

CJ-series EtherNet/IP Unit CJ1W-EIP21

CSM_CJ1W-EIP21_DS_E_9_9

EtherNet/IP unit with tag data link capacity of 180,000 words or more

- EtherNet/IP is an industrial multivendor network that uses Ethernet. Managed by the ODVA (Open DeviceNet Vendors Association), it has open standards and is used with a wide range of industrial devices.
- The EtherNet/IP Unit supports tag data links to enable sharing data between devices at Ethernet nodes and a message service for sending and receiving data when required.
- The EtherNet/IP Unit supports the same FINS/UDP and FINS/TCP functionality as Ethernet Units.

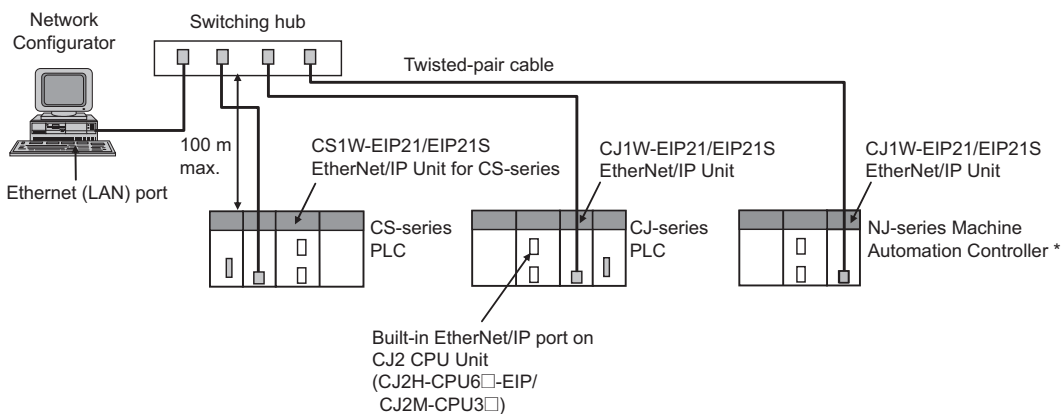


EtherNet/IP®

Features

- Large-capacity tag data links are easily enabled by simply setting connections, with no programming required.
- Tag data links can be used to exchange data with up to 256 nodes over up to 256 connections.
- Up to 256 connections can be set per Unit with up to 722 words of data per connection, for a total of up to 184,832 words of link data. (There is no limit to the data link capacity for the overall network.)
- Data concurrency is maintained within each connection (for up to 722 words).
- Tag data link settings can be changed for individual Units even while tag data links are being used on a network.
- Errors can be diagnosed using the Network Configurator, and system errors can be monitored with a wide array of status flags.

System Configuration



* EtherNet/IP Unit with unit version 2.1 or later is required to connect C1JW-EIP21 to NJ-series CPU Unit.
Use CPU Unit with version 1.01 or later and Sysmac Studio with version 1.02 or later.


CJ1W-EIP21

Ordering Information

International Standards


- The standards are abbreviated as follows: U: UL, U1: UL (Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, and CE: EC Directives.
- Contact your OMRON representative for further details and applicable conditions for these standards.
- Refer to the OMRON website (www.ia.omron.com) or ask your OMRON representative for the most recent applicable standards for each model.

EtherNet/IP Unit

Unit type	Product name	Specifications			No. of unit numbers allocated	Current consumption (A)		Model	Standards
		Communications cable	Communications functions	Units per CPU Unit		5 V system	24 V system		
CJ1 CPU Bus Unit	EtherNet/IP Unit 	Shielded twisted-pair (STP) cable Categories: 100 Ω at 5, 5e	Tag Data Link Functions, Message Communications Functions	8 max. *1	1	0.41	—	CJ1W-EIP21	UC1, N, L, CE

*1. Up to four EtherNet/IP Units can be connected to a NJ CPU Unit. Up to seven EtherNet/IP Units can be connected to a CJ2H-CPU6□-EIP. Up to two EtherNet/IP Units can be connected to a CJ2M CPU Unit.

Industrial Switching Hubs

Product name	Appearance	Functions	No. of ports	Accessories	Current consumption (A)	Model
Industrial Switching Hubs		Quality of Service (QoS): EtherNet/IP control data priority 10/100BASE-TX, Auto-Negotiation	5	Power supply connector	0.07	W4S1-05D

Recommended Network Devices

The following table shows the devices recommended for use with the EtherNet/IP.

Part	Manufacturer	Model number	Inquires
Switching Hub	Phoenix Contact	FL SWITCH SFN 8TX (8 ports)	Phoenix Contact USA Customer Service
	Contec USA, Inc.	SH8008(FIT)H (8 ports)	CONTEC USA Inc.
	Cisco Systems, Inc.	WS-C2955T-12 (12 ports)	Cisco Systems, Inc. Main Corporate HQ
Twisted-pair cable	100BASE-TX EtherNet/IP compliant cable		—
Connectors (Modular plug)	STP Plug		
	Panduit Corporation	MPS588	Panduit Corporation US Headquarters
Boots	Tsuko Company	MK boot (IV) LB	Tsuko Company Japan Headquarters

Note: 1. Always use a switching hub when using tag data links in the network.

Note: 2. If a repeater hub is used for EtherNet/IP tag data links (cyclic communications), the network's communications load will increase, data collisions will occur frequently, and stable communications will be impossible.

Mountable Racks

Model	NJ system		CJ1 system		CP1H system	NSJ system *1	
	CPU Rack	Expansion Rack	CPU Rack	Expansion Backplane	CP1H PLC	NSJ Controller	Expansion Backplane
CJ1W-EIP21	4 Units (per CPU Unit) *2		8 Units (per CPU Unit) *3		2 Units *4	Not supported	8 Units

*1. Product no longer available to order.

*2. EtherNet/IP Unit with unit version 2.1 or later is required to connect C1JW-EIP21 to NJ-series CPU Unit. Use CPU Unit with version 1.01 or later and Sysmac Studio with version 1.02 or later.

*3. Up to seven EtherNet/IP Units can be connected to a CJ2H-CPU6□-EIP. Up to two EtherNet/IP Units can be connected to a CJ2M CPU Unit.

*4. A CP1W-EXT01 CJ Unit Adaptor is required.

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EtherNet/IP Units Specifications

Item		Specifications
Model number		CJ1W-EIP21
Type		100Base-TX *1
Applicable PLCs		NJ-series, CJ (CJ1, CJ2) series, CP1H, and NSJ series PLCs.
Unit classification		CJ-series CPU Bus Unit
Mounting location		CPU Rack or Expansion Rack
Number of Units that can be mounted		NJ-series System : 4 max. (including Expansion Racks) CJ series System and NSJ series System: 8 max. (including Expansion Racks) *2 CP1H System: 2 max.
CPU Unit words used	Allocated CIO Area words (CPU Bus Unit words)	25 words/Unit (one unit number's words) These words contain control bits and flags, the target node PLC's operating and error information, Unit status, communications status, registered/normal target node information, and FINS/TCP connection status.
	Allocated DM Area words (CPU Bus Unit words)	100 words/Unit (one unit number's words) These words contain the IP address display/setting area.
	User-set area	Any usable data area words Target node PLC's operating and error information, and registered/normal target node information
	CPU Bus Unit System Setup	Not used.
Non-volatile memory within EtherNet/IP Unit (See note.)		The following settings are stored in the EtherNet/IP Unit's non-volatile memory. Note: Unlike the regular Ethernet Units, the CPU Bus Unit Setup Area in the CPU Unit is not used for these settings. 1. Unit Setup (communications settings for the EtherNet/IP Unit, such as the IP address, DNS server settings, host name, baud rate, FINS/UDP settings, and FINS/TCP settings) 2. Tag data link settings (device parameters)
Transfer specifications	Media access method	CSMA/CD
	Modulation method	Baseband
	Transmission paths	Star form
	Baud rate	100 Mbit/s (100Base-TX)
	Transmission media	Shielded twisted-pair (STP) cable Categories: 100 Ω at 5, 5e
	Transmission distance	100 m (distance between hub and node)
Number of cascade connections		There is no limitation when a switching hub is used.
Current consumption (Unit)		410 mA max. at 5 V DC
Weight		94 g max.
Dimensions		31 × 90 × 65 mm (W × H × D)
Other general specifications		Other specifications conform to the general specifications of the CJ-series.

*1. If tag data links are being used, use 100Base-TX. Otherwise, 10Base-T can be used, but this is not recommended.

*2. Up to seven EtherNet/IP Units can be connected to a CJ2H-CPU6□-EIP. Up to two EtherNet/IP Units can be connected to a CJ2M CPU Unit.

Communications Specifications

Item			Specifications		
			NJ	CJ2	CJ1
CIP service	Tag data links (Cyclic communications)	Number of connections	256		
		Packet interval (refresh cycle)	0.5 to 10,000 ms (in 0.5-ms units) Can be set independently for each connection. (Data is refreshed over the network at the preset interval and does not depend on the number of nodes.)		
		Allowed communications bandwidth per Unit	6,000 to 12,000 pps *1 *2		
		Number of tag sets	256		
		Tag types	CIO Area, DM Area, EM Area, Holding Area, Work Area, and network symbols *3		
		Number of tags per connection (= 1 tag set)	8 (7 tags when the tag set contains the controller status)		
		Maximum link data size per node (total size of all tags)	184,832 words		
		Maximum data size per connection	504 bytes (252 words) or 1444 bytes (722 words) *4 Data synchronicity is maintained within each connection.		
		Number of registrable tag sets	256 (1 connection = 1 tag set)		
		Maximum size of 1 tag set	722 words (The controller status uses 1 word when the tag set contains the PLC status.)		
		Maximum number of tags that can be refreshed per CPU Unit cycle *5	Output/Transmission (CPU to EtherNet/IP): 256 Input/Reception (EtherNet/IP to CPU): 256		Output/Transmission (CPU to EtherNet/IP): 19 Input/Reception (EtherNet/IP to CPU): 20 *6
		Data that can be refreshed per CPU Unit cycle *5 The layout of the allocated CIO Area words is the default. *7	Output/Transmission (CPU to EtherNet/IP): 6,432 words Input/Reception (EtherNet/IP to CPU): 6,432 words		Output/Transmission (CPU to EtherNet/IP): 7,469 words Input/Reception (EtherNet/IP to CPU): 7,469 words
		Changing tag data link parameters during operation	Supported *8		
		Multicast packet filter function *9	Supported		
	Explicit messaging	Class 3 (connected)	Number of connections: 128		
		UCMM (unconnected)	Number of clients that can communicate at one time: 32 max. Number of servers that can communicate at one time: 32 max.		
		CIP routing *10	Supported CJ1W-EIP21/EIP21S, CS1W-EIP21/EIP21S, NJ-501-□□□□, NJ-301-□□□□, CJ2H-CPU□□-EIP, CJ2M-CPU3□□		
	FINS service *11		FINS/UDP	Not supported	Supported
			FINS/TCP	Not supported	16 connections max.
SNMP		Agent	SNMPv1, SNMPv2c, SNMP trap		
		MIB	MIB-II		
EtherNet/IP conformance test			CT11		
Ethernet interface			10BASE-T or 100BASE-TX Auto Negotiation or fixed settings		

*1. In this case, pps means "packets per second" and indicates the number of packets that can be processed in one second.

*2. When using the EtherNet/IP Unit with version 3.0 or later. When using the EtherNet/IP Unit with version 2.1 or earlier, the maximum allowed communications bandwidth per Unit is 6,000 pps.

*3. Network symbols can be used for the following CPU Units.

NJ501-□□□□/NJ301-□□□□/CJ2H-CPU6□-EIP/CJ2M-CPU3□/CJ2H-CPU6□ with the unit version 1.6 or later/CJ2M-CPU1□ with unit version 2.2 or later

*4. To use 505 to 1,444 bytes as the data size, the system must support the Large Forward Open standard (an optional CIP specification). The CS/CJ-series Units support this standard, but before connecting to nodes of other companies, confirm that those devices also support it.

*5. If the maximum data size is exceeded, the data refreshing with the CPU Unit will extend over two or more cycles.

*6. If status layout is set to user settings, the maximum number of tags is as follows.

Output/Transmission	Input/ Reception
19	19

*7. The table below shows value when the layout type is User defined.

		When connected to CJ1 CPU Unit	When connected to CJ2 CPU Unit
Data (words) that can be refreshed per CPU Unit cycle	Output/Transmission	7405	6368
	Input/Reception	7405	6368

*8. If parameters are changed in the EtherNet/IP Unit, however, the EtherNet/IP Unit will be restarted. When other nodes are communicating with the affected node, the communications will temporarily time out and automatically recover later.

*9. Because the EtherNet/IP Unit is equipped with an IGMP client, unnecessary multicast packets can be filtered by using a switching hub that supports IGMP snooping.

*10. When NJ-Series CPU Units is described, Supported only by the EtherNet/IP Units with unit version 2.1 or later and NJ-Series CPU Units with unit version 1.01 or later.

*11. The EtherNet/IP Unit uses the TCP/UDP port numbers shown in the following table.

Service	Protocol		Port number		Remarks	
	CJ1/CJ2	NJ	CJ1/CJ2	NJ	CJ1/CJ2	NJ
Tag data links	UDP		2222		The port number is fixed.	
Class3, UCMM	TCP/UDP		44818			
DNS	UDP		53			
BOOTP client	---	UDP	---	68		
FINS/UDP service	UDP	---	9600	---	Port numbers in the Unit Setup can be changed with the CX-Programmer.	Port numbers in the Unit Setup can be changed with the Sysmac Studio.
FINS/TCP service	TCP	---	9600	---		
FTP	TCP		20, 21			
SNTP	UDP		123			
SNMP	UDP		161			
SNMP trap	UDP		162			

Unit Versions and Software Versions

The following versions of the Sysmac Studio, CX-Programmer and Network Configurator are required to set EtherNet/IP Units.

Yes:Supported, ---:Not supported

CJ1W-EIP21	Sysmac Studio *1		CX-Programmer *2			Network Configurator for EtherNet/IP	
	Ver.1.01 or lower	Ver.1.02 or higher	Ver.7.1 or lower	Ver.8.0 or higher	Ver.8.02 or higher	Ver.3.40 or lower	Ver.3.50 or higher
Ver.1.0	---	---	---	Yes *3	Yes	Yes	Yes
Ver.2.0	---	---	---	Yes	Yes	Yes	Yes
Ver.2.1	---	Yes	---	Yes	Yes	---	Yes
Ver.3.0 *4	---	Yes	---	Yes	Yes	---	Yes

*1. Available only when connecting with NJ-series CPU Units.

*2. Available only when connecting with CJ1/CJ2-series CPU Units.

*3. The most recent version of the common module for CX-One version 3.□□ must be installed.

*4. Using the Sysmac Studio auto-update (November 2014 or later).

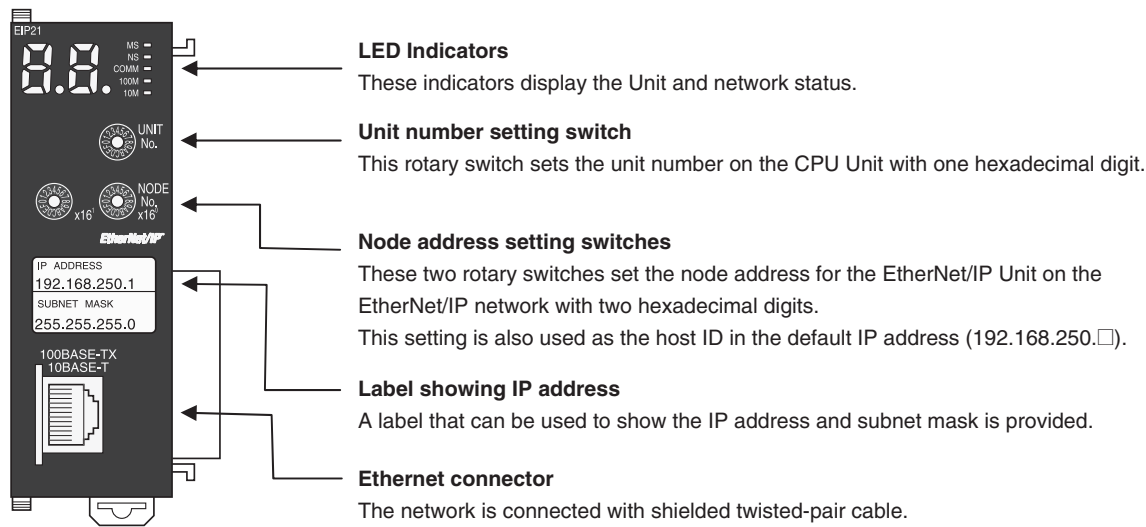
Network Configurator Requirements

The Network Configurator is a software package designed for building, setting, and controlling a multi-vendor EtherNet/IP Network using OMRON's EtherNet/IP. It is included in CX-One version 3.0. The Network Configurator provides the following functions for building, setting, and controlling EtherNet/IP.

Item		Specification		
System Requirements		Refer to the CX-One Catalog (Cat. No. R134), visit your local OMRON website.		
Network connection method		CS1/CJ1	CJ2	NJ
	Serial interface	CPU Unit's Peripheral or RS-232C port	CPU Unit's USB or RS-232C port	CPU Unit's USB port
	Ethernet interface	EtherNet/IP Unit's Ethernet port	CPU Unit's Ethernet port EtherNet/IP Unit's Ethernet port	
Location on Network		A single node address is used (only when directly connected to EtherNet/IP).		
Number of Units that can be connected to Network		A single Network Configurator per Network (More than one Configurator cannot be used in the same system.)		
Main functions	Network control functions	<ul style="list-style-type: none"> The Network configuration can be created and edited regardless of whether the Network Configurator is online or offline. The Network configuration can be read from a file or the network. 		
	Configuration functions	The EDS files used by the Network Configurator can be installed and deleted.		
Supported file formats		Configurator network configuration files (*.ncf) Configuration files (*.ncf) created using the Network Configurator for EtherNet/IP (version 2) can be imported by selecting External Data - Import from the File Menu.		

External Interface

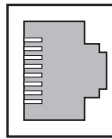
CJ1W-EIP21



Ethernet Connectors

The following standards and specifications apply to the connectors for the Ethernet twisted-pair cable.

- Electrical specifications: Conforming to IEEE802.3 standards.
- Connector structure: RJ45 8-pin Modular Connector (conforming to ISO 8877)



Connector pin	Signal name	Abbr.	Signal direction
1	Transmission data +	TD+	Output
2	Transmission data –	TD–	Output
3	Reception data +	RD+	Input
4	Not used.	–	–
5	Not used.	–	–
6	Reception data –	RD–	Input
7	Not used.	–	–
8	Not used.	–	–
Hood	Frame ground	FG	–

CJ1W-EIP21

Functional Comparson of EtherNet/IP Functionality

Yes: Supported, No: Not supported

Item	CJ1W-EIP21 EtherNet/IP Unit (built-in port on CJ2 CPU Unit)			Built-in EtherNet/IP port on NJ-series CPU Unit	CJ-series Ethernet Unit
	Unit version 1.0	Unit version 2.0	Unit version 2.1 Unit version 3.0		
Tag data link communications service	Yes	Yes	Yes	Yes	No
CIP message communications service	Yes	Yes	Yes	Yes	No
FINS/UDP service	Yes	Yes	Yes	Yes	Yes
FINS/TCP service	Yes	Yes	Yes	Yes	Yes
Socket service	No	No	No	Yes	Yes
File transfer (FTP)	No	Yes	Yes	Yes	Yes
Mail send/receive	No	No	No	No	Yes
Web functions	No	No	No	No	Yes
Automatic adjustment of PLC/Controller's internal clock	No	Yes	Yes	Yes	Yes
Simple backup function	Yes	Yes	Yes	No	Yes
Error history	Yes	Yes	Yes	Yes *1	Yes
Response to PING command	Yes	Yes	Yes	Yes	Yes
SNMP/SNMP trap	No	Yes	Yes	Yes	No
CIDR function for IP addresses	No	Yes	Yes	Yes	Yes *2
Online connection by EtherNet/IP using CX-One	No	Yes	Yes	No	No
Online connection by Ethernet (FINS) using CX-One	Yes	Yes	Yes	No	Yes
Online connection by EtherNet/IP using Network Configurator	Yes	Yes	Yes	Yes	No
Mounting in a Controller with an NJ series CPU Unit	No	No	Yes *3	No	No
Secure communications	No	No	No	No	No
User authentication	No	No	No	No	No
Opening and closing the port	No	No	No	No	No
IP packet filtering	No	No	No	No	No
Operation log	No	No	No	No	No

*1. This is equivalent to the event log of the built-in EtherNet/IP port of an NJ-series Controller.

*2. This function supported by unit version 1.5 or later.

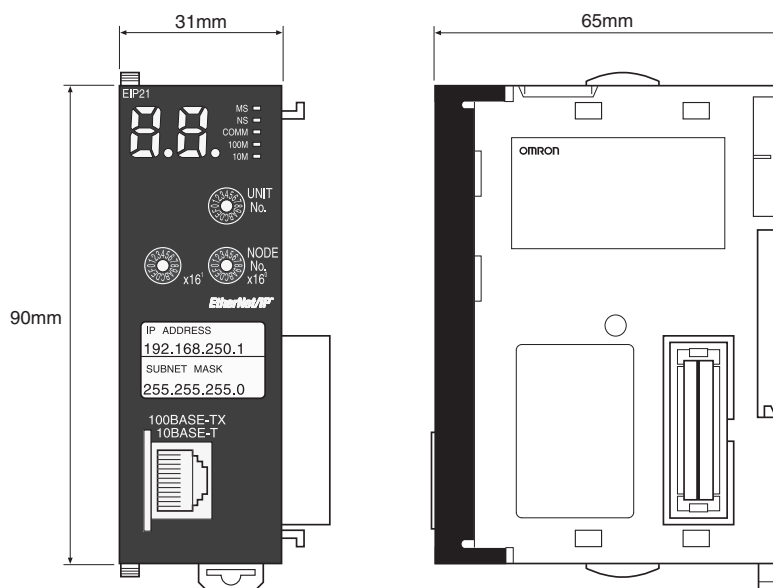
*3. You cannot use the following functions if you connect to the CPU Unit through an EtherNet/IP Unit.

- Going online with a CPU Unit from the Sysmac Studio. (However, you can go online from the Network Configurator.)
- Troubleshooting from an NS-series PT

Dimensions

(Unit: mm)

CJ1W-EIP21



Related Manuals

Manual number	Model	Name	Contents
W465	CS1W-EIP21 CJ1W-EIP21 CJ2H-CPU□□-EIP CJ2M-CPU3□ CS1W-EIP21S CJ1W-EIP21S	EtherNet/IP Units Operation Manual	Provides information on operating and installing EtherNet/IP Units, including details on basic settings, tag data links, and FINS communications. Refer to the <i>Communications Commands Reference Manual</i> (W342) for details on FINS commands that can be sent to CS-series and CJ-series CPU Units when using the FINS communications service. Refer to the <i>Ethernet Units Operation Manual Construction of Applications</i> (W421) for details on constructing host applications that use FINS communications.
W495	CJ1W-EIP21 CJ1W-EIP21S	CJ-series EtherNet/IP Units Operation Manual for NJ-series CPU Unit	Information on using an EtherNet/IP Unit that is connected to an NJ-series CPU Unit is provided. Information is provided on the basic setup, tag data links, and other features. Use this manual together with the NJ-series CPU Unit Hardware User's Manual (Cat. No. W500) and NJ-series CPU Unit Software User's Manual (Cat. No. W501).
W421	CS1W-ETN21 CJ1W-ETN21	Ethernet Units Operation Manual Construction of Applications	Provides information on constructing host applications for 100Base-TX Ethernet Units, including functions for sending/receiving mail, socket service, automatic clock adjustment, FTP server functions, and FINS communications.
W342	CS1G/H-CPU□□H CS1G/H-CPU-□□V1 CS1W-SCU21 CS1W-SCB21/41 CJ1G/H-CPU□□H CJ1G-CPU□□ CJ1W-SCU41	Communications Commands Reference Manual	Describes the C-series (Host Link) and FINS communications commands used when sending communications commands to CS-series and CJ-series CPU Units.
W463	CXONE-AL□□D-V□	CX-One Setup Manual	Describes the setup procedures for the CX-One. Information is also provided on the operating environment for the CX-One.

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