OMRON

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

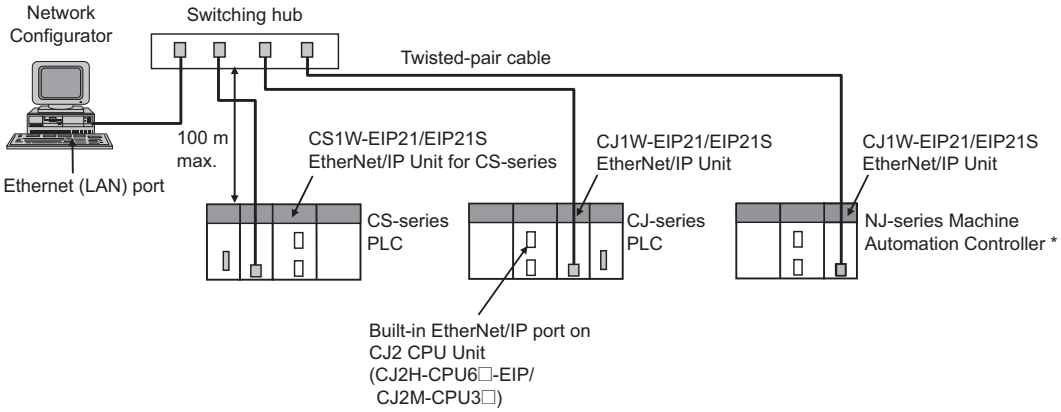
- EtherNet/IP is an industrial multivendor network that uses Ethernet. Managed by the ODVA (Open DeviceNet Vendors Association), it has open standards and is used with a wide range of industrial devices.
- The EtherNet/IP Unit supports tag data links to enable sharing data between devices at Ethernet 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.

# 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<br>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)<br>CJ series System and NSJ series System: 8 max. (including Expansion Racks) ✻2<br>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.<br>**Note:** Unlike the regular Ethernet Units, the CPU Bus Unit Setup Area in the CPU Unit is not used for these settings.<br>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)<br>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<br>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.

# CJ1W-EIP21

## 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)<br>Can be set independently for each connection.<br>(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<br>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<br>(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<br>Input/Reception (EtherNet/IP to CPU): 256 | | Output/Transmission (CPU to EtherNet/IP): 19<br>Input/Reception (EtherNet/IP to CPU): 20 ✻6 |
| | | Data that can be refreshed per CPU Unit cycle ✻5<br>The layout of the allocated CIO Area words is the defauly. ✻7 | Output/Transmission (CPU to EtherNet/IP): 6,432 words<br>Input/Reception (EtherNet/IP to CPU): 6,432 words | | Output/Transmission (CPU to EtherNet/IP): 7,469 words<br>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.<br>Number of servers that can communicate at one time: 32 max. | | |
| | | CIP routing ✻10 | Supported<br>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<br>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□ withe 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 refleshed 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 | | | |

# CJ1W-EIP21

## 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).

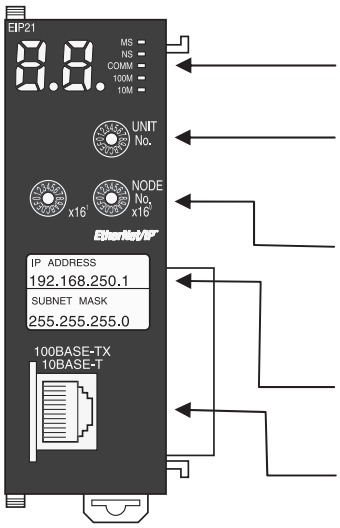
## Network Configurator Requirements

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<br>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** | • The Network configuration can be created and edited regardless of whether the Network Configurator is online or offline.<br>• 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)<br>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**




**LED Indicators**
These indicators display the Unit and network status.

**Unit number setting switch**
This rotary switch sets the unit number on the CPU Unit with one hexadecimal digit.

**Node address setting switches**
These two rotary switches set the node address for the EtherNet/IP Unit on the EtherNet/IP network with two hexadecimal digits.
This setting is also used as the host ID in the default IP address (192.168.250.□).

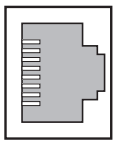
**Label showing IP address**
A label that can be used to show the IP address and subnet mask is provided.

**Ethernet connector**
The network is connected with shielded twisted-pair cable.

### 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 Comparsion of EtherNet/IP Functionality

Yes: Supported, No: Not supported

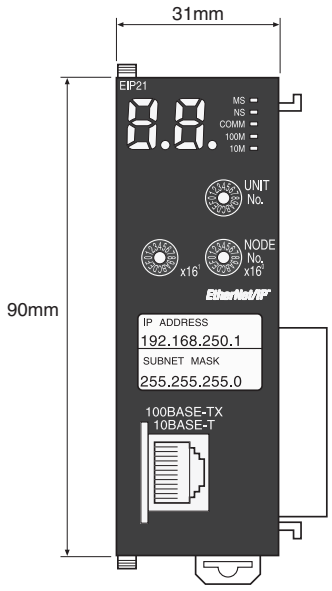
| Item | CJ1W-EIP21 EtherNet/IP Unit (built-in port on CJ2 CPU Unit) | | | Built-in EtherNet/IP port on NJ-series CPU Unit | CJ-series Ethernet Unit |
|---|---|---|---|---|---|
| | Unit version 1.0 | Unit version 2.0 | Unit version 2.1 Unit version 3.0 | | |
| **Tag data link communications service** | 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 |
| **Openiing and closing the port** | No | No | No | No | No |
| **IP packet filtering** | No | No | No | No | No |
| **Operation log** | No | No | No | No | No |

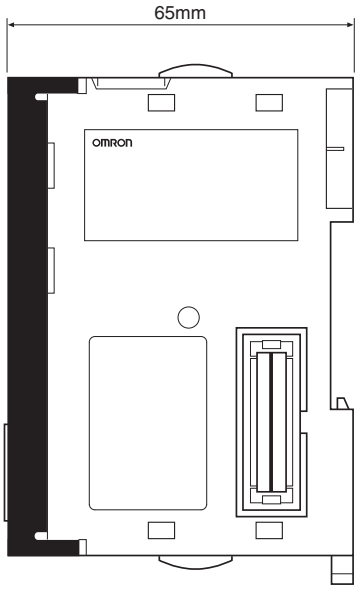
**✻1.** This is equivalent to the event log of the built-in EtherNet/IP port of an NJ-series Controller.
**✻2.** This function supported by unit version 1.5 or later.
**✻3.** You cannot use the following functions if you connect to the CPU Unit through an EtherNet/IP Unit.
- Going online with a CPU Unit 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<br>CJ1W-EIP21<br>CJ2H-CPU□□-EIP<br>CJ2M-CPU3□<br>CS1W-EIP21S<br>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.<br>Refer to the *Communications Commands Reference Manual* (W342) for details on FINS commands that can be sent to CS-series and CJ-series CPU Units when using the FINS communications service.<br>Refer to the *Ethernet Units Operation Manual Construction of Applications* (W421) for details on constructing host applications that use FINS communications. |
| W495 | CJ1W-EIP21<br>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<br>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<br>CS1G/H-CPU-□□V1<br>CS1W-SCU21<br>CS1W-SCB21/41<br>CJ1G/H-CPU□□H<br>CJ1G-CPU□□<br>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. |

## Terms and Conditions Agreement

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