Configuring a CS1D System

This section provides tools to configure a CS1D system. Included in this section are:

Power and Expansion Selection

Tools are provided to calculate the total current consumption of a CS1D system. With this information, the proper power supply can be selected. When the number of modules or power requirements exceeds the capability of the power supplies available, I/O expansion racks solve the problem. If the number of modules in the CPU rack exceeds 5 or the current consumption is greater than the capacity of the power supply units, use the CPU and expansion rack configuration.

I/O Allocations

In CS1D PLC systems, part of the I/O memory is allocated to basic, special I/O and CS1 CPU bus units. This section describes in detail how each of these units is allocated in the I/O memory.

Units in a CS1D System Configuration

Use this section to determine which units and peripheral devices can be used to configure a CS1D Duplex system.

What is a CS1D Duplex system?

A CS1D system consists of two duplex power supplies, two duplex CPUs, one duplex unit, one duplex CPU backplane, and up to 5 basic I/O, special I/O and CS1 CPU bus units. See page C-218.

What goes on a CS1D expansion rack?

The CS1D expansion rack contains two duplex power supplies, an expansion CS1D I/O backplane, basic I/O units, special I/O units and CS1 CPU bus units. See page C-219.

Where are ratings to calculate overall current consumption?

The current consumption ratings for the CPU are on pages C-223 to C-224. Basic I/O, special I/O and CS1 CPU bus units are collected in the tables on pages C-161 to C-165.

What power supply is available for a CS1D system?

Only one power supply is available for the CS1D system. The same power supply is used in the CPU and expansion racks.

Input Voltage	**100 to 240 VAC**
Output rating	7 A, 5 VDC
Output capacity	35 W
24 VDC service power	No
RUN output contact	Yes
Power supply model	CS1D-PA207R
See page	**C-218**

How many expansion racks can be used?

The CS1D system can be expanded using CS1D expansion racks or CS1D long distance expansion racks. The maximum number of expansion racks in any CS1 system will depend on the combination of these racks.

The following table outlines all acceptable combinations.

Combination of Expansion Racks	**CS1D Expansion Racks Only**	**CS1D Long Distance Expansion Racks**
Maximum expansion racks per CPU	7	7
Maximum distance from CPU rack	12 m	90 m

Note: On a CS1D long distance configuration, the following units are required:
CS1W-IC102 – I/O control unit. One unit mounted on the CPU rack.
CS1W-II102 – I/O interface unit. One unit mounted on each CS1 expansion rack.
See page C-222 to select the appropriate I/O connecting cables.

CPU Selection

This section describes the CPUs and memory cards for a CS1D system.

How many I/O points are needed?

Number of I/O	5120
CPU models	CS1D-CPU65H
	CS1D-CPU67H
See page	**C-12**

How much program memory storage is required?

Program Memory Size	CPU Models	See page
60 K steps	CS1D-CPU65H	**C-12**
250 K steps	CS1D-CPU67H	**C-12**

How much data memory storage is required?

Data Memory Size	128 K Words	448 K Words
CPU models	CS1D-CPU65H	CS1D-CPU67H
See page	**C-12**	**C-12**

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

Selecting program storage options

Memory card uses:

- Download recipes
- Replace PLC program while operating
- Auto-boot the PLC upon power up

Memory Size	15 MB	30 MB	64 MB
Memory card	HMC-EF172	HMC-EF372	HMC-EF672
See page	**C-150, C-225**	**C-150, C-225**	**C-150, C-225**

Note: An adapter is available to insert the flash memory card into a computer. Go to pages C-150 and C-225 for details.

Basic I/O Selection

This section describes the standard, high-density and mixed I/O modules, terminal blocks and cables used in a CS1D system.

Input Configuration

What input voltage do you need?

DC

Type	24 VDC
Model number	CS1W-ID211
	CS1W-ID231
	CS1W-ID261
	CS1W-ID291
	CS1W-IDP01
See page	**C-42**

AC

Type	200-240 VAC
Model number	CS1W-IA211
See page	**C-42**

AC/DC

Type	100-120 VAC/DC
Model number	CS1W-IA111
See page	**C-42**

How many input points are required?

Choose from the available point densities below.

Input Points	16	32	64	96
DC inputs	CS1W-ID211 CS1W-IDP01	CS1W-ID231	CS1W-ID261	CS1W-ID291
AC inputs	CS1W-IA211	–	–	–
AC/DC inputs	CS1W-IA111	–	–	–
See page	**C-42**	**C-42**	**C-42**	**C-42**

What are the input current requirements?

Input Current	4.1 mA or Below	7 mA or Below	10 mA or Below
DC inputs	–	CS1W-ID211	–
		CS1W-ID231	
		CS1W-ID261	
		CS1W-ID291	
		CS1W-IDP01	
AC inputs	–	–	CS1W-IA211
AC/DC inputs	CS1W-IA111 (DC in)	–	CS1W-IA111 (AC in)
See page	**C-42**	**C-42**	**C-42**

Are terminal blocks and connection cables necessary?

Input modules with 8 or 16 points have removable terminal blocks that accept direct wiring from input devices. High-density 32-, 64- and 96-point modules use cables and terminal blocks to connect inputs and consolidate wiring back to the control panel. For more information see page C-67.

Module	Connector Type	Terminal Block	Cable
CS1W-ID211	Removable terminal block	Not required	Not required
CS1W-IDP01			
CS1W-IA111			
CS1W-IA211			
CS1W-ID231	Fujitsu-compatible connector on module	XW2B-40G4 or G5	XW2Z-□□□B
CS1W-ID261		Two XW2B-40G4 or G5	Two XW2Z-□□□B
CS1W-ID291		Two XW2B-60G4 or G5	Two XW2Z-□□□H-1

Note: For more information on wiring connections, please refer to the wiring section starting on page D-1.

Output Configuration

How many output points are required?

Choose from the available point densities below.

Output points	8	16	32	64	96
Transistor Sinking (NPN)	–	CS1W-OD211	CS1W-OD231	CS1W-OD261	CS1W-OD291
Transistor Sourcing (PNP)	–	CS1W-OD212	CS1W-OD232	CS1W-OD262	CS1W-OD292
Relay	CS1W-OC201	CS1W-OC211	–	–	–
Triac	CS1W-OA201	CS1W-OA211	–	–	–
See page	**C-51, C-52**	**C-51, C-52**	**C-51**	**C-51**	**C-51**

Are terminal blocks and connection cables necessary?

Output modules with 5, 8 or 16 points have removable terminal blocks that accept direct wiring from output devices. High-density 32-, 64- and 96-point modules use cables and terminal blocks to connect inputs and consolidate wiring back to the control panel. For more information see page C-67.

Module	Connector Type	Terminal Block	Cable
CS1W-OC201	Removable terminal block	Not required	Not required
CS1W-OC211			
CS1W-OD211			
CS1W-OD212			
CS1W-OA201			
CS1W-OA211			
CS1W-OD231	Fujitsu-compatible connector on module	XW2B-40G4 or G5	XW2Z-□□□B
CS1W-OD232		XW2B-40G4 or G5	XW2Z-□□□B
CS1W-OD261		Two XW2B-40G4 or G5	Two XW2Z-□□□B
CS1W-OD262		Two XW2B-40G4 or G5	Two XW2Z-□□□B
CS1W-OD291		Two XW2B-60G4 or G5	Two XW2Z-□□□H-1
CS1W-OD292		Two XW2B-60G4 or G5	Two XW2Z-□□□H-1

Note: For more information on wiring connections, please refer to the wiring section starting on page D-1.

Mixed I/O Configuration

What input voltage and transistor output type (NPN or PNP) do you need?

Input Voltage	5 VDC	24 VDC	See page
Sinking outputs (NPN)	CS1W-MD561	CS1W-MD261	**C-63**
		CS1W-MD291	**C-63**
Sourcing outputs (PNP)	–	CS1W-MD262	**C-63**
		CS1W-MD292	**C-63**

How many input/output points are required?

Choose from the available point densities below.

I/O Points	32 In/32 Out	48 In/48 Out	See page
	CS1W-MD261	CS1W-MD291	**C-63**
	CS1W-MD262	CS1W-MD292	**C-63**
	CS1W-MD561		**C-63**

Are terminal blocks and connection cables necessary?

High-density I/O modules use cables and terminal blocks to connect inputs/outputs and consolidate wiring back to the control panel. For more information see page C-67.

Module	Connector Type	Terminal Block	Cable
CS1W-MD261	Fujitsu-compatible connector on module	Two XW2B-40G4 or G5	Two XW2Z-□□□B
CS1W-MD262		Two XW2B-40G4 or G5	Two XW2Z-□□□B
CS1W-MD561		Two XW2B-40G4 or G5	Two XW2Z-□□□B
CS1W-MD291		Two XW2B-60G4 or G5	Two XW2Z-□□□H-1
CS1W-MD292		Two XW2B-60G4 or G5	Two XW2Z-□□□H-1

Configuration Guidelines

Remember to add all the current consumptions of basic I/O, special I/O modules, and CPU bus units to determine which power supply is appropriate.

Please refer to the ***System Configuration*** section for current consumption of individual modules.

For more I/O options, see the ***Industrial Networks and Communication*** section for DeviceNet I/O on page C-123 and CompoBus/S I/O on page C-138.

Special I/O Selection

This section describes the CS1D modules that are specially designed to handle analog, single- and multiple-axis position control, multiple-axis motion control, high-speed counting, ID sensor control and voice notification module right on the PLC. All of these modules have independent co-processors to handle the specialized functions to reduce the load on the CPU and keep cycle times extremely fast.

Analog I/O Modules

Please refer to the ***Analog Selection Guide*** on pages C-76 to C-81. Only CS1 analog I/O modules can be used on the CS1D system.

Single- and Multiple-axis Position Control Modules

The position control modules for the CS1D series have been developed for precise positioning on pick and place machines and for the use of cutting equipment and positioning systems. Servo or stepper systems that accept pulse-train inputs can be controlled with these modules.

Configure a complete system by combining these parts:

- Position control module (CS1W-NC □□□).
- Omron SMARTSTEP or W-Series servo drive or any manufacturer's servo/stepper drive.

Module	Output	Controlled Axes	See page
CS1W-NC113	Open collector	1 Axis	**C-97**
CS1W-NC213		2 Axis	**C-97**
CS1W-NC413		4 Axis	**C-97**
CS1W-NC133	Line driver	1 Axis	**C-97**
CS1W-NC233		2 Axis	**C-97**
CS1W-NC433		4 Axis	**C-97**

Motion Control Modules

The motion control modules for the CS1D series have been developed for precise positioning, as is necessary in pick and place machines and positioning systems. Up to four axes can be controlled dependently or independently of one another.

The new high-performance motion controller CS1W-MCH71 can also handle up to 30 axes over an electronic high-speed 10 Mbps bus and also perform electronic gear functions.

Module	Controlled Axes	Electronic Gear Functions	See page
CS1W-MC221	2 max.	No	**C-99**
CS1W-MC421	4 max.	No	**C-99**
CS1W-MCH71	30 max.	Yes	WEB Go to **www.omron.com/oei**, type CS1W-MCH71 in "Site Search" for more information.

High-Speed Counter Modules

The high-speed counter modules count pulse signal inputs that are too fast to be detected by normal input units.

Module	Max. Input Frequency	Input Voltage	Number of Counters	Remarks
CS1W-CT021	50 kHz - 500 kHz with Line Driver Input	5, 12, 24 VDC and RS-422 Line Driver	2	–
CS1W-CT041	50 kHz - 500 kHz with Line Driver Input	5, 12, 24 VDC and RS-422 Line Driver	4	–
CS1W-HCP22	50 kHz - 200 kHz with Line Driver Input	5, 12, 24 VDC and RS-422 Line Driver	2	Programmable unit with PLC functionality and 2 pulse outputs
CS1W-HCA22	50 kHz - 200 kHz with Line Driver Input	5, 12, 24 VDC and RS-422 Line Driver	2	Programmable unit with PLC functionality and 2 analog outputs
CS1W-CTS21	1.5 MHz	RS-422/485	2	SSI (Synchronous Serial Interface) encoder inputs

ID Sensor Modules

The ID sensor modules interface with the V600-series RFID (Radio Frequency Identification) system for high-speed communications between the CPU unit and data carriers (Radio Frequency Tags).

Module	Number of R/W Heads	See page
CS1W-V600C11	1	**C-107**
CS1W-V600C12	2	**C-107**

Configuration Guidelines

Remember to add all the current consumptions of basic I/O, special I/O modules, and CPU bus units to determine which power supply is appropriate.

Please refer to the ***System Configuration*** section for current consumption of individual modules.

For more I/O options, see the ***Industrial Networks and Communication*** section for DeviceNet I/O on page C-123 and CompoBus/S I/O on page C-138.

Industrial Networking

This section describes the data and command exchange communications options available for CS1D systems:

Need to exchange large volumes of large messages enterprise-wide?

Ethernet **Page C-116**

Need a deterministic network between PLCs and between computers and PLCs?

Controller Link **Page C-120**

Need to exchange data and messages with legacy large rack Omron PLCs?

SYSMAC Link **Page C-122**

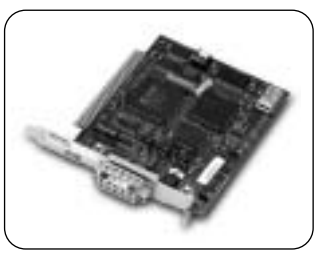
Need an open network that exchanges device data and status?

DeviceNet
Wide range of connectivity options
Wide range of slave I/O and master options **Page C-123**

Need to exchange data and make remote settings available to host computers, controllers and other serial devices?

Serial Communications
Protocol Macros allow immediate connectivity to serial controllers, offer custom protocol development and ladder program access **Page C-143**

Collect and Share Valuable Data



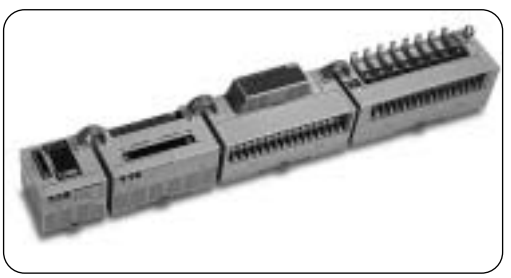
Networking has become one of the core requirements of automation systems today because tomorrow's competitive edge comes from factory floor and enterprise-wide data. More and more, factory operations are becoming dependent on machine and line productivity data. Automation systems that were once isolated and stand-alone now provide valuable data for process optimization and statistical analysis.

Omron's Industrial Networking options provide easy-to-implement connections from controllers to Data Acquisition Systems and Supervisory Control Systems that is unmatched in the industry today. This is very easy to accomplish using Omron's Programmable Controllers because:

1) the Communications Modules provide the intelligence for routing the commands or data, and
2) the memory of the processor is organized so that communications requests can access data areas in the processor without interrupting the control function of the CPU to do "block transfers."

Data memory provides a "scratch pad" for information to be written to and read from. It can also be the "working" memory to which real world I/O changes are automatically written. This allows the user to designate the desired data, what it means and what should be done with it from a remote location, ***without*** interfering with the execution of the control program.

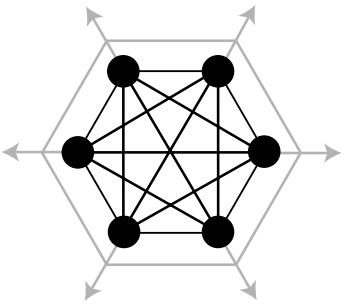
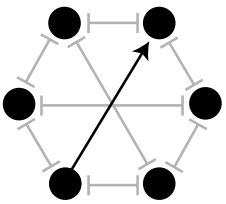
The final key to this capability is Omron's unique middleware product called FINS (Factory Intelligent Network Service) that allows messages and information to be ***seamlessly*** routed across and up to three networks. This means that a message or command that originates from a computer and originates on Ethernet, can route through a factory floor Programmable Controller over Controller Link and, finally, access I/O data in a "micro" controller over either a serial link or DeviceNet.



Omron Simplifies Setup for Network Communications

Examine the realities and costs involved in building the network communications that let you integrate plant floor data with front office systems. Two considerations move to the top of the list: flexibility to handle changing requirements easily and the ability to integrate legacy products. The table below clarifies the advantages of Omron's approach.

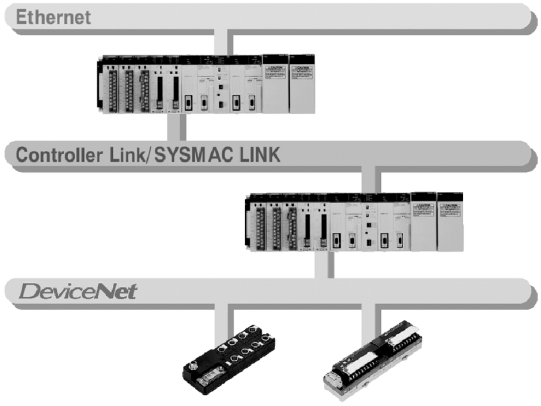
Comparison of Omron's Data Link to Traditional Block Transfer

Data Exchange Method	Data Link	Block Transfer
What it accomplishes	Makes available an easily expanded area of data that is accessible to all PLCs on the network. Data requests are handled outside the scan time by co-processors in the communications modules. 	Defines a point-to-point connection between a desired individual data point in a PLC to make a specific link to the requesting PLC and define the amount of data that can be exchanged. Typically limited to 64 words. 
Setup procedure	• Use dialog box "wizard" setup • User defines how much data is to be sent via the Data Link, what memory location is to be used and how much to "read" from all other network nodes	• Use special Move instructions • Must follow any Read or Write command • Error checking is done by programming and data consistency must be checked due to scan cycle mismatches
Setup example	The screen capture shows a typical Data Link set-up in progress. The user can define: • How much data gets sent • What memory area is the source of the data and • Where to put received data 	Printout shows the first rung of an extensive program required to define point-to-point data exchange and to verify data consistency. • Error checking is done by programming • Size of transfer affects program cycle timing 
Making changes	• Amount of data to be handled, changing where it goes or adding a new node is as simple as the initial setup • No impact on program execution	• Program must be adjusted if data size changes; program execution time changes • If different models are communicating, up to 3 programming software packages could be required
Costs and future expandability	Data Link reduces the original cost of programming in setting up the routing tables for exchange and offers maximum flexibility for future changes, requiring minimal editing to routing table data.	Long hours of programming each individual point-to-point exchange followed by system testing to be sure cycle time is acceptable, followed by any modifications to bring cycle time back into bounds. Future changes are time consuming editing projects.
Handling legacy systems	Omron's CX-Programmer software covers all Omron's programmable controllers with networking capability, from micros up to large rack systems. Access to the memory areas available for each model is selected in a dialog box when the specific model is designated.	Depending on the manufacturer, multiple programming software packages are required to set up and modify the block transfer ladder programming across the full range of PLCs in an installation. Finding and hiring programmers with experience in older platforms becomes difficult as time goes by.

Note: Only CS1 Basic and High-density I/O modules as well as Special I/O modules can be used with the CS1D. Please refer to the appropriate I/O section for more information.

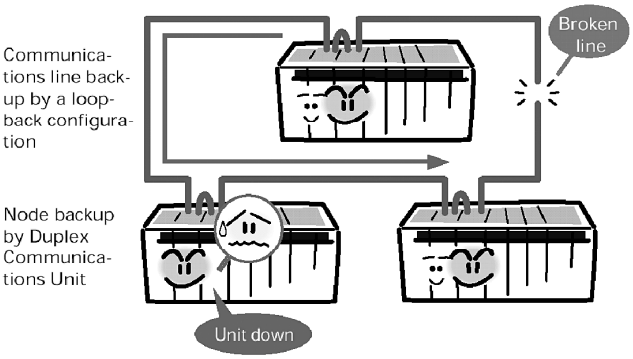
Seamless Network Environments

With the CS1D, Networks are available for every level: Ethernet communications for data, Controller Link and SYSMAC LINK for controllers, and DeviceNet for components. Messages can be sent and received over a maximum of three network levels.



Higher Network Reliability

Duplex communications using Controller Link Fiber Optic Modules offer a loopback configuration that enables continuous communications even in the event of a problem.



Note: 1. Controller Link Modules CS1W-CLK12-V or CS1W-CLK52-V1 are required for network duplexing.
2. For more details and specifications, refer to the newest version of manual W370.
3. Please refer to the CS1 Industrial Networks and Communications section for Ethernet, Controller Link, SYSMAC LINK and DeviceNet specifications.

■ System Configuration

A CS1D System can be configured as either a CS1D Duplex System or a CS1D Simplex System.

■ CS1D Duplex Systems

A CS1D System with two CPU Units mounted is called a CS1D Duplex System.

Duplex Functions

The following duplex functions are supported by a CS1D Duplex System.

Duplex functions	Support
Duplex CPUs (with Duplex Inner boards)	Yes
Duplex power supply modules	Yes
Duplex communications modules (e.g., Controller Link modules)	Yes
Online unit replacement	Yes

The Two Modes in a CS1D Duplex System

A CS1D Duplex System can be operated in either Duplex Mode or Simplex Mode.

- Duplex Mode
  In Duplex Mode, the CPUs are placed in duplex system status. If a fatal error occurs in the active CPU, control is switched to the standby CPU and operation continues.
- Simplex Mode
  In Simplex Mode, a single CPU controls operation.

■ CS1D Simplex Systems

In a CS1D Simplex System, operation is possible with only a single CPU mounted.

Aside from having just one CPU mounted, a CS1D Simplex System is the same as the Simplex Mode in a CS1D Duplex System in all other respects, such as system configuration (mounted Units) and operating restrictions.

Duplex Functions

The following duplex functions are supported in a CS1D Simplex System.

As shown in the table, duplex Power Supply Units, duplex Communications Units, and online Unit replacement are supported, but duplex CPUs are not.

Duplex function	Support
Duplex CPUs (with duplex inner boards)	No
Duplex power supply modules	Yes
Duplex communications modules (e.g.,Controller Link modules)	Yes
Online unit replacement	Yes

CS1D Simplex System Mode

Only the Simplex Mode is possible in a CS1D Simplex System.

System Configuration

One CS1D CPU (on either side of the Duplex Unit) and one Duplex Unit are mounted to a CS1D-BC052 Duplex CPU Backplane.

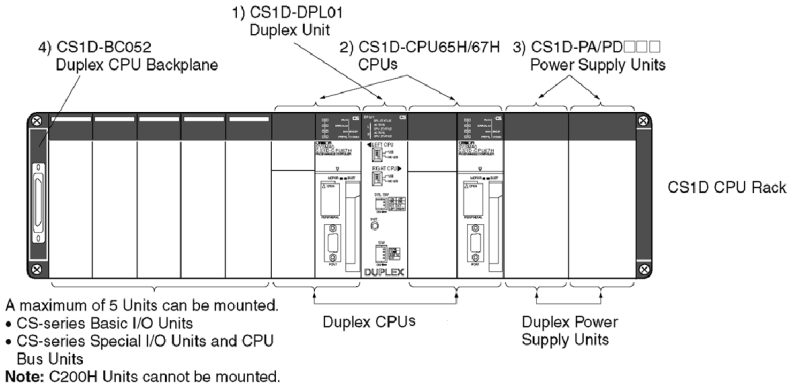
Note: A Duplex Unit is required even in a Simplex System.

CPU Rack

■ System Configuration

Note: Observe the following precautions when configuring a system.

- CS1D-□□□□ models must be used for all CPUs, Power Supply Units, and Backplanes.
- CS-series and C200H Expansion Backplanes cannot be connected. CS1D-series Backplanes must be used.
- C200H I/O and communication modules cannot be used. (They cannot be mounted to CPU Racks, Expansion Racks, or Long-distance Expansion Racks.)



■ CS1D CPU Racks

Name		Model	Contents
1	Duplex unit	CS1D-DPL01	The duplex unit is the unit that controls duplex system operation. It monitors for errors and switches operation when an error occurs.
2	CS1D CPUs (with Duplex inner board)	CS1D-CPU□□H	CS1D CPUs are designed especially for a duplex system. Two CPUs of the identical model are mounted in a duplex system. If the inner board is to be configured for duplex operation, two duplex inner boards are also mounted. In a simplex system (i.e., operation by a single CPU), only one CPU is mounted.
3	CS1D Power supply unit	CS1D-PA207R	CS1D Power supply units are designed especially for a duplex system. Two power supply units are mounted to a CPU rack, expansion rack or long distance expansion rack for a duplex power supply configuration. When not configuring a duplex power supply only one power supply unit is mounted.
4	Duplex CPU backplane	CS1D-BC052	The duplex CPU backplane is used in a CS1D duplex system. It allows duplex CPUs, duplex power supplies and duplex communications units to be mounted and enables online replacement of units.

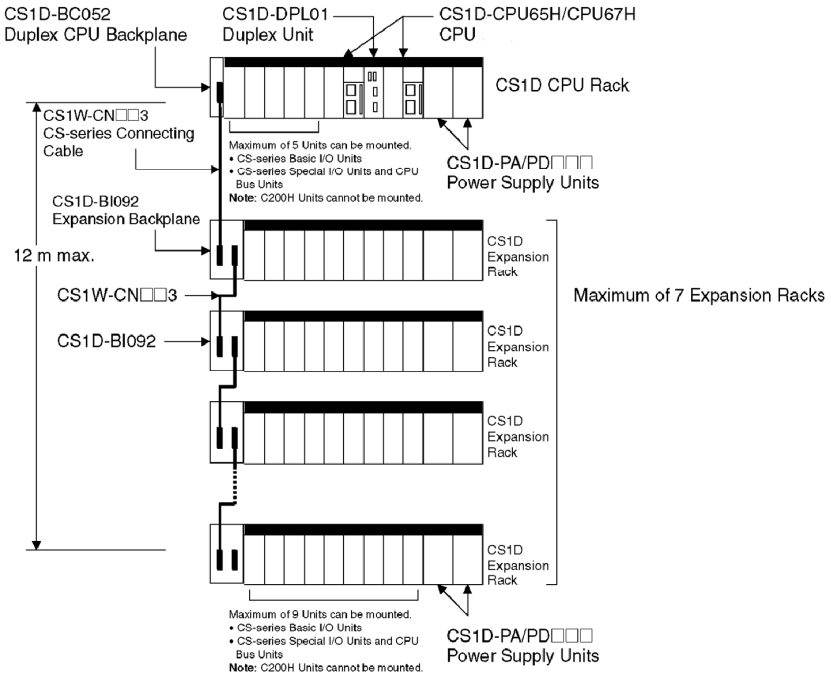
Note: 1. A Duplex System including an Inner Board can be used with CS1D CPUs with lot numbers of 030422 (manufactured April 22, 2003) or later.

2. When Inner Boards are used in a duplex configuration, one Duplex Inner Board must be mounted in each CPU. Non-duplex Inner Boards cannot be used.
3. When using a Memory Card in Duplex Mode, mount it in the active CPU. (Duplex Memory Card operation is not possible.) Duplex EM File Memory operation is possible.
4. In Simplex Mode, the single CPU can be mounted to either the right or the left slot. A Duplex Unit is required in either case.

■ CPU Rack + CS1D Expansion Racks

Use the following CS1D Expansion Backplane.

Name	Model number	Contents
CS1D Expansion Backplane (supports online unit replacement)	CS1D-BI092	This Backplane must be used for any Expansion Racks in a CS1D Duplex System. It enables duplex Power Supply Units, duplex Communications Units, and online Unit replacement. It is also used as the Backplane for a Long-distance Expansion Rack.



Expansion Racks

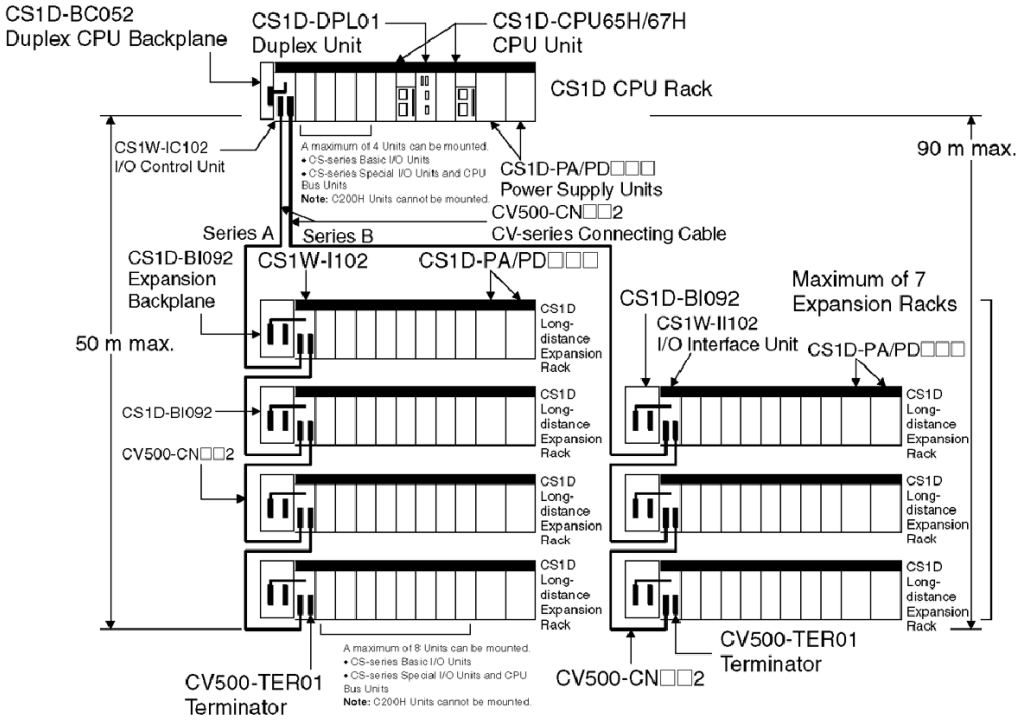
■ CS1D CPU Rack + CS1D Long-distance Expansion Racks

A Long-distance Expansion System can also be configured as a Simplex System.

Use the following CS1D Expansion Backplane.

Name	model number	Contents
CS1D Expansion Backplane (supports online Unit replacement)	CS1D-BI092	This Backplane must be used for any Long-distance Expansion Racks in a CS1D Duplex System. It enables duplex Power Supply Units, duplex Communications Units, and online Unit replacement. It is also used as the Backplane for a Long-distance Expansion Rack.

Note: An I/O Control Unit (CS1W-IC102) is mounted only to the CPU Rack.



■ Units in a CS1D System Configuration

This section lists the Units and Peripheral Devices that can be used to configure a CS1D Duplex System.

Note: Special CS1D products must be used for the CPUs, Power Supply Units, CPU Backplane, and Expansion Backplanes. CS-series products cannot be used.

Name		Model	Usable in CS1D Duplex System?	Remarks
CPUs	CS1D CPUs	CS1D-CPU65H	Yes	Use CS1D products only. CS-series products cannot be used.
		CS1D-CPU67H	Yes	
	CS-series CPUs	CH1G/H-CPU□□-V1 CS1G/H-CPU□□H	No	
Duplex Module		CS1D-DPL01	Yes	—
Power supply unit	CS1D Power supply	CS1D-PA207R	Yes	Use CS1D products only. C200H and CS-series products cannot be used.
	Power supply for C200H and CS-series	C200H-P□□□□□	No	
CPU backplanes	Duplex CPU backplane	CS1D-BC052	Yes	
	CS-series backplane	CS1W-BC□□□	No	
Expansion backplanes	CS1D expansion backplane	CS1D-BI092	Yes	Use CS1D products only. C200H and CS-series products cannot be used. The same backplane is used for CS1D Expansion Racks and long-distance expansion racks. The connecting cables are the same as for the CS-series.
	CS-series expansion backplane	CS1W-BI□□□	No	
	C200H expansion backplane	C200HW-BI□□□-V1	No	
I/O control module		CS1W-IC102	Yes	Used with long-distance expansion rack. (Mounted to CPU rack. Cannot be mounted to expansion racks.)
I/O interface module		CS1D-II102	Yes	Used with long-distance expansion rack. (Mounted to expansion racks.)
Basic I/O modules		CS-series I/O modules	Yes	—
		CS-series interrupt input module (CS1W-INT01)	Restrictions	Can be used only as an ordinary input module in a CS1D Duplex system.
		C200H basic I/O modules	No	C200H basic I/O units cannot be used.
Special I/O units		CS-Series special I/O units	Yes	—
		C200H special I/O units	No	C200H special I/O units cannot be used.
CPU Bus units		CS-Series CPU Bus units	Yes	—
		Controller Link units (for duplex communications) CS1W-CLK12-V1 (H-PCF cable) CS1W-CLK52-V1 (GI cable)	Yes	Allows communications units to be used in duplex operation.
Inner boards	Non-duplex inner boards	CS1W-SCB21 CS1W-SCB21-V1 CS1W-SCB41 CS1W-SCB41-V1 CS1W-LCB01, etc.	No	Cannot be used in either Duplex Mode or Simplex Mode.

(This table continues on the next page.)

CS1D System Configuration (continued)

Name		Model	Usable in CS1D Duplex System?	Remarks	
Memory cards		HMC-EF□□□	Yes	Memory cards cannot be used in duplex operation. Mount the memory card to the active CPU.	
Battery set		CS1W-BAT01	Yes	—	
Connector covers		C500-COV01	No	—	
		CV500-COV01	Yes		
Programming devices	Computer software	CX-Programmer Ver. 3.0 or later	Yes	—	
		CX-Programmer Ver. 2.1 or earlier	No	CX-Programmer Ver 2.1 or earlier cannot be used.	
		CX-Protocol	Yes	—	
		SYSMAC-CPT	No	—	
		SYSMAC Support Software (SSS)	No	—	
	Programming consoles	CQM1H-PRO01E	Yes	The Key Sheet and Connecting Cable are the same for the CS1D and CS1-H systems.	
		C200H-PRO27-E	Yes		
CS-series connecting cables		CS1W-CN313	Yes	0.3 m	Used to connect CPU rack to expansion rack, or to connect expansion racks.
		CS1W-CN713	Yes	0.7 m	
		CS1W-CN223	Yes	2 m	
		CS1W-CN323	Yes	3 m	
		CS1W-CN523	Yes	5 m	
		CS1W-CN133	Yes	10 m	
		CS1W-CN133-2	Yes	12 m	
Long-distance expansion cables		CV500-CN312	Yes	0.3 m	Used to connect Long-distance expansion racks.
		CV500-CN612	Yes	0.6 m	
		CV500-CN122	Yes	1 m	
		CV500-CN222	Yes	2 m	
		CV500-CN322	Yes	3 m	
		CV500-CN522	Yes	5 m	
		CV500-CN132	Yes	10 m	
		CV500-CN232	Yes	20 m	
		CV500-CN332	Yes	30 m	
		CV500-CN432	Yes	40 m	
		CV500-CN532	Yes	50 m	
Terminator		CV500-TER01	Yes	Used as terminating resistance for long-distance expansion racks.	

■ I/O Allocations

CS1D I/O allocations are the same as with the CS1. The only difference is the maximum number of CS1 Special I/O modules that can be mounted on a PLC. For the CS1D, the maximum number is 68 units.

■ Current Consumption

There is a fixed amount of current and power that can be provided to the units on the rack. Even when using only one power supply unit, design the system so that the total current consumption of units on the rack does not exceed the values for the maximum power supply unit current and the maximum total power.

When Duplex power supplies are used, the load for each CS1D power supply is reduced by approximately half. Calculate the total current consumption under normal conditions (i.e., with one power supply mounted), taking into account the load when an error occurs at one of the power supplies.

■ CPU Rack and Expansion Racks

The maximum current and power provided for the CPU rack and expansion racks is shown below.

Note: 1. CPU Rack: When making calculations, include the current and power consumption for a duplex CPU backplane, a duplex unit and two CS1D power supply units.

2. When making calculations, include the current and power consumption for an online replacement expansion backplane.

Power supply unit model	Maximum current provided			Maximum total power provided
	5 V (internal logic power supply)	26 V (relay power supply)	24 V (service power supply)	
CS1D-PA207R	7 A	1.3 A	None	35 W

Current Consumption

■ Total Current and Power Consumption Calculation Example

Example 1: Mounting the following units on a CPU Rack with a CS1D-PA207R power supply unit.

Item	Model	Quantity	Voltage group	
			5 V	26 V
Duplex CPU backplane (5 slots)	CS1D-BC052	1	0.55 A	—
Duplex Unit	CS1D-DPL01	1		
CPU	CS1D-CPU67H	2	0.82 A	—
Input unit	CS1W-ID291	1	0.20 A	—
Output unit	CS1W-OC221	1	0.13 A	0.096 A
Special I/O unit	CS1W-MAD44	2	0.20 A	0.20 A
CPU bus unit	CS1W-CLK21	1	0.33 A	—
Service power supply	—		—	—
Current consumption	Calculation		0.55 + 0.82 x 2 + 0.20 + 0.13 + 0.20 x 2 + 0.33	0.096 + 0.20 x 2
	Result		3.25 A (≤7 A)	0.496 A (≤1.3 A)
Power consumption	Calculation		3.25 A x 5 V = 16.3 W	0.496 A x 26 V = 12.9 W
	Result		16.3 + 12.9 = 29.2 W (≤35 W)	

Example 2: Mounting the following units on an Expansion Rack with a CS1D-PA207R Power supply unit.

Item	Model	Quantity	Voltage group	
			5 V	26 V
Online replacement expansion backplane	CS1D-BI092	1	0.28 A	—
Input unit	CS1W-ID291	2	0.20 A	—
Output unit	CS1W-OC291	7	0.48 A	—
Current consumption	Calculation		0.28 + 0.20 x 2 + 0.48 x 7	—
	Result		4.04 A (≤7 A)	—
Power consumption	Calculation		4.04 A x 5 V = 20.2 W	—
	Result		20.2 W (≤35 W)	

■ Current Consumption Tables

Note: Please refer to the CS1 System Power and Expansion section for current consumption of CS1 Basic I/O, CS1 Special I/O and CS1 CPU Bus units.

5 V Voltage Group

Name	Model	Current consumption (A)
Duplex CPU backplane	CS1D-BC052	0.55 (total for backplane and duplex unit)
Duplex unit	CS1D-DPL01	
CS1D CPU	CS1D-CPU67H	0.82 (See note 1.)
	CS1D-CPU65H	0.82 (See note 1.)
Online replacement expansion backplane	CS1D-BI092	0.28
I/O control unit	CS1W-IO102	0.92
I/O interface unit	CS1W-II102	0.23

Note: 1. The values shown include the current consumption for programming devices.
2. NT-AL001-E Link adapters consume an additional 0.15 each when used.

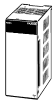
■ CPU Rack

Name	Specifications			Standards	Part number
CPUs	I/O bits	Program capacity	Data memory capacity	---	---
	5,120	60K steps	128K words (DM: 32K words, EM: 3 banks of 32K words each)	UC, N, L, CE, CID2	**CS1D-CPU65H**
	5,120	250K steps	448K words (DM: 32K words, EM: 13 banks of 32K words each)		**CS1D-CPU67H**
CPU Backplane	5 slots				**CS1D-BC052**
Power Supply Units	100 to 120 VAC or 200 to 240 VAC (with RUN output); Output capacity: 7 A, 5 VDC				**CS1D-PA207R**
Duplex Unit	—				**CS1D-DPL01**
I/O Control Unit	For Expansion Racks connected over a distance of more than 12 m (2 terminating resistors included. C200H Modules cannot be used on Long-distance Expansion Racks.)			U, C, CE, N	**CS1W-IC102**
Memory Cards 	Flash memory, 15 MB			L, CE	**HMC-EF172**
	Flash memory, 30 MB				**HMC-EF372**
	Flash memory, 64 MB				**HMC-EF672**
	Memory Card Adapter (for computer PCMCIA slot)			CE	**HMC-AP001**
Serial Communications Boards	2 × RS-232C ports, protocol macro function			U, C, N, L, CE	**CS1W-SCB21-V1**
	1 × RS-232C port + 1 × RS-422/485 port, protocol macro function				**CS1W-SCB41-V1**
Programming Consoles 	An English Keyboard Sheet (CS1W-KS001-E) is required. (Connects to peripheral port on CPU only. Cannot be connected to RS-232C port.)			U, C, N, CE	**CQM1H-PRO01-E**
					C200H-PRO27-E
Programming Console Key Sheet	For C200H-PRO27 and CQM1-PRO01			CE	**CS1W-KS001-E**
Programming Console Connecting Cables 	Connects the C200H-PRO27-E Programming Console. (2.0 m)				**CS1W-CN224**
	Connects the C200H-PRO27-E Programming Console. (6.0 m)				**CS1W-CN624**
CX-Programmer software	For 1 license		Windows-based Support Software for ladder programming on Windows 95, 98, Me, NT 4.0, 2000, or XP (Connects to peripheral port on CPU or RS-232C port on CPU or Serial Communications Unit/Board.)	---	**WS02-CXPC1-EV3**
	For 3 licenses				**WS02-CXPC1-EV3L03**
	For 10 licenses				**WS02-CXPC1-EV3L10**
Peripheral Device Connecting Cables (for peripheral port)	Connects DOS computers, D-Sub 9-pin receptacle (Length: 0.1 m) (Conversion cable to connect RS-232C cable to peripheral port)			CE	**CS1W-CN118**
	Peripheral bus or Host Link		Connects DOS computers, D-Sub 9-pin (2.0 m)		**CS1W-CN226**
			Connects DOS computers, D-Sub 9-pin (6.0 m)		**CS1W-CN626**
Peripheral Device Connecting Cables (for RS-232C port)	Peripheral bus or Host Link, anti-static		Connects DOS computers, D-Sub 9-pin (2.0 m)	---	**C200H-CN229-EU**
					CBL-202 *
PC USB Adapter	Converts PC USB port to a PC serial port for use with Omron serial programming cables.			---	**CS1W-C1F31**
CX-Protocol	Windows-based Protocol Creation Software for Windows 95, 98, Me, NT 4.0, 2000, or XP			---	**WS02-PSTC1-E**
Battery Set	For CS1 Series only. (Replace battery within 2 years of the production date.)			L, CE	**CS1W-BAT01**

* Available in Canada only.

Expansion Rack

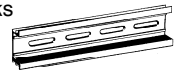
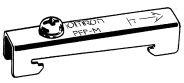
■ Expansion Rack

Name	Specifications		Standards	Part number
CS1D Expansion Backplane 	9 slots		UC, N, L, CE, CID2	**CS1D-BI092**
Power Supply Module 	100 to 120 VAC or 200 to 240 VAC (with RUN ouput), Output capacity: 7 A , 5 VDC			**CS1D-PA207R**
I/O Interface Unit	For Expansion Racks connected over a distance of more than 12 m. (C200H Modules cannot be used on Long-distance Expansion Racks.)		U, C, CE	**CS1W-II102**
CS1 I/O Connecting Cables	Connects CS1 Expansion I/O Backplanes to CPU Backplane or other CS1 Expansion I/O Backplanes.	Length: 0.3 m	L, CE	**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**
Long-distance Expansion Rack Cables	Connect I/O Control Unit to I/O Interface Unit or connects two I/O Interface Modules	Length: 0.3 m	N, L, CE	**CV500-CN312**
		Length: 0.6 m	N, CE	**CV500-CN612**
		Length: 1 m		**CV500-CN122**
		Length: 2 m	CE	**CV500-CN222**
		Length: 3 m		**CV500-CN322**
		Length: 5 m		**CV500-CN522**
		Length: 10 m		**CV500-CN132**
		Length: 20 m		**CV500-CN232**
		Length: 30 m		**CV500-CN332**
		Length: 40 m		**CV500-CN432**
		Length: 50 m		**CV500-CN532**

Note: Refer to the CS1 Ordering Guide for:

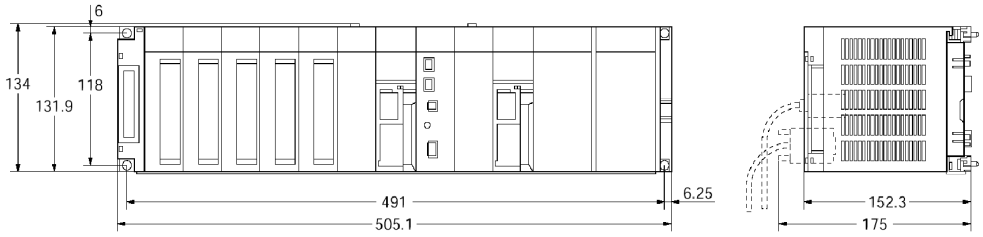
- CS1 High-density I/O modules
- CS1 Special I/O modules
- CS1 CPU Bus units
- DeviceNet product line

■ Mounting Rails and Accessories

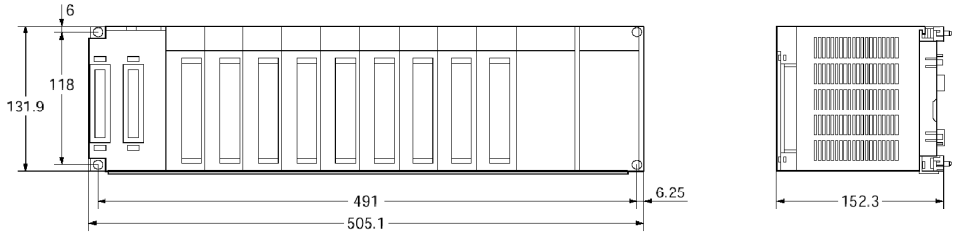
Name	Specifications	Standards	Part number
DIN Track Mounting Bracket 	1 set (2 included)	---	**C200H-DIN01**
DIN Tracks 	Length: 50 cm; height: 7.3 cm		**PFP-50N**
	Length: 1 m; height: 7.3 cm		**PFP-100N**
	Length: 50 cm; height: 16 mm		**PFP-100N2**
End Plate 	---		**PFP-M**
Spacer 	---		**PFP-S**

Unit: mm

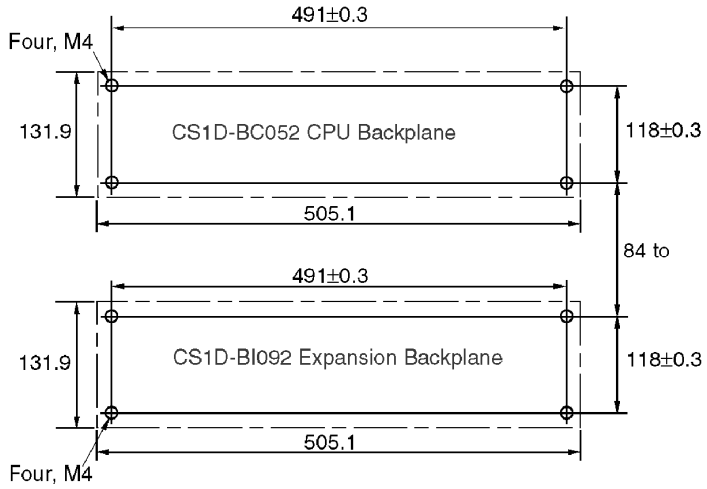
■ CS1D CPU Backplane



■ CS1D Expansion Backplane



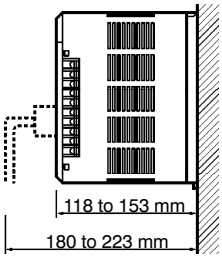
■ Backplane Mounting Dimensions



Dimensions

■ Mounting Depth

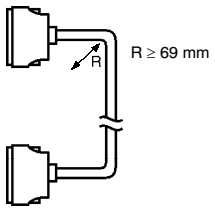
The depth of all Racks is from 118 to 153 mm depending on the Units that are mounted. Additional depth is required to connect Peripheral Devices and Cables. Be sure to allow sufficient mounting depth.



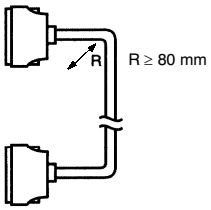
Cable Bending Radius

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)



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



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

OMRON

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