Cat. No. Z909-E1-01

SYSMAC CS and CJ Series
CS1W-EIP21 (100Base-TX)
CJ1W-EIP21 (100Base-TX)
EtherNet/IP Units

OPERATION MANUAL

OMRON

CS1W-EIP21 (100Base-TX)
CJ1W-EIP21 (100Base-TX)
EtherNet/IP Units

Operation Manual

Produced March 2007

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.

⚠ Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PLC” means Programmable Controller. “PC” is used, however, in some Programming Device displays to mean Programmable Controller.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1,2,3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

© OMRON, 2007

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of OMRON.

No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

TABLE OF CONTENTS

TABLE OF CONTENTS

About this Manual:

This manual describes the operation of the CS1W-EIP21 and CJ1W-EIP21 EtherNet/IP Units (100Base-TX) for constructing applications and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install or operate the Ethernet/IP Unit. Be sure to read the precautions provided in the following section.

Precautions

Section 1 introduces the functions and protocols used in EtherNet/IP Unit communications services.

Section 2 describes how to design an EtherNet/IP system.

Section 3 describes Network Configurator installation.

Section 4 explains how to install the EtherNet/IP Unit and make the initial settings required for operation.

Section 5 ntlp describes the words allocated in the CIO Area and the DM Area for EtherNet/IP Units.

Section 6 ntlp explains how to manage and use IP addresses.

Section 7 ntlp 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.

Appendices ntlp provide information on EtherNet/IP network parameters, the buffer configuration, TCP status transitions, ASCII characters, maintenance, and inspections.

Relevant Manuals

The following table lists CS- and CJ-series manuals that contain information relevant to EtherNet/IP Units.

Manual number	Model	Name	Contents
Z909	CS1W-EIP21 CJ1W-EIP21	EtherNet/IP Units Operation Manual (this manual)	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.
W420	CS1W-ETN21 CJ1W-ETN21	Ethernet Units Operation Manual Construction of Networks	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.
W421	CS1W-ETN21 CJ1W-ETN21	Ethernet Units Operation Manual Construction of Applications	Provides information on constructing host applications for 100Base-TX Ethernet Units, including functions for sending/receiving mail, socket service, automatic clock adjustment, FTP server functions, and FINS communications.
W343	CS1W-ETN01 CS1W-ETN11 CJ1W-ETN11	Ethernet Units Operation Manual	Describes the installation and operation of the 10Base-5 and 10Base-T Ethernet Units.
W342	CS1G/H-CPU□□H CS1G/H-CPU-□□V1 CS1W-SCU21 CS1W-SCB21/41 CJ1G/H-CPU□□H CJ1G-CPU□□ CJ1W-SCU41	Communications Commands Reference Manual	Describes the C-series (Host Link) and FINS communications commands used when sending communications commands to CS-series and CJ-series CPU Units.
W339	CS1G/H-CPU□□H CS1G/H-CPU-□□V1	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).
W393	CJ1G/H-CPU□□H CJ1G-CPU□□	Programmable Controllers Operation Manual	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).
W394	CS1G/H-CPU□□H CS1G/H-CPU-□□V1 CJ1G/H-CPU□□H CJ1G-CPU□□ NSJ□-□□□□(B)-G5D NSJ□-□□□□(B)-M3D	Programmable Controllers Programming Manual	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).

Manual number	Model	Name	Contents
W340	CS1G/H-CPU□□H CS1G/H-CPU-□□V1 CJ1G/H-CPU□□H CJ1G-CPU□□ NSJ□-□□□□(B)-G5D NSJ□-□□□□(B)-M3D	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).
W446	WS02-CXPC1-EV6	CX-Programmer Ver. 6.1 Operation Manual	Provides information on how to use the CX-Programmer, 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.
Z901	NE1S-CPU01	NE1S Series NE1S-CPU01 Programmable Controller Operation Manual	Describes the design, installation, maintenance, and operation of the NE1S-series PLC. Also provides information on how to use the NE Programmer.
Z902	NE1S-CNS21U	NE1S Series ControlNet Unit Operation Manual	Describes the use of the ControlNet Unit.
Z903	NE1S-DRM21U	NE1S Series DeviceNet Unit Operation Manual	Describes the use of the DeviceNet Unit.

⚠ **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.

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 NON-INFRINGEMENT, 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.

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.

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.

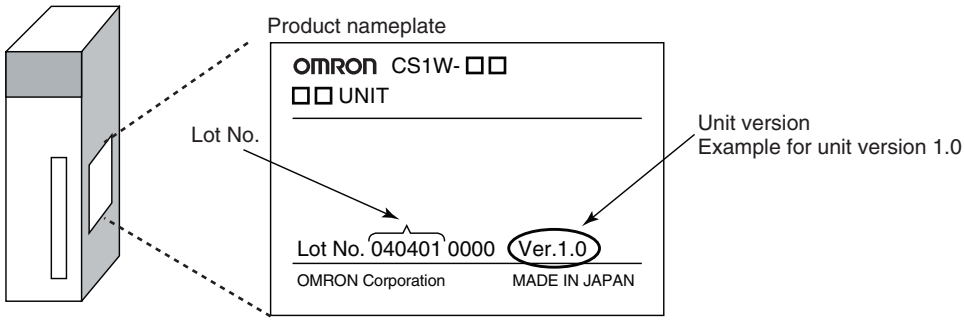
Unit Versions of CS/CJ-series

Unit Versions

A “unit version” has been introduced to manage Units in the CS/CJ Series according to differences in functionality accompanying Unit upgrades.

Notation of Unit Versions on Products

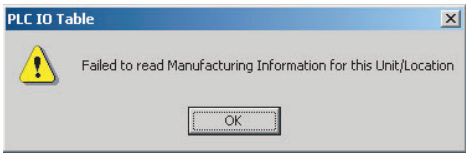
The unit version is given to the right of the lot number on the nameplate of the products for which unit versions are being managed, as shown below.



Confirming Unit Versions with Support Software

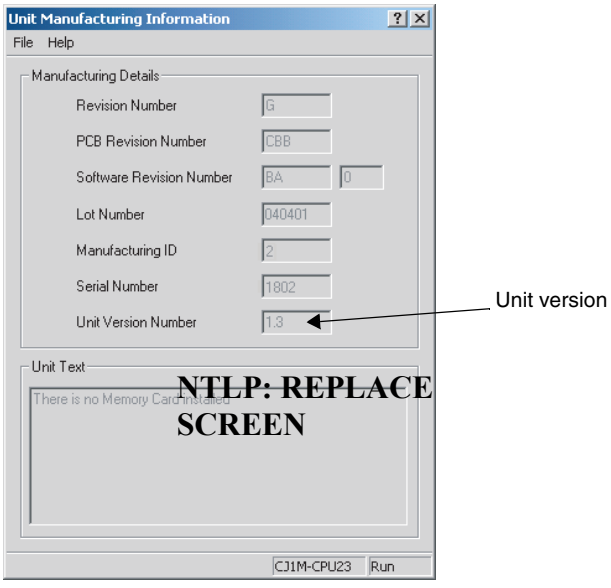
CX-Programmer version 4.0 can be used to confirm the unit version using the ***Unit Manufacturing Information***.

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.



Note The unit version will be displayed in the *Unit Manufacturing Information* Dialog Box.

Using Unit Version Label

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

In this manual, the unit version of a EtherNet/IP Unit is given as shown in the following table.

Product nameplate	Notation used in this manual	Special remarks
Ver. 1.0 or later number shown to right of the lot number	Ethernet Unit Ver. 1.0 or later	Information without reference to specific Unit Versions applies to all versions of the Unit.

CIP Revision and Unit Versions

The CIP revision corresponding to the unit version of the EtherNet/IP Unit is given in the following table.

Unit version	CIP revision
Version 1.0	Revision 1.1

PRECAUTIONS

This section provides general precautions for using the CS1W-EIP21 and CJ1W-EIP21 EtherNet/IP Units (100Base-TX).

The information contained in this section is important for the safe and reliable application of EtherNet/IP Units. You must read this section and understand the information contained before attempting to set up or operate an EtherNet/IP Unit.

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. 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.

⚠**WARNING** Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

- 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 outputs may remain ON or OFF due to deposits on or burning of the output relays, or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-V DC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

⚠**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.

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.

⚠ **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 Ω or less when installing the Units. Not connecting to a ground of 100 Ω 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 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.

- 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 Units only after checking terminal blocks and connectors completely.
- 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.
    - Changing the present value of any word or any set value in memory.
- After replacing Units, resume operation only after transferring to the new CPU Unit and/or Special I/O Units the contents of the DM Area, HR Area, programs, parameters, and other data required for resuming operation. Not doing so may result in an unexpected operation.
- 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.

- When transporting the Unit, use special packing boxes and protect it from being exposed to excessive vibration or impacts during transportation.
- CPU Bus Units will be restarted when routing tables are transferred from a Programming Device to the CPU Unit. Restarting these Units is required to read and enable the new routing tables. Confirm that the system will not be adversely affected before allowing the CPU Bus Units to be reset.
- When the EtherNet/IP Unit's settings (IP address or tag data link settings) are transferred from a Programming Device, all of the destination EtherNet/IP Units (nodes) will be reset in order to enable the transferred settings. Transfer settings to the EtherNet/IP Units only after verifying that restarting the Units will not cause any problems in the system.
- 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.
- Before resetting a CPU Bus Unit or Special I/O Unit, always verify that restart the Unit will not cause any problems in the system.

6 Conformance to EC Directives

6-1 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. 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:

EtherNet/IP Unit	EMS	EMI
CS1W-EIP21	EN61000-6-2	EN61000-6-4 (Radiated emission: 10-m regulations)
CJ1W-EIP21		

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).

SECTION 1
Features and System Configuration

This section introduces the functions and protocols used in EtherNet/IP Unit communications services.

1-1 EtherNet/IP Unit Overview

1-1-1 EtherNet/IP Features

EtherNet/IP is an industrial multi-vendor network that uses Ethernet components. The EtherNet/IP specifications are open standards managed by the ODVA (Open 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. EtherNet/IP has the following features.

The CIP has the following advantages.

- Destination nodes are specified by a relative path, without a fixed routing table.
- 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.

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.

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 184, 832 words) between PLCs.

Tag Data Link (Cyclic Communications) Cycle Time

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 The communications load to the nodes must be within the Units' allowed communications bandwidth.

Multi-vendor Communications with CIP Messages

Data can be exchanged with a variety of devices connected by EtherNet/IP because it supports the standard CIP (Common Industrial Protocol) message communications.

Communicating with FINS Messages (FINS/TCP and FINS/UDP)

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 There are no particular restrictions when sending FINS messages to OMRON Ethernet Units (CS1W-ETN21 or CJ1W-ETN21) in an Ethernet network.

Network Connections with DeviceNet Devices

When a PLC has an EtherNet/IP Unit and DeviceNet Unit mounted, the PLC can be used as a gateway to exchange data with DeviceNet Devices through CIP messages.

Network Connections with Controller Link

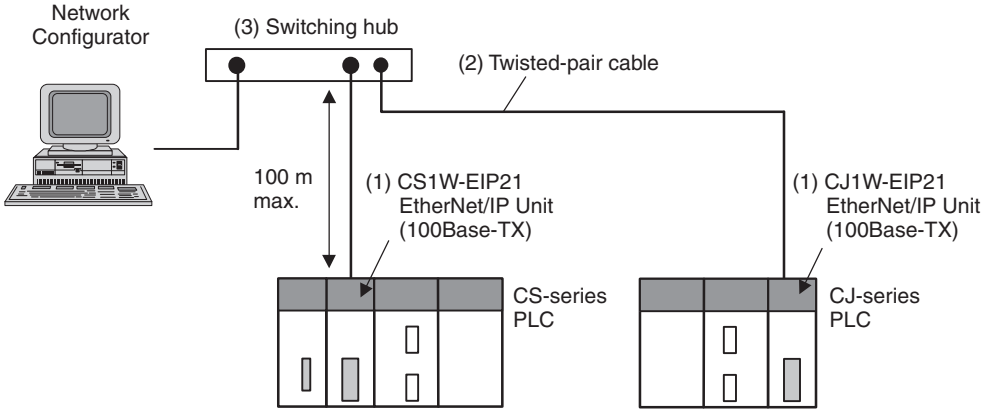
Mutual connections of Controller Link and EtherNet/IP are also supported (using the FINS communications service). The Controller Link connection allows a PLC on the Controller Link network to be monitored from a PLC on the EtherNet/IP network. Conversely, data can be exchanged with a PLC on the EtherNet/IP network from a PLC on the Controller Link network.

Plentiful Troubleshooting Functions

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

1-1-2 System Configuration



1-1-3 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.

The devices shown in the following table are required to configure a network with CS1W-EIP21 and CJ1W-EIP21 EtherNet/IP Units, so prepare them in advance.

Network device	Contents
(1) CS-series EtherNet/IP Units (CS1W-EIP21) or CJ-series EtherNet/IP Units (CJ1W-EIP21)	These are Communications Units that connect a CS-series or CJ-series PLC to an EtherNet/IP network.
(2) Twisted-pair cable	The twisted-pair cable connects EtherNet/IP Units to the switching hub, with an RJ45 Modular Connector at each end. Use a category 5 or 5e UTP (unshielded twisted-pair) or STP (shielded twisted-pair) cable.
(3) Switching Hub	This is a relay device that connects multiple nodes in a star-shaped LAN.

Recommended Switching Hubs

For details on recommended devices for constructing a network, refer to *4-4-2 Recommended Products*.

Note 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.

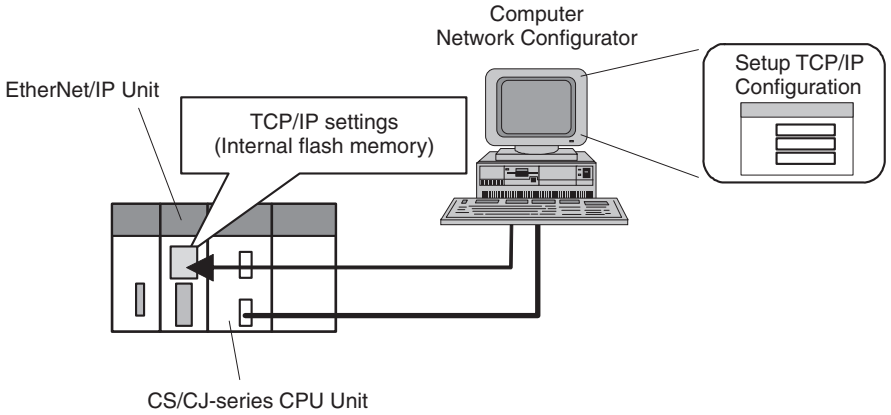
1-1-4 Setup Area and Related Programming Devices

Use the Network Configurator to make the EtherNet/IP Unit's TCP/IP settings and device parameter settings. Both of these settings are stored in the EtherNet/IP Unit's non-volatile memory.

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.

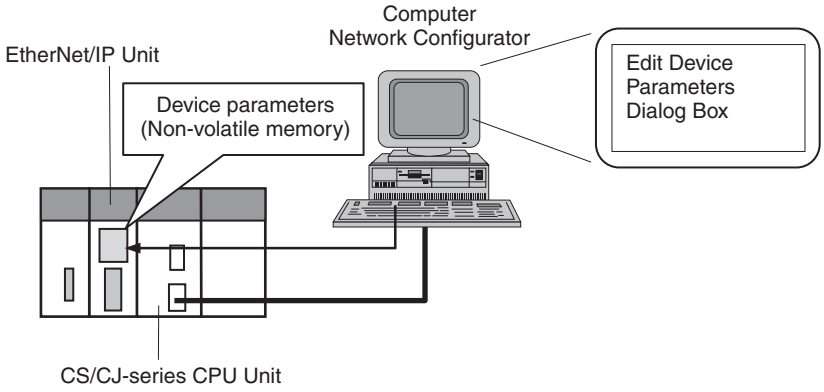
■ TCP/IP Settings

The TCP/IP settings are settings such as the local IP address and subnet mask. Connect the Network Configurator online to the CS/CJ-series PLC, select ***Tools*** − ***Setup TCP/IP Configuration***, and make the settings in the Setup TCP/IP Configuration Window.



■ **Device Parameter Settings**

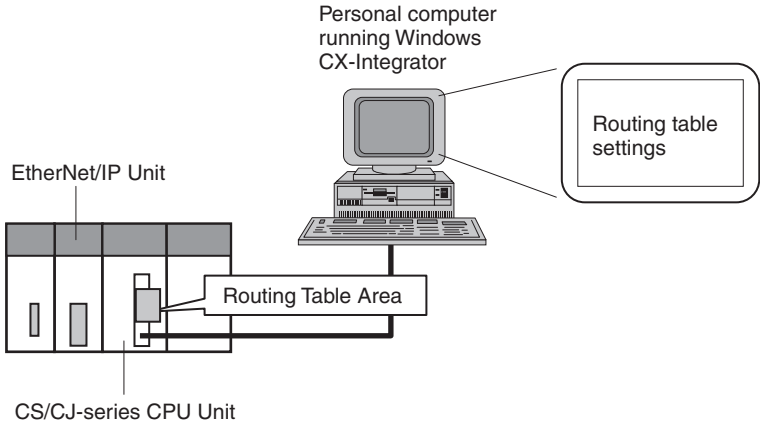
The EtherNet/IP Unit's device parameters are made up of communications settings such as the tag data link setting parameters, FINS/UDP settings, and FINS/TCP settings. Double-click the EtherNet/IP Unit in the Network Configurator's right pane to display the Edit Device Parameters Dialog Box, and make the necessary settings in the Connections Tab, Tag Sets Tab, Status Area Tab, and FINS Configuration Tab.



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/IP Unit is turned ON or restarted, it reads and uses the contents of the Routing Table Area as the settings for FINS network.



1-1-5 Communications Services Overview

The following communications services are supported.

CIP (Common Industrial Protocol) Communications Services

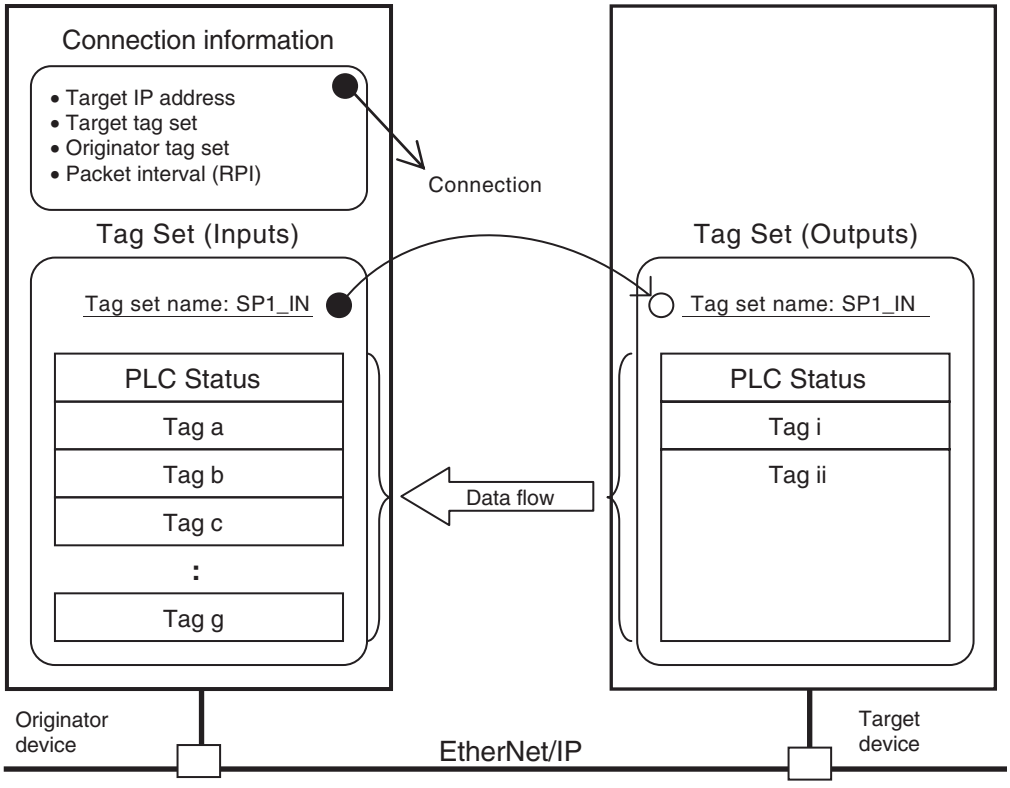
Tag Data Links (Cyclic Communications)

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 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 256 connections can be registered.

The following table shows the tag and tag set specifications of the CS1W-EIP21 and CJ1W-EIP21.

Tags	Tag set
Total size of all tags ≤ 184,832 words	Maximum size of 1 tag set ≤ 722 words (The maximum size is 721 words when the tag set includes the PLC status.)
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 tags ≤ 256	Number of registrable tag sets ≤ 256

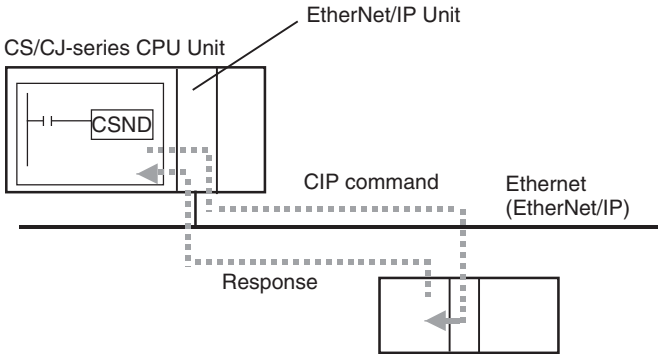


Note In this example, a connection is established with the originator's tag list containing tags a to g (inputs), which are grouped in a tag set called SP1_IN, and the target's tag list containing tags i and ii (outputs), which are grouped in a tag set called SP1_OUT.

Message Communications (Unconnected Message Service)

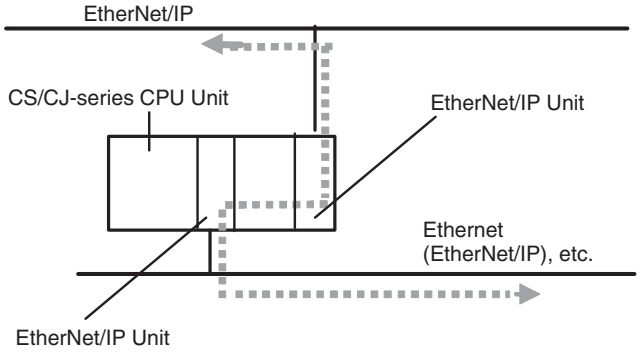
User-specified CIP commands can be sent to devices on the EtherNet/IP network. CIP commands, such as those for reading and writing data, can be sent and their responses received by executing the CMND instruction from the CS/CJ-series CPU Unit's user program (without using a connection).

(With an NE1S-series CPU Unit, use the CSND instruction to send CIP commands.)



CIP messages (CIP commands and responses) can also be transferred to another CIP-based network via the EtherNet/IP Unit using the CIP routing function for message communications.

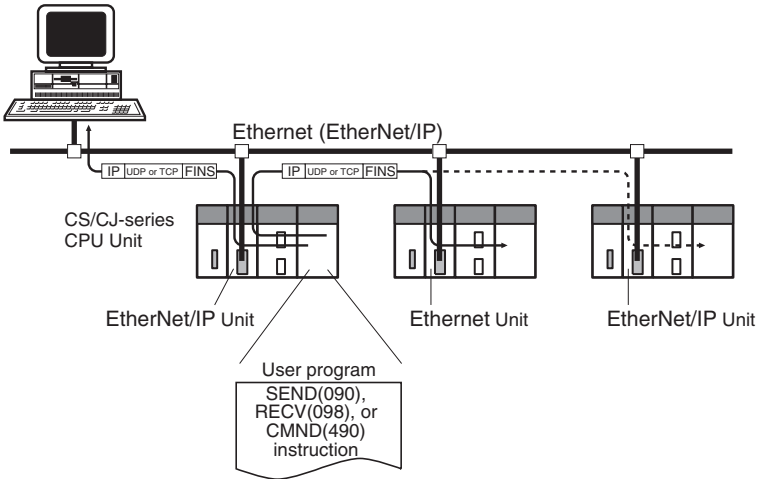
In the CS/CJ Series, CIP routing is possible only through two EtherNet/IP Units. In the NE1S Series, CIP routing is possible through a DeviceNet Unit or ControlNet Unit as well as another EtherNet/IP Unit.



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.

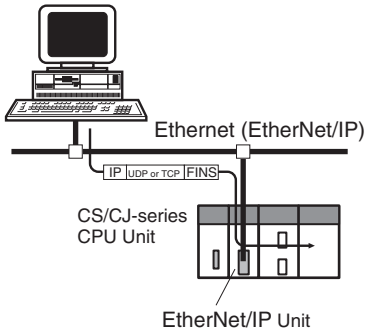
Note There are no particular restrictions when sending FINS messages to OMRON Ethernet Units (CS1W-ETN21 or CJ1W-ETN21) in an Ethernet network.



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.)

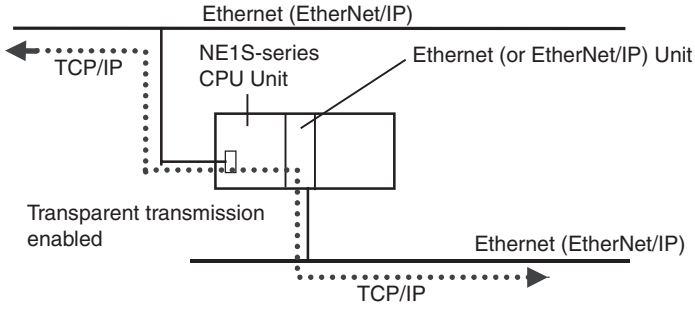
Note Use CX-Programmer version 4.0 to use TCP/IP. For lower versions of CX-Programmer, FinsGateway Version 2003 or higher is required to use TCP/IP.



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.

1-1-6 IP Routing Service (NE1S Series Only)

TCP/IP or UDP/IP packets can be transmitted transparently between the CPU Unit and the EtherNet/IP Network. The IP routing function (IP over ControlNet) enables TCP/IP or UDP/IP communications between the ControlNet network connected through the ControlNet Unit and the Ethernet network connected through the CPU Unit's built-in Ethernet port. The CIP communications service cannot be used with IP over ControlNet. IP (Internet Protocol) communications are performed using the ControlNet as the network interface layer. The CPU Unit treats the ControlNet Unit as an NIC (Network Interface Card).



Note When using the IP routing function, do not connect the EtherNet/IP Unit's Ethernet port in the same network as a CPU Unit's built-in Ethernet port. If these ports are connected, an IP address duplication will be detected and the EtherNet/IP Unit will be unable to communicate.

1-2 EtherNet/IP Unit Specifications

1-2-1 General Specifications

CS-series and NES-series EtherNet/IP Units

Item		Specifications	
Model number		CS1W-EIP21	
Type		100Base-TX (Can be used as 10Base-T, but this is not recommended.)	
Applicable PLCs		CS-series PLCs	
Unit classification		CS-series CPU Bus Unit	
Mounting location		CPU Rack or Expansion Rack	
Number of Units that can be mounted		4 max. (including Expansion Racks)	
CPU Unit words used	Allocated CIO Area words (CPU Bus Unit words)	25 words/Unit (one unit number's words)	
		These words contain control bits and flags, the target node PLC's operating and error information, Unit status, communications status, registered/normal target node information, and FINS/TCP connection status.	
	Allocated DM Area words (CPU Bus Unit words)	100 words/Unit (one unit number's words, not supported in the NE1S Series)	
		These words contain the IP address display/setting area (not supported in the NE1S Series).	
	User-set area	Any usable data area words	
		Target node PLC's operating and error information, and registered/normal target node information	
	CPU Bus Unit System Setup	Not used.	
Non-volatile memory within EtherNet/IP Unit (See note.)		The following settings are made from the Network Configurator and stored in the EtherNet/IP Unit's non-volatile memory. **Note** Unlike the regular Ethernet Units, the CPU Unit's CPU Bus Unit System Setup Area (Unit settings area) is not used for these settings. 1. TCP/IP settings such as the EtherNet/IP Unit's IP address, DNS server, host name, and baud rate 2. Device parameter settings (communications settings such as the tag data link setting parameters, FINSUDP settings, and FINS/TCP settings)	
Transfer specifications	Media access method	CSMA/CD	
	Modulation method	Baseband	
	Transmission paths	Star form	
	Baud rate	100 Mbit/s (100Base-TX)	10 Mbit/s (10Base-T)
	Transmission media	Unshielded twisted-pair (UDP) cable Categories: 5, 5e Shielded twisted-pair (STP) cable Categories: 100 Ω at 5, 5e	Unshielded twisted-pair (UDP) cable Categories: 3, 4, 5, 5e Shielded twisted-pair (STP) cable Categories: 100 Ω at 3, 4, 5, 5e
	Transmission distance	100 m (distance between hub and node)	
	Number of cascade connections	There is no limitation when a switching hub is used.	
Current consumption (Unit)		410 mA max. at 5 V DC	
Vibration resistance		Conforms to JIS 0040. 10 to 57Hz: 0.075-mm amplitude, 57 to 150 Hz: acceleration 9.8 m/s^2 in X, Y, and Z directions for 80 minutes each (sweep time: 8 minutes × 10 sweeps = 80 minutes)	
Shock resistance		Conforms to JIS 0041. 147m/s^2, 3 times each in X, Y, and Z directions	
Ambient operating temperature		0 to 55°C	
Ambient humidity		10% to 90% (with no condensation)	

Item	Specifications
Atmosphere	Must be free of corrosive gas.
Ambient storage temperature	–20 to 75°C
Weight	171 g max.
Dimensions	35 × 130 × 101 mm (W × H × D)

CJ-series EtherNet/IP Unit

Item		Specifications	
Model number		CJ1W-EIP21	
Type		100Base-TX (Can be used as 10Base-T, but this is not recommended.)	
Applicable PLCs		CJ-series PLCs	
Unit classification		CJ-series CPU Bus Unit	
Mounting location		CPU Rack or Expansion Rack	
Number of Units that can be mounted		4 max. (including Expansion Racks)	
CPU Unit words used	Allocated CIO Area words (CPU Bus Unit words)	25 words/Unit (one unit number's words)	
		These words contain control bits and flags, the target node PLC's operating and error information, Unit status, communications status, registered/normal target node information, and FINS/TCP connection status.	
	Allocated DM Area words (CPU Bus Unit words)	100 words/Unit (one unit number's words)	
		These words contain the IP address display/setting area.	
	User-set area	Any usable data area words	
		Target node PLC's operating and error information, and registered/normal target node information	
	CPU Bus Unit System Setup	Not used.	
Non-volatile memory within EtherNet/IP Unit (See note.)		The following settings are made from the Network Configurator and stored in the EtherNet/IP Unit's non-volatile memory. **Note** Unlike the regular Ethernet Units, the CPU Unit's CPU Bus Unit System Setup Area (Unit settings area) is not used for these settings. 1. TCP/IP settings such as the EtherNet/IP Unit's IP address, DNS server, host name, and baud rate 2. Device parameter settings (communications settings such as the tag data link setting parameters, FINSUDP settings, and FINS/TCP settings)	
Transfer specifications	Media access method	CSMA/CD	
	Modulation method	Baseband	
	Transmission paths	Star form	
	Baud rate	100 Mbit/s (100Base-TX)	10 Mbit/s (10Base-TX)
	Transmission media	Unshielded twisted-pair (UDP) cable Categories: 5, 5e Shielded twisted-pair (STP) cable Categories: 100 Ω at 5, 5e	Unshielded twisted-pair (UDP) cable Categories: 3, 4, 5, 5e Shielded twisted-pair (STP) cable Categories: 100 Ω at 3, 4, 5, 5e
	Transmission distance	100 m (distance between hub and node)	
	Number of cascade connections	There is no limitation when a switching hub is used.	
Current consumption (Unit)		410 mA max. at 5 V DC	
Vibration resistance		Conforms to JIS 0040. 10 to 57Hz: 0.075-mm amplitude, 57 to 150 Hz: acceleration 9.8 m/s^2 in X, Y, and Z directions for 80 minutes each (sweep time: 8 minute × 10 sweeps = 80 minutes)	
Shock resistance		Conforms to JIS 0041. 147m/s^2, 3 times each in X, Y, and Z directions	

Item	Specifications
Ambient operating temperature	0 to 55°C
Ambient humidity	10% to 90% (with no condensation)
Atmosphere	Must be free of corrosive gas.
Ambient storage temperature	–20 to 75°C
Weight	94 g max.
Dimensions	31 × 90 × 65 mm (W × H × D)

1-2-2 Communications Specifications

Item			CS/CJ	NE1S
CIP service	Tag data links (Cyclic communications)	Number of connections	256	
		Packet interval (refresh cycle)	0.5 to 10,000 ms (in 0.5-ms units) Can be set independently for each connection. (Data is refreshed over the network at the preset interval and does not depend on the number of nodes.)	
		Allowed communications bandwidth per Unit	6000 pps (See note 1.)	
		Number of tag sets	256	
		Tag types	CIO, DM, EM, HR, WR	
		Number of tags per connection (= 1 tag set)	8 (7 tags when the tag set contains the PLC status)	
		Maximum link data size per node	184,832 words	
		Maximum data size per connection	252 words or 722 words (See note 2.) **Note** Data synchronicity is maintained within each connection.	
		Number of registrable tag sets	256 (1 connection = 1 tag set)	
		Maximum size of 1 tag set	722 words (The PLC status uses 1 word when the tag set contains the PLC status.)	
		Maximum number of tags that can be refreshed per CPU Unit cycle (See note 3.)	Output/Transmission (CPU → EtherNet/IP): 19 Input/Reception (EtherNet/IP → CPU): 20 (See note 4.)	---
		Data that can be refreshed per CPU Unit cycle (See note 3.)	Output/Transmission (CPU → EtherNet/IP): 7,405 words Input/Reception (EtherNet/IP → CPU): 7,405 words	Output/Transmission (CPU → EtherNet/IP): 6,432 words Input/Reception (EtherNet/IP → CPU): 6,432 words
		Changing tag data link parameters during operation	Supported (See note 5.)	
		Multi-cast packet filter function (See note 6.)	Supported	
	Explicit messaging	Class 3 (connected)	Number of connections: 128	
		UCMM (unconnected)	Number of clients that can communicate at one time: 32 max. Number of servers that can communicate at one time: 32 max.	
		CIP routing	CS1W-EIP21 CJ1W-EIP21	CS1W-EIP21 CJ1W-EIP21 NE1S-CPU01 NE1S-DRM21U NE1S-CNS21U
FINS service		FINS/UDP	Supported	
		FINS/TCP	16 connections max.	
EtherNet/IP conformance test			Conforms to A3.7.3	
Ethernet interface			10BASE-T or 100BASE-TX Auto Negotiation or fixed settings	

Note (1) In this case, pps means “packets per second” and indicates the number of packets that can be processed in one second.

(2) To use 505 to 1444 bytes as the data size, the system must support the Large Forward Open standard (an optional CIP specification). The CS1, NE1S, and CJ1 CPU Units support this standard, but other companies’ devices may not support it.

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

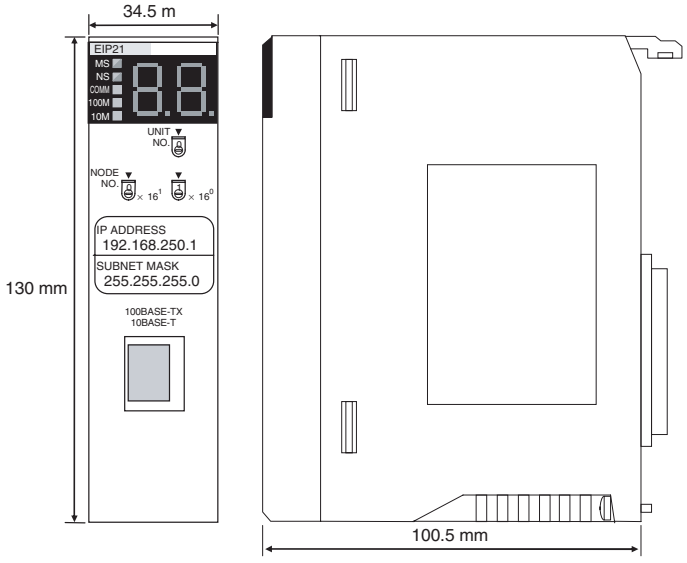
(4) If status layout is selected in the user settings, the maximum number of tags that can be received is 19 tags.

(5) If parameters are changed, the target EtherNet/IP Unit will restart. When other nodes communicating with the target node, the affected data will temporarily time-out and automatically recover later.

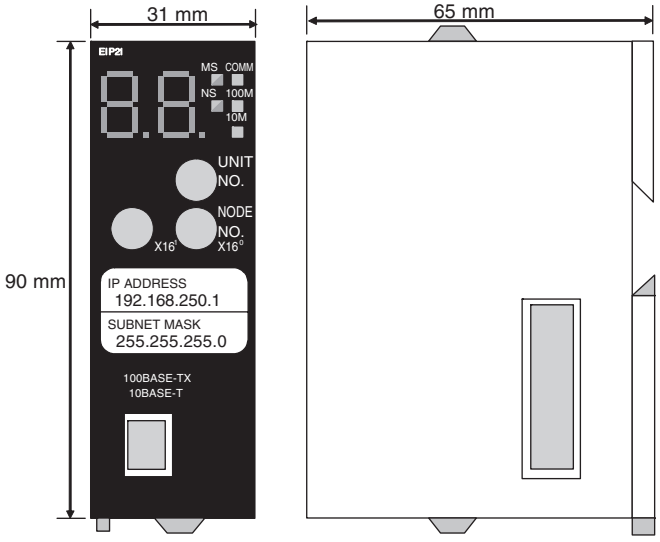
(6) Since the EtherNet/IP Unit is equipped with an IGMP client, unnecessary multi-cast packets can be filtered by using a switching hub that supports IGMP snooping.

1-2-3 Dimensions

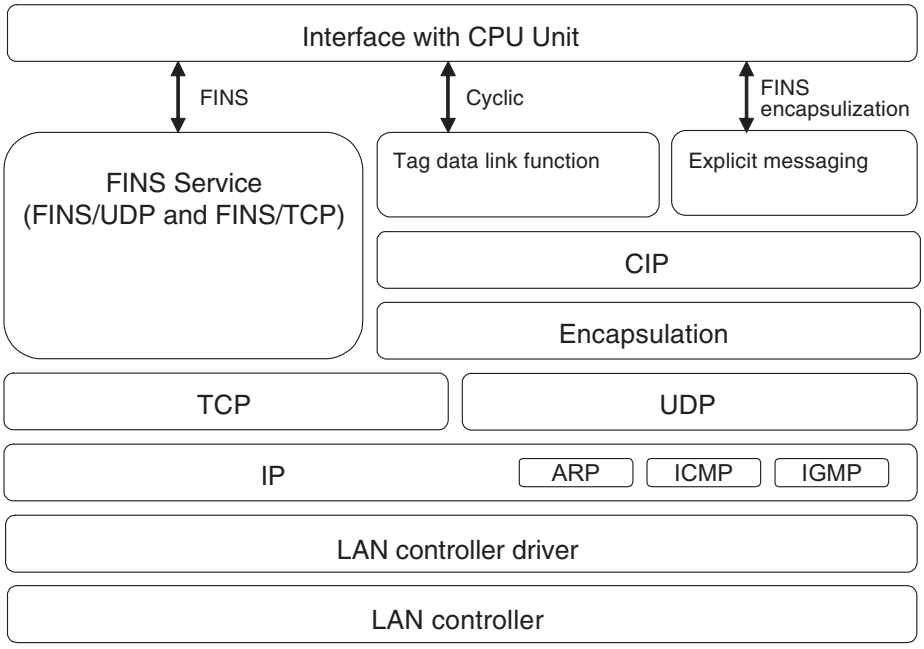
CS1W-EIP21



CJ1W-EIP21



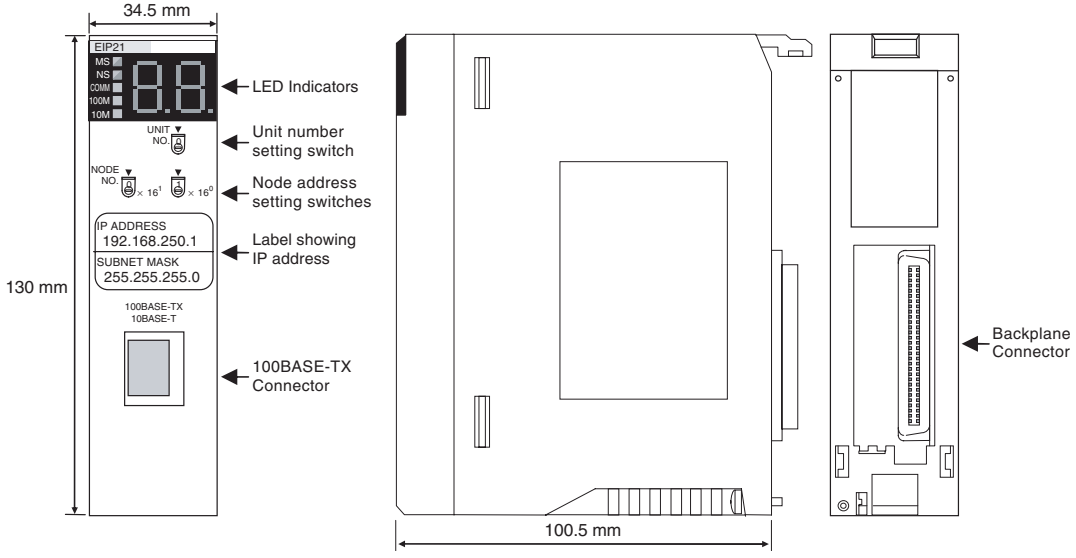
1-2-4 Software Configuration



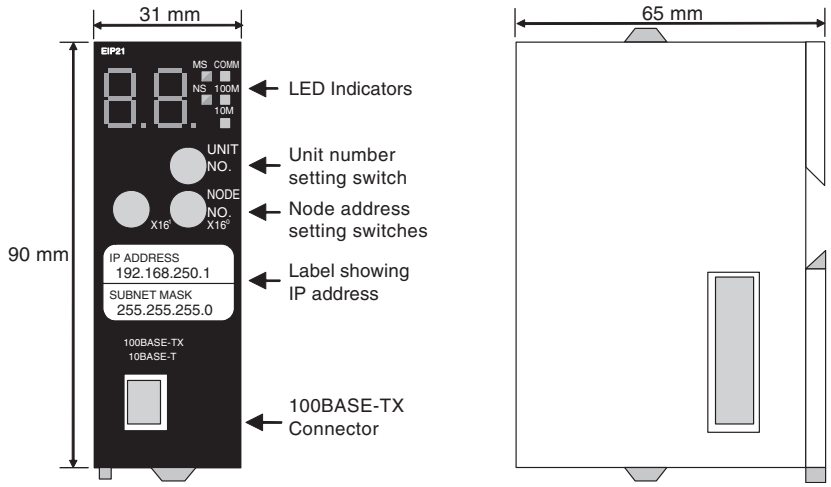
1-3 Nomenclature and Functions

1-3-1 Nomenclature and Functions

CS1W-EIP21



CJ1W-EIP21

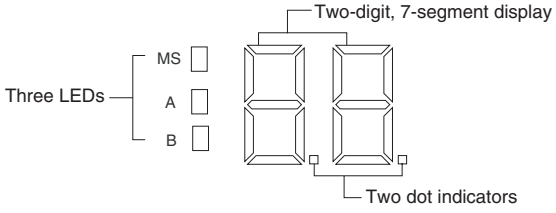


Indicators

The EtherNet/IP Units are equipped with the following indicators that indicate the operating status of the node itself and the overall network.

1,2,3...

1. Two two-color status indicators (two-color: green or red LEDs)
2. Three one-color Ethernet indicators (yellow LEDs)
3. A two-digit, 7-segment display
4. Two dot indicators



Status Indicators: MS, NS, COMM, 100M, and 10M

The MS (Module Status) indicator indicates the status of the node itself and the NS (Network Status) indicator indicates the status of the network.

The COMM, 100M, and 10M indicators indicate the status of Ethernet communications.

The MS and NS indicators can be green or red. The COMM, 100M, and 10M indicators are yellow. These indicators can be lit, flashing, or not lit. The following table shows the meaning of these indicator conditions.

Refer to ???*Section 13 Error Processing and Maintenance* for details on using these indicators for troubleshooting.

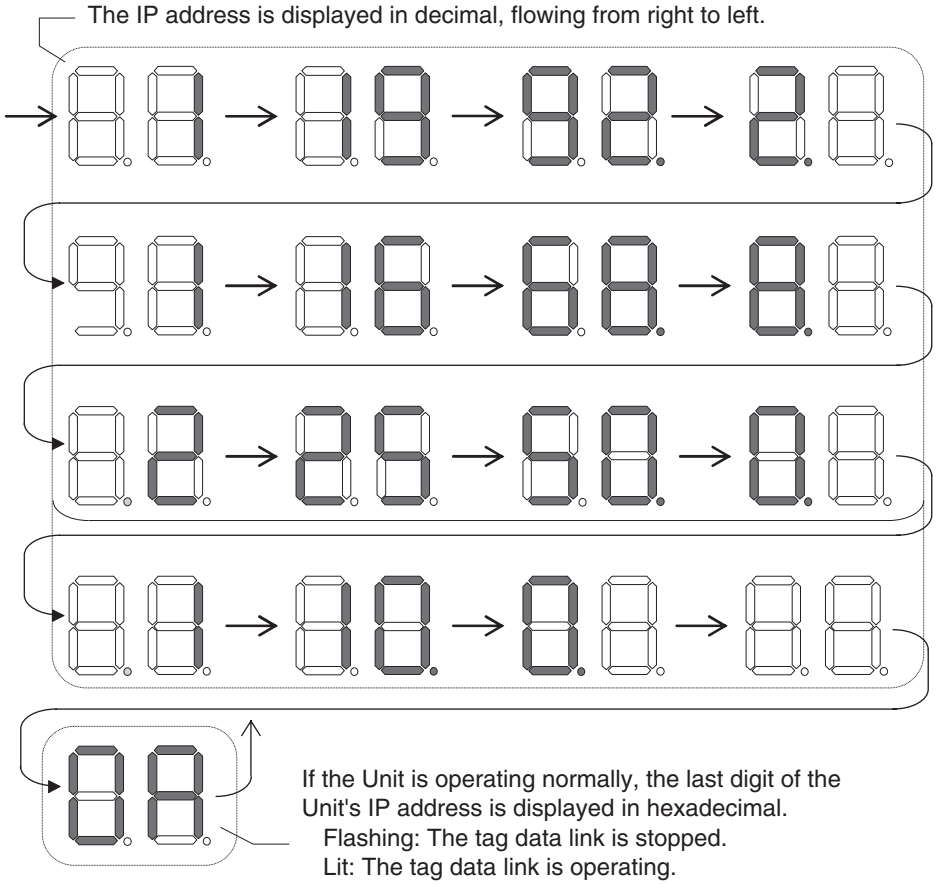
Indicator	Name	Color	LED status	Indicated operating status
MS	Module	Red	Lit	Fatal error
			Flashing	Recoverable error
		Green	Lit	Normal
		---	Not lit	Power supply OFF
NS	Network	Red	Lit	Fatal error
			Flashing	Recoverable error
		Green	Lit	Tag data link and message connections established
			Flashing	Tag data link and message connections not established
		---	Not lit	Offline or power supply OFF

Indicator	Name	Color	LED status	Indicated operating status
COMM	Communication	Yellow	Lit	Transferring data
			Not lit	Not transferring data
100M	100 Mbps	Yellow	Lit	100BASE-TX link established
			Not lit	100BASE-TX link not established
10M	10 Mbps	Yellow	Lit	10BASE-TX link established
			Not lit	10BASE-TX link not established

Seven-segment Display

When the power is turned ON (or the Unit is restarted), the IP address set in the EtherNet/IP Unit is displayed on the 7-segment display just once, from right to left. Afterwards, the rightmost 8 bits of the IP address is displayed in hexadecimal during normal operation.

Example 1: Displaying IP Address 192.168.250.10

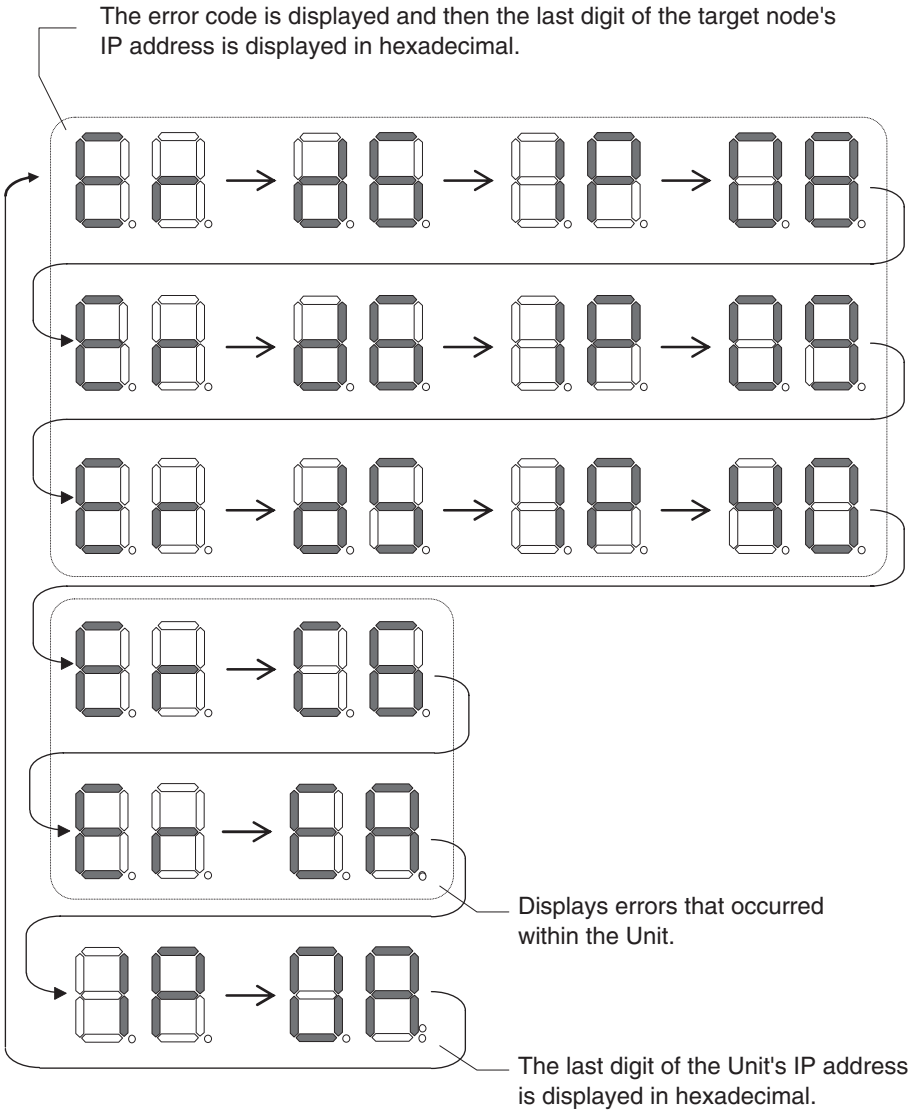


If an error occurs, the error code will be displayed alternately with the rightmost byte of the affected device's IP address. For details on error codes, refer to ???*Section 13 Error Processing and Maintenance*.

Displaying Multiple Error Sources

- A d6 error (failed to establish connection) occurred with IP address 192.168.250.8.
- A d6 error (failed to establish connection) occurred with IP address 192.168.250.9.
- A d5 error (verification error, target nonexistent) occurred with IP address 192.168.250.64.

- A C6 error (multiple switches ON) and EA error (EtherNet/IP expansion setting error) occurred with IP address 192.168.250.10.



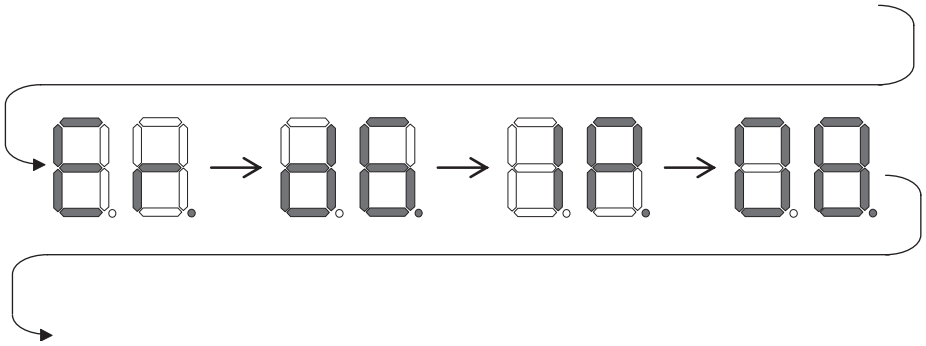
- There is no particular priority to the order in which the errors are displayed. All of the errors are displayed repeatedly in order.

Right and Left Dot LEDs

If an error occurred in two or more devices with the same rightmost byte in their IP addresses, the Right Dot LED will be lit while the devices' error is being displayed.

Example: Displaying the Following Errors

- A d6 error (failed to establish connection) occurred with IP address 10.0.1.8.
- A d6 error (failed to establish connection) occurred with IP address 10.0.2.8.



1-3-2 Switch Settings

Unit Number Setting Switch

The Unit Number Setting Switch sets the EtherNet/IP Unit's unit number as a CPU Bus Unit. The unit number determines which data area words are allocated to the Unit to contain data such as control bits, flags, status information, and connection information.

Setting method	Setting range
One-digit hexadecimal	0 to F

Note The unit number is factory-set to 0.

The unit number can be set to any number in the setting range (0 to F), as long as the same number is not set on another CPU Bus Unit in the same PLC.

Note

(1) Use a small screwdriver to make the setting, and be sure not to damage the rotary switch.

(2) Always turn OFF the PLC's power supply before setting the unit number.

(3) The unit number is factory-set to 0.

(4) If the same unit number is set on more than one CPU Bus Unit mounted in a PLC, a unit number duplication error will occur in the PLC and the EtherNet/IP Unit will not be able to start operating.

Node Address Setting Switch

The Node Address Setting Switch sets the EtherNet/IP Unit's node address.

Setting method	Setting range
Two-digit hexadecimal	01 to FE

Note The node address is factory-set to 01. With the default settings, the values set on these switches become the last two digits of the EtherNet/IP Unit's IP address.

Default IP address = 192.168.250.node address
With the factory-default node address setting of 01, the default IP address is 192.168.250.1.

The node address can be set to any number in the setting range (01 to FE), as long as the same address is not set on another node in the network.

Note If the node address setting is changed during operation, the MS Indicator will flash red.

1-4 Network Configurator Overview

1-4-1 Overview

The Network Configurator Ver. 2.0 or later is software designed for building, setting, and controlling a multi-vendor EtherNet/IP Network using OMRON's EtherNet/IP. 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.

Hardware (EDS File) Control EDS files used by the Network Configurator can be installed and deleted.

1-4-2 Network Configurator Requirements

Item		Specification	
Operating environment	Hardware	Personal computer: IBM PC/AT or compatible CPU: Pentium 300 MHz or higher Memory: 256 Mbytes Hard disk: A minimum of 40 Mbytes available space Monitor: SVGA (800 ×600 pixels) min. CD-ROM drive or DVD drive: At least 1 drive	
	OS	Windows 2000 or Windows XP (Windows is a registered trademark of Microsoft Corporation.)	
Network connection method	Interface	CS/CJ-series port	NE1S-series port
	Serial interface	CPU Unit's Peripheral or RS-232C port	CPU Unit's USB/RS-232C port
	Ethernet interface	EtherNet/IP Unit's Ethernet port	CPU Unit's Ethernet port
	RSLinx interface	Not supported.	ControlNet Unit's ControlNet port (See note 1.)
	DeviceNet interface	Not supported.	DeviceNet Unit's DeviceNet port (See note 2.)
Location on Network		A single node address is used (only when directly connected to EtherNet/IP).	
Number of Units that can be connected to Network		A single Network Configurator per Network (More than one Configurator cannot be used in the same system.)	
Main functions	Network control functions	• The Network configuration can be created and edited regardless of whether the Network Configurator is online or offline. • The Network configuration can be read from a file or the network.	
	Configuration functions	The EDS files used by the Network Configurator can be installed and deleted.	
Supported file formats		Configurator network configuration files (*.ncf)	

Note

(1) The following interface card and software are required to connect through an RSLinx interface.

- Allen-Bradley 1784-PCC Communication Card
- Rockwell RSLinx 2.1 Software

(2) The following Interface Board or Interface Card is required to connect through a DeviceNet interface.

- OMRON 3G8F7-DRM21 DeviceNet PCI Board

- OMRON 3G8F5-DRM21 DeviceNet ISA Board
- OMRON 3G8E2-DRM21 DeviceNet PCMCIA Card

1-4-3 Precautions When Using the Network Configurator

Only an OMRON EtherNet/IP Unit can be set as the originator for a connection using the Network Configurator.

- The Network Configurator can be connected to the EtherNet/IP network through the following ports:
  - CS/CJ-series CPU Unit's serial port (peripheral or RS-232C)
  - NE1S-series CPU Unit's serial port (USB or RS-232C) or Ethernet port
  - NE1S-series DeviceNet Unit's DeviceNet port
    (One of the following Interface Boards or Cards is required to connect through DeviceNet: 3G8F7-DRM21 DeviceNet PCI Board, 3G8F5-DRM21 DeviceNet ISA Board, or 3G8E2-DRM21 DeviceNet PCMCIA Card.)
  - NE1S-series ControlNet Unit's ControlNet port (See note 2.)
    (The following interface card and software are required to connect through an RSLinx interface: an Allen-Bradley 1784-PCC Communication Card and a Rockwell RSLinx 2.1 Software.)
- The Network Configurator can be connected directly to the EtherNet/IP network from the computer's Ethernet port. When connecting directly to the EtherNet/IP network, an Ethernet port must be set up in the computer in advance. In this case, the Network Configurator will be connected to the EtherNet/IP network as a single node. If there isn't an unused node address available, the Network Configurator can't be connected directly to the EtherNet/IP network.

SECTION 2
Designing the EtherNet/IP System

This section describes how to design an EtherNet/IP system.

2-1 Design Procedures

This section describes how to design an EtherNet/IP system in the following two cases.

(1) Establishing a new EtherNet/IP system

(2) Modifying an established EtherNet system

2-1-1 Establishing a New EtherNet/IP System

This section describes how to use the Network Configurator to construct a new EtherNet/IP system by designing the new system and downloading the parameters to the network devices.

Selecting a Switching Hub

Always use a switching hub when using tag data links. Select a switching hub with the functions required for the communications being used in the network.

Refer to *2-2 Selecting the Network Devices*.

System Design and Programming (Offline Operations)

1. Starting the Network Configurator

Start the Network Configurator.

Refer to ???*7-2-1 Starting and Network Configurator*.

2. Registering Devices

Use the Network Configurator to register devices in the EtherNet/IP network.

Refer to ???*7-2-3 Registering Devices*.

3. Setting Device Parameters

Set the device parameters (communications settings such as tag data link parameters, FINS/UDP settings, and FINS/TCP settings) for each device in the network configuration.

Refer to ???*7-2-4 Creating Tag Sets* and ???*7-2-5 Setting the Connections with Target Devices*.

4. Verifying the Network Bandwidth Being Used

The network's communications load capacity is called the bandwidth. Verify that the bandwidth used by the EtherNet/IP tag data links does not exceed the allowed network bandwidth.

If the bandwidth exceeds the allowed level, adjust the packet interval (RPI).

Refer to *2-3 Checking Bandwidth Usage and Adjusting the Packet Interval (RPI)*.

5. Calculating and Verifying the Maximum Response Time

Calculate the maximum response time of all of the tag data links, and verify that the response time meets the required specifications. If the response time does not meet the required specifications, evaluate and correct the network configuration by taking steps such as dividing the network.

Refer to ???*Section 11 Communications Performance and Communications Load*.

6. Saving the Network Configuration File

Save the network configuration file with the completed design.

Refer to ???*7-2-11 Saving the Network Configuration File*.

7. Closing the Network Configurator

Exit from the Network Configurator.

The next steps are wiring the network and connecting the Network Configurator to the network.

Constructing the Actual System

Wire the network, install the actual devices, and set the devices' IP addresses.

8. Clearing the Devices' Various Parameters

Clear the various parameters stored in the new devices that will be used in the system.

Refer to ???*7-2-10 Clearing Device Parameters*.

Note Before connecting newly added devices to the network, clear the parameters set in the devices. The EtherNet/IP Unit will restart automatically when the Unit's device parameters are cleared (reset) from the Network Configurator. The Unit must restart in order to enable the cleared parameter settings (default settings). Clear (reset) the device parameters only after verifying that restarting the Unit will not cause any problems in the system.

9. Changing the Devices' IP Addresses

Set the actual devices' IP addresses. Any of the following methods can be used to set the EtherNet/IP Unit's local IP address.

- If you want to connect the EtherNet/IP Unit immediately, the default IP address is 192.168.250.node address. (The node address is set with the Node Address Setting Switches on the front of the Unit.)
- If you want to set a particular IP address and set (store) that local IP address in the CPU Unit, set it with the CPU Unit's allocated DM Area words.
- If you want to set a particular IP address and set (store) that local IP address in the EtherNet/IP Unit, set the TCP/IP with the Network Configurator.
  Refer to ???*4-8 TCP/IP Settings*.

Note

(1) Before connecting a device to the network, set a suitable IP address for the device.

(2) When setting the EtherNet/IP Unit's local IP address with the Network Configurator, connect the Units one at a time, and download the TCP/IP setting parameters.
The EtherNet/IP Unit will restart automatically when the TCP/IP setting parameters are downloaded to the Unit from the Network Configurator. The Unit must restart in order to enable the parameter settings. Download the TCP/IP setting parameters only after verifying that restarting the Unit will not cause any problems in the system.

Downloading Device Parameters

10. Starting the Network Configurator

Start the Network Configurator.

Refer to ???*7-2-1 Starting and Network Configurator*.

11. Reading the Network Configuration File

Read the network configuration file, which was saved with the completed design, into the Network Configurator.

Refer to ???*7-2-12 Reading the Network Configuration File*.

12. Verifying the IP Addresses

Verify that the devices' IP addresses in the network configuration file matches the actual devices' IP addresses. If one of the IP addresses does not match, change the IP address so that it matches.

Refer to ???*4-8 TCP/IP Settings*.

13. Connecting the Network Configurator to the Network

Connect the Network Configurator to the CPU Unit through the serial port or Ethernet interface.

Refer to ???*7-2-6 Connecting the Network Configurator to the Network*.

14. Downloading the Device Parameters

Download the parameters to all of the devices in the network.

Refer to ???*7-2-7 Downloading Tag Data Link Parameters*.

15. Verifying the Downloaded Device Parameters

Compare the parameters in all of the devices in the network, to verify that the user-set device parameters were properly downloaded and saved in the devices.

Refer to ???*7-2-9 Comparing the Tag Data Link Parameters*.

16. Closing the Network Configurator

Exit from the Network Configurator.

Note

(1) The EtherNet/IP Unit will restart automatically when the device parameters are downloaded to the Unit from the Network Configurator. The Unit must restart in order to enable the parameter settings. Download the device parameters only after verifying that restarting the Unit will not cause any problems in the system.

(2) After the device parameters have been downloaded, compare the parameters and verify that the saved parameters are correct.

(3) Before operating the actual system, always verify that the devices in the network are operating as expected in the system design.

Actual System Operation

17. Operating the Actual System

Start operating the system.

2-1-2 Modifying an Established EtherNet/IP System

This section describes how to change an EtherNet/IP system after the system has started operating.

Uploading and Saving the System's Network Configuration

1. Stopping the System

Take steps, such as stopping the CPU Unit's program, so that device parameter changes will not affect the system.

2. Starting the Network Configurator and Connecting to the Network

Start the Network Configurator and connect it to the network via the CPU Unit's serial port or an Ethernet interface.

Refer to ???*7-2-1 Starting the Network Configurator* and ???*7-2-6 Connecting the Network Configurator to the Network*.

3. Uploading the Network Configuration

Upload the network information to collect the current network configuration.

Refer to ???*7-2-8 Uploading Tag Data Link Parameters*.

4. Saving the Network Configuration File

Save a network configuration file containing all of the devices' verified parameters.

Refer to ???*7-2-11 Saving the Network Configuration File*.

5. Closing the Network Configurator

Exit from the Network Configurator.

Changing the Actual System Configuration

Refer to the modified specifications and make the necessary changes, such as changing network wiring, changing IP addresses, adding devices, and deleting devices.

6. Clearing Parameters in Added Devices

Clear the various parameters stored in the added devices.

Refer to ???*7-2-10 Clearing Device Parameters*.

Note Before connecting newly added devices to the network, clear the parameters set in the devices. The EtherNet/IP Unit will restart automatically when the Unit's device parameters are cleared (reset) from the Network Configurator. The Unit must restart in order to enable the cleared parameter settings (default settings). Clear (reset) the device parameters only after verifying that restarting the Unit will not cause any problems in the system.

7. Changing the Devices' IP Addresses

Set the IP addresses of the added devices.

- If you want to connect the EtherNet/IP Unit immediately, the default IP address is 192.168.250.node address. (The node address is set with the Node Address Setting Switches on the front of the Unit.)
- If you want to set a particular IP address and set (store) that local IP address in the CPU Unit, set it with the CPU Unit's allocated DM Area words.
- If you want to set a particular IP address and set (store) that local IP address in the EtherNet/IP Unit, set the TCP/IP with the Network Configurator.
  Refer to ???*4-8 TCP/IP Settings*.

Note

(1) Before connecting a device to the network, set a suitable IP address.

(2) When setting the EtherNet/IP Unit's local IP address with the Network Configurator, connect the Units one at a time, and download the TCP/IP setting parameters.
The EtherNet/IP Unit will restart automatically when the TCP/IP setting parameters are downloaded to the Unit from the Network Configurator. The Unit must restart in order to enable the parameter settings. Download the TCP/IP setting parameters only after verifying that restarting the Unit will not cause any problems in the system.

Changing Device Parameters

8. Starting the Network Configurator

Start the Network Configurator to redesign the network.

9. Reading the Network Configuration File

Read the previously saved network configuration file.

Refer to ???*7-2-12 Reading the Network Configuration File*.

10. Changing the Network Configuration

Make the changes required in the system redesign, such as adding devices, deleting devices, and changing IP addresses.

Refer to ???*4-8 TCP/IP Settings*.

11. Changing the Device Parameters

Change the device parameters for each device in the network configuration, as required in the system redesign.

Refer to ???*7-2-4 Creating Tag Sets* and ???*7-2-5 Setting the Connections with Target Devices*.

12. Verifying the Network Bandwidth Being Used

Verify that the bandwidth used by the EtherNet/IP tag data links does not exceed the allowed network bandwidth.

If the bandwidth exceeds the allowed level, adjust the packet interval (RPI).

Refer to ???*2-3 Checking Bandwidth Usage and Adjusting the Packet Interval (RPI)*.

13. Recalculating and Verifying the Maximum Response Time

Calculate the maximum response time of all of the tag data links, and verify that the response time meets the design requirements. If the response time does not meet the required specifications, evaluate and correct the network configuration by taking steps such as using a different switching hub or dividing the network.

Refer to *2-2 Selecting the Network Devices*.

Refer to ???*Section 11 Communications Performance and Communications Load*.

14. Saving the Network Configuration File

Save the modified network configuration file.

Refer to ???*7-2-11 Saving the Network Configuration File*.

15. Closing the Network Configurator

Exit from the Network Configurator.

The next steps are completing the changes in the actual system and connecting the Network Configurator to the network.

Note Changing Target Device Parameters
If the target device parameters are changed, they will no longer agree with the parameter information registered in the originator device where the target device is registered. A yellow bar will be displayed next to the target device icon to indicate when this occurs.
Open the *Edit Device Parameters* Dialog Box and check target device information.

Downloading the Changed Device Parameters

16. Reading the Network Configuration File

Read the network configuration file, which was saved with the completed design.

Refer to ???*7-2-12 Reading the Network Configuration File*.

17. Starting the Network Configurator and Connecting to the Network

Start the Network Configurator and connect it to the network via the CPU Unit's serial port or an Ethernet interface.

Refer to ???*7-2-1 Starting the Network Configurator* and ???*7-2-6 Connecting the Network Configurator to the Network*.

18. Downloading the Device Parameters

Download the parameters to all of the devices.

Refer to ???*7-2-7 Downloading Tag Data Link Parameters*.

19. Verifying the Downloaded Device Parameters

Compare the parameters in all of the devices, to verify that the user-set device parameters were properly downloaded and saved in the devices.

Refer to ???*7-2-9 Comparing the Tag Data Link Parameters*.

20. Closing the Network Configurator

Exit from the Network Configurator.

Note

(1) The EtherNet/IP Unit will restart automatically when the device parameters are downloaded to the Unit from the Network Configurator. The Unit must restart in order to enable the parameter settings. Download the device parameters only after verifying that restarting the Unit will not cause any problems in the system.

(2) After the device parameters have been downloaded, compare the parameters and verify that the saved parameters are correct.

(3) Before operating the actual system, always verify that the devices in the network are operating as expected in the system design.

Restarting Actual System Operation

21. Operating the Actual System

Start operating the system.

2-2 Selecting the Network Devices

2-2-1 Recommended Network Devices

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

Part	Maker	Model number	Inquires
Switching Hub	Cisco Systems, Inc.	WS-C2955T-12 (12-port switching hub) **Note** For use in an FA environment	Cisco Systems, Inc. Main Corporate HQ: (800) 553-6387
	Contec USA, Inc.	SH-8008(FIT)H	CONTEC USA Inc.: (408) 400-8700
	Phoenix Contact	FL SWITCH SFN 8TX	Phoenix Contact USA Customer Service: (800) 808-7177
Twisted-pair cable	100BASE-TX		
	Fujikura	F-LINK-E 0.5mm × 4P	Fujikura America, Inc.: (408) 748-6991
		Specifications: STP cable (shielded, twisted-pair cable) Category 5 or 5e **Note** Impedance up to 100 Ω max.	
	Fujikura	CTP-LAN5 0.5 mm × 4P	
		Specifications: UTP cable (unshielded, twisted-pair cable) Category 5 or 5e	

Part	Maker	Model number	Inquires
Connectors (Modular plug)	STP Plug		
	Panduit Corporation	MPS588	Panduit Corporation US Headquarters: (800) 777-3300
	UTP Plug		
	Panduit Corporation	MP588-C	Panduit Corporation US Headquarters: (800) 777-3300
Boots	Tsuko Company	MK boot (IV) LV	Tsuko Company Japan Headquarters 011-81 (03) 3542-2781

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

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

2-2-2 Switching Hub Types

Layer 2 (L2) Switching Hub

These switching hubs use the Ethernet MAC address to switch ports. Ordinary switching hubs have this function.

Layer 3 (L3) Switching Hub

These switching hubs use the Ethernet MAC address or IP address to switch ports. When using an EtherNet/IP Unit, select from the following functions.

- L2 switch without multicast filtering function
- L2 switch with multicast filtering function
- L3 switch with multicast filtering function and L2/L3 QoS function

2-2-3 Switching Hub Functions

This section describes the switching hub functions which are important when using an EtherNet/IP network.

Multicast Filter

The multicast filter transfers multicast packets to the specific nodes only. This function is implemented in the switching hub as IGMP Snooping or GMRP. "Specific nodes" are nodes equipped with an IGMP client that have made transfer requests to the switching hub. (OMRON EtherNet/IP Units are equipped with an IGMP client.)

When the hub does not use the multicast filter, multicast packets are sent to all nodes, just like broadcast packets, which increases the traffic in the network. Settings must be made in the switching hub to enable this function.

Layer 3/4 QoS (Quality of Service) Function

This function controls the priority of packet transmissions, so that packets can be sent with higher priority to a particular IP address and TCP (UDP) port.

When tag data links and message communications are executed on the same network, tag data links can be sent at higher priority to prevent problems such as transmission delays due to message communications traffic and packet losses due to buffer overflow. Settings must be made in the switching hub to enable this function and give higher priority to tag data link packets.

2-2-4 Precautions When Selecting a Switching Hub

The functions supported by the switching hub may affect tag data link transmission delays and the configuration. In addition, if the switching hub supports advanced functions, special settings are required for those functions.

When selecting a switching hub, it is necessary to consider whether the switching hub will be selected based on the kind of communications that will be performed in the network or the kind of switching hub that you want to use. Refer to the following precautions when selecting a switching hub.

Selecting the Switching Hub Based on the Types of Network Communications

Executing Tag Data Links Only

We recommend using an L2 switching hub without multicast filtering or an L2 switching hub with multicast filtering.

Using an L2 switching hub with multicast filtering prevents increased traffic due to unnecessary multicast packets, so the tag data links can operate at higher speed. If either of the following conditions exists, the amount traffic will be the same for both kinds of L2 switching hubs (with or without multicast filtering).

- The tag data links are set to share the same data with all nodes in the network. (The multicast packets are transferred to all nodes in the network, just like a broadcast.)
- The tag data link settings are all one-to-one (unicast) and multicast packets cannot be used.

If the multicast filter function is being used, settings must be made for that function in the switching hub.

Executing Tag Data Links and Message Communications

We recommend using an L3 switching hub with multicast filtering and L3/L4 QoS.

By setting tag data links for higher-priority transmission, it is possible to prevent problems such as transmission delays due to message communications traffic and packet losses due to buffer overflow. Settings must be made in the switching hub to enable this function and give higher priority to tag data link packets.

Special settings must be made in the switching hub when using the multicast filtering function and L3/L4 QoS function.

Selecting the Switching Hub Based on the Hub's Supported Functions

L2 Switching Hub without Multicast Filtering

We recommend this kind of switching hub when only tag data links are executed and any of the following conditions is met.

- The tag data links are set to share the same data with all nodes in the network. (The multicast packets are transferred to all nodes in the network, just like a broadcast.)
- The tag data link settings are all one-to-one (unicast) and multicast packets cannot be used.
- There is little traffic in the tag data links.

No special settings are required for an L2 switching hub without multicast filtering.

L2 Switching Hub with Multicast Filtering

We recommend this kind of switching hub when only tag data links are executed and the following condition is met.

- There are many 1:N links (where N represents some number of nodes in the network) in the tag data link settings, i.e., there are many multicast packets used, or there is heavy traffic in the tag data links.

Special settings are required for an L2 switching hub with multicast filtering.

L3 Switching Hub with Multicast Filtering and L3/L4 QoS Functions

We recommend this kind of switching hub when both tag data links and message communications are executed.

By setting tag data links for higher-priority transmission, it is possible to prevent problems such as transmission delays due to message communications traffic and packet losses due to buffer overflow. Settings must be made in the switching hub to enable this function and give higher priority to tag data link packets.

Special settings must be made in the switching hub when using the multicast filtering function and L3/L4 QoS function.

2-3 Checking Bandwidth Usage and Adjusting the Packet Interval (RPI)

In an Ethernet network using a switching hub, the network bandwidth is not shared by all of the nodes; independent transmission paths are established between individual nodes through the switching hub.

A dedicated communications buffer is established in the switching hub for communications between the nodes and full-duplex communications (simultaneous transmission and reception) are performed asynchronously with other transmission paths. The communications load in other transmission paths does not affect communications, so packet collisions do not occur and stable, high-speed communications can be carried out.

The switching hub functions shown in the following table are some of the factors determining the performance of tag data links.

Item	Description
Buffer capacity	This is the amount of data that can be buffered when packets accumulate at the switching hub.
Multicast filter function	This function transfers multicast packets to the specific nodes only.
QoS function	This function performs priority control on packet transfers.

The following table shows the tag data link settings that can be made for individual EtherNet/IP Units as well as the setting ranges.

Item	Contents	Settings
Network bandwidth	Physical Ethernet baud rate	100 Mbps or 10 Mbps
Allowed tag data link communications bandwidth	Maximum number of tag data link packets that can be processed in 1 second (pps: packets per second)	6,000 pps max.
Connection resources	Number of connections that can be established	256 max.
Packet interval (RPI: Requested Packet Interval)	Refresh cycle for tag data	0.5 to 10,000 ms (in 0.5 ms units)

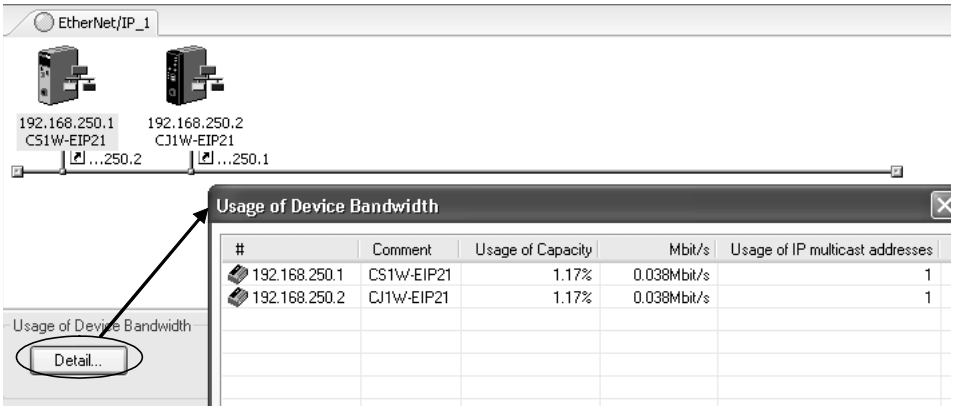
When the tag data link settings exceed the capabilities of the switching hub being used, adjust (increase) the packet interval (RPI) value and set it again. In addition, if the required tag data link performance cannot be achieved with the switching hub's capabilities, reevaluate the overall network configuration and correct it by taking steps such as selecting a different switching hub or splitting the network.

The following sections show how to check the network bandwidth being used by the tag data links in the designed network, and how to set the appropriate values.

2-3-1 Checking the Tag Data Links' Bandwidth Usage

The Network Configurator can display the bandwidth actually used for tag data links at each EtherNet/IP Unit, based on the connections set in the network configuration.

The device bandwidth used by tag data links can be checked by clicking the **Detail** Button in the Usage of Device Bandwidth Area at the bottom of the Network Configuration Window.



The display shows the percentage of the allowed tag data link bandwidth used (Usage of Capacity), as well as the network bandwidth used (Mbit/s).

The percentage of the allowed tag data link bandwidth used (Usage of Capacity) depends on the packet interval (RPI) setting.

The percentage of the allowed tag data link bandwidth used (Usage of Capacity) will increase as the packet interval (RPI) setting is shortened. Conversely, the percentage of the allowed tag data link bandwidth used (Usage of Capacity) will decline as the packet interval (RPI) setting is lengthened.

The packet interval (RPI) can be set in any one of the following ways.

- Setting the same interval for all connections
- Setting a particular device's connection
- Setting a particular connection

When the same packet interval (RPI) is set for all connections, the percentage of the allowed tag data link bandwidth used (Usage of Capacity) will basically increase proportionally as the packet interval (RPI) is made faster.

Example:
If the packet interval (RPI) is set to 50 ms for all connections and the tag data link bandwidth used (Usage of Capacity) is 40%, the Usage of Capacity may increase to 80% when the packet interval (RPI) is reduced to 25 ms for all connections.

Note We recommend using less than 80% of the allowed tag data link bandwidth (Usage of Capacity). Even if the Usage of Capacity is less than 80%, time-outs and other communications problems may occur during temporary network loads such as Network Configurator monitoring operations or message communications by user applications. If this kind of communications problem occurs, lengthen some or all of the nodes' packet interval (RPI) settings to reduce the Usage of Capacity.
Even if the Usage of Capacity is between 80% and 100%, it will still be possible to establish connections and perform message communications through the Network Configurator, but time-outs are likely to occur during message communications.

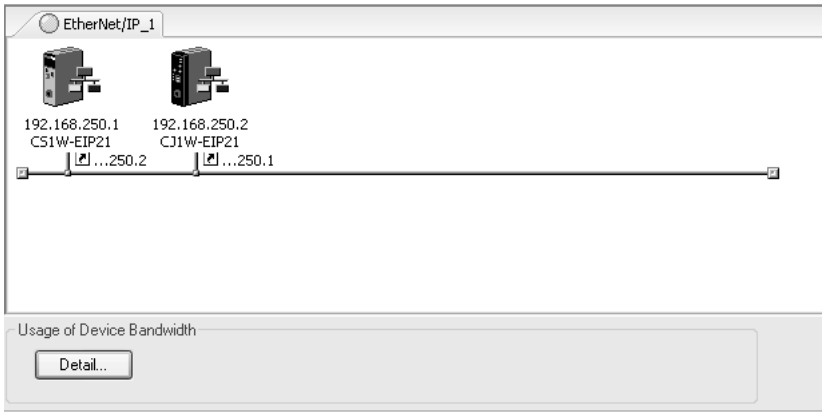
2-3-2 Checking the Device Bandwidth Usage and Resetting the RPI

The percentage of the allowed tag data link bandwidth used (Usage of Capacity) can be checked offline by inputting the packet interval (RPI) values in the Network Configurator's tag data link connection settings. Check the Usage of Capacity and change the packet interval (RPI) settings.

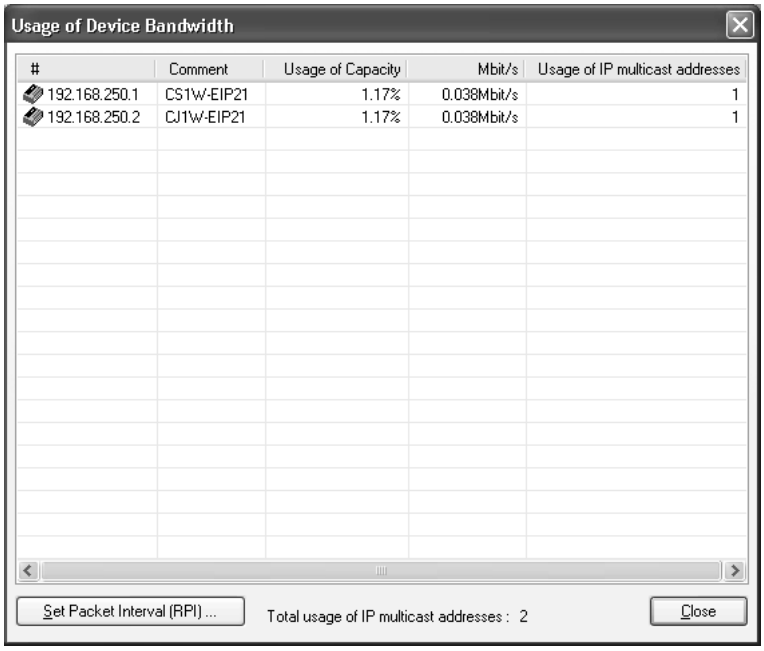
If the required communications performance cannot be achieved by changing the settings, reevaluate the network starting with the network configuration.

1,2,3...

1. Make the required settings in the Network Configurator's Network Configuration Window.
2. Click the **Detail** Button in the Usage of Device Bandwidth Area at the bottom of the Network Configuration Window.



The Usage of Device Bandwidth Area Dialog Box will be displayed.



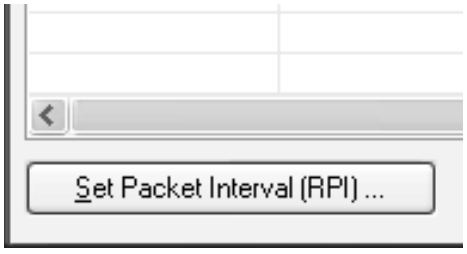
The *Usage of Capacity* column will show the percentage of the allowed tag data link bandwidth being used, and the *Mbit/s* column will show the network bandwidth (baud rate) being used.

3. The percentage of the allowed tag data link bandwidth being used (Usage of Capacity) can be adjusted by changing the associated devices' packet interval (RPI) settings. The packet interval (RPI) settings can be adjusted with the following 3 methods.

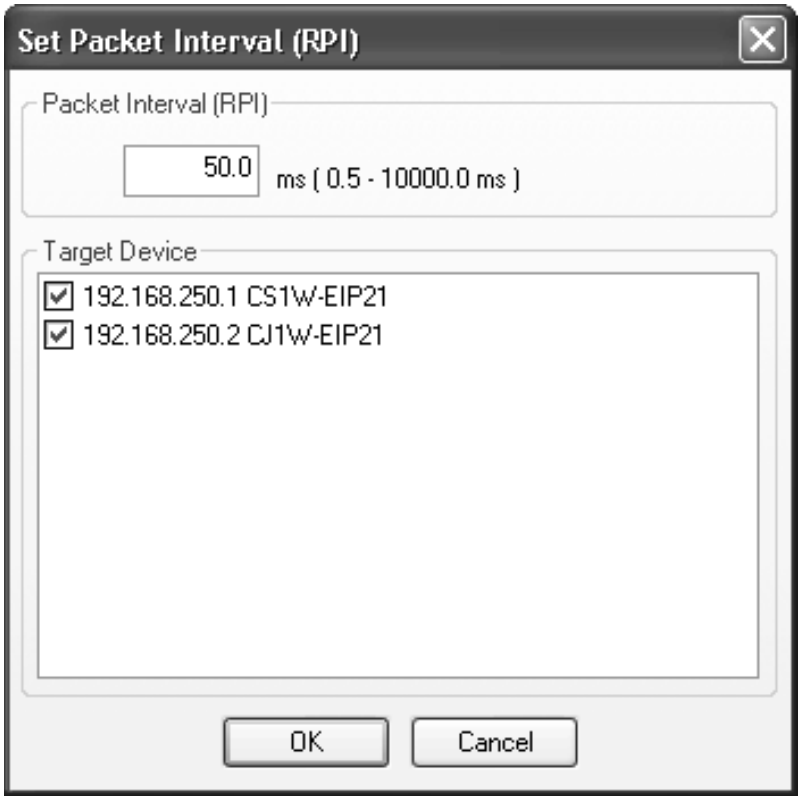
Method 1: Same Packet Interval Set for all Connections

The Usage of Capacity can be adjusted by changing the packet interval (RPI) for all of the connections together.

a. Click the **Set Packet Interval (RPI)** Button at the bottom of the Usage of Device Bandwidth Dialog Box.



b. The Set Packet Interval (RPI) Dialog Box will be displayed. Input a new packet interval (RPI) value, and click the **OK** Button.

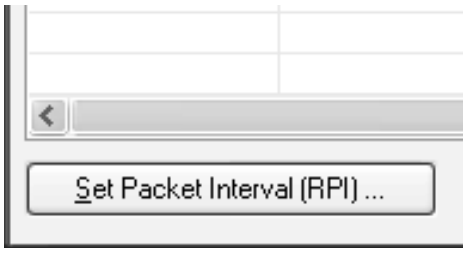


Method 2: Changing a Particular Device's Packet Interval (RPI) Setting

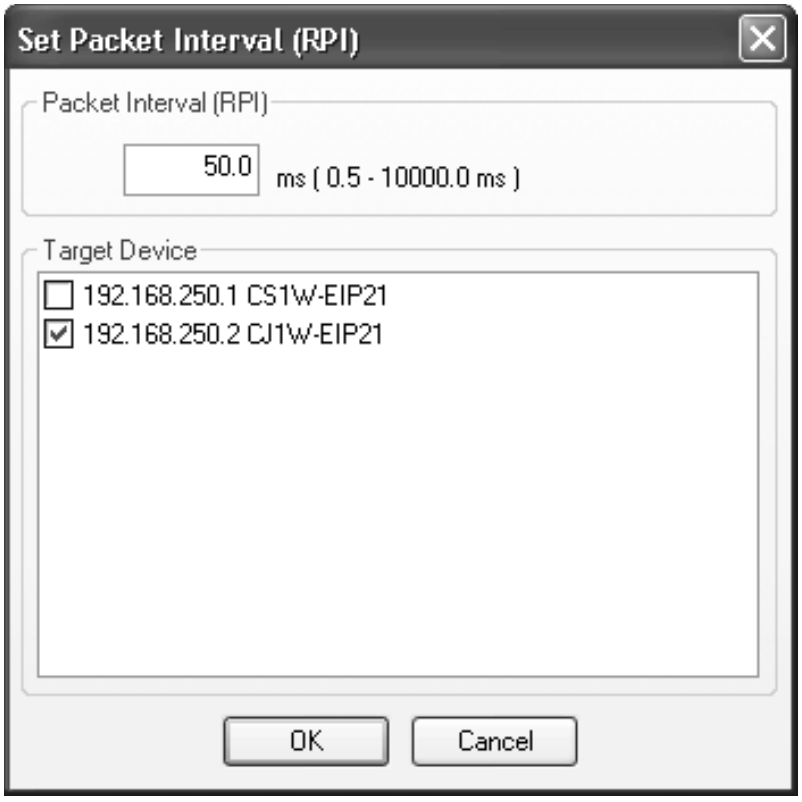
The Usage of Capacity can be adjusted for only a particular device by changing the packet intervals (RPI) for all of the device's connections together.

In this case, the Usage of Capacity will also change for the devices that are the target devices of the connection which was adjusted.

a. Click the **Set Packet Interval (RPI)** Button at the bottom of the Usage of Device Bandwidth Dialog Box.



b. The Set Packet Interval (RPI) Dialog Box will be displayed. In the *Target Device* Area, deselect the target devices that are not being adjusted by removing the check marks.



c. Input a new packet interval (RPI) value, and click the **OK** Button.

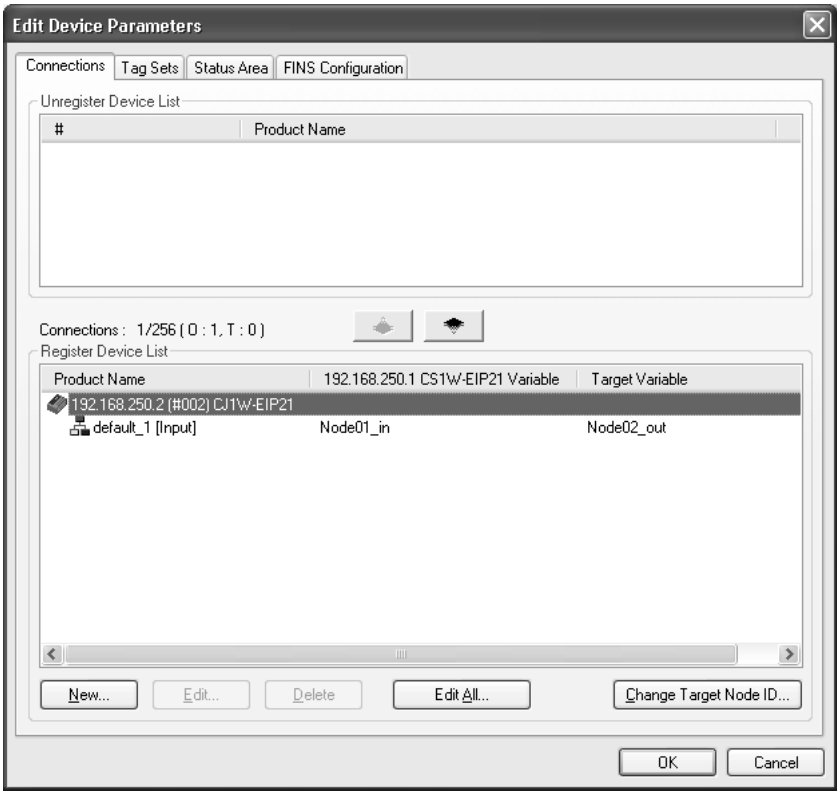
Method 3: Changing a Particular Connection's Packet Interval (RPI) Setting

The Usage of Capacity can be adjusted by individually changing the packet intervals (RPI) setting for a particular connection.

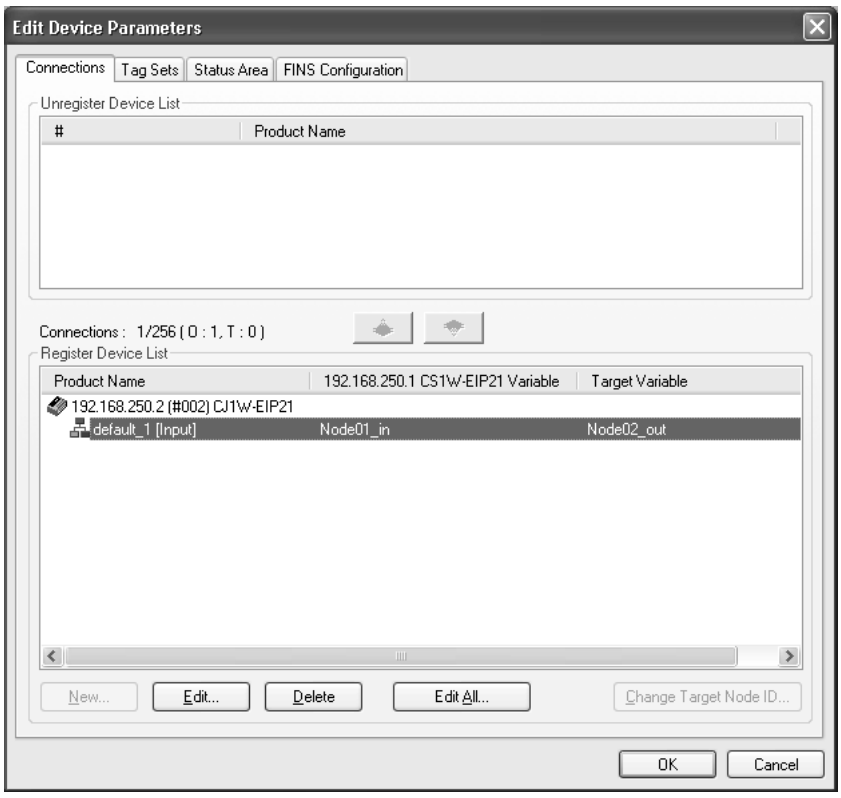
In this case, the Usage of Capacity will also change for the device that is the target device of the connection which was adjusted.

a. Click the **Close** Button at the bottom of the Usage of Device Bandwidth Dialog Box.

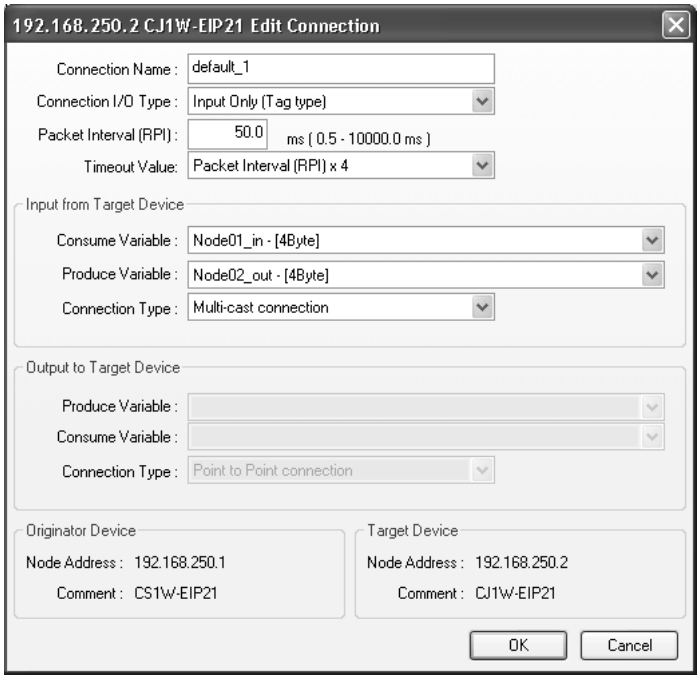
b. Double-click the device that is set as the originator of the desired connection. The Edit Device Parameters Dialog Box will be displayed.



c. In the Register Device List, select the connection for which you want to change the packet interval (RPI), and click the **Edit** Button.



d. The device's Edit Connections Dialog Box will be displayed. Input a new packet interval (RPI) value, and click the **OK** Button.



4. If the packet interval (RPI) cannot be adjusted to the desired value by the three preceding methods, evaluate the network configuration itself and consider taking the following steps.
   - Reduce the number of nodes and number of connections.

- Split the network.

5. Check the bandwidth usage again.

   If the connection settings have been changed, click the **Detail** Button in the Usage of Device Bandwidth Area at the bottom of the Network Configuration Window. Verify that the allowed tag data link bandwidth used (Usage of Capacity) is less than 100%.

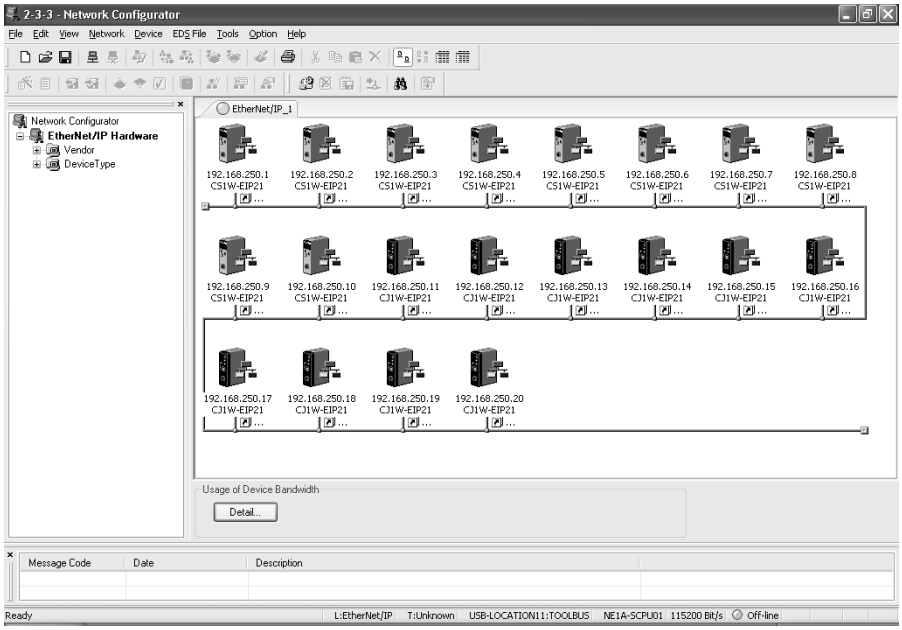
   It is particularly important to check the Usage of Capacity when an individual connection's packet interval (RPI) setting was changed without using the **Set Packet Interval (RPI)** Button at the bottom of the Usage of Device Bandwidth Dialog Box.

6. Run user tests to verify that there are no problems with the new settings.

2-3-3 Packet Interval (RPI) Setting Examples

The following examples explain how to calculate the packet intervals (RPI) in the following network configuration.

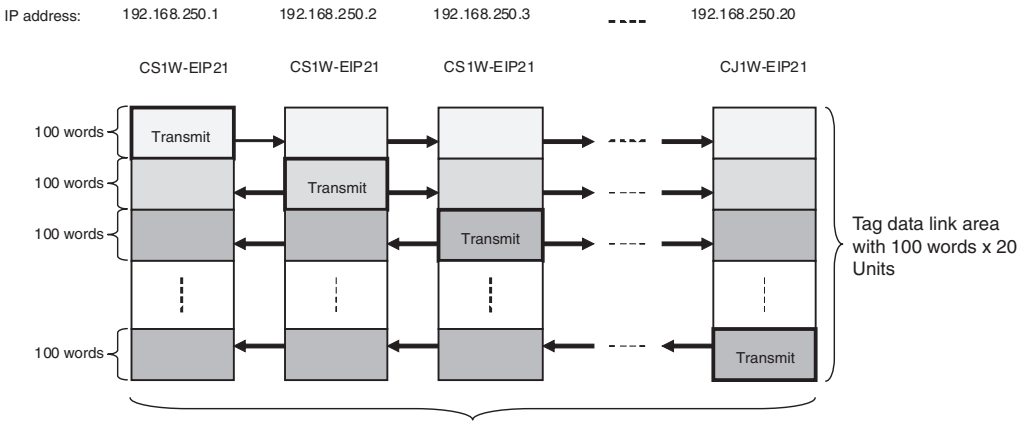
Example Conditions



Connections

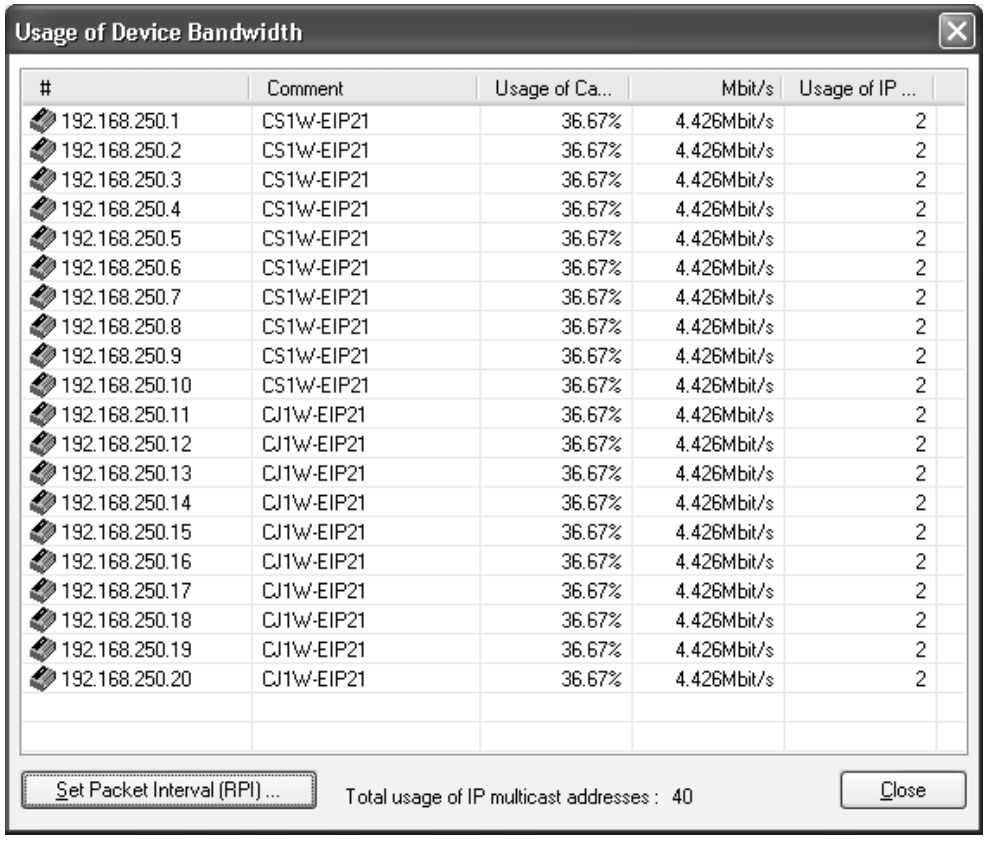
In this example, there are 10 CS1W-EIP21 Units and 10 CJ1W-EIP21 Units for a total of 20 devices connected in the network. Each device has one 100-word tag for transmission and nineteen 100-word tags for reception, so that the Units exchange data mutually.

By default, the packet intervals (RPI) are set to 50 ms for all of the connections. The devices' IP addresses range from 192.168.250.1 to 192.168.250.20.



Checking the Device Bandwidth Usage

When the **Detail** Button is clicked in the Usage of Device Bandwidth Area, it is apparent that the percentage of the allowed tag data link bandwidth being used by each device's tag data link (Usage of Capacity) is 36.67%, as shown in the following dialog box.

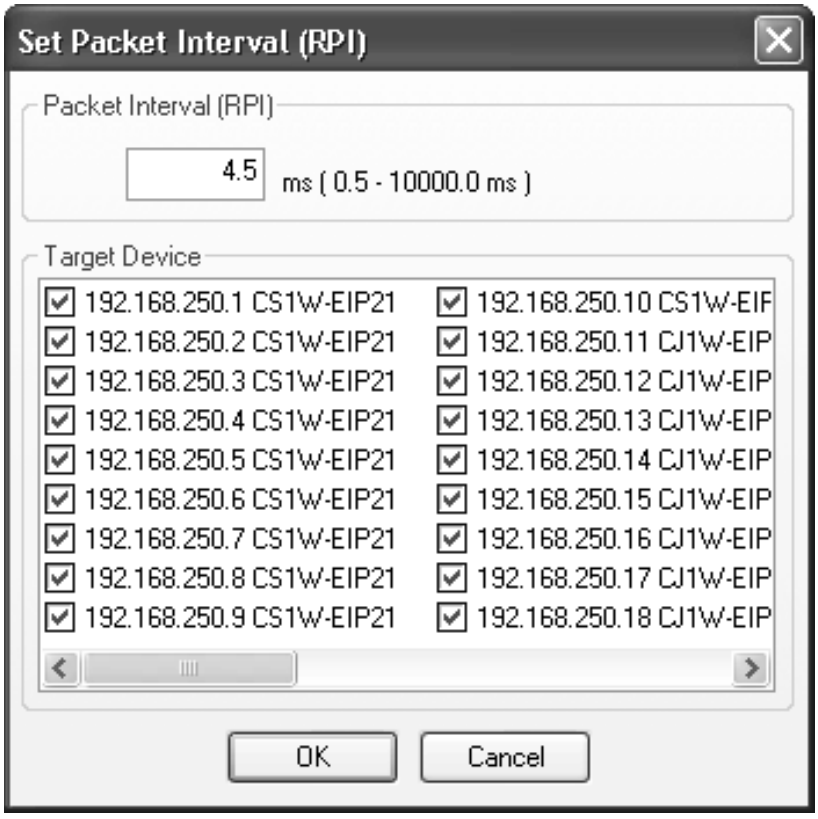


Changing the Settings

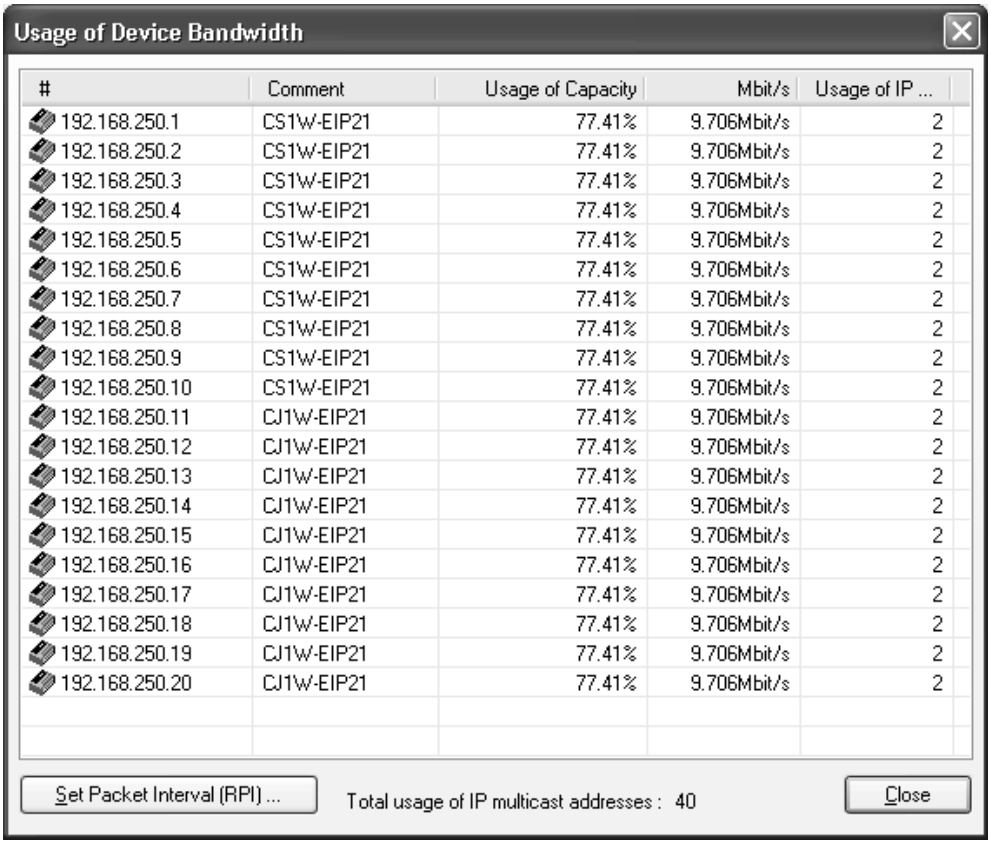
Method 1: Same Packet Interval Setting for All Connections

The percentage of the allowed tag data link bandwidth being used (Usage of Capacity) was 36.67% with the packet interval (RPI) set to 10.0 ms for all of the connections, so the packet interval (RPI) will be set to 4.5 ms, which is about one-half of the original setting.

Click the **Set Packet Interval (RPI)** Button at the bottom of the Usage of Device Bandwidth Dialog Box. The Set Packet Interval (RPI) will be displayed. Input 4.5 ms as the new packet interval (RPI) value, and click the **OK** Button.



The percentage of the allowed tag data link bandwidth being used (Usage of Capacity) increases to 77.41% and the same packet interval (RPI) is set for all of the connections, which indicates that 4.5 ms is the fastest packet interval (RPI).

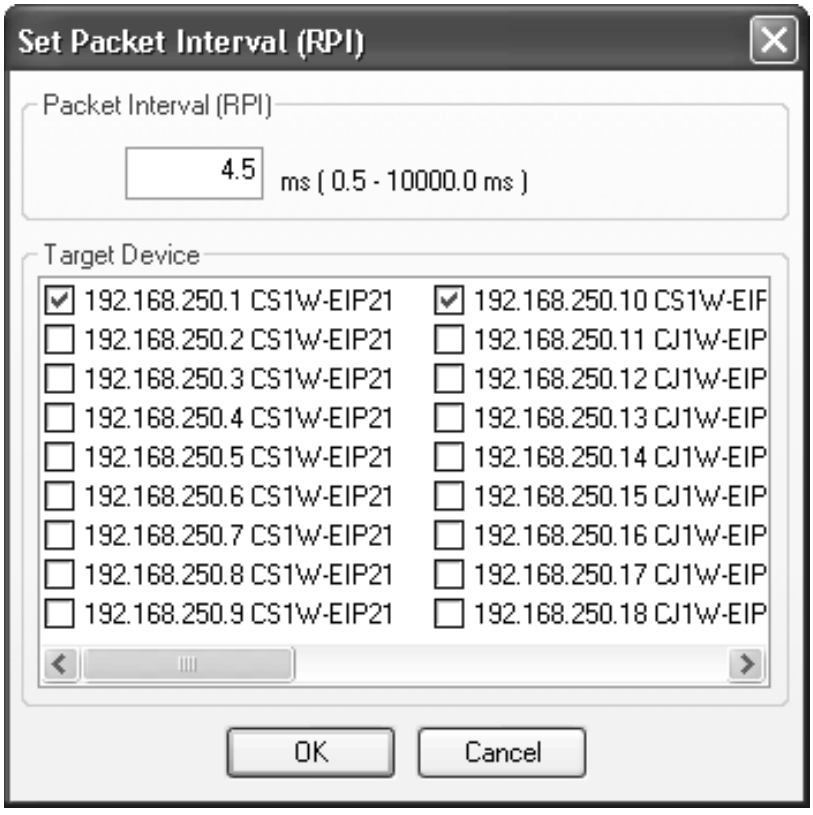


#	Comment	Usage of Capacity	Mbit/s	Usage of IP ...
192.168.250.1	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.2	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.3	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.4	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.5	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.6	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.7	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.8	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.9	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.10	CS1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.11	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.12	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.13	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.14	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.15	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.16	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.17	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.18	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.19	CJ1W-EIP21	77.41%	9.706Mbit/s	2
192.168.250.20	CJ1W-EIP21	77.41%	9.706Mbit/s	2

Method 2: Changing a Particular Device's Packet Interval (RPI) Setting

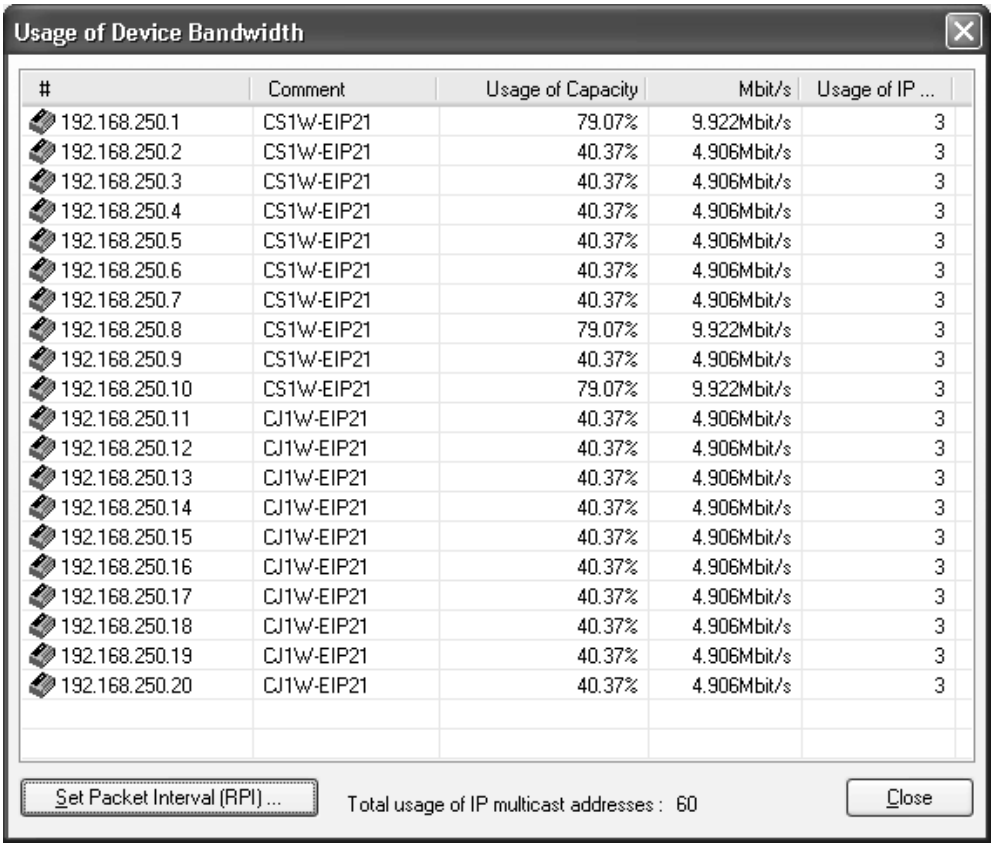
In this example, we want faster tag data links for devices 192.168.250.1 and 192.168.250.10 only. Click the **Set Packet Interval (RPI)** Button at the bottom of the Usage of Device Bandwidth Dialog Box to display the Set Packet Interval (RPI) Dialog Box.

In the Target Device Area, deselect all devices other than 192.168.250.1 and 192.168.250.10 by removing the corresponding check marks. Input 4.5 ms as the new packet interval (RPI) value, and click the **OK** Button.



The percentage of the allowed tag data link bandwidth being used (Usage of Capacity) increases to 79.07% for devices 192.168.250.1 and 192.168.250.10, which indicates that the packet interval (RPI) is set to a higher speed for these devices' connections.

The Usage of Capacity values also indicate that the Usage of Capacity has increased (from 36.67% to 40.37%) for all of the other devices, which connect with devices 192.168.250.1 and 192.168.250.10.

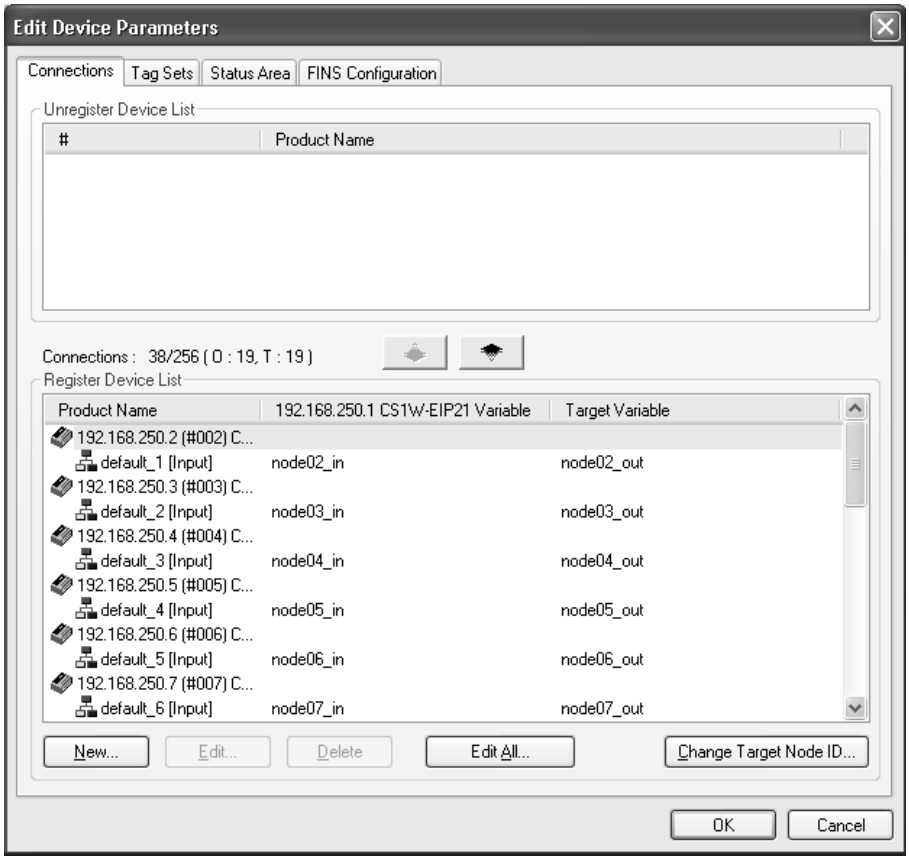


#	Comment	Usage of Capacity	Mbit/s	Usage of IP ...
192.168.250.1	CS1W-EIP21	79.07%	9.922Mbit/s	3
192.168.250.2	CS1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.3	CS1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.4	CS1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.5	CS1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.6	CS1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.7	CS1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.8	CS1W-EIP21	79.07%	9.922Mbit/s	3
192.168.250.9	CS1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.10	CS1W-EIP21	79.07%	9.922Mbit/s	3
192.168.250.11	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.12	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.13	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.14	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.15	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.16	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.17	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.18	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.19	CJ1W-EIP21	40.37%	4.906Mbit/s	3
192.168.250.20	CJ1W-EIP21	40.37%	4.906Mbit/s	3

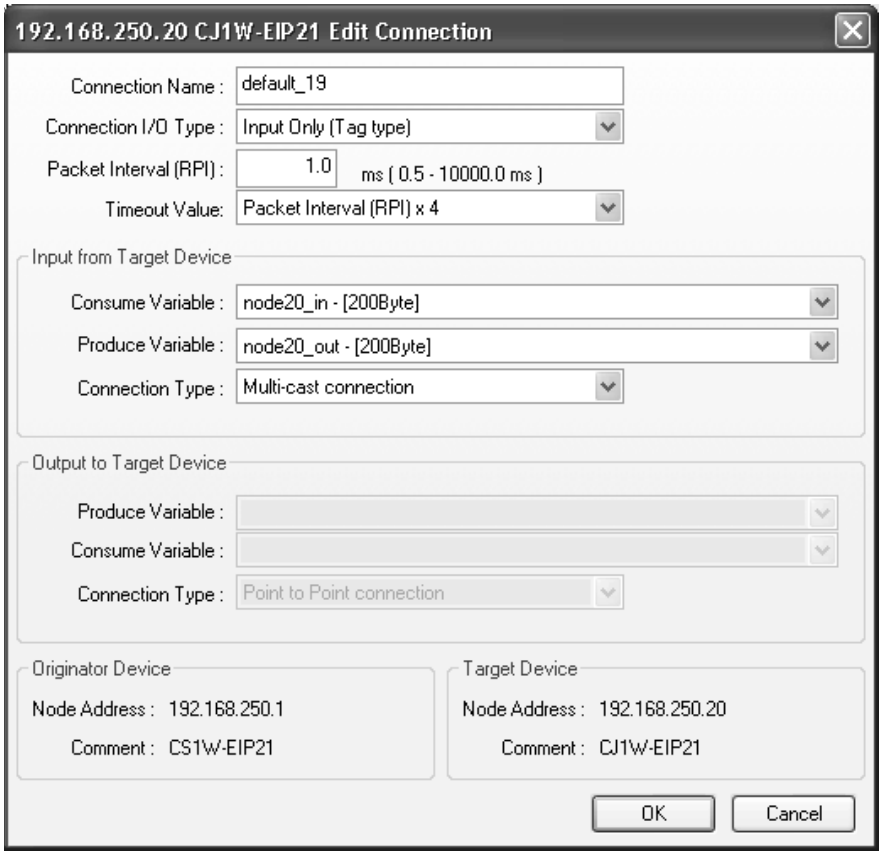
Method 3: Changing Only a Particular Connection's Packet Interval (RPI)

In this example, we want a faster tag data links for just a particular connection of device 192.168.250.1.

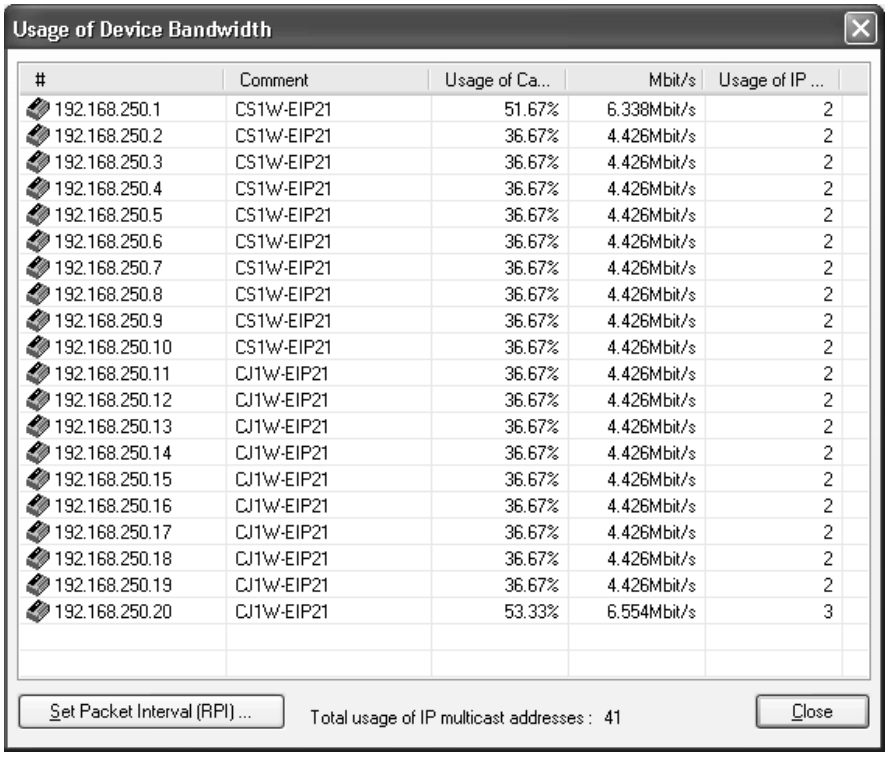
Double-click device 192.168.250.1 in the Network Configuration WIndow.



Information about the connection with device 192.168.250.20 is registered in the Register Device List. Double-click this connection to edit the settings.



In the Edit Connection Dialog Box, input 1.0 ms as the new packet interval (RPI) value, and click the **OK** Button. The tag data link bandwidth being used by device 192.168.250.1 (Usage of Capacity) increases to 51.67%, which indicates that a packet interval (RPI) is set to a higher speed for this device.



#	Comment	Usage of Ca...	Mbit/s	Usage of IP ...
192.168.250.1	CS1W-EIP21	51.67%	6.338Mbit/s	2
192.168.250.2	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.3	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.4	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.5	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.6	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.7	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.8	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.9	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.10	CS1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.11	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.12	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.13	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.14	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.15	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.16	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.17	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.18	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.19	CJ1W-EIP21	36.67%	4.426Mbit/s	2
192.168.250.20	CJ1W-EIP21	53.33%	6.554Mbit/s	3

In this case, the tag data link bandwidth being used by device 192.168.250.20 (Usage of Capacity) also increases (from 36.67% to 53.33%).

SECTION 3
Network Configurator Installation

This section describes Network Configurator installation.

3-1 Network Configurator Installation

3-1-1 Installation Preparations

System Requirements

A computer with the following specifications is required to run the Network Configurator.

Item	Specification
Computer	IBM PC/AT or compatible
CPU	Pentium 300 MHz min.
OS	Microsoft Windows 2000 or Microsoft Windows XP
Supported languages	Japanese/English
Memory	256 MB min.
HDD	40 MB min. of available space
Monitor	SVGA (800 × 600 pixels) or better
CD-ROM or DVD-ROM	1 device min.
Communications port CS/CJ Series connection	One or more of the following: RS-232C port or Ethernet port
Communications port for NE1S Series connection	One or more of the following: USB port, RS-232C port, Ethernet port, DeviceNet port, or ControlNet port

For details on communications ports, refer to *1-4-3 Precautions When Using the Network Configurator*.

Installation Procedures

■ **Installing the Network Configurator**

For details on installing the Network Configurator, refer to *3-1-2 Installing the Network Configurator*.

■ **Installing the USB Driver (NEIS Series Only)**

For details on connecting online using a USB port, refer to *3-1-3 Installing the USB Driver (NE1S Series Only)*.

3-1-2 Installing the Network Configurator

Installation Procedure

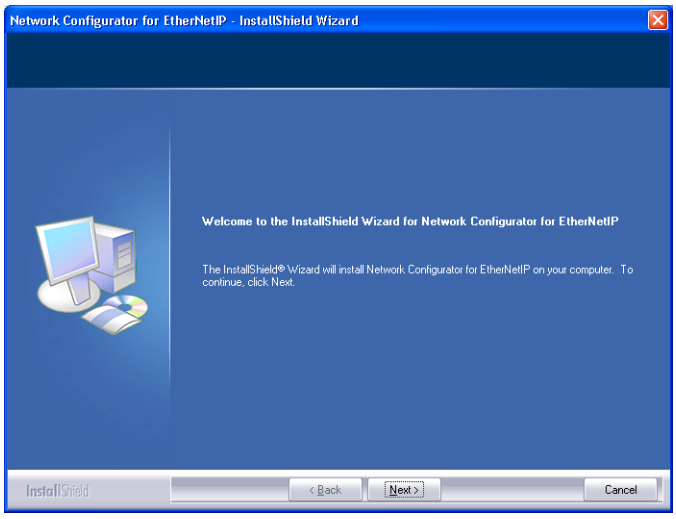
Use the following procedure to install the Network Configurator.

Note Administrator privileges are required to install the software.

1,2,3...

1. Insert the installation CD in the CD-ROM drive.
2. Execute setup.exe from the CD-ROM using either of the following methods.
   - Click the icon to access the CD-ROM and double-click the setup.exe file.

- Select ***Run*** from the Start menu, browse the CD-ROM for the setup.exe file and then click the **OK** Button. The following dialog box will be displayed.



3. Click the **Next** Button. The License Agreement Dialog Box will be displayed.
4. Select the ***I accept the terms of the License Agreement*** option and then click the **Next** Button. The Customer Information Dialog Box will be displayed.
5. Enter the *User Name, Company Name,* and *Serial Number,* and then click the **Next** Button. Specify the installation folder and then click the **Next** Button again. A dialog box will be displayed when preparation for installation have been completed.
6. Click the **Install** Button to start installation. When installation completes normally, the InstallShield Wizard Complete Dialog Box will be displayed.
7. Click the **Finish** Button.

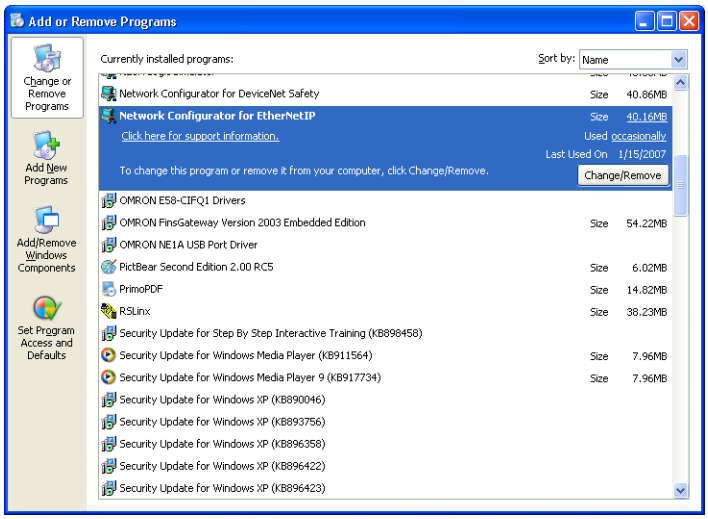
Uninstallation Procedure

Use the following procedure to uninstall the Network Configurator.

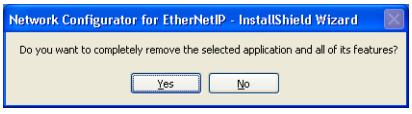
1,2,3...

1. Select ***Settings - Control Panel - Add/Remove Programs*** from the Start menu.

2. Select ***Network Configurator for EtherNet/IP*** in the Add/Remove Programs Dialog Box, as shown below, and click the **Change/Remove** Button.



The following dialog box will be displayed.



3. Click the **Yes** Button.
The software will be uninstalled. When uninstallation is completed normally, the Maintenance Complete Dialog Box will be displayed.
4. Click the **Finish** Button.

Upgrading the Software Version (NE1S Series Only)

Use the following procedure to upgrade the version of the Network Configurator.

Installing an Update

Install the updated version without uninstalling the existing software.

1,2,3...

1. The updated version is provided as an executable (.exe) file, so either of the following methods can be used to execute the update file.
   - Double-click the file in the My Computer Window.
   - Select ***Run*** from the Start Menu, browse and select the update file, and click the **OK** Button.

Installing a Release

1,2,3...

1. Uninstall the software to be upgraded (refer to *Uninstallation Procedure*).
2. Install the new software version (refer to *3-1-2 Installing the Network Configurator*).

3-1-3 Installing the USB Driver (NE1S Series Only)

Note Administrator privileges are required to install the software.

Use the following procedure to install the USB driver.

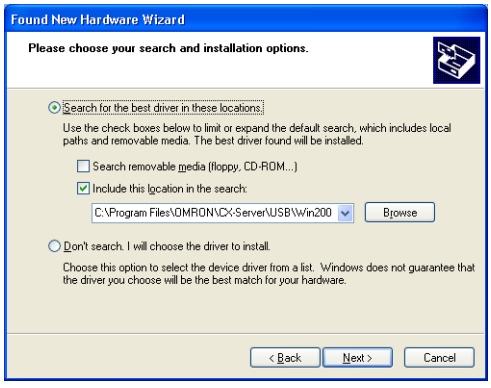
1,2,3...

1. Connect the CPU Unit and the computer with a USB cable.
2. Turn ON the power supply to the CPU Unit.
After a few moments, the following dialog box will be displayed.

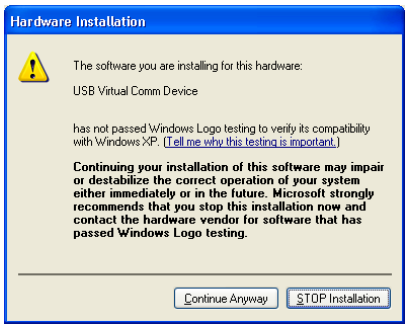
Select either *Yes, this time only* or *Yes, now and every time I connect a device* Option, and click the **Next** Button.

3. The following dialog box will be displayed.

4. Select the *Install the software automatically (Recommended)* Option and click the **Next** Button.
   The following dialog box will be displayed.

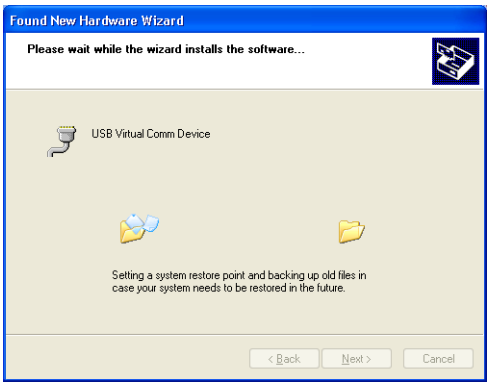


5. Click the **Browse** Button, specify the *CD-ROM\driver\usb\win2000* folder in the dialog box that is displayed, and click the **Next** Button.
The following dialog box will be displayed.

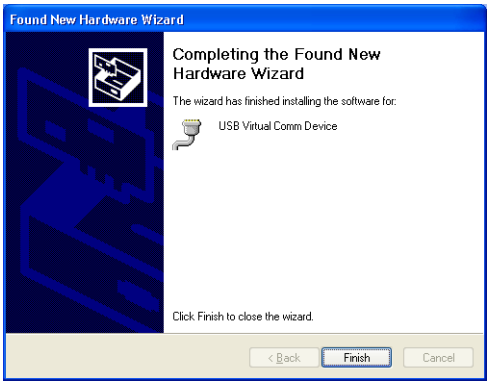


Click the **Continue Anyway** Button.

The following dialog box will be displayed.



6. Click the **Next** Button.
The following dialog box will be displayed if the USB driver is installed normally.
7. A Windows Certification Dialog Box will be displayed. Click the **Yes** Button.



8. Click the **Finish** Button.
This completes the installation of the USB driver.

Terms and Conditions of Sale

1. Offer; Acceptance. These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
2. Prices; Payment Terms. All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice.
3. Discounts. Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. Interest. Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
5. Orders. Omron will accept no order less than $200 net billing.
6. Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
7. Taxes. All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
8. Financial. If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. Cancellation; Etc. Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. Force Majeure. Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. Shipping; Delivery. Unless otherwise expressly agreed in writing by Omron:
    a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
    b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
    c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
    d. Delivery and shipping dates are estimates only; and
    e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. Claims. Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
13. Warranties. (a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied. (b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses 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. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. See http://www.omron247.com or contact your Omron representative for published information.
14. Limitation on Liability; Etc. OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.
15. Indemnities. Buyer shall indemnify and hold harmless Omron Companies and their employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Omron is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Omron and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party.
16. Property; Confidentiality. Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information and materials supplied by Omron to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
17. Export Controls. Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (iii) sale of products to "forbidden" or other proscribed persons; and (ii) disclosure to non-citizens of regulated technology or information.
18. Miscellaneous. (a) Waiver. No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) Assignment. Buyer may not assign its rights hereunder without Omron's written consent. (c) Law. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) Amendment. These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) Severability. If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) Definitions. As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

1. Suitability of Use. Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
   (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
   (ii) Use in consumer products or any use in significant quantities.
   (iii) 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.
   (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.
   NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
2. Programmable Products. Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.
3. Performance Data. Data presented in Omron Company websites, catalogs and other materials 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 user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.
4. 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 part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.
5. Errors and Omissions. Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

OMRON

OMRON ELECTRONICS LLC

1 Commerce Drive
Schaumburg, IL 60173
847.843.7900
For US technical support or
other inquiries: 800.556.6766

OMRON CANADA, INC.

885 Milner Avenue
Toronto, Ontario M1B 5V8
416.286.6465

OMRON ON-LINE

Global - www.omron.com
USA - www.omron247.com
Canada - www.omron.ca
Brazil - www.omron.com.br
Latin America - www.espanol.omron.com

UNITED STATES	
To locate a Regional Sales Office, local Distributor or to obtain product information, call: 847.843.7900	
MEXICO SALES OFFICES	
Mexico, D.F.	555.660.3144
Ciudad Juárez	656.623.7083
Monterrey, N.L	818.377.4281
Querétaro	442.135.4510
BRAZIL SALES OFFICE	
Sao Paulo	55.11.2101.6310
ARGENTINA SALES OFFICE	
Cono Sur	54.114.787.1129
OTHER LATIN AMERICAN SALES	
mela@omron.com	

Z909-E1-01

©2007 OMRON ELECTRONICS LLC
Printed in the U.S.A.
Specifications subject to change without notice.