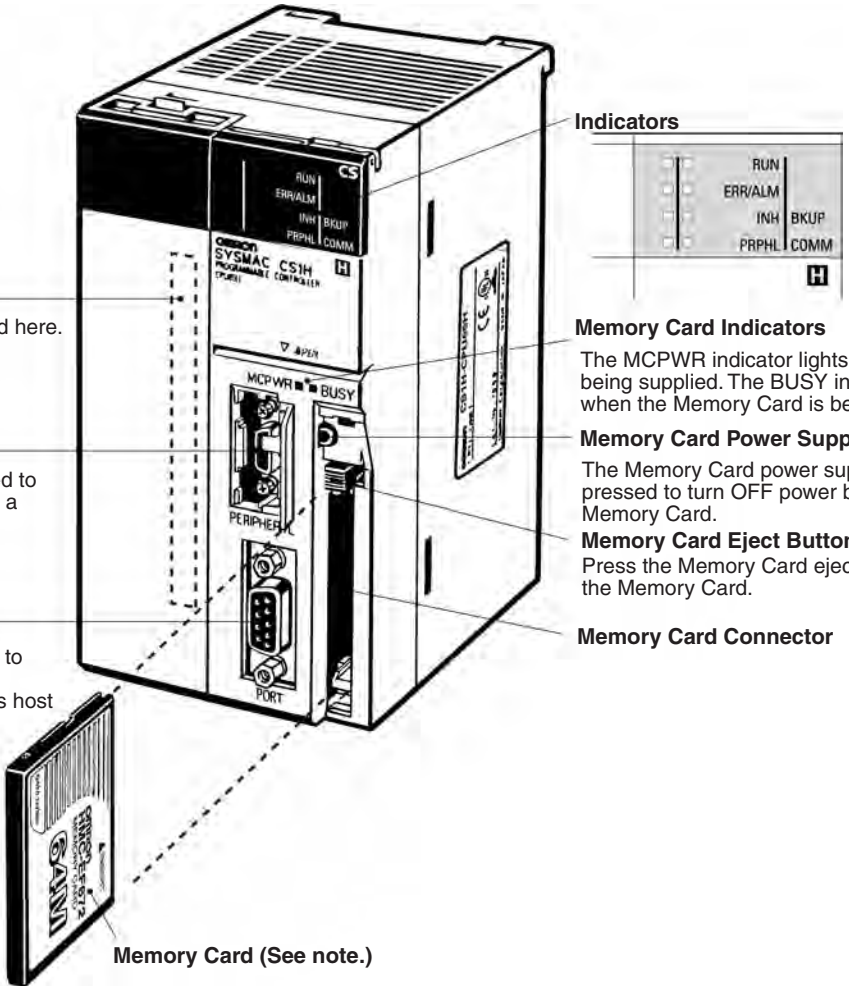
Analog Input Units CS1W-AD041-V1 /AD081-V1
Analog Input Units CS1W-AD161
Analog Output Units CS1W-DA041/DA08V/DA08C
Analog I/O Unit CS1W-MAD44
Process I/O Units CS1W-P□□□□(-V1)
Position Control Units CS1W-NC□□3
Motion Control Units CS1W-MC221-V1/MC421-V1
Customizable Counter Units CS1W-HCP22-V1/HCA22-V1/HCA12-V1/HIO01-V1
High-speed Counter Units CS1W-CT021/041
ID Sensor Units CS1W-V600C11 CS1W-V600C12

C200H Special I/O Units

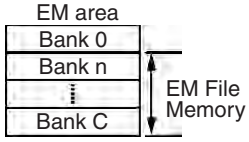
Temperature Sensor Units C200H-TS□□□
Temperature Control Units C200H-TC□□□
Heat/Cool Control Units C200H-TV□□□
PID Control Units C200H-PID□
Position Control Units* C200HW-NC□□3
High-speed Counter Units* C200H-CT□□□
Cam Positioner Unit* C200H-CP114
ID Sensor Units* C200H-IDS□□
GP-IB Interface Unit CS1W-GPI01
ASCII Units* C200H-ASC□□
DeviceNet I/O Link Unit C200HW-DRT21
CompoBus/S Master Unit C200HW-SRM21-V1

Note 1. Only CS1-series Units (i.e., with model numbers starting "CS1W") can be used with CS1D PLCs.
2. The HMC-EF372/EF672 cannot be used with CS1G-CPU□□H, CS1H-CPU□□H, CJ1G-CPU□□H, and CJ1H-CPU□□H CPU Units with lot numbers of 02108 or earlier (i.e., CPU Units manufactured before 8 January 2002) or with NS7-series PTs with lot numbers of 0852 or earlier (i.e., PTs manufactured before 8 May 2002). Be careful when ordering.
3. 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 CS-series PLC Operation manuals for details.

CPU Unit Overview



With the CS1 PLCs, 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	30 MB	HMC-EF372
		64 MB	HMC-EF672
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.)

Specifications

■ CPU Units

Model	I/O bits	Program capacity	Data memory capacity (See Note.)	Instruction processing speed	Built-in ports	Options
CS1H-CPU67H/CS1D-CPU67S	5,120 bits (Up to 7 Expansion Racks)	250K steps	448K words	LD: 0.02 μs	Peripheral port and RS-232C port.	Memory Cards Inner Boards, such as Serial Communications Board Only a Loop Control Board (CS1D-LCB05D) can be mounted in a CS1D CPU Unit. No other Inner Boards can be used.
CS1H-CPU66H		120K steps	256K words			
CS1H-CPU65H/CS1D-CPU65S		60K steps	128K words			
CS1H-CPU64H		30K steps	64K words			
CS1H-CPU63H		20K steps				
CS1G-CPU45H	5,120 bits (Up to 7 Expansion Racks)	60K steps	128K words	LD: 0.04 μs		
CS1G-CPU44H/CS1D-CPU44S	1,280 bits (Up to 3 Expansion Racks)	30K steps	64K words			
CS1G-CPU43H	960 bits (Up to 2 Expansion Racks)	20K steps				
CS1G-CPU42H/CS1D-CPU42S		10K steps				
CS1D-CPU65H	5,120 bits (Up to 7 Expansion Racks)	60K steps	128K words	Basic instructions: 0.02 μs min. Special instructions: 0.04 μs		
CS1D-CPU67H		250K steps	448K words			

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

CS1 CPU Unit Descriptions

■ Common Specifications

Item			Specification
Control method			Stored program
I/O control method			Cyclic scan and immediate processing are both possible.
Programming			Ladder diagram
Instruction length			1 to 7 steps per instruction
Ladder instructions			Approx. 400 (3-digit function codes)
Execution time			Basic instructions: 0.02 μs min., Special instructions: 0.04 μs min.
Number of tasks			288 (256 of which are also used as interrupt tasks) 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. **Note:** Interrupts cannot be used with a CS1D CPU Unit.
Function Blocks (See note 1.)			Languages supported for use in function block definitions: Ladder programming language and structured text
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 2.) (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.)
	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.)
	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.
		DeviceNet 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) DeviceNet bits are allocated to Slaves according to DeviceNet 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.

Item	Specification
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 the PLC is turned OFF or operating mode is changed. **Note:** Words H512 to H1535 are allocated to the Function Block Holding Area and are used only for the function block instance area (internally allocated variable area).
Auxiliary Area	Read only: 7,168 bits (448 words): A00000 to A44715 (words A000 to A447) Read/write: 8,192 bits (512 words): A44800 to A95915 (words A448 to A959) Auxiliary bits are allocated specific functions.
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 PLC 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. The DM Area is a general-purpose data area that is read and written by word (16 bits). The contents of the DM Area is maintained when the PLC is turned OFF or operating mode is changed.
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 PLC 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 PLC 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	4,000 words (500 data trace samples at the maximum sample size of 31 bits and 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 15-MB, 30-MB, or 48-MB capacities can be used.

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

2. Up to 16 C200H Special I/O Units can be used in one PLC, and with some C200H Special I/O Units, the limit is 10 Units. There are some I/O Units that are classified as Special I/O Units.

CS1 CPU Unit Descriptions

■ Function Specifications

Item	Specification
Parallel processing modes	The CS1G and CS1H CPU Units support processing modes in which the program is executed in parallel with peripheral processing
Battery-free operation	The user program and system program can be automatically backed up flash memory is mounted.
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	Possible (Depends on ON/OFF status of IOM Hold Bit in Auxiliary Area.)
Load OFF	All outputs on Output Units can be turned OFF.
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. (CS1 Basic I/O Units only)
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 (binary); PC System Setup: Data file format (binary); I/O Memory: Data file format (binary), text format, CSV format
	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	One or more program blocks in user programs can be overwritten when CPU Unit is in PROGRAM or MONITOR mode. This function is not available for block programming areas.
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 PLC is turned ON, contents of CIO Area, Work Area, part of Auxiliary Area, timer Completion Flag and PVs, Index Registers, and Data Registers will be saved.
Sending commands to a Host Link computer	FINS commands can be sent to a computer connected via Host Link System by executing Network Communications Instructions from PLC.
Remote programming and monitoring	Host Link communications can be used for remote programming and remote monitoring through a Controller Link System or Ethernet network.
Eight-level communications (See note 2.)	Host Link communications can be used for remote programming and remote monitoring from devices on networks up to seven levels away (Controller Link Network, Ethernet Network, or other network).
Storing comments in CPU Unit	I/O comments can be stored in Memory Cards, EM file memory, or in the Comment MemoryÅiSee note 1.) contained in the CPU Unit's flash memory.
Program check	Program checks are performed at beginning of operation for items such as no END instruction and instruction errors. The CX-Programmer 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	5 years at 25°C (Depending on the ambient operating temperature and communications conditions, 1.1 years min. Battery Set: CS1W-BAT01) (See note 3.)
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).

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

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

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

■ General Specifications

Item	Specifications					
Power Supply Unit	C200HW-PA204	C200HW-PA204S	C200HW-PA204R	C200HW-PA209R	C200HW-PD024	C200HW-PD106R
Supply voltage	100 to 120 VAC or 200 to 240 VAC, 50/60 Hz				24 VDC	100 VDC
Operating voltage range	85 to 132 VAC or 170 to 264 VAC				19.2 to 28.8 VDC	85 to 143 VDC
Power consumption	120 VA max.			180 VA max.	40 W max.	50 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)	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	0.625 A, 26 VDC Total: 30 W	1.3 A, 26 VDC Total: 45 W	0.625 A, 26 VDC Total: 30 W	1 A, 26 VDC Total: 30 W
Output terminal	Not provided	24 VDC load current consumption Less than 0.3 A: +17%/–11% 0.3 A or greater: +10%/–11% (Lot No. 0197 or higher)	Not provided		Not provided	
RUN output (See Note 1.)	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	Contact configuration: SPST-NO Switch capacity: 250 VAC, 2 A (resistive load) 250 VAC, 0.5 A (inductive load) 24 VDC, 2 A
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 50/60 Hz for 1 min between DC external and GR terminals, leakage current: 10 mA max. (See Note 1.)	2,300 VAC 50/60 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	Conforms to IEC61000-4-4, 2 kV (power lines)					
Vibration resistance	10 to 57 Hz, 0.075-mm amplitude, 57 to 150 Hz, acceleration: 9.8 m/s^2 in X, Y, and Z directions for 80 minutes (Sweep time 8 min ×10 = total time 80 min.) CPU Unit mounted to a DIN track: 2 to 55 Hz, 2.9 m/s^2 in X, Y, and Z directions for 20 minutes					
Shock resistance	147 m/s^2, 3 times each in X, Y, and Z directions					
Ambient operating temperature	0 to 55°C					
Ambient operating humidity	10% to 90% (with no condensation)					
Atmosphere	Must be free from corrosive gases.					
Ambient storage temperature	–20 to 75°C (excluding battery)					
Grounding	Less than 100 Ω					
Enclosure	Mounted in a panel.					

CS1 CPU Unit Descriptions

Item	Specifications	
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, cULus, cUL, NK, Lloyd's, and EC directives.	Conforms to cULus

Note: 1. Disconnect the Power Supply Unit's LG terminal from the GR terminal when testing insulation and dielectric strength. Internal components will be damages if testing is performed with these terminals connected.

2. Only when mounted to a Backplane.

3. Depth is 153 mm for C200HW-PA209R.

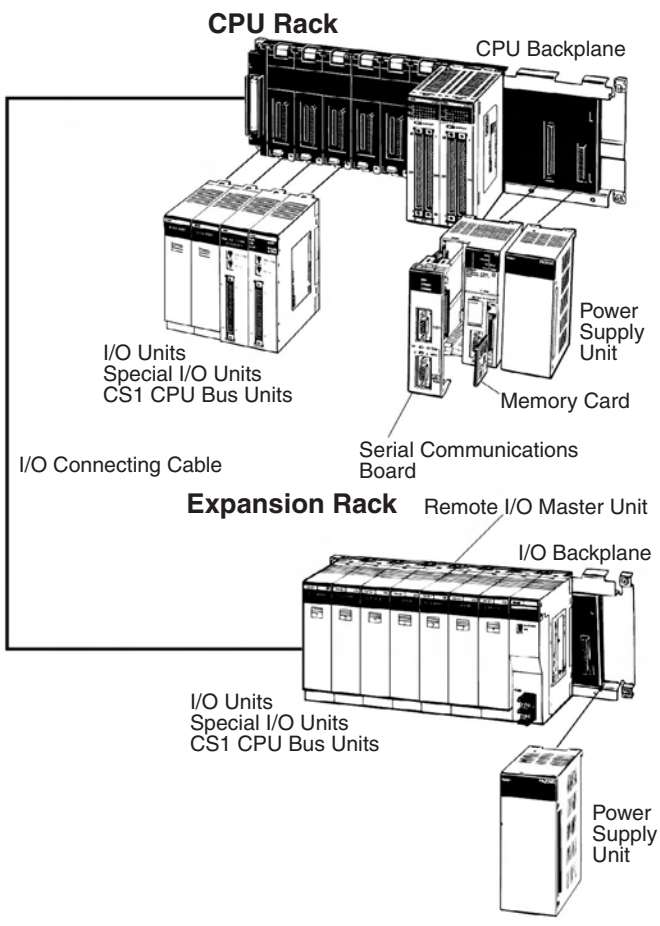
4. Enquire separately for general specifications of Process I/O Units.

Item	Specifications	
Power Supply Unit	CS1D-PA207R	CS1D-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	150 VA max.	40 W max.
Inrush current	30 A max. at100 to 120 VAC, 40 A max. at 200 to 240 VAC	30 A max.
Output capacity	7 A, 5 VDC (including CPU Unit power)	4.3 A, 5 VDC (including CPU Unit power)
	1.3 A, 26 VDC Total: 35 W	0.56 A, 26 VDC Total: 28 W
Output terminal	Not provided	
RUN output (See Note 2.)	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 2.)	20 MΩ min. (at 500 VDC) between DC external and GR terminals (See Note 2.)
Dielectric strength	2,300 VAC 50/60 Hz for 1 min between AC external and GR terminals (See Note 2.) Leakage current: 10 mA max.	1,000 VAC 50/60 Hz for 1 min between DC external and GR terminals, leakage current: 10 mA max. (See Note 2.)
	1,000 VAC 50/60 Hz for 1 min between AC external and GR terminals (See Note 2.) Leakage current: 10 mA max.	
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power lines)	
Vibration resistance	10 to 57 Hz, 0.075-mm amplitude, 57 to 150 Hz, acceleration: 9.8 m/s^2 in X, Y, and Z directions for 80 minutes (Sweep time 8 min ×10 = total time 80 min.)	
Shock resistance	147 m/s^2, 3 times each in X, Y, and Z directions	
Ambient operating temperature	0 to 55°C	
Ambient operating humidity	10% to 90% (with no condensation)	
Atmosphere	Must be free from corrosive gases.	
Ambient storage temperature	–20 to 75°C (excluding battery)	
Grounding	Less than 100 Ω	
Enclosure	Mounted in a panel.	
Weight	All models are each 6 kg max.	

Note: 1. Only when mounted to a CPU Backplane.

2. Disconnect the Power Supply Unit's LG terminal from the GR terminal when testing insulation and dielectric strength. Internal components will be damages if testing is performed with these terminals connected.

CS1G/CS1H Basic System Configuration



■ CPU Rack

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

■ 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.

■ Long-distance Expansion Racks

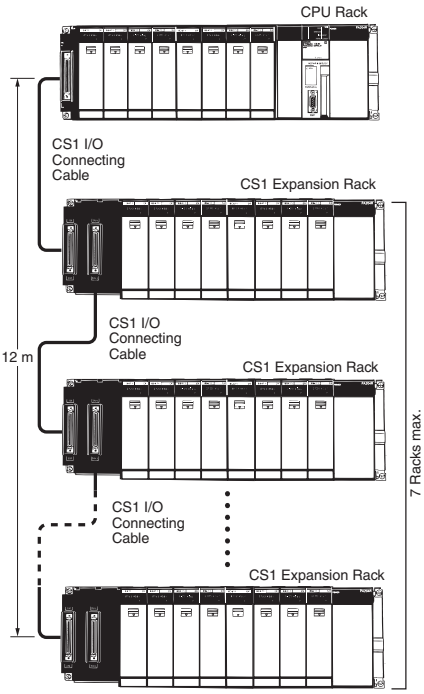
An I/O Control Unit and I/O Interface Units can be used to extend the normal limit of 12 m to 50 m for each of two series of CS1 Expansion Racks. The following Units can be mounted to Long-distance Expansion Racks: CS1 Basic I/O Units, CS1 Special I/O Units, and CS1 CPU Bus Units. (C200H Units cannot be mounted to Long-distance Expansion Racks.)

CS1G/CS1H Expansion Racks

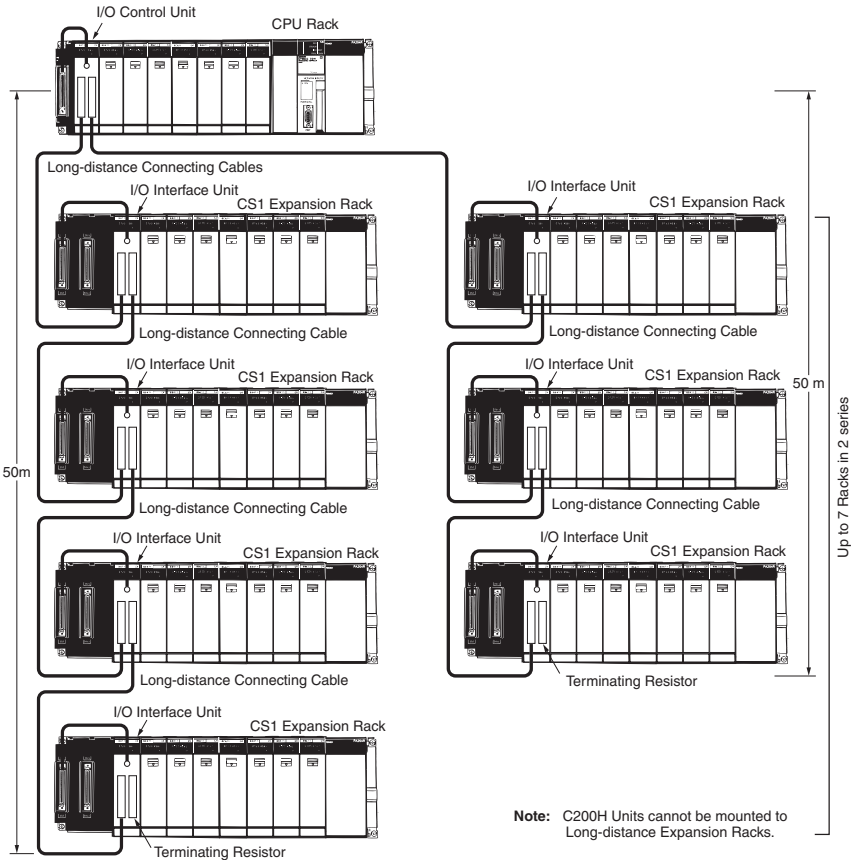
■ Expansion Rack Patterns

The following diagrams show the 5 possible patterns of Expansion Racks.

CPU Rack with CS1 Expansion Racks

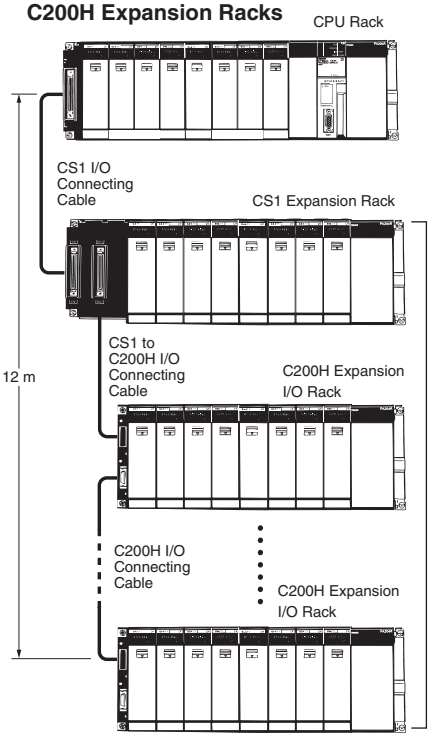


CPU Rack with CS1 Long-Distance Expansion Racks

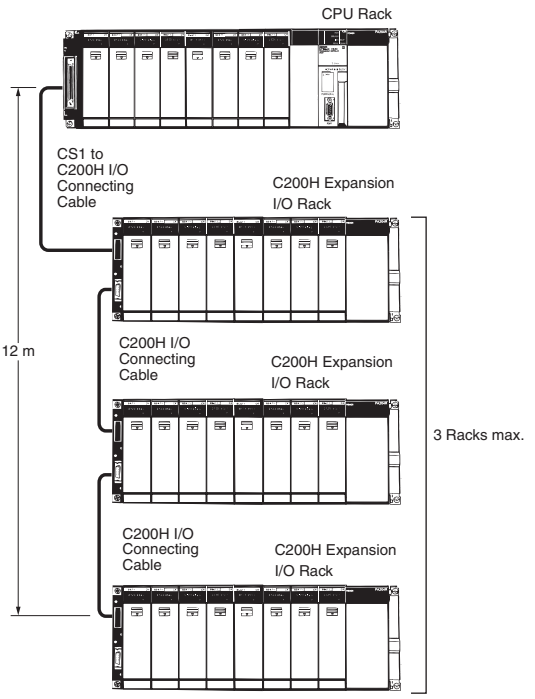


Note: C200H Units cannot be mounted to Long-distance Expansion Racks.

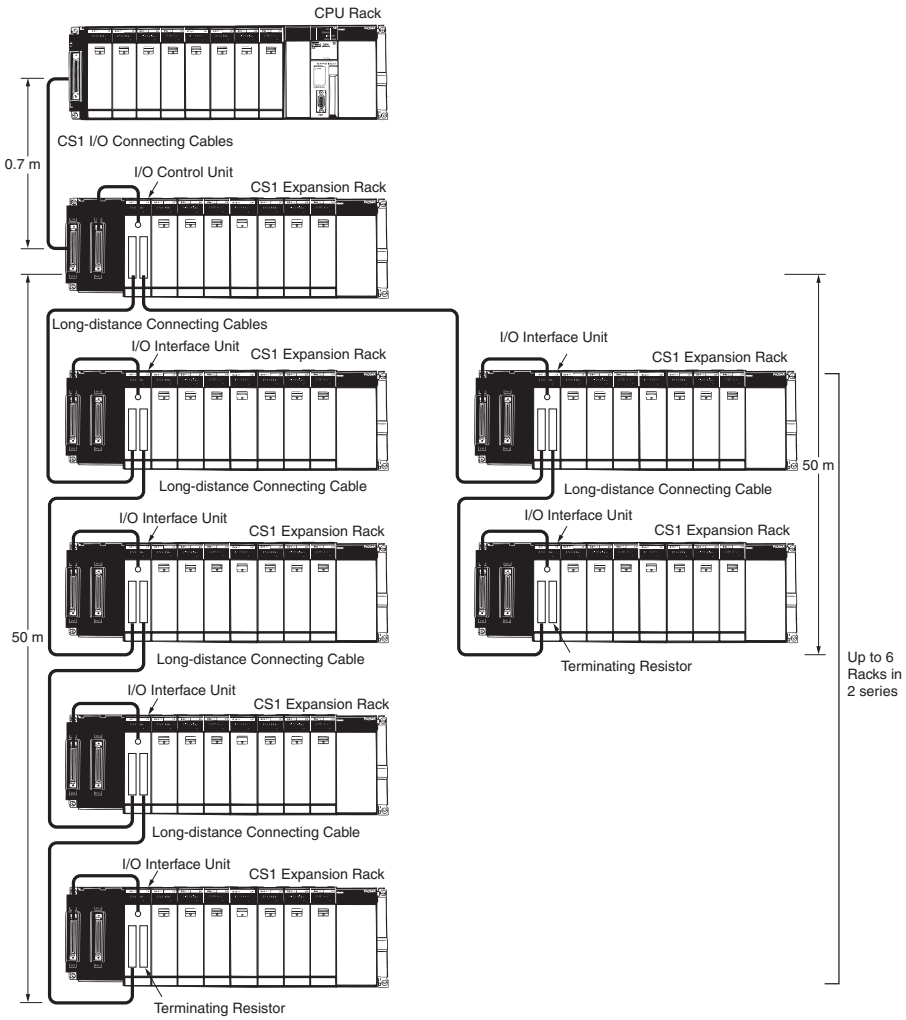
CPU Rack + CS1 Expansion Rack + C200H Expansion Racks



CPU Rack + C200H Expansion Racks



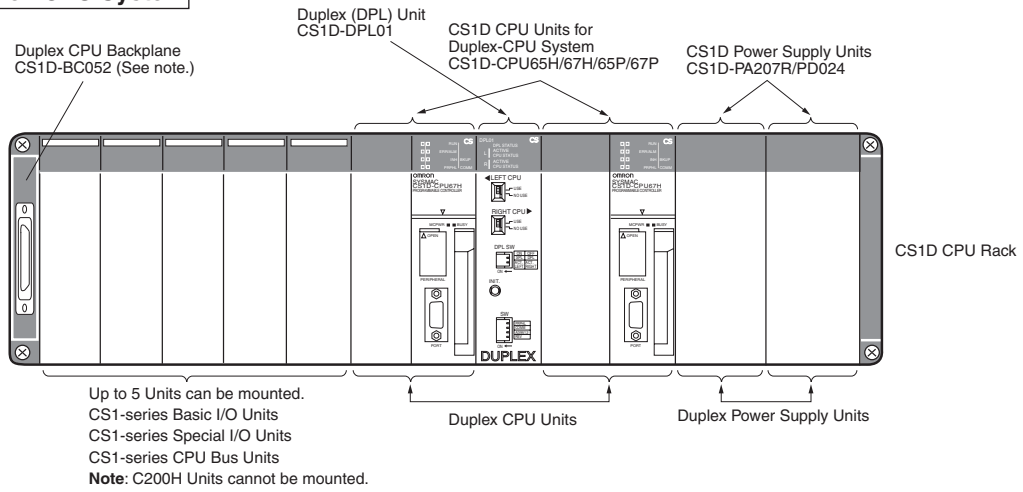
CPU Rack with CS1 Expansion Rack and CS1 Long-Distance Expansion Racks



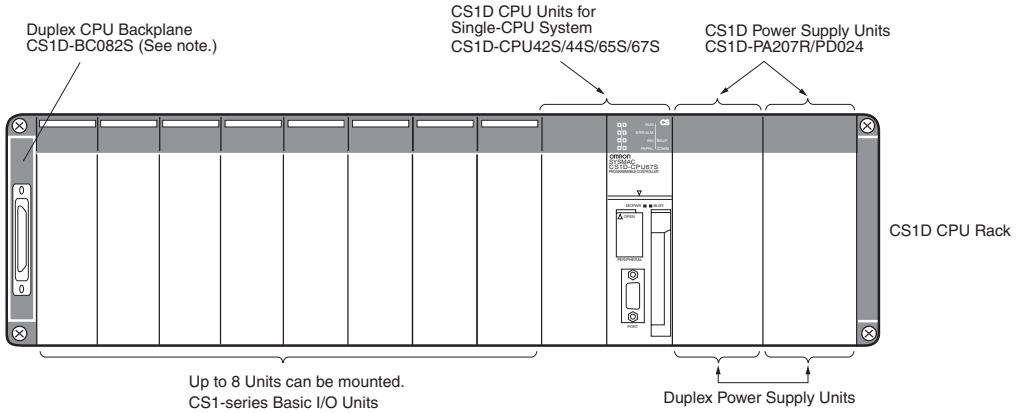
Note: C200H Units cannot be mounted to Long-distance Expansion Racks. (They can be mounted to the CS1 Expansion Rack with the I/O Control Unit mounted.)

CS1D System Configuration

Duplex-CPU System



Single-CPU System



CPU Rack

A CPU Rack consists of a Duplex CPU Backplane to which CPU Units, Power Supply Units, a Duplex Unit, CS1-series Basic I/O Units, CS1-series Special I/O Units, and CS1-series CPU Bus Units are mounted.

Memory Cards and Inner Boards to mount in the CPU Units are optional. (Inner Board cannot be mounted to the CS1D-CPU□□H/P)

The CPU Units, Power Supply Units, Duplex CPU Backplane, and Duplex Unit are all designed specifically for CS1D PLCs.

Note: Different Backplanes are used for the CPU Rack and Expansion Racks. Be sure to use the correct Backplane.

Expansion Racks

An Expansion Rack consists of an Expansion Backplane to which Power Supply Units, CS1-series Basic I/O Units, CS1-series Special I/O Units, and CS1-series CPU Bus Units are mounted.

The Power Supply Units and Expansion Backplane are designed specifically for CS1D PLCs.

CS1-series Expansion Backplanes and C200H Backplanes cannot be connected.

Long-distance Expansion Racks

A Long-distance Expansion Rack consists of an Expansion Backplane to which an I/O Interface Unit, CS1-series Basic I/O Units, CS1-series Special I/O Units, and CS1-series CPU Bus Units are mounted. An I/O Control Unit is used to connect to the Long-distance Expansion Racks.

Using Long-distance Expansion Rack increases the normal limit of 12 m for the Rack to 50 m.

CS1D PLCs

With a CS1D Duplex-CPU System, two CPU Units can be mounted to the CPU Rack for Duplex Mode operation (Duplex Mode), or just one CPU Unit can be mounted for Simplex Mode operation. In either case, a Duplex Unit is required.

With a CS1D Single-CPU System, just one CPU Unit is mounted and a Duplex Unit is not required.

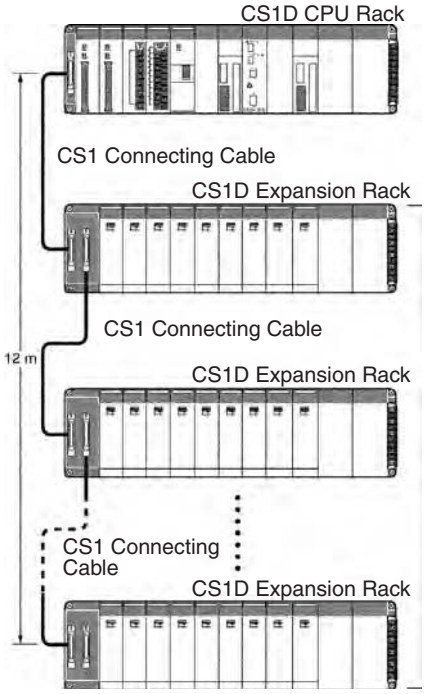
Also, two Power Supply Units can be mounted to any Rack to increase redundancy. (Racks can also be operated with only one Power Supply Unit.) With any of these combinations, there are no further restrictions if the system configuration, e.g., the same number of Expansion Racks can be used as with the other CS1-series PLCs.

Note: C200H Basic I/O Units, C200H Special I/O Units, and C200H CPU Bus Units cannot be mounted on any Rack.

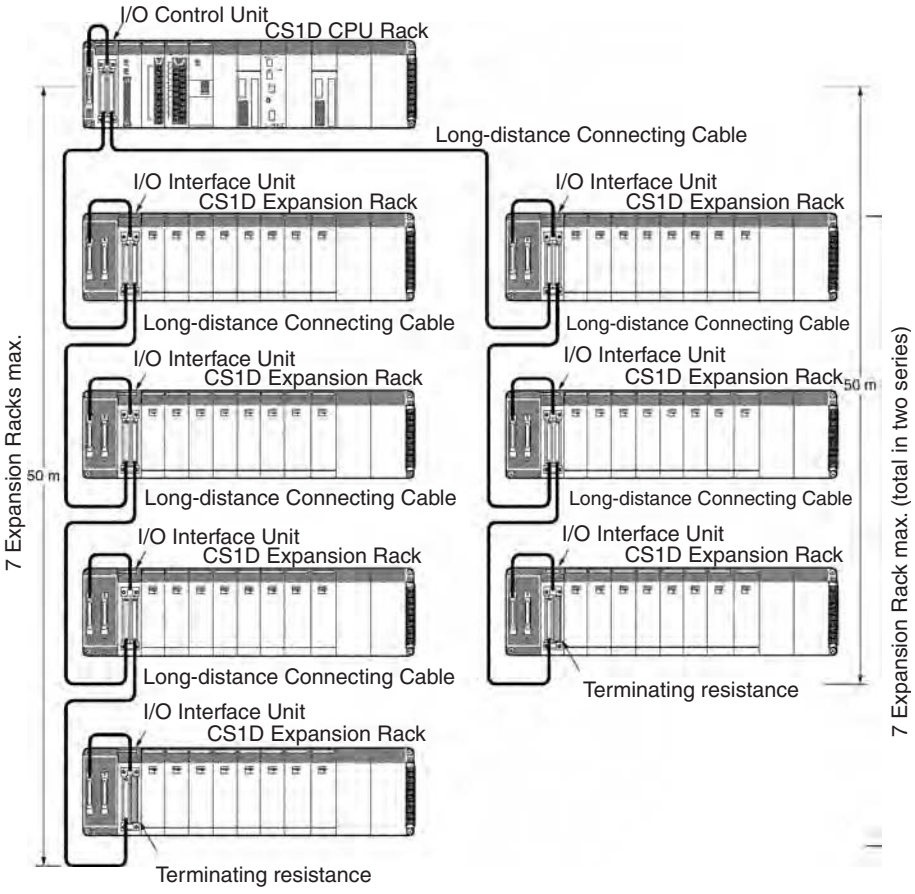
CS1D Expansion Rack Patterns

There are two patterns that can be used.

CPU Rack + Expansion I/O Racks

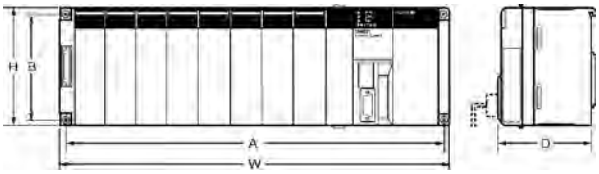


CPU Rack + Long-distance Expansion Racks



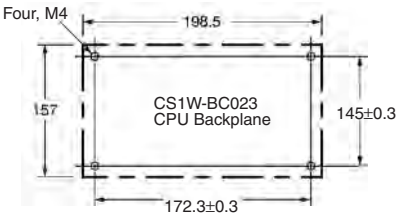
Mounting Dimensions

■ Dimensions



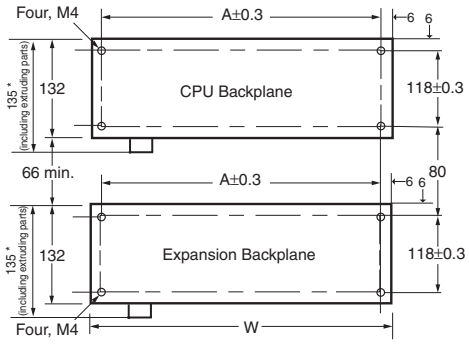
■ Backplanes

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



* The CS1D Backplane does not have any extruding parts.

Unit: mm

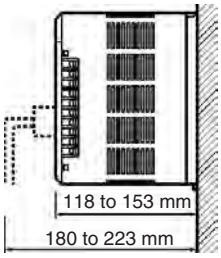
Backplane	Model	A	W
CPU Backplanes	CS1W-BC022/023 (2 slots)	172.3	198.5
	CS1W-BC032/033 (3 slots)	246	260
	CS1W-BC052/053 (5 slots)	316	330
	CS1W-BC082/083 (8 slots)	421	435
	CS1W-BC102/103 (10 slots)	491	505
	CS1D-BC052 (for Duplex-CPU Systems)		
	CS1D-BC082S (for Single-CPU System)		
CS1 Expansion Backplanes	CS1W-BI032/033 (3 slots)	246	260
	CS1W-BI052/053 (5 slots)	316	330
	CS1W-BI082/83 (8 slots)	421	435
	CS1W-BI102/103 (10 slots)	491	505
	CS1D-BI092 (for CS1D PLC)		
C200H Expansion I/O Backplanes	C200HW-BI031 (3 slots)	175	189
	C200HW-BI051 (5 slots)	245	259
	C200HW-BI081-V1 (8 slots)	350	364
	C200HW-BI101-V1 (10 slots)	420	434

Unit: mm

Backplane	A	B	W	H	D
CS1W-BC022/023 (2 slots)	172.3	145	198.5	157	123
CS1W-BC032/033 (3 slots)	246	118	260	132	
CS1W-BC052/053 (5 slots)	316		330		
CS1W-BC082/083 (8 slots)	421		435		
CS1W-BC102/103 (10 slots)	491		505		
CS1D-BC052 (for Duplex-CPU System)					
CS1D-BC082S (for Single-CPU System)					

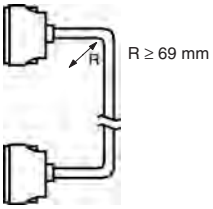
■ Mounting Height

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 in the control panel containing the PLC.

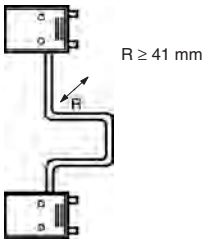


Note: I/O Connecting Cables are 12 m long max. and require sufficient space to maintain the min. bending radius.

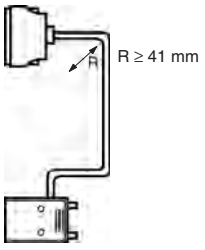
CS1 I/O Connecting Cable
(Cable diameter: 8.6 mm)



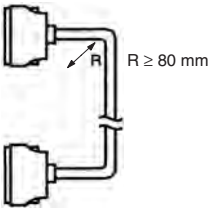
C200H I/O Connecting Cable
(Cable diameter: 5.1 mm)



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



Long-distance Connecting Cable
(Cable diameter: 10 mm)



CS1-series Features

Better Basic Performance

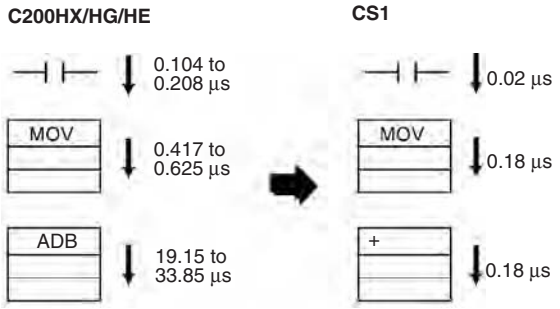
Large Program, Memory, and I/O Capacity; High-speed Instructions and Peripheral Servicing

■ Better Machine Performance with High-speed Processing

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

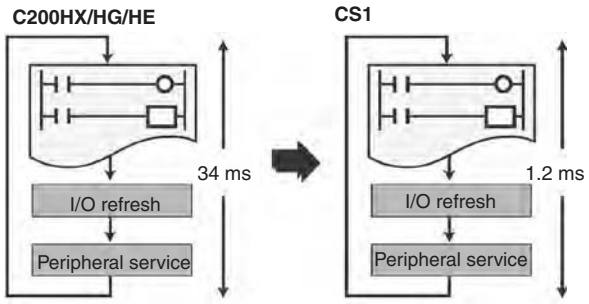
Execution Times from 20 ns

Faster instruction processing includes 0.02 μs for LD and 0.18 μs for MOV. And special instructions are processed almost as fast as basic ones (e.g., as fast as 0.18 μs for some instructions).



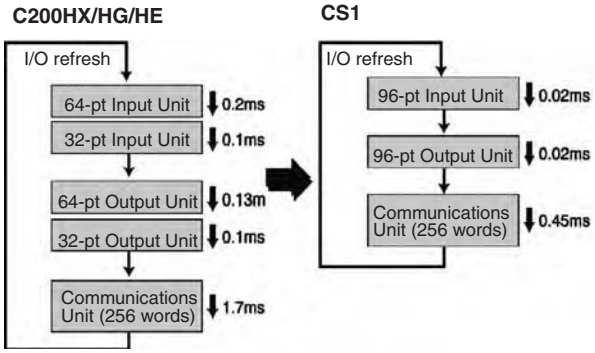
30 Times the Overall Cycle Speed

The following examples are for 30K-step programs (basic instructions: 50%; MOV instructions: 30%; arithmetic operation instructions: 20%).



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: 0.45 ms (4 times faster)

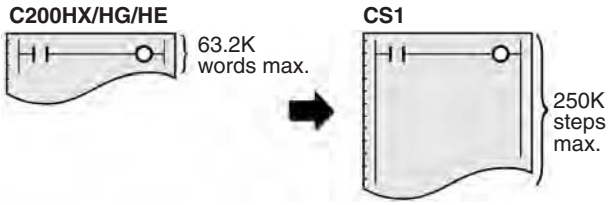


■ Large Capacities to Do the Job

CS1 PLCs also provide ample capacity for advanced machine interfaces, communications, and data processing.

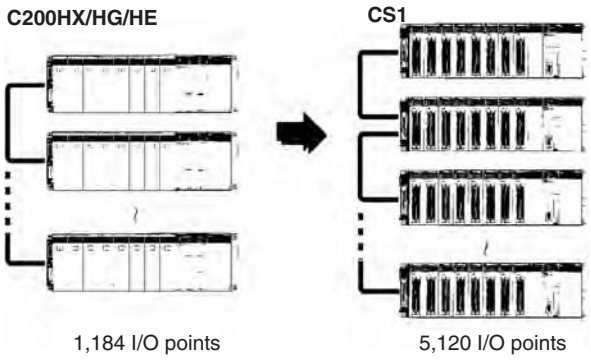
4 Times the Program Capacity

Create programs with up to 250K steps.



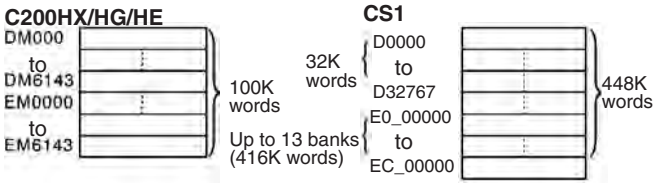
4.3 Times the I/O Capacity

Handle up to 5,120 I/O points.



4.5 Times the Data Memory

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



16 Times the Number of Timers/Counters

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