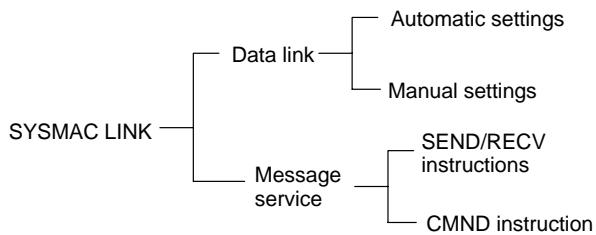CS1 Series
SYSMAC LINK

SYSMAC LINK Units: CS1W-SLK11/SLK21
SYSMAC LINK Support Boards: 3G8F5-SLK21/SLK22

A Basic FA Network with Data Links and Message Communications.
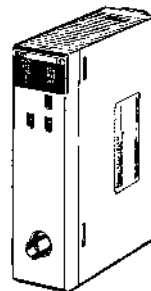## Both Wired and Optical Networks Supported.

■ An FA network SYSMAC LINK Network supports data links between PCs or between PCs and personal computers (data constantly shared over a given area), as well as communications messages between PCs or between PCs and personal computers (i.e., send and receive data when necessary).
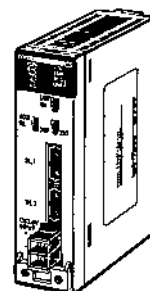
What is the SYSMAC LINK?

The SYSMAC LINK is an FA network that can transfer data among OMRON Programmable Controllers (CS1-series, C200HX/HG/HE, and CV-series PCs) and IBM PC/AT or compatible computers. The SYSMAC LINK supports data links that enable data sharing and a message service that enables sending and receiving data when required.

Wired Unit
CS1W-SLK21

Optical Unit
CS1W-SLK11

Personal Computer Board
3G8F5-SLK21/22 (Wired Board)

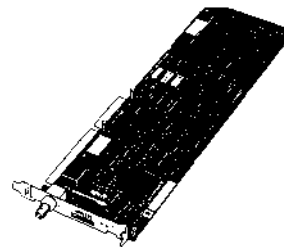There are two types of SYSMAC LINK Systems: The Wired System, which is connected using coaxial cables, and the Optical System, which is connected using optical fiber cables.
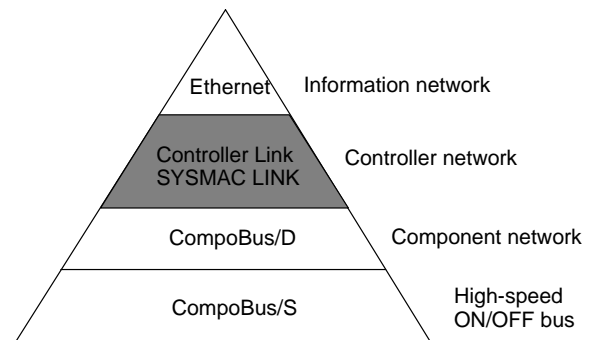
- Ethernet — Information network
- Controller Link SYSMAC LINK — Controller network
- CompoBus/D — Component network
- CompoBus/S — High-speed ON/OFF bus

"Programmable Controller" is abbreviated as "PC" in these *Specification Sheets.*
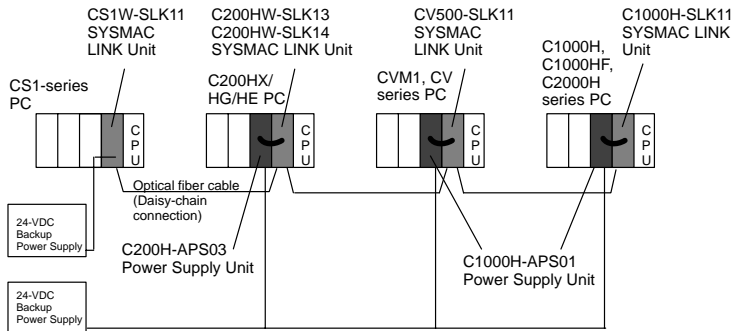
■ System Configuration

The CS1-series, CVM1, CV-series, C1000H/HF, C2000H, C200HX/HG/HE, and C200HS PCs can be connected.

Wired System (Coaxial Cable)
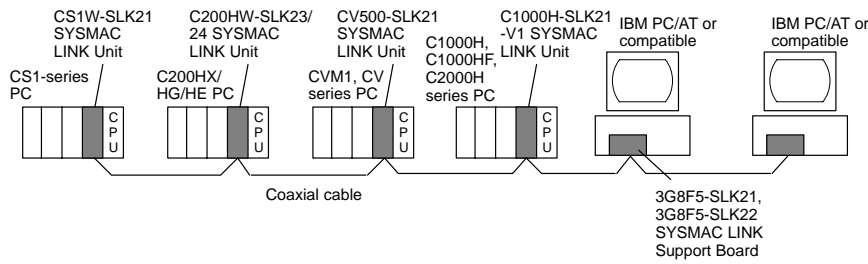
Optical System (Optical Fiber Cable)

Note: IBM PC/AT or compatible personal computers cannot be connected using optical fiber cables.

■ Features

Data Links

Data links allow the constant sharing of data in predetermined data areas between nodes, between PCs, or between a PC and an IBM PC/AT or compatible computer on the network. Data links do not require the use of communications programs on the PC (CPU Unit) or IBM PC/AT or compatible computer. Data written in the send area of the local node will be automatically sent to the receive area of other nodes.

Any portions of the I/O area (CIO Area), data link area (LR Area), and data memory area (DM Area) can be specified as the send or receive words.

● Number of send words per node: 508 words max. (CIO Area: 254 words + DM Area: 254 words)

● Number of send and receive words per node: 2,966 words max. (sum of CIO Area and DM Area)

The data link area can be set automatically or manually.

Automatic Setting

Used for simple data link processing. Data link can be performed by simply setting parameters in the DM Area of the PC. Send data size per node is the same for all nodes. All nodes participating in the data link share the same data.

Constant data exchange (sharing)
(CIO Area, LR Area, DM Area)
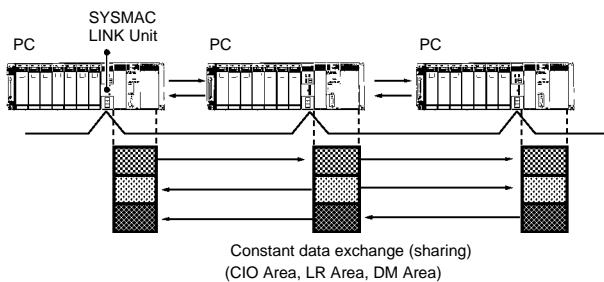
Manual Setting

Used for flexible data link processing depending on each system. Using the CX-Net of the CX-Programmer, individual data link tables can be set for each node and the data link words can be freely allocated for each node. Send data size per node can be freely set. It is also possible to set nodes for only send or receive data.
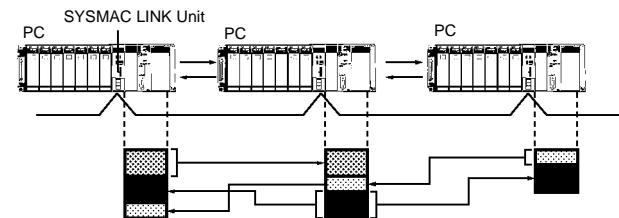
Message Service

This function controls data transmission with particular nodes, reading or writing of status data, changing of operation modes, etc., by executing communications instructions on a program. The communications instructions include SEND/RECV instructions for data transmission and CMND instructions for issuing various commands.

SEND/RECV

The SEND or RECV instruction sends or receives data in an area of a particular node.

The SEND instruction sends data from an area of the local node and writes to an area in the designated node.

The RECV instruction requests the designated node to send area data and writes the data to the local node.

CMND

The CMND instruction issues a command to read or write data of other nodes, control, or read error logs. With the SYSMAC LINK Unit, OMRON's command protocol called "FINS commands" is used.
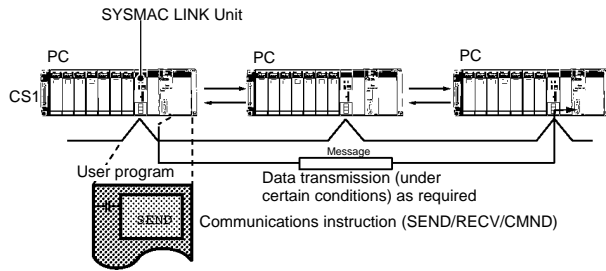
Coaxial Cable or Optical Fiber Cable Connection

The SYSMAC LINK Units can be connected to the network using either coaxial cables or optical fiber cables. Select the system that suits your application.

Features of System Using Coaxial Cable

The 5C-2V Coaxial Cable is used for wiring the SYSMAC LINK Unit or Board.

Features of System Using Optical Fiber Cable

- Optical Fiber Cable has superior noise resistance, so this system can provide highly reliable communications even in very noisy conditions.

- The communications distance can be up to 10 km in total (1 km max. between nodes), which allows long-distance or large-scale networks.

Compatible with Different Node Configurations

- The following SYSMAC LINK Units are available for communications between different models. It must be noted, however, that the wired system and optical system cannot exist in one SYSMAC LINK Network.

Wired system

- SYSMAC LINK Unit for CS1-series Programmable Controllers

- SYSMAC LINK Unit for C200HX/HG/HE Programmable Controllers

- SYSMAC LINK Unit for CVM1 and CV-series Programmable Controllers

- SYSMAC LINK Unit for C200H and C200HS Programmable Controllers

- SYSMAC LINK Unit for C1000H, C1000HF, and C2000H Programmable Controllers

- SYSMAC LINK Support Board for IBM PC/ATs or compatibles

Optical System

- SYSMAC LINK Unit for CS1-series Programmable Controllers

- SYSMAC LINK Unit for C200HX/HG/HE Programmable Controllers

- SYSMAC LINK Unit for CVM1 and CV-series Programmable Controllers

- SYSMAC LINK Unit for C200H and C200HS Programmable Controllers

- SYSMAC LINK Unit for C1000H, C1000HF, and C2000H Programmable Controllers

Flexible Inter-network Connections

- The SYSMAC LINK Network can connect to other networks (Ethernet, Controller Link, and SYSMAC LINK) via CVM1, CV-series, or CS1-series PCs. By installing a Communications Unit for the Ethernet, Controller Link, or SYSMAC LINK on the same CS1-series, CVM1, or CV series-PC as a Controller Link Unit, a message service can be created with nodes in interconnected networks through this PC. Up to three network levels are possible.

- The programming and monitoring of other PCs on the network can be conducted from Programming Devices connected to the PC's CPU Unit. Inter-network connections are possible in this case also and can cover up to three network levels.

Node Bypass (Optical System Only)

With the Optical SYSMAC LINK network, data communications can be continued by bypassing the node, even when a node in the communications line malfunctions or the PC or IBM PC/AT or compatible computer power supply is turned OFF. This prevents the whole network system from being affected by a node malfunction or power interruption.

To use the bypass node function, 24-VDC backup power must be supplied to the SYSMAC LINK Unit.

RAS

RAS performs real-time monitoring of the network status. If an error occurs in the network, RAS records and displays the time and contents of the error.

Status Area

- Data Link Status Area
  When the data link function is used, the data link status is reflected in the data link status area of the PC.

- Network Status Area
  The network status such as the state of node participation is reflected in the status area of the PC.

Error Log

The error log function records contents (codes) and times of errors that occur in the network into the RAM, or EEPROM in the SYSMAC LINK Unit.

The recorded errors can be read using the CX-Net of the CX-Programmer or the message service function.

Data Link Settings Using CX-Programmer

You can make data link table settings, monitor the status of data links, and perform similar operations for the CS1-series SYSMAC LINK Unit using the CX-Programmer programming software. (You cannot directly connect the SYSMAC Support Software to a CS1-series CPU Unit using RS-232C.)

■ SYSMAC LINK Communications Specifications

Item	Specifications	
	Wired system	**Optical system**
Communications functions	Data links, message communications	
Communications method	N:N token bus	
Code	Manchester code	
Modulation	Baseband code	
Synchronization	Flag synchronization (conforms to HDLC frames)	
Transmission path form	Bus	Daisy-chain
Baud rate and maximum transmission distance	Baud rate: 2 Mbps (fixed)	Baud rate: 2 Mbps (fixed)
	Maximum transmission distance: 1 km	Maximum transmission distance: 10 km
		Maximum distance between nodes: Crimp cut: 800 m Adhesive: 1 km (see note)
Transmission path	Coaxial cable (5C-2V)	H-PCF cable (optical two-core cable)
Node connection method	BNC connector	Special full-lock connector (a half-lock connector can also be used)
Maximum number of nodes	62 nodes (32 nodes when the 3G8F5-SLK22 is used)	
Number of data link words	Send words per node: 508 words max. (254 words in CIO Area + 254 words in DM Area)	
	Data link words (send and receive) that can be created in a single CS1-series CPU Unit: 2,966 words max. (CIO Area + DM Area)	
Data link areas	Automatic settings: CIO 1000 to CIO 1063 (Data Link Area), D00000 to D00127 (DM Area)	
	Manual settings: CIO 0000 to CIO 6143 (entire CIO), entire DM Area (D00000 to D32767)	
Message length	552 bytes max. (including header)	
RAS functions	Automatic polling node backup	Automatic polling node backup
	Self-diagnostics (startup hardware check)	Self-diagnostics (startup hardware check)
	Internode testing, broadcast test (using FINS command)	Internode testing, broadcast test (using FINS command)
	Watchdog timer	Watchdog timer
	Error log	Error log
		Node bypath function (by Power Supply Unit)
Error control	Manchester encoding check	
	CRC check (CCITT $X^{16} + X^{12} + X^5 + 1$)	

Note: The maximum distance between nodes depends on the connector and cable processing methods.

Data Link Specifications

Type of Data Link		Automatic settings		Manual settings
No. of data link nodes		62 nodes max. (2 nodes min.)		
No. of data link words	Number of send/receive words per node	2,966 words max. (CIO Area + DM Area total)		
Data link areas	CIO Area	Data Link Area: CIO 1000 to CIO 1063	Select from the following: CIO Area only, DM Area only, CIO + DM Areas	CIO Area (CIO 0000 to CIO 6143) (See note)
	DM Area	D00000 to D00127		DM Area (D00000 to D32767) (See note)
Starting data link word	CIO Area	CIO 1000		Manual settings can be made between CIO 0000 to CIO 6143
	DM Area	D00000		Manual settings can be made between D00000 to D32767
Number of words sent per node	CIO Area	Either 4, 8, 16, or 32 words (same for each node)		0 to 254 words (separate for each node)
	DM Area	Either 8, 16, 32, or 64 words (same for each node)		
Allocating data link words	CIO Area	Each node has the same number of data link words and words are allocated to nodes in the order of node addresses.		The number of data link words and the order of allocation can be set for each node. The same order of allocation must be used for both the CIO Area and the DM Area.
	DM Area			

Note: When creating manually set data link tables using CX-Programmer Ver. 1.2 Service Pack 1, the words that can be set by the user are limited to the same words as for CVM1/CV, as follows:
CIO Area: CIO 0000 to CIO 2555
DM Area: D00000 to D24575

Message Communications Specifications

Instruction		SEND/RECV	CMND
Application		Sending and receiving data	Reading and writing data (file memory, etc.) from other nodes, changing the operating mode, other control operations, reading error log, etc.
Message contents		Commands for sending and receiving data	Sends any FINS command
Local node to destination node	PC to PC	Possible	Possible
	PC to computer	Possible (requires a program to return responses from computer)	Possible (requires a program to return responses from computer)
	Computer to PC	Possible (requires a program to receive responses at the computer)	Possible (requires a program to receive responses at the computer)
Local node: Destination node		SEND instruction: 1:1 or 1:N (broadcasting data) RECV instruction: 1:1	SEND instruction: 1:1 or 1:N (broadcasting data)
Number of words sent and received		256 words max. (512 bytes)	542 bytes max.

■ SYSMAC LINK Units

Models

Applicable PC	Unit classification	Type	Media	Type of communications	Model number
CS1	CPU Bus Unit	Wired	Coaxial cable	Data links (manual settings, automatic settings), message communications (using SEND, RECV, and CMND instructions)	CS1W-SLK21
		Optical fiber	Optical fiber cable		CS1W-SLK11

SYSMAC LINK Unit Programming Software

Type	Name	Specifications	Model number
SYSMAC LINK programming software	CX-Programmer Ver. 1.2 Service Pack 1 or later	Manual data link settings, data link start/stop, read network status, read error log, routing table settings, network testing, changing network parameter settings	WS02-CXPC1-J

Note: 1. When creating manually set data link tables using CX-Programmer Ver. 1.2 Service Pack 1, the words that can be set by the user are limited to the same words as for CVM1/CV, as follows:
CIO Area: CIO 0000 to CIO 2555
DM Area: D00000 to D24575

2. You cannot use SYSMAC LINK support software in the CS1 SYSMAC LINK Unit.

SYSMAC LINK Unit Specifications

Item		Specifications	
		CS1W-SLK21	**CS1W-SLK11**
		Wired Unit	**Optical Unit**
Unit classification		CS1 CPU Bus Unit	
Applicable PCs		CS1-series PC	
Maximum number of Units		4 Units max. (total of Wired and Optical Units)	
Mounting position		Mount in any 4 slots on the CPU Rack or CS1 Expansion Rack	
Unit number settings		0 to F	
Data exchange with CPU Units	CPU Bus Unit I/O Area	25 words per Unit	
		SYSMAC LINK Unit to CPU Unit: Data link status, network participation status, error information, etc.	
Data exchange with CPU Units	CPU Bus Unit words in DM Area	100 words per Unit (however, only the first one word is used.)	
		CPU Unit to SYSMAC LINK Unit: Polling node/polled note mode setting, data link start, data link mode (automatic/manual) setting, data link words for automatic setting, etc.	
Settings switches		Rotary switches: Unit number, node address	
Indicators		There are nine LED indicators on Optical Unit or eight LED indicators on Wired Unit: RUN (operating), communications error, CPU Unit error, participating in network, polling node, sending, receiving, participating in data link, and power ON (Optical Units only).	
Front-panel connections		BNC connector	Optical connector $\times$ 2
			24-VDC power terminal block
Effect on CPU Unit cycle time		0.2 ms	
		If data links are operating, add 1.5 ms + (number of words transferred x 0.001 ms)	
		If message service is operating, also add event execution time	
Power consumption (supplied from Power Supply Unit)		330 mA at 5 VDC	470 mA at 5 VDC
Backup power supply		–	24 VDC, 200 mA max.
Dimensions		35 $\times$ 130 $\times$ 101 mm (W $\times$ H $\times$ D)	
Weight		400 g	500 g (excluding cable mounting)
Standard accessories		F-type Adapter (C1000H-CE001), insulating cover	Cable Bracket
Catalog number		W367	

■ Applicable CPU Units

PC	CPU Unit model number	Maximum number of Units that can be mounted on CPU Racks and CS1 Expansion Racks	Mounting position limitations
CS1-series	CS1H-CPU☐☐ (-V1) CS1G-CPU☐☐ (-V1)	4 Units max. (total for Wired and Optical Units) (Settable unit numbers: 0 to F)	None

■ SYSMAC LINK Support Boards

Models and Specifications

Item	Specification	
	3G8F5-SLK21	**3G8F5-SLK22**
Type	Wired Board	
Maximum number of nodes that can be connected to the network	62 nodes	32 nodes (node address: 1 to 62)
Computer	IBM PC/AT or compatible	
Compatible OS	IBM PC DOS Ver. 5.0 or later, Windows 95/NT (see note)	
Compatible language	Microsoft C Ver. 6.0 Quick BASIC Ver. 4.5	
Setting switches	DIP switch: Memory allocations Short pin: Interrupt level	
Indicators	There are seven LED indicators: RUN (operating), communications error, EEPROM error, participating in network, sending, receiving, and participating in data link.	
Connectors	BNC connector (connect the coaxial cable using the F-adapter supplied), card edge connector	
Power consumption	0.6 A max. at 5 VDC	
Dimensions	120 × 260 mm (W × L)	120 × 163 mm (W × L)
Weight	250 g	
Product configuration	1 Board + SYSMAC LINK Support Software (3.5-inch floppy disk, 1.44 MB)	
Standard accessories	1 F-connector (C1000H-CE001)	
Catalog No.	W220	---

Note: FinsGateway is required separately for Windows 95 or Windows NT.

■ Accessories (Sold Separately)

Coaxial Cables

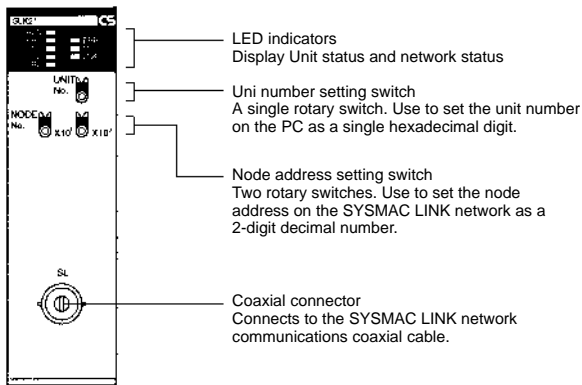| Name	Model	Manufacturer
Coaxial Cable	5C-2V	Fujikura Ltd.
	ECXF5C-2V	Hitachi Cable, Ltd.
Connector	BNC-P-5C-CR10-B	Daiichi Denshi Kogyo Co., Ltd.
F-connectors	C1000H-CE001	OMRON
Terminating Resistors	C1000H-TER01	OMRON

Note: The CR-H-1130 Hand Crimp Tool is required to assemble connectors.
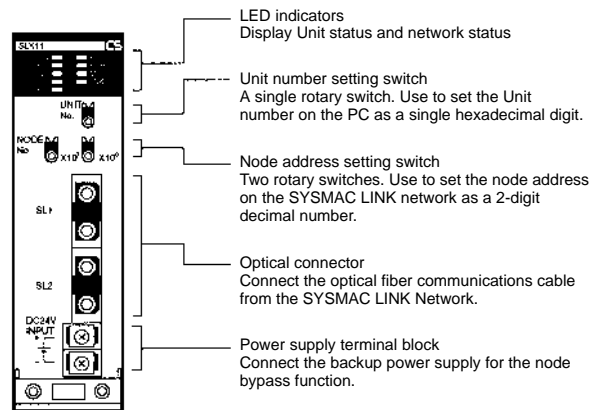
Optical Fiber Cables

Name	Specifications			Model
	Product	**Cable color, etc.**	**Cable length**	
Optical fiber cable	Hard plastic-clad fiber (H-PCF)	Black	10 m	S3200-HCCB101
			50 m	S3200-HCCB501
			100 m	S3200-HCCB102
			500 m	S3200-HCCB502
			1,000 m	S3200-HCCB103
		Orange	10 m	S3200-HCCO101
			50 m	S3200-HCCO501
			100 m	S3200-HCCO102
			500 m	S3200-HCCO502
			1,000 m	S3200-HCCO103
	Optical connector	For node connection, full lock type, crimp cut		S3200-COCF2011
	Inline adapter	Used in cable relays (extension)		S3200-COIAT2000
	Optical fiber cable with connector	Optical connector: Both ends on S3200-COCF2011	2 m	S3200-CN201-20-20
			5 m	S3200-CN501-20-20
			10 m	S3200-CN102-20-20
			15 m	S3200-CN152-20-20
			20 m	S3200-CN202-20-20
			Over 20 m	S3200-CN-20-20 (Specify length when ordering.)
	Optical connector assembly tool	Applicable optical connector: S3200-COCF2011		S3200-CAK1062
	Optical power tester	Applicable optical connector S3200-COCF2011 (applicable head unit: S3200-CAT2702)		S3200-CAT2700
	Master fiber	Applicable head unit: S3200-CAT2702		S3200-CAT2001H

■ Nomenclature

CS1W-SLK21 Wired Unit

LED indicators
Display Unit status and network status

Uni number setting switch
A single rotary switch. Use to set the unit number on the PC as a single hexadecimal digit.

Node address setting switch
Two rotary switches. Use to set the node address on the SYSMAC LINK network as a 2-digit decimal number.

Coaxial connector
Connects to the SYSMAC LINK network communications coaxial cable.

CS1W-SLK11 Optical Unit

LED indicators
Display Unit status and network status

Unit number setting switch
A single rotary switch. Use to set the Unit number on the PC as a single hexadecimal digit.

Node address setting switch
Two rotary switches. Use to set the node address on the SYSMAC LINK network as a 2-digit decimal number.

Optical connector
Connect the optical fiber communications cable from the SYSMAC LINK Network.

Power supply terminal block
Connect the backup power supply for the node bypass function.

LED Indicators

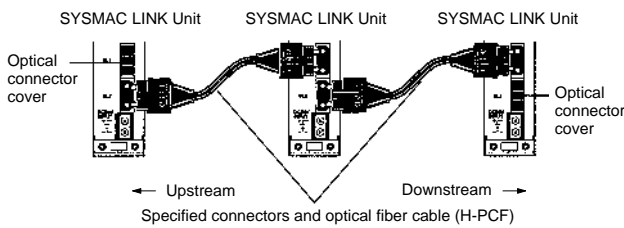| Indicator	Color	Display	Meaning
RUN (operating)	Green	Lit	Operating normally
		Not lit	Unit error
P/S (power supply ON, CS1W-SLK11 only)	Green	Lit	Power is being supplied from the backup power supply.
		Not lit	Power is not being supplied from the backup power supply.
ERC (error detected by Unit)	Red	Lit	Communications Controller error, node address setting error, duplicate node address setting
		Not lit	Communications operating normally
ERH (error in the CPU Unit)	Red	Lit	CPU Unit error, CPU Unit interface error, EEPROM error, unit number setting error, duplicate unit number setting, I/O tables not set
		Not lit	CPU Unit operating normally
INS (participating in network)	Yellow	Lit	Participating in network
		Not lit	Not participating in network
SD (sending data)	Yellow	Lit	Sending data
		Not lit	Not sending data
RD (receiving data)	Yellow	Lit	Receiving data
		Not lit	Not receiving data
LNK (data link)	Yellow	Lit	Data links operating
		Slow flashing	Data link table settings error
		Quick flashing	Data link table communications cycle time is too short.
		Not lit	Data links not operating

9

■ External Connections

Wired Units

Connect each node using coaxial cables by means of multidrop connections.

F-adapter

Connector

Terminating resistance

Terminating resistance

5C-2V Coaxial Cable
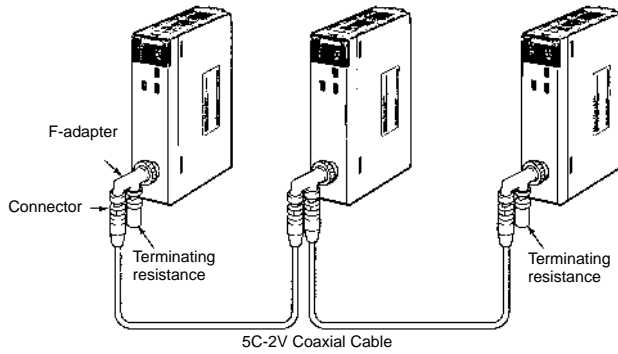
Optical Units

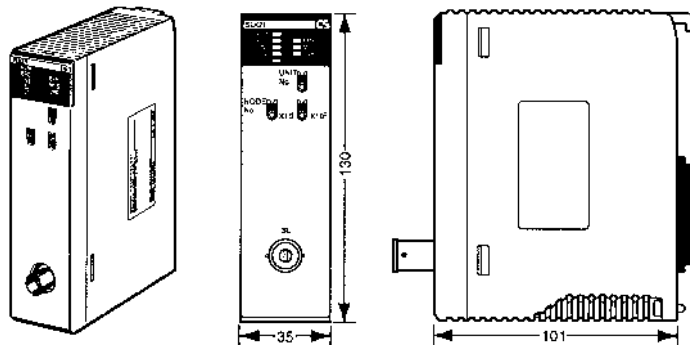Connect all the nodes in series in a daisy chain using the optical fiber cable (H-PCF cable).

SYSMAC LINK Unit   SYSMAC LINK Unit   SYSMAC LINK Unit

Optical connector cover

Optical connector cover

← Upstream   Downstream →

Specified connectors and optical fiber cable (H-PCF)

■ Dimensions

Wired Unit

CS1W-SLK21   Unit: mm
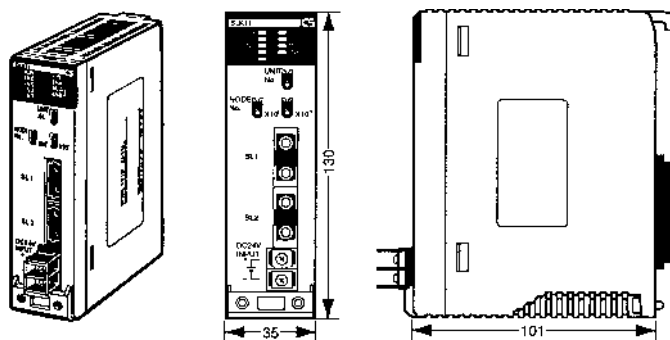
130

35

101

Optical Unit

CS1W-SLK11   Unit: mm

130

35

101

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