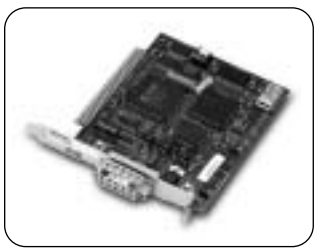
Industrial Networking

This section describes the data and command exchange communications options available for CS1 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 Profibus-DP Wide range of connectivity options Wide range of slave I/O and master options	**Page C-123, C-134**
Need a high-speed distributed I/O network?	CompoBus/S Wide range of slave I/O options	**Page C-138**
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



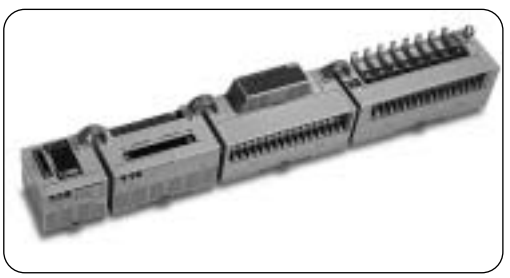
Networking has become one of the core requirements of automation systems today because tomorrow's competitive edge comes from factory floor and enterprise-wide data. More and more, factory operations are becoming dependent on machine and line productivity data. Automation systems that were once isolated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

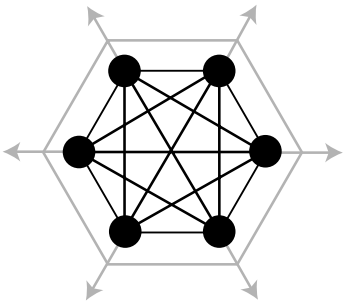
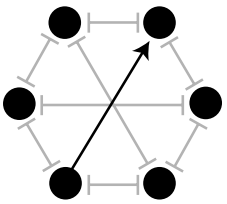
The final key to this capability is Omron's unique middleware product called FINS (Factory Intelligent Network Service) that allows messages and information to be ***seamlessly*** routed across and up to three networks. This means that a message or command that originates from a computer and originates 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

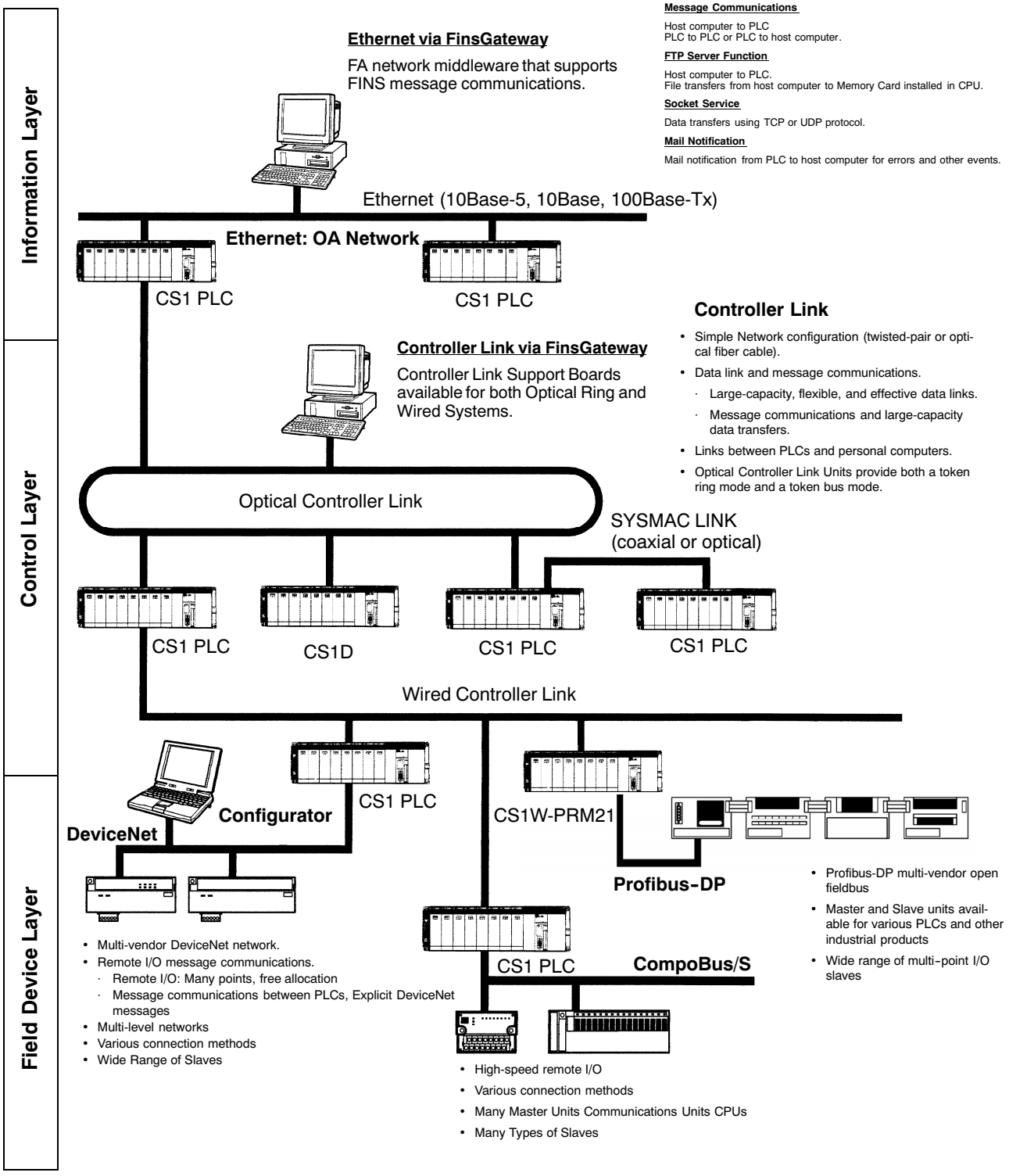
Examine the realities and costs involved in building the network communications that let you integrate plant floor data with front office systems. Two considerations move to the top of the list: flexibility to handle changing requirements easily and the ability to integrate legacy products. The table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

Seamless Communications Between Information Control Systems

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



■ Overview

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

■ Communications Specifications

Network	Ethernet	Controller Link	SYSMAC Link	PC Link	DeviceNet	CompoBus/S	Profibus-DP
Messages	Yes	Yes	Yes	---	Yes	---	Yes
Data links	---	Yes	---	Yes	---	---	---
Remote I/O	---	---	Yes	---	Yes	Yes	Yes
Maximum speed	10 Mbps	2 Mbps Comm cycle: Approx. 34 ms (Wired: 32 nodes, 2-Kbits + 2-Kword data links)	2 Mbps Comm cycle: Approx. 34 ms (Wired: 32 nodes, 2-Kbits + 2-Kword data links)	128 Kbps	500 Kbps Comm cycle: Approx. 5 ms (128 inputs and 128 outputs)	750 Kbps (See note 1.) Comm cycle: Approx. 1 ms (128 inputs and 128 outputs)	12 Mbps (See note 1.) Comm cycle: Approx. 1 ms
Total distance	2.5 km	Twisted-pair cable: 1 km (at 500 bps) Optical cable: 20 km	Coaxial: 1 km Optical: 10 km	500 m	500 m (at 125 bps)	Trunk line: 500 m (See note 2) Communications cycle: 6 ms max.	1200 m at 9600 bps 100 m at 12 Mbps Up to 4800 m with 3 repeaters
Maximum nodes	100	32/62	62	32	63	32	125
Communications media	Twisted-pair cable	Special twisted-pair cable or optical cable	Coaxial or Optical cable	DeviceNet cable	DeviceNet cable	2-core or 4 core VCTF cable, Special flat cable (See note 3)	Shielded twisted-pair
Network data link capacity	---	32,000 or 62,000 words	2,966 words	64 words	---	---	---
Remote I/O capacity	---	---	---	32,000 pts (with Configurator) 2,048 pts (without Configurator)	32,000 pts (with Configurator) 2,048 pts (without Configurator)	256 pts	7,168 (with Configurator)
Supporting PLCs	CJ1, CS1, CVM1, CV Series, C200HX/HG/HE	CJ1, CS1, CVM1, CV Series, C200HX/HG/HE	CS1, CVM1, CV Series, C200HX/HG/HE, C200HS, C1000H, C2000H	CS1, C200HX/HG/HE, C200HS, C1000H, C2000H	CJ Series, CS Series, CVM1, CV Series, C200HX/HG/HE, C200HS, CQM1/CQM1H (with I/O Link), CPM2C (with I/O link)	CJ1, CS1, C200HX/HG/HE, C200HS, CQM1/CQM1H (with I/O link), CPM1A/ CPM2C (with I/O Link)	CS1, CJ1, C200HX/HG/HE, C200HS, CQM1, CQM1H (With I/O link), CPM1A/2A (with I/O link)

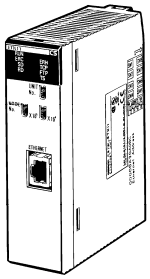
Note: 1. For the baud rate of 500 kpbs.

2. For the baud rate of 125 kbps.

3. For the high-speed communications mode (trunk length: 100 m) (30 m max. when using 4-conductor VCTF cable or special flat cable)

4. For 12 Mbps trunk line length is 100 m.

Ethernet Module



CS1W-ETN21
(100 Base-Tx)

■ Network Capabilities

Basic Capabilities

- Compatible with 100Base-TX (100 Mbps) and 10 Base-T (10 Mbps)
- 254 total nodes possible
- SNTP client functionality for automatic clock adjustment
- DNS client functionality to specify servers by host name
- Compatible with earlier CS1 Ethernet modules

E-Mail Capability

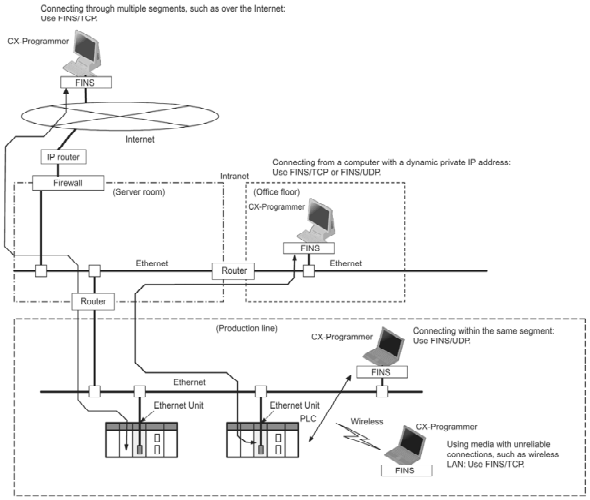
- Transmit e-mail attachments from the Ethernet module using an SMTP server to acquire user-created data, error log data, and module status data.
- Using a POP3 server, the user can send commands to the Ethernet unit via e-mail.

Internet Capability

- Host computers that acquire a dynamic IP address (using DHCP) can send commands to the PLC and receive responses.
- Multiple FINS supported applications within the computer can go on-line simultaneously.
- Using FINS communications, both TCP/IP and UDP/IP are supported.
- Using the built-in FTP server, files can be read from or written to the mounted memory card.
- Using FINS communications, connectivity with devices on other networks is possible (renting services).
- Socket services (TCP or UDP protocols) allow for Ethernet connected devices to send and receive data.
- FINS commands can be sent or received by PLCs or computers on the same Ethernet network.

■ Ethernet Network

Take advantage of a wide range of communications capabilities. Communicate with PLCs remotely through the Internet or locally through an Ethernet network. Transfer data with TCP/IP or UDP/IP socket services, execute Omron's standard FINS commands, transfer and receive memory card files with FTP, send e-mail with SMTP or receive e-mail with POP3. Select the communications services that are required and flexibly connect PLCs on an Information-Level Ethernet network.



Omron's Ethernet modules support the full TCP/IP model for maximum flexibility in data exchange. Omron uses easy-to-establish routing tables to share common data table contents instead of programming requests to share specific blocks of data with specific PLCs. With Omron, all communication modules can share data within PLC memory. This allows great flexibility for future control modifications without substantial reprogramming effort.

■ Specifications

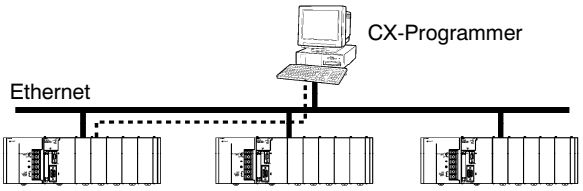
Product	Communications services	Unit numbers	Model number
CPU Bus Module	FINS communications, FTP server, socket services, DNS client, Mail services, SNTP services.	0 to F (4 modules max.)	CS1W-ETN21

Ethernet: Information Network

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

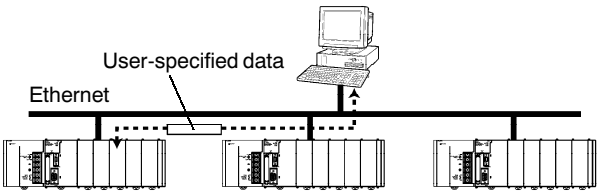
■ Remote Programming and Monitoring

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



■ Socket Service

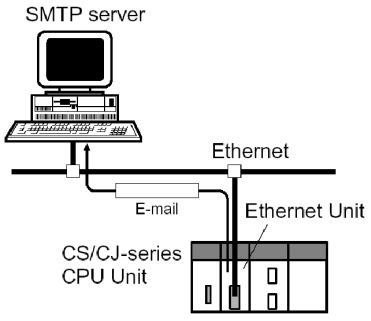
Send and receive data from devices on the same Ethernet Network using UDP or TCP protocol.



■ Mail Service

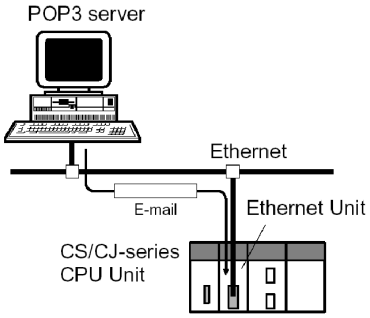
Mail Transmission Function

The Ethernet unit is able to send user-created data, error log data, and CPU status data as e-mail attachments using an SMTP server.



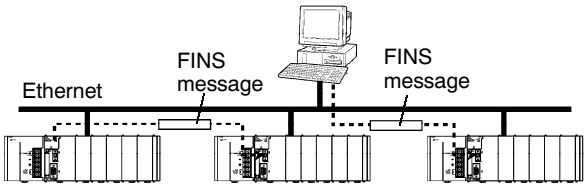
Mail Receive Function

Send FINS commands via e-mail through the internet or through the local intranet. The Ethernet unit receives the commands using a POP3 server, executes the commands and sends an e-mail response to the sender.



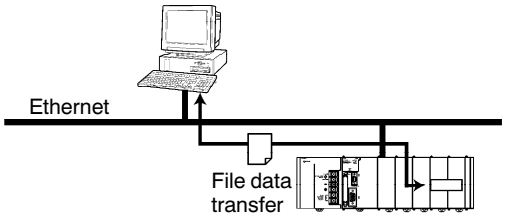
■ FINS Message Service

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



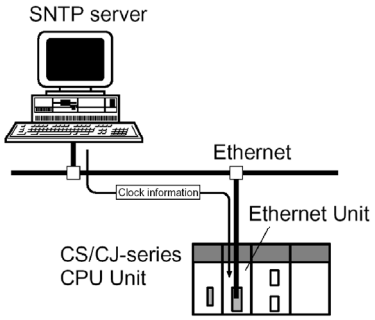
■ FTP Service

Use the FTP to transfer and receive files between Memory Cards in the CPU Unit and computer memory.



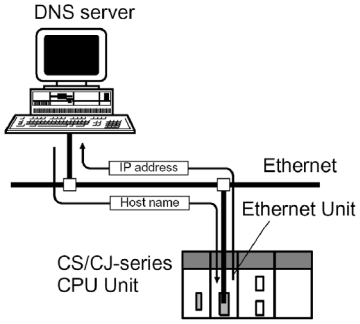
■ Automatic Clock Adjustment

The Ethernet unit can require clock information from an SNTP server on a triggered event, or on a regular interval. This information can be used to refresh the internal clock information of the CPU.

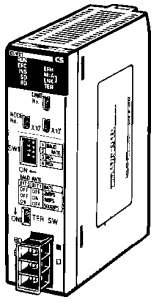


■ Specifying Servers By Host Name

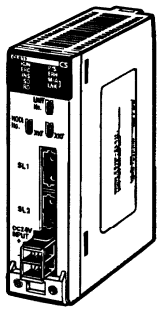
POP servers, SMTP servers and SNTP servers can be specified by Host Name rather than IP address by using the DNS client function.



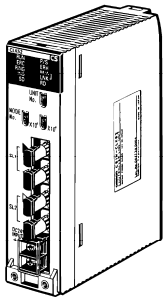
Controller Link Units and Controller Link Support Board



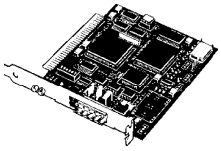
CS1W-CLK21-V1
Wired Controller Link Unit



CS1W-CLK12-V1
Optical Controller Link Unit (H-PCF Cable)



CS1W-CLK52-V1
Optical Controller Link Unit (GI Cable)



Personal Computer Boards
(for PCI bus)
3G8F7-CLK21-EV1
(for wired systems)
3G8F7-CLK12-EV1
(for optical, H-PCF-cable systems)
3G8F7-CLK52-EV1
(for optical, GI-cable systems)

Controller Link Repeater Units
CS1W-RPT01 (wire to wire type)
CS1W-RPT02 (wire to optical type for H-PCF cable)
Cs1W-RPT03

The Controller Link is Omron's main FA-level network. It supports automatic data links between PLCs and a host computer, as well as programmed data transfers using a message service. You get high-capacity, flexible data links and high-capacity data transfers with messages.

For a low-cost communications system, twisted pair cables can be used.

■ Features

Basic Functionality

- Connect CJ1 series, CS1 series, CVM1, CV, CQM1H, C200HX/HG/HE PLCs simultaneously (32 nodes max) to a max. distance of 1 km @ 500 Kbps baud rate.
- Shielded twisted-pair (STP) or optical fiber units available (Optical fiber connections have a high tolerance for noisy environments).
- Complete error correction and troubleshooting functions.
- Set communications parameters using CX-Programmer software.
- Total number of data link words in one network: 32,000 words (64,000 bytes) max.

CS1-V1 Controller Link Models:

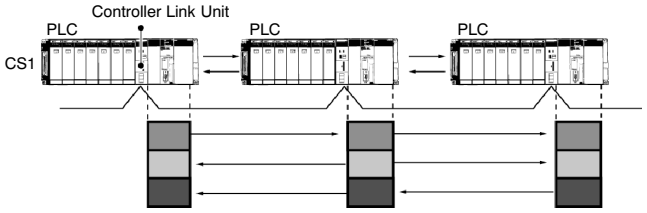
- Connect up to 62 V1 nodes total utilizing repeater units.
- Transmit up to 1.5 km at 2 Mbps baud rate using STP cables and STP repeater units.
- Complete error correction and troubleshooting functions.
- 1:N unequal allocation of data link possible using CX-Programmer v3.2 or greater.
- Data link allocation can be changed wihile data link is running.
- Number of data link words per module: 12,000 words (24,000 bytes) max.

PCI Controller Link Support Board

- Number of data link words in one PCI module: 32,000 words (64,000 bytes) max.
- Direct communication to controller link layer using CX-Programmer software.

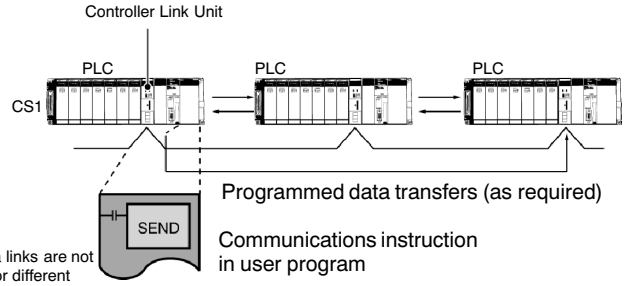
■ System Configuration

Data Links



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

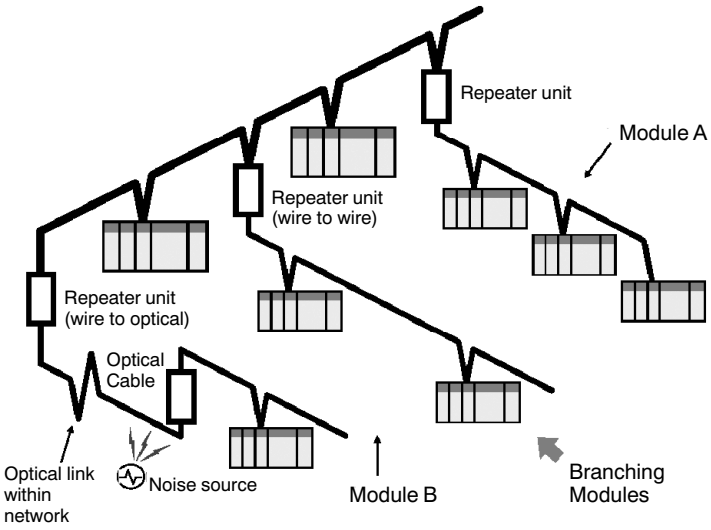
Message Communications



Programmed data transfers (as required)

Communications instruction in user program

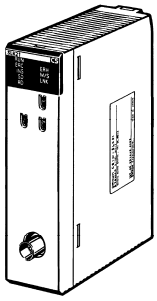
Note: Data links are not possible for different areas simultaneously.



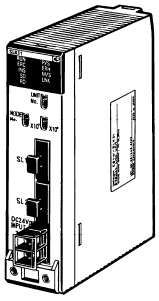
■ Specifications

Unit/Board	Classification	Communications	Media	Specifications	Unit numbers	Model
Controller Link Unit	CS1 CPU Bus Unit	Data links and message communications	Wired	Up to 4 Units can be mounted to a CPU rack or CS1 expansion racks.	0 to F (4 unit max.)	CS1W-CLK21-V1
			Optical (Token ring or token bus)			CS1W-CLK12-V1 CS1W-CLK52-V1
Controller Link Support Boards	Personal computer board		Wired	Applicable computer: Windows compatible computer with PCI bus	---	3G8F7-CLK21-EV1
			Optical (Token ring or token bus)			3G8F7-CLK12-EV1 3G8F7-CLK52-EV1
Controller Link Repeater Unit	Not mounted in a PLC		Wire to wire	Tree configuration max length 1.5 km (.93 miles) with 2 repeaters	---	CS1W-RPT01
			Wire to optical H-PCF			CS1W-RPT02
			Wire to optical GI			CS1W-RPT03

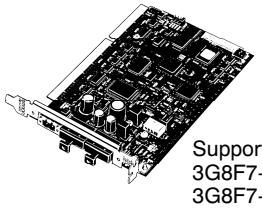
SYSMAC LINK Units and Support Boards



CS1W-SLK21
Coaxial SYSMAC LINK Unit



CS1W-SLK11
Optical SYSMAC LINK Unit



Support Boards (for PCI bus)
3G8F7-SLK21-E (for coaxial systems)
3G8F7-SLK11-E (for optical systems)

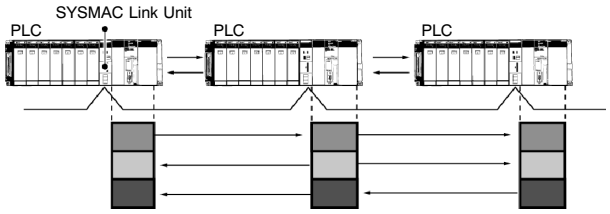
Both automatic data links and as-needed message services can be set up between PLCs or between PLCs and factory computers. You can exchange large volumes of data between up to 62 nodes for large-scale networks, or create a smaller network to suit the application.

■ Features

- Large-capacity, flexible data links.
- Large-capacity data transfers with message service.
- Use co axial cable or optical fiber to meet the system requirements.
- Connect different series of PLCs: CS1, C200HX/HG/HE, CVM1, CV, C200HS and C1000H.
- Complete trouble shootingmeasures.
- Communications settings with CX-programmer.

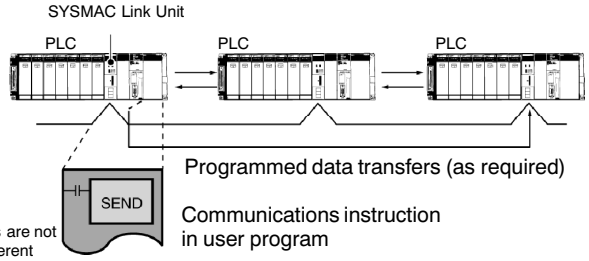
■ System Configuration

Data Links



CYCLIC transfer with shared memory data areas
I/O bits, LR area bits, DM area words, etc.

Message Communications



Programmed data transfers (as required)

Communications instruction in user program

Note: Data links are not possible for different areas simultaneously.

■ Specifications

Unit	Unit classification	Communications	Transmission media	Speecifications	Unit numbers	Model
SYSMAC Link Unit	CS1 CPU Bus Unit	Data links and message service	Coaxial cable	Up to 4 units can be mounted to CPU racks or CS1 expansion racks.	0 to F (4 units max.)	CS1W-SLK21
			Optical cable			CS1W-SLK11
SYSMAC Link Support Board	Computer Board		Coaxial cable	Computer: windows-compatible with PCI bus	---	3G8F7-SLK21-E
			Optical cable			3G8F7-SLK11-E

Multivendor, Multibit Network.
Control up to 32,000 Points (2,000 Words) per Master

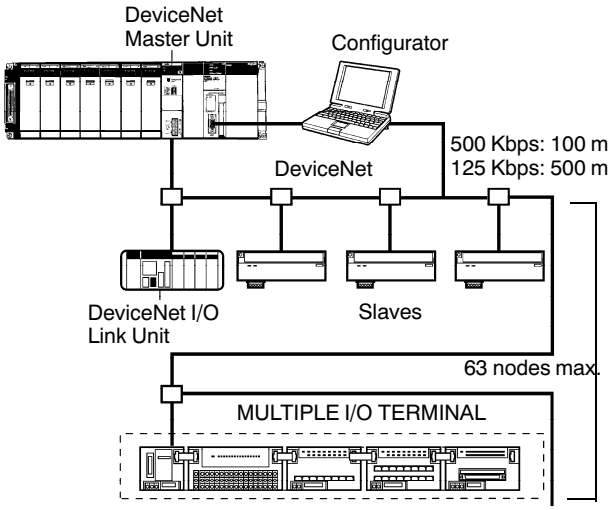
■ High-Speed Network for FA

DeviceNet is a high-speed network optimized for applications that require control of I/O on factory floor machinery.

Omron has developed an extensive offering of DeviceNet compatible products that reflect Omron's commitment to meeting two overriding operating performance principles: *(1) intuitive operation* and *(2) ease of deployment*.

To accomplish these objectives, powerful features have been built into Omron's DeviceNet Master Modules — features not seen in DeviceNet Masters from other vendors.

Omron's DeviceNet Master Modules provide the best possible DeviceNet can performance while simplifying network setup and configuration.



As a founding member of ODVA (Open DeviceNet Vendor's Association), Omron has implemented DeviceNet in a manner that assures ease of use and deployment. In the list that follows, you will see that our DeviceNet master units offer powerful features not found in the DeviceNet masters from other vendors.

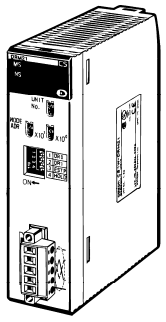
Highlights of Omron's DeviceNet Master Modules

- **Automatic network enrollment and I/O allocation**. Configuration tools are not required to set up, map and allocate the network into controller memory.
- **I/O allocation to *any* CPU memory area *without* the use of a configuration tool.** Allocate I/O using CX-Programmer software.
- **Omron DeviceNet Master has FINS capability.** This allows DeviceNet to be used to route data or to carry programming commands to FINS-capable devices. FINS is a communications protocol developed by Omron and embedded in the firmware of products such as network communication master modules.
- **Large buffer memory ensuring data integrity for explicit messaging.** Omron's master has 200 words of buffer memory to ensure consistent data integrity.
- **Message handling capacity eliminates a need for any space between messages.** Omron's master provides the fastest system throughput possible by eliminating any requirement for quiet space between messages.

All of the above features provide the best possible DeviceNet performance while simplifying network setup and configuration. Omron's DeviceNet slaves are fully compatible with the latest standards to ensure open communication with legacy masters from other vendors. *Wireless DeviceNet*, an Omron exclusive combination of transmitter and receiver, opens many new networking possibilities. It removes the barriers of wires and fixed topologies, opening the door to distributed intelligence and more flexibility in the location of networked I/O.

DeviceNet Master Module

Multivendor, Multibit Network.
Control up to 32,000 Points (2,000 Words) per Master



CS1W-DRM21
DeviceNet Unit

This is OMRON's implementation of the DeviceNet open field network, a multibit, multivender network for machine/line control and information. The following types of communications are possible.

1. Remote I/O communications for automatic data transfers between the CPU and Slaves (with no programming in the CPU).
2. Message communications that, using specific instructions (IOWR and CMND), can be programmed in a CPU equipped with a DeviceNet Unit to send read/write message to slaves or other CPUs equipped with DeviceNet Modules and control operation.

■ Features

The following functionality is available without a Configurator:

- Remote I/O communications slaves can be allocated in any area using the DM Area settings.
- More than one DeviceNet Unit can be mounted for each CPU (3 max. for fixed allocations).
- More than one DeviceNet Unit can be connected in a single network. When using the Configurator (see note), remote I/O can be allocated in an order independent of node address.

  Note: The Configurator is allocated 1 node if connected using a special board or card. It is not allocated a node if connected using serial or ethernet communications.
- DeviceNet Modules can be used as both masters and slaves, and master and slave functionality can be used simultaneously.
- DeviceNet Modules allow DeviceNet networks to be handled with the same seamless transparency as Controller Link, Ethernet, or other networks by using message communications or CX-Programmer remote programming and monitoring.

■ Specifications

DeviceNet Master Module

Classification	Types of communications	Specifications	Unit numbers	Model
CS1 CPU Bus Unit	Remote I/O communications master (fixed or user-set allocations) Remote I/O communications slave (fixed or user-set allocations) Message communications	Up to 16 Modules can be mounted when a Configurator is used. (3 max. without configurator)	0 to F (Configurator required to mount 16 Modules.)	CS1W-DRM21

■ DeviceNet Configurator

Product	Specifications	Model number
DeviceNet Configurator	Software only (Windows 95, 98, NT 4.0, or 2000)	WS02-CFDC1-E
	ISA board with software (Windows 95, 98, or NT)	3G8F5-DRM21-E
	PCMCIA card with software (Windows 95, 98, ME, 2000 or XP)	3G8E2-DRM21-EV1

■ Setting/Monitoring Software

Product	Specifications	Model number
NX-Server	DDE edition — serve network info to spreadsheets	WS02-NXD1-E

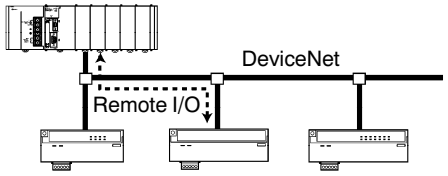
DeviceNet Slave Modules

■ DeviceNet: Component Network

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

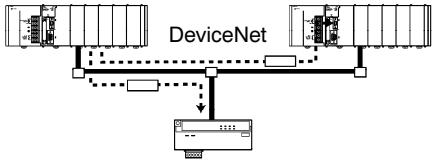
■ Remote I/O Communications

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



■ Message Communications

Send FINS messages between OMRON PLCs and Explicit message between OMRON PLCs and devices from other makers.

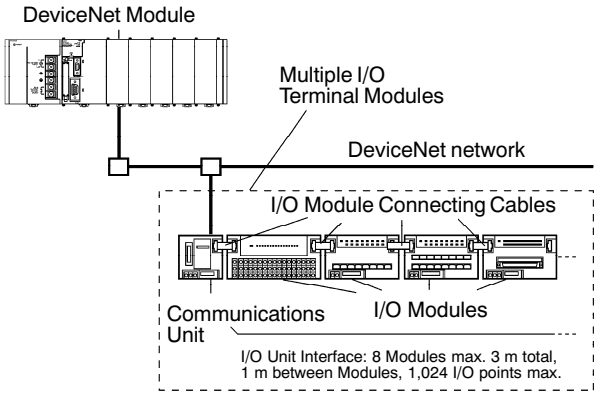


■ Select from a Wide Range of Slaves

Connect contact I/O, analog I/O, temperature inputs, sensor (photoelectric or proximity) inputs, and small PLCs. Most DeviceNet Slaves count as one node on the network, except for Multiple I/O Terminal Modules.

■ Use Multiple I/O Terminal Modules as DeviceNet Slaves

I/O can be expanded through one-step connections. Special I/O and explicit messages are also supported. Multiple I/O DeviceNet Slaves allow connection of up to 256 I/O points per node; analog input points allow a maximum of 1,024 points.



■ DeviceNet Slaves

Product		Specifications		Model number
Programmable Slaves		Controller with CPM2C CPU No. of remote I/O link points: 1,024 max. Provides CompoBus/S Master.	4 transistor outputs (sinking)	CPM2C-S100C-DRT
			4 transistor outputs (sourcing)	CPM2C-S110C-DRT
I/O Link Modules		512 internal inputs/512 internal outputs (between CS1 Series or C200HX/HG/HE PLC and Master)		C200HW-DRT21
		16 internal inputs/16 internal outputs (between CQM1/CQM1H and Master)		CQM1-DRT21
		32 internal inputs/32 internal outputs (between CPM1A/CPM2A and Master)		CPM1A-DRT21
Remote I/O Terminals with Transistors		8 input points, NPN		DRT1-ID08
		8 input points, PNP		DRT1-ID08-1
		8 output points, NPN		DRT1-OD08
		8 output points, PNP		DRT1-OD08-1
		16 input points, NPN		DRT1-ID16
		16 input points, PNP		DRT1-ID16-1
		16 output points, NPN		DRT1-OD16
		16 output points, PNP		DRT1-OD16-1
Remote I/O Terminals with Transistors and 3-Tier Terminal Block	Common power supply for communications and internal circuits	16 input points, NPN		DRT1-ID16TA
		16 input points, PNP		DRT1-ID16TA-1
		8 input points, NPN 8 output points, NPN		DRT1-MD16TA
		8 input points, PNP 8 output points, PNP		DRT1-MD16TA-1
		16 output points, NPN		DRT1-OD16TA
		16 output points, PNP		DRT1-OD16TA-1
	Separate power supplies for communications and internal circuits	16 input points, NPN		DRT1-ID16T
		16 input points, PNP		DRT1-ID16T-1
		8 input point, NPN 8 output points, NPN		DRT1-MD16T
		8 input point, PNP 8 output points, PNP		DRT1-MD16T-1
		16 output points, PNP		DRT1-OD16T
		16 output points, NPN		DRT1-OD16T-1
Remote I/O Terminals with transistors and connectors		32 input points, NPN		DRT1-ID32ML
		32 input points, PNP		DRT1-ID32ML-1
		32 output points, NPN		DRT1-OD32ML
		32 output points, PNP		DRT1-OD32ML-1
		16 input points, NPN 16 output points, NPN		DRT1-MD32ML
		16 input points, PNP 16 output points, PNP		DRT1-MD32ML-1
	Mounting Bracket B	—		SRT2-ATT02
Remote Adapters		16 input points, NPN, prewired connector		DRT1-ID16X
		16 input points, PNP, prewired connector		DRT1-ID16X-1
		16 output points, NPN, prewired connector		DRT1-OD16X
		16 output points, PNP, prewired connector		DRT1-OD16X-1
	Flat Ribbon Cable Connectors with MIL plugs	Straight DIP pins		XG4A-2031
		L-shaped DIP pins		XG4A-2034

(This table continues on the next page.)

DeviceNet Slaves (continued)

Product		Specifications		Model number
DeviceNet Sensor Communication Module for E3X-DA Fiber Amplifier (refer to the expanded info on E3X-DA at the end of this section)		Connects to up to 16 Fiber Amplifier Modules for the E3X-DA-N		E3X-DRT21
		Fiber Amplifier Unit		E3X-DA6-P
		Reduced-wiring Connector		E3X-CN02
		Terminal Unit, connects one sensor or switch		E39-TM1
Sensor Terminals (for 2-wire Senors)		8 sensor I/O points, NPN, 2 inputs per Sensor		DRT1-HD16S
		8 sensor I/O points, PNP		DRT1-ND16S
	Cable Connectors	0.3 to 0.5 mm^2		XS8A-0441
		0.14 to 0.2 mm^2		XS8A-0442
Water-Resistant Terminals (IP67)		4 input points, NPN		DRT1-ID04CL
		4 input points, PNP		DRT1-ID04CL-1
		4 output points, NPN		DRT1-OD04CL
		4 output points, PNP		DRT1-OD04CL-1
		8 input points, NPN		DRT1-ID08CL
		8 input points, PNP		DRT1-ID08CL-1
		8 output points, NPN		DRT1-OD08CL
		8 output points, PNP		DRT1-OD08CL-1
Environment-Resistant Terminals (IP65)		8 input points, NPN		DRT1-ID08C
		16 input points, NPN		DRT1-HD16C
		16 input points, PNP		DRT1-HD16C-1
		8 output points, NPN		DRT1-OD08C
		16 output points, NPN		DRT1-WD16C
		16 output points, PNP		DRT1-WD16C-1
		8 input points, NPN 8 output points, NPN		DRT1-MD16C
		8 input points, PNP 8 output points, PNP		DRT1-MD16C-1
B7AC Interface Terminal		10 input points x 3 (3 branches for the B7AC)		DRT1-B7AC
Analog Input Terminals		4 input points (4 words) or 2 input points (2 words) (Set via DIP switch.)		DRT1-AD04
		4 input points (4 words)		DRT1-AD04H
Analog Output Terminals		2 output points (2 words)	Current: 0 to 20 mA, 4 to 20 mA	DRT1-DA02
			Voltage: 1 to 5 V, 0 to 10 V, −10 to 10 V	
Temperature Input Terminals		4 input points (4 words)	Thermocouple type inputs: R, S, K1, K2, J1, J2, T, E, B, N, L1, L2, U, W, PLII	DRT1-TS04T
			RTD type inputs: Pt100, JPt100	DRT1-TS04P
RS-232C Unit		Two RS-232C ports, 16 inputs (signal status)		DRT1-232C2

■ Smart DeviceNet I/O Terminals

Basic Modules

Product	Specifications		Model number	Standards
Smart I/O basic Modules automaticaly collect network status and connected device performance information	16 inputs	NPN	DRT2-ID16	cULus, CE
	16 inputs	PNP	DRT2-ID16-1	
	16 outputs	NPN	DRT2-OD16	
	16 outputs	PNP	DRT2-OD16-1	
3-tier Terminal Block Types	16 inputs	NPN	DRT2-ID16TA	cULus, CE
	16 inputs	PNP	DRT2-ID16TA-1	
	16 outputs	NPN	DRT2-OD16TA	
	16 outputs	PNP	DRT2-OD16TA-1	
	8 inputs 8 outputs	NPN NPN	DRT2-MD16TA	cULus, CE
	8 inputs 8 outputs	PNP PNP	DRT2-MD16TA-1	
MIL Connector Terminal Block Types	32 inputs	NPN	DRT2-ID32ML	cULus, CE
	32 inputs	PNP	DRT2-ID32ML-1	
	32 outputs	NPN	DRT2-OD32ML	
	32 outputs	PNP	DRT2-OD32ML-1	
	16 inputs 16 outputs	NPN NPN	DRT2-MD32ML	cULus, CE
	16 inputs 16 outputs	PNP PNP	DRT2-MD32ML-1	
Relay Output Terminal Block	16 relay outputs		DRT2-ROS16	cULus, CE

Expansion Modules

Product	Specifications		Model number	Standards
Smart expansion I/O Modules provide mix and match flexibility in distributed I/O configuration	8 inputs	NPN	XWT-ID08	cULus, CE
	8 inputs	PNP	XWT-ID08-1	
	8 outputs	NPN	XWT-OD08	
	8 outputs	PNP	XWT-OD08-1	
	16 inputs	NPN	XWT-ID16	
	16 inputs	PNP	XWT-ID16-1	
	16 outputs	NPN	XWT-OD16	
	16 outputs	PNP	XWT-OD16-1	

Analog I/O Terminal

Product	Specifications		Model number	Standards
Analog Input Terminal	4 inputs (0 to 5 V, 1 to 5 V, 0 to 10 V, ±10 V, 0 to 20 mA, 4 to 20 mA)	Resolution: 12 bit; 1/6000; 4 ms max./4 pt conversion time	DRT2-AD04	cULus, CE, CL1 Div2
Analog Output Terminal	2 outputs (0 to 5 V, 1 to 5 V, 0 to 10 V, ±10 V, 0 to 20 mA, 4 to 20 mA)	Resolution: 12 bit; 6000; 2 ms/pt conversion time	DRT2-DA02	

IP67 Rated Transistor Terminals with M12 Connectors

Product	Specifications		Model number	Standards
Terminals with IP67-rated water-washdown resistance	16 inputs	NPN	DRT2-HD16C	cULus, CE
	16 inputs	PNP	DRT2-HD16C-1	
	8 inputs	NPN	DRT2-ID08C	
	8 inputs	PNP	DRT2-ID08C-1	
	8 outputs	NPN	DRT2-OD08C	
	8 outputs	PNP	DRT2-OD08C-1	

■ DeviceNet Enhanced Products

Product	Specifications		Model number	Standards
Vision sensors	Single camera system		F150-C10E-2-DRT	CE
	Two camera system		F150-C10E-3-DRT	CE
Operator interface terminal adapter for NT31/NT631 touch screens	Combined with CS1 slave, up to 15 terminals/network; with CJ1slave, up to 41 terminals/network		NT-DRT21	cULus, CE
Communications module for fiber-optic sensor block	Up to 16 E3X-DA-N amplifiers form a wire saving sensor input slave block		E3X-DRT21	cRUus
Temperature/process controllers, single loop, 1/8 DIN	Controller with LED display; requires plug-in control output modules; to use a heater burnout alarm, order a current transformer		E5EK-AA2-DRT21	RU, CSA, CE
Multi-zone temperature controller, 8 loops, optional display unit	Heating mode, voltage output, heater open circuit	Thermo-couple RTD	E5EZ-8AQHD1TCB-V2 E5ZE-8AQHD1PB-V2	CE
	Heating mode, voltage output,	Thermo-couple RTD	E5EZ-8AQAD1TCB-V2 E5ZE-8AQAD1PB-V2	CE
	Heating mode, voltage output,	Thermo-couple RTD	E5EZ-8ACAD1TCB-V2 E5ZE-8ACAD1PB-V2	CE
	Heating mode, voltage output, heater open circuit	Thermo-couple RTD	E5EZ-8VQHD1TCB-V2 E5ZE-8VQHD1PB-V2	CE
	Heating mode, voltage output,	Thermo-couple RTD	E5EZ-8VQAD1TCB-V2 E5ZE-8VQAD1PB-V2	CE
	Heating mode, voltage output,	Thermo-couple RTD	E5EZ-8VCAD1TCB-V2 E5ZE-8VCAD1PB-V2	CE
Communications module for multi-loop (2 to 32) plug-in temperature controller	Set parameters and montitor status via DeviceNet for all loops		E5EK-AA2-DRT21	cRUus, CE
Intelligent flag ID system	Set addresses and monitor work-in-process based on unique ID via DeviceNet: reads 24 bits of data max.: writes 16 bits of data max.		V600-HAM42-DRT	cRUus, CE
	M12 threaded sensing head		V600-HS51	–
	30.5 x 18 x 10 mm head		V600-HS61	–
	53 x 50 x 23 mm head		V600-HS63	–
	100 x 100 x 30 mm head		V600-HS67	–
AC inverter, MV-series adapter	Monitor Run/Stop and operating conditions and make changes in set values from a PLC via DeviceNet using this adapter for all 3G3MV inverters		3G3MV-PDRT2	RU, CSA, CE
AC inverter, G5-series adapter	Monitor Run/Stop and operating conditions and make changes in set values from a PLC via DeviceNet using this adapter for all G5 inverters		SI-N1	cRUus
AC inverter, RV-series adapter	Monitor Run/Stop and operating conditions and make changes in set values from a PLC via DeviceNet using this adapter for all RV inverters		3G3RV-PDRT2	cRUus

(This table continues on the next page.)

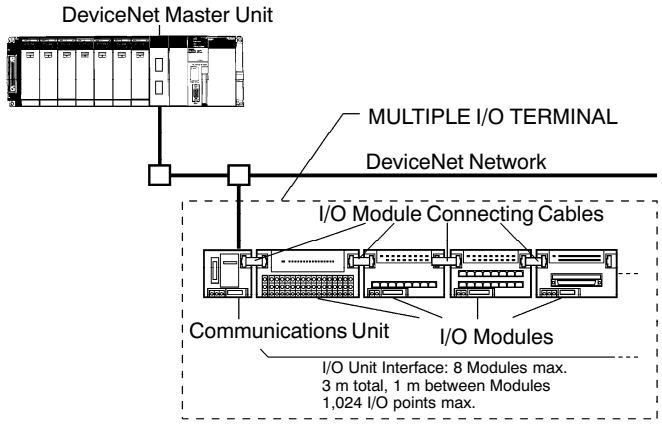
DeviceNet Enhanced Products (continued)

Product	Specifications	Model number	Standards
Servo drive, W-series adapter	Communicate positioning commands, drive parameters, positioning data, motor characteristics etc, between the W-series servo and a DeviceNet master. Commands received via DeviceNet are output to the W-series servo drive	R88A-NCW152-DRT	cULus, CE
High-Density Temperature Controller	DeviceNet-compatible 8-loop Temperature Controller	E5ZE-8□D1-□B-V2	---
Multi-function Compact Inverter DeviceNet Communications Unit	DeviceNet Communications Unit for the 3G3MV AC Inverters	3G3MV-PDRT1-SINV	---
High-Function General-purpose Inverter DeviceNet Communications Module	DeviceNet Communications Unit for the 3G3RV and 3G3FV AC Inverters	3G3FV-PDRT1-SIN	---
Vision Sensor Controller	DeviceNet-compatible F150-3 Vision System	F150-C10V3-DRT	---
Super-compact Signal Converter Bases	DeviceNet-compatible Bases	K3FM-BI□/BO□	---
DeviceNet Wireless Modules	Magnetic based antenna style master module	WD30-ME01	---
	Magnetic based antenna style slave module	WD30-SE01	---
	Pencil antenna style master module	WD30-ME	---
	Pencil antenna style slave module	WD30-SE	---

DeviceNet Multiple I/O Terminal Modules

Multibit Building-Block DeviceNet Slave

■ System Configuration



A communications unit can be connected to DeviceNet to interface various types of I/O Modules. Allocations and address settings are not required for the I/O Modules, enabling flexible, simple distributed I/O.

■ Features

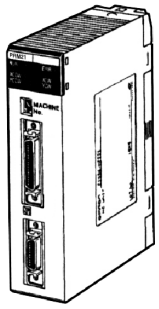
- To expand I/O, merely add I/O Modules to the I/O interface.
- Create a low-cost multibit system.
- Connect up to 8 multibit I/O terminals to one communications unit.
- Mix Digital and Analog Modules.
- Select from a wide range of Modules.

■ Specifications

Product		I/O points	Specifications	Model number
Communications Unit		—	Communication Gateway to up to 8 GT1's; 1024 I/O max.	DRT1-COM
Digital I/O Modules	Modules with Terminal Blocks	16 inputs	NPN	GT1-ID16
		16 inputs	PNP	GT1-ID16-1
		16 outputs	NPN	GT1-OD16
		16 outputs	PNP	GT1-OD16-1
	Modules with MOLEX Connectors	16 inputs	NPN	GT1-ID16MX
		16 inputs	PNP	GT1-ID16MX-1
		16 outputs	NPN	GT1-OD16MX
		16 outputs	PNP	GT1-OD16MX-1
	Modules with Fujitsu Connectors	16 inputs	NPN	GT1-ID16ML
		16 inputs	PNP	GT1-ID16ML-1
		16 outputs	NPN	GT1-OD16ML
		16 outputs	PNP	GT1-OD16ML-1
	Modules with D-Sub 25-pin Connectors	16 inputs	NPN	GT1-ID16DS
		16 inputs	PNP	GT1-ID16DS-1
		16 outputs	NPN	GT1-OD16DS
		16 outputs	PNP	GT1-OD16DS-1
	Modules with High-density Fujitsu Connectors	32 inputs	NPN	GT1-ID32ML
		32 inputs	PNP	GT1-ID32ML-1
		32 outputs	NPN	GT1-OD32ML
		32 outputs	PNP	GT1-OD32ML-1
Analog Input Modules		8 inputs	MOLEX connector, 16 bits per point	GT1-AD08MX
		4 inputs	Terminal block, 16 bits per point	GT1-AD04
Analog Output Modules		4 outputs	MOLEX connector	GT1-DA04MX
		4 outputs	Terminal block	GT1-DA04
Temperature Input Modules		4 inputs	Thermocouple	GT1-TS04T
		4 inputs	Platinum resistance thermometer	GT1-TS04P
Counter Unit		1 input, 2 outputs	1 input, 2 outputs Counter Unit with encoder input	GT1-CT01
Relay Output Modules		8 outputs	8 relay outputs, 2 A, SPST-NO	GT1-ROP08
		16 outputs	16 relay outputs, 5 A, SPST-NO	GT1-ROS16
I/O Unit Connecting Cable		—	1 m	GCN1-100

Profibus-DP Master

Open Field Bus Networking and Device-Level Control



C200HW-PRM21

PROFIBUS is a vendor-independent, open fieldbus standard for a wide range of applications in manufacturing, process and building automation. Vendor independence and openness are guaranteed by the PROFIBUS standard EN50170. With PROFIBUS, devices of different manufacturers can communicate without special interface adjustments.

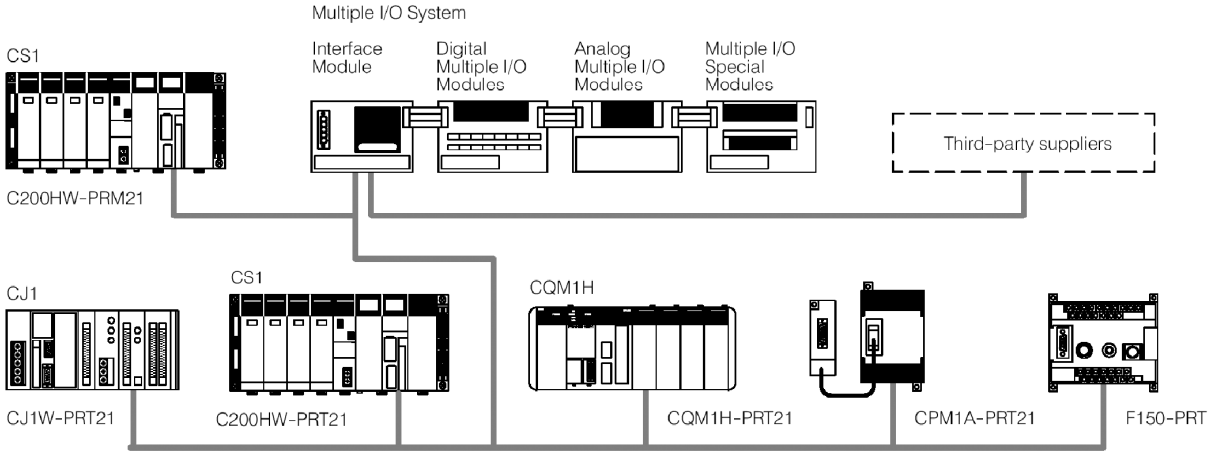
■ Features

- 100 I/O words for direct CPU access is preconfigured.
- Flexible assignment of the I/O words with configurator software.
- Bus transmission can be synchronized with the PLC.
- PROFIBUS-DP master module for C200HS, C200H Alpha and CS1.
- Special I/O module, similar to DeviceNet Master.
- Can be mounted in any backplane slot, including expansion backplane.
- Up to 10 master modules per C200HS, C200H Alpha or CS1.
- Each master supports up to 124 slaves.
- All mandatory PROFIBUS-DP functions, including SYNC/FREEZE, are supported.

■ System Configuration Capabilities

PROFIBUS-DP configurations can include multiple active (master) stations as well as mulitple passive (slave) stations. Master stations form a logical token ring and support communication to assigned slave stations to manage both master-master and master-slave communications and control.

■ System Configuration



■ Specifications

Item	Description	
Applicable standard	EN50170 Part 2 (PROFIBUS-DP)	
Network topology	Bus, max. 125 nodes	
Connector	Female D-sub 9-pin	
Transmission rate	9.6, 19.2, 93.75, 187.5, 500 kbit/s 1.5, 3, 6, 12 Mbit/s	
Cable lengths	1200 m at 9600 bit/s, 100 m at 12 Mbit/s, with 3 repeaters up to 4800 m	
Communications cable	Shielded twisted pair conforms to EN50170 Part 2	
Communications time	From 1 ms at 12 Mbit/s min.	
Supported functions		
As requester	Data_Exchange	asynchronous or synchronous
	Slave_Diag	with configurator software, with IOWR/IORD
	SET_PRN	automatic
	CHK_CFG	automatic
	Global_Control	Multicast + Broadcast of Sync, Freeze and Clear and Clear Data
As responder	Get_Master_Diag	

■ Network Components

PROFIBUS-DP Master for C200H and CS1

Model	C200HW-PRM21
Max. data size	2 input and 2 output areas
Data area size	300 words
Number of masters per PLC without configurator	1
Number of masters per PLC with configurator	10 (or 16)
Power consumption	600 mA, 5 VDC

PROFIBUS-DP I/O Link Unit for C200H and CS1

Model	C200HW-PRT21
Number of I/O (selectable)	8+8...1600+1600
Number of reserved I/O words	1+1...100+100
C200HE/HG/HX and CS1G/H CPUs	All
Power consumption	250 mA 5 VDC
Bus and unit status display	LED
Accessories	GSD file on disk

Multiple I/O PROFIBUS-DP Interface Module – DIN Rail Mounting

Model	PRT1-COM
Communications port	PROFIBUS-DP to EN50170, Part 2
Number of multiple I/O modules	max. 8
Number of I/Os	512 inputs and 512 outputs
Length of I/O connecting cable	max 3m

Programming

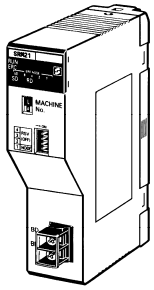
Item	Description	Model
PROFIBUS Configurator	Network configuration software. For WINDOWS 95/98/NT4.0	WS02-PDC2-E

Technical Documentation – English

Product	Title	Model
PROFIBUS-DP Master Unit	Operation manual	W349-E2
Multiple I/O PROFIBUS-DP		W900-E2
PROFIBUS-DP I/O Link Unit		W901-E2
CS1W, PROFIBUS-DP I/O Link Unit		W408-E2

CompoBus/S Master Module

High-speed ON/OFF Bus for Distributed Machine Control and Reduced Wiring



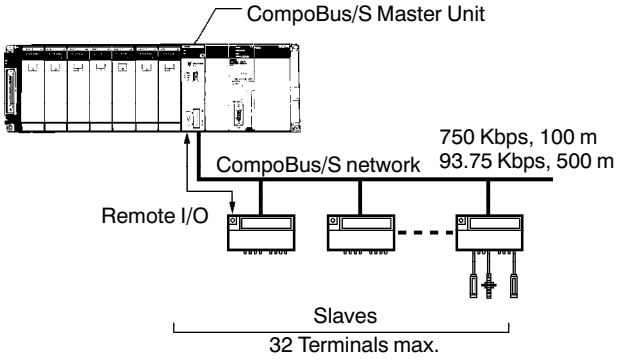
C200HW-
SRM21-V1

CompoBus/S provides fast local I/O update speeds combined with the ability to distribute the I/O over as much as 500 meters (1640 ft)! It's like installing a 256-point I/O module in a single slot in a Programmable Controller. The actual I/O Terminals are connected with a single twisted-pair cable in a daisy chain connection scheme. With a wide variety of wiring connection options for remote I/O Terminals and analog capability. CompoBus/S can expand system mounting options while providing reduced wiring and start-up cost benefits. Update times can be as fast as 0.8 ms for 256 field mounted I/O. This cost-effective remote I/O solution has created a whole new standard for speed and value in distributed I/O.

■ Features

- Up to 256 I/O points per Master.
- Up to 32 Slaves per Master.
- Communications cycle time: 0.8 ms (fastest speed at 750 kbps) over 100 m.
- Communications distance: up to 500 m (at 93.75 kbps) over 100 m.
- Analog I/O terminals available.
- Free wiring with any branching method for up to 200 m (in long-distance communications mode).

■ System Configuration



■ Master Specifications

I/O points	256 (128 inputs and 128 outputs) or 128 (64 inputs and 64 outputs) Switch selectable
Allocated words	For 256 I/O: 20 words (8 for inputs, 8 for outputs, 4 for status) For 128 I/O: 10 words (4 for inputs, 4 for outputs, 2 for status)
Number of mountable master units	For 256 I/O: 8 For 128 I/O: 16
Points per node number	8 points
Number of connectable slaves	32
Status information	Communications error flags, participation flags

■ Specifications

<table>
<tr><td colspan="2">Communications method</td><td>Special CompoBus/S protocol</td></tr>
<tr><td colspan="2">Coding</td><td>Manchester</td></tr>
<tr><td colspan="2">Connections</td><td>Multidrop, T-branch (requires termination)</td></tr>
<tr><td colspan="2">Baud rate</td><td>High-speed mode: 750 kbps
Long-distance mode: 93.75 kbps. Set via DIP switch.
(Set via DM Area; Default: 750 kbps.)</td></tr>
<tr><td rowspan="4">Communications cycle time</td><td rowspan="2">High-speed mode</td><td>0.5 ms (with 8 input and 8 output Slaves)</td></tr>
<tr><td>0.8 ms (with 16 input and 16 output Slaves)</td></tr>
<tr><td rowspan="2">Long-distance mode</td><td>4.0 ms (with 8 input and 8 output Slaves)</td></tr>
<tr><td>6.0 ms (with 16 input and 16 output Slaves)</td></tr>
<tr><td colspan="2">Media</td><td>2-conductor cable (VCTF 0.75 x 2), 4-conductor cable (VCTF 0.75 x 4), or Special Flat Cable</td></tr>
<tr><td colspan="2">Maximum communications distance</td><td>With 2-conductor VCTF Cable
<table>
<tr><th>Mode</th><th>Main</th><th>Branch</th><th>Total branch</th></tr>
<tr><td>High-speed</td><td>100 m</td><td>3 m</td><td>50 m</td></tr>
<tr><td>Long-distance</td><td>500 m</td><td>6 m</td><td>120 m</td></tr>
</table>
With 2-conductor VCTF or Special Flat Cable
<table>
<tr><th>Mode</th><th>Main</th><th>Branch</th><th>Total branch</th></tr>
<tr><td>High-speed
(See note 1.)</td><td>30 m</td><td>3 m</td><td>30 m</td></tr>
<tr><td>Long-distance
(See note 2.)</td><td colspan="3">Any up to 200 m total</td></tr>
</table></td></tr>
<tr><td colspan="2">Max. No. of nodes</td><td>32</td></tr>
<tr><td colspan="2">Error control checks</td><td>Manchester code, frame length, and parity checks</td></tr>
</table>

Note: 1. For 16 slaves or fewer: main: 100 m; total branch: 50 m.
2. No restrictions on branching method or individual line lengths. Connect terminating resistance to Slave farthest from Master.

CompoBus/S Slave Modules

■ CompoBus/S Slaves

Product	Specifications	Model number
I/O Link Modules	For CPM2C; 8 input points, 8 output points	CPM2C-SRT21
	For CPM1A/CPM2A; 8 input points, 8 output points	CPM1A-SRT21
Remote I/O Terminals with Transistors	4 input points, NPN	SRT2-ID04
	4 input points, PNP	SRT2-ID04-1
	4 output points, NPN	SRT2-OD04
	4 output points, PNP	SRT2-OD04-1
	8 input points, NPN	SRT2-ID08
	8 input points, PNP	SRT2-ID08-1
	8 output points, NPN	SRT2-OD08
	8 output points, PNP	SRT2-OD08-1
	16 input points, NPN	SRT2-ID16
	16 input points, PNP	SRT2-ID16-1
	16 output points, NPN	SRT2-OD16
	16 output points, PNP	SRT2-OD16-1
Remote I/O Terminals with Transistors and 3-tier Terminal Block	16 input points, NPN	SRT2-ID16T
	16 input points, PNP	SRT2-ID16T-1
	16 I/O points, NPN	SRT2-MD16T
	16 I/O points, PNP	SRT2-MD16T-1
	16 output points, NPN	SRT2-OD16T
	16 output points, PNP	SRT2-OD16T-1
Remote Input Terminals with Transistors and Connectors	4 input points, NPN	SRT2-ID04MX
	8 input points, PNP	SRT2-ID08MX
Remote Output Terminals with Relays	8 relay output points	SRT2-ROC08
	16 relay output points	SRT2-ROC16
	8 power MOSFET relay output points	SRT2-ROF08
	16 power MOSFET relay output points	SRT2-ROF16
Remote I/O Terminals with Transistors and Connectors	32 input points, NPN	SRT2-ID32ML
	32 input points, PNP	SRT2-ID32ML-1
	32 output points, NPN	SRT2-OD32ML
	32 output points, PNP	SRT2-OD32ML-1
	32 I/O points, NPN	SRT2-MD32ML
	32 I/O points, PNP	SRT2-MD32ML-1
	8 input points, NPN	SRT2-VID08S
	8 input points, PNP	SRT2-VID08S-1
	8 output points, NPN	SRT2-VOD08S
	8 output points, PNP	SRT2-VOD08S-1
	16 input points, NPN	SRT2-VID16ML
	16 input points, PNP	SRT2-VID16ML-1
	16 output points, NPN	SRT2-VOD16ML
	16 output points, PNP	SRT2-VOD16ML-1
	Mounting Bracket A	SRT2-ATT01
	Mounting Bracket B	SRT2-ATT02

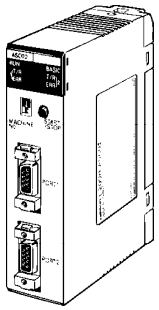
(This table continues on the next page.)

CompoBus/S Slaves (continued)

Product	Specifications	Model number
Waterproof Terminals (with Transistors)	4 input points, NPN	SRT2-ID04CL
	4 input points, PNP	SRT2-ID04CL-1
	4 output points, NPN	SRT2-OD04CL
	4 output points, PNP	SRT2-OD04CL-1
	8 input points, NPN	SRT2-ID08CL
	8 input points, PNP	SRT2-ID08CL-1
	8 output points, NPN	SRT2-OD08CL
	8 output points, PNP	SRT2-OD08CL-1
CompoBus/S Fiber Amplifier Sensor Communication Module	Connects to up to 14 E3X-DA Fiber Amplifier Modules communications	E3X-SRT21
Sensor Terminals	8 Sensor inputs, NPN	SRT2-ID08S
	4 Remote-teaching sensor inputs, 4 outputs (NPN)	SRT2-ND08S
	8 Sensor outputs, NPN	SRT2-OD08S
Analog Input Terminal	1 to 4 inputs (set via DIP switch)	SRT2-AD04
Analog Output Terminal	1 or 2 outputs (set via DIP switch)	SRT2-DA02
Remote I/O Modules	16 input points, NPN	SRT2-ID16P
	16 output points, NPN	SRT2-OD16P

ASCII Modules

Easily perform ASCII Data Communications

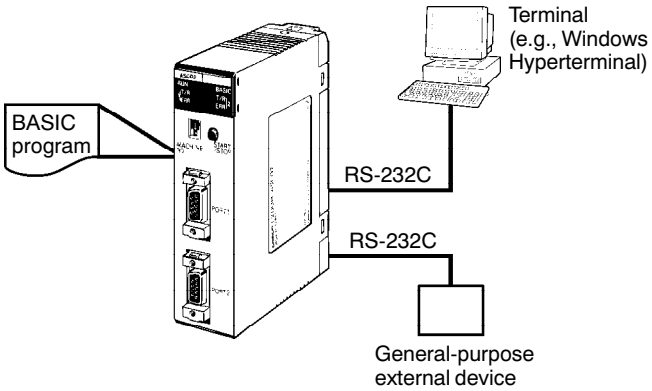


C200H-ASC11
C200H-ASC21
C200H-ASC31

The ASCII Modules support BASIC language programming and RS-232C and RS422A/485 serial communications. BASIC programming enables ASCII communications with essentially any external device. It can also be used as a special processing unit to aid the CPU Unit without using external communications.

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

■ System Configuration



■ Features

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

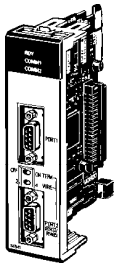
■ Specifications

Classification	User memory	Shared memory	Serial communications ports	Unit numbers	Model
C200H Special I/O Unit	200 Kbytes	Provided (90 words in I/O memory)	RS-232C x 2	0 to F	C200H-ASC11
			RS-232C x 1, RS-422A/485 x 1		C200H-ASC21
			RS-232C x 2, RS-232C x 1 for terminal		C200H-ASC31

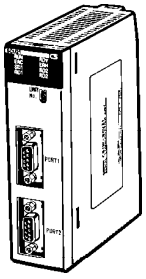
Note: The C200H-ASC02 can also be used with CS1 PLCs.

Serial Communications Boards
Serial Communications Modules

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



Serial Communications Boards
CS1W-SCB21-V1
CS1W-SCB41-V1



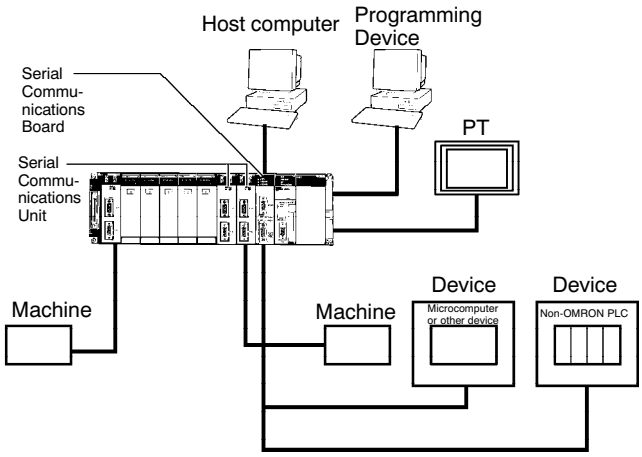
Serial Communications Module
CS1W-SCU21-V1

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

■ Features

- Serial Communications Board
  - Increase the number of serial ports without using I/O slots.
  - Connect general-purpose external devices 1:N using RS-422A/485.
  - Generate interrupts in CPU Unit when data is received.
- Serial Communications Board
  - Mount up to 16 Units (including all other CPU Bus Units) on CPU or Expansion Racks. Ideal for systems that required many serial ports.

■ System Configuration



■ Specifications

Unit	Classification	Serial communications modes	Serial	Unit numbers	Model
Serial Communications Board	Inner Board	Set separately for each port: Protocol Macro, Host Link, or 1:N NT Link	RS-232C x 2	---	CS1W-SCB21-V1
			RS-232C x 1, RS-422A/485 x 1		CS1W-SCB41-V1
Serial Communications Unit	CS1 CPU Bus Unit		RS-232C x 2	0 to F	CS1W-SCU21-V1

Note: For more details and specifications, refer to manual W336.

Serial Communications Boards
Serial Communications Modules

■ Serial Communications Features

Unit	Model	Ports	Serial communications mode						BASIC programming	Message communications
			Protocol macros	Host Link	NT Links	No-protocol	Peripheral bus	Programming Console bus		
			General-purpose external devices	Host computers	OMRON PTs	General-purpose external devices	Programming Devices	Programming Console	General-purpose external device	
CPU Units	All models	Port 1: Peripheral	No	Yes	Yes	No	Yes	Yes	No	No
		Port 2: RS-232C	Yes	Yes	Yes	Yes	Yes	No	No	No
ASCII Units	C200H-ASC02	Port 1: RS-232C	No	No	No	No	No	No	Yes	No
		Port 2: RS-232C	No	No	No	No	No	No	Yes	No
	C200H-ASC11	Port 1: RS-232C	No	No	No	No	No	No	Yes	No
		Port 2: RS-232C	No	No	No	No	No	No	Yes	No
	C200H-ASC21	Port 1: RS-232C	No	No	No	No	No	No	Yes	No
		Port 2: RS-422A/485	No	No	No	No	No	No	Yes	No
	C200H-ASC31	Port 1: RS-232C	No	No	No	No	No	No	Yes	No
		Port 2: RS-232C	No	No	No	No	No	No	Yes	No
Serial Communications Boards/ Units	CS1W-SCB21	Port 1: RS-232C	Yes	Yes	Yes	No	No	No	No	No
		Port 2: RS-232C	Yes	Yes	Yes	No	No	No	No	No
	CS1W-SCB41	Port 1: RS-232C	Yes	Yes	Yes	No	No	No	No	No
		Port 2: RS-422A/485	Yes	Yes	Yes	No	No	No	No	No
	CS1W-SCU21	Port 1: RS-232C	Yes	Yes	Yes	No	No	No	No	No
		Port 2: RS-232C	Yes	Yes	Yes	No	No	No	No	No
DeviceNet RS-232C Unit	DRT1-232C2	Port 1: RS-232C Port 2: RS-232C	No	No	No	No	No	No	No	Yes

All the Capacity and Advanced Capabilities Needed for HMI, Communications or Data Processing

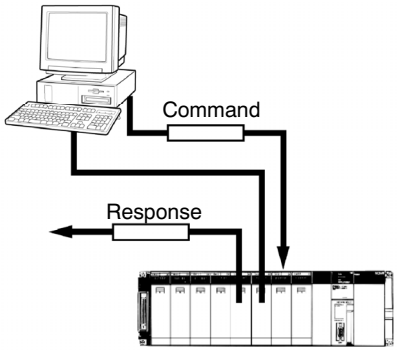
■ Other Protocols

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

Host Links

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

Unsolicited messages can also be sent from the PLC to the host computer by sending FINS commands from the ladder program using the SEND(090), RECV(098), and CMND(490) instructions.

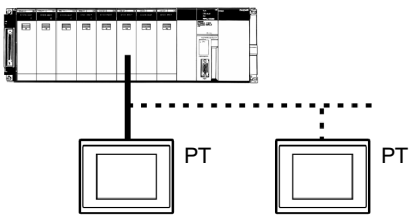


1:N NT Links

The PLC can be connected to an Omron Operator Interface Terminal via RS-232C or RS422A/485 ports; I/O memory in the PLC can be allocated to various Operator Interface Terminal functions, including status control areas, status notifications areas, touch switches, lamps, memory tables, and other objects.

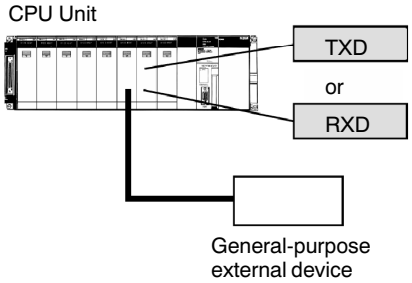
Addition of High-Speed NT Links

High-speed NT Links (three times faster than conventional host link transmissions) are possible with the NS Series and version 2 of the NT631 and NT31 Series. This speed is particularly important when connecting to more than one Operator Interface Terminal.



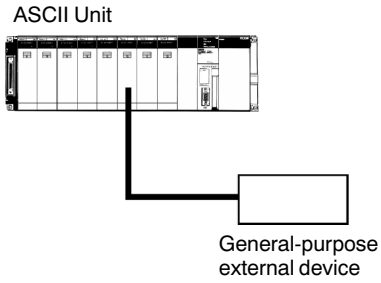
■ Serial Communications Protocols

Serial Communications instructions (TXD and RXD) for communications ports can be used for simple data transfers (custom protocols), such as to input data from bar code readers or output data to a printer. Start/end codes can be specified, and RS, CS, and other control signals can be handled. Serial communications instructions can only be used with the built-in RS232C port.



General-purpose Protocols Using BASIC

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



Protocol Macros

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

■ Features

- Communicates with almost any external device with an RS-232C or RS-422/485 port.
- Standard protocols included for Omron temperature controller, panel meters, bar code readers and encoders.
- Use CX-Protocol Windows-based software to create protocols for any non-Omron device.

Omron's CS1 offers serial communications in addition to what is standard on the CPU with additional Communication Bus Modules. These modules are necessary to expand on the CPU's Serial Port functionality. By incorporating a separate communication bus, all data exchanges and setting changes do not affect the cycle time of the control functions.

An exclusive time-saving setup feature built into Omron controllers, called Protocol Macro, contains the hand-shaking commands for many of Omron's controllers with serial communications. A Protocol Macro instruction in the PLC, called from the ladder diagram, designates the serial device and serial communications starts up automatically. To quickly develop a protocol macro for other serial devices, use Omron's CX-Protocol software. It contains typical commands to quickly create the short hand-shaking program and register it for later use in the PLC's memory.

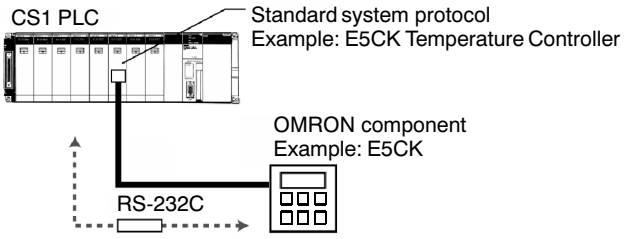
■ Types of Protocol

Protocols	External devices	Required products	Model
Standard system protocols	OMRON components	Serial Communications Module	WS02-PSTC1-E
User-created protocols	General-purpose external device	Serial Communications Module + CX-Protocol (Windows-based protocol support software)	

■ Application Examples

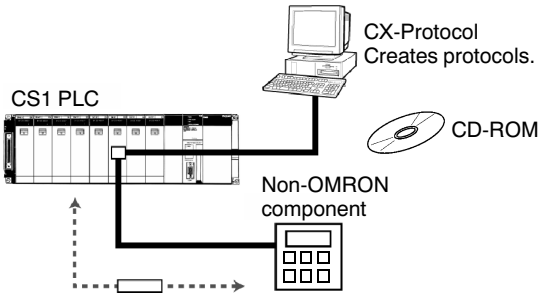
Standard System Protocols

Perform data transfers with OMRON components using standard system protocols. There is no need to develop your own protocols in the example shown here.



User-Created Protocols

To create data transfers with non-OMRON components, simply define parameters using the CX-Protocol Software.

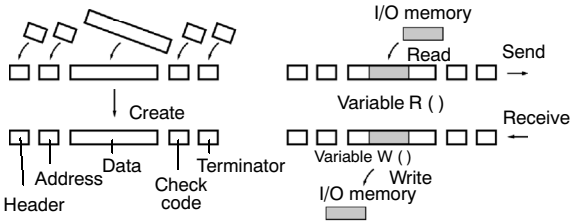


All the Hand-Shaking Commands for Many Omron Controllers with Serial Communications

The Two Main Functions of Protocol Macros

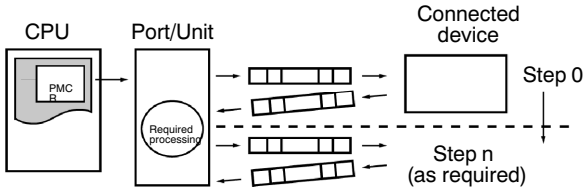
1. Creating Communications Frames

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



2. Creating Frame Send/Receive Procedures

The required processing, including sending and receiving communications frames, can be performed one step at a time based on the results of the previous step, and then CX-Protocol Software can be used to trace send and receive data.



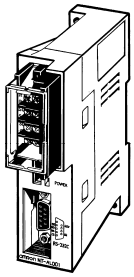
■ Standard System Protocols

Component		Model	Send/receive sequences
CompoWay/F-compatible components (Items below are: Digital Controllers and Temperature Controllers.)			
• Small Digital Controller with Communications (53 x 53 mm)		E5CK	Present value read, set point read, manipulated variable read, etc.
• Temperature Controllers with Digital Indications (96 x 96 mm or 48 x 96 mm)		E5□J-A2H0	Set point write, alarm write, PID parameter write, etc.
• Digital Controllers with Communications (96 x 96 mm)		ES100□	Uses CompoWay/F command send/response receive
• 8 loop Temperature Controller with communications		E5ZE	
Intelligent Signal Processors		K3MA-□	Display value read, comparison value read, write, etc.
Bar Code Readers	Laser Scanner type	V500	Read start, data read, read stop, etc.
	CCD type	V520	
Laser Micrometer		3Z4L	Measurement condition set, continuous measurement start, etc.
Machine Vision Systems	High speed, high precision, low cost	F200	Measurement, continuous measurement, etc.
	High-precision inspection/positioning	F300	
	Character inspection software/positioning software	F350	Measurement, positioning, inspection, character inspection, etc.
ID Controllers	Electromagnetic coupling	V600	Carrier data read, autoread, write, etc.
	Microwave	V620	
Hayes Modem AT Command		—	Modem initialize, dial, send, etc.

Note: You will find Protocols for the F400 Vision System available to download from the Software Patches and Utilities area on Omron's website, www.omron.com/oei.

RS-232C to RS-422A Adapter Module

Long-Distance Transmissions and No Separate Power Supply



NT-AL001

The NT-AL001 is used to connect an Operator Interface Terminal or other device with an RS-232C terminal to a device with an RS-422A terminal.

■ Features

- Long-distance transmissions are possible through an RS-422A interface. By converting from RS-232C to RS-422A and then back to RS-232C, a transmission distance of up to 500 m can be achieved.
- No power supply is required. If the 5-V terminal (150 mA max.) is connected from the RS-232C device, a separate power supply is not required to drive the Adapter Unit.
- Duct wiring can be used. The removable terminal block enables wiring not possible with D-sub connectors. (The RS-232C interface is 9-pin D-sub.)

■ Communications Specifications

RS-232C Interface

Item	Specification
Baud rate	64 Kbps max.
Transmission distance	2 m max.
Connector	9-pin, D-sub connector (female)

RS-422A Interface

Item	Specification
Baud rate	64 Kbps max. (depends on RS-232C baud rate)
Transmission distance	500 m max.
Terminal block	8 terminals, M3.0; detachable