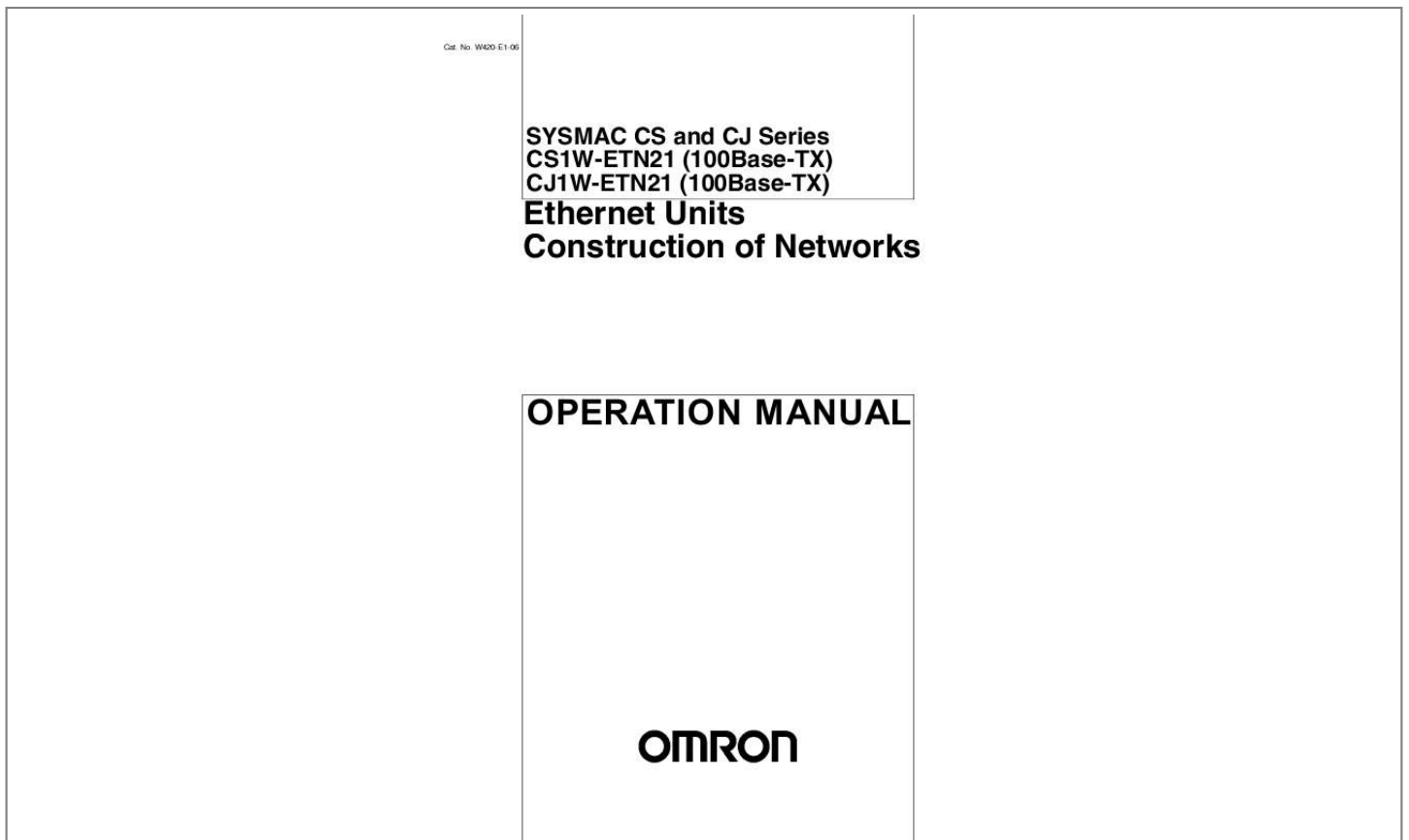




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You can read the recommendations in the user guide, the technical guide or the installation guide for OMRON CJ1W-ETN21. You'll find the answers to all your questions on the OMRON CJ1W-ETN21 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual OMRON CJ1W-ETN21
User guide OMRON CJ1W-ETN21
Operating instructions OMRON CJ1W-ETN21
Instructions for use OMRON CJ1W-ETN21
Instruction manual OMRON CJ1W-ETN21



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.....
.....
.....

..... *Application Precautions* .

.....
.....
.....

.....
.....
.....

.... *Conformance to EC Directives*

.....
.....
.....

.....
.....
.....

.... xxi xxii xxiii xxiv xxv *SECTION 1 Features and System Configuration*

.....
.....

1-1 1-2 1-3 1-4 1-5 1-6 1-7 1-8 Ethernet Unit Function Guide

.....
.....
.....
.....

..... *Features*

.....
.....
.....
.....
.....
.....

..... *System Configuration* .

.....
.....
.....
.....

..... *Specifications*

.....
.....
.....
.....

.... *Overview of Communications Functions* .

.....

.....
.....
.....
.....

..... *Connecting to the Network* ...

.....
.....
.....

.....
.....
.....
.....

Creating I/O Tables

.....
.....
.....

.....
.....
.....

..... *Unit Setup Procedure* .

.....
.....
.....
.....

.....
.....
.....

..... *Basic Settings*

.....
.....
.....
.....

.....
.....
.....

..... *Unit Setup for Particular Applications* .

.....
.....
.....
.....

... 29 30 31 33 34 38 39 41 46 50 52 54 2-10 *Communications Test* ..

.....
.....

.....
.....
.....

2-11 Converting from Previous Models

.....
.....
.....
.....

.....
..... SECTION 3 CX-Programmer Unit Setup ...

.....
.....
.....
..... 3-1 3-2 3-3 3-4 3-5 3-6 3-7 3-8 Setup
.....

..... FINS/TCP
.....
.....
.....

..... DNS
.....
.....
.....

..... SMTP
.....
.....
.....

..... POP
.....
.....
.....

..... Mail Address
.....
.....

.....
.....
.....

.....
.....
Send Mail

.....
.....
.....

.....
.....
. Receive Mail

.....
.....
.....

.....
.....
.....
..... 61 62 64 66 67 68 69 70 72 ix TABLE OF CONTENTS 3-9 Auto Adjust Time

.....
.....
.....

.....
.....
.....
..... 74 75 3-10 HTTP

.....



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<http://yourpdfguides.com/dref/2886647>

..
.....
.....
.....

.....
.....
.....
.....

..... SECTION 4 Ethernet Unit Memory Allocations.....

.....
.....

..... 4-1 4-2 4-3 CIO Area Allocations...

.....
.....
.....
.....

.....
.....
.....

..... DM Area Allocations.....

.....
.....
.....
.....

.....
.....
.....

..... Auxiliary Area Data.....

.....
.....
.....
.....

.....
.....
.....

..... 77 78 86 90 SECTION 5 Determining IP Addresses.

.....

.....
.....

..... 5-1 5-2 5-3 IP Addresses...

.....
.....
.....
.....

.....
.....
.....

..... IP Addresses in FINS Communications.....

.....
.....
.....
.....

..... Private and Global Addresses.....

.....

.....
.....

..... 93 94 96 108 SECTION 6 FINS Communications. ...

.....
.....

..... 115 6-1 6-2 6-3 6-4 6-5 6-6 6-7 Overview of FINS Communications. .

.....
.....

.....
..... FINS/UDP Method .

.....
.....

.....
.....

.....
..... FINS/TCP Method . .

.....
.....

.....
.....

.....
..... Creating Routing Tables ...

.....
.....

.....
.....

.....
.....

..... Using FINS Applications ...

.....
.....

.....
.....

.....
.....

..... Communicating between OMRON PLCs

.....
.....

.....
.....

..... Precautions on High Traffic in FINS Communications . .

.....
.....

. . . . 116 118 120 124 128 137 155 SECTION 7 FINS Commands Addressed to Ethernet Units .
.

. 157 7-1 7-2 7-3 Command Codes and Response Codes

.
.
.
.

.
Socket Applications
.

.
.
.
.

. Command/Response Reference
.

.
.
.

. 158 159 161 SECTION 8 Troubleshooting

.
.
.

. . . . 203 8-1 8-2 8-3 8-4 8-5 Troubleshooting with Indicators

.
.
.

. . . . Error Status
.

. . . . n using personal computer and UNIX machine socket interfaces to create applications using FINS communications.

xiii Relevant Manuals The following table lists CS and CJ-series manuals that contain information relevant to Ethernet Units. Manual number W420 Model CS1W-ETN21 CJ1W-ETN21 Name Ethernet Units Operation Manual Construction of Networks (this manual) Contents W421 CS1W-ETN21 CJ1W-ETN21

Provides information on operating and installing 100Base-TX Ethernet Units, including details on basic settings 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. Ethernet Units Operation Manual 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. Ethernet Units Operation Manual Describes the installation and operation of the 10Base-5 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 and CJ-series CPU Units. W343 CS1W-ETN01 CS1W-ETN11 CJ1W-ETN11 CS1G/H-CPU@@@H CS1G/H-CPU@@@EVI CS1D-CPU@@@H CS1D-CPU@@@S CJ1M-CPU@@@ CS1W-SCU21-V1 CS1W-SCB21-V1/41-V1 CJ1G/H-CPU@@@H CJ1G-CPU@@@P CJ1G-CPU@@@ CJ1W-SCU21-V1/41-V1 CS1G/H-CPU@@@H CS1G/H-CPU@@@-EVI W342 W339 Programmable Controllers Operation Manual W393 CJ1G/H-CPU@@@H CJ1G-CPU@@@P CJ1M-CPU@@@ CJ1G-CPU@@@ Programmable Controllers Operation Manual Provides an outline of, and describes the design, installation, maintenance, and other basic operations for the CS-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). 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 and CJ-series PLCs. Use

together with the Programmable Controllers Operation Manual (W339 for CS-series PLCs and W393 for CJseries PLCs). W394 CS1G/H-CPU@@H CS1G/H-CPU@@EV1 CS1D-CPU@@H CS1D-CPU@@S CJ1G/H-CPU@@H CJ1G-CPU@@P CJ1G-CPU@@ CJ1M-CPU@@ CS1G/H-CPU@@H CS1G/H-CPU@@EV1 CS1D-CPU@@H CS1D-CPU@@S CJ1G/H-CPU@@H CJ1G-CPU@@P CJ1G-CPU@@ CJ1M-CPU@@ Programmable Controllers Programming Manual W340 Programmable Controllers Instructions Reference Manual 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 Programmable Controllers Programming Manual (W394). xiv Manual number W446 Model WS02-CXPC@-V8 Name CX-Programmer Ver. 8.0 Operation Manual Contents Provides information on how to use the CX-Programmer, a Windows-based programming device, and CX-Net, a Windows-based network configuration tool. Use together with the Programmable Controllers Operation Manual (W339 for CS-series PLCs and W393 for CJseries PLCs), Programmable Controllers Programming Manual (W394) and the Programmable Controllers Instructions Reference Manual (W340) to perform programming.

W444 CXONE-AL@@C-E W445 CXONE-AL@@C-E W341 CQM1H-PRO01-E CQM1-PRO01-E C200H-PRO27-E W336 CS1W-SCB21-V1/41-V1 CS1W-SCU21-V1 CJ1W-SCU21-V1/41-V1 CX-One Setup Man- Describes operating procedures for the CX-One FA Inteual grated Tool Package. Refer to this manual for operating procedures for the CXOne FA Integrated Tool Package. CX-Integrator Opera- Describes operating procedures for the CX-Integrator nettion Manual work configuration support software for CS/CJ-series PLCs. Refer to this manual for operating procedures for the CXIntegrator network configuration support software for CS/ CJ-series PLCs. Programming ConProvides information on how to operate the Programming soles Operation Console.

Manual Use together with the Programmable Controllers Operation Manual (W339 for CS-series PLCs and W393 for CJseries PLCs), Programmable Controllers Programming Manual (W394) and the Programmable Controllers Instructions Reference Manual (W340) to perform programming. Serial CommunicaAccessing the PLC connected to the CX-Programmer via tions Boards and Ethernet or the host computer or other device connected Serial Communicato the Serial Communications Board or Unit. tions Units Operation Describes the use of Serial Communications Units and Manual Boards, including details on hardware, software, and standard system protocols. !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.



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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.

xv *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. In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted. IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR. xvii *Application Considerations* SUITABILITY FOR USE OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use. The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products: · Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual. · Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations. · Systems, machines, and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to the products. 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. xviii *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. xix xx PRECAUTIONS This section provides general precautions for using the CS1W-ETN21 and CJ1W-ETN21 Ethernet Units (100Base-TX).

The information contained in this section is important for the safe and reliable application of Ethernet Units. You must read this section and understand the information contained before attempting to set up or operate an Ethernet Unit. 1 2 3 4 5 6 Intended Audience

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.
.
.

. General Precautions . . .

.
.
.

. Safety Precautions.

.
.
.

. Operating Environment Precautions . . .

.
.
.

..... Application Precautions .

.....
.....
.....

.....
.....
.....

Conformance to EC Directives

.....
.....
.....

..... 6-1 Applicable Directives

.....
.....
.....

.. 6-2 Concepts

.....
.....
.....

.....
.....

... xxii xxiii xxiv xxv xxvi xxvii xxviii xxix xxxi Intended Audience 1 1 Intended Audience This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent). · Personnel in charge of installing FA systems. · Personnel in charge of designing FA systems. · Personnel in charge of managing FA systems and facilities. 2 General Precautions The user must operate the product according to the performance specifications described in the operation manuals. Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative. Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms. This manual provides information for programming and operating the Unit.



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Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during operation. !WARNING It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications. 3 Safety Precautions !WARNING Do not attempt to take any Unit apart while the power is being supplied.

Doing so may result in electric shock. !WARNING Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock. !WARNING Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock. !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. xxii Operating Environment Precautions 4 · Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits. !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.

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 Unit. !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. xxiii Application Precautions 5 · Always turn OFF the power supply to the CPU Unit, Slaves, and Communications Units before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock. · Mounting or dismounting 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. !Caution Failure to abide by the following precautions could lead to faulty operation of the Ethernet Unit or the system, or could damage the Ethernet Unit. Always heed these precautions. · 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. · Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e., not in the Programmable Controller) must be provided by the customer. · 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 against short-circuiting may result in burning.

· Do not install the Unit near devices that generate strong high-frequency noise. · Do not drop the Unit or subject it to excessive vibration or shock. · 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. · Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring may result in burning. · Wire all connections correctly. · Mount Units only after checking terminal blocks and connectors completely.

· Make sure that the terminal blocks, expansion cables, and other items with locking devices are locked in place. · When transporting the Unit, use special packing boxes and protect it from being exposed to excessive vibration or impacts during transportation. xxiv Conformance to EC Directives 6 · Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in unexpected operation. · 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. · Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up. Not doing so may result in malfunction or damage. · 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 (including the setting of the startup operation mode). · Force-setting/force-resetting any bit in memory. · Changing the present value of any word or any set value in memory. 6 6-1 Conformance to EC Directives Applicable Directives · EMC Directives · Low Voltage Directive 6-2 Concepts EMC Directives OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine.



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The actual products have been checked for conformity to EMC standards (see the following note).

Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer. EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards. Note Applicable EMS (Electromagnetic Susceptibility) and EMI (Electromagnetic Interference) Standards in the EMC (Electromagnetic Compatibility) standards are as follows: Unit/Board CS1W-ETN21 CJ1W-ETN21 EMS EMI EN61000-6-4 (Radiated emission: 10-m regulations) EN61000-6-2 xxv Conformance to EC Directives 6 Low Voltage Directive Always ensure that devices operating at voltages of 50 to 1,000 V AC and 75 to 1,500 V DC meet the required safety standards for the PLC (EN61131-2). xxvi SECTION 1 Features and System Configuration This section introduces the features, describes the system configuration and Unit parts, and provides Unit specifications. 1-1 Ethernet Unit Function Guide

.....
.....
.....
.....

.. 1-1-1 1-1-2 1-2 1-3 Overall System Configuration Example

.....
.....

.... Determining the Objectives

.....
.....
.....

..... 2 2 2 8 11 11 11 12 14 14 15 16 17 17 18 20 20 21 22 22 23 23 25 27 28 Features

.....
.....
.....
.....

.... System Configuration .

.....
.....
.....
.....

.. 1-3-1 1-3-2 1-3-3 System Configuration

.....
.....
.....

..... Devices Required for Constructing a Network .

.....
.....

..... Setup Area and Related Peripheral Devices

.... General Specifications .

.....
.....
.....
.....

.... Dimensions .

.....
.....
.....
.....

... Software Configuration

.....

.....	
.....	
.....	<i>FINS Communications Service ..</i>
.....	
.....	
.....	
.....	<i>Socket Services</i>
.....	
.....	
.....	
.....	<i>FTP Server Function. ...</i>
.....	
.....	
.....	
.....	<i>Mail Send Function.</i>
.....	
.....	
.....	
.....	<i>Mail Receive Function</i>
.....	
.....	
.....	
.....	<i>Automatic Clock Adjustment Function ...</i>
.....	
.....	
.....	<i>Specifying Servers by Host Name .</i>
.....	
.....	
.....	
.....	<i>Component Names</i>
.....	
.....	
.....	
.....	
.....	<i>Indicators</i>
.....	
.....	
.....	
.....	
.....	<i>1-4 Specifications ..</i>
.....	
.....	
.....	
.....	
.....	<i>1-4-1 1-4-2 1-4-3 1-5 Overview of Communications Functions ...</i>
.....	
.....	
.....	

..... 1-5-1 1-5-2 1-5-3 1-5-4 1-5-5 1-5-6 1-5-7 1-6 Nomenclature and Functions

.....
.....
.....

.. 1-6-1 1-6-2 1-7 1-8 Comparison with Previous Models ...

.....
.....

Unit Version Upgrade Information

.....
.....

... 1 Ethernet Unit Function Guide Section 1-1 1-1-1 Ethernet Unit Function Guide Overall System Configuration Example The following diagram shows an example of an overall system configuration using Ethernet Units. (1) Connecting the CX-Programmer to the PLCs online via Ethernet CX-Programmer Mail software Mail FINS Mail IP router Internet (5) Transferring large data files between (6) Configuring an independent communications protocol personal computers and PLCs for the host application using TCP/IP (UDP/IP) Office Floor FTP software Mail software CX-Programmer SCADA software PLC Reporter, Compolet FinsGateway (communications driver) Ethernet Independent user application Intranet Firewall Server Room DNS server POP3 server SMTP server Sntp server Ethernet FTP Router Large files UDP/TCP socket Router (4) Receiving mail (data, files) at PLCs Receiving mail Writing commands FINS Ethernet Unit (Factory line) NS-series PT FINS CX-Programmer Ethernet Ethernet Unit Sending mail (3) Capturing PLC changes and sending the status of equipment to an operator (7) Automatically adjusting the PLC's internal clock periodically PLC PLC FINS message communications (1) Connecting the CX-Programmer to PLCs online via Ethernet Wireless FINS message communications Memory Card FINS (2) Sending and receiving data via Ethernet between OMRON PLCs 1-1-2 Determining the Objectives Use the UDP/IP version of the FINS communications service (i.e., FINS/UDP). FINS/UDP is supported by many OMRON products and is compatible with earlier Ethernet Units (CS1W-ETN01/ETN11 and CJ1W-ETN11). The CX-Programmer can be connected and used with FINS/UDP even if personal computer middleware (FinsGateway) is not used. FinsGateway (any version) can also be used together with the CX-Programmer. Connecting the CX-Programmer to PLCs Online via Ethernet Connecting within the Same Segment 2 Ethernet Unit Function Guide Connecting through Multiple Segments Section 1-1 Use the TCP/IP version of the FINS communications service (i.e., FINS/TCP). FINS/TCP is a new function supported by these Ethernet Units (CS1WETN21 and CJ1W-ETN21). It provides automatic recovery at the TCP/IP layer from communications errors (such as packet loss) that occur during multilevel routing.

For CX-Programmer (version 4.0 or higher), FINS/TCP can be used to directly connect to the PLC online. To use lower versions of the CX-Programmer with FINS/TCP, use FinsGateway (version 2003 or higher) as personal computer middleware. Use the TCP/IP version of the FINS communications service (i.e., FINS/TCP). FINS/TCP is a new function supported by these Ethernet Units (CS1WETN21 and CJ1W-ETN21). It provides automatic recovery at the TCP/IP layer from communications errors (such as packet loss) resulting from unreliable connections. For CX-Programmer (version 4.0 or higher), FINS/TCP can be used to directly connect to the PLC online.

To use lower versions of the CX-Programmer with FINS/TCP, use FinsGateway (version 2003 or higher) as personal computer middleware. Depending on whether or not the connection will be within the same segment, either use an IP address conversion method for dynamic IP addresses in the UDP/IP version of the FINS communications service or use the TCP/IP version of the FINS communications service. It is possible to connect online to a PLC using the CX-Programmer from a computer serving as a temporarily connected node or a permanent DHCP client. For CX-Programmer (version 4.0 or higher), FINS/TCP can be used to directly connect to the PLC online.

To use lower versions of the CX-Programmer with FINS/TCP, use FinsGateway (version 2003 or higher) as personal computer middleware. Using Media with Unreliable Connections, Such as a Wireless LAN Connecting from a Personal Computer with a Dynamic Private IP Address 3 Ethernet Unit Function Guide Connecting through multiple segments, such as over the Internet: Use FINS/TCP. CX-Programmer Section 1-1 FINS Internet IP router Firewall (Server room) DNS server POP3 server SMTP server Sntp server Ethernet Intranet Connecting from a computer with a dynamic private IP address: Use FINS/TCP or FINS/UDP.



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(Office floor) CX-Programmer FINS Router Ethernet Router (Production line) CX-Programmer Connecting within the same segment: Use FINS/UDP. FINS Ethernet Ethernet Unit Ethernet Unit PLC Wireless CX-Programmer Using media with unreliable connections, such as wireless LAN: Use FINS/TCP. FINS Reference SECTION 6 FINS Communications Exchanging Data between OMRON PLCs using Ethernet Connecting within the Same Segment Use the UDP/IP version of the FINS communications service (i.e., FINS/UDP), and construct applications using the SEND(090), RECV(098), and CMND(490) instructions in the ladder program. FINS/UDP is supported by many OMRON products, and is compatible with earlier Ethernet Units (CS1WETN01/ETN11 and CJ1W-ETN11). The protocol processing for FINS/UDP is simpler than for FINS/TCP, giving FINS/UDP certain advantages in terms of performance. Another feature of FINS/UDP is that it can be used for broadcasting. On the other hand, with FINS/UDP it is necessary to provide measures, such as retries, for handling communications errors. Connecting through Multiple Segments Use the TCP/IP version of the FINS communications service (i.e., FINS/TCP), and construct applications using the SEND(090), RECV(098), and CMND(490) instructions in the ladder program.

FINS/TCP is the initial function supported by this Ethernet Unit (CS1W-ETN21 and CJ1W-ETN21). It provides automatic recovery at the TCP/IP layer from communications errors (such as packet loss) that occur during multilevel routing. 4 Ethernet Unit Function Guide Intranet Production line A Section 1-1 Ethernet Unit Ethernet Router FINS message communications Connecting through multiple segments: Use FINS/TCP. Router Production line B Mail communications Ethernet Unit PLC Ethernet Unit PLC FINS message communications Memory Card Connecting within the same segment: Use FINS/UDP. Reference SECTION 6 FINS Communications Monitoring PLC Changes and Sending Equipment Status to the Operator by E-mail Operation When the mail send function is used, automatic communications applications via the Internet can be constructed relatively easily. With this Ethernet Unit, the following mail triggers can be set as PLC changes. When these settings can be used, no special ladder program is required for sending e-mail. · When a particular bit (the Mail Send Switch) turns ON · When values change in particular words (=, <>, <, <=, >=, >) · When a particular bit changes (either OFF to ON or ON to OFF) · When a change occurs at the Ethernet Unit (stored in error log) · When a change occurs at the CPU Unit (e.g., a non-fatal error, a fatal error, or a mode change) · At regular intervals The following data can be sent by e-mail: · Text (user-created text strings (ASCII data), Ethernet Unit error log data, and status data) · Attached files (IOM data created automatically by the Ethernet Unit, data tables, and files in File Memory) To use the mail send function, there must be a separate SMTP server on the network.

When using the SMTP server of an Internet Service Provider (ISP), security measures, such as POP before or SMTP, may be required. (This Unit handles POP before SMTP.) In addition to the IP address, the host name used for the DNS service can be specified for the SMTP/POP3 server. 5 Ethernet Unit Function Guide Mail software Section 1-1 Receiving e-mail E-mail Internet IP router Intranet Firewall (Server room) DNS server POP3 server SMTP server SMTP server Ethernet Router (Office floor) Mail software Receiving e-mail Ethernet Router (Production line) Ethernet Ethernet Unit Sending e-mail Monitoring PLC changes and sending equipment status to the operator by e-mail PLC's I/O memory data sent as attached file Reference SECTION 2 Mail Send Function in the Operation Manual Construction of Applications Receiving E-mail (Data and Files) at the PLC Operation Use the mail receive function. When the mail receive function is used, the PLC can be accessed through a mail address, enabling remote applications via the Internet to be constructed relatively easily.

With the mail receive function, any of the following remote commands can be specified as e-mail subjects. · FileWrite (File Write) · FileRead (File Read) · FileDelete (File Delete) · FileList (File List Read) · UMBackup (User Memory Backup) · PARAMBackup (Parameter Area Backup) · IOMWrite (I/O Memory Write) · IOMRead (I/O Memory Read) To use the mail receive function, there must be a separate POP3 server on the network. Aside from the IP address, the host name used for DNS service can be specified for the POP3 server. · ChangeMode (Operating Mode Change) · ErrorLogRead (Error Log Read) · ErrorLogClear (Error Log Clear) · MailLogRead (Mail Log Read) · MailLogClear (Mail Log Clear) · Test (Mail Test) · FinsSend (FINS Command Send) 6 Ethernet Unit Function Guide Mail software Section 1-1 Sending e-mail Internet IP router Firewall Intranet (Server room) DNS server POP3 server SMTP server SMTP server Ethernet Router (Office floor) Mail software Sending e-mail Ethernet Router (Production line) Writing command File attachment enabled Ethernet Ethernet Unit Writing command File attachment enabled Receiving e-mail Receiving e-mail at the PLC Reference SECTION 3 Mail Receive Function in the Operation Manual Construction of Applications Exchanging Large Files between a Personal Computer and PLC Operation Use the FTP server function. The FTP server function makes it possible to log in to the Ethernet Unit from a computer (FTP client) as required, and to specify folders and files to be transferred.

The following items can be used as PLC File Memory. · A Memory Card (mounted to the CPU Unit) · EM File Memory (The portion of the EM Area in the CPU Unit's I/O memory used by the CX-Programmer as File Memory) Reference SECTION 4 FTP Server Function in the Operation Manual Construction of Applications Creating an Original Communications Procedure Using TCP/IP (UDP/IP) for the Host Application or Communicating with PLCs from Another Manufacturer Operation Using the socket services function, create a communications application in the ladder program. With the socket services function, TCP/IP or UDP/IP can be used directly to receive data. Use the socket services to create applications based on manipulating control bits or the CMND(490) instruction. Reference SECTION 4 Socket Service Function in the Operation Manual Construction of Applications 7 Features Automatically Adjusting the PLC's Internal Clock at Regular Intervals Operation Use the automatic clock adjustment function. Section 1-2 With the automatic clock adjustment function, the SMTP server's clock is taken as the standard for automatically adjusting the built-in clock of the PLC connected to the Ethernet Unit.



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The adjustment can be regularly executed at a specified time (once a day) and it can be executed each time by the ladder program. To use the automatic clock adjustment function, there must be a separate SNTP server on the network. Aside from the IP address, the host name used for DNS service can be specified for the SNTP server. Reference SECTION 5 Automatic Clock Adjustment Function in the Operation Manual Construction of Applications 1-2 Features The transmission medium has been upgraded to 100Base-TX, while compatibility with the functions and application interfaces of the existing Ethernet Unit models (CSIW-ETN01, CSIW-ETN11, and CJ1W-ETN11) has been maintained.

Moreover, processing speed has been improved so that the system response performance for the same FINS message applications is now up to four times faster. Compatibility and Speed Various Protocols Available on Ethernet A variety of protocols makes available a wide range of applications for use on an Ethernet network. The protocols that can be selected include sending and receiving data by TCP/IP or UDP/IP (socket services), sending and receiving commands by OMRON's standard protocol FINS, transferring files by FTP, sending and receiving e-mail by SMTP/POP3, and automatically adjusting the PLC's internal clock by SNTP. A communications service can be selected according to need, allowing the PLC to be flexibly integrated with the Ethernet information network. Communications by UDP/IP and TCP/IP (Socket Services Function) The standard Ethernet protocols, UDP/IP and TCP/IP, are supported, making it possible to communicate with a wide range of devices, workstations, computers, and Ethernet Units from other manufacturers. Up to eight ports can be used for various protocols, enabling the use of various applications. Simplified Socket Services Without using the CMND(490) instruction, the socket services function for TCP or UDP can be simplified by presetting parameters and using dedicated bits. In addition, the size of received data accumulated in the reception buffer is now stored, and a Data Received Flag has been added. These new features eliminate the need for ladder programs to monitor the timing for completion of instructions and socket service processing, and thus reduce the amount of labor required for program development. 8 Features Section 1-2 Starting with unit version 1.

5, the performance of sending and receiving has been improved using optional settings for the TCP or UDP socket services using specific bits in memory. Also, a linger socket option has been added to the TCP socket services. Specifying this option enables open processing immediately with the same port number without having to wait (approximately 1 min.) until the port number opens after the socket closes. Improved FINS Message Communications The following functions have been improved over previous Ethernet Unit models.

They allow the scale of the system to be increased, and can give greater flexibility to the system configuration including the host computer. · Expanded number of nodes (to 254 max., from 126 max.) · Communications are now enabled even if the host computer's IP address is dynamic. (DHCP client computers can be handled, including TCP/IP and UDP/IP.

) Previously IP addresses for host computers could be fixed only. For Ethernet Units with Unit Ver. 1.3 or later, the Unit can be protected against access from nodes with dynamically changed IP addresses (set to be fixed only). · An automatic client FINS node address allocation function now makes it possible to connect online to the PLC even if no FINS node address has been set for the host computer. Previously online connection to the PLC was possible only after a FINS node address was set for the host computer. · FINS message communications are now enabled in TCP/IP (with up to 16 simultaneous connections), so a system can now utilize FINS message communications in both UDP/IP and TCP/IP. Previously only UDP/IP could be used. · Multiple FINS applications (such as the CX-Programmer) on the same computer can now be connected online to the PLC via Ethernet (in either TCP/IP or UDP/IP). Previously when one FINS application on a computer was connected online to the PLC, it was impossible to connect any other at the same time.

Transferring Data Files between Host Computers (FTP Server Function) A built-in FTP server function enables data files in the PLC to be read from a workstation or computer with an FTP client function, and for data to be written to the PLC. Large amounts of data can be transferred at a time from clients, without requiring ladder programming. Additional E-mail Functions With previous Ethernet Unit models (CSIW-ETN01/CSIW-ETN11/CJ1W-ETN11), e-mail could be sent only from the Ethernet Unit, and the data that could be sent was limited to user-created ASCII text data and system data. Now the following e-mail functions have been added. Mail Receive Function (Receiving Commands for the PLC by E-mail) E-mail File Attachment Function Commands for the PLC (mail remote commands) can be written into e-mail, and the Ethernet Unit can receive them, execute them, and send responses by e-mail. This function can be linked to the CS/CJ File Memory function. 9 Features Section 1-2 · The Ethernet Unit can automatically generate data files (6,000 words maximum per file) from the CPU Unit's I/O memory status, and send them to specified e-mail addresses as e-mail attachments. It can also send program files from the Memory Card (up to 1 MB) to specified e-mail addresses as e-mail attachments. · In addition to using the existing Mail Send Switch, or having e-mail sent at regular intervals, it is possible to set triggers for sending e-mail (for example, by having e-mail sent when a PV in the CPU Unit's I/O memory reaches a certain value (size comparison), or when the bit at a specified address turns ON). · Up to eight of these e-mail send conditions (destination, trigger type, etc.

) can be preregistered so that e-mail will be sent automatically whenever the conditions are met. Note The e-mail functions require a separate mail server (SMTP/POP3). Automatic PLC Internal Clock Adjustment The built-in clock of the PLC connected to the Ethernet can be automatically adjusted, with the SNTP server clock taken as the standard. Automatic adjustments through the entire system enable the various records generated by production equipment to be managed according to clock information and analyzed. Note The automatic clock adjustment requires a separate SNTP server.

Specification of Servers by Host Name In addition to directly specifying the IP address for a SMTP, POP3, or SNTP server, it is also possible (by means of the Ethernet Unit's DNS client function) to specify the server by host name. This enables automatic searches for IP addresses for purposes such as system checking, even when the IP addresses for servers have been changed.



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Note (1) A separate DNS server is required to specify servers by host name using DNS. (2) The IP address is specified directly for the DNS server. Classless IP Address Settings Using CIDR Starting from unit version 1.

5, it is possible to use classless inter-domain routing (CIDR) by specifying the subnet class using an option setting. This enables greater flexibility in specification by eliminating the need to have the network ID component of the IP address be dependent on the class. Use Web Function to Read Ethernet Unit Settings and Status A Web function is provided in Ethernet Units with Unit Ver. 1.3 or later. This enables use of a Web browser to read the Ethernet Unit's system settings and statuses. Network Connection with Controller Link The Ethernet information network can be connected to the Controller Link control system network by using the FINS communications service function. This enables a PLC on a Controller Link network to be monitored from a PLC on an Ethernet network, and it allows data to be exchanged between them. 10 System Configuration Full Range of Functions for Handling Troubles Section 1-3 A full range of functions is provided for promptly handling any troubles that may arise. · Self-diagnostic function when power is turned ON · Remote node connection check by PING command · Remote node connection check by internode test · Error log for recording error information when an error occurs · Notification by e-mail when an error occurs 1-3 1-3-1 System Configuration System Configuration CX-Programmer CX-Integrator FinsGateway (3) Hub (2) Twisted-pair cable 100 m max.

(1) CS1W-ETN21 Ethernet Unit (100Base-TX) CS-series PLC (1) CJ1W-ETN21 Ethernet Unit (100Base-TX) CJ-series PLC 1-3-2 Devices Required for Constructing a Network The basic configuration for a 100Base-TX Ethernet System consists of one hub to which nodes are attached in star form using twisted-pair cable. The devices shown in the following table are required to configure a network with 100Base-TX-type CS1W-ETN21 and CJ1W-ETN21 Ethernet Units, so prepare them in advance. Network device (1) CS-series Ethernet Units (CS1W-ETN21) or CJ-series Ethernet Units (CJ1W-ETN21) (2) Twisted-pair cable Contents These Ethernet Units are Communications Units that connect a CS-series or CJ-series PLC to 100Base-TX Ethernet networks. (They can also be used as 10Base-T.) This is twisted-pair cable for connecting 100Base-TX-type Ethernet Units to the hub, with an RJ45 Modular Connector at each end. Use a category 3, 4, 5, or 5e UTP (unshielded twistedpair) or STP (shielded twisted-pair) cable. This is a relay device for connecting multiple nodes in a star LAN. (3) Hub Recommended Hubs For details on recommended devices for constructing a network, refer to 2-4 Network Installation. 11 System Configuration Section 1-3 1-3-3 Setup Area and Related Peripheral Devices For the Ethernet Unit to function as a node on an Ethernet network, make the settings, as required, in the CPU Bus Unit System Setup Area allocated in non-volatile memory in the CPU Unit. Use the CX-Programmer to make the settings (by connecting online from the I/O Table Window, selecting the Ethernet Unit, and then selecting Unit Setup).

Each time the Ethernet Unit is turned ON or restarted, it reads and uses the contents of the CPU Bus Unit System Setup Area as the settings for the communications services. If setting items for expanded functionality of the Ethernet Unit are not displayed, make the settings after updating the Support Software using an auto update or by using the Web function of the Ethernet Unit. Personal computer running Windows CX-Programmer Unit Setup Ethernet Unit Making Settings in the CPU Bus Unit System Setup Area (with the CXProgrammer) CPU Bus Unit System Setup Area CS/CJ-series CPU Unit Making Settings in the Routing Table Area (with CX-Integrator) OMRON Communications Units use OMRON's original FINS network system. Make the settings for the FINS network and the relay path, as required, in the Routing Table Area allocated to the non-volatile memory in the CPU Unit. Use CX-Integrator to make the settings.

(CX-Integrator is software that comes with the CX-One and is automatically installed when the CX-One is installed.) Each time the Ethernet Unit is turned ON or restarted, it reads the contents of the Routing Table Area as the settings for FINS network. Personal computer running Windows CX-Integrator Routing table settings Ethernet Unit Routing Table Area CS/CJ-series CPU Unit Middleware for FINS Communications Applications on a Personal Computer (FinsGateway) FinsGateway can be used as middleware when constructing communications applications on a personal computer for a FINS network, using Visual C++ or Visual BASIC. The CX-Programmer and CX-Integrator can also be connected online through FinsGateway. When FINS/UDP is used in the FINS communications service, all versions of FinsGateway can be used.

When FINS/TCP is used in the FINS communications service, only FinsGateway Version 2003 or higher can be used. 12 System Configuration Section 1-3 When the CX-Programmer and CX-Integrator are connected online by FINS/ TCP, FinsGateway Version 2003 or higher must be used. For CX-Programmer Ver. 4.0 or higher, FINS/TCP can be used to directly connect to the PLC online. Personal computer running Windows User-created software CX-Programmer FinsGateway Windows Ethernet Unit CS/CJ-series CPU Unit 13 Specifications Section 1-4 1-4-1 Specifications General Specifications Item Specifications CS1W-ETN21 100Base-TX (Can be used as 10Base-T) CS-series PLCs CS-series CPU Bus Unit CPU Rack or Expansion Rack 4 max. (including Expansion Racks) CSMA/CD Baseband Star form 100 Mbit/s (100Base-TX) 10 Mbit/s (10Base-T) CS-series Ethernet Unit Model number Type Applicable PLCs Unit classification Mounting location Number of Units that can be mounted Transfer specifications Media access method Modulation method Transmission paths Baud rate Transmission media Transmission distance Number of cascade connections Current consumption (Unit) Weight Dimensions Other general specifications Unshielded twisted-pair (UDP) cable Unshielded twisted-pair (UDP) cable Categories: 5, 5e Categories: 3, 4, 5, 5e Shielded twisted-pair (STP) cable Shielded twisted-pair (STP) cable Categories: 100 at 5, 5e Categories: 100 at 3, 4, 5, 5e 100 m (distance between hub and node) No restrictions if switching hubs are used. 380 mA max. at 5 V DC 200 g max. 35 × 130 × 101 mm (W × H × D) Conform to general specifications for the SYSMAC CS Series.

CJ-series Ethernet Unit Item Model number Type Applicable PLCs Unit classification Mounting location Number of Units that can be mounted Transfer specifications Media access method Modulation method Transmission paths Baud rate Transmission media Specifications CJ1W-ETN21 100Base-TX (Can be used as 10Base-T) CJ-series PLCs CJ-series CPU Bus Unit CPU Rack or Expansion Rack 4 max.



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(including Expansion Racks) CSMA/CD Baseband Star form 100 Mbit/s (100Base-TX) 10 Mbit/s (10Base-TX) Transmission distance Number of cascade connections Current consumption (Unit) Weight Dimensions Other general specifications Unshielded twisted-pair (UDP) cable Unshielded twisted-pair (UDP) cable Categories: 5, 5e Categories: 3, 4, 5, 5e Shielded twisted-pair (STP) cable Shielded twisted-pair (STP) cable Categories: 100 at 5, 5e Categories: 100 at 3, 4, 5, 5e 100 m (distance between hub and node) No restrictions if switching hubs are used. 370 mA max. at 5 V DC 100 g max. 31 × 90 × 65 mm (W × H × D) Conform to general specifications for the SYSMAC CJ Series. 14 Specifications Section 1-4 1-4-2 Dimensions ETN21 RUN ERC SD RD LNK 100M ERH TCP FTP HOST CS1W-ETN21 UNIT NO. 0 NODE NO. 0 1 × 161 × 160 130 100BASE-TX 10BASE-T 35 101 (Unit: mm) CJ1W-ETN21 Front · Unit Version 1.5 or Later 31 Back · Unit Version 1.4 or Earlier 2.

7 31 65 2.7 ETN21 RUN ERC SD TCP RD FTP LINK HOST 100M ERH ETN21 RUN ERC SD TCP RD FTP LINK HOST 100M ERH F012 F012 F012 F012 F012 3456 3456 x161 90 100BASE-TX 10BASE-T 90 100BASE-TX 10BASE-T 2.7 2.7 BCDE NODE No. x160 BCDE BCDE 3456 UNIT No. F012 3456 UNIT No. NODE No. x161 x160 789A 789A BCDE BCDE 3456 789A 789A 789A BCDE 3456 789A (Unit: mm) 15 Specifications Section 1-4 1-4-3 Software Configuration The software supported by the Ethernet Unit runs in the layers shown in the following diagram. The components that form the various layers are defined below the diagram. CS/CJ-series CPU Unit FINS communication service 7.

FINS FINS/UDP 5. UDP 2. IP 1. Ethernet (Ver. 2.0) 3. ICMP Memory Card / EM File Memory Socket services E-mail E-mail transmis- reception sion 6. TCP 4. ARP FTP 8. FTP server Ethernet Unit CS/CJ-series CPU Unit Socket services 11.

SMTP FINS/TCP 9. SMTP 10. POP3 1,2,3... 1. Ethernet (Ver. 2.0) The Version 2.0 Ethernet frame format is used for communications. 2. IP (Internet Protocol) Transfers datagrams to destination nodes using IP addresses. 3. ICMP (Internet Control Message Protocol) Supports IP communications by signalling errors in data transfers. 4. ARP (Address Resolution Protocol) Determines the Ethernet address (i.e., physical address) by broadcasting based on the target IP address. 5. UDP (User Datagram Protocol) Performs data communications. Data resends, priority control, flow control, and other measures to ensure communications reliability are not performed for UDP communications, so the transmitted data may not arrive at the destination node. To increase reliability, it is necessary to program special measures into the user applications. 6. TCP (Transmission Control Protocol) Performs communications after establishing a connection (i.e., a virtual circuit) with the destination node, providing a highly reliable communications service. 7. FINS (Factory Interface Network Service) A protocol that sends messages between PLCs on any of various OMRON FA networks. To ensure that transmitted messages arrive at the destination node, it is necessary to program special measures such as retry processing into the user's applications. 8. FTP (File Transfer Protocol) Transfers data files. 9. SMTP (Simple Mail Transfer Protocol) A communications protocol for sending e-mail by TCP/IP. 10. POP3 (Post Office Protocol Ver. 3.0) A communications protocol for receiving e-mail by TCP/IP. 11. SNTP (Simple Network Time Protocol) A communications protocol for automatic clock adjustment by UDP/IP. 12. DNS (Domain Name System) A communications protocol for determining IP address names according to UDP/IP and TCP/IP. 16 Overview of Communications Functions Section 1-5 1-5-1 Overview of Communications Functions 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. Basic Functions Ethernet IP UDP or TCP FINS IP UDP or TCP FINS CS/CJ-series CPU Unit Ethernet Unit User program SEND(090), RECV(098), or CMND(490) instruction Ethernet Unit Ethernet Unit Executing, from the host computer, FINS commands with UDP/IP or TCP/IP headers enables various control operations, such as the reading and writing of I/O memory between PLCs, mode changes, and file memory operations. 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. Ethernet IP UDP or TCP FINS CS/CJ-series CPU Unit Ethernet 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.

Upgraded Functions With the CS1W-ETN21 and CJ1W-ETN21, the following functions have been upgraded. · The FINS communications service can be executed not only with UDP/IP but also with TCP/IP, and it is even possible to use FINS communications with both UDP/IP and TCP/IP together on the same network. Using TCP/IP makes FINS communications highly reliable. 17 Overview of Communications Functions Section 1-5 · Even if the IP address and UDP port number of the host computer (a DHCP client computer) are changed, it is still possible for the host computer to send FINS commands to PLCs on the Ethernet network and to receive responses. When UDP is used, either the automatic generation (dynamic) method or the IP address table method must be selected for IP address conversion. When TCP is used, changes in IP address and TCP port numbers are handled automatically. · Multiple FINS applications (CX-Programmer and user-created application programs) at the same computer can be connected online to a PLC via Ethernet (using either TCP/IP or UDP/IP). 1-5-2 Socket Services The socket services allow devices on the Ethernet to send and receive various data using either the UDP or TCP protocol. Manipulating Dedicated Control Bits One way to use socket services is to set the required parameters in the parameter area allocated in the DM Area, and then to request particular UDP or TCP socket services by turning ON dedicated control bits in memory. When the Ethernet Unit has completed the requested process, the same bit is turned OFF to provide notification.

Data that is sent or received is automatically handled according to the I/O memory locations specified in the parameter area.



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