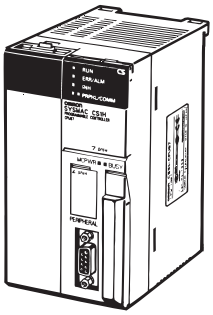
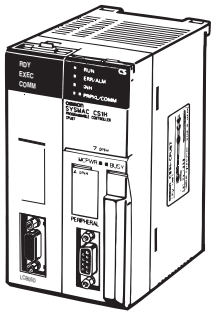
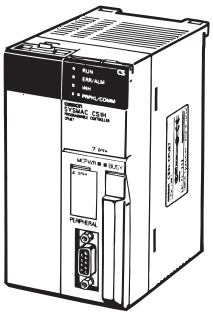
CPU Units



CS1D CPU Unit
(For a Duplex CPU System)



Process-control CPU Unit



CS1D CPU Unit
(For a Single CPU System)

Item		CS1D CPU Unit											
		CS1D-H CPU Unit (For Duplex CPU Systems)				Process-control CPU Unit		CS1D-H CPU Unit (For Single CPU Systems)					
Model		CS1D-CPU68HA	CS1D-CPU67HA	CS1D-CPU67H	CS1D-CPU65H	CS1D-CPU67P	CS1D-CPU65P	CS1D-CPU67SA	CS1D-CPU67S	CS1D-CPU65S	CS1D-CPU44SA	CS1D-CPU44S	CS1D-CPU42S
CPU Unit duplexing		Can be duplexed.						Cannot be duplexed.					
Number of I/O points		5,120 points									1,280 points	1,280 points	960 points
Number of Expansion Racks		7 max.									3 max.	3 max.	2 max.
User program capacity		400 Ksteps	250 Ksteps	250 Ksteps	60 Ksteps	250 Ksteps	60 Ksteps	250 Ksteps	250 Ksteps	60 Ksteps	30 Ksteps	30 Ksteps	10 Ksteps
Data memory		832 Kwords	448 Kwords	448 Kwords	128 Kwords	448 Kwords	128 Kwords	448 Kwords	448 Kwords	128 Kwords	64 Kwords	64 Kwords	64 Kwords
	DM	32 Kwords	32 Kwords	32 Kwords	32 Kwords	32 Kwords	32 Kwords	32 Kwords	32 Kwords	32 Kwords	32 Kwords	32 Kwords	32 Kwords
	EM	32 Kwords × 25 banks	32 Kwords × 13 banks	32 Kwords × 13 banks	32 Kwords × 3 banks	32 Kwords × 13 banks	32 Kwords × 3 banks	32 Kwords × 13 banks	32 Kwords × 13 banks	32 Kwords × 3 banks	32 Kwords × 1 bank	32 Kwords × 1 bank	32 Kwords × 1 bank
LD instruction execution time		0.02 μs										0.04 μs	
Interrupt functions		Cannot be used.						Can be used.					
Loop control functions		None				Yes (Can be duplexed.)		Yes, when a Loop Control Board is installed					
Function blocks		Yes		None				Yes	None		Yes	None	
Structured text		Yes		None				Yes	None		Yes	None	
Sequential function chart		Yes		None				Yes	None		Yes	None	
CS1D-CPU65H compatible mode		None	Yes	None				None	None		None	None	
CS1D-CPU67H compatible mode		None	Yes	None				None	None		None	None	
Current consumption (A)	5 V	0.82 ✻1, ✻2	0.82 ✻1, ✻2	0.82 ✻1, ✻2	0.82 ✻1, ✻2	1.04	1.04	0.82 ✻1	0.82 ✻1	0.82 ✻1	0.82 ✻1	0.78 ✻1	0.78 ✻1
	26 V	---	---	---	---	---	---	---	---	---	---	---	---

✻1. These values include the current consumption of a connected Programming Console.
✻2. NT-AL001 Link Adapters consume an additional 0.15 A each when used.

Common Specifications

Item		Specifications	
Control method		Stored program	
I/O control method		Cyclic scan and immediate processing are both supported. ✻1	
Programming		Ladder diagram Structured text (ST) ✻2 Sequential function chart (SFC) ✻2 Instruction list (IL)	
Instruction length		1 to 7 steps per instruction	
Ladder instructions		Approx. 400 (3-digit function codes)	
Instruction execution times	**Basic instructions**	0.02 μs min.	
	Special instructions	0.04 μs min.	
Number of Tasks		Cyclic tasks: 32 Interrupt tasks: 256 (Interrupt tasks can be defined as cyclic tasks to create extra cyclic tasks, making a total of 288 tasks that can be executed each cycle.) Cyclic tasks are executed each cycle and are controlled with TKON and TKOF instructions. The following 4 types of interrupt tasks are supported: Power OFF interrupt task (1 max.), scheduled interrupt tasks (2 max.), I/O interrupt tasks (32 max.), and external interrupt tasks (256 max.). These interrupt tasks are supported in the CS1D-CPU□□S/SA CPU Units for Single CPU Systems. Interrupt tasks are not supported in the CS1D-CPU□□H/P/HA CPU Units for Duplex CPU Systems.	
Interrupt types **Note: The interrupts can be used in CS1D-CPU□□SA/S CPU Units only.**		Scheduled Interrupts: Interrupts generated by the CPU Unit's built-in timer at regular intervals. I/O Interrupts: Interrupts from Interrupt Input Units Power OFF Interrupts: Interrupts executed when the CPU Unit's power is turned OFF. External I/O Interrupts: Interrupts from the Special I/O Units, CS-series CPU Bus Units, or the Inner Board.	
Function blocks ✻2		Languages in function block definitions: Ladder language, Structured Text	
CIO (Core I/O) Area	**I/O Area**	5,120: CIO 000000 to CIO 031915 (320 words from CIO 0000 to CIO 0319) The setting of the first word can be changed from the default (CIO 0000) so that CIO 0000 to CIO 0999 can be used. I/O bits are allocated to CS-series Basic I/O Units.	These words can be used as work words if they are not used for their specified purpose.
	Data 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.	
	CPU Bus Unit Area	6,400 (400 words): CIO 150000 to CIO 189915 (words CIO 1500 to CIO 1899) These words are allocated to 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) These words are allocated to CS1 Special I/O Units. (10 words per Unit, 96 Units max. The maximum total number of slots, however, is limited to 80 including expansion slots, so the 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 can be 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) (Can be used as work words in the program.)	
	I/O Terminal Area	512 (32 words): CIO 310000 to CIO 313115 (words CIO 3100 to CIO 3131) (Can be used as work words in the program.)	
Work Areas	**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 the 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) These bits are used to control the programs only. (I/O from external I/O is not possible.) When using work bits in programming, use the bits in the 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 the execution of the program, and maintain their ON/OFF status when the PLC is turned OFF or the operating mode is changed. The words from H512 to H1535 are Function Block Holding Area words. ✻2 They can be set only in the FB instance area (internally-assigned range of variables). ✻2	
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 for specific functions.	
Temporary Relay (TR) Area		16 bits (TR0 to TR15) Temporary bits are used to temporarily store the 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)	
Data Memory (DM) Area		32 Kwords: D00000 to D32767 Special I/O Unit DM Area: D20000 to D29599 (100 words × 96 Units) Used to set parameters for Special I/O Units. CPU Bus Unit DM Area: D30000 to D31599 (100 words × 16 Units) Used to set parameters for CPU Bus Units. Inner Board DM Area: D32000 to D32099 Used to set parameters for Inner Boards (Single CPU Systems only). Used as a general-purpose data area for reading and writing data in word units (16 bits). Words in the DM Area maintain their status when the PLC is turned OFF or the operating mode is changed.	
Extended Data Memory (EM) Area		32 Kwords per bank, 25 banks max.: E0_00000 to E18_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 the EM Area maintain their status when the PLC is turned OFF or the operating mode is changed. The EM Area is divided into banks, and the addresses can be set by either of the following methods: Changing the current bank using the EMBC instruction and setting addresses for the current bank, or setting bank numbers and addresses directly. EM data can be stored in files by specifying the number of the first bank (EM file memory).	
Data Registers		DR0 to DR15 Used to offset the PLC memory addresses in Index Registers when addressing words indirectly. (Data registers can be set to be used independently by each task. One register is 16 bits (1 word).	
Index Registers		IR0 to IR15 Store PLC memory addresses for indirect addressing. One register is 32 bits (2 words).	
Task Flags		32 (TK0000 to TK0031) Task Flags are read-only flags that are ON when the corresponding cyclic task is executable and OFF when the corresponding task is not executable or in standby status.	

Item		Specifications	
Trace Memory		4,000 words (The maximum amount of data that can be traced in a data trace is 500 samples for 31 bits and 6 words.	
Source/ comment memory ✻2	**Program sources, comments, program indexes, symbol tables**	Capacity: 2 MB	
File Memory		Memory Cards: A 128 MB/256 MB ✻2/512 MB ✻2 OMRON Memory Card can be used (MS-DOS format). EM file memory: The EM Area can be converted to file memory (MS-DOS format). The memory capacity is the maximum capacity of the CPU Unit's EM Area (Maximum capacity of CS1D-CPU68HA: 1,600 KB)	
Functions	**Parallel Processing Mode**	Program execution and peripheral servicing can be performed simultaneously (CS1D-CPU□□SA/S only).	
	Battery-free operation	The user program and the system's parameters are backed up automatically in flash memory, which is standard equipment.	
	Constant cycle time	1 to 32,000 ms (Unit: 1 ms)	
	Cycle time monitoring	Possible (Unit stops operating if the cycle is too long): 10 to 40,000 ms (Unit: 10 ms)	
	I/O refreshing	Cyclic refreshing, immediate refreshing ✻1, refreshing with I/O REFRESH instruction	
	I/O memory holding when changing operating modes	Possible (Depends on the ON/OFF status of the IOM Hold Bit in the Auxiliary Area.)	
	Load OFF	All outputs on Output Units can be turned OFF.	
	Input response time setting	Time constants can be set for inputs from Basic I/O Units. The time constant can be increased to reduce the influence of noise and chattering or it can be decreased to detect shorter pulses on the inputs (CS1 Basic I/O Units only).	
	Startup mode setting	Supported.	
	Memory Card functions	Automatically reading programs (autoboot) from the Memory Card when the power is turned ON.	
		Format in which data is stored in Memory Card	User program: Program file format PLC Setup and other parameters: Data file format (binary format) I/O memory: Data file format (binary format), text format, or CSV format
		Functions for which Memory Card read/write is supported	User program instructions, Programming Devices (including Programming Consoles), Host Link computers
	Filing	Memory Card data and the EM (Extended Data Memory) Area can be handled as files.	
	Debugging	Control set/reset, differential monitoring, data tracing (scheduled, each cycle, or when instruction is executed), storing location generating error when a program error occurs	
	Online editing	User programs can be overwritten in program-block units when the CPU Unit is in MONITOR or PROGRAM mode. This function is not available for block programming areas.	
	Program protection	Overwrite protection: Set using DIP switch. Copy protection: Password set using Programming 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 the execution time and logic of each programming block.	
	Error log	Up to 20 errors are stored in the error log. Information includes the error code, error details, and the time the error occurred.	
	Serial communications	Built-in peripheral port: Programming Device (including Programming Console) connections, Host Links, NT Links Built-in RS-232C port: Programming Device (excluding Programming Console) connections, Host Links, no-protocol communications, NT Links	
	Clock	Provided on all models. **Note:** Used to store the 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 retention during power interruptions	Held Areas: Holding bits, contents of Data Memory and Extended Data Memory, and status of the counter Completion Flags and present values. **Note:** If the IOM Hold Bit in the Auxiliary Area is turned ON, and the PLC Setup is set to maintain the IOM Hold Bit status when power to the PLC is turned ON, the contents of the CIO Area, the Work Area, part of the Auxiliary Area, timer Completion Flags and PVs, Index Registers, and the Data Registers will be saved.	
	Power OFF detection delay time	FINS commands can be sent to a computer connected via the Host Link System by executing Network Communications Instructions from the 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.	
	Multiple-level communications ✻3	Duplex CPU Systems: 3 levels Single CPU Systems: 8 levels	
	Storing comments in CPU Unit	I/O comments can be stored in the Memory Card, EM file memory, or comment memory in the CPU Unit flash memory. ✻2	
	Program check	Program checks are performed at the beginning of operation for items such as no END instruction and instruction errors.	
	Control output signals	RUN output: The internal contacts will be ON (closed) while the CPU Unit is operating in RUN mode or MONITOR mode. These terminals are provided only on CS1D-PA207R Power Supply Units.	
	Battery service life	The battery life is 5 years at an ambient temperature of 25°C, although the lifetime can be as short as 1.1 years under adverse temperature and power conditions. (Battery Set: CS1W-BAT01) ✻4	
	Self-diagnostics	CPU errors (watchdog timer), I/O verification errors, I/O bus errors, memory errors, and battery errors	
	Other functions	Words in the Auxiliary Area store the number of power interruptions, time of the last power interruption, and total power ON time.	

✻1. Immediate refreshing cannot be used in the CS1D-CPU□□HA/H/P CPU Units. (It can be used in the CS1D-CPU□□SA/S CPU Units.)

✻2. Supported only by the CPU Unit version 4.0 or later.

✻3. Communications are possible across up to eight levels only for the Controller Link and Ethernet networks (and the CX-Integrator or CX-Net in CX-Programmer version 4.0 or higher is required to set the routing tables). Communications are possible across only up to three communications levels for the SYSMAC LINK, DeviceNet, and FL-net networks.

✻4. Use a replacement battery that was manufactured within the last two years.

Functions Added by Unit Version

■Function Supported by Unit Version

CPU Unit model		CS1D-CPU□□H					CS1D-CPU□□HA	CS1D-CPU□□S		CS1D-CPU□□SA
System		Duplex CPU System					Duplex CPU System	Single CPU System		Single CPU System
FunctionUnit version		No unit version	Ver. 1.1	Ver. 1.2	Ver. 1.3	Ver. 1.4	Ver. 4.0	Ver. 2.0	Ver. 2.1	Ver. 4.0
Functions unique to CS1D CPU Units	Duplex CPU Units	OK	OK	OK	OK	OK	OK	---	---	---
	Online Unit Replacement using a Programming Device	OK	OK	OK	OK	OK	OK	OK	OK	OK
	Duplex Power Supply Units	OK	OK	OK	OK	OK	OK	OK	OK	OK
	Duplex Controller Link Units	OK	OK	OK	OK	OK	OK	OK	OK	OK
	Duplex Ethernet Units	---	OK	OK	OK	OK	OK	OK	OK	OK
	Unit Removal using a Programming Device during Operations	OK	OK	OK	OK	OK	OK	OK	OK	OK
	Unit Removal without a Programming Device during Operations	---	---	OK	OK	OK	OK	---	---	---
	Removal/Addition of Units without a Programming Device during Operations ✻1	---	---	---	OK ✻1	OK ✻1	OK ✻1	---	---	---
	Duplex Connecting Cables	---	---	---	OK ✻2	OK ✻2	OK ✻2	---	---	---
	Addition of Units and Backplanes during Operations	---	---	---	OK ✻3, ✻4	OK ✻3, ✻4	OK ✻3, ✻4	---	---	---
	Replacement of Duplex Unit during Operations	---	---	---	OK ✻2	OK ✻2	OK ✻2	---	---	---
Downloading Individual Tasks		---	---	---	---	---	---	OK	OK	OK
Improved Read Protection Using Passwords		---	---	---	---	---	---	OK	OK	OK
Write Protection from FINS Commands Sent to CPU Units via Networks		---	---	---	---	---	---	OK	OK	OK
Online Network Connections without I/O Tables		---	---	---	---	---	---	OK	OK	OK
Communications through a Maximum of 8 Network Levels		---	---	---	---	---	---	OK	OK	OK
Connecting Online to PLCs via NS-series PTs		---	---	---	---	---	---	OK	OK	OK
Setting First Slot Words		---	---	---	---	---	---	OK (64 groups max.)	OK (64 groups max.)	OK (64 groups max.)
Automatic Transfers at Power ON without a Parameter File (.STD)		---	---	---	---	---	---	OK	OK	OK
Operation Start/End Times		---	OK	OK	OK	OK	OK	OK	OK	OK
Automatic Allocation of Communications Ports		---	---	---	OK	OK	OK	OK	OK	OK
Support of new instructions	MILH, MILR, MILC	---	---	---	---	---	---	OK	OK	OK
	= DT, <>DT, <DT, < = DT, >DT, > = DT	---	---	---	---	---	---	OK	OK	OK
	BCMP2	---	---	---	---	---	---	OK	OK	OK
	GRY	---	---	---	---	---	---	OK	OK	OK
	TPO	---	---	---	---	---	---	OK	OK	OK
	DSW, TKY, HKY, MTR, 7SEG	---	---	---	---	---	---	OK	OK	OK
	EXPLT, EGATR, ESATR, ECHRD, ECHWR	---	---	---	---	---	---	OK	OK	OK
	IORD/IOWR reading/writing to CPU Bus Units	---	---	---	---	---	---	OK	OK	OK
Function blocks		---	---	---	---	---	OK	---	---	OK
	Online editing of function blocks	---	---	---	---	---	OK	---	---	OK
	Support for I/O variables (including array variables for I/O variables)	---	---	---	---	---	OK	---	---	OK
	Support for STRING data type and processing functions for ST language	---	---	---	---	---	OK	---	---	OK
ST language an be used in a task program		---	---	---	---	---	OK	---	---	OK
SFC language an be used in a task program		---	---	---	---	---	OK	---	---	OK
PLC Setup: FB Communications Instruction Settings: Number of Resends Response Monitoring Time: FB Communications Instruction DeviceNet Communications Instruction		---	---	---	---	---	OK	---	---	OK
Serial Gateway (converting FINS commands to CompoWay/F commands at the built-in serial port)		---	---	---	---	---	---	---	---	---
Free Running Timer (system timers used after the power is turned ON)		---	---	---	---	---	OK	---	---	OK
Read Protection Using Extended Passwords		---	---	---	---	OK	OK	---	OK	OK

CPU Unit model		CS1D-CPU□□H					CS1D-CPU□□HA	CS1D-CPU□□S		CS1D-CPU□□SA
System		Duplex CPU System					Duplex CPU System	Single CPU System		Single CPU System
FunctionUnit version		No unit version	Ver. 1.1	Ver. 1.2	Ver. 1.3	Ver. 1.4	Ver. 4.0	Ver. 2.0	Ver. 2.1	Ver. 4.0
Disabling Password Input after Five Consecutive Incorrect Passwords		---	---	---	---	OK	OK	---	OK	OK
Auxiliary Area Notification of Production Lot Number		---	---	---	---	OK	Ok	---	OK	OK
Comment Memory (in internal flash memory)		---	---	---	---	---	OK	---	---	OK
Expanded simple backup data	The following files stored in comment memory can be backed up. • Symbol table files • Comment files • Program index files	---	---	---	---	---	OK	---	---	OK
TXDU, RXDU (support no-protocol communications with serial communications units version 1.2 or later)		---	---	---	---	---	---	---	---	OK
Model conversion instructions: XFERC, DISTC, COLLC, MOVBC, BCNTC		---	---	---	---	---	---	---	---	---
Special function block instructions: GETID		---	---	---	---	---	OK	---	---	OK
Additional instruction functions	TXD, RXD (support no-protocol communications with serial communications units version 1.2 or later)	---	---	---	---	---	---	---	---	OK
Use of new special instructions	Numerical value to ASCII conversion instructions and ASCII to numerical value conversion instructions: NUM4, NUM8, NUM16, STR4, STR8, STR16	---	---	---	---	---	OK	---	---	OK
Use of new special instructions	Text file write instruction: TWRIT	---	---	---	---	---	OK	---	---	OK

Note: OK: Supported, ---: Not supported

✻1. The Removal/Addition of Units without a Programming Device function is supported only by CS1D CPU Units with unit version 1.3 or later and a Duplex CPU, Dual I/O Expansion System. If the Removal/Addition of Units without a Programming Device function is selected in a Duplex CPU, Single I/O Expansion System, the function operates as the earlier Unit Removal without a Programming Device function.

✻2. Supported only by a CS1D Duplex CPU, Dual I/O Expansion System.

✻3. Basic I/O Units and Special I/O Units can be added for the Online Addition of Units and Backplanes function. CPU Units cannot be added.

✻4. Expansion Backplanes cannot be added with a Duplex CPU, Single I/O Expansion System.

■Unit Versions and Programming Devices

OK: Supported, ---: Not supported, △: Can be used except for new functions added for unit versions

CPU Unit	Function	Required programming device										
		CX-Programmer										Programming Console
		Ver. 3.2 or lower	Ver.3.3	Ver.4.0	Ver.5.0 Ver.6.0	Ver.6.1	Ver.7.0	Ver.7.2	Ver.8.0	Ver.9.6	Ver. 9.7 or higher	
CS1D CPU Units for Single CPU Systems, Unit Ver. 2.0	---	---	---	OK	OK	OK	OK	OK	OK	OK	OK	OK
CS1D CPU Units for Single CPU Systems, Unit Ver.2.1	Functions added for unit version 2.1	---	---	△	△	△	△	△	△	OK	OK	△
CS1D CPU Units for Single CPU Systems, Unit Ver.4.0	Functions added for unit version 4.0	---	---	△	△	△	△	△	△	△	OK	△
CS1D CPU Units for Duplex CPU Systems, no unit version	---	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
CS1D CPU Units for Duplex CPU Systems, Unit Ver.1.1	Functions added for unit version 1.1	△	△	OK	OK	OK	OK	OK	OK	OK	OK	OK
CS1D CPU Units for Duplex CPU Systems, Unit Ver.1.2	Functions added for unit version 1.2	△	△	△	△	OK	OK	OK	OK	OK	OK	OK
CS1D CPU Units for Duplex CPU Systems, Unit Ver.1.3	Functions added for unit version 1.3	△	△	△	△	△	OK ✻	OK	OK	OK	OK	Online addition of Units is not supported.
CS1D CPU Units for Duplex CPU Systems, Unit Ver.1.4	Functions added for unit version 1.4	△	△	△	△	△	△	△	△	OK	OK	△
CS1D CPU Units for Duplex CPU Systems, Unit Ver.4.0	Functions except for functions added for unit version 4.0 when CS1D-CPU67HA is in CS1D-CPU65H/CS1D-CPU67H compatible mode	△	△	△	△	△	△	△	△	OK	OK	△
CS1D CPU Units for Duplex CPU Systems, Unit Ver.4.0	---	---	---	---	---	---	---	---	---	---	OK	△

✻ The CX-Programmer version 7.0 can be used by expanding the unit's functions using the auto update function.