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You can read the recommendations in the user guide, the technical guide or the installation guide for OMRON CJ2M-CPU3. You'll find the answers to all your questions on the OMRON CJ2M-CPU3 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

**User manual OMRON CJ2M-CPU3**  
**User guide OMRON CJ2M-CPU3**  
**Operating instructions OMRON CJ2M-CPU3**  
**Instructions for use OMRON CJ2M-CPU3**  
**Instruction manual OMRON CJ2M-CPU3**

Cat. No. W85-EI-06

**SYSMAC CS and CJ Series**  
CS1W-EIP21 (100Base-TX)  
CJ1W-EIP21 (100Base-TX)  
CJ2H-CPU6 -EIP (100Base-TX)  
CJ2M-CPU3\_ (100Base-TX/10Base-T)

**EtherNet/IP Units**

**OPERATION MANUAL**

**OMRON**



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etherNet/IP Unit or built-in EtherNet/IP port communications services. Section 2 provides the specifications of EtherNet/IP Units and introduces recommended network configuration devices. Section 3 explains how to install and make the initial settings required for operation of the EtherNet/IP Unit or built-in EtherNet/IP port. Section 4 describes the words allocated in the CIO Area and the DM Area for EtherNet/IP Units or built-in EtherNet/IP ports. Section 5 explains how to manage and use IP addresses. Section 6 describes tag data link functions and related Network Configurator operations. Section 7 describes message communications using FINS messages and explicit messages. Section 8 provides information on communicating on EtherNet/IP Systems and interconnected networks using FINS commands. The information provided in the section deals only with FINS communications in reference to EtherNet/IP Units or built-in EtherNet/IP ports. Section 9 describes message communications using FINS commands sent from the ladder program in the CPU Unit of the PLC.

Section 10 describes the communications performance in an EtherNet/IP network, and shows how to estimate the I/O response times and transmission delays. Section 11 describes the functions provided by the FTP server. Section 12 provides an overview of the automatic clock adjustment function, including details on specifications, required settings, operations from CX-Programmer, and troubleshooting. Section 13 describes cleaning, inspection, and Unit replacement procedures, as well as the Simple Backup Function. Section 14 describes error processing, periodic maintenance operations, and troubleshooting procedures needed to keep the EtherNet/IP network operating properly.

We recommend reading through the error processing procedures before operation so that operating errors can be identified and corrected more quickly. Appendices provide information on EtherNet/IP network parameters, the buffer configuration, TCP status transitions, ASCII characters, maintenance, and inspections. xi Relevant Manuals The following table lists CS- and CJ-series manuals that contain information relevant to EtherNet/IP Units or built-in EtherNet/IP ports. Manual number W465 Model CS1W-EIP21 CJ1W-EIP21 CJ2H-CPU6@-EIP CJ2M-CPU3@ Name EtherNet/IP Units Operation Manual (this manual) Contents W420 CS1W-ETN21 CJ1W-ETN21 W421 CS1W-ETN21 CJ1W-ETN21 W343 CS1W-ETN01 CS1W-ETN11 CJ1W-ETN11 CS1G/H-CPU@@H CS1G/H-CPU@@-V1 CS1W-SCU@@-V1 CS1W-SCB@@-V1 CJ2H-CPU6@-EIP CJ2H-CPU6@ CJ2M-CPU@@ CJ1G/H-CPU@@H CJ1G-CPU@@ CJ1M-CPU@@ CJ1W-SCU@@-V1 CP1E-E@@D@-@ CP1E-N@@D@-@ CP1H-X@@@-@ CP1H-Y@@@-@@ CJ2H-CPU6@-EIP CJ2H-CPU6@ CJ2M-CPU@@ Provides information on operating and installing EtherNet/IP Units, including details on basic settings, tag data links, and FINS communications. 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.

Refer to the Ethernet Units Operation Manual Construction of Applications (W421) for details on constructing host applications that use FINS communications. Ethernet Units Oper- Provides information on operating and installing ation Manual 100Base-TX Ethernet Units, including details on basic Construction of Net- settings and FINS communications. Refer to the Commuworks nications 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. Ethernet Units Oper- Provides information on constructing host applications for ation Manual 100Base-TX Ethernet Units, including functions for sending/receiving mail, socket service, automatic clock adjustConstruction of Applications ment, FTP server functions, and FINS communications. Ethernet Units Oper- Describes the installation and operation of the 10Base-5 ation Manual and 10Base-T Ethernet Units. Communications Commands Reference Manual Describes the C-series (Host Link) and FINS communications commands used when sending communications commands to CS-series, CJ-series, CP-series, and SYSMAC One NSJ-series CPU Units. W342 W472 CJ-series CJ2 CPU Unit Hardware User's Manual Provides hardware information for the CJ2 CPU Units. Information is included on features, system configuration, component names, component functions, installation, setting procedures, and troubleshooting. Use together with the CJ-series CJ2 CPU Unit Software User's Manual (W473). W473 CJ2H-CPU6@-EIP CJ2H-CPU6@ CJ2M-CPU@@ CJ-series CJ2 CPU Provides software information for the CJ2 CPU Units.

Unit Software User's Information is included on CPU Unit operation, internal Manual memory, programming, setting procedures, and CPU Unit functions. Use together with the CJ-series CJ2 CPU Unit Hardware User's Manual (W472). xii Manual number W474 Model CJ2H-CPU6@-EIP CJ2H-CPU6@ CJ2M-CPU@@ CS1G/H-CPU-@@H CS1G/H-CPU-@@-V1 CJ1G/H-CPU@@H CJ1M-CPU@@ CJ1G-CPU@@ NSJ@-@@@@(B)-G5D NSJ@-@@@@(B)-M3D CS1G/H-CPU@@H CS1G/H-CPU-@@V1 Name Programmable Controllers Instructions Reference Manual Contents Describes the ladder diagram programming instructions supported by CS-series and CJ-series PCs. Use this manual for CJ2 CPU Units. W339 Programmable Controllers Operation Manual W393 CJ1G/H-CPU@@H CJ1G-CPU@@ Programmable Controllers Operation Manual W394 CS1G/H-CPU@@H CS1G/H-CPU-@@V1 CJ1G/H-CPU@@H CJ1G-CPU@@ NSJ@-@@@@(B)-G5D NSJ@-@@@@(B)-M3D CS1G/H-CPU@@H CS1G/H-CPU-@@V1 CJ1G/H-CPU@@H CJ1G-CPU@@ NSJ@-@@@@(B)-G5D NSJ@-@@@@(B)-M3D CXONE-AL@@C-V4 CXONE-AL@@D-V4 WS02-CXPC@-V9 Programmable Controllers Programming Manual Provides an outline of, and describes the design, installation, maintenance, and other basic operations for the CSseries PLCs.



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Information is also included on features, system configuration, wiring, I/O memory allocations, and troubleshooting. Use together with the Programmable Controllers Programming Manual (W394). Provides an outline of, and describes the design, installation, maintenance, and other basic operations for the CJ-series PLCs. Information is also included on features, system configuration, wiring, I/O memory allocations, and troubleshooting. Use together with the Programmable Controllers Programming Manual (W394).

Describes programming, tasks, file memory, and other functions for the CS-series, CJ-series, and NS-J-series PLCs. Use together with the Programmable Controllers Operation Manual (W339 for CS-series PLCs and W393 for CJ-series PLCs). W340 W463 W446 W464 CXONE-AL@@C-V4/ CXONE-AL@@D-V4 Describes the ladder diagram programming instructions supported by CS-series and CJ-series PCs. Use together with the Programmable Controllers Operation Manual (W339 for CS-series PLCs and W393 for CJ-series PLCs), and the Programmable Controllers Programming Manual (W394). CX-One Setup Man- Describes the setup procedures for the CX-One.

Information is also provided on the operating environment for the CX-One. CX-Programmer Provides information on how to use the CX-Programmer, Operation Manual a Windows-based programming device. Use together with the Programmable Controllers Operation Manual (W339 for CS-series PLCs and W393 for CJ-series PLCs), Programmable Controllers Programming Manual (W394) and the Programmable Controllers Instructions Reference Manual (W340) to perform programming. CS/CJ/CP/NSJ Describes the operating procedures of the CX-Integrator series CX-Integrator that can be used to set up and monitor networks. Ver.

2. @ Operation Manual Programmable Controllers Instructions Reference Manual !WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given. xiii xiv Read and Understand this Manual Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments. Warranty and Limitations of Liability WARRANTY OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NONINFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. LIMITATIONS OF LIABILITY OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

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NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM. PROGRAMMABLE PRODUCTS OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof. xvi Disclaimers CHANGE IN SPECIFICATIONS Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice.

When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products. DIMENSIONS AND WEIGHTS Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown. PERFORMANCE DATA Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements.

Actual performance is subject to the OMRON Warranty and Limitations of Liability. ERRORS AND OMISSIONS The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions. xvii xviii Unit Versions of CS/CJ-series Unit Versions Notation of Unit Versions on Products A "unit version" has been introduced to manage Units in the CS/CJ Series according to differences in functionality accompanying Unit upgrades.



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The unit version is given to the right of the lot number on the nameplate of the products for which unit versions are being managed, as shown below. CS1W-EIP21/CJ1W-EIP21 Product nameplate CS1WUNIT Lot No. Unit version Example for unit version 1.0 Lot No. 040401 0000 OMRON Corporation Ver.1.0 MADE IN JAPAN CJ2H-CPU@@-EIP/CJ2M-CPU3@ Product nameplate CJ2HUNIT Indicates that the unit version of the CPU Unit is 1.

0. Indicates that the unit version of the built-in EtherNet I/P port is 2.0. Lot No. 080701 CPU Ver. 1.0 EIP Ver.2.0 OMRON Corporation MADE IN JAPAN In this manual, the version of the EtherNet/IP port built into the CJ2HCPU@@-EIP/CJ2M-CPU3@ CPU Unit is given as the unit version. Confirming Unit Versions with Support Software CX-Programmer version 4.

0 can be used to confirm the unit version using the Unit Manufacturing Information. Note The unit versions of Pre-Ver.1.0 Units cannot be confirmed in Unit Manufacturing Information. The following dialog box is displayed.

In the IO Table Window, right-click and select Unit Manufacturing information - CPU Unit. The following Unit Manufacturing information Dialog Box will be displayed. xix Unit version Note Using Unit Version Label The unit version will be displayed in the Unit Manufacturing Information Dialog Box. The following unit version label is provided with the EtherNet/IP Unit. This label can be attached to the front of the EtherNet/IP Unit to differentiate between EtherNet/IP Units with different unit versions.

Unit Version Notation Product nameplate Ver. 1.0 or later number shown to right of the lot number In this manual, the unit version of a EtherNet/IP Unit is given as shown in the following table. Special remarks Information without reference to specific Unit Versions applies to all versions of the Unit. Notation used in this manual Ethernet Unit Ver. 1.0 or later (See note.) Note Some Support Software products call the EtherNet/IP Unit version the "revision."

"Revision" is also sometimes used in this manual. Applicable CIP Revisions The following tables list the CIP revisions that are supported by the different unit versions of the EtherNet/IP Unit.

CS1W-EIP21, CJ1W-EIP21, and CJ2H-CPU@@-EIP Unit version Unit version 1.0 Unit version 2.0 CIP revision Revision 1.01 Revision 2.01 or 2.02 CJ2M-CPU3@ Unit version Unit version 2.0 Unit version 2.1 CIP revision Revision 2.01 Revision 2.02 xx Unit Versions and Programming Device Versions The following versions of the CX-Programmer and Network Configuration are required to set EtherNet/IP Units.

CS1W-EIP21, CJ1W-EIP21, and CJ2H-CPU@@-EIP Unit version Unit version 1.0 Unit version 2.0 Unit version Unit version 1.0 Unit version 2.0 OK OK Ver.

7.1 or lower ---- CX-Programmer Ver. 8.0 OK OK \*1 Ver. 8.

02 or higher OK OK Network Configurator for EtherNet/IP Ver. 3.00 or higher CJ2M-CPU3@ Unit version Unit version 2.0 Unit version 2.1 Unit version Unit version 2.0 Unit version 2.1 Ver. 9.0 or lower ----CX-Programmer Ver. 9.

1 OK OK\*2 Ver. 9.2 or higher OK OK Network Configurator for EtherNet/IP Ver. 3.1 or lower Ver. 3.20 Ver. 3.21 or higher --OK OK\*3 --OK\*4 OK \*1: The most recent version of the common module for CX-One version 3. must be installed.

\*2: The most recent version of the common module for CX-One version 4. must be installed. \*3: The settings cannot be downloaded from the computer to the PLC if more than 20 words of tag data links are set. \*4: A maximum of 20 words of tag data links can be set. xxi xxii PRECAUTIONS This section provides general precautions for using the CS/CJ-series EtherNet/IP Units and built-in EtherNet/IP ports.

The information contained in this section is important for the safe and reliable application of EtherNet/IP Units or built-in EtherNet/IP ports. You must read this section and understand the information contained before attempting to set up or operate an EtherNet/IP Unit or built-in EtherNet/IP port. 1 2 3 4 5 6

Intended Audience . . .

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.. General Precautions .....

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. Safety Precautions. . . .

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.. Operating Environment Precautions .....

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.... Application Precautions .....

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· Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits. · The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system. · The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. Unexpected operation, however, may still occur for errors in the I/O control section, errors in I/O memory, and other errors that cannot be detected by the self-diagnosis function. As a countermeasure for all such errors, external safety measures must be provided to ensure safety in the system. · Provide measures in the computer system and programming to ensure safety in the overall system even if errors or malfunctions occur in data link communications or remote I/O communications. !WARNING Provide safety measures in external circuits (i.e., not in the Programmable !Caution Execute online editing only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable. · Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits. !Caution Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.

Serious accidents may result from abnormal operation if proper measures are not provided. !Caution Confirm safety at the destination node before changing or transferring to another node the contents of a program, the PLC Setup, I/O tables, I/O memory, or parameters. Changing or transferring any of these without confirming safety may result in injury. !Caution Tighten the screws on the terminal block of the AC Power Supply Unit to the torque specified in the operation manual. The loose screws may result in burning or malfunction.

xxv Operating Environment Precautions 4 4 Operating Environment Precautions !Caution Do not operate the control system in the following locations: · Locations subject to direct sunlight. · Locations subject to temperatures or humidity outside the range specified in the specifications. · Locations subject to condensation as the result of severe changes in temperature. · Locations subject to corrosive or flammable gases. · Locations subject to dust (especially iron dust) or salts. · Locations subject to exposure to water, oil, or chemicals. · Locations subject to shock or vibration. !Caution Take appropriate and sufficient countermeasures when installing systems in the following locations: · Locations subject to static electricity or other forms of noise. · Locations subject to strong electromagnetic fields. · Locations subject to possible exposure to radioactivity.

· Locations close to power supplies. 5 Application Precautions Observe the following precautions when using the EtherNet/IP Unit or built-in EtherNet/IP port. !WARNING Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury. · Always connect to a ground of 100 or less when installing the Units. Not connecting to a ground of 100 or less may result in electric shock. · Always turn OFF the power supply to the CPU Unit and Slaves before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock. · Mounting or dismounting Power Supply Units, I/O Units, CPU Units, Memory Packs, or Master Units. · Assembling the Units.

· Setting DIP switches or rotary switches. · Connecting cables or wiring the system. · Connecting or disconnecting the connectors. !Caution Failure to abide by the following precautions could lead to faulty operation of the EtherNet/IP Unit, built-in EtherNet/IP port, or the system, or could damage the Ethernet Unit. Always heed these precautions.

· Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e., not in the Programmable Controller) must be provided by the customer. xxvii Application Precautions 5 · Always use the power supply voltages specified in the operation manuals. An incorrect voltage may result in malfunction or burning.

· Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction. · Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures · Make sure that all the Backplane mounting screws, terminal block screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction. · Leave the label attached to the Unit when wiring. Removing the label may result in malfunction if foreign matter enters the Unit. · Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.

· Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning. · Observe the following precautions when wiring the communications cable. · Separate the communications cables from the power lines or high-tension lines. · Do not bend the communications cables past their natural bending radius. · Do not pull on the communications cables. · Do not place heavy objects on top of the communications cables. · Always lay communications cable inside ducts. · Use appropriate communications cables.

· Make sure that the terminal blocks, expansion cable connectors, and other items with locking devices are locked in place. · Wire all connections correctly according to instructions in this manual. · Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring may result in burning. · Mount terminal blocks and connectors only after checking the mounting location carefully.

· Check the user program (ladder program and other programs) and parameters for proper execution before actually running it on the Unit. Not checking the program may result in unexpected operation. · Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation. · Changing the operating mode of the PLC.

· Force-setting/force-resetting any bit in memory.



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DeviceNet Vendor Association), just like DeviceNet. EtherNet/IP is not just a network between controllers; it is also used as a field network. Since EtherNet/IP uses standard Ethernet technology, various general-purpose Ethernet devices can be used in the network. The EtherNet/IP Unit and built-in EtherNet/IP port have the following features.

*High-speed, High-capacity Data Exchange through Data Links* The EtherNet/IP protocol supports implicit communications, which allows cyclic communications (called tag data links in this manual) with EtherNet/IP devices. Data can be exchanged at high speed between Controllers and devices, using high-volume tag sets (up to 640 words for the CJ2M-EIP21 and up to 184,832 words for other CPU Units) between PLCs. Tag data links (cyclic communications) can operate at the cyclic period specified for each application, regardless of the number of nodes. Data is exchanged over the network at the refresh cycle set for each connection, so the communications refresh cycle will not increase even if the number of nodes is increased, i.e. the synchronicity of the connection's data is preserved. Since the refresh cycle can be set for each connection, each application can communicate at its ideal refresh cycle. For example, a processes interlocks can be transferred at high speed while the production commands and the status monitor information are transferred at low speed. Note Communicating with FINS Messages (FINS/TCP and FINS/UDP) The communications load to the nodes must be within the Units' allowed communications bandwidth. Data can be exchanged with other OMRON FA devices using SEND, RECV, and CMND instructions from the ladder program, because EtherNet/IP supports OMRON's standard FINS message communications services.

There are two kinds of message services, using UDP/IP and TCP/IP (called FINS/UDP and FINS/TCP), allowing flexible data exchange for different applications. Note Network Connections with Controller Link There are no particular restrictions when sending FINS messages to OMRON Ethernet Units (CS1W-ETN21 or CJ1W-ETN21) in an Ethernet network. Mutual connections of Controller Link and EtherNet/IP are also supported (using the FINS communications service). The Controller Link connection allows a PLC on the Controller Link network to be monitored from a PLC on the EtherNet/IP network. Conversely, data can be exchanged with a PLC on the EtherNet/IP network from a PLC on the Controller Link network.



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*Tag Data Link (Cyclic Communications) Cycle Time 2 EtherNet/IP Unit Features FTP Server Section 1-1 A built-in FTP server is provided to enable transferring files in the PLC to and from a host computer. This enables transferring large amounts of data from a client without any additional ladder programming. The clocks built into PLCs connected to Ethernet can be automatically adjusted to the time of the clock in the SNTP server. If all of the clocks in the system are automatically adjusted to the same time, time stamps can be used to analyze various production histories. Automatic PLC Clock Adjustment Note Manage the Network with an SNMP Manager Note Specify Servers with Host Names A separate SNTP server is necessary to automatically adjust the PLC clocks.*

*Internal status information from the EtherNet/IP Unit or built-in EtherNet/IP port can be passed to network management software that uses an SNMP manager. A separate SNMP manager is necessary for network management. DNS client functionality allows you to use host names instead of IP addresses to specify SNTP servers and SNMP managers. This is useful, for example, when server IP addresses change for system revisions because the IP addresses are automatically found when host names are used. (1) A separate DNS server is necessary to use host names with the DNS client. (2) The DNS server is specified directly using its IP address. Note Set Classless IP Address with CIDR Plentiful Troubleshooting Functions A subnet mask can be set to use classless IP addresses, allowing more flexibility in address settings. A variety of functions are provided to quickly identify and handle errors. · Self-diagnosis at power ON · PING command to check the connection with another node · Error Log functions record the time of occurrence and other error details Note The CIP (Common Industrial Protocol) is a shared industrial protocol for the OSI application layer. The CIP is used in networks such as EtherNet/IP, ControlNet, and DeviceNet.*

*Data can be routed easily between networks that are based on the CIP, so a transparent network can be easily configured from the field device level to the host level. The CIP has the following advantages. · Destination nodes are specified by a relative path, without fixed routing tables. · The CIP uses the producer/consumer model. Nodes in the network are arranged on the same level and it is possible to communicate with required devices whenever it is necessary.*

*The consumer node will receive data sent from a producer node when the connection ID in the packet indicates that the node requires the data. Since the producer can send the same data with the same characteristics in a multicast (either multicast or unicast can be selected), the time required for the transfer is fixed and not dependent on the number of consumer nodes. 3 Devices Required for Constructing a Network Section 1-2 1-2 Devices Required for Constructing a Network The basic configuration for an EtherNet/IP System consists of one switching hub to which nodes are attached in star configuration using twisted-pair cable. CX-One Support Software (2) Twisted-pair cable (1) Built-in EtherNet/IP port on 100 m max. Ethernet (LAN) port (3) Switching hub (1) CS1W-EIP21 EtherNet/IP Unit for CS-series (1) CJ1W-EIP21 EtherNet/IP Unit CJ-series PLC CJ2 CPU Unit (CJ2H-CPU@@-EIP/ CJ2M-CPU3@) CJ-series PLC CS-series PLC The devices shown in the following table are required to configure a network with CS1W-EIP21 and CJ1W-EIP21 EtherNet/IP Units or the built-in EtherNet/IP port in CJ2H-CPU@@-EIP/CJ2M-CPU3@ CPU Units.*

*Network device (1) CS1W-EIP21 EtherNet/IP Units for CS-series PLCs, CJ1W-EIP21 EtherNet/IP Units for CJ-series PLCs, or built-in EtherNet/IP port in CJ2H-CPU@@-EIP/ CJ2M-CPU3@ CPU Units (2) Twisted-pair cable Contents These are Communications Units or built-in ports that connect a CS-series or CJ-series PLC to an EtherNet/IP network. (3) Switching Hub The twisted-pair cable connects EtherNet/IP Units or built-in EtherNet/IP ports to the switching hub, with an RJ45 Modular Connector at each end. Use an STP (shielded twisted-pair) cable of category 5, 5c, or higher. This is a relay device that connects multiple nodes in a star-shaped LAN. Recommended Switching Hubs Note For details on recommended devices for constructing a network, refer to 2-3-1 Recommended Network Devices. 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. Always use a switching hub when using tag data links in the network. 1-3 Support Software Required to Construct a Network This section describes the Support Software that is required to construct an EtherNet/IP network. Make the tag data link settings and Unit setup settings for the EtherNet/IP Unit or built-in EtherNet/IP port. Both of these settings are stored in the EtherNet/IP Unit's non-volatile memory (See note.*

*). Support Software is provided for each, as described below. Note Unlike the Ethernet Units, the EtherNet/IP Unit's TCP/IP settings are not stored in the CPU Unit's CPU Bus Unit System Setup Area. The settings are stored in the EtherNet/IP Unit itself. The CX-Programmer is used to set basic parameters, such as the local IP address of the EtherNet/IP Unit or built-in EtherNet/IP port and the subnet mask. (The CX-Programmer is included in the CX-One.) The CX-Programmer can also be used to check if data I/O is being performed correctly for tag data links. Unit Setup: CXProgrammer 4 Support Software Required to Construct a Network Computer CX-Programmer Section 1-3 EtherNet/IP Unit or built-in EtherNet/IP port Unit settings (Built-in non-volatile memory) Edit Parameters Dialog Box CS/CJ-series CPU Unit Refer to the CX-Programmer Operation Manual (Cat. No. W446) for information on the CX-Programmer.*

*Tag Data Link Settings: Network Configurator The Network Configurator is used to set the tag data links for the EtherNet/IP Unit or built-in EtherNet/IP port. (The Network Configurator is included in CXOne version 3.0 or higher.) The main functions of the Network Configurator are given below. 1) Setting and Monitoring Tag Data Links (Connections) The network device configuration and tag data links (connections) can be created and edited. After connecting to the network, the device configuration and tag data link settings can be uploaded and monitored. 2) Multivendor Device Connections EDS files can be installed and deleted to enable constructing, setting, and managing networks that contain EtherNet/IP devices from other companies. The IP addresses of EtherNet/IP devices can also be changed. EtherNet/IP Unit or built-in EtherNet/IP port Computer Network Configurator Edit Device Parameters Dialog Box Tag Data Link Settings (Built-in non-volatile memory) Transferred CS/CJ-series CPU Unit For details on the Network Configurator, refer to SECTION 6 Tag Data Link Functions.*



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*Routing Table Settings: CX-Integrator Proprietary OMRON FINS network system can be constructed from OMRON Communications Units. When FINS services are used, the CX-Integrator allows you to set routing tables to define transmission paths. (The CX-Integrator is included in the CX-One.) If FINS services are not used, then routing tables are not required. 5 Communications Services Overview Personal computer running Windows CX-Integrator Routing table settings Section 1-4 EtherNet/IP Unit or built-in EtherNet/IP port Routing Table Area CS/CJ-series CPU Unit Refer to the CX-Integrator Operation Manual (Cat. No. W464) for information on the CX-Integrator. 1-4 Communications Services Overview The following communications services are supported. CIP (Common Industrial Protocol) Communications Services 1) Tag Data Links (Cyclic Communications) A program is not required to perform cyclic data exchanges with other devices in the EtherNet/IP network. Normally, the tag data links in an EtherNet/IP Unit or built-in EtherNet/IP port are started by grouping the tags created with the Network Configurator into a tag set, and establishing a connection with the target device using that group of tags. One connection is used per group (tag set).*

*Up to 32 connections for the CJ2M-EIP21 and up to 256 connections for other CPU Units) can be registered. The following table gives the tag and tag set specifications. CS1W-EIP21 CJ1W-EIP21 CJ2H-CPU@@-EIP Total size of all tags 184,832 words Tags CJ2M-CPU3@ CS1W-EIP21 CJ1W-EIP21 CJ2H-CPU@@-EIP Maximum size of 1 tag set 722 words (The maximum size is 721 words when the tag set includes the PLC status.) Tag sets CJ2M-CPU3@ Total size of all tags 640 words Maximum size of 1 tag set 640 words\*1 (The maximum size is 639 words when the tag set includes the PLC status.)\*2 Maximum size of 1 tag 640 words\*1 (The maximum size is 639 words when the tag set includes the PLC status.)\*2 Number of registrable tags Number of registrable tags 256 32 Maximum size of 1 tag 722 words (The maximum size is 721 words when the tag set includes the PLC status.) Number of tags per tag set 8 (7 tags/tag set when the tag set includes the PLC status) Note Input and output variables cannot be combined. Number of registrable tag sets 256 Number of registrable tag sets 32 \*1 Unit version 2.0: 20 words maximum. \*2 Unit version 2.*

*0: 19 words maximum. 6 Communications Services Overview Section 1-4 Connection information · Target IP address · Target tag set · Originator tag set · Packet interval (RPI) Connection Tag Set (Inputs) Tag set name: SP1\_IN Tag Set (Outputs) Tag set name: SP1\_IN PLC Status Tag a Tag b Data flow PLC Status Tag i Tag ii Tag c : Tag g Originator device EtherNet/IP Target device Note (1) In this example, a connection is established with the originator's tag list containing tags a to g (inputs), which are grouped in a tag set called SP1\_IN, and the target's tag list containing tags i and ii (outputs), which are grouped in a tag set called SP1\_OUT. (2) The specifications for using tag data links with the CJ2M built-in EtherNet/IP port on a CJ2M-CPU3@ CPU Unit are different from the specifications for EtherNet/IP Units (CJ1W-EIP21 or CS1W-EIP21) and the CJ2H built-in EtherNet/IP port on a CJ2H-CPU@@-EIP CPU Unit. Make sure you are using the correct specifications for the application. Refer to 2-1-3 Communications Specifications for the communications specifications.*

*2) Message Communications (Unconnected Message Service) User-specified CIP commands can be sent to devices on the EtherNet/IP network. CIP commands, such as those for reading and writing data, can be sent and their responses received by executing the CMND instruction from the CS/ CJ-series CPU Unit's user program (without using a connection). EtherNet/IP Unit CS/CJ-series CPU Unit CMND CIP command Ethernet (EtherNet/IP) Response 7 Communications Services Overview Section 1-4 CIP messages (CIP commands and responses) can also be transferred to another CIP-based network via the EtherNet/IP Unit or built-in EtherNet/IP port using the CIP routing function for message communications. In the CS/CJ Series, CIP routing is possible only through two EtherNet/IP Units or built-in EtherNet/IP port. EtherNet/IP CS/CJ-series CPU Unit EtherNet/IP Unit Ethernet (EtherNet/IP), etc. EtherNet/IP Unit FINS Communications Service FINS commands can be sent to or received from other PLCs or computers on the same Ethernet network by executing SEND(090), RECV(098), or CMND(490) instructions in the ladder diagram program. This enables various control operations such as the reading and writing of I/O memory between PLCs, mode changes, and file memory operations. Note There are no particular restrictions when sending FINS messages to OMRON Ethernet Units (CS1W-ETN21 or CJ1W-ETN21) in an Ethernet network. Ethernet (EtherNet/IP) IP UDP or TCP FINS IP UDP or TCP FINS CS/CJ-series CPU Unit EtherNet/IP Unit User program SEND(090), RECV(098), or CMND(490) instruction Ethernet Unit EtherNet/IP Unit Various control operations (such as the reading and writing of I/O memory between PLCs, mode changes, and file memory operations) can be executed from the host computer by sending the corresponding FINS command with a UDP/IP or TCP/IP header attached. For example, it is possible to connect online via Ethernet from FINS communications applications such as the CX-Programmer, and to perform remote programming and monitoring. (See note.) Note Use CX-Programmer version 4.0 to use TCP/IP. For lower versions of CX-Programmer, FinsGateway Version 2003 or higher is required to use TCP/IP. 8 Communications Services Overview Section 1-4 Ethernet (EtherNet/IP) IP UDP or TCP FINS CS/CJ-series CPU Unit EtherNet/IP Unit The FINS gateway function enables access to PLCs on not only the same Ethernet network but on various other networks, including SYSMAC LINK and Controller Link.*

*9 Network Configurator Overview Section 1-5 1-5-1 Network Configurator Overview Overview Network Configurator version 3.0 or higher 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 4.0 or higher. Network Configurator version 3.20 is necessary to use the built-in EtherNet/IP port on a CJ2M-CPU3@ CPU Unit. Network Configurator version 3.20 is included with CX-One version 4.0 or higher. The Network Configurator provides the following functions for building, setting, and controlling EtherNet/IP.*

*Network Control 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. EDS files used by the Network Configurator can be installed and deleted.*



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... 13 EtherNet/IP Unit and Built-in EtherNet/IP Port Specifications Section 2-1 2-1-1 EtherNet/IP Unit and Built-in EtherNet/IP Port Specifications General Specifications The general specifications conform to those of the CS-series and CJ-series PLCs. 2-1-2 Unit Specifications Specifications CS1W-EIP21 100Base-TX (See note).

) CS-series PLCs CS-series CPU Bus Unit CPU Rack or Expansion Rack 8 max. (including Expansion Racks) 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. 100 words/Unit (one unit number's words) These words contain the IP address display/setting area CS-series EtherNet/IP Units Item Model number Type Applicable PLCs Unit classification Mounting location Number of Units that can be mounted CPU Unit Allocated CIO Area words used words (CPU Bus Unit words) Allocated DM Area words (CPU Bus Unit words) 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 Not used. Setup Non-volatile memory within EtherThe following settings are stored in the EtherNet/IP Unit's non-volatile memory. Net/IP Unit (See note).

) 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 Media access method CSMA/CD specificaModulation method Baseband tions Transmission paths Star form Baud rate 100 Mbit/s (100Base-TX) Transmission media Shielded twisted-pair (STP) cable Categories: 100 at 5, 5e Transmission distance 100 m (distance between hub and node) Number of cascade There is no limitation when a switching hub is used. connections Current consumption (Unit) 410 mA max. at 5 V DC Weight 171 g max. Dimensions 35 x 130 x 101 mm (W x H x D) Other general specifications Other specifications conform to the general specifications of the CS-series Note If tag data links are being used, use 100Base-TX. Otherwise, 10Base-T can be used, but this is not recommended. 14 EtherNet/IP Unit and Built-in EtherNet/IP Port Specifications CJ-series EtherNet/IP Unit Item Model number Type Applicable PLCs Unit classification Mounting location Number of Units that can be mounted Specifications CJ1W-EIP21 100Base-TX (See note.) CJ-series PLCs CJ-series CPU Bus Unit CPU Rack or Expansion Rack 8 max.

(including Expansion Racks) Section 2-1 CPU Unit Allocated CIO Area words used words (CPU Bus Unit words) Allocated DM Area words (CPU Bus Unit words) User-set area Note Up to seven EtherNet/IP Units can be connected to a CJ2H-CPU@-EIP CPU Unit. A maximum of two EtherNet/IP Units can be connected to a CJ2M CPU Unit (regardless of whether the CPU Unit has a built-in port). 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. 100 words/Unit (one unit number's words) These words contain the IP address display/setting area.



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