OMRON

CS1 Series
# Serial Communications Boards/Unit

Serial Communications Boards: CS1W-SCB21 and CS1W-SCB41
Serial Communications Unit: CS1W-SCU21

Protocol Macros, Host Links, and NT Links (1:N Mode)
Add Ports for Serial Communications

■ Two RS-232C or RS-422A/485 serial communications ports are provided on the Inner Board and CPU Bus Unit. Select protocol macro, Host Link, or NT Link (1:N mode) for each port separately.

Serial Communications Boards

CS1W-SCB21
CS1W-SCB41

Serial Communications Unit

CS1W-SCU21
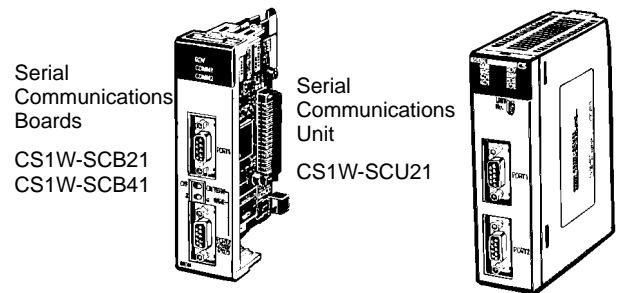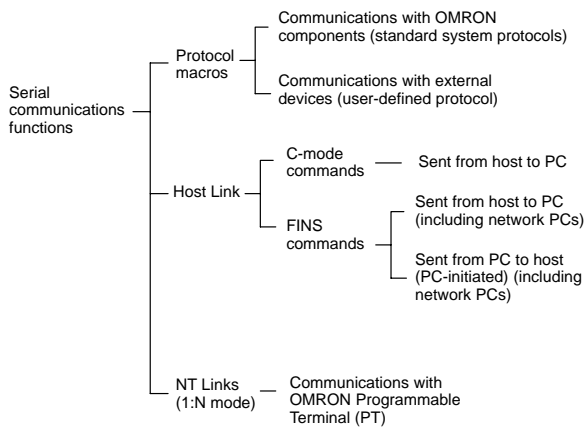
■ System Configuration
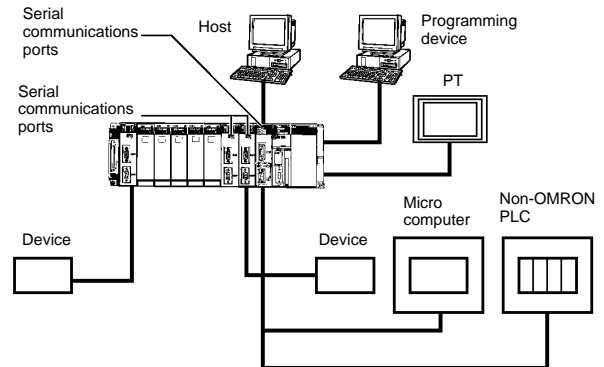
Protocol Macros

Data transfer procedures (protocols) with general-purpose external devices are created using the CX-Protocol to match the communications specifications (half-duplex or full-duplex, and start-stop synchronization) of the external device with the RS-232C or RS-422A/485 port.

These protocols are stored in the Serial Communications Boards or the Serial Communications Unit, and enable data to be exchanged with general-purpose external devices simply by executing the PMCR instruction in the CPU Unit.

Standard system protocols for exchanging data with OMRON devices (such as Temperature Controllers, Intelligent Signal Processors, Bar Code Readers, and Modems) are provided as a standard feature in the Serial Communications Boards, the Serial Communications Unit, and the CX-Protocol. The CX-Protocol can also be used to change the standard system protocols according to user requirements.
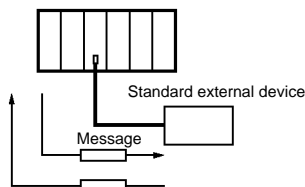
Host Link

In Host Link mode, C-mode commands (Host Link commands) or FINS commands can be sent from a host to read or write I/O memory in the PC or to control the PC's operating modes. The host can be a personal computer or a Programmable Terminal. The FINS commands are sent with other data, such a Host Link header and terminator.In Host Link mode, SEND, RECV, and CMND instructions can be used to send FINS commands from PC to the host to read data, write data, or perform other operations. This is called slave-initiated communications or unsolicited communications. The FINS commands are sent with other data, such a Host Link header and terminator.
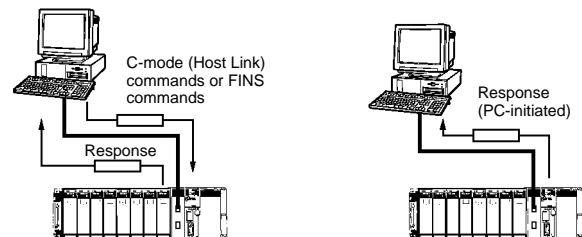
NT Link Functions (1:N Mode)

A PC can be connected to one or more Programmable Terminals (PTs) using an RS-232C or RS-422A/485 port. The I/O memory of the PC is allocated to the Status Control Areas and the Status Notification Areas used by the PTs, as well as to display objects, such as touch switches, lamps, and memory tables. This enables the status of the I/O memory in the PC to be controlled and monitored by operations from the PTs, without the use of a ladder diagram programming in the PC. Up to eight PTs can be connected to a PC.
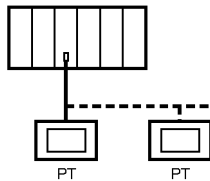
Note:
1. The Serial Communications Boards and Units do not support 1:1 NT Links. The NT Links must be set to 1:N even if only one PT is connected. Connection is not possible to PTs that do not support 1:N NT Links.
2. An NT-AI001 Conversion Unit is required when using NT Links at 1:N connection in the RS-232C port of an NT30/30C Programmable Terminal.
3. The Programming Console functions of the PT (Expansion Mode) cannot be used.

Serial Communications Board

A Serial Communications Board is installed as an option in a CPU Unit. Two serial communications ports can thus be added without using an I/O slot.

There are two types of Serial Communications Boards: One with two RS-232C ports and one with one RS-232C and one RS-422A/485 port. The RS-422A/485 port can be used for a 1:N connection with general-purpose external devices without using Link Adapters to support the protocol macro function or NT Link function.

Select protocol macro, Host Link, NT Link, or loopback test for each port separately.

Serial Communications Unit

A total of up to 16 CPU Bus Units can be mounted on the CPU Rack or an Expansion Rack. The total of 16 must include all Serial Communications Units and all other CPU Bus Units. The PC can thus be expanded to provide additional serial communications ports as required by the system.

Select protocol macro, Host Link, NT Link, or loopback test for each port separately.

Serial Communications Modes

Serial communications mode	Connection configuration	Overview	Supported commands/communications instructions
Protocol macro	Standard external devices	Message communications (communications frames) compatible with the communications specifications for standard external devices.	PMCR instructions
Host Link (SYSMAC WAY)	IBM PC/AT or compatible (including PTs)	Communications between hosts and PC (includes PC-initiated communications).	Host Link (C-mode) commands or FINS commands (including slave-initiated commands)
NT Link (1:N mode)	OMRON PT (Programmable Terminal)	High-speed communications with the PT.	None

■ Features

Protocol Macros

Wide Range of Communications Protocols

Communications are possible with virtually any general-purpose external device, provided it has an RS-232C or RS-422A/485 port, supports half-duplex or full-duplex communications, and supports start-stop synchronization.

Send Frames and Receive Frames Matching Specifications

Send frames (command + data and other send frames) and receive frames (response and other frames) can be created and registered according to the communications frame specifications of the external device.

Communications-related Functions

Error check code calculations, frame length calculations during sending, and ASCII⇔Hexadecimal conversion of numeric data are supported.

Send/Receive Monitoring

Receive wait monitoring, receive completion monitoring, and send completion monitoring are supported. If monitoring times are exceeded, send/receive can either be terminated, or retry processing can be performed.

Retry Processing

Send/receive retry processing can be automatically executed when an error occurs, simply by setting the number of retries.

PC Read/Write Variables in Send Frames and Receive Frames

Variables for reading PC memory can be included in the actual send frames. These can be used as destination addresses or data when reading PC data while sending. Variables for writing to PC memory can be also included in the actual receive frames. These can be used to write the contents of destination addresses or data to the PC during reception.

Switch 1:N Communications or the Data Write Destinations Using Repeat Processing

Repeat processing (repeat counters) for send/receive processing can be specified in communications sequences. This enables the same data to be sent by switching destination addresses during communications 1:N (N = 32 max. due to restrictions in the physical layer) or by switching the PC memory write destination addresses during data reception.

PC Interrupts During Data Reception

An interrupt can be created in the PC's CPU Unit during data reception, and an interrupt program can be executed in the CPU Unit. (The PC interrupt function is supported only for the Serial Communications Boards. This function cannot be used with Serial Communications Units.)

Next Process Switching According to Receive Data

The contents of up to 15 set of expected receive data can be compared with the receive data to determine the next process.

The following functions have been improved.

New Error Check Codes

LRC2 (two's complement of LRC), and SUM1 (one's complement of SUM) have been added to the error check codes.

Step Queuing for Sync Signal from the PC

At any step of the send/receive sequence, the next process can be made to wait until a sync signal from the PC's CPU Unit has been input. This enables processing, such as data manipulations, to be performed in the CPU Unit during the send/receive sequence.

Half-duplex or Full-duplex Transmissions

With the conventional protocol macro functions, only half-duplex transmissions were possible. With half-duplex mode, the reception buffer is cleared immediately after the send operation is completed. Therefore, if there was a rapid response from the remote device, for example, the data received between data sending and the completion of the send operation could not be accessed as receive data by the next receive operation.

Support for the full-duplex transmissions enables all the data received in a sequence to be accessed. Data can also be received from a remote device while sending.

Note: Full-duplex transmissions can be used with either RS-232C or RS-422A/485 as long as 1:1, 4-wire connections are used. Full-duplex transmissions cannot be used with 1:N connections or 2-wire connections.

Clear Reception Buffer at Any Time

With full-duplex mode, the reception buffer is cleared only immediately before a send/receive sequence is executed. When a reception or other fault occurs, the receive data can be cleared at any time using the reception buffer clear (FLUSH) command.

Control ER Signal at Any Time

With a connection to a modem, the ER signal is used to show the send/receive enabled status of a Serial Communications Board or Unit (Data Terminal Equipment (DTE)). In conventional operations, the ER signal could be turned ON only while a send/receive sequence was being executed.

Improving this function has enabled the ER signal to be turned ON or OFF at any time during a send/receive sequence. This enables modem connections and disconnections to be performed by a protocol macro.

The ER signal can also be kept ON, even after a send/receive sequence has been completed. In this case, the ER signal remains ON, even after it has been switched to a different serial communications mode (for example, Host Link). This function enables remote programming and monitoring to be performed using remote Programming Devices, by switching to the Host Link mode with the STUP instruction once the connection has been made with the modem.

Host Link Features

Host Link communications are supported by all CS1-series CPU Units. Serial Communications Boards and Units can be used to connect a single PC to more than one host for Host Link communications, including slave-initiated communications. Host Link communications provide the following features.

Connect One Computer to Multiple PCs

An RS-422A/485 port can be used to connect one host to up to 32 CS1-series PCs.

Computer Monitoring and Control of PCs

Host Link communications enable the host to monitor or control PC operations and to read and write I/O memory in the PCs.

FINS Commands for Complete Control

In addition to C-series (Host Link) commands, FINS commands are also supported. FINS commands give you the power to control CS1-series PC functionality.

Redundant Error Checking

Both vertical and horizontal (FCS) parity checks are performed on communications data to achieve essentially error-free communications. Combining error checking and retry processing goes one step further to eliminate nearly all the effects of communications problems.

Simultaneous Usage of Both Ports

Each Serial Communications Board and Unit provides two serial communications ports that can be used simultaneously to connect to two different hosts. A total of up to 16 CPU Bus Units, including the Serial Communications Units, can be mounted to one PC. If all 16 CPU Bus Units are Serial Communications Units, then up to 32 ports can be added.

Slave-initiated Communications

Communications can be performed either by sending a command from a host and having the PC return a response, or by sending a command from a PC and having the computer send a response. Starting communications from a slave is called unsolicited communications, and is made possible through the SEND, RECV, and CMND instructions. These can be used to send FINS commands to a host connected locally or to a host connected to a remote network up to three networks away (counting the local network).

Send FINS Commands to Remote Networks

A FINS command contained within a Host Link header and terminator can be sent using Host Link communications to PCs connected not only on Host Link networks, but also other interconnected remote networks up to three networks away (counting the local network). Various types of networks can exist between the source of the command and the destination of the command.

Send FINS Commands to Computers Connected to Remote PCs

A FINS command contained within a Host Link header and terminator can be sent using Host Link communications to a host connected to a PC on a remote network up to three networks away (counting the local network, but not counting the final Host Link connection). Various types of networks can exist between the PC sending the command and the destination of the command.

■ Models

Name	Applicable PCs	Unit type	Serial communications mode	Serial communications port	Model number
Serial Communications Board	CS1 series	Inner Board	Select protocol macro, Host Link, NT Link (1:N mode), or loopback test for each port separately	RS-232C x 2	CS1W-SCB21
				RS-232C x 1 + RS-422A/485 x 1	CS1W-SCB41
Serial Communications Unit		CPU Bus Unit		RS-232C x 2	CS1W-SCU21

Protocol Macro Programming Devices (Sold Separately)

Name	Operating requirements	Specifications	Model number
CX-Protocol	IBM PC/AT or compatible OS: Windows 95 or 98 Memory: 16 MB min. (24 MB recommended) Hard disk: 24 MB min. free space (50 MB recommended)	Create new protocols (send and receive sequences) Change standard sequence protocols (store system protocol as a file) Display series data and store file when sending or receiving messages traced by the Board or Unit	WS02-PSTC1-E
	Connector cable	Connect to peripheral port	2.0 m or 6.0 m	CS1W-CN□□□
		Connect to RS-232C port	2.0 m or 5.0 m	XW2Z-□□□□(-□)

■ Specifications

Item		Specifications		
Classification		CS1 Inner Board		CS1 CPU Bus Unit
Name		Serial Communications Board		Serial Communications Unit
Model number		**CS1W-SCB21**	**CS1W-SCB41**	**CS1W-SCU21**
Serial communi-cations ports	Port 1	RS-232C	RS-232C	RS-232C
	Port 2	RS-232C	RS-422A/485	RS-232C
Serial communications mode		You can set Host Link, protocol macro, NT Link (1:N mode), or loopback test separately for each communications port.		
		• Host Link: Connects host to PC (can send C-mode commands or FINS commands from the host to the PC, or send FINS commands from the PC to the host). • Protocol macro: For communications between the PC and a general-purpose external device (including OMRON-made components). • NT Link (1:N mode): For communications between a PC and an OMRON PT (Programmable Terminal). • Loopback test: For loopback tests on the communications ports.		
Number of mountable Boards/Units	CPU Unit	One Board per Inner Board slot		None
	CPU Rack	None		A total of up to 16 Units, including all other CPU Bus Units. No restrictions on the mounting location.
	Expansion Rack	None		
Unit numbers		None		0 to F (cannot set same number for more than one CPU Bus Unit)
Data exchange with the CPU Unit	Ordinary refreshing of software switches and status	Allocated 25 words of the 100 words in the Inner Board CIO Area (constant data exchange with the CPU Unit)		Allocated 25 words of the 25 words in the CPU Bus Unit CIO Area (constant data exchange with the CPU Unit)
		CPU Unit to Board or Unit: Wait release switch, forced abort switch, etc.		
		Board or Unit to CPU Unit: Protocol status (protocol macro execution flag, error code, etc.), transmission error status, transmission control signal status, flow control status, etc.		
	Transfer from the CPU Unit set by the system	Of the 768 words in the Inner Board DM Area, each serial port is allocated 10 words (total 20 words). Data is transferred from the CPU Unit at the following times: • Startup or restart • Ladder instruction: STUP • Port Settings Changing Flag turns ON (Auxiliary Area)		Of the CPU Bus Unit DM Area, each serial port is allocated 10 words (total 20 words). Data is transferred from the CPU Unit at the following times: • Startup or restart • Ladder instruction: STUP • Port Settings Changing Flag turns ON (Auxiliary Area)
		CPU Unit to Board or Unit: Serial communications mode, baud rate, communications conditions, protocol macro transmission path form, maximum number of bytes when sending or receiving protocol macro data, etc.		
Settings		None	Selector switch: 2-wire or 4-wire selector, terminating resistance switch	Rotary switch: Unit number (0 to F)

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Item	Specifications		
Indicators	There are three LED indicators on the front of the Unit: Board status, protocol macro status, communications port 1/2 sending/receiving		There are eight LED indicators on the front of the Unit: Unit status, protocol macro status, CPU Unit status, communications port 1/2 sending, communications port 1/2 receiving
Connections	RS-232C ports (two)	RS-232C port	RS-232C ports (two)
		RS-422A/485 port	
	Create cables using the supplied connectors (plug: XM2A-0901, hood: XM2S-0911-E).		
Effect on CPU Unit cycle time	0.25 ms		0.25 ms
	Add the following value when a protocol macro is being executed:		Add the following value when a protocol macro is being executed:
	0.001 ms x maximum number of send/receive words (0 to 500) + 1.3 ms		0.001 ms x maximum number of send/receive words (0 to 500)
	If Host Link or NT Link (1:N mode) is operating, also add event execution time.		If Host Link or NT Link (1:N mode) is operating, also add event execution time.
Power consumption (see note)	280 mA + x max. at 5 VDC	360 mA + x max. at 5 VDC	290 mA + x max. at 5 VDC
	Note: The current consumption is for one Serial Communications Board or Unit. When an NT-AL001 Link Adapter is connected to a RS-232C port, power is supplied to the Link Adapter from the Board or Unit. A current consumption of 150 mA must be added for each Link Adapter that is connected. In the above specifications, "x" indicates that 150 mA must be added for each port to which an NT-AL001 Link Adapter is connected to provide the required 5-V power supply.		
Dimensions	35 x 130 x 100 mm (W x H x D)		
	Note: The height including the base when using the supplied connectors and recommended cables is 223 mm.		
Weight	100 g max.	110 g max.	200 g max.
Standard accessories	Two RS-232C or RS-422A/485 connectors (plug: XM2A-0901, hood: XM2S-0911-E)		
Cat. No.	W336		

■ Built-in Standard System Protocols

Protocols (send/receive sequences) for the following OMRON components are built into the Board/Unit and the CX-Protocol as standard features.

Components		Model number	Send/receive sequence
CompoWay/F Masters		OMRON components with CompoWay/F master function	Sends CompoWay/F command and receives responses
Digital Controllers, Temperature Controllers	Compact Digital Controller with Communications (53 x 53 mm)	E5CK	Reads current value, target value, operating quantity, etc.
	Digital Command Temperature Controller with Thermac J communications (96 x 96 mm or 48 x 96 mm)	E5□J-A2H0	Writes target value, warning value, PID values, etc.
	Digital Controller with Communications (96 x 96 mm)	ES100□	
	Temperature Controller with Communications (8 control points)	E5ZE	
Digital Panel Meters with Communications Output (special specifications)		K3T□	Reads display value; reads and writes comparison value, etc.
Bar Code Readers	Laser scanner	V500	Start reading command, reads data, stop reading command, etc.
	CCD	V520	
Laser Micrometer		3Z4L	Measurement conditions settings, continuous measurement start, etc.
Visual Inspection Systems	High-speed, high-precision, low-cost	F200	Execute measuring, execute continuous measuring, etc.
	High-precision detection/positioning	F300	
	Character Recognition Software/Positioning Software	F350	Execute measuring, fix position, execute detection, detect characters, etc.
ID Controllers	Electromagnetic coupling (short distance)	V600	Read from carrier, auto read, write to carrier, etc.
	Microwave (long distance)	V620	
Hayes Modem AT Commands			Initialize modem, dial-up operation, send/receive data, etc.

■ Applicable CPU Units

PC series	CPU Unit model	Maximum number of Units that can be mounted
CS1	CS1H-CPU□□ CS1G-CPU□□	Serial Communications Board: 1 PC under the CPU Unit
		Serial Communications Unit: A total of 16 Units can be mounted on the CPU Rack and CS1 Expansion Rack (no limitation on mounting position).

■ Accessories (Sold Separately)

Name		Manufacturer	Model	Remarks
Recommended cable	RS-232C compatible	Fujikura Densen	UL 2464 AWG28 x 5P IFS-RVV-SB (UL product), AWG28 x 5P IFVV-SB (non-UL product)	When using NT-AL001 conversion adapter for RS-232C/RS-422A, OMRON recommends XW2Z-070T-1 (0.7 m) or XW2Z-200T-1 (2 m) as the connector cable between NT-AL001 and RS-232C.
		Hitachi Densen	UL2464-SB (MA) 5P x 28AWG (7/0.127) (UL product), CO-MA-VV-SB 5P x 28AWG (7/0.127) (non-UL product)	
	RS-422A/485 compatible	Hirakawa Hewtech Corp.	CO-HC-ESV-3P × 7/0.2	---
RS-232C or RS422A/485 connector		Plug	XM2A-0901	---
		Hood	XM2S-0911-E	---

Name	Connection port	Personal computer	Length	Model number
CX-Protocol connector cable	Connect to a peripheral port on the CPU Unit	IBM PC/AT or compatible	2.0 m	CS1W-CN226
			6.0 m	CS1W-CN626
	Connect to the RS-232C port on the CPU Unit or the Serial Communications Board or Unit (Host Link mode)		2.0 m	XW2Z-200S-V
			5.0 m	XW2Z-500S-V
	For switching between CPU Unit and D-SUB9 pin (pin arrangement in the RS-232C port built into the CPU Unit)		0.1 m	CS1W-CN118

■ Serial Communications Mode Specifications

Host Link Specifications

Item	Description		
Communications mode	Half-duplex (Full-duplex for slave-initiated communications)		
Synchronous mode	Start-stop synchronization (asynchronous mode)		
Baud rate (see note 1)	RS-232C port and RS-422A/485 ports: 2,400/4,800/9,600/19,200/38,400/57,600/115,200 bps		
	Default setting: 9,600 bps		
Communications distance (see note 1)	RS-232C port: 15 m max. (see note 2)		
	RS-442A/485 port: 500 m max. (The total combined cable length is 500 m max. T-branch lines must be a maximum of 10 m long.)		
Connection configuration	RS-232C port: 1:1 (1:N (N = 32 Units max.) is possible using an Converting Link Adapters.)		
	RS-422A/485 port: 1:N (N = 32 Units max.)		
Number of connected Units	32 Units max. (unit numbers 0 to 31; unit number 0 is set for 1:1 connection)		
Frame structure	C-mode commands	Header: @, address: (Host Link unit number) 0 to 31 (BCD), data: header code + text, error check code: FCS, terminator: *+CR	
	FINS commands	Header: @, address: (Host Link unit number) 0 to 31 (BCD), data: header code (always "FA") + FINS header + FINS command + text, error check code: FCS, terminator: *+CR	
Error check codes	Vertical parity: Even, odd. or none FCS (horizontal parity converted to ASCII)		
Command flow and support	Command flow	Commands	Contents
	Host to PC	C-mode commands	1:1 or 1:N communications with directly connected PCs (The specified frame format must be prepared on the host and then sent.)
		FINS commands (in Host Link protocol)	1:1 or 1:N communications with directly connected PCs.
	PC to host	FINS commands (in Host Link protocol)	Communications using SEND(090), RECV(098), and CMND(490) from CPU Unit.
			The host must interpret the commands and return a response in the correct format.
			Connection between the host and PC must be 1:1.

Note: 1. Confirm the baud rates and communications distance supported by connected devices.

       2. The maximum cable length for RS-232C is 15 m. The RS-232C standard, however, does not cover baud rates above 19.2 Kbps. Refer to the manual for the device being connected to confirm support.

Protocol Macro Function Specifications

| Item		Description	
Number of protocols	**20 max.**	Can be created and registered with the Protocol Support Tool (CX-Protocol).	
Number of sequences	**1,000 max.**		
Per protocol	**Number of sequences**	60 max.	
	Number of messages	300 max.	
	Number of reception matrixes	100 max.	
Sequence execution condition		Using the CPU Unit's PMCR(260) instruction (specifying the sequence number)	
Communications mode		Half-duplex or full-duplex	
Synchronous mode		Start-stop synchronization (asynchronous mode)	
Baud rate (see note 1)		RS-232C port and RS-422A/485 ports: 1,200/2,400/4,800/9,600/19,200/38,400 bps	
		Default setting: 9,600 bps	
Communications distance (see note 1)		RS-232C port: 15 m max.	
		RS-442A/485 port: 500 m max. (The total combined cable length is 500 m max. T-branch lines must be a maximum of 10 m long.)	
Connection configuration		RS-232C port: 1:1 (1:N (N = 32 Units max.) is possible using a Converting Link Adapter.)	
		RS-422A/485 port: 1:N (N = 32 Units max.)	
Number of connected Units		32 Units max. (unit numbers 0 to 31; unit number 0 is set for 1:1 connection)	
Maximum number of data exchange words between PC and protocol macro function	**Operand setting**	250 words	Including the word that specifies the number of words (1 word)
	Link word setting	500 words	O1, O2, I1, and I2: 500 words total
	Direct setting	500 words	Maximum number of words per data attribute
Sequence contents (step common parameters)	**Number of steps per sequence**	16 max.	
	Transmission control parameters	X-on/X-off flow, RS/CS flow, delimiter control, or contention control, and modem control can be selected.	
	Response notification method (operand)	Scan notification or interrupt notification (i.e., writing the receive data in the I/O memory area specified in the 4th operand of the PMCR(260) instruction) can be selected.	
		Scan notification: Writes the receive data to I/O memory during CPU Unit scanning.	
		Interrupt notification: Writes the receive data to I/O memory as soon as it is received, and at the same time specifies the execution of the interrupt program for the CPU Unit.	
		Note The interrupt notification method can be executed only by a Serial Communications Board. It cannot be used for a Serial Communications Unit.	
		Scan method (fixed)	Board and Unit
		Interrupt notification	Board only (See note 2.)
		Interrupt notification for reception case number	Board only (See note 2.)

Item		Description	
Step contents	**Monitoring time during send/receive processing**	Receive wait, receive completion, or send completion can be monitored. Setting range: 0.01 to 0.99 s, 0.1 to 9.9 s, 1 to 99 s, or 1 to 99 minutes	
	Link word setting	Area in which data is exchanged between the CPU Unit and the Serial Communications Board or Unit during Communications Board or Unit refreshing. Two areas are possible for each device: An area for storing receive data and an area for storing send data.	
	Commands	Send only (SEND), receive only (RECV), send and receive (SEND&RECV), wait (WAIT), reception buffer clear (FLUSH), ER-ON (OPEN), or ER-OFF (CLOSE)	
	Repeat counter	1 to 255 times	
	Retry count	0 to 9 (Only when the command is SEND&RECV)	
	Send wait time	0.01 to 0.99 s, 0.1 to 9.9 s, 1 to 99 s, or 1 to 99 minutes (Only when the command is SEND or SEND&RECV)	
	With or without response write (operand)	When receive processing is completed (when the receive data is stored in the area specified in the 4th operand of the PMCR(260) instruction), whether or not to store the received messages can be selected.	
	Next processing	When a step has ended normally, End (sequence completed), Next (proceed to the next step No.), Goto (go to the specified step No.), or Abort (interrupt the step and terminate that sequence) can be selected.	
	Error processing	When a step has ended abnormally, End, Next, Goto, or Abort can be selected.	
	Send message	Data sent to the specified address when the command is SEND or SEND&RECV.	Consists of a header (*1), address (*2), length, data (*2), error check code (*3), and terminator (*1). For an explanation of *1, *2, and *3, see the next page.
	Receive message	Data sent from the specified address when the command is RECV or SEND&RECV.	
	Reception matrix	When the command is RECV or SEND&RECV, sets the expected receive messages (15 max.), and switches to the next processing according to the message received.	Specifies the receive messages and the next processing for each of cases No. 00 to No. 15. Of the maximum 16 cases, one case must be set as "Other" in the receive messages (in addition to the set receive messages).

Note: 1. The baud rate and the communications distance depend on the remote device.

2. A macro syntax error will occur if the interrupt notification method is executed for a Serial Communications Unit.

Item						
Message unit contents	***1: Header and terminator data attributes**	Constant	ASCII data, hexadecimal data, or control code			
	*2: Data attributes of addresses and data in send/receive messages	Constant	ASCII data, hexadecimal data, or control code (with an address, no control code is possible)			
		Variable	No conversion, conversion to ASCII data, or conversion to hexadecimal data (the read/write direction can be specified)			
		Designation method	(X, Y) X: Effective address (where read from, or where written to) Y: Data size (1 to 1,000) **Note** The data size is the number of bytes on the transmission path.			
		X	Word designation	Word read (I/O memory to send data)	Specify using the 3rd operand of the PMCR(260) instruction.	Set leading address + n (The linear expression $aN + b$, including repeat counter N, is also possible for n.)
					Specify using a link word.	
					I/O memory direct designation	
				Word write (receive data to I/O memory)	Specify using the 4th operand of the PMCR(260) instruction.	
					Specify using a link word.	
					I/O memory direct designation	
			Wild card	*	Any data or address can be received (only in receive messages)	
			Repeat counter	N		
Message contents	***2: Data attributes of addresses and data in send/receive messages**	Variables	Y	Linear expression including repeat counter	$aN + b$	a: 0 to 1000; b: 1 to 1000 N: Repeat counter value
				Wild card	*	Can be received regardless of the length (only in receive messages)
				Word designation	Word read (I/O memory to send data)	Specify using the 3rd operand of the PMCR(260) instruction.	Set leading address + n (The linear expression $aN + b$, including repeat counter N, is also possible for n.)
					Specify using a link word.	
					I/O memory direct designation	
	*3: Error check codes		LRC, LRC2, CRC-CCITT, CRC-16, SUM, SUM1, and SUM2 can be calculated.			
	Maximum length of send/receive messages		1,000 bytes. (A maximum length between 200 and 1,000 bytes can be set in the Setup Area.)			
	Maximum number of data attributes registered in one message		96 attributes (see note 1)			
	Maximum number of write data attributes registered in one message		30 attributes (see note 2)			
Trace function			A total of up to 1,700 bytes (characters) of time-series data can be traced in send and receive messages. Changes to the step No. and control signals such as RS and CS can also be traced.			

Note: 1. The CX-Protocol can be used to register up to 96 attributes per message.

2. A macro syntax error will occur when the protocol macro is executed if more than 31 write attributes are registered in one message.
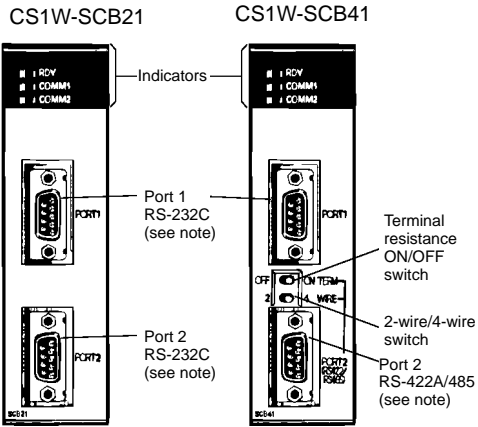
■ Data Exchange
Serial Communications Boards
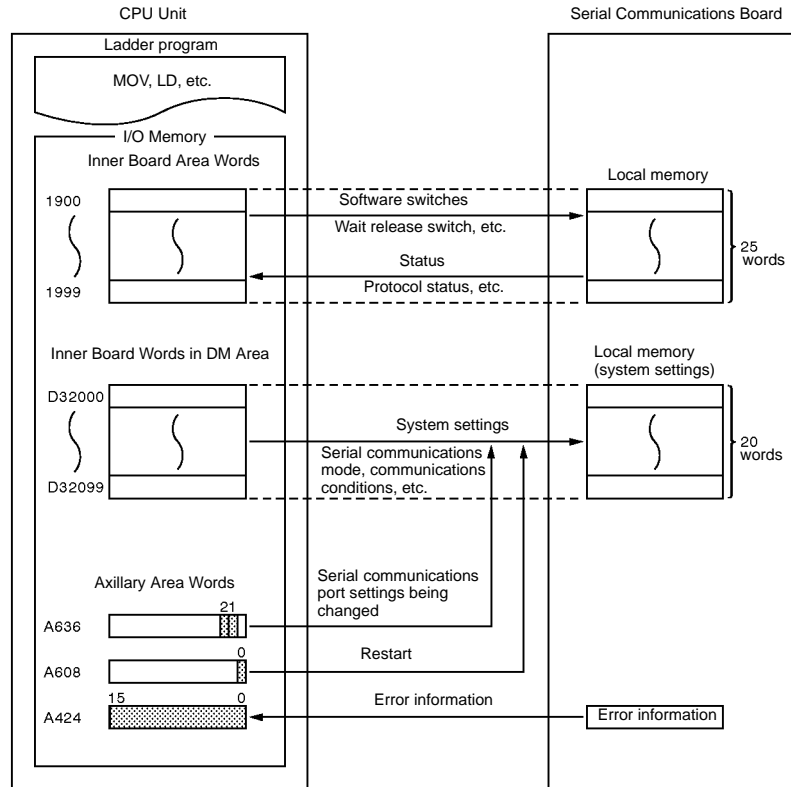
Serial Communications Unit
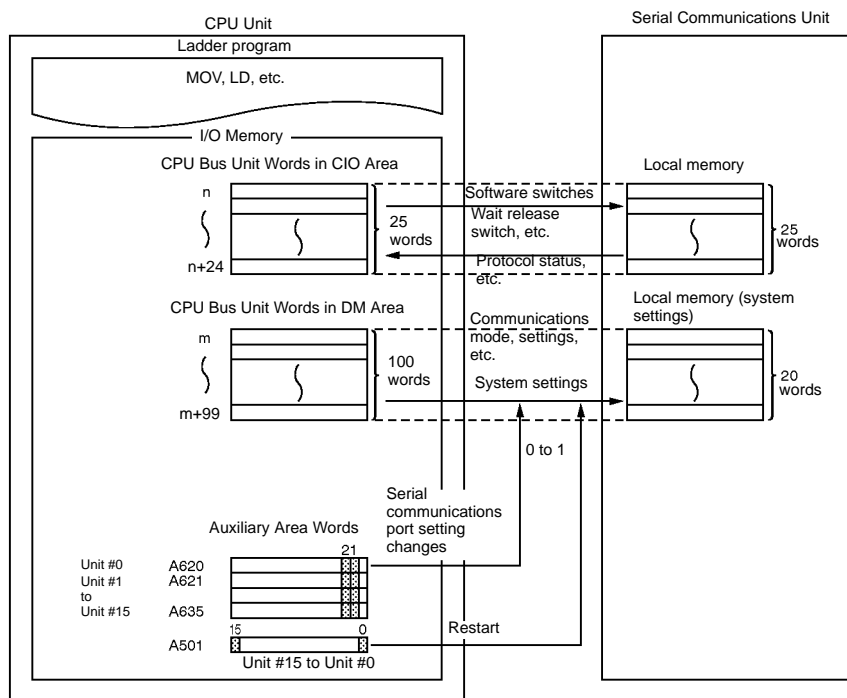
■ Nomenclature
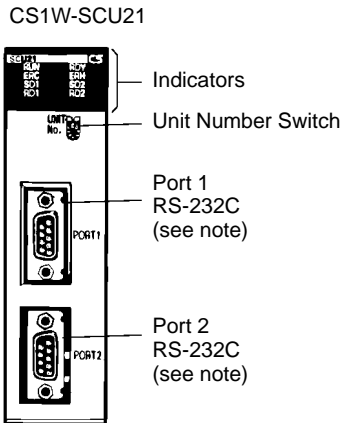### Serial Communications Boards

CS1W-SCB21   CS1W-SCB41

Applicable connectors: XM2A-0901 (plug);
XM2S-0911-E (hood) (manufactured by
OMRON) (2 sets supplied with Unit)

Indicators

Indicator	Color	Indicator	Operating status
RDY	Green	Lit	Operating normally, protocol macro preparations complete
		Flashing	Operating normally, protocol macros not ready
		Not lit	One of the following errors gas occurred in the serial communications board.
			Board or hardware error
			WDT error in the PC
			WDT error in the Board
COMM1	Yellow	Lit	Port 1 is sending or receiving data
		Not lit	Port 1 is not sending or receiving data
COMM2	Yellow	Lit	Port 2 is sending or receiving data
		Not lit	Port 2 is not sending or receiving data

Serial Communications Unit

CS1W-SCU21

Applicable connectors: XM2A-0901 (plug);
XM2S-0911-E (hood) (manufactured by
OMRON)

(2 sets supplied with Unit)

Indicators

Indicator	Color	Indicator	Operating status
RUN	Green	Lit	Operating normally
		Not lit	Unit hardware error
RDY	Green	Lit	Protocol macro preparations complete
		Flashing	Protocol macros not ready
		Not lit	Communications Unit hardware fault
ERH	Red	Lit	CPU Unit error, or Unit is not registered in the I/O tables
		Flashing	System setting error
		Not lit	CPU Unit operating normally, system settings normal
ERC	Red	Lit	Unit hardware fault
		Flashing	Protocol data error (checksum error), or protocol data syntax error
		Not lit	Operating in normal mode
SD1	Yellow	Lit	Port 1 is sending data
		Not lit	Port 1 is not sending data
RD1	Yellow	Lit	Port 1 is receiving data
		Not lit	Port 1 is not receiving data
SD2	Yellow	Lit	Port 2 is sending data
		Not lit	Port 2 is not sending data
RD2	Yellow	Lit	Port 2 is receiving data
		Not lit	Port 2 is not receiving data

■ External Connections

RS-232C Port

Pin Arrangement

Pin No.	Abbreviation	Signal name	Input or output
1	FG	Shield	---
2	SD	Send data	Output
3	RD	Receive data	Input
4	RS	Request to send	Output
5	CS	Send possible	Input
6	5V	Power	---
7	DR	Data set ready (see note 4)	Input
8	ER	Data terminal ready	Output
9	SG	Signal ground	---
Shell	FG	Shield	---
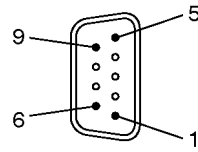
Applicable Connectors

Plug: XM2A-0901 (manufactured by OMRON) or equivalent.
Hood: XM2S-0911-E (manufactured by OMRON) or equivalent.
There is one plug and hood for each port.

UL2464 AWG28 x 5P IFS-RVV-SB (UL product) Fujikura Densen

AWG28 x 5P IFVV-SB (non-UL product)
UL2464-SB (MA) 5P x 28AWG (7/0.127) (UL product) Hitachi Densen
CO-MA-VV-SB 5P x 28AWG (7/0.127) (non-UL product)
Cable length: 15 m max.

RS-422A/485 Port

Pin Arrangement

Pin No.	Abbreviation	Signal name	Input or output
1	SDA	Send data	Output
2	SDB	Send data +	Output
3	NC	Not used	---
4	NC	Not used	---
5	NC	Not used	---
6	RDA	Receive data	Input
7	NC	Not used	---
8	RDB	Receive data +	Input
9	NC	Not used	---
Shell	FG	Shield	---
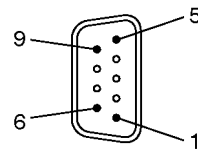
Applicable Connectors

Plug: XM2A-0901 (manufactured by OMRON) or equivalent.
Hood: XM2S-0911-E (manufactured by OMRON) or equivalent.
There is one plug and hood for each port.

Recommended cable

CO-HC-ESV-3P x 7/0.2 Hirakawa Hewtech Corp.
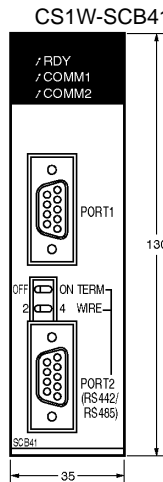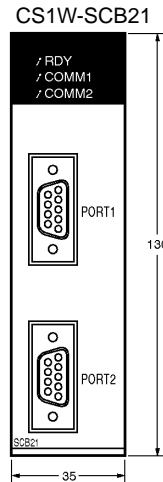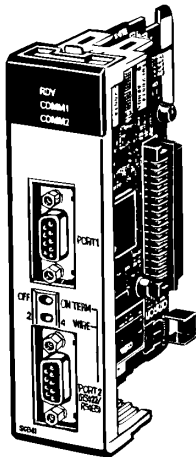Cable length: 500 m max. (cable length 500 m max, T-branch cable length 10 m max.)
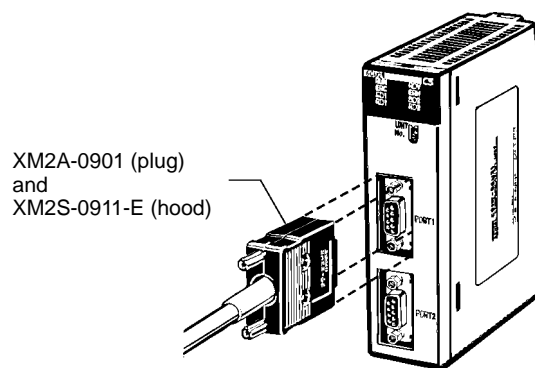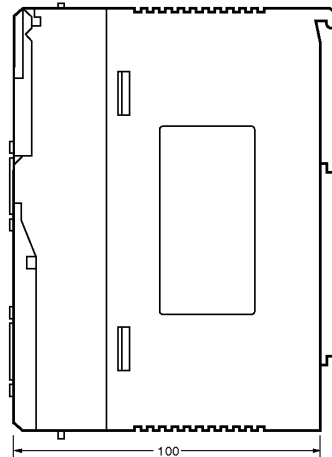
XM2A-0901 (plug)
and
XM2S-0911-E (hood)

■ Dimensions

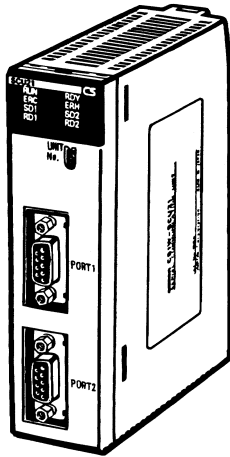**Note:**   All units are in millimeters unless otherwise indicated.
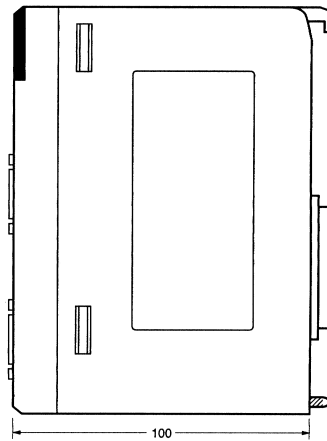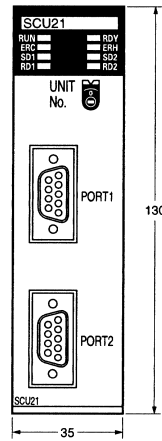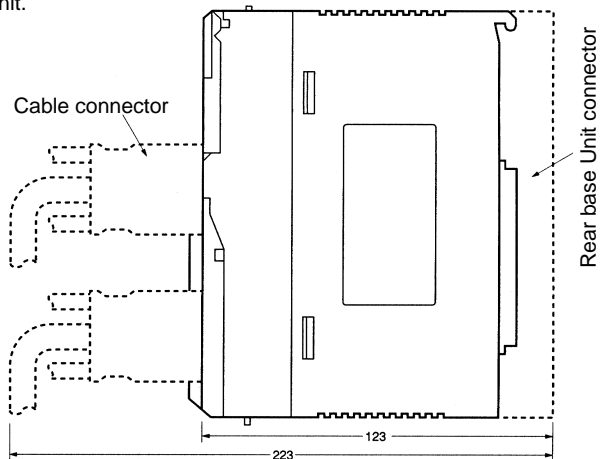
CS1W-SCB21/41

CS1W-SCU21

Dimensions when Board or Unit is mounted.
Dimensions are the same for the Serial Communications Board and Unit.

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