OMRON

ZP-series

EtherNet/IP™ Communication Unit

User's Manual

ZP-EIP

EtherNet/IP Communication Unit

Z496-E1-02

NOTE

Trademarks

Copyrights

Introduction

Thank you for purchasing a ZP-series EtherNet/IP Communication Unit.
This manual contains information that is necessary to use the ZP-series EtherNet/IP Communication Unit. Please read this manual and make sure you understand the functionality and performance of the product before you attempt to build a system.
Keep this manual in a safe place where it will be available for reference during operation.

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 introducing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and maintaining FA systems.
- Personnel in charge of managing FA systems and facilities.

Applicable Products

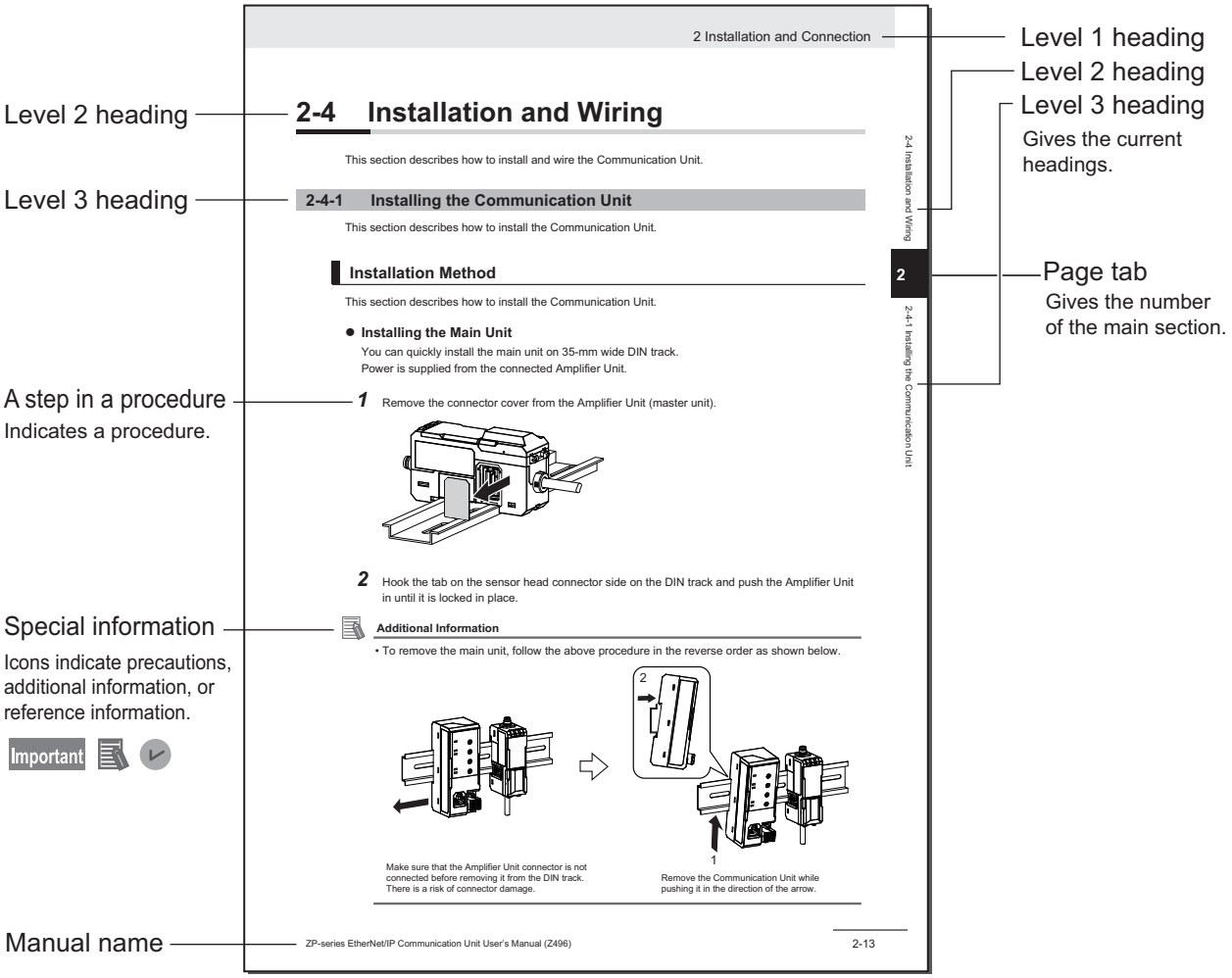
This manual covers the following product.

- ZP-series EtherNet/IP Communication Unit
  ZP-EIP

Manual Structure

Page Structure

The following page structure is used in this manual.



This illustration is provided only as a sample. It may not literally appear in this manual.

Special Information

Special information in this manual is classified as follows:

Important

This summarizes particularly important points about its performance, including the things to be observed during operation and the advice on usage.

Additional Information

Additional information to read as required.
This information is provided to increase understanding or make operation easier.

Version Information

Information on differences in specifications and functionality for products with different unit versions and for different versions of the Support Software is given.

Precaution on Terminology

- In this manual, "download" refers to transferring data from the Support Software to a physical device and "upload" refers to transferring data from a physical device to the Support Software.

Sections in this Manual

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Terms and Conditions Agreement

Warranty, Limitations of Liability

Warranties

- **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.

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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.

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It shall be the users sole responsibility to determine and use adequate measures and checkpoints to satisfy the users particular requirements for (i) antivirus protection, (ii) data input and output, (iii) maintaining a means for reconstruction of lost data, (iv) preventing Omron Products and/or software installed thereon from being infected with computer viruses and (v) protecting Omron Products from unauthorized access.

Safety Precautions

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of the ZP-series EtherNet/IP Communication Unit.
The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.
The following notation is used.

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

Symbols

	The ○ and slash symbol indicates operations that you must not do. The specific operation is shown in the ○ and explained in text. This example indicates a general prohibition for something that you must not do.
	The ● symbol indicates operations that you must do. The specific operation is shown in the ● and explained in text. This example shows a general precaution for something that you must do.

Warnings

⚠ WARNING

This product is not intended for applications that directly or indirectly detect the human body for the purpose of ensuring safety. Do not use the product for detection systems for human body protection.	
Virus protection Install and maintain the latest commercially available antivirus software on computers connected to control systems.	

Prevention of unauthorized access

To prevent unauthorized access to OMRON products, implement the following measures.

- Introduction of physical controls that allow only authorized users to access control systems and equipment
- Prevention of access from untrusted devices by minimizing network connections to control systems and equipment
- Separation from IT networks through introduction of firewalls (blocking unused communications ports, restricting communications hosts)
- Use of virtual private networks (VPNs) when remote access to control systems and equipment is necessary
- Introduction of multi-factor authentication for remote access to control systems and equipment
- Use and frequent change of strong passwords
- Preliminary virus scanning for use of external storage devices such as USB memory sticks in control systems and equipment

Protection of I/O data

Confirm the validity of backup, range check, etc. in case of unintended modification of I/O data to control systems and equipment.

- Data range check
- Validation and preparation of backup and restore processes in case of data tampering or errors
- Safety design such as emergency stop and fallback operation in anticipation of data tampering and errors

Restoration of lost data

Periodically back up and maintain setting data as a measure against data loss.

When an intranet environment is used via a global address, connecting to an unauthorized terminal or server, such as SCADA or HMI, may result in network security issues such as spoofing or tampering. Take adequate measures on your own, such as restricting access to terminals, using terminals with secure functions, and locking the installation area.

When building an intranet, communications problems may occur due to cable disconnection or unauthorized network equipment.
Take adequate measures to restrict physical access to network equipment, for example, by locking the installation area.

Equipment with SD Memory Card functionality poses a security risk that a third party may remove or illegally unmount removable media to illegally acquire, tamper with, or replace files and data contained in them.
Take adequate measures on your own to restrict physical access to the Controller, for example, by locking the installation area, controlling entry to the room, or taking appropriate control measures for the removable media.

Security Measures for Wave Inspire ZP

- To prevent computer viruses, install antivirus software on a computer where you use this software.
  Make sure to keep the antivirus software updated.
- Keep your computer's OS updated to avoid security risks caused by a vulnerability in the OS.
  Make sure that the user name and password for the OS or this software are properly set and managed to prevent unauthorized use by others.
- Always use the highest version of this software to add new features, increase operability, and enhance security.
- Set up a firewall (e.g., disabling unused communication ports, limiting communication hosts, etc.) on a network for a control system and devices to separate them from other IT networks.
- Use a virtual private network (VPN) for remote access to a control system and devices from this software.

Precautions for Safe Use

- Never use this product with AC power supply. Otherwise it may explode.
- Before turning on the product's power, make sure that the supply voltage does not exceed the maximum power supply voltage.
- When attaching or detaching the sensor head, amplifier slave unit, or Communication Unit, be sure to turn off the power to the amplifier master unit. If you do this while the power is on, it may cause a malfunction.
- Do not use the product if the case is damaged.
- If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke, immediately stop using the product, turn off the power, and consult your dealer.
- Always turn off the power of the unit before connecting or disconnecting cables.
- Burn injury may occur. The product surface temperature rises depending on application conditions, such as the ambient temperature and the power supply voltage. Attention must be paid during operation or cleaning.

Precautions for Correct Use

- Do not install in the following locations:
  Locations where the ambient temperature exceeds the rated temperature range.
  Locations subject to sudden temperature changes (where condensation will form).
  Locations where the relative humidity is below or above 35% to 85%.
  Locations where there are corrosive or flammable gases.
  Locations where there is dust, salt, or iron powder.
  Locations where there is strong scattered light (laser light, arc welding light, ultraviolet light, etc.)
  Locations where the device will be subject to direct vibration or shock.
  Locations exposed to direct sunlight or next to a heater.
  Locations where there is splashing or spraying of water, oil, or chemicals.
  Locations where there is a strong electrical or magnetic field.
- Be sure to mount the unit to the DIN track until it clicks.
- Always use two end plates to keep certainly connection side by side.
- Do not attempt to disassemble, deform by pressure, incinerate, repair, or modify this product.
- After wiring and before turning on the power, check whether the power supply is correct, whether there are any incorrect connections such as load short circuits, and whether the load current is appropriate. There is a risk of malfunction due to incorrect wiring, etc.
- When changing settings, please check safety by stopping the device, etc.
- Do not exceed 100,000 writing operations of the EEPROM (non-volatile memory). Setting information is written to the EEPROM when various setting changes, setting initialization, etc. are performed.
- Do not use organic solvents (e.g. paint thinner and alcohol) for cleaning. Otherwise protective structure may deteriorate.
-  Dispose in accordance with applicable regulations.

Regulations and Standards

Conformance to EU Directives

This sensor complies with the following EN standards.

- EN61326-1
- Electromagnetic environment: Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
- While under electro-magnetic interference, the voltage and current outputs may fluctuate within ±3% F.S.

Important

The ZP-series products comply with EU Directives. To ensure that the machine or device in which the ZP-series products are used complies with EU Directives, the following precautions must be observed.

- You must use SELV power supply for the DC power supplies that are connected as the Unit/input power supplies and output power supplies for the ZP-series products.
  We recommend that you use the OMRON S8VK-S/S8VK-G-series Power Supplies. EMC standard compliance was confirmed for the recommended Power Supplies.
- ZP-series products that comply with EU Directives also conform to the Common Emission Standard. Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment in which the ZP-series products are used complies with EU Directives.
- You must use power supplies with an output hold time of 10 ms or longer for the DC power supplies that are connected as the Unit/input power supplies and output power supplies for the ZP-series products.
- This is a Class A product (for industrial environments). In a residential environment, it may cause radio interference. If radio interference occurs, the user may be required to take appropriate measures.
- Conformance to EU Directives was confirmed using power supply cables and I/O cables with a cable length of shorter than 30 m.

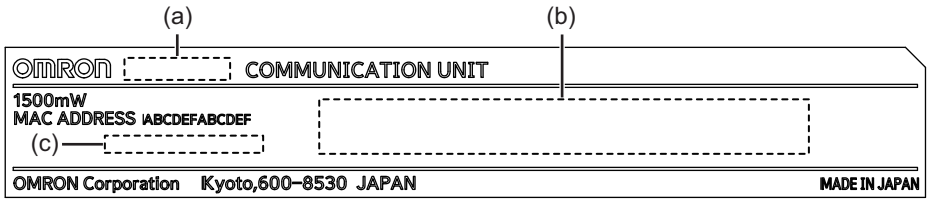
Conformance to UL and CSA Standards

Some ZP-series products comply with UL and CSA standards.
If you use a product that complies with UL or CSA standards and must apply those standards to your machinery or devices, pay attention to the following requirements during use.

- Installation environment
  Ambient operating temperature: -10 to 50°C
  Ambient humidity range: 35% to 85% (with no condensation)
  For indoor use only
  Altitude: 2,000 m max.
  Pollution degree: 3
- Use a Class 2 power supply with 10 to 30 VDC.

Conformance to Korea KC Mark

- The conformance to the Korean KC Mark can be checked at the following URL.
  http://www.rra.go.kr/selform/OMR-ZP-EIP
- The serial number on the label on the main unit indicates the date of manufacture.



No.	Name	Description
(a)	Model	Indicates product model.
(b)	Standard	Indicates the mark of a standard to which certification has been obtained and conformity declared.
(c)	Serial number	Indicates serial number “SSSSMYYA”. SSSS: Identification number M: Months of production 1-9 for Jan-Sep, X for Oct, Y for Nov, Z for Dec YY: Year of manufacture (last 2 digits of year) A: OMRON’s control number

Related Manuals

The following table shows related manuals. Use these manuals for reference.

Manual name	Cat. No.	Models	Application	Contents
ZP Series Laser Displacement Sensor User's Manual	Z495	ZP-LS□□ ZP-L3□□□	Learning how to use ZP-series Sensor Head and Amplifier Unit.	The hardware configuration, installation method, and functions of the ZP-series Sensor Head and Amplifier Unit are described.

Terminology

Term	Abbreviation	Description
BOOTP server	---	A server that automatically distributes the IP address and network configuration information required by client devices at startup of the network. This allows the devices to connect to the network without the need for manual configuration.
Common Industrial Protocol	CIP	CIP (Common Industrial Protocol) is a protocol for standardizing data exchange and communications between devices. CIP allows device configuration, control, and data collection in a unified manner and is used in networks such as EtherNet/IP, DeviceNet, and ControlNet. This ensures compatibility and efficient communications between different manufacturers and devices.
CPU Unit	---	A CPU Unit is the central part of a Controller that processes inputs from sensors and actuators, and outputs control signals based on a program. It manages the entire system.
CR + LF	---	CR (Carriage Return) and LF (Line Feed) are control characters that indicate line breaks in a text file. CR returns the cursor to the beginning of the line. LF moves the cursor to the next line.
CX-Programmer	---	Configuration Support Software for OMRON CS/CJ/CP-series PLCs. It enables the user to configure the internal settings of OMRON PLCs, edit ladder diagrams, and build a network.
DHCP server	---	A server that automatically assigns IP addresses and configuration information to client devices at startup of the network. Unlike a BOOTP server, a DHCP server has a dynamic IP address reuse capability and provides lease time management and additional configuration options. As an advanced version of BOOTP, it offers more flexible and feature-rich management.
EDS file	---	An EDS (Electronic Data Sheet) file contains device specifications and configuration information, as well as definitions of device functions, parameters, and data structures. This enables proper recognition of devices in a network for efficient configuration and management. EDS files support compatibility and integration of devices.
EtherNet/IP	---	An industrial network protocol developed and managed by ODVA (Open DeviceNet Vendors Association). It enables real-time communication and data exchange between devices such as PLCs and sensors.
Exclusive Owner	---	Exclusive Owner has the role of independently sending specific I/O data over the network and is dedicated to updating and controlling the data. It is an adapter that prevents data from being modified by other devices, thus ensuring consistent data provision. The adapter periodically sends data through cyclic communications so that other devices can retrieve accurate information.
ICMP	---	A protocol for reporting network status and error messages. It is primarily used for diagnosing and troubleshooting IP networks. ICMP sends information on packet unreachability, timeouts, network problems, etc. to help maintain the health of the network. Commands such as "ping" are well-known.

Term	Abbreviation	Description
I/O data	---	Information that contains input data and control signals from sensors and actuators for real-time exchange with a PLC or Controller. This enables quick data sharing and control between devices for efficient process monitoring and control. I/O data is sent and received through cyclic communications or message communications.
IP address	---	A unique number for identifying each device in a network. It has the role of specifying the destination of data to be sent and received.
Address Conflict Detection (ACD)	---	IP Address Conflict Detection (ACD) is a function that detects duplicate IP addresses in a network such as EtherNet/IP to prevent communications problems. When a device is connected to the network, ACD checks whether it has the same IP address as another device. If a duplication is detected, it alerts the device and stops the communications to prevent address conflicts. ACD ensures stable network operations.
Multi-cast connection:	---	A communications method in which a single data packet is sent simultaneously to multiple devices. This enables efficient delivery of the same data to multiple devices, reducing the network load and saving the communications bandwidth. It is mainly used when multiple devices require the same data.
Measured value	MV	As opposed to RV, MV refers to the measured value after calculation, hold, differential, zero reset, and keep processing.
Network Configurator	---	Configuration Support Software for OMRON EtherNet/IP products. It enables the user to configure IP addresses and tag data links, monitor the network status, and so on.
Network unit	NWU	NWU is an abbreviation for a network unit.
NTP/SNTP	---	NTP (Network Time Protocol) and SNTP (Simple Network Time Protocol) are protocols for accurately synchronizing computers' time through a network. NTP provides highly accurate and complex synchronization with a time server to adjust the time in a hierarchical system. On the other hand, SNTP is a simplified version of NTP that is easier to configure and implement, but somewhat less accurate. Both are used to ensure time consistency in a network.
PLC	---	PLC (Programmable Logic Controller) is a computer used for automation control in factories and plants. It processes inputs from sensors, gives instructions to actuators, and controls machines and processes based on a program. It features high environmental resistance, flexible programming, and real-time control.
Point to Point connection:	---	A method of direct communication between two devices in a network. This connection allows data to be sent only from a specific sender device to a specific receiver device, thus ensuring efficient and stable data exchange. It is mainly used for real-time data exchange and control between individual devices.
Real value	RV	RV refers to the measured value after averaging, measurement direction processing, and scaling.
RPI	---	A setting that specifies the interval for sending and receiving data in cyclic communications between devices. It affects the accuracy of real-time control.
Sysmac Studio	---	Configuration Support Software for OMRON NJ/N-series PLCs. It enables the user to configure the internal settings of OMRON PLCs, edit ladder diagrams, and build a network.
Tag data link	TDL	TDL is an abbreviation for tag data link.

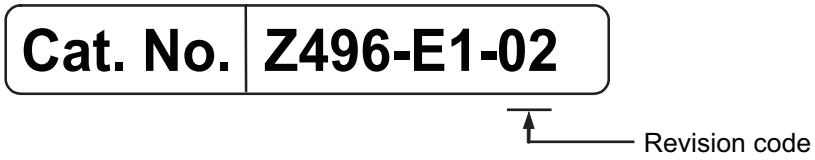
Term	Abbreviation	Description
TCP/IP	---	A basic protocol for data communications over the Internet and networks, where TCP is responsible for accurate transfer of data and IP is responsible for address assignment and routing.
Wave Inspire ZP	---	Configuration Support Software for the ZP-EIP. It enables the user to configure the Amplifier Unit adjacent to the Communication Unit, monitor measured values, and display and save time-series data.
Adapter	---	A device that has the role of receiving and processing data from a device connected to a network. Typical examples are sensors and actuators.
Attribute ID	---	A number that identifies an attribute in a specific object instance.
Amplifier Unit	---	A ZP-series Amplifier Unit.
Event log	---	A function that records status changes, errors, and important operations of a devices. It facilitates the diagnosis of system operations and problems. Event logs help device administrators and engineers with troubleshooting and performance analysis, thus improving the reliability and efficiency of the entire network.
Instance ID	---	A number that identifies an individual instance in a specific object class.
Octet	---	When a 32-bit IPv4 address value is divided into four 8-bit parts, each part is called an octet. Each octet is expressed as a number from 0 to 255, separated by a dot (e.g., 192.168.0.1). This format enables an IP address to uniquely identify a device or network by distinguishing the network and host portions for communications and routing.
Object	---	A structure for organizing and managing device functions and data. Each object has specific functions and properties (e.g., digital input, analog output), and is accessed and manipulated by attributes and services. This enables standardized and efficient communications between devices. Objects are used as part of the CIP (Common Industrial Protocol).
Originator	---	A device that has the role of starting the sending of data on a network and transmitting data packets.
Class ID	---	A number for identifying the object class in a device to specify the device's functions and attributes during communications.
Cross cable	---	A cable with a different wiring arrangement at each end. It is used to directly connect the same type of devices, for example, connecting two computers or hubs to each other.
Service code	---	A number that identifies a specific operation or request for a device in a network.
Cyclic communications	---	A communications method that automatically sends and receives data at a fixed period to achieve efficient data exchange between industrial devices that require real-time control.
Subnet mask	---	A 32-bit value for identifying a device in a network by dividing the IP address into the network and host portions. A subnet mask determines the communications range in a network to allow devices in the same subnet to communicate with each other. Normally, the portion represented by three 255s refers to the network address and the rest identifies the host (e.g., 255.255.255.0).
Ethernet switch	---	A device that efficiently transfers data between devices in a network. It sends data only to specific destinations, thus improving the network's performance.

Term	Abbre-viation	Description
Scanner	---	A scanner has the role of a Controller that communicates with multiple devices on a network. It collects data from adapters and gives them control instructions. Typical examples are PLCs.
Straight cable	---	A cable with the same wiring arrangement at each end. It is used to connect different devices, for example, connecting a computer and a switch.
Target	---	A device that receives and processes data sent from the originator over the network.
Time stamp	---	Time information that is internally held by the Communication Unit. This information is set when measured values are retrieved and stored. There are two ways to set the current time: manually setting it or periodically retrieving time information from an NTP/SNTP server, etc.
Tag set	---	A format for organizing and exchanging device data. It provides definitions of data items (tags) and their attributes. This enables tag-based data reading, writing, and setting between devices such as PLCs and sensors for efficient data management and communications.
Tag data link	---	A function that is used in EtherNet/IP networks to enable real-time exchange of tag-based data between PLCs or I/O devices for efficient control.
Communication Unit	---	A ZP-series Communication Unit. In this manual, it refers to the ZP-EIP.
Communication Unit buffering	---	A function that stores measured data in the Communication Unit so that it can be retrieved later by a command.
Default gateway	---	The IP address of the router that devices in a network pass through when sending data to a different network or the Internet. To communicate with a device outside the local network, the device transfers data to this gateway. Then, the gateway determines an appropriate route for delivering the data to the destination. This establishes a connection between the networks.
Topology	---	A connection structure of devices or nodes in a network. There are several types of topologies, for example, bus, star, ring, etc.
Input/Output Assembly	---	A data structure that manages I/O data of a device. The Input Assembly receives data from a sensor and provides it to a PLC. The Output Assembly, on the other hand, sends control signals from a PLC to an actuator. This ensures efficient data exchange between the sensor and actuator for real-time control.
Node	---	Equipment or a device connected to a network. It is a unit of communications for sending and receiving data or exchanging control signals.
Field network	---	An industrial communications network for real-time data exchange among sensors, actuators, and control devices used in factories and plant sites.
No-protocol communications	---	A communications method that follows the TCP/IP procedures, but is not restricted to a specific protocol in data portions that consist of ASCII characters, binary numbers, and delimiters.
Message communications	---	An acyclic communications method in which one side requests data when necessary and the other responds to it. It is used for changing settings, retrieving diagnostic information, and so on.
Modular jack	---	A standardized socket used for connecting a telephone or network cable. Generally, RJ-45 or RJ-11 is often used.
Label	---	Information assigned each time Communication Unit buffering is performed. It allows the user to determine how many times Communication Unit buffering has been performed.

Term	Abbre-viation	Description
Rotary switch	---	A switch that uses a rotating knob to switch contacts. It is used for selecting one from multiple circuits or settings.

Revision History

A manual revision code appears as a suffix to the catalog number on the front and back covers of the manual.



Revision code	Date	Revised content
01	December 2024	Original production
02	April 2025	Expanded explanations and corrected mistakes.

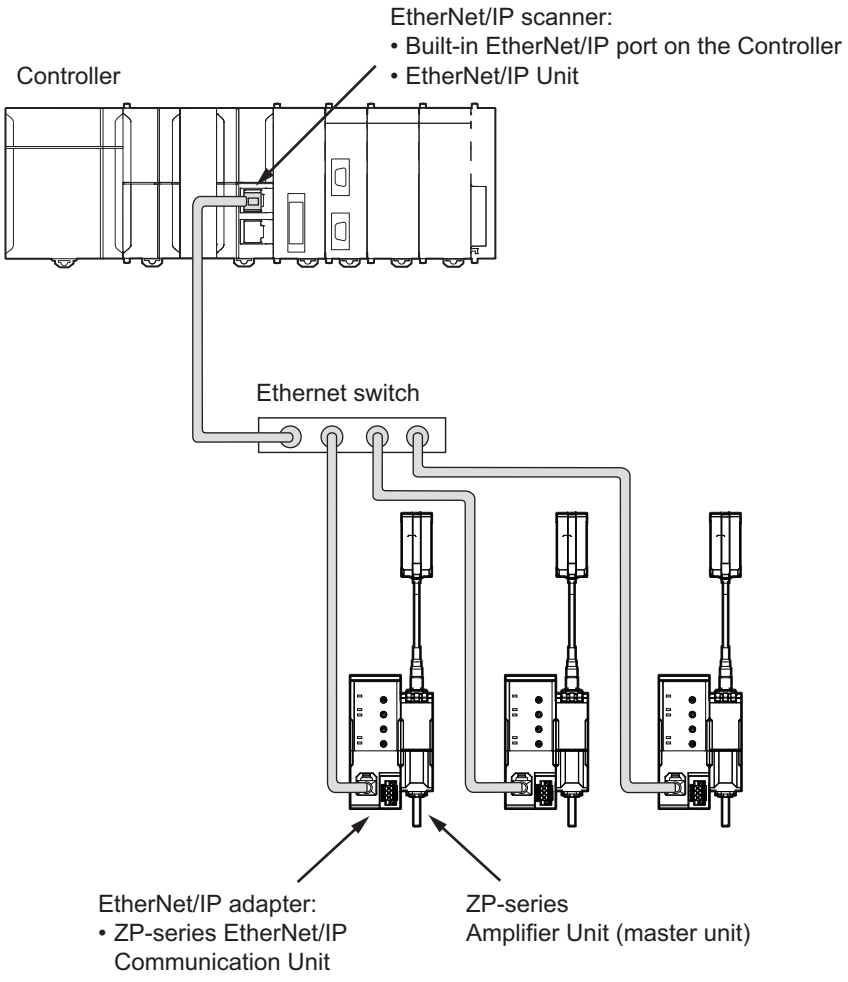
1

Basic Configuration

This section describes the basic configuration of ZP-series EtherNet/IP Communication Units.

1-1 Introduction to the Communication Unit

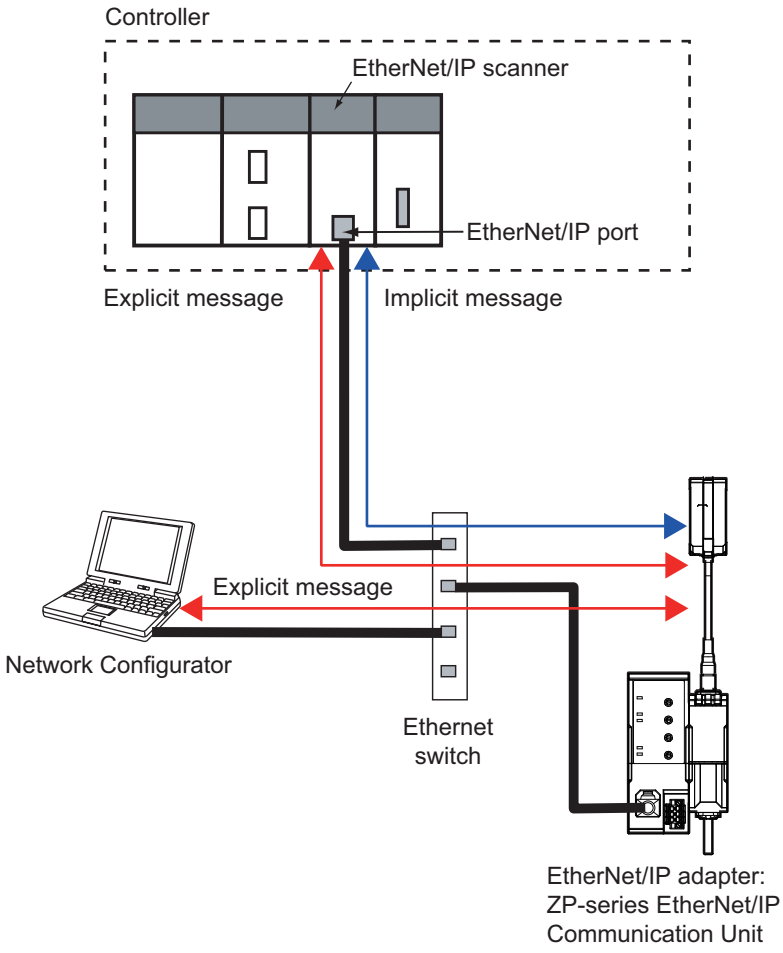
The ZP-series EtherNet/IP Communication Unit is an Ethernet/IP adapter that can be connected to ZP-series Amplifier Units.
The ZP-series EtherNet/IP Communication Unit sends measured data from a ZP-series Amplifier Unit to the Ethernet/IP scanner through the Ethernet/IP network.



1-2 Introduction to EtherNet/IP

EtherNet/IP is an industrial multi-vendor network that uses Ethernet. 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. Because EtherNet/IP uses standard Ethernet technology, various general-purpose Ethernet devices can be used in the network.

To start EtherNet/IP communications, one device must open a communications line called *connection* to the other device. The device that opens a connection is called *scanner* while the device to which the connection is opened is called *adapter* (the Communication Unit is an adapter device).
EtherNet/IP provides tag data link (cyclic communications through implicit messages), which send and receive data periodically, and message communications (explicit message), which send and receive commands and responses at an arbitrary timing.
Tag data link allows the RPI (“communications cycle”) to be set according to the priority of the data to be sent/received, which makes it possible to send/receive data by adjusting the overall communications load.
Message communications allow the exchange of the required commands/responses at the required timing. Message communications are used for applications that do not require the punctuality as in cyclic communications, for example, to read and write adapter device settings.



The following sections describe implicit message communications (cyclic communications) and explicit message communications (non-cyclic communications).

1-2-1 Implicit Message Communications

Implicit message communications allow cyclic communications with EtherNet/IP devices. In this manual, these cyclic communications are called tag data links. Data can be exchanged at high speed between Communication Units and Controllers using tag sets in EtherNet/IP scanners.
Tag data links can operate at the cyclic period specified for each application (RPI), regardless of the number of nodes. Data exchange occurs 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. Therefore, the concurrency of the connection's data is maintained.

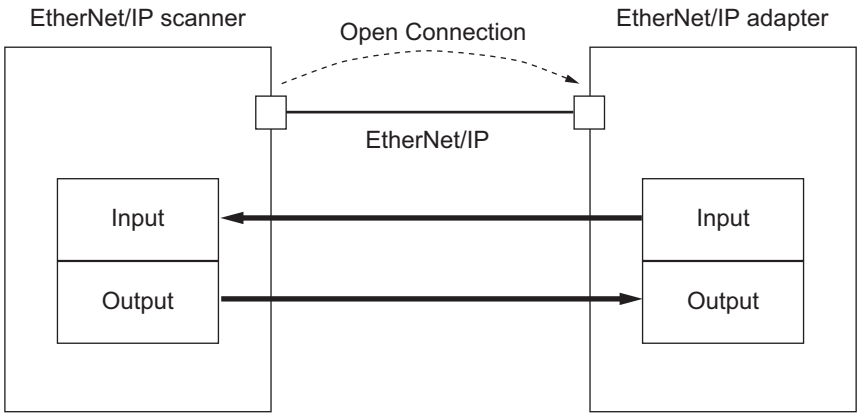
Since the refresh cycle can be set for each connection, each application can communicate at its ideal refresh cycle. For example, an application's critical interlock information can be transferred at higher speed while the less critical production commands and the status monitor information are transferred at lower speed.
There are three common types of implicit message connections classified as Exclusive Owner, Input Only, and Listen Only. Among these types, the Communication Unit only supports Exclusive Owner.

Implicit Message Connections

The Exclusive Owner connection supported by the Communication Unit is described below.

● Exclusive Owner Connection

An Exclusive Owner connection is used in a bidirectional connection between an EtherNet/IP scanner and an EtherNet/IP adapter that has I/O data, where the EtherNet/IP scanner controls the output data to the EtherNet/IP adapter. You cannot make Exclusive Owner connections from more than one EtherNet/IP scanner. For an IO-Link Master Unit, a connection I/O type of *input/output* is equivalent to an Exclusive Owner connection.



I/O Data Assemblies for the Communication Unit

Refer to *Section 4 Specifications of I/O Data* on page 4-1 for information on the I/O data assemblies for the Communication Unit.

1-2-2 Explicit Message Communications

The Communication Unit supports explicit message server functions. This means that you can access CIP objects in the Communication Unit from a device such as an EtherNet/IP scanner or the Network Configurator. Accessing CIP objects through an explicit message enables the following operations.

- Troubleshooting the Communication Unit by reading event logs, clearing event logs, etc.
- Configuring the device parameter settings, and the IP address and other communications parameters for the Communication Unit

You can also set up the adjacent Amplifier Unit.

Refer to *A-3 Supported CIP Objects* on page A-18 for details on CIP objects that are supported by the Communication Unit.

1-3 Features of the Communication Unit

The features of the ZP-series EtherNet/IP Communication Unit are described below.

● High-speed and High-capacity Data Exchange through Tag Data Links (Cyclic Communications)

The Communication Unit supports implicit communications and can perform cyclic communications with an EtherNet/IP scanner. In this manual, these cyclic communications are called tag data links. Large volumes of data can be sent to and from the EtherNet/IP scanner at high speed.
(Refer to *1-2 Introduction to EtherNet/IP* on page 1-3 and *4-1 Tag Data Links* on page 4-2.)

● Cyclic Communications at a Specified Cycle

Tag data links operate at the cyclic period specified for each connection, 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. Also, the concurrency of the connection's data is maintained. Since the refresh cycle can be set for each connection, each application can communicate at its ideal refresh cycle. For example, inter-process interlocks can be transferred at high speed, while the production commands and the status monitor information are transferred at low speed.
(Refer to *1-2 Introduction to EtherNet/IP* on page 1-3 and *4-1 Tag Data Links* on page 4-2.)

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

● Flexible Network Topology

You can construct two types of topologies: star and tree.
(Refer to *2-1-2 EtherNet/IP Topologies* on page 2-3.)

● Reading the Settings of the Adjacent Amplifier Unit

You can change the settings and read the set values of the Amplifier Unit adjacent to the Communication Unit.

● Buffering Measured Data to Internal Storage

You can store the measured data received from the Amplifier Unit inside the Communication Unit and retrieve it later using commands and external inputs.

1-4 Application Procedures

This section describes the basic application procedures for the Communication Unit.

Step	Item		Description	Reference
1	Preparing for Work	Confirming Suitability of Specifications	Confirm that the following restrictions for the Communication Unit are met. • Confirm the model of Amplifier Unit for power supply.	*1-1 Introduction to the Communication Unit* on page 1-2
2	Making Hardware Settings and Installing and Wiring the Communication Unit	Setting the IP address	Directly set the IP address with the hardware rotary switches. You can also use following methods to set the IP address. • Software settings with the Network Configurator. • Get the IP address from the BOOTP server with hardware switches. • Get the IP address from the DHCP server with hardware switches. • Software settings with Wave Inspire ZP	• *2-3-3 Rotary Switches* on page 2-9 • *Setting the IP Address* on page 3-9
		Installation	Mount the Communication Unit on the DIN track.	*Installation Method* on page 2-13
		Wiring	Wire the Communication Unit. • Connect the communications cables. • Connect the I/O cables.	• *2-4-2 Wiring the EtherNet/IP Network* on page 2-15 • *1-1 Introduction to the Communication Unit* on page 1-2 • *2-4-3 Wiring the External I/O Connector* on page 2-17
3	Turning ON the Power Supplies		Turn ON the power supply to the Amplifier Unit that supplies power to the Communication Unit.	*1-1 Introduction to the Communication Unit* on page 1-2
4	Making the TCP/IP Settings for the Communication Unit		Create an EtherNet/IP network configuration with the Network Configurator. Make the TCP IP settings for the Communication Unit. If you perform software settings, set the IP address with the Network Configurator.	*3-2-3 Setting TCP/IP* on page 3-7
5	Setting Tag Data Links	Creating Network Variables	Use the Support Software corresponding to the Controller to connect to. Create network variables corresponding to the tags required for the device to participate in tag data links. *1	*A-2 Setting Tag Data Links* on page A-5
		Setting the Tags, Tag Sets, and Connections	Create tags and tag sets for the EtherNet/IP scanner (originator) with the Network Configurator, and establish a connection with the Communication Unit. At this time, select the input tag set and output tag set for the Communication Unit that you determined at the beginning of this step.	
6	Downloading Tag Data Link Parameters		Download the tags, tag sets, and connections that you set in step 5 into the EtherNet/IP scanner (originator). After they are downloaded, the tag data links start automatically.	

Step	Item		Description	Reference
7	Checking Operation	Checking the Indicators	Check the indicators and displays on the Controller, EtherNet/IP scanner, Communication Unit, and Amplifier Unit to confirm that there is no error.	• User's manual for the CPU Unit that you use • User's manual for the EtherNet/IP scanner that you use • User's manual for the Amplifier Unit that you use
		Checking the Wiring	Use the Support Software depending on the Controller that you connect. In Watch tab page, etc., read input data from and write output data to the Communication Unit to confirm that the wiring is completed correctly.	• Operation manual for the Support Software that you use
8	Creating the User Program		Create the user program with network variables. At this time, write the program so that it uses valid I/O data to make tag data links.	• User's manual for the CPU Unit that you use • Operation manual for the Support Software that you use

*1. Create network variables only when the Controller that can handle network variables is used. For example, some models of the NJ/NX-series CPU Unit or CJ-series CPU Unit (CJ2H-CPU6□-EIP21 and CJ2M-CPU3□ only) are available. For Controllers that cannot handle network variables, use the I/O memory addresses of the CPU Unit for tags.

2

Installation and Connection

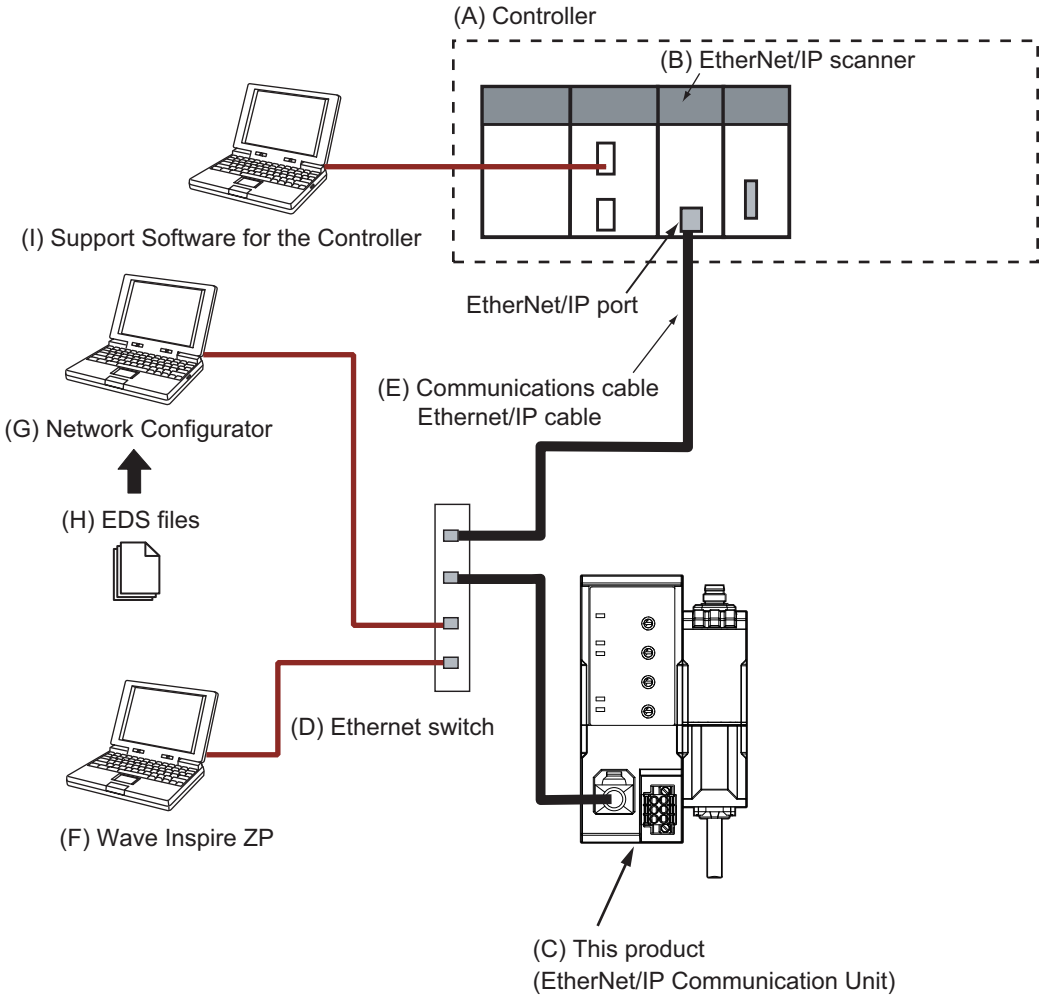
This section describes the installation and connection procedures for the Communication Unit.

2-1 System Configuration

This section describes the system configuration of the ZP-series EtherNet/IP Communication Unit and the topologies of EtherNet/IP.

2-1-1 System Configuration of the Communication Unit

An example of a system configuration for the ZP-series EtherNet/IP Communication Unit is shown below.



The description of each item is given below.

Letter	Item	Description
(A)	Controller	This is an OMRON CPU Unit or a controller from another company, connected to the Communication Unit through an EtherNet/IP adapter. It exchanges I/O data with the Communication Unit and executes a user program through EtherNet/IP. The following OMRON Controllers can be connected to the Communication Unit. • NJ/NX-series CPU Unit • CJ/CP/CS-series PLC

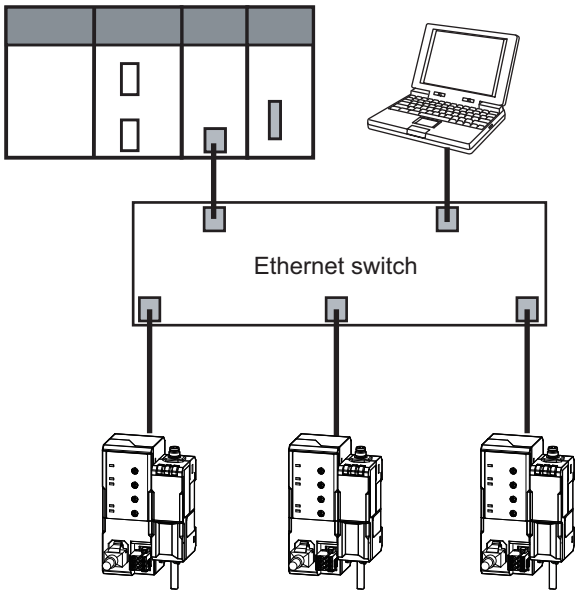
Letter	Item	Description
(B)	EtherNet/IP scanner	The EtherNet/IP scanner monitors the status of the connections with EtherNet/IP adapters and exchanges I/O data with EtherNet/IP adapters through the EtherNet/IP network. It refers to the *originator* when opening a connection. The following OMRON EtherNet/IP scanners are available. • EtherNet/IP Units, such as CJ1W-EIP21 and CS1W-EIP21 • Built-in EtherNet/IP port on an NJ/NX/CJ-series CPU Unit
(C)	This product Ethernet/IP Communication Unit	This product outputs the data that is received from the EtherNet/IP scanner through the EtherNet/IP network to a connected external device, and sends the data that is input from a connected external device to the EtherNet/IP scanner through the EtherNet/IP network. It refers to the *target* when opening a connection.
(D)	Ethernet switch	This is a relay device that connects multiple nodes. To prevent the increase of network traffic due to multicast packets, it is recommended to use an Ethernet switch with multicast filtering capability. Refer to the user's manual for EtherNet/IP scanner that you use for information on recommended Ethernet switches.
(E)	Communications cable	Use a double-shielded cable with aluminum tape and braiding of category 5 (100BASE-TX) or higher, and use straight wiring.
(F)	Wave Inspire ZP	This is computer-based Support Software that enables configuring the Communication Unit and the adjacent Amplifier Unit, as well as getting and monitoring time-series data.
(G)	Network Configurator	The Network Configurator is the Support Software to configure an EtherNet/IP network. To use it, you need to install the Sysmac Studio. For the Communication Unit, it is used for the following purposes. • Setting the IP address of the Communication Unit • Setting the connection between the EtherNet/IP scanner and the Communication Unit The above is an example of connecting Network Configurator to Communication Units via Ethernet. Refer to *Going Online* on page 3-7 for other connection methods.
(H)	EDS files	The EDS files contain information that is unique to the Communication Unit. You can load EDS files into the Network Configurator or other Support Software for EtherNet/IP network setup to easily allocate data and view or change settings. The EDS files for Communication Units are already installed in the Sysmac Studio or Network Configurator. You can obtain the EDS files for the latest models through the automatic update function.
(I)	Support Software for the Controller	The Support Software is used to configure the Controller and EtherNet/IP scanner, create user programs, and perform monitoring, and troubleshooting. The Support Software depends on the Controller that you use.

2-1-2 EtherNet/IP Topologies

The Communication Unit supports star and tree topologies.

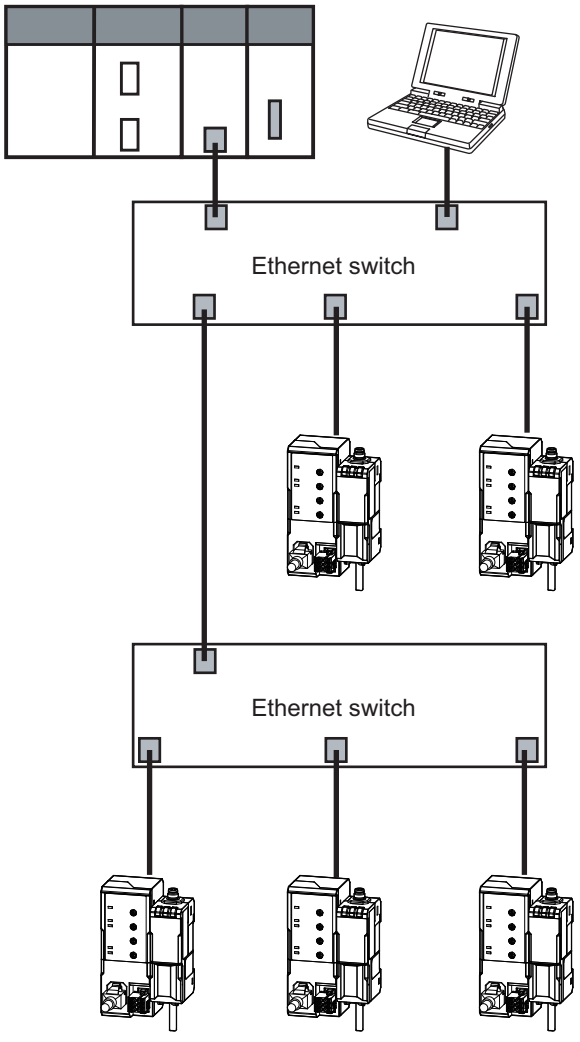
● Star

A topology that consists of more than one Communication Unit connected to an Ethernet switch.



- **Tree**

  A topology that consists of a combination of star and line topologies.



2-2 Support Software

The following table shows the Support Software that you can use to configure a system of the ZP-series EtherNet/IP Communication Unit.

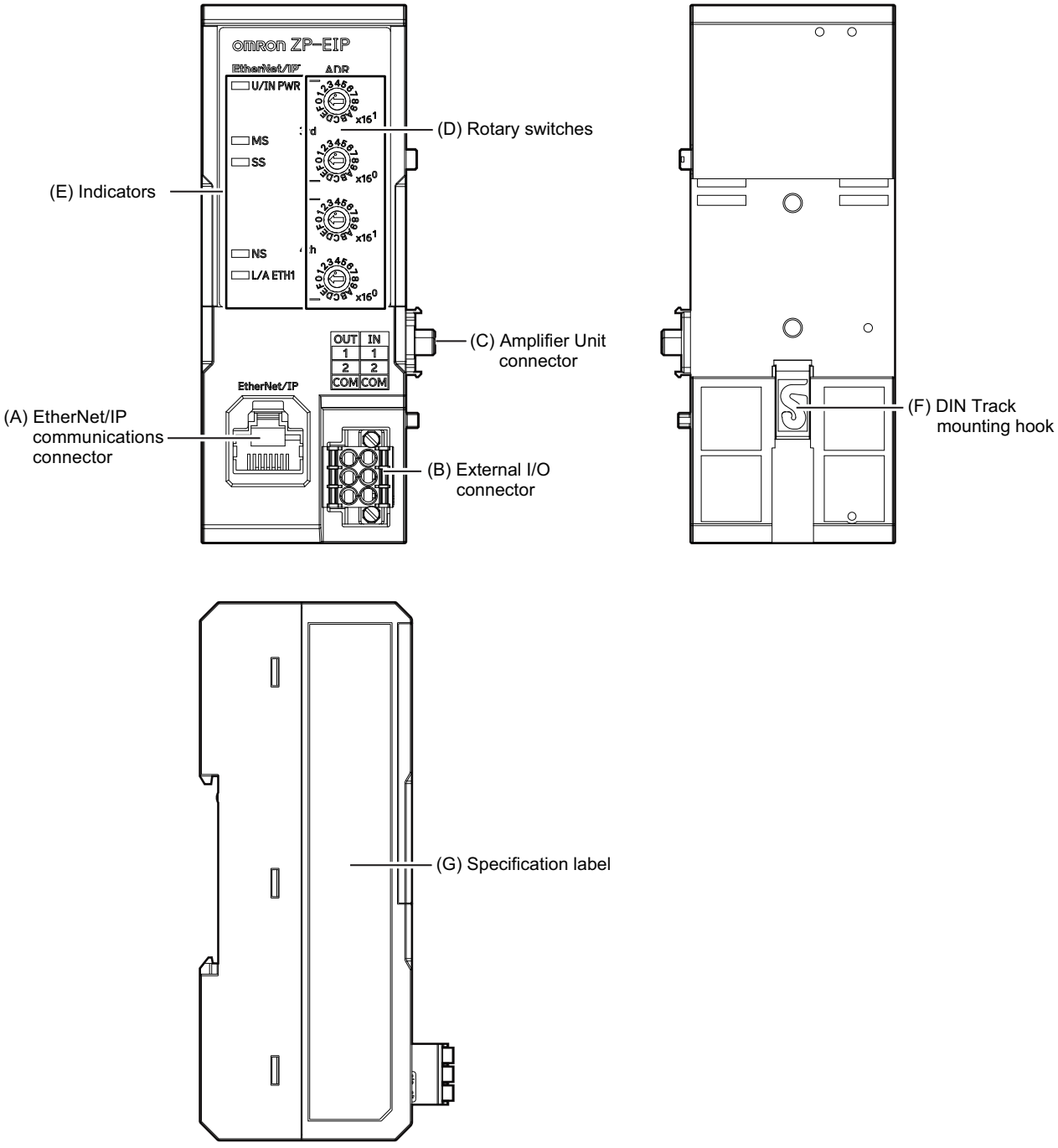
Destination to which Communication Unit is connected		Applications and applicable Support Software			
Controller	**EtherNet/IP scanner**	**Creating the user program**	**Setting connections**	**Setting device parameters for the Communication Unit**	**Configuring and monitoring the Amplifier Unit**
NJ/NX-series CPU Unit	Built-in EtherNet/IP port on NJ/NX-series CPU Unit, or CJ1W-EIP21	Sysmac Studio	Sysmac Studio or Network Configurator	Wave Inspire ZP	
CJ/CP/CS-series PLC	• EtherNet/IP Unit CJ1W-EIP21 or CS1W-EIP21 • Built-in EtherNet/IP port on CJ-series CPU Unit	CX-Programmer	Network Configurator		
Controller from another company	EtherNet/IP scanner from another manufacturer	Software from another manufacturer	Software from another manufacturer		

2-3 Part Names and Functions

This section describes the names and functions of the parts of the Communication Unit.

2-3-1 Parts and Names

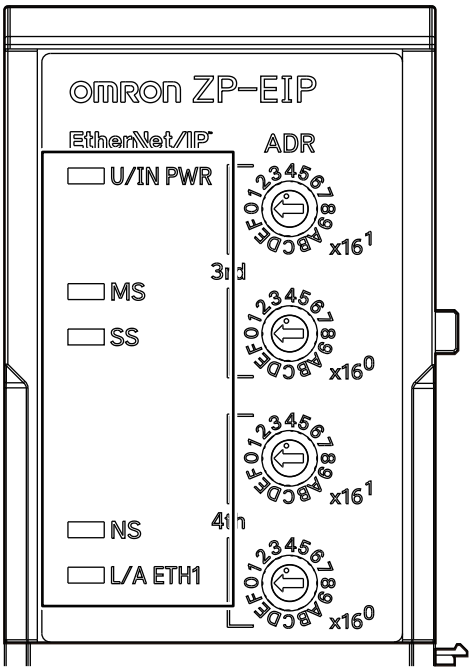
This section gives the names of the parts of the Communication Unit.



Letter	Name	Function
(A)	EtherNet/IP communications connector	The connector for the EtherNet/IP port. • RJ45 connector (8-pin modular jack) Connect a communications cable.
(B)	External I/O connector	The connector for connecting external devices. • Terminal block connector Connect I/O cables.
(C)	Amplifier Unit connector	The connector for supplying power from the Amplifier Unit.
(D)	Rotary switches	The switches for setting the IP address.
(E)	Indicators	The indicators that show the present operating status of the Communication Unit.
(F)	DIN Track mounting hook	The hook for mounting the Communication Unit on the DIN track.
(G)	Specification label	The label that displays the model, specifications, MAC address, serial number, etc.

2-3-2 Indicators

This section describes the indicators of the Communication Unit.



● MS Indicator

The module status indicator. This indicator shows the operating status of the Unit.

Color	Status		Description
Green		Lit	The Unit is operating normally.
		Flashing	• The Unit is starting or restarting. • BOOTP/DHCP Server Connection Error

Color	Status		Description
Red		Lit	One of the following unrecoverable errors was detected. • Non-volatile Memory Hardware Error • Unit Processing Error • Hardware failure
		Flashing	One of the following nonfatal errors was detected. • Non-volatile Memory Checksum Error • IP Address Conflict • TCP/IP Setting Error (Local IP Address) • Automatic Clock Adjustment Setting Error • NTP/SNTP Server Connection Error
Green/Red		Flashing	Initializing
---		Not lit	The Unit/input power is not supplied.

● NS Indicator

The network status indicator. This indicator shows the status of the EtherNet/IP network.

Color	Status		Description
Green		Lit	Tag data link communications or explicit message communications (Class 3) is established and normal communications are in progress.*1
		Flashing	Tag data link communications or explicit message communications (Class3) is not established.*2
Red		Lit	IP address conflict
		Flashing	The Exclusive Owner connection timed out.
Green/Red		Flashing	Initializing
---		Not lit	• No link established • The IP address is not set.

*1. A state in which there are one or more established connections with the IP address obtained.

*2. A state in which there are no established connections and no occurrences of timeout in Exclusive Owner connections with the IP address obtained.

● L/A ETH1 Indicator

The Link/Activity indicator for the EtherNet/IP port. This indicator shows the linked status and communications status of the EtherNet/IP port.

Color	Status		Description
Green		Lit	Link established
		Flashing	Link established and communications are active.
---		Not lit	No link established

● U/IN PWR Indicator

This indicator shows the status of the Unit/input power supply.

Color	Status		Description
Green		Lit	The Unit/input power is supplied.
---		Not lit	The Unit/input power is not supplied.

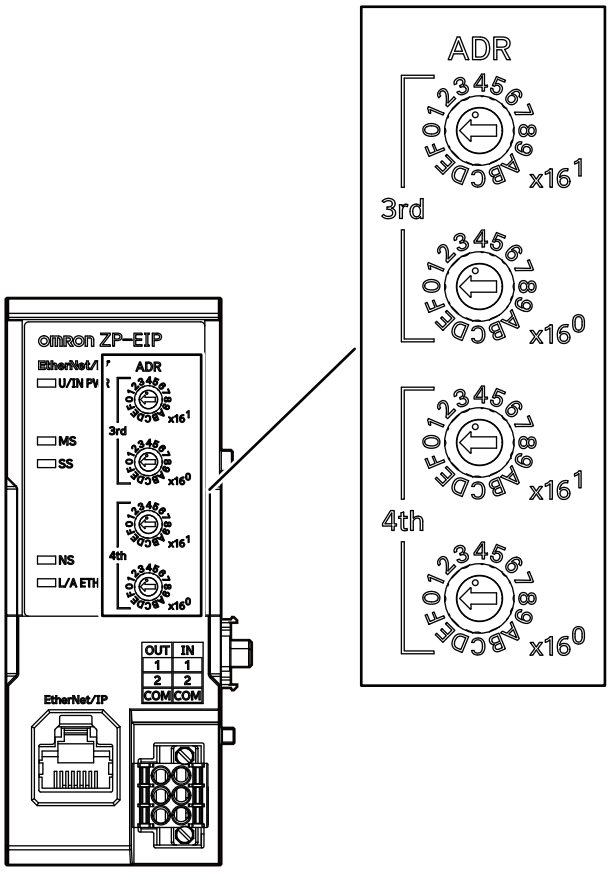
● SS Indicator

The sensor status indicator. This indicator shows the Amplifier Unit connection status when Amplifier Units are connected.

Color	Status		Description
Green		Lit	Communications between the Amplifier Units are normal.
		Flashing	A warning occurred in one of the connected Amplifier Units.
Red		Lit	One of the following conditions occurred at startup when a connection was established with the Amplifier Unit. • The number of Amplifier Unit channels exceeds 16. • A communications error occurred at startup.
		Flashing	A system error occurred in one of the connected Amplifier Units after startup. (When Hold Setting For Error Status is OFF, the indicator will be lit or flashing green once the Amplifier Unit's system error is removed).
---		Not lit	Initializing

2-3-3 Rotary Switches

Use the rotary switches to set the IP address of the Communication Unit.
The pair of the third octet switches represents the first two hexadecimal digits, while the pair of the fourth octet switches represents the last two hexadecimal digits.
The setting range of the third and fourth octets is 00 to FF hex, and the default setting is 00 hex.
Refer to *Setting the IP Address* on page 3-9 for details on the setting method.



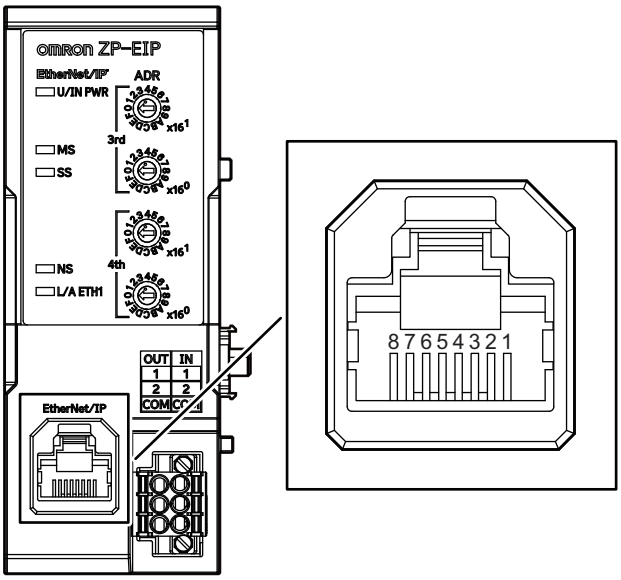
2-3-4 Connectors

The Communication Unit has the following connectors.

- EtherNet/IP communications connector
- Amplifier Unit connector
- External I/O connector

EtherNet/IP Communications Connector

The EtherNet/IP communications connector is used for EtherNet/IP communications. In this manual, it is sometimes referred to as "communications connector".



The specifications are as follows:

- Connector structure
  RJ45 connector (8-pin modular jack)
- Pin arrangement

Pin No.	Signal name	Description
1	TD+	Send data +
2	TD-	Send data -
3	RD+	Receive data +
4	Unused	---
5	Unused	---
6	RD-	Receive data -
7	Unused	---
8	Unused	---

External I/O Connector

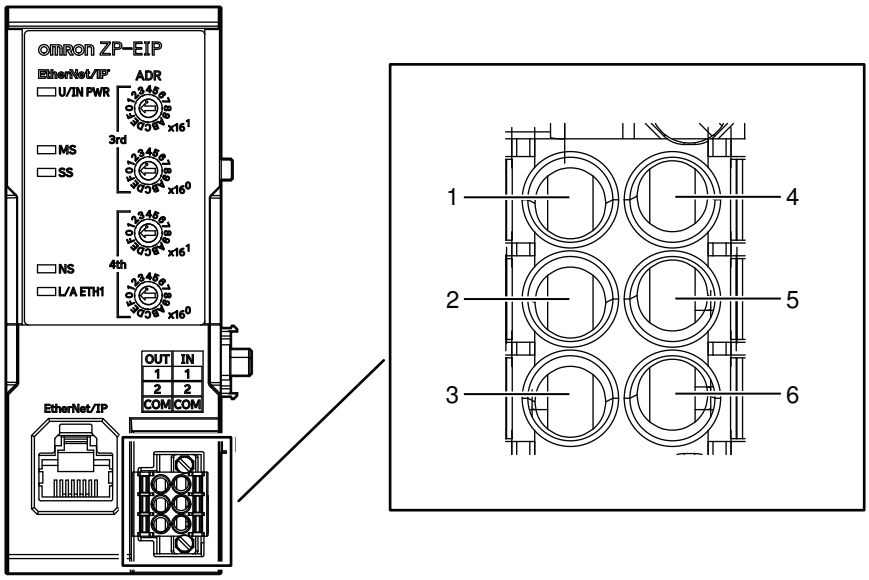
The connector for connecting external devices.
Connect the applicable wires listed below.
Applicable wire specifications

Solid wire: 0.2 to 1.5 mm^2

Stranded wire: 0.2 to 1.5 mm^2

Stranded wire with bar terminal (no plastic sleeve): 0.25 to 1.5 mm^2

Stranded wire with bar terminal (plastic sleeve): 0.25 to 0.75 mm^2
AWG24-16
End processing length: 10 (±0.5) mm



The specifications are as follows:

- Connector structure
  Terminal block connector
- Pin arrangement

Pin No.	Signal name	Description
1	Control output 1	Mode1: Cuing information 1 Mode 2: Communication Unit buffering start/end control*1
2	Control output 2	Mode 1: Cuing information 2 Mode 2: Clear Communication Unit Buffering*1
3	COM_OUT	COM for output
4	External input 1	Communication Unit buffering execution status*1
5	External input 2	Communication Unit buffering full*1
6	COM_IN	COM for input

*1. Refer to *5-5 Communication Unit Buffering* on page 5-18 for details.

Important

- Make sure that unnecessary signal lines are not in contact with other signal lines.
- Install the terminal block securely to prevent accidental injury when pushing in the release button with a screwdriver.

2-4 Installation and Wiring

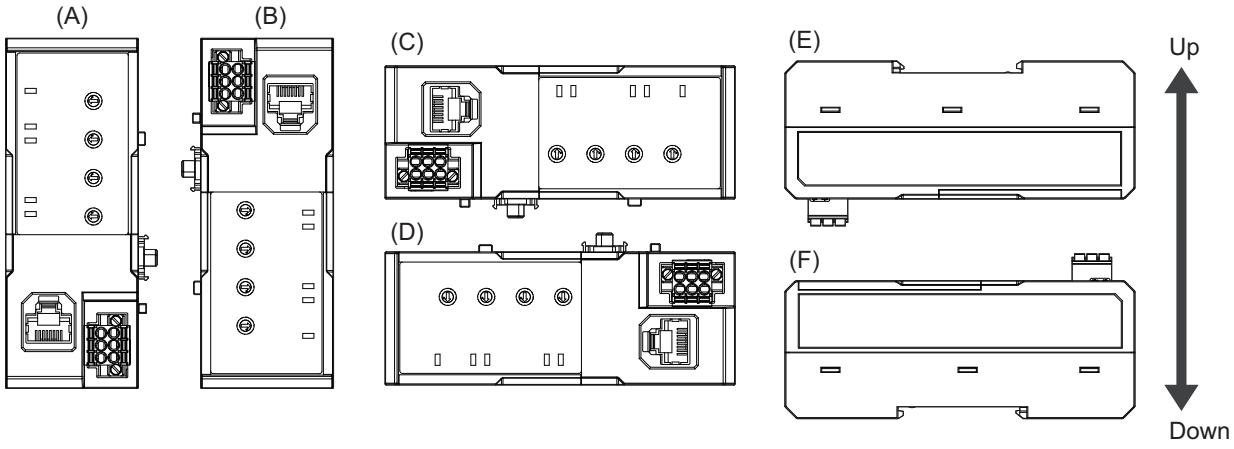
This section describes how to install and wire the Communication Unit.

2-4-1 Installing the Communication Unit

This section describes how to install the Communication Unit.

Installation Orientations

The Communication Unit can be installed in any of the following six orientations.



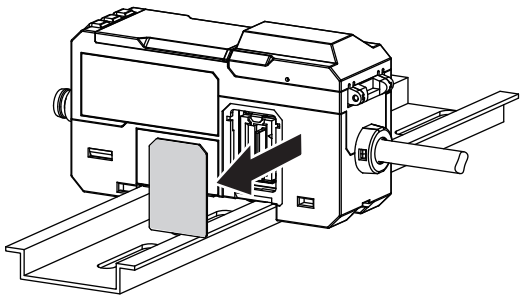
Installation Method

This section describes how to install the Communication Unit.

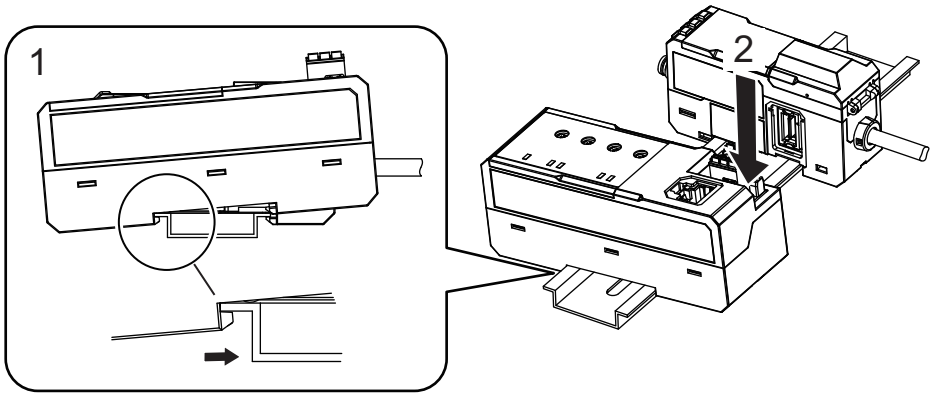
● Installing the Main Unit

You can quickly install the main unit on 35-mm wide DIN track.
Power is supplied from the connected Amplifier Unit.

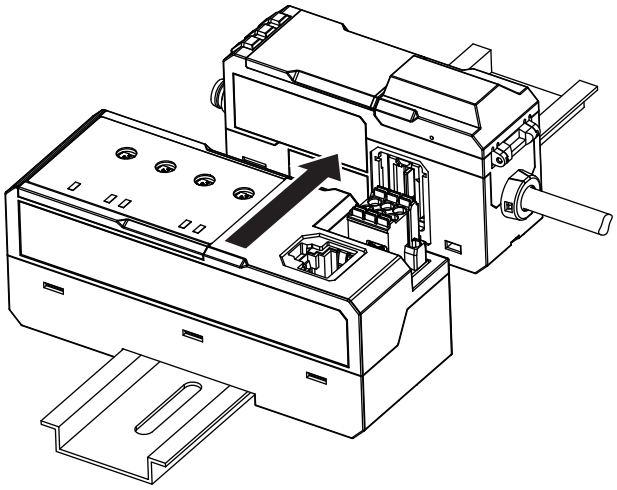
1 Remove the connector cover from the Amplifier Unit (master unit).



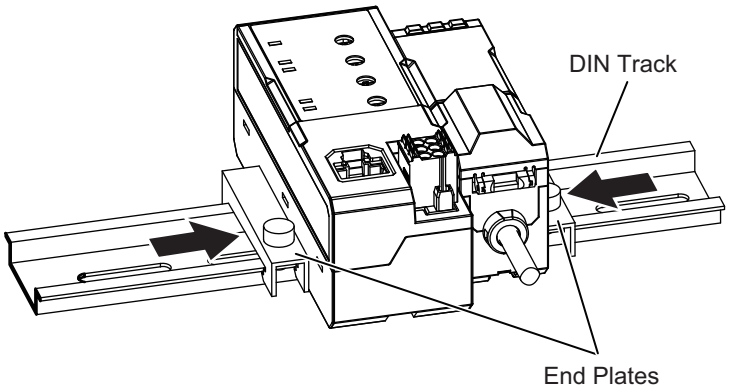
2 Hook the tab on the sensor head connector side on the DIN track and push the Amplifier Unit in until it is locked in place.



3 Slide the Communication Unitt into the connector of the master unit until it *clicks* into place.

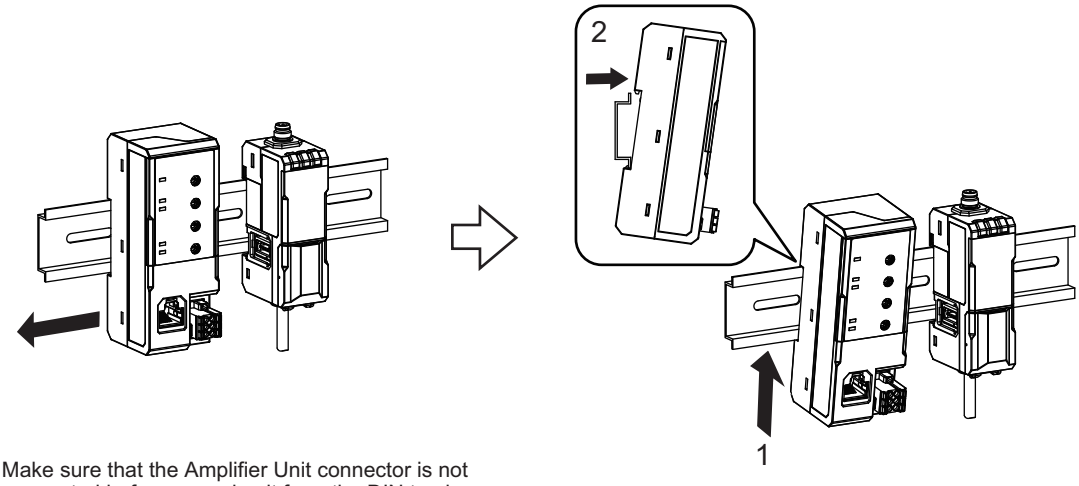


4 Place the End Plates (PFP-M) included with the Communication Unit on both ends of the Communication Unit and Amplifier Unit, and fix them by tightening the screws on the End Plates (two End Plates per location).



Additional Information

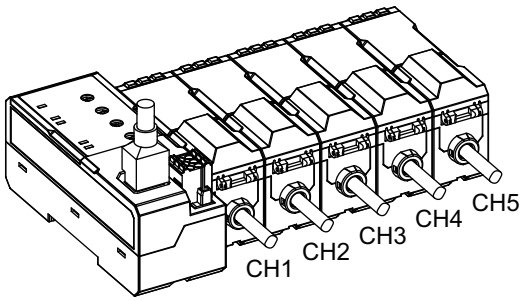
- To remove the main unit, follow the above procedure in the reverse order as shown below.



Make sure that the Amplifier Unit connector is not connected before removing it from the DIN track. There is a risk of connector damage.

Remove the Communication Unit while pushing it in the direction of the arrow.

- When multiple Amplifier Units are connected together, the channel numbers are as shown below.



2-4-2 Wiring the EtherNet/IP Network

This section describes how to install the EtherNet/IP network for the Communication Unit. Refer to the user's manual for EtherNet/IP scanner that you use for how to wire an EtherNet/IP scanner.

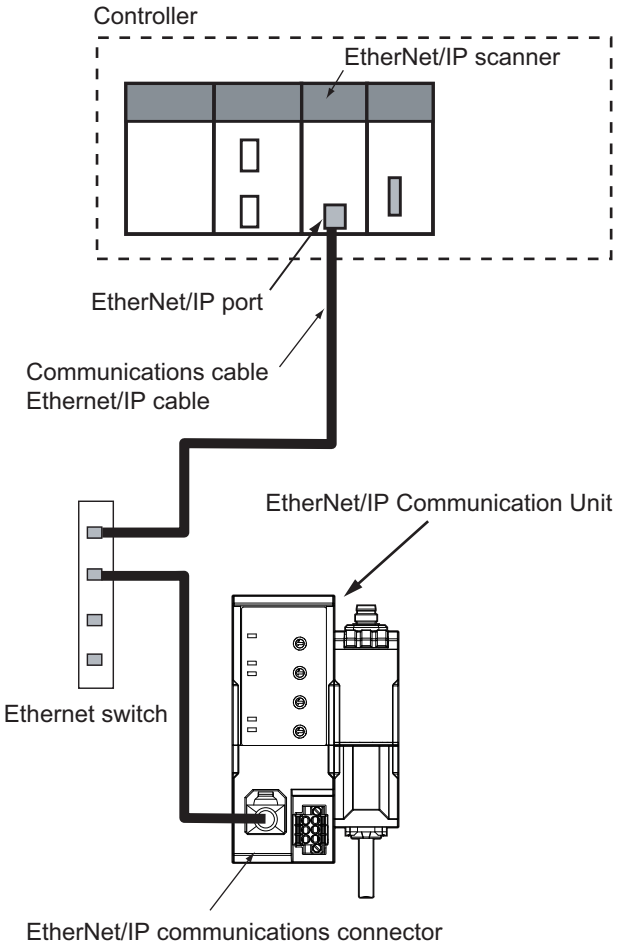
Preparing for Wiring

● Preparing Communications Cables

For communications cables, use the EtherNet/IP communications cables shown in *2-4-4 Connected Devices* on page 2-22.

Refer to *EtherNet/IP Cables* on page 2-22 for details.

Connecting Communications Cables



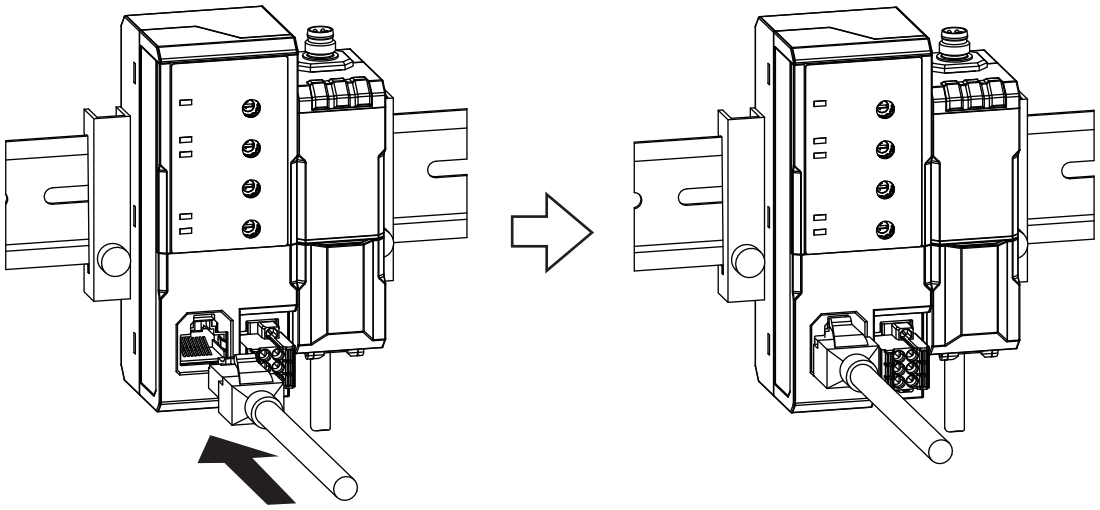
The following describes the communications cable connection procedure.

● Connection Procedure

Use the following procedures to connect a communications cable.

1 Turn OFF the power supply to the Communication Unit.

2 Connect the communications cable's modular jack to the connector of the Communication Unit. Insert the modular jack until it *clicks* into place. The communications cable is locked in the connector.

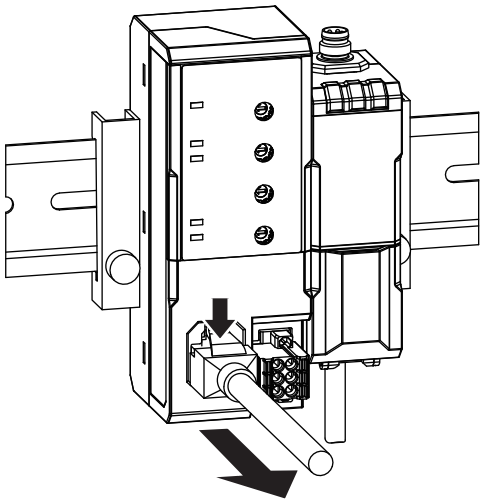


● Removal Procedure

Use the following procedures to remove a communications cable.

1 Turn OFF the power supply to the Communication Unit.

2 Pull the communications cable straight out while pressing the tab on it.



2-4-3 Wiring the External I/O Connector

This section describes how to wire the external I/O connector for connecting external devices.

Preparing for Wiring

● Preparing Wires

Applicable wire specifications

- Solid wire: 0.2 to 1.5 mm^2
- Stranded wire: 0.2 to 1.5 mm^2

- Stranded wire with bar terminal (no plastic sleeve): 0.25 to 1.5 mm^2
- Stranded wire with bar terminal (plastic sleeve): 0.25 to 0.75 mm^2
- AWG 24 to 16
- End processing length: 10 (±0.5) mm

● Preparing Tightening Tools

Use a slotted screwdriver to fix the external I/O connector to the Communication Unit. The tightening torque is 0.2 N·m.

Connecting the External I/O Connector

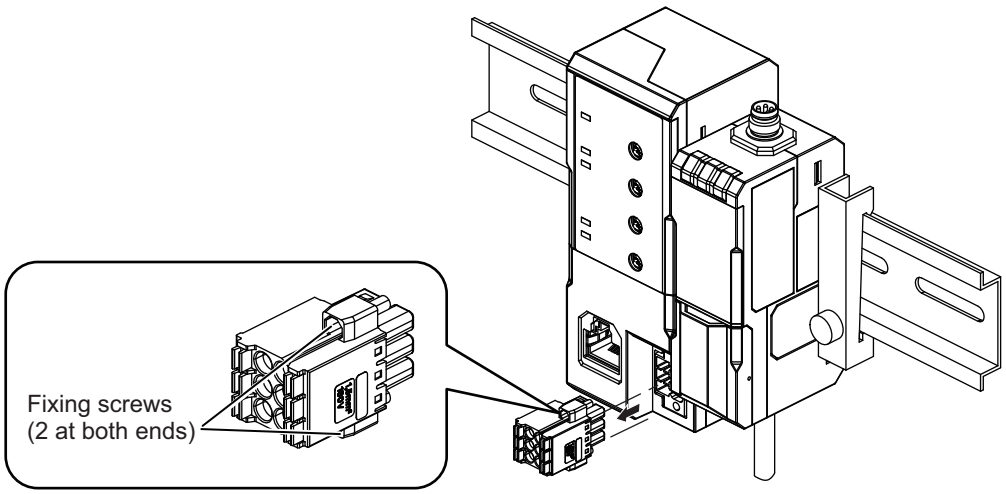
The connection procedure and tightening torque for the external I/O connector are described below.

● Connection Procedure

The procedure for connecting the external I/O connector is as follows.

1 Turn OFF the power supply to the Communication Unit.

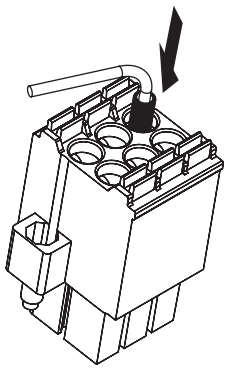
2 Loosen the two fixing screws with a screwdriver and remove the terminal block from the Communication Unit.



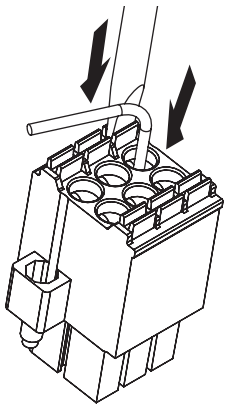
Note The Communication Unit is shipped without the screws tightened.

3 Insert the wire into a terminal hole.

- When using wire with bar terminal
  Push the wire in.



- When using solid or stranded wire
  While pushing in the release button adjacent to the terminal hole with a screwdriver, insert the wire all the way into the terminal hole and remove the screwdriver.



4 Install the external I/O terminal block back onto the Communication Unit and fix it by tightening the two screws with a slotted screwdriver (tightening torque: 0.2 N·m).

● Removal Procedure

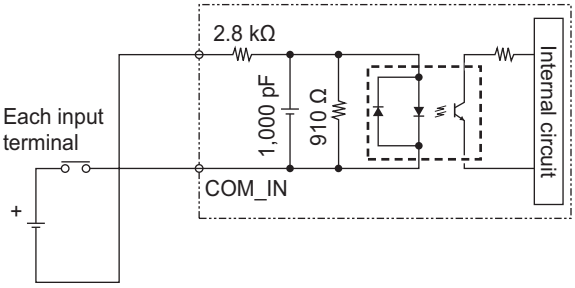
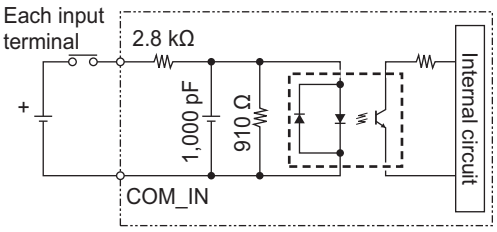
Turn OFF the power supply to the Communication Unit, and then remove it by reversing the installation procedure.

Electrical Specifications

The electrical specifications of the Communication Unit for external I/O are shown below.

● Input Circuit

Item	Specification
Input voltage	10 to 30 V (including ripple)

Item	Specification	
Wiring examples*1	For connection to NPN input devices 	For connection to a PNP input devices 
ON voltage/ON current*2	8.8 V min./2 mA min.	
OFF voltage/OFF current*3	4 V max./0.5 mA max.	
Input current	8 mA typical (24 VDC)	
ON delay	0.1 ms max.	
OFF delay	0.1 ms max.	

*1. Commonly used for NPN and PNP types. Wire the circuit appropriately according to the specifications of the external device.

*2. The voltage or current value at which the device is turned ON from OFF.
The value of ON voltage is the potential difference between COM_IN and each input terminal.

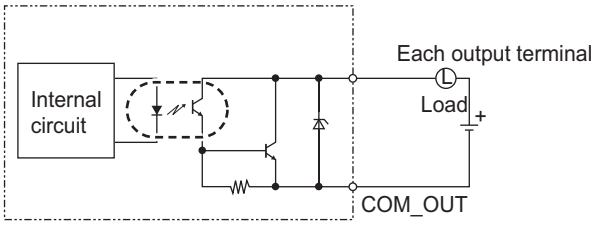
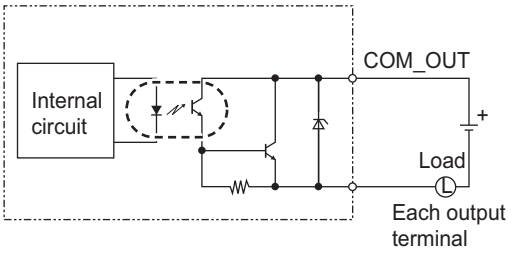
*3. The voltage or current value at which the device is turned OFF from ON.
The value of OFF voltage is the potential difference between COM_IN and each input terminal.

Additional Information

Measures against chattering

Be sure to use non-contact relays (SSR, PLC transistor output) for input signals. Using relays with contacts may allow for re-input of signals during measurement due to bounce of the contacts.

● Output Circuit

Item	Specification	
Output voltage	10 to 30 VDC	
Wiring examples*1	For connection to NPN output devices 	For connection to a PNP output devices 
Load current	50 mA max.	
ON residual voltage	2 V max.	

Item	Specification
ON leakage current	0.1 mA max.

*1. Commonly used for NPN and PNP types. Wire the circuit appropriately according to the specifications of the external device.

Additional Information

- Connect a load that meets the output specifications. A short-circuit may cause sensor failure.
- Use a load current at or below the specification value. Exceeding the specification value may damage the output circuit.

2-4-4 Connected Devices

This section describes the connected devices for wiring the Communication Unit.

EtherNet/IP Cables

● Connection Cables between Communication Unit and EtherNet/IP Scanner with RJ45 Connectors

When you use 100BASE-TX/100BASE-T, use a Category 5 or higher STP (Shielded Twisted-Pair) cable. Either straight or cross cables can be used.

- **Connector cables**

Item		Recommended manufacturer	Cable length (m)	Model
Wire gauge and number of pairs: AWG26, 4-pair cable Cable sheath material: PUR	Cable with Connectors on Both Ends (RJ45/RJ45) Standard RJ45 plugs *1 Cable color: Yellow *2 	OMRON	0.3	XS6W-6PUR8SS30CM-YF
			0.5	XS6W-6PUR8SS50CM-YF
			1	XS6W-6PUR8SS100CM-YF
			2	XS6W-6PUR8SS200CM-YF
			3	XS6W-6PUR8SS300CM-YF
			5	XS6W-6PUR8SS500CM-YF
Wire gauge and number of pairs: AWG22, 2-pair cable	Cable with Connectors on Both Ends (RJ45/RJ45) Rugged RJ45 plugs *1 Cable color: Light blue 	OMRON	0.3	XS5W-T421-AMD-K
			0.5	XS5W-T421-BMD-K
			1	XS5W-T421-CMD-K
			2	XS5W-T421-DMD-K
			5	XS5W-T421-GMD-K
			10	XS5W-T421-JMD-K

*1. Cables with standard RJ45 plugs are available in the following lengths: 0.2 m, 0.3 m, 0.5 m, 1 m, 1.5 m, 2 m, 3 m, 5 m, 7.5 m, 10 m, 15 m, 20 m.
Cables with rugged RJ45 plugs are available in the following lengths: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, 10 m, 15 m.
For details, refer to the *Industrial Ethernet Connectors Catalog* (Cat. No. G019).

*2. Cable colors are available in yellow, green, and blue.

- **Cable and connector**

Item			Recommended manufacturer	Model
Products for EtherCAT or Ether-Net/IP (100BASE-TX/10BASE-T)	Wire gauge and number of pairs: AWG22, 2-pair cable	Cable	Kuramo Electric Co.	KETH-PSB-OMR*1
			JMACS Japan Co., Ltd.	PNET/B*1
		RJ45 Assembly Connector 	OMRON	XS6G-T421-1*1

*1. We recommend you to use the above Cable and RJ45 Assembly Connector together.

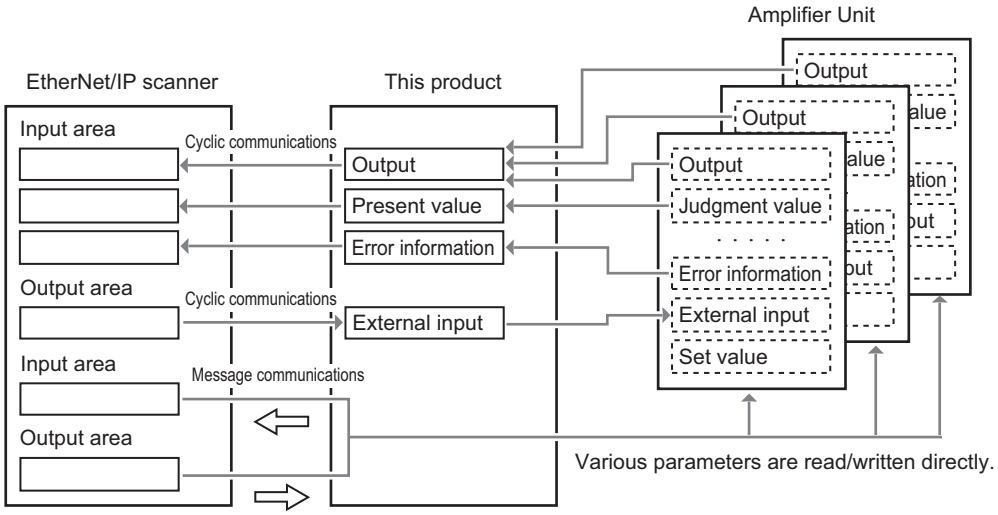
3

Communication Unit Functions and Setup

This section describes how to set up the Communication Unit.

3-1 Communication Unit Functions

This section describes the functions incorporated in the Communication Unit.
The Communication Unit, operating as an EtherNet/IP adapter device, supports cyclic and message communications for EtherNet/IP communications.



3-1-1 Overview of Functions and Communications Methods

The following functions are available from the EtherNet/IP scanner.

○: Possible/×: Not possible

Function		Communications method		
		Cyclic communications	Message communications	
		Implicit message*1	Explicit message	No-protocol
Amplifier Unit Setup and Control	Read Status	○	×	○
	Read Present Measured Value		○	
	Read External Output Status			
	External Input Control			
	Initialize			
	Threshold Teaching			
	Rewrite/Read Settings			
	Key Lock			
Communication Unit (Main Unit) Communications Setup	Set IP Address	×		
	Set Automatic Clock Adjustment Function			
	Get Event Log Information			
Communication Unit (Main Unit) Function Setup and Control	Change External Input Settings			
	Set Communication Unit Buffering Function			
	Control Communication Unit Buffering Function		×	

*1. Refer to *A-2 Setting Tag Data Links* on page A-5 for the detailed connection method.

3-1-2 Settings

The following table shows the settings to allow the EtherNet/IP scanner to access I/O data in the Communication Unit.

Category	Item	Description
Communication Unit Setup	TCP/IP Settings	Set the following as the TCP/IP settings for the Communication Unit. • IP Address Settings
Settings for Data Exchange between Scanner and Communication Unit	Tag Data Link Settings	Set the tag data link parameters, such as tags, tag sets and connections. Select the I/O data to use for the Communication Unit in the connection setting.
	Network Variable Creation*1	Create variables that are required to access the Communication Unit with a user program.

*1. Create network variables only when the Controller that can handle network variables is used. Refer to the user's manual for your Controller for information on whether it can handle network variables.

3-2 Network Configuration Extraction and Advance Setup

This section describes how to use the Network Configurator to extract the network configuration and set the IP address of the connected Communication Unit.

3-2-1 Starting the Network Configurator

This section describes the starting method and window structure of the Network Configurator.

Starting Method

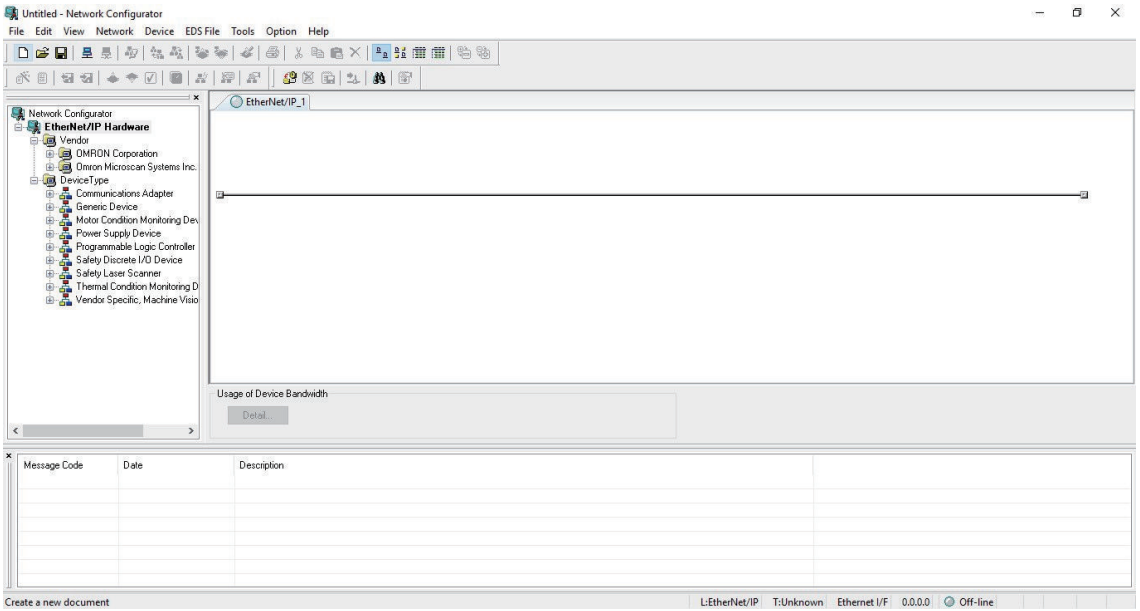
- **Starting from the Windows Start Menu**

  If you use the built-in EtherNet/IP port on an NJ/NX-series CPU Unit, select the following to start the Network Configurator.

  OMRON – **Sysmac Studio** – **Network Configurator for EtherNetIP** – **Network Configurator**

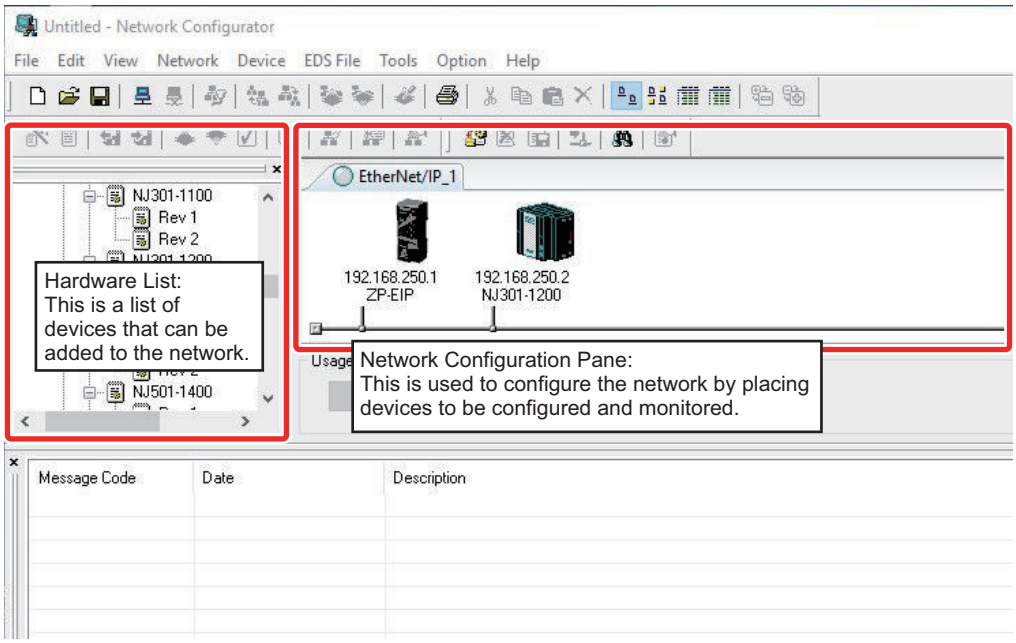
  To use a CS and CJ Series EtherNet/IP Unit, replace “Sysmac Studio” with “CX-One” in the above sequence.

  When the Network Configurator starts, the following window is displayed.



Main Window

The Main Window consists of a Hardware List and a Network Configuration pane, as shown in the following diagram.

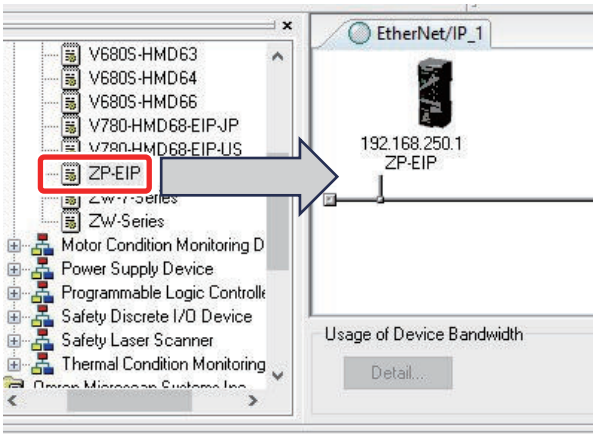


You can manage two or more networks by adding networks.
Refer to *Starting the Network Configurator* in the user's manual for your OMRON EtherNet/IP scanner for how to add a network.

3-2-2 Registering Devices

Register all of the devices required in the equipment (such as EtherNet/IP scanners and Communication Units to participate in tag data links) in the network configuration.

1 Register the device to participate in the tag data links by dragging it from the Hardware List on the left side of the window to the Network Configuration pane on the right side.
The icon of the device is displayed in the Network Configuration pane, as shown in the following diagram.
Be sure to select a device with the same major CIP revision (Rev ☐).



You can also select a device in the Hardware List and press the Enter key to register it.

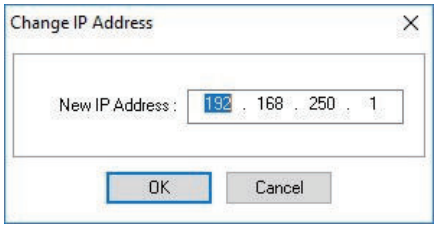
Precautions for Correct Use

Make sure that the device name and major CIP revision of the device to register match those of the actual device to use. If the device name or major CIP revision is incorrect, the following will occur when you attempt to download tag data link parameters in the Network Configurator.

- If the device name is incorrect
  A **Specified device can not be accessed, or wrong device type** message will be displayed, and the download will fail.
- If the major CIP revision is incorrect
  A **Wrong unit revision** message will be displayed, and the download will fail.

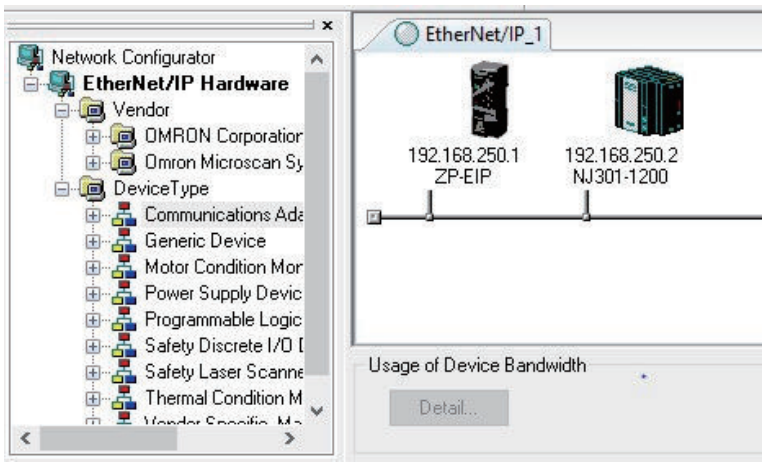
If the download fails, change the device name or major CIP revision of the device to register so that they match those of the actual device to use. Refer to *Changing Devices* in the user's manual for your OMRON EtherNet/IP scanner for how to change devices.
The device will operate in the same manner as above when you upload or verify the tag data link parameters.

2 Right-click the icon of the registered device and select **Change Node Address**.
The **Change IP Address** dialog box is displayed.



3 Set the IP address of the registered device to match the IP address of the actual device. After you make the setting, click the **OK** button.
If you plan to perform software settings to set the IP address with the Network Configurator, set the IP address on the actual device in advance.
Refer to *Setting the IP Address* on page 3-9 for the setting procedure.

4 Repeat steps 1 to 3, and register all devices to which tag data links are made.



3-2-3 Setting TCP/IP

This section describes the TCP/IP settings for the Communication Unit. It also describes the methods to go online with the network, which you need to configure the settings.

Going Online

There are several ways to go online with the EtherNet/IP network from the Network Configurator. The connection method depends on the OMRON EtherNet/IP scanner to connect to. For example, to connect to the built-in EtherNet/IP port on an NJ/NX-series CPU Unit as a scanner, you can use the following connection methods.

- Connecting through Ethernet
- Connecting through CPU Unit's USB port
- Direct Connection to built-in EtherNet/IP port via Ethernet

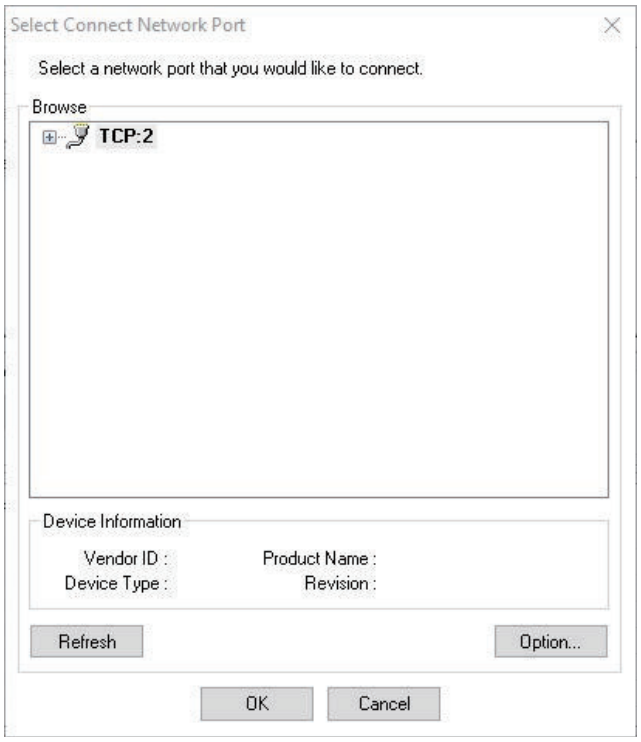
Here, connecting through Ethernet is described.
Refer to *Connecting the Network Configurator to the Network* in the user's manual for your OMRON EtherNet/IP scanner for other connection methods.

● Connecting through Ethernet

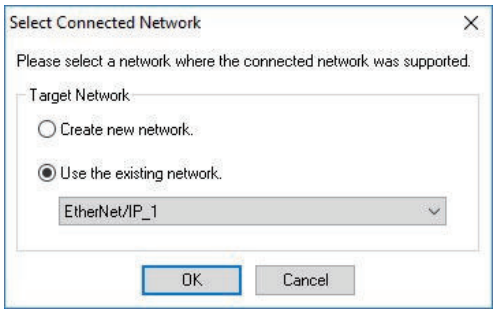
You can connect the Network Configurator to the Communication Unit either directly or thorough an Ethernet switch.

1 Select **Option** – **Select Interface** – **Ethernet I/F**.

2 Select **Network** – **Connect**.
If there are multiple Ethernet interfaces on the computer, the **Select Interface** dialog box is displayed. Select the interface to connect, and press the **OK** button.
The following dialog box is displayed.

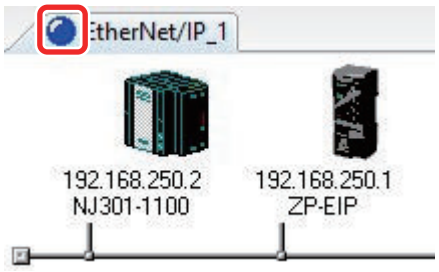


3 Click the **OK** button.
The following dialog box is displayed.



4 Select the network to connect to and click the **OK** button.
The Network Configurator is connected to the EtherNet/IP network.
If the Network Configurator goes online normally, **On-line** is displayed in the status bar at the bottom of the window. The network connection icon is displayed in blue on the Network tab page in which the Network Configurator is connected.

Network connection icon



Setting the IP Address

There are several ways to set the IP address of the Communication Unit.
Use the rotary switches on the front panel of the Unit to specify the setting method for the IP address.

Set value (hex)		Setting Method	Reference
Third octet	Fourth octet		
00 to FF	00	Directly Setting the IP Address with the Network Configurator	*Directly Setting the IP Address with the Network Configurator* on page 3-9
		Getting the IP Address from the BOOTP Server with the Network Configurator	*Getting the IP Address from the BOOTP Server with the Network Configurator* on page 3-11
		Getting the IP Address from the DHCP Server with the Network Configurator	*Getting the IP Address from the DHCP Server with the Network Configurator* on page 3-13
00 to FF	01 to FE	Directly Setting the IP Address with Hardware Switches	*Directly Setting the IP Address with Hardware Switches* on page 3-15
00	FF	Getting the IP Address from the BOOTP Server with Hardware Switches	*Getting the IP Address from the BOOTP Server with Hardware Switches* on page 3-16
01 to FF	FF	Getting the IP Address from the DHCP Server with Hardware Switches	*Getting the IP Address from the DHCP Server with Hardware Switches* on page 3-16

Precautions for Correct Use

By default, the Communication Unit is set as follows.
- IP address: Fixed to 192.168.250.1
- IP address conflict detection: Enabled

This means that using two or more Communication Units with the default settings will cause IP address conflict when the Unit/input power is supplied.

● Directly Setting the IP Address with the Network Configurator

The following describes how to use the Network Configurator to directly set the IP address.

Precautions for Correct Use

If you have two or more Communication Units for which to set IP addresses, connect them to the network one at a time, and download the TCP/IP Configuration's IP address parameters with the Network Configurator.
By default, the Communication Unit is set as follows.
- IP address: Fixed to 192.168.250.1
- IP address conflict detection: Enabled

This means that using two or more Communication Units with the default settings will cause IP address conflict when the Unit/input power is supplied.

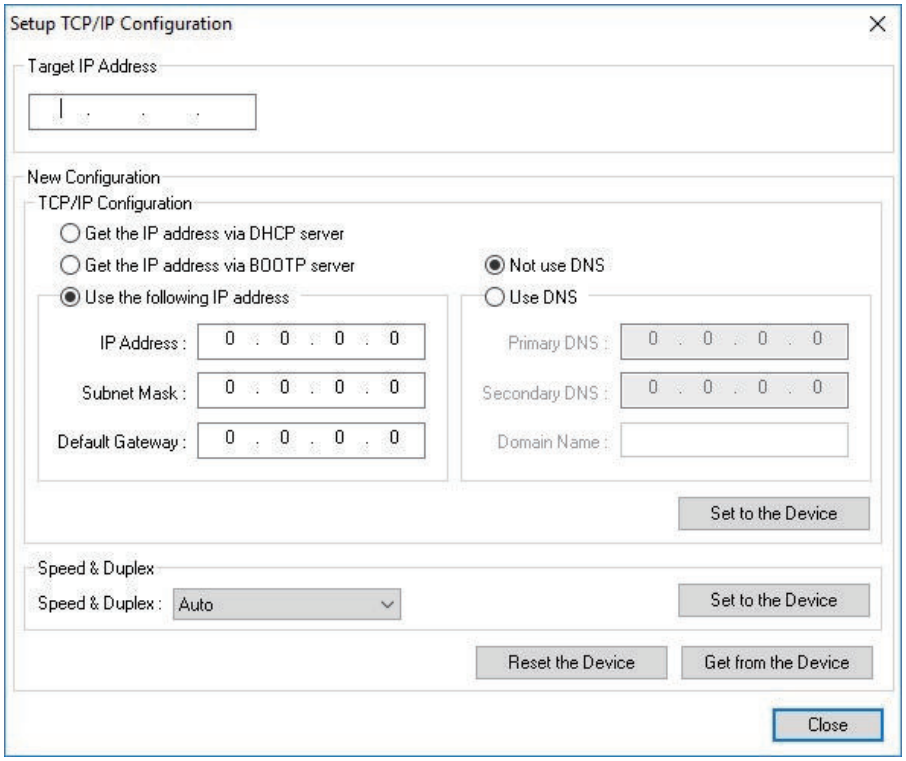
1 Set the rotary switches as follows, and turn ON the Unit/input power supply to the Communication Unit.

Third octet switches: Any value between 00 to FF hex

Fourth octet switches: 00 hex

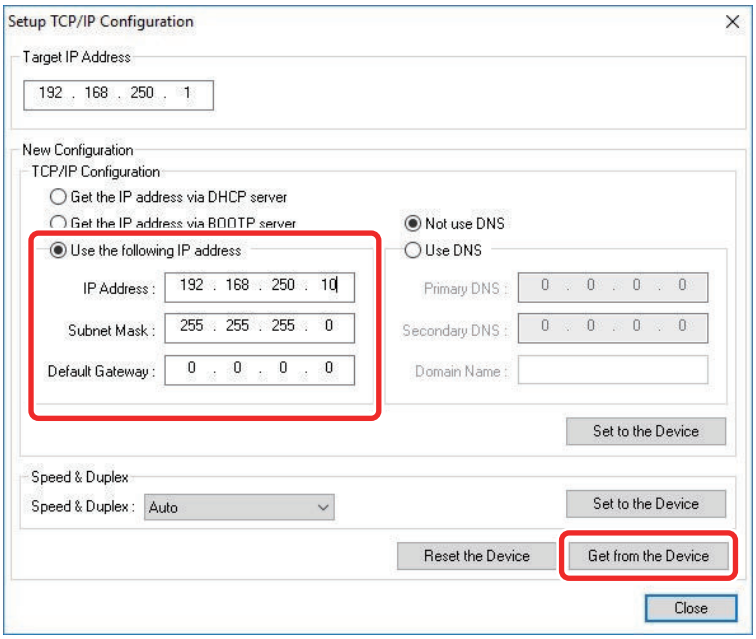
2 Go online with the network that includes the Communication Unit to set up.

3 Select **Tools** – **Setup TCP/IP Configuration** from the menu.
The **Setup TCP/IP Configuration** dialog box is displayed. In the dialog box below, the default settings are shown.



4 In the **Setup TCP/IP Configuration** dialog box, enter the settings for the Communication Unit.

1) In the **Target IP Address** area, enter the IP address of the Communication Unit (192.168.250.1 by default).
2) In the **New Configuration** area, select the **Use the following IP address** option, and set the IP address, subnet mask, and default gateway.



Additional Information

Clicking the **Get from the Device** button sets the present settings in the **New Configuration** area. Use this method as necessary.

5 Select the **Not use DNS** option.

6 In the **New Configuration** – **TCP/IP Configuration** area, click the **Set to the Device** button.
The IP address settings that you configured in the **New Configuration** area are downloaded to the Communication Unit.

Precautions for Correct Use

- Setting an incorrect target IP address causes connection to an unexpected device, which results in setting incorrect device parameters.
  Download data only after you confirm the IP address of the connected device.
- If the ACD Setting is Enable (default) and the set IP address is assigned to another device, IP address conflict will occur.

● Getting the IP Address from the BOOTP Server with the Network Configurator

The following describes how to specify the Network Configurator to get the IP address from the BOOTP server.

Precautions for Correct Use

If you have two or more Communication Units for which to set IP addresses, connect them to the network one at a time, and download the TCP/IP Configuration's IP address parameters with the Network Configurator.
By default, the Communication Unit is set as follows.
- IP address: Fixed to 192.168.250.1
- IP address conflict detection: Enabled

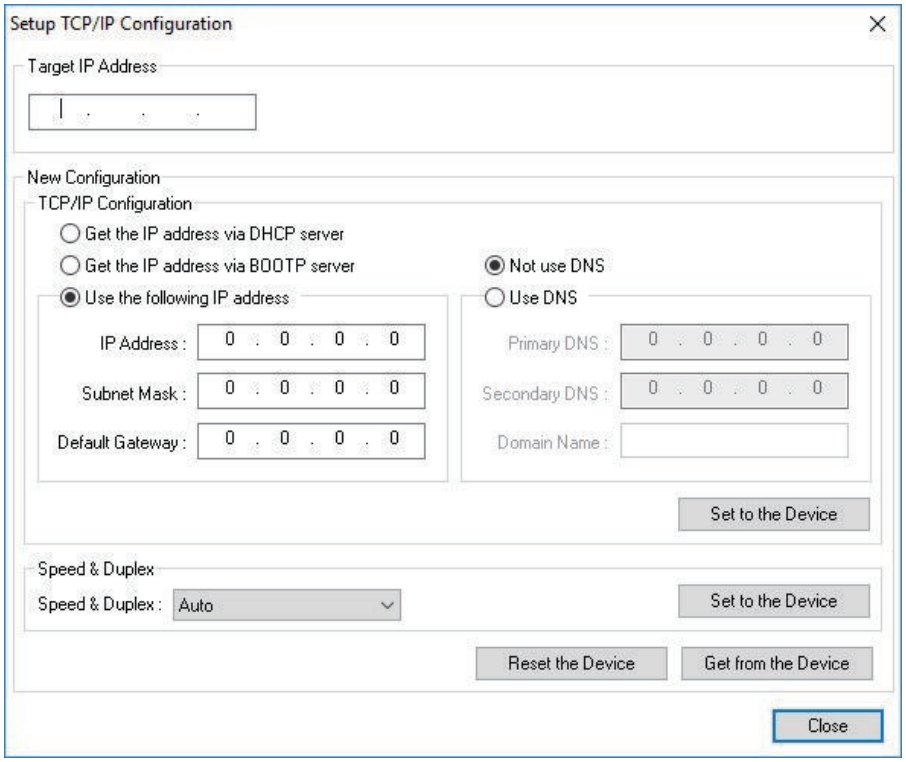
This means that using two or more Communication Units with the default settings will cause IP address conflict when the Unit/input power is supplied.

On the BOOTP server, create a pairing table of the MAC addresses of Communication Units and the IP addresses assigned to the Communication Units in advance. Refer to the instruction manual for your BOOTP server for how to create a pairing table.
The MAC address of the Communication Unit is printed on a label attached to the right side of the Unit. Refer to *2-3-1 Parts and Names* on page 2-6 in for the location of the MAC address label.

1 Set the rotary switches as follows, and turn ON the Unit/input power supply to the Communication Unit.
Third octet switches: Any value between 00 to FF hex
Fourth octet switches: 00 hex

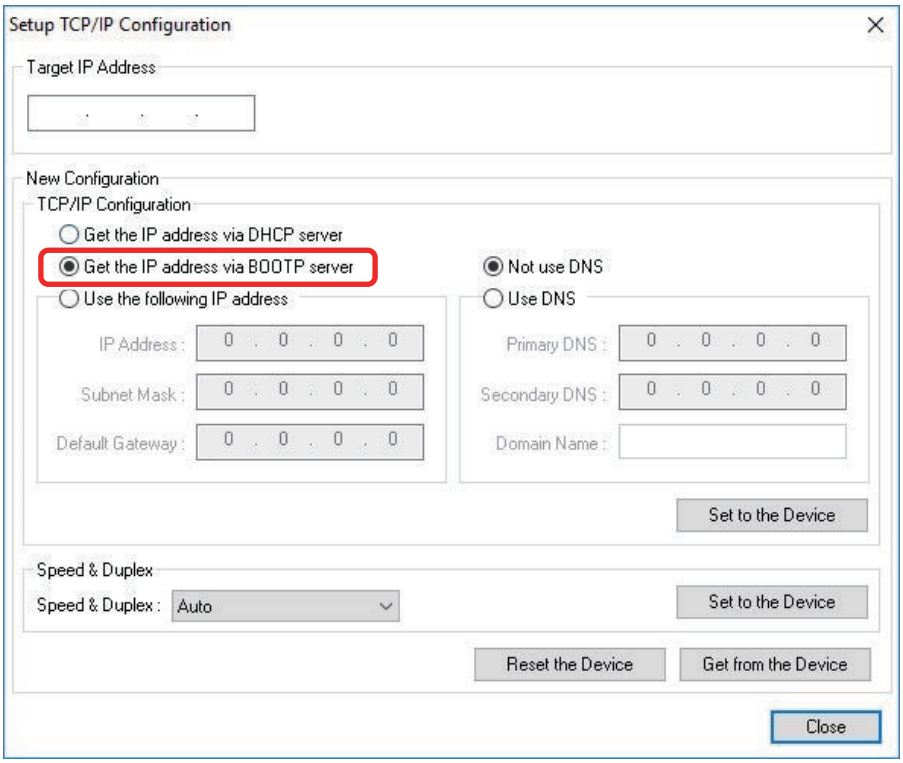
2 Go online with the network that includes the Communication Unit to set up.

3 Select **Tools** – **Setup TCP/IP Configuration** from the menu.
The **Setup TCP/IP Configuration** dialog box is displayed. In the dialog box below, the default settings are shown.



4 In the **Setup TCP/IP Configuration** dialog box, enter the settings for the Communication Unit.

1) In the **Target IP Address** area, enter the IP address of the Communication Unit (192.168.250.1 by default).
2) In the **New Configuration** area, select the **Get the IP address via BOOTP server** option.



5 In the **New Configuration** – **TCP/IP Configuration** area, click the **Set to the Device** button.
The settings that are required to get IP address from the BOOTP server are downloaded to the Communication Unit.

6 Cycle the Unit/input power supply or restart the Unit.
The Communication Unit gets the IP address from the BOOTP server.

● Getting the IP Address from the DHCP Server with the Network Configurator

The following describes how to specify the Network Configurator to get the IP address from the DHCP server.

Precautions for Correct Use

If you have two or more Communication Units for which to set IP addresses, connect them to the network one at a time, and download the TCP/IP Configuration's IP address parameters with the Network Configurator.
By default, the Communication Unit is set as follows.

- IP address: Fixed to 192.168.250.1
- IP address conflict detection: Enabled

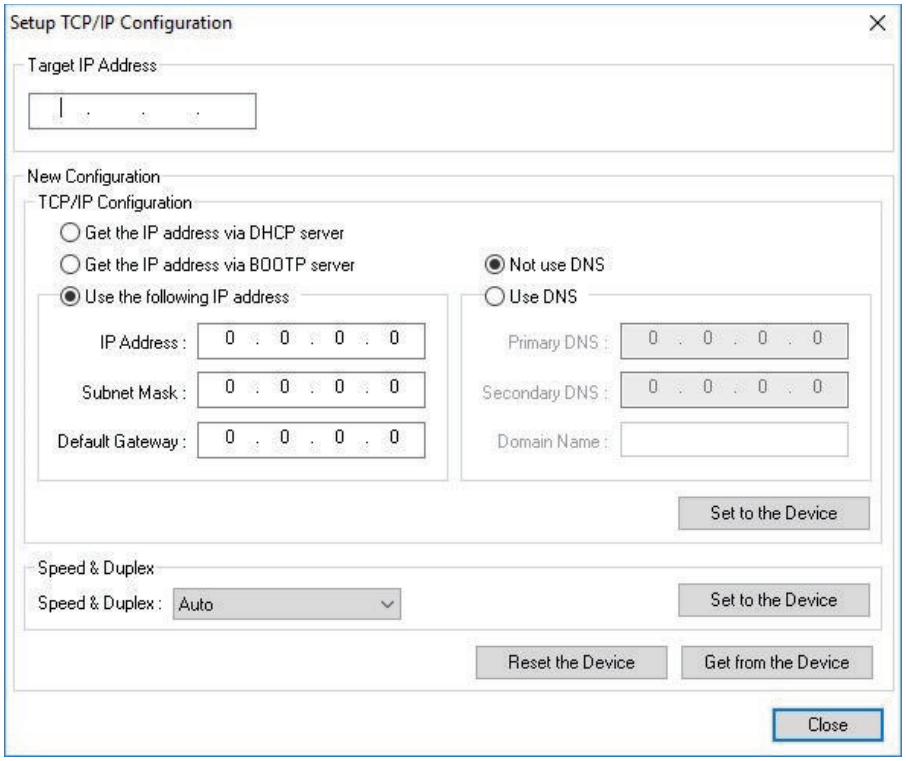
This means that using two or more Communication Units with the default settings will cause IP address conflict when the Unit/input power is supplied.

On the DHCP server, create a pairing table of the MAC addresses of Communication Units and the IP addresses assigned to the Communication Units in advance. Refer to the instruction manual for your DHCP server for how to create a pairing table.
The MAC address of the Communication Unit is printed on a label attached to the right side of the Unit. Refer to *2-3-1 Parts and Names* on page 2-6 in for the location of the MAC address label.

1 Set the rotary switches as follows, and turn ON the Unit/input power supply to the Communication Unit.
Third octet switches: Any value between 00 to FF hex
Fourth octet switches: 00 hex

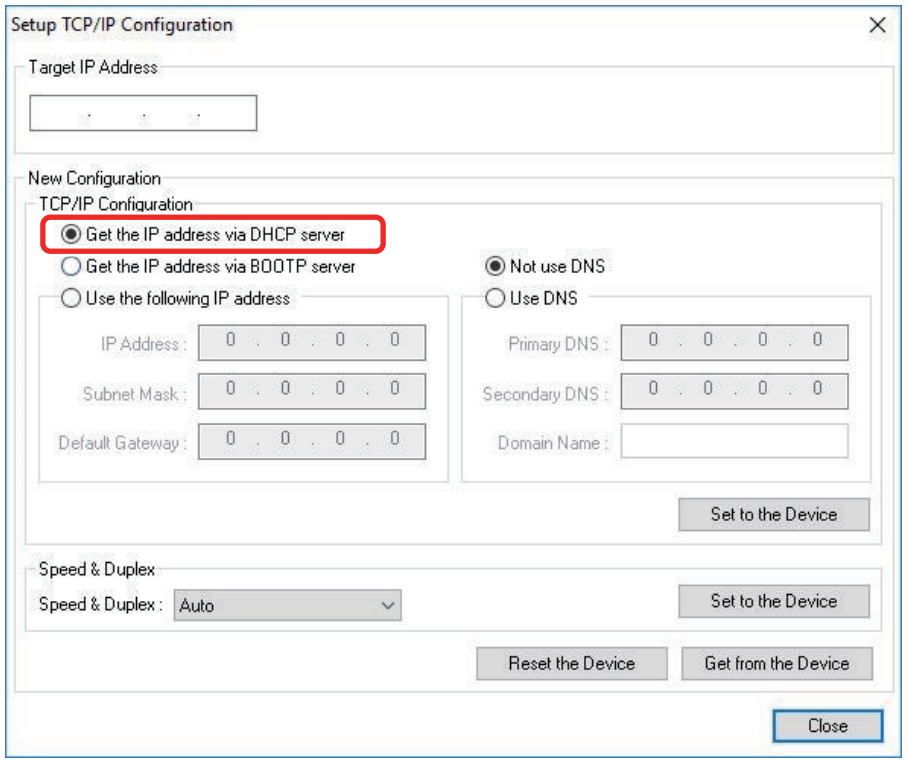
2 Go online with the network that includes the Communication Unit to set up.

3 Select **Tools** – **Setup TCP/IP Configuration** from the menu.
The **Setup TCP/IP Configuration** dialog box is displayed. In the dialog box below, the default settings are shown.



4 In the **Setup TCP/IP Configuration** dialog box, enter the settings for the Communication Unit.

1) In the **Target IP Address** area, enter the IP address of the Communication Unit (192.168.250.1 by default).
2) In the **New Configuration** area, select the **Get the IP address via DHCP server** option.

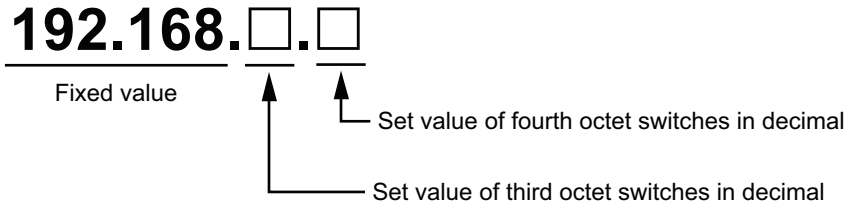


5 In the **New Configuration** – **TCP/IP Configuration** area, click the **Set to the Device** button.
The settings that are required to get IP address from the DHCP server are downloaded to the Communication Unit.

6 Cycle the Unit/input power supply or restart the Unit.
The Communication Unit gets the IP address from the DHCP server.

● Directly Setting the IP Address with Hardware Switches

The following describes how to set the IP Address directly with hardware switches.
Use the third and fourth octet switches to directly set the IP address.
The relationship between the switch settings and the set IP address are as follows.



Rotary switches	Setting range (hex)
Third octet switches	00 to FF
Fourth octet switches	01 to FE

For example, when the set values of the rotary switches are as follows, the IP address is 192.168.17.34.

- Set value of third octet switches: 11 hex
- Set value of fourth octet switches: 22 hex

Precautions for Correct Use

- The Communication Unit gets the set IP address value when the Unit/input power supply is turned ON, or the Unit is restarted.
  This means that the IP address of the Communication Unit is not changed even if you change the IP address setting while power is supplied.
- If the ACD Setting is Enable (default) and the set IP address is assigned to another device, IP address conflict will occur.

● Getting the IP Address from the BOOTP Server with Hardware Switches

The following describes how to get the IP Address from the BOOTP server with hardware switches.
You can set the hardware switches to get the IP address from the BOOTP server.
The switch settings are as follows.

Rotary switches	Set value (hex)
Third octet switches	00
Fourth octet switches	FF

On the BOOTP server, create a pairing table of the MAC addresses of Communication Units and the IP addresses assigned to the Communication Units in advance. Refer to the instruction manual for your BOOTP server for how to create a pairing table.
The MAC address of the Communication Unit is printed on a label attached to the right side of the Unit. Refer to *2-3-1 Parts and Names* on page 2-6 in for the location of the MAC address label.
The Communication Unit gets the IP address from the BOOTP server to make it its local IP address every time the Unit/input power supply is turned ON, or the Unit is restarted.

Precautions for Correct Use

- If the Communication Unit cannot get the IP address from the BOOTP server during a period of 60 seconds after the Unit/input power supply is turned ON, or the Unit is restarted, a BOOTP/DHCP Server Connection Error occurs. The Unit will continue to try to get the IP address from the BOOTP server even after the connection error occurs.
- If the Unit gets an illegal address from the BOOTP server, an TCP/IP Setting Error (Local IP Address) occurs. The Unit will continue to try to get an IP address from the BOOTP server even after the setting error occurs.
- To cancel getting the IP address from the BOOTP server, change the rotary switch settings, and then cycle the Unit/input power supply or restart the Unit.

● Getting the IP Address from the DHCP Server with Hardware Switches

The following describes how to get the IP Address from the DHCP server with hardware switches.
You can set the hardware switches to get the IP address from the DHCP server.
The switch settings are as follows.

Rotary switches	Set value (hex)
Third octet switches	01
Fourth octet switches	FF

On the DHCP server, create a pairing table of the MAC addresses of Communication Units and the IP addresses assigned to the Communication Units in advance. Refer to the instruction manual for your DHCP server for how to create a pairing table.

The MAC address of the Communication Unit is printed on a label attached to the right side of the Unit. Refer to *2-3-1 Parts and Names* on page 2-6 in for the location of the MAC address label.
The Communication Unit gets the IP address from the DHCP server to make it its local IP address every time the Unit/input power supply is turned ON, or the Unit is restarted.

Precautions for Correct Use

- If the Communication Unit cannot get the IP address from the DHCP server during a period of 60 seconds after the Unit/input power supply is turned ON, or the Unit is restarted, a BOOTP/DHCP Server Connection Error occurs. The Unit will continue to try to get the IP address from the DHCP server even after the connection error occurs.
- If the Unit gets an illegal address from the DHCP server, an TCP/IP Setting Error (Local IP Address) occurs. The Unit will continue to try to get an IP address from the DHCP server even after this error occurs.
- To cancel getting the IP address from the DHCP server, change the rotary switch settings, and then cycle the Unit/input power supply or restart the Unit.

● Resetting the IP Address If You Forget the IP Address of the ZP-L

The following is an example of resetting the IP address if you forget the IP address of the main unit and cannot connect to Wave Inspire ZP or the external device connected via the TCP/IP no-protocol or explicit message protocol.

1 Set the third octet to FA (hex) and the fourth octet to 01 (hex) on the hardware switch and connect to Wave Inspire ZP with the IP address *192.168.250.1*.

2 In Wave Inspire ZP, execute the Initialize command.
The Initialize command restarts the Communication Unit with the internal IP address reset to the default *192.168.250.1* and disconnect it from the computer (on which Wave Inspire ZP is running).

3 Reset all hardware switches to 0.

4 Connect the Communication Unit to Wave Inspire ZP again with the default IP address *192.168.250.1* and then set any IP address.

4

Specifications of I/O Data

This section describes the specifications of I/O data for the Communication Unit.

4-1 Tag Data Links

4-1-1 Tag Data Links Overview

Tag data links enable cyclic tag data exchanges between an EtherNet/IP scanner and Communication Units in an EtherNet/IP network.

With a tag data link, one node requests the connection of a communications line to exchange data with another node.
The node that requests the connection is called the originator, and the node that receives the request is called the target.

For communications between an EtherNet/IP scanner and a Communication Unit, connection information is set in the EtherNet/IP scanner that is the originator.
The output data and input data for each node for which data is exchanged are set in the connection information. These data are called output tag set and input tag set. A tag set in the EtherNet/IP scanner must specify a tag.

The following section describes tags and tag sets that are used in communications between the EtherNet/IP scanner and the Communication Unit.

4-1-2 Tag Data Link Data Areas

Tags

A tag is a unit that is used to exchange data with tag data links.
For communications between an EtherNet/IP scanner and a Communication Unit, specify a network variable or I/O memory area of EtherNet/IP scanner for each tag.

Precautions for Correct Use

If you use an NJ/NX-series CPU Unit as the Controller, you must set refreshing tasks to maintain concurrency in the values of network variables that are assigned to tags. Refer to the user's manual for the OMRON EtherNet/IP scanner that you use for details.

Tag Sets

A tag set represents a unit of data that is used to establish a tag data link connection. A tag data link is created by linking one tag set to another with a connection. There are input tag sets and output tag sets.
A connection is used to exchange data as a unit within which data concurrency is maintained. Thus, data concurrency is maintained for all the data exchanged for the tags in one data set.

● Tag Sets for the Communication Unit

The Communication Unit provides only one type of input and output tag sets. Refer to *4-2-1 Input and Output Tag Sets* on page 4-5 for details on the input and output tag sets for the Communication Unit.

● Tag Sets for the EtherNet/IP Scanner

Each tag set in an EtherNet/IP scanner must specify at least one tag. A tag set can contain only input tags or only output tags. The same input tag cannot be included in more than one input tag set.

In communications between an EtherNet/IP scanner and a Communication Unit, the size of the data for data exchange is the total size of the tags included in the tag set. The data size of tag sets for the EtherNet/IP scanner must match the size of tag sets for the Communication Unit. Specify the size of each tag so that the size of the tag sets matches as follows.

- Input tag set for the EtherNet/IP scanner and output tag set for the Communication Unit
- Output tag set for the EtherNet/IP scanner and input tag set for the Communication Unit

● Setting Tag Set Names

A tag set name must be set for each tag set in the EtherNet/IP scanner. The setting is not required for tag set names for the input and output tag sets provided in the Communication Unit as they have predefined tag set names.

4-1-3 Connection Type and Packet Interval (RPI)

This section describes the following parameters for connection setting in the tag data link setting procedure.

- Connection type
- Packet Interval (RPI)

Connection Type

A multicast connection (Multi-cast connection) or unicast connection (Point to Point connection) can be selected as the connection type in the tag data link connection settings. With a multicast connection, you can send an output tag set in one packet to multiple nodes and make allocations to the input tag sets. If multicast connections are used, however, use an Ethernet switch that has multicast filtering. Otherwise, the tag set is received by all nodes in the network.

A unicast connection separately sends one output tag set to each node, and so it sends the same number of packets as the number of input tag sets. Therefore, using multicast connections can decrease the communications load if one output tag set is sent to multiple nodes.

If an Ethernet switch that does not have multicast filtering is used, the multicast packets will be broadcast to the entire network and packets will be sent to nodes that do not require them, which will cause the communications load on those nodes to increase.

To use a multicast connection and send an output tag set in one packet to multiple nodes, the connection type of the connections that receive the output tag set is multicast, and the output tag set and packet intervals (RPI) are all the same. Note that, if you use a multicast connection, establishing a connection failed when setting a different packet interval (RPI) for more than one connection with the same output tag set. If you set a different packet interval (RPI), set the unicast connection type.

Packet Interval (RPI)

The packet interval (RPI: Requested Packet Interval) is the data I/O refresh cycle in the Ethernet circuit when performing tag data links, and can be set separately for each connection. With EtherNet/IP, data is exchanged on the communications line at the packet interval (RPI) that is set for each connection, regardless of the number of nodes.
The performance of communications devices is limited to some extent by the limitations of each product's specifications. Consequently, there are limits to the packet interval (RPI) settings. Refer to *A-2-3 Setting the Connection* on page A-10 for the specifications of the Communication Unit. Refer to the user's manual for EtherNet/IP scanner that you use for the specifications of the EtherNet/IP scanner.

● Bandwidth Usage (PPS)

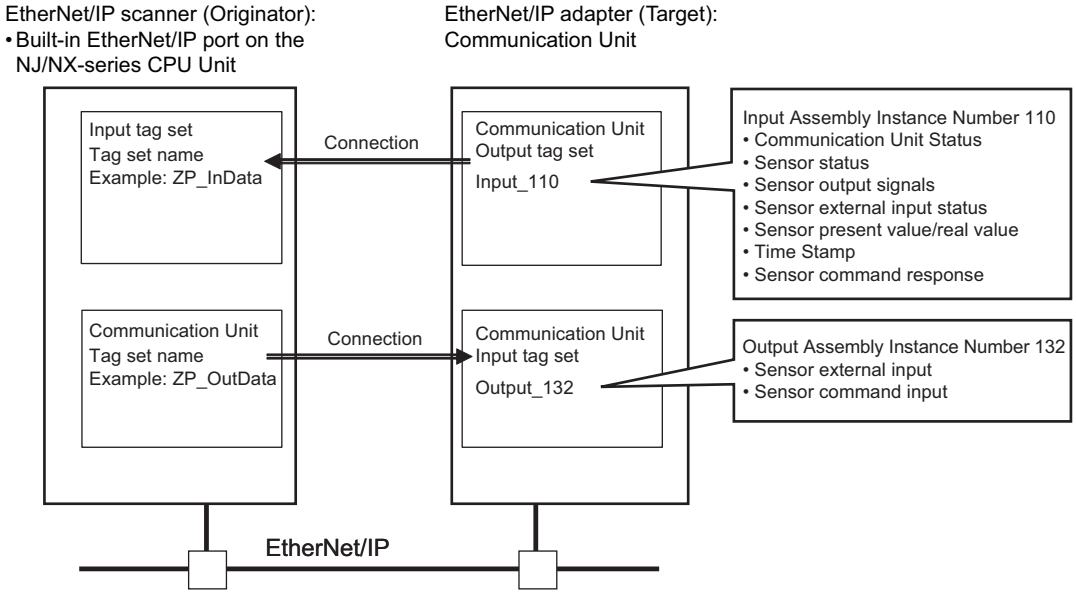
The number of packets transferred by a tag data link in a second is called the used bandwidth or PPS. PPS is an acronym for packet per second.
The PPS is calculated from the RPI and heartbeat for each connection. The PPS must be calculated so that it does not exceed the specification of the allowed communications bandwidth per Unit specified for both the EtherNet/IP scanner and the Communication Unit. Refer to the user's manual for EtherNet/IP scanner that you use for details on the calculation method. Refer to *A-1-3 EtherNet/IP Communications Specifications* on page A-3 for the specifications of the Communication Unit. Refer to the user's manual for EtherNet/IP scanner that you use for the specifications of the EtherNet/IP scanner.

4-1-4 Setting Method

Refer to *A-2 Setting Tag Data Links* on page A-5 for details on how to set tag data links.

4-2 Tag Sets

This section describes the I/O data for a Communication Unit.
Between an EtherNet/IP scanner and a Communication Unit, I/O data exchange is performed with tag data link communications. This means that the I/O data for a Communication Unit is defined with input and output tag sets.



4-2-1 Input and Output Tag Sets

The input and output tag sets that can be assigned to the Communication Unit are given below.

Implicit message connections	Connection I/O type	Communication Unit Output Tag Set		Communication Unit Input Tag Set	
		PLC Input Assembly Instance Number	Data size [bytes]	PLC Input Assembly Instance Number	Data size [bytes]
Exclusive Owner	Full	110	276	132	24

Additional Information

If you select Exclusive Owner for implicit message connections, the Communication Unit will stop sending the output tag set to the EtherNet/IP scanner when a connection timeout occurs. Using the output tag set for Exclusive Owner for Multi-cast connection also causes the Communication Unit to temporarily stop sending data to other EtherNet/IP scanner that uses the same output tag set for Multi-cast connection. To prevent the Unit from temporarily stop sending data, use the output tag set for Exclusive Owner in a Point to Point connection.

4-2-2 Types and Data Configuration of Tag Sets

This section describes the types and data configuration of output and input tag sets.

Types of Communication Unit Output Tag Sets (Input Data)

An output tag set is the input data in the Communication Unit, which is sent to the EtherNet/IP scanner.
The type of an output tag set is defined as the type of the Input Assembly that makes up the output tag set. The type of an Input Assembly is distinguished by the instance number.
The following describes the data configuration of the Input Assembly for each Input Assembly Instance Number.

● Input Assembly Instance Number 110

Name	Address (Byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Communication Unit Status	0	Ready	Reserved		Communication Unit External Input Status IN1	Communication Unit External Input Status IN2	Reserved	Reserved	Communication Unit Error Status
	1	Overall Error Status	Overall Warning Status	Reserved	Communication Unit External Output OUT1	Communication Unit External Output OUT2	Reserved	Reserved	Reserved
Sensor Error Status	2	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	3	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Sensor Warning Status	4	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	5	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Reserved	6	Reserved							
	7								
Reserved	8	Reserved							
	9								
Sensor Enable	10	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	11	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Reserved	12	Reserved							
	13								
Reserved	14	Reserved							
	15								
Reserved	16	Reserved							
	17								
Sensor Output 1 (HIGH)	18	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	19	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Sensor Output 2 (LOW)	20	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	21	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Sensor Output 3 (PASS)	22	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	23	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Reserved	24	Reserved							
	25								
Reserved	26	Reserved							
	27								
External Input Status 1 (External Input 1)	28	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	29	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09

Name	Address (Byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
External Input Status 2 (External Input 2)	30	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	31	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
External Input Status 3 (External Input 3)	32	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	33	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
External Input Status 4 (External Input 4)	34	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	35	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Sensor Busy Status	36	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	37	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Reserved	38	Reserved							
	39								
Reserved	40	Reserved							
	41								
Reserved	42	Reserved							
	43								
Reserved	44	Reserved							
	45								
Reserved	46	Reserved							
	47								
Measurement Value	48	Output Data 1 (32-bit signed integer)							
	49								
	50								
	51								
	52	Output Data 2 (32-bit signed integer)							
	53								
	54								
	55								
	56	Output Data 3 (32-bit signed integer)							
	57								
	58								
	59								
	60	Output Data 4 (32-bit signed integer)							
	61								
	62								
	63								
	64	Output Data 5 (32-bit signed integer)							
	65								
	66								
	67								
	68	Output Data 6 (32-bit signed integer)							
	69								
	70								
	71								
	72	Output Data 7 (32-bit signed integer)							
	73								
	74								
	75								

Name	Address (Byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	76	Output Data 8 (32-bit signed integer)							
	77								
	78								
	79								
	80	Output Data 9 (32-bit signed integer)							
	81								
	82								
	83								
	84	Output Data 10 (32-bit signed integer)							
	85								
	86								
	87								
	88	Output Data 11 (32-bit signed integer)							
	89								
	90								
	91								
	92	Output Data 12 (32-bit signed integer)							
	93								
	94								
	95								
	96	Output Data 13 (32-bit signed integer)							
	97								
	98								
	99								
	100	Output Data 14 (32-bit signed integer)							
	101								
	102								
	103								
	104	Output Data 15 (32-bit signed integer)							
	105								
	106								
	107								
	108	Output Data 16 (32-bit signed integer)							
	109								
	110								
	111								
	112	Output Data 17 (32-bit signed integer)							
	113								
	114								
	115								
	116	Output Data 18 (32-bit signed integer)							
	117								
	118								
	119								
	120	Output Data 19 (32-bit signed integer)							
	121								
	122								
	123								

Name	Address (Byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	124	Output Data 20 (32-bit signed integer)							
	125								
	126								
	127								
Time Stamp	128	Time information: Elapsed time (ms) since January 1, 1970							
	129								
	130								
	131								
	132								
	133								
	134	Reserved							
	135								
Measured Real Value CH Data (RV value)	136	Measured Real Value CH1 Data (32-bit signed integer)							
	137								
	138								
	139								
	140	Measured Real Value CH2 Data (32-bit signed integer)							
	141								
	142								
	143								
	144	Measured Real Value CH3 Data (32-bit signed integer)							
	145								
	146								
	147								
	148	Measured Real Value CH4 Data (32-bit signed integer)							
	149								
	150								
	151								
	152	Measured Real Value CH5 Data (32-bit signed integer)							
	153								
	154								
	155								
	156	Measured Real Value CH6 Data (32-bit signed integer)							
	157								
	158								
	159								
	160	Measured Real Value CH7 Data (32-bit signed integer)							
	161								
	162								
	163								
	164	Measured Real Value CH8 Data (32-bit signed integer)							
	165								
	166								
	167								
	168	Measured Real Value CH9 Data (32-bit signed integer)							
	169								
	170								
	171								

Name	Address (Byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	172	Measured Real Value CH10 Data (32-bit signed integer)							
	173								
	174								
	175								
	176	Measured Real Value CH11 Data (32-bit signed integer)							
	177								
	178								
	179								
	180	Measured Real Value CH12 Data (32-bit signed integer)							
	181								
	182								
	183								
	184	Measured Real Value CH13 Data (32-bit signed integer)							
	185								
	186								
	187								
	188	Measured Real Value CH14 Data (32-bit signed integer)							
	189								
	190								
	191								
	192	Measured Real Value CH15 Data (32-bit signed integer)							
	193								
	194								
	195								
	196	Measured Real Value CH16 Data (32-bit signed integer)							
	197								
	198								
	199								
Reserved	200	Reserved							
	201								
	202								
	203								
	204	Reserved							
	205								
	206								
	207								
	208	Reserved							
	209								
	210								
	211								
	212	Reserved							
	213								
	214								
	215								
	216	Reserved							
	217								
	218								
	219								

Name	Address (Byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	220	Reserved							
	221								
	222								
	223								
	224	Reserved							
	225								
	226								
	227								
	228	Reserved							
	229								
	230								
	231								
	232	Reserved							
	233								
	234								
	235								
	236	Reserved							
	237								
	238								
	239								
	240	Reserved							
	241								
	242								
	243								
	244	Reserved							
	245								
	246								
	247								
	248	Reserved							
	249								
	250								
	251								
	252	Reserved							
	253								
	254								
	255								
	256	Reserved							
	257								
	258								
	259								
	260	Reserved							
	261								
	262								
	263								
Command Status	264	Reserved							
	265								Command Flag

Name	Address (Byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Command Response	266	Response Command							
	267	Response Data							
	268								
	269								
	270								
	271								
	272								
Reserved	273	Reserved							
	274								
	275								

Types of Communication Unit Input Tag Sets (Output Data)

The following describes the data configuration of the Output Assembly for each Output Assembly Instance Number.

● Output Assembly Instance Number 132

Name	Address (Byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
External Input Request 1 (External Input 1)	0	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	1	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
External Input Request 2 (External Input 2)	2	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	3	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
External Input Request 3 (External Input 3)	4	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	5	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
External Input Request 4 (External Input 4)	6	CH08	CH07	CH06	CH05	CH04	CH03	CH02	CH01
	7	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH09
Reserved	8	Reserved							
	9								
Reserved	10	Reserved							
	11								
Control input	12			Reserved					Clear Communication Unit Error
	13	Clear Error	Clear Warning						Execute Command
Command input	14	Command data Refer to *4-3 Tag Data Link Commands* on page 4-16.							
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								

4-2-3 Details on Input Assembly Data

Details on the Input Assembly data are described below.

Input Assembly Data

The roles of data assigned to the Input Assembly memory map are described below.

Category	Data	Role
Communication Unit Status	Ready	This is OFF when the Communication Unit cannot accept commands. It is ON when the Communication Unit can accept commands.
	Communication Unit External Input Status	This is ON when the Communication Unit external terminal input is ON. When External Input is assigned to Communication Unit buffering control, the Communication Unit performs Communication Unit buffering control in addition to showing the input status. When the setting is assigned to *Cuing information*, the Communication Unit outputs the input status as it is.
	Communication Unit External Output Status	This outputs the execution status of Communication Unit buffering.
	Communication Unit Error Status	This is ON when an error has occurred in the Communication Unit (main unit). It is OFF when the Communication Unit (main unit) is operating normally.
	Overall Error Status	This is ON when the Sensor Error Status is ON even for one channel. It is OFF when all Amplifier Units are operating normally.
	Overall Warning Status	This is ON when the Sensor Warning Status is ON even for one channel. It is OFF when all Amplifier Units are operating normally.
Sensor Error Status		This shows the Sensor Error Status for each channel. The bit of the channel in an error state is ON.
Sensor Warning Status		This shows the Sensor Warning Status for each channel. The bit of the channel in a warning state is ON.
Sensor Enable		This shows the measurement status for each channel. The bit of the channel in an enable state (within the measurement range) is ON.
Sensor Output 1 (HIGH)		This shows the output status of HIGH judgment for each channel. The bit of the channel in an output ON state is ON.
Sensor Output 2 (LOW)		This shows the output status of LOW judgment for each channel. The bit of the channel in an output ON state is ON.
Sensor Output 3 (PASS)		This shows the output status of PASS judgment for each channel. The bit of the channel in an output ON state is ON.
External Input Status 1 (External Input 1)		This shows the input status of External Input 1 for each channel. The bit of the channel in an input ON state is ON.
External Input Status 2 (External Input 2)		This shows the input status of External Input 2 for each channel. The bit of the channel in an input ON state is ON.
External Input Status 3 (External Input 3)		This shows the input status of External Input 3 for each channel. The bit of the channel in an input ON state is ON.
External Input Status 4 (External Input 4)		This shows the input status of External Input 4 for each channel. The bit of the channel in an input ON state is ON.

Category	Data	Role
Sensor Busy Status		This shows the command executing status for each channel. The bit of the channel in a command executing state is ON.
Output Data		This outputs the present measured value data being used for output judgment. By default, the measurement value of each channel is assigned to Output Data 1 to 16, and Output Data 17 to 20 are unassigned. The settings can be changed in the *Output Target Data* settings.
Time Stamp		This shows the time information managed by the Communication Unit.
Measured Real Value Channel Data		This outputs the measured value data before calculation (RV value) based on the measured value information output from the Sensor Head as the measured real value.
Command Flag		This outputs the status of command execution.
Response Command		This shows the command part of the command response from the Amplifier Unit.
Response Data		This shows the data part of the command response from the Amplifier Unit.

Operation during Ready OFF

Communications type	Response specification
Explicit message	For commands other than NR and NW, an error response is returned. For the NR and NW commands, a normal response is returned.
TCP/IP no-protocol command	Error response
TDL command	Error response

4-2-4 Details on Output Assembly Data

Details on the Output Assembly data is described below.

Output Data

The role of data assigned to the Output Data memory map is described below.

Category	Data	Role
External Input Request		This is an external input request to the Amplifier Unit in each channel. The bit of the target channel is turned ON when the request is made, and turned OFF when the request is released.
Control Input	Execute Command	This is turned ON from OFF when command execution is instructed by the PLC to the sensor. CommandExe is turned ON from OFF once the command parameters are set. It is turned back OFF from ON based on the input condition that the command completion signal (FLG signal) from the sensor is turned ON by the PLC.
	Clear Error	This clears the recoverable error status related to the Amplifier Unit. It turns ON from OFF at the time of command execution.
	Clear Warning	This sends a warning clear request to all Amplifier Units. It turns ON from OFF at the time of command execution.
	Clear Communication Unit Error	This clears errors that have occurred inside the Communication Unit. It turns ON from OFF at the time of command execution.

Category	Data	Role
Command Input		This stores command parameters to be sent to the Amplifier Unit.

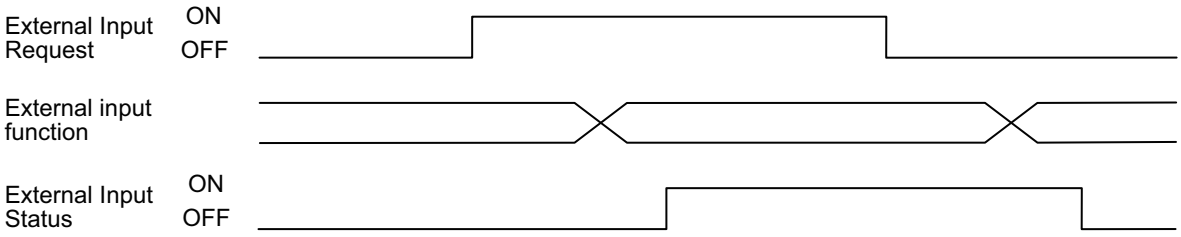
Timing Chart

External Input

This shows the Amplifier Unit's External Input Request status (4 types) for each channel.

Channel	External Input Request
1	Laser OFF
2	Zero Reset
3	Timing/Bank A
4	Reset/Bank B

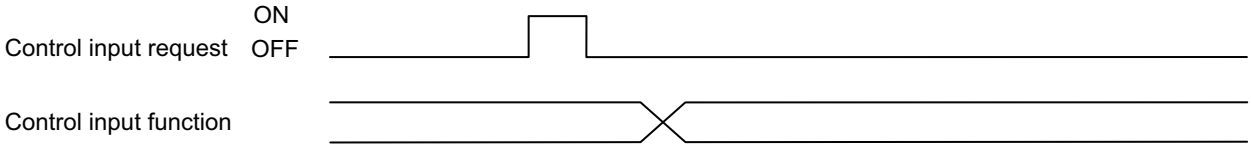
The bit of the channel in which External Input should be ON is ON.



Control Input

This shows information on the control input to the Communication Unit.
Currently, it includes the following information.

Channel	Control input request	Control input function
1	Clear Communication Unit Error	This is turned ON when error information of the Communication Unit is to be cleared.
2	Clear Error	This is turned ON when error information on the Amplifier Unit is cleared.
3	Clear Warning	This is turned ON when warning information on the Amplifier Unit is cleared.
4	Execute Command	This is turned ON when a command processing request is being made to the Communication Unit.



4-3 Tag Data Link Commands

For tag data links, there is an area for message communications.
By using the command area, you can perform message communications in cyclic communications processing as long as tag data link communications are established.

Command Code Comparison Table

Command that can be used	CIP ClassID	TDL command code
DW	0x390	0x63
DR	0x390	0x62
AD	0x392	*1

*1. Refer to the *Command code* column of the table in *A-4-3 AD Command List* on page A-68.

4-3-1 Command (Computer/PLC → Communication Unit → Amplifier Unit)

	Command (including waveform acquisition)								
Name	Address (byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Control Input	0								Clear Communication Unit Error
	1	Clear Error	Clear Warning						Execute Command
Command input	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								
	11								

Command Input Address Details

Byte	AD command	DW or DR command
2	Channel number*1	AttributeID
3		
4	TDL command code	TDL command code

Byte	AD command	DW or DR command
5	Data*2	Data
6		
7		
8		
9		
10		
11		

*1. Channel number is specified in bits.
Example:
When the command is sent to CH1, the 2nd byte is 0x01 and the 3rd byte is 0x00.
When the command is sent to CH3, the 2nd byte is 0x04 and the 3rd byte is 0x00.
When the command is sent to CH16, the 2nd byte is 0x00 and the 3rd byte is 0x80.
*2. Refer to the *Parameter data* column in *A-4-3 AD Command List* on page A-68 for the data part.

4-3-2 Response (Amplifier Unit → Communication Unit → PLC)

Name	Address (byte)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Command Status	0								
	1								Command flag
Command Response	2	Response Data							
	3	Response Command							
	4								
	5								
	6								
	7								
	8								
Reserved	9	Reserved by the system							
	10								
	11								

Command Response Address Details

Byte	AD command	DW/DR command
2	TDL command code	TDL command code
3	Data*1	Data*1
4		
5		
6		
7		
8		

*1. The 3rd and 4th bytes contain the response status.

	When OK	When NG
2nd byte	TDL command code	TDL command code
3rd byte	0x00	Error code
4th byte	0x00	0x00

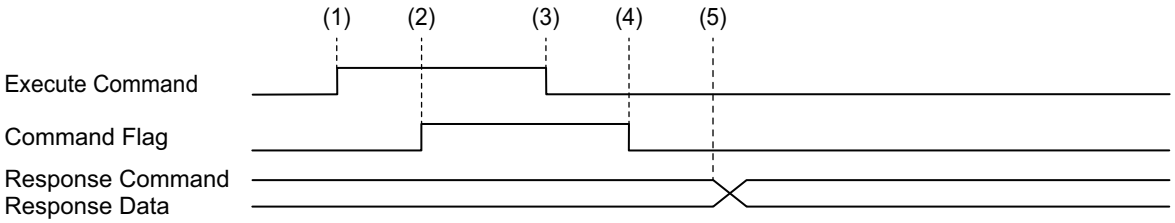
Note Refer to the *Response data* column in *A-4-3 AD Command List* on page A-68 for the data part.

Error Codes

Code	Error	Description
F0	Command error	An undefined command was received.
F1	Status error	The command processing of the Amplifier Unit or Communication Unit is not possible.
F2	Setting error	A parameter error is detected, such as an out-of-address range.
F3	Communications error	The start byte or sum value is inconsistent due to noise during communications between Amplifier Units, or other causes.

Timing Chart

Shows information on command input to the Amplifier Unit.
Currently, it includes the following information.
1. Channel number (2 bytes): Channel number of the Amplifier Unit that executes the command
2. Command ID (1 byte): ID of the command to be executed
3. Command data (6 bytes): Input data for the command to be executed



(1) Execute Command is turned ON.
(2) Command Flag is turned ON. It is turned ON immediately in response to (1).
(3) Execute Command is turned OFF.
(4) Command Flag is turned OFF. It is turned OFF immediately in response to (3).
(5) The Response Command and Response Data are updated. The period from (4) to (5) is the command response time.

5

Additional Communication Unit Functions

This section describes the functions of the ZP-series EtherNet/IP Communication Unit as an EtherNet/IP adapter.

5-1 List of Additional Functions

The following table lists the functions of the ZP-series EtherNet/IP Communication Unit as an EtherNet/IP adapter.

Category	Function name	Description	Reference
Ethernet functions	IP address setting	A function that sets the IP address of the Communication Unit. Use one of the following methods. • Hardware settings • Software settings with the Network Configurator.	*Setting the IP Address* on page 3-9
	BOOTP client	A client function that enables the Communication Unit to get the IP address of the Communication Unit from the BOOTP server. It cannot be used together with the DHCP client.	
	DHCP client	A client function that enables the Communication Unit to get the IP address of the Communication Unit from the DHCP server. It cannot be used together with the BOOTP client.	
	NTP/SNTP client	A client function that enables the Communication Unit to get the clock information from the NTP/SNTP server with automatic clock adjustment.	---
	ICMP function	The Communication Unit provides ICMP (Internet Control Message Protocol) that has the following capabilities. • Response to PING command • Destination Unreachable error response to sender	*5-2 ICMP Function* on page 5-3
EtherNet/IP functions	IP address conflict detection	A function that enables the Communication Unit to detect IP address conflict with other nodes in the same EtherNet/IP network.	*5-3 IP Address Conflict Detection* on page 5-5
	Tag data link	A function that enables cyclic tag data exchanges between an EtherNet/IP scanner and Communication Units in an EtherNet/IP network.	*4-1 Tag Data Links* on page 4-2
	Automatic clock adjustment	A function that enables Communication Units to retrieve clock information from the NTP or SNTP server after the Unit/input power supply is turned ON and update their internal clock information.	---
Application functions	Dedicated ZP-series communications function	A function that enables control input, setting changes, and information retrieval to/from the Communication Unit or the adjacent Amplifier Unit.	---
	Communication Unit buffering	A function that stores measured value information received from the Amplifier Unit in the Communication Unit based on an external command and outputs it at a user-specified timing.	*5-5 Communication Unit Buffering* on page 5-18

5-2 ICMP Function

5-2-1 Overview of Function

The Communication Unit provides ICMP (Internet Control Message Protocol) that has the following capabilities.

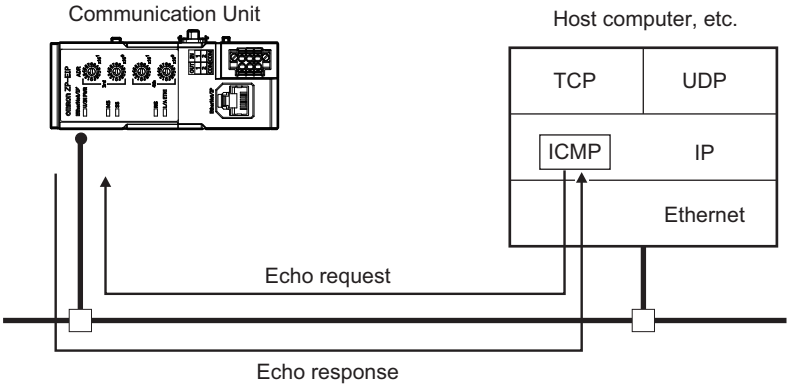
- Response to PING command
- Destination Unreachable error response to sender

5-2-2 Details on Function

This section describes the following two functions that you can use.

Response to PING Command

The PING command sends an echo request packet to a remote node and receives an echo response packet to confirm that the remote node communications are normal. The PING command uses the ICMP echo request and response. The echo response packet is automatically returned in the ICMP. The PING command is normally used to check the connections of remote nodes when you set up a network. The Communication Unit supports the ICMP response function. This enables you to execute the PING command from a computer or the host computer to the Communication Unit to perform a communications test with the Communication Unit. If the Communication Unit returns a normal response to the PING command, then it is physically connected correctly and Ethernet node settings are correct.



Refer to *Testing Communications* in the user's manual for your OMRON EtherNet/IP scanner for how to use the PING command on the host computer.

Destination Unreachable Error Response to Sender

If the UDP port specified by the sender on the Communication Unit is not open, the Communication Unit returns a Destination Unreachable error response to the sender. The Communication Unit also returns this error response on receipt of the PING command, if the response conditions are met.

5-2-3 Setting Method

No setting is required.

5-3 IP Address Conflict Detection

5-3-1 Overview of Function

A function that enables the Communication Unit to detect IP address conflict with other nodes in the same EtherNet/IP network.

5-3-2 Details on Function

- The Communication Unit detects IP address conflict during startup and during normal communications.
- If the Communication Unit detects IP address conflict, it stops the EtherNet/IP communications and reports it to you with the MS and NS indicators. Then, an *IP Address Conflict* event occurs.

Refer to *2-3-2 Indicators* on page 2-7 for details on the MS and NS indicators.
Refer to *7-5 Checking for Errors and Troubleshooting with the Event Codes of the Communication Unit* on page 7-22 for details on events.

Precautions for Correct Use

If there is more than one node with the same IP address in the EtherNet/IP network, the Communication Unit will not detect IP address conflict for the node that participates in the network first because it is connected correctly. However, it will detect IP address conflict for the second and later nodes that attempt to participate in the network.

Settings

Set the device parameters of the Communication Unit to set the IP address conflict detection function.
IP address conflict detection is enabled by default.
The settings are shown in the following table.

Setting	Description	Default	Setting range	Update timing
ACD Setting	Enable or disable IP address conflict detection.	Enable	• Enable • Disable	After restart

When you do not use this function, set *ACD Setting* to **Disable** in the Network Configurator.

How to Reset an IP Address Conflict Error

There are two methods to reset an IP address conflict error. Refer to *Setting the IP Address* on page 3-9 for details on how to set the IP address.

● Method 1

Set the IP addresses again so that the same address is not used by more than one node. When you set the IP addresses again, perform the following processing depending on the setting method. Then, the IP address conflict error will be reset.

IP address setting method	Processing
Directly set the IP address with hardware switches.	Set an IP address that is not used by other nodes with rotary switches. Then, cycle the Unit/input power supply to the node that you reset or restart the node. Then, the new IP address is read.
Directly set the IP address with the Network Configurator.	If there is more than one node with the same IP address in the same network, you cannot directly set the IP address with the Network Configurator. Therefore, remove a node with the same IP address from the network. Connect the Network Configurator to the removed node and set an IP address that is not used by other nodes for it. After you set the IP address, connect the node to the network.

● Method 2

Remove one of the two nodes that have the duplicate IP address from the network. Perform either of the following processing operations on the nodes with the duplicate address in the network.

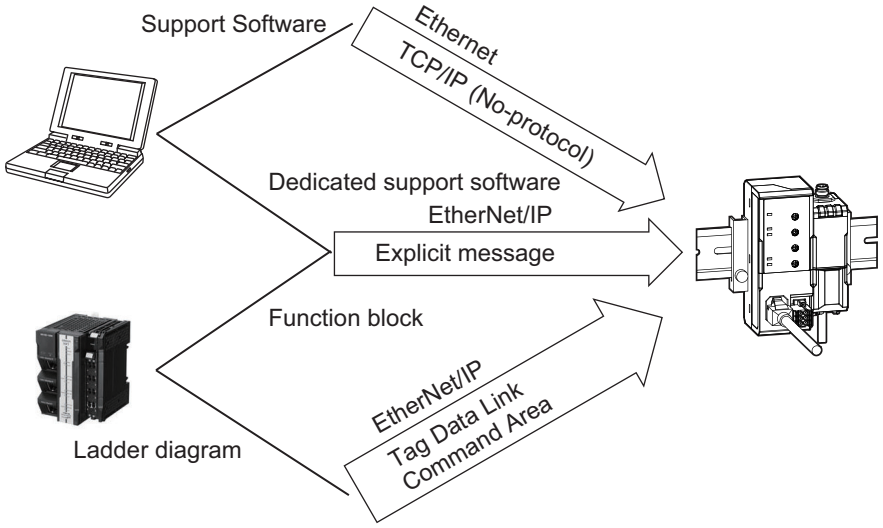
- Cycle the Unit/input power supply or restart the node.
- Remove the node from the network, and then connect it to the network again.

This resets the IP address conflict error in the node that remains in the network.

If the removed node is necessary for the system, set a different IP address to the node and then connect it to the network again.

5-4 Message Communications

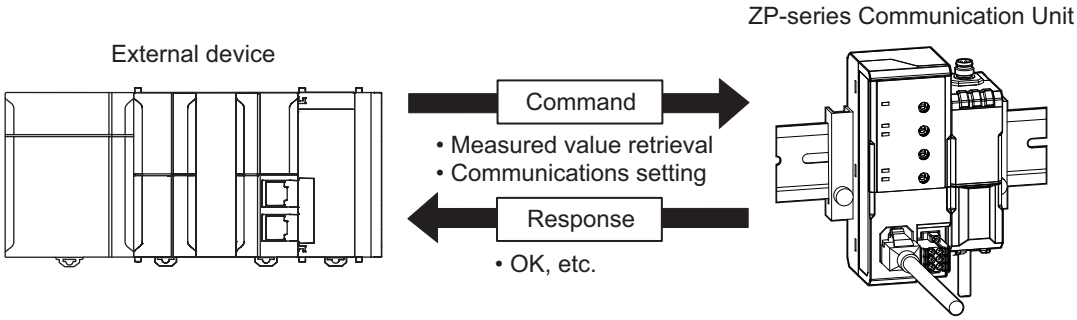
The Communication Unit supports message communications via three types of protocols: *TCP/IP no-protocol*, *explicit message*, and *tag data link*.
Message communications from each protocol are processed in the order they are sent to the Communication Unit.
For command processing, the Ready signal in tag data links is OFF.
When Ready signal is OFF, the Communication Unit does not accept commands.



Protocol	Functions				
	Amplifier Unit measured value retrieval	Communication Unit setup	Amplifier setup	Amplifier operation command	Communication Unit buffering control
TCP/IP No-protocol	Supported	Supported	Supported	Supported	Supported
Explicit message	Not supported	Supported	Supported	Supported	Not supported
Tag Data Link (Command Area)	Supported	Not supported	Supported	Supported	Not supported

5-4-1 TCP/IP No-protocol

The TCP/IP no-protocol allows an external device (PLC, etc.) to send control commands to the Communication Unit, and the Communication Unit to receive the responses from the external device (PLC, etc.). This enables the Communication Unit and the adjacent Amplifier Unit to perform various controls and setting changes, such as getting measured values and changing communications settings.
Specifically, the external device (PLC, etc.) issues ASCII character commands (e.g., "MS" when getting measured values). Then, the displacement sensor returns a response such as "OK", "NG", or a value.



5-4-2 List of Commands

Command category	Command name	Command	Description	Reference
Amplifier setting data R/W	Write Amplifier Unit settings	AW	Sends a Rewrite settings command to the sensor.	*5-4-3 Command Format* on page 5-10
	Read Amplifier Unit settings	AR	Sends a Read settings command to the sensor. The maximum number of digits of read data is 8 digits. If the upper digits of data are zeros, only the minimum number of digits is returned without being zero-padded.	
	Amplifier Unit operation command	AD	Sends a sensor operation command.	
Communication Unit main unit commands	Write Communication Unit communications settings	NW	Sends a Rewrite communications settings command.	
	Read Communication Unit communications settings	NR	Sends a Read communications settings command.	
	Write Communication Unit main unit settings	DW	Sends a Rewrite main unit settings command.	
	Read Communication Unit main unit settings	DR	Sends a Read main unit settings command.	
	Get software version information	VG	Reads firmware version information.	
	Clear error command	EC	Clears the error information currently held. The command executes clear processing for both errors caused by the Communication Unit itself and errors due to a system error in the Amplifier Unit. If an error continues to occur in the Communication Unit or Amplifier Unit, sending this command causes the Communication Unit to enter the error state again.	
	Get latest measured value command	MS	Reads the present measurement information.	
	Get all latest measured value information command	MA	Outputs all measurement information.	
	Start Communication Unit buffering command	LS	Starts Communication Unit buffering.	*5-5 Communication Unit Buffering* on page 5-18
	End Communication Unit buffering command	LE	Ends Communication Unit buffering.	
	Clear Communication Unit buffering command	LC	Clears Communication Unit buffering data.	
	Get Communication Unit buffering status command	LI	Gets Communication Unit buffering status.	

Command category	Command name	Command	Description	Reference
	Output Communication Unit buffering data command	LB	Outputs Communication Unit buffering data.	
	Abort Communication Unit buffering output	LA	Aborts Communication Unit buffering output.	
	Initialize Communication Unit to factory defaults command	NF	Initializes the Communication Unit to the factory defaults. (Equivalent to Reset service Type:1 of Identity object)	*5-4-2 List of Commands* on page 5-8
	Restart Communication Unit	NS	Restarts the Communication Unit. (Equivalent to Reset service Type:0 of Identity object)	
	Write error status command	SW	Writes parameters related to the error status.	
	Read error status command	SR	Reads the parameters related to the error status.	
	Write error history command	GW	Writes parameters related to the error history.	
	Read error history command	GR	Reads the parameters related to the error history.	
	Clear error history command	GC	Clears the recorded abnormality history.	

5-4-3 Command Format

● NW Command

Command Class ID Instance ID Attribute ID

Offset	0	1	2	3	4	5	6	7	8	9	10 and above	Last 2 bytes
	N	W	,	F	5	,	1	,	1	,	Write data	CR + LF

Response

0	1	2	3	4	5	6	7	8	10	11	12	Last 2 bytes
N	W	,	F	5	,	1	,	1	,	"OK" or "NG"		CR + LF

Note Class ID, instance ID, and attribute ID are specified in hexadecimal and do not require zero-padding.
Write data requires zero-padding only when STRUCT is specified as the data type.

● NR Command

Command Class ID Instance ID Attribute ID

Offset	0	1	2	3	4	5	6	7	8	Last 2 bytes
	N	R	,	F	5	,	1	,	1	CR + LF

Response

0	1	2	3	4	5	6	7	8	9	10 and above	Last 2 bytes
N	R	,	F	5	,	1	,	1	,	Read data	CR + LF

Note Class ID, instance ID, and attribute ID are specified in hexadecimal and do not require zero-padding.
Read data may have leading zeros in the parameter part as a result of fixed-length data exchange depending on the command.
Example
Command: NR,F5,1,5
Response: NR,F5,1,3,C0A8FA0100000000000000000000000000000000000000

● DW Command

Command Class ID Instance ID Attribute ID

Offset	0	1	2	3	4	5	6	7	8	9	10	11 and above	Last 2 bytes
	D	W	,	3	9	0	,	1	,	1	,	Write data	CR + LF

Response Class ID Instance ID Attribute ID

0	1	2	3	4	5	6	7	8	9	10	11 and above	Last 2 bytes
D	W	,	3	9	0	,	1	,	1	,	"OK" or "NG"	CR + LF

● DR Command

Command Class ID Instance ID Attribute ID

Offset	0	1	2	3	4	5	6	7	8	9	Last 2 bytes
	D	R	,	3	9	0	,	1	,	1	CR + LF

Offset Response Instance ID

0	1	2	3	4	5	6	7	8	9	10	11 and above	Last 2 bytes
D	R	,	3	9	0	,	1	,	1	,	Read data	CR + LF

● AW Command

Command

Offset

0	1	2	3 to 4	5	6 to 7	8	9 to 10	11	12 to 15	Last 2 bytes
A	W	, (comma)	Channel number	, (comma)	Index1*1	, (comma)	Index2*1	, (comma)	Write data	CR + LF

Channel number: 01 to 10 (hexadecimal)
Index1: 00 to FF (2-digit hexadecimal), Index specification
Index2: 00 to FF (2-digit hexadecimal), fixed at 0
Write data: 4-byte hexadecimal, negative numbers entered in two's complement representation
Example:
Setting -700,000 (-7 mm) for LOW threshold value
AW, 01, 01, 00, FFF551A0

- How it is considered
  (1) Conversion of integer part (700,000) of -700,000 to 4-byte data → 000AAE60
  (2) Bit inversion → FFF5519F
  (3) Addition of +1 to (2) → FFF551A0

*1. Refer to *A-4-2 AW and AR Command Parameter List* on page A-64.

Response

Offset

0	1	2	3 to 4	5	6 to 7	8	9 to 10	11	12 to 13	Last 2 bytes
A	W	, (comma)	Channel number	, (comma)	Index1*1	, (comma)	Index2*1	, (comma)	"OK" or "NG"	CR + LF

Index1: 00 to FF (2-digit hexadecimal), specified Index
Index2: 00 to FF (2-digit hexadecimal), fixed at 0

*1. Refer to *A-4-2 AW and AR Command Parameter List* on page A-64.

● AR Command

Command

Offset

0	1	2	3 to 4	5	6 to 7	8	9 to 10	Last 2 bytes
A	R	, (comma)	Channel number	, (comma)	Index1*1	, (comma)	Index2*1	CR + LF

Channel number: 01 to 10 (hexadecimal)
Index1: 00 to FF (2-digit hexadecimal), Index specification
Index2: 00 to FF (2-digit hexadecimal), fixed at 0

*1. Refer to *A-4-2 AW and AR Command Parameter List* on page A-64.

Response

Offset

0	1	2	3 to 4	5	6 to 7	8	9 to 10	11	12 to 15	Last 2 bytes
A	R	, (comma)	Channel number	, (comma)	Index1*1	, (comma)	Index2*1	, (comma)	Read data	CR + LF

Read data: 4-byte hexadecimal
Index1: 00 to FF (2-digit hexadecimal), specified Index
Index2: 00 to FF (2-digit hexadecimal), fixed at 0

*1. Refer to *A-4-2 AW and AR Command Parameter List* on page A-64.

● AD Command

Command

Offset

0	1	2	3 to 4	5	6 to 7	8	9 to 20	Last 2 bytes
A	D	, (comma)	Channel number	, (comma)	Command ID*1	, (comma)	Write data	CR + LF

Channel number: 01 to 10 (hexadecimal)
Command ID: 00 to FF (2-digit hexadecimal)
Write data: 6-byte hexadecimal
*1. Refer to the table in Attribute ID in *A-3-7 Amplifier Unit Operation Command Object (Class ID: 392 Hex)* on page A-39.

Response

Offset

0	1	2	3 to 4	5	6 to 7	8	9 to 14	Last 2 bytes
A	D	, (comma)	Channel number	, (comma)	Command ID*1	, (comma)	Read data	CR + LF

Channel number: 01 to 10 (hexadecimal)
Command ID: 00 to FF (2-digit hexadecimal)
Read data: 6-byte hexadecimal
*1. Refer to the table in Attribute ID in *A-3-7 Amplifier Unit Operation Command Object (Class ID: 392 Hex)* on page A-39.

● VG Command

Command

Offset

0	1	Last 2 bytes
V	G	CR + LF

Response

Offset

0	1	2	3 to 6	Last 2 bytes
V	G	, (comma)	Read data	CR + LF

Read data: 4-digit version information (ASCII character string)

● EC Command

Command

Offset

0	1	Last 2 bytes
E	C	CR + LF

Response

Offset

0	1	2	3 to 4	Last 2 bytes
E	C	, (comma)	"OK"	CR + LF

● MS Command

Command

Offset

0	1	2	3 to 4	5	6	Last 2 bytes
M	S	, (comma)	Channel number 0: All channels 1 to 16: Channel	, (comma)	Additional information 0: Time Stamp 1: Communications external input 2: Time Stamp + External Input	CR + LF

Response

Offset	0	1	2	3 to 14	15	12 to 19 (for 1 channel)	20	21, 22	Last 2 bytes
	M	S	, (comma)	Time Stamp	, (comma)	Measured value MV	, (comma)	Communications external input	CR + LF

Channel number: 01 to 10 in hexadecimal. For Channel number 0, measured values for all channels are returned as comma-delimited values.
Time, measured value: Hexadecimal (ASCII character string, 0x7FFF0000 → "7FFF0000")

● MA Command

Command

Offset	0	1	Last 2 bytes
	M [0x4D]	A [0x41]	CR + LF [0x0D0A]

Response

Offset	0	1	2	3 to 8	9	10	11	12	13	14	15	16	17
	M [0x4D]	A [0x41]	, (comma)	Time [hex]	, (comma) [0x2C]	Communications error external input [hex]	, (comma) [0x2C]	AMPSTATUS (CH1) [hex]	AMPOUT (CH1) [hex]	Measured value MV (CH1) [hex]			

18	19	20	21	22	to	177	178	179	180	181	182	183	184	185	186	Last 2 bytes
Internal measured value RV (CH1) [hex]				, (comma) [0x2C]	to	AMPSTATUS (CH16)	AMPOUT (CH16)	Measured value MV (CH16)				Internal measured value RV (CH16) [hex]				CR + LF [0x0D0A]

Time, measured value: Hexadecimal (binary data)
Communications error external input: Error and external input information on the Communication Unit, where bit 0 is the input status of External Input 1, bit 1 is the input status of External Input 2, and bit 7 is the error status
Measured value MV: MV value. 0x7FFF0000 for unconnected Amplifier Units
Measured value RV: RV value. 0x7FFF0000 for unconnected Amplifier Units

AMPSTATUS(CHx): Status information in PV data

Bit	Name	Description
0	Busy	ON when the sender Amplifier Unit is in a command executing state or in the SETTING mode, OFF otherwise.
1	Enable	Measurement status of the sender Amplifier Unit
2	Warning	A warning occurred in the sender Amplifier Unit.
3	Err	A system error occurred in the sender Amplifier Unit.
4	Input Status1(LD OFF)	External Input Status 1 (Laser OFF)
5	Input Status2(Zero)	External Input Status 2 (Zero Reset)
6	Input Status3(Timing/Bank A)	External Input Status 3 (Timing input/Bank Change)
7	Input Status4(Reset/Bank B)	External Input Status 4 (Reset input/Bank Change)

AMPOUT: Data that shows the control output status of the Amplifier Unit

Bit	Name	Description
0	---	---

Bit	Name	Description
1	---	---
2	High	High judgment output (0: OFF, 1: ON)
3	Pass	Pass judgment output (0: OFF, 1: ON)
4	Low	Low judgment output (0: OFF, 1: ON)
5	Error	Error output (0: Normal, 1: Error)
6	---	---
7	---	---

Command response

Example

	ASCII	Binary
Command	MA[CRLF]	0x4d410d0a
Response Time Stamp: 0x123456789ABC External Input: 0x03 AMPSTATUS 1CH: 0xF8 AMPOUT 1CH: 0x08 mv 0x12345678 rv 0x87654321	MA...	0x[4d41][2c][123456789ABC][2c][03][2c][F8012345678876543 21][2c] ... **Note** Brackets [ ] are used as a delimiter for convenience.

● NF Command

Command

Offset

0	1	Last 2 bytes
N	F	CR + LF

Response

Offset

0	1	2	3 to 4	Last 2 bytes
N	F	, (comma)	"OK"	CR + LF

● NS Command

Command

Offset

0	1	Last 2 bytes
N	S	CR + LF

Response

Offset

0	1	2	3 to 4	Last 2 bytes
N	S	, (comma)	"OK"	CR + LF

● GW Command

Command Class ID Instance ID Attribute ID

Offset

0	1	2	3	4	5	6	7	8 to 9	10	11	12	13	14	15	16	17	18	Last 2 bytes
G	W	,	4	1	,	1	,	9	,	Write data								CR + LF

Response

0	1	2	3	4	5	6	7	8	10	11	12	13	14	15	16	17	18	Last 2 bytes
G	W	,	4	1	,	1	,	9	,	"OK" or "NG"								CR + LF

Note Class ID, instance ID, and attribute ID are specified in hexadecimal and do not require zero-padding.
Write data does not require zero-padding.

● GR Command

Command Class ID Instance ID Attribute ID

Offset

0	1	2	3	4	5	6	7	8 to 9	Last 2 bytes
G	R	,	4	1	,	1	,	E	CR + LF

Response

0	1	2	3	4	5	6	7	8 to 9	10	11 and above	Last 2 bytes
G	R	,	4	1	,	1	,	E	,	Read data	CR + LF

Note Class ID, instance ID, and attribute ID are specified in hexadecimal and do not require zero-padding.
Read data requires zero-padding.

● GC Command

Command Class ID

Offset

0	1	2	3	Last 2 bytes
G	C	,	Erase specification	CR + LF

0: RAM only
1: Logs in ROM also erased

Response

0	1	2	3	4	Last 2 bytes
G	C	,	OK or NG		CR + LF

Note Class ID, instance ID, and attribute ID are specified in hexadecimal and do not require zero-padding.
Read data requires zero-padding.

● SW Command

Command Class ID Instance ID Attribute ID

Offset

0	1	2	3	4	5	6	7	8	9	10	11 and above	Last 2 bytes
S	W	,	3	9	1	,	1	,	1	,	Write data	CR + LF

Response Class ID Instance ID Attribute ID

0	1	2	3	4	5	6	7	8	9	10	11 and above	Last 2 bytes
S	W	,	3	9	1	,	1	,	1	,	"OK" or "NG"	CR + LF

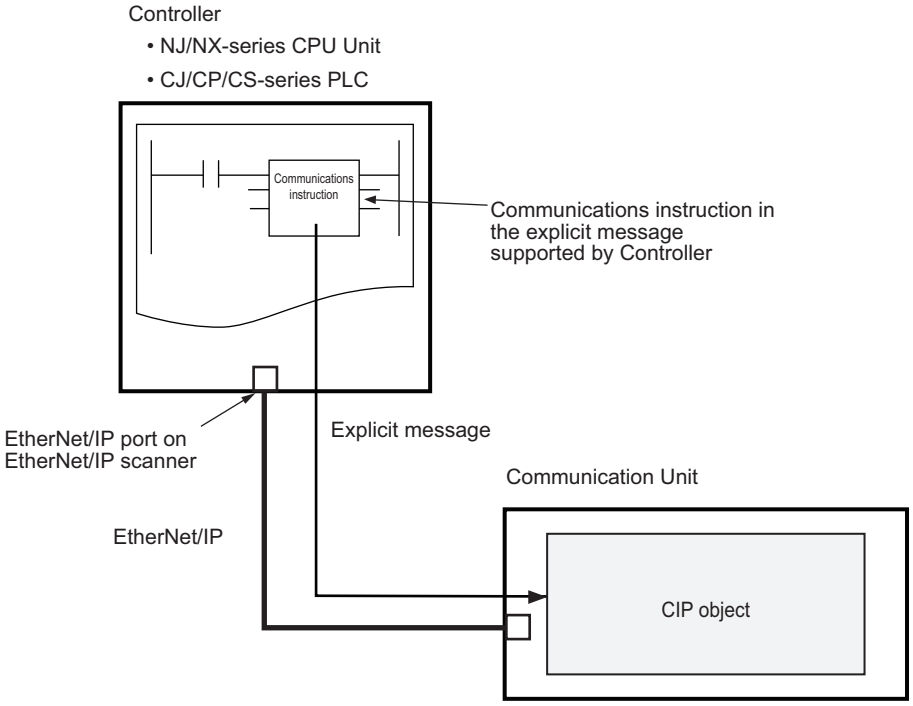
● SR Command

	Command		Class ID				Instance ID		Attribute ID	
Offset	0	1	2	3	4	5	6	7	8	9	Last 2 bytes
	S	R	,	3	9	1	,	1	,	1	CR + LF

Offset	Response							Instance ID					
	0	1	2	3	4	5	6	7	8	9	10	11 and above	Last 2 bytes
	S	R	,	3	9	1	,	1	,	1	,	Read data	CR + LF

5-4-4 Explicit Messages

In EtherNet/IP, you can use explicit message communications to change the settings for the Communication Unit, Amplifier Unit, and Sensor Head.
Refer to “CIP Objects” in “Appendices” for the specifications of explicit message communications.



Conditions for Explicit Message Communications

The following conditions must be met.

- Communications must be established between the EtherNet/IP scanner and the Communication Unit.

Accessing CIP Objects through an Explicit Message

You can use the following methods to access CIP objects in the Communication Unit through an explicit message.

- Using the special instructions for the Controller to send an explicit message

- Setting general parameters in the Network Configurator to send an explicit message

These are described below.

● Special Instructions for the Controller

Use the following special instructions depending on the Controller.

Controller	Special Instruction
NJ/NX-series CPU Unit	CIPSend (Send Explicit Message) instruction CIPUCMMSend (Send Explicit Message) instruction
CJ/CP/CS-series PLC	CMND (Send Explicit Message) instruction

For details on the communications instructions for NJ/NX-series CPU Units, refer to the instructions reference manual for the connected CPU Unit.
For details on the communications instructions for CJ/CP/CS-series PLCs, refer to the *CS/CJ/NSJ Series Instructions Reference Manual (Cat. No. W474)* and *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)*.
However, the following two restrictions apply if the CIPSend or CIPUCMMSend instruction for NJ/NX-series CPU Units is used for the Communication Unit. These restrictions are described below.

Restriction 1:
To establish a class 3 connection, use the CIPOpenWithDataSize instruction and specify the data length of input variables (*DataSize*) to 509 or less. The CIPOpen instruction cannot establish a class 3 connection.
Note that a CPU Unit with unit version 1.06 or later and Sysmac Studio version 1.07 or higher are required to use the CIPOpenWithDataSize instruction.

Restriction 2:
For the data type of the request path (*RqPath*), which is a input variable to the CIPSend and CIPUCMMSend instructions, use the structure _sREQUEST_PATH_EX type. For the logical format members of the input variable, specify the following supported values. The structure _sREQUEST_PATH type cannot be used.

Logical format	Supported value
ClassIDLogicalFormat	_8BIT (8 bits) or _16BIT (16 bits)
InstanceIDLogicalFormat	_8BIT (8 bits) or _16BIT (16 bits)
AttributeIDLogicalFormat	_8BIT (8 bits)

Note that a CPU Unit with unit version 1.11 or later and Sysmac Studio version 1.15 or higher are required to use _sREQUEST_PATH_EX type.

● Setting General Parameters in the Network Configurator

In the Network Configurator, select **Tool** – **Setup Parameters** from the menu.
The **Setup Parameters** dialog box is displayed.
Refer to Help on the Network Configurator for details.

5-5 Communication Unit Buffering

5-5-1 Overview of Function

A function that stores measured value information received from the Amplifier Unit in the Communication Unit based on an external command and outputs it at a user-specified timing.

5-5-2 Details on Function

Communication Unit buffering is started and ended according to events.
The function can be configured and controlled only via TCP/IP no-protocol command communications.

- **Case 1: Manual Communication Unit buffering via computer**
  This is a standard use case. Communication Unit buffering is performed manually to store data in the Communication Unit. It is also stopped manually to extract the data using Support Software.
- **Case 2: Communication Unit buffering using an equipment event as a trigger**
  Communication Unit buffering is started and ended using an equipment event from a PLC, etc. as a trigger.

List of Operations

Operation	Description	Mean and descriptions of operation	
		External I/O*1	Command
Start	Start Communication Unit buffering.	Turn ON External Input 1. Turn ON External Output 1 to output the start status.	LS*3
End	End Communication Unit buffering.	Turn OFF External Input 1. Turn OFF External Output 1 to output the end status.	LE*3
Clear data	Clear the Communication Unit Buffering data stored inside the Communication Unit.	Turn ON External Input 2.	LC
Output data	Output the Communication Unit buffering data to an external device.	---	LB*2
Get Communication Unit buffering status	Check the execution status of Communication Unit buffering.	External Output 1	LI
Stop Communication Unit Buffering output	Stop the output of Communication Unit buffering.	---	LA

*1. Refer to the timing charts for details.
*2. While the LB command is outputting Communication Unit buffering data, no commands other than the LA comma are accepted.
*3. The start and stop of buffering by command can always be executed independent of the start and end conditions. These operations are always enabled as a safety function in the event of an error on the control side.

List of Setting Data

The table below shows a list of command settings for Communication Unit buffering.

The settings are reflected at the next start of Communication Unit buffering using EtherNet/IP message communications, without restarting the Communication Unit.

Setting	Setting value	Description
Amount of Communication Unit Buffering data (per output)	0 to 250,000 (Default: 180,000)	Set the number of data points to be stored per Communication Unit buffering output data. When the amount of Communication Unit buffering data is 0 and the overwrite mode is ON, Communication Unit buffering will be continuously performed in the overwrite mode using a buffer of 250,000 points after it is started. If label data is overwritten even partially, all of the label data will be deleted. When the amount of Communication Unit buffering data is 0 and the overwrite mode is OFF, Communication Unit buffering will not be started. When it is executed by command, an NG response will be returned.
Communication Unit buffering thinning number	1 to 3,600,000 (Default: 1)	Set the storage interval for Communication Unit buffering. If the set value is *1*, Communication Unit buffering will be performed in 1-ms cycles. If the set value is *2*, Communication Unit buffering will be performed in 2-ms cycles. By setting the maximum value (3,600,000 ms), you can achieve a storage interval of one hour.
Overwrite mode	0 (Default): Standard 1: Overwrite	Standard: Communication Unit buffering will be performed during the period from start to end. Communication Unit buffering will be stopped when the memory becomes full. Overwrite: If Communication Unit buffering count exceeds the set amount of Communication Unit buffering data, the Communication Unit buffering will continue by overwriting the oldest Communication Unit buffering data. Changing this setting clears all Communication Unit buffering data that has already been stored.
Output target data 1 to 20	OFF, CH1 to CH16 (Default: Communication Unit buffering target data 1 to 16 are sequentially assigned data for CH1 to CH16, respectively, and target data 17 to 20 are assigned OFF.)	Select the measured value data targeted for Communication Unit buffering. A maximum of 16 data points can be specified. In areas where OFF is set, 0x7FFF0000 will be automatically stored by Communication Unit buffering.
Communication Unit buffering start condition	0 (Default): Command 1: Amplifier Unit judgment result 2: External Input 1 ON	Specify the start condition for Communication Unit buffering. Starting Communication Unit buffering by command is enabled regardless of the specified Communication Unit buffering start condition.
Communication Unit Buffering Start Condition:Channel	1 to 16: CH1 to CH16 (Default: 1)	This is the channel specification when Amplifier Unit judgment result is used as the Communication Unit buffering start condition.

Setting	Setting value	Description
Communication Unit Buffering Start Condition:Judge	0: High 1: Pass 2: Low 3: All OFF (during non-measurement) 4: OR (Timing when measurement is enabled) (Default: 1)	Specify the type of judgment when Amplifier Unit judgment result is used as the Communication Unit buffering start condition. It is judged that the start condition is met when the signal is switched from another signal to the start condition signal. Example: When the start condition is *High*, Communication Unit buffering is started as soon as the Amplifier Unit's signal is switched from *Pass* to *High*. If the Amplifier Unit's signal remains *High*, Communication Unit buffering will not be started.
Communication Unit buffering end condition	0: Command 1: Amplifier Unit judgment result 2: External Input 1 OFF 3: Sampling time	Specify the end condition for Communication Unit buffering. Ending Communication Unit buffering by command is enabled regardless of the specified Communication Unit buffering end condition.
Communication Unit buffering end judgment result specification channel	1 to 16: CH1 to CH16 (Default: 1)	This is the channel specification when Amplifier Unit judgment result is used as the Communication Unit buffering end condition.
Communication Unit buffering end judgment result specification judgment	0: High 1: Pass 2: Low 3: All OFF (during non-measurement) (Default: 1)	Specify the type of judgment when Amplifier Unit judgment result is used as the Communication Unit buffering end condition. It is judged that the end condition is met when the signal is switched from another signal to the end condition signal. Example: When the end condition is *High*, Communication Unit buffering is ended as soon as the Amplifier Unit's signal is switched from *Pass* to *High*. If the Amplifier Unit's signal remains *High*, Communication Unit buffering will not be started.
Sampling time [ms]	1 to 2,500,000 (Default: 1)	The setting is enabled only when the Communication Unit Buffering start condition is set to External Input and the end condition is set to Sampling time. Specify how many samples you want to take after the start of Communication Unit buffering before it is ended. This cannot be set to equal to or less than the Communication Unit Buffering thinning number because otherwise Communication Unit buffering will not be performed during the sampling time. To force Communication Unit buffering to end during the sampling time, use the LE command.
Communication Unit buffering start delay time [ms]	0 to 1,000 (Default: 0)	Set the delay time to delay the actual start of Communication Unit Buffering after the Communication Unit buffering status is turned ON. When the maximum value (1,000) is set, Communication Unit buffering will be started with a delay of 1 s.

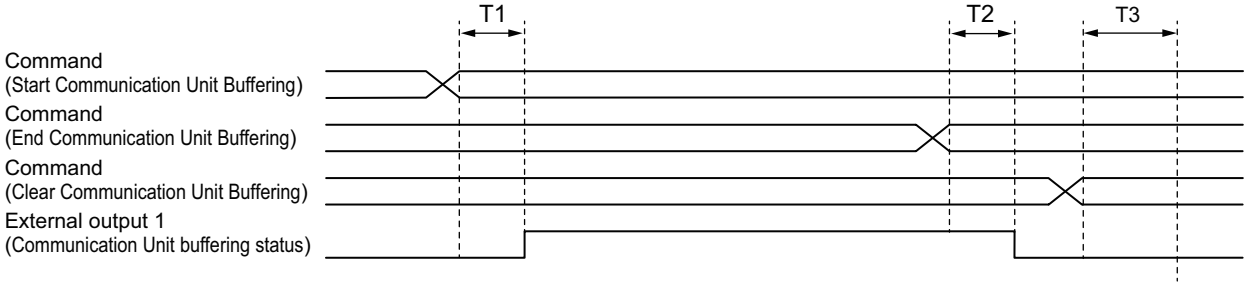
Timing Chart

The timing charts below show Communication Unit buffering for different combinations of the start and end conditions.

Pattern	Start	End	Usage example
1	Command	Command	Using the Support Software on a trial basis, start and end Communication Unit buffering.

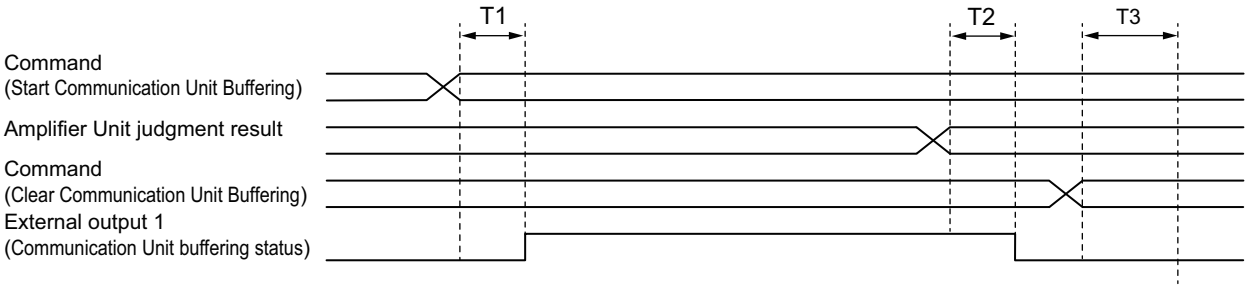
Pattern	Start	End	Usage example
2	Command	Amplifier Unit judgment result	Using the Support Software on a trial basis, start Communication Unit buffering and, when it is ended by an equipment/workpiece inspection error, store the data immediately before the error in the Communication Unit's buffer.
3	Command	External Input OFF	Using the Support Software on a trial basis, start Communication Unit buffering and, if an error is found in equipment/workpiece inspection, end it by input from the Controller such as a PLC.
4	Command	Sampling time	Using the Support Software, start Communication Unit buffering on a trial basis to store data for one night.
5	Amplifier Unit judgment result	Command	Using the Support Software on a trial basis, start Communication Unit buffering when the equipment/workpiece inspection error conditions are met, and stop it manually after a certain period of time.
6	Amplifier Unit judgment result	Amplifier Unit judgment result	Automatically perform Communication Unit buffering according to the measurement status.
7	Amplifier Unit judgment result	External Input OFF	Automatically start Communication Unit buffering at the timing of equipment/workpiece inspection and stop it by a signal from a PLC at the end of an equipment event.
8	Amplifier Unit judgment result	Sampling time	Automatically start Communication Unit buffering in equipment/workpiece inspection status and continue it to store data for a certain period of time.
9	External Input ON	Command	Using the Support Software on a trial basis, start Communication Unit buffering when the equipment/workpiece inspection error conditions are met, and stop it manually after a certain period of time.
10	External Input ON	Amplifier Unit judgment result	Automatically start Communication Unit buffering at the timing of equipment event start and stop it if the equipment/workpiece inspection status changes to an error.
11	External Input ON	External Input OFF	Automatically perform Communication Unit buffering in a continuous manner from the start to the end of an equipment event.
12	External Input ON	Sampling time	Automatically perform Communication Unit buffering in a continuous manner from the start of an equipment event for a certain period of time.

● Pattern 1 (Command - Command)



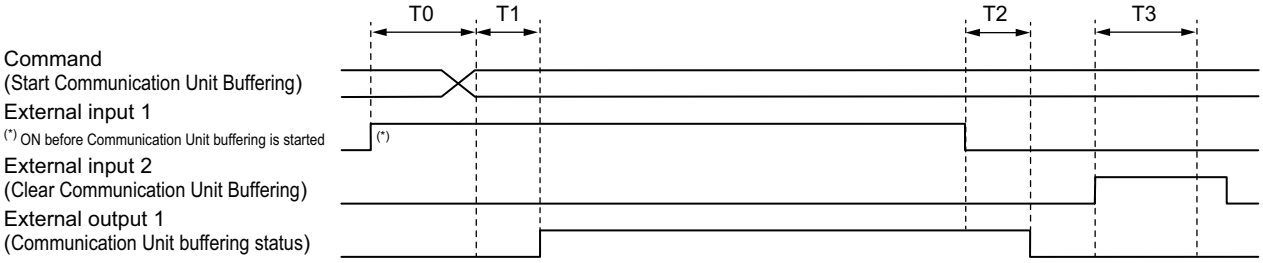
Item		Minimum	Maximum
T1	Communication Unit buffering start response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering stop response time	---	---
T3	Communication Unit buffering clear response time	---	---

● Pattern 2 (Command - Amplifier Unit Judgment Result)



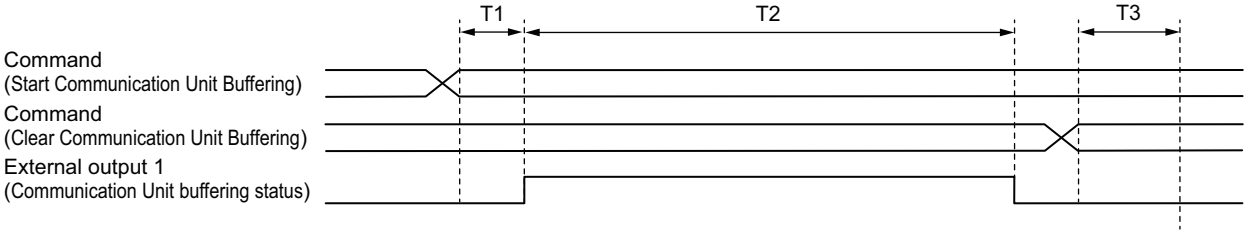
Item		Minimum	Maximum
T1	Communication Unit buffering start response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering stop response time	---	---
T3	Communication Unit buffering clear response time	---	---

● Pattern 3 (Command - External Input OFF)



Item		Minimum	Maximum
T0	Communication Unit buffering pre-start input response	1 ms	2 ms
T1	Communication Unit buffering start response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering stop response time	1 ms	---
T3	Communication Unit buffering clear response time	---	---

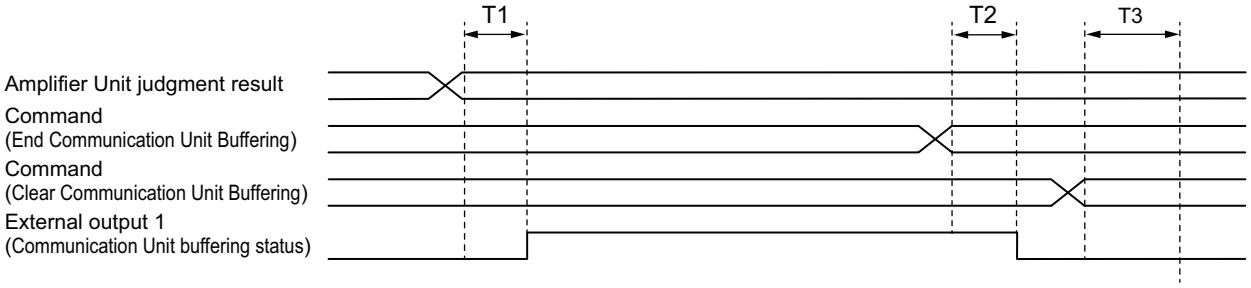
● Pattern 4 (Command - Sampling Time)



Item		Minimum	Maximum
T1	Communication Unit buffering start response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms

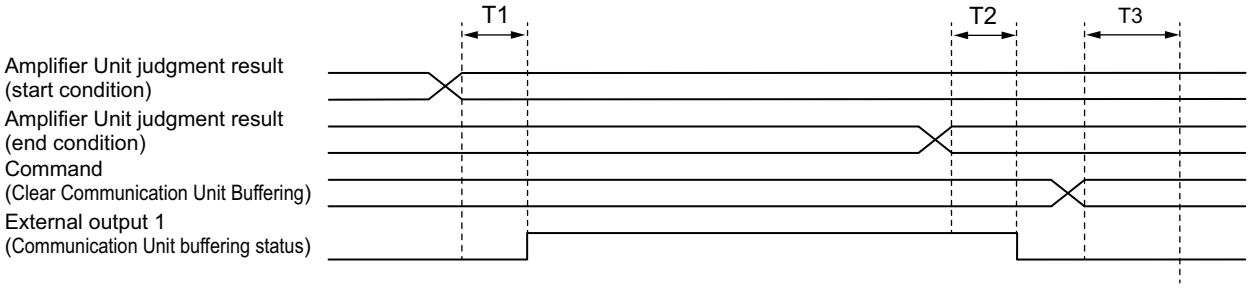
Item		Minimum	Maximum
T2	Communication Unit buffering stop response time	Sampling time	Sampling time + 1 ms
T3	Communication Unit buffering clear response time	---	---

● Pattern 5 (Amplifier Unit Judgment Result - Command)



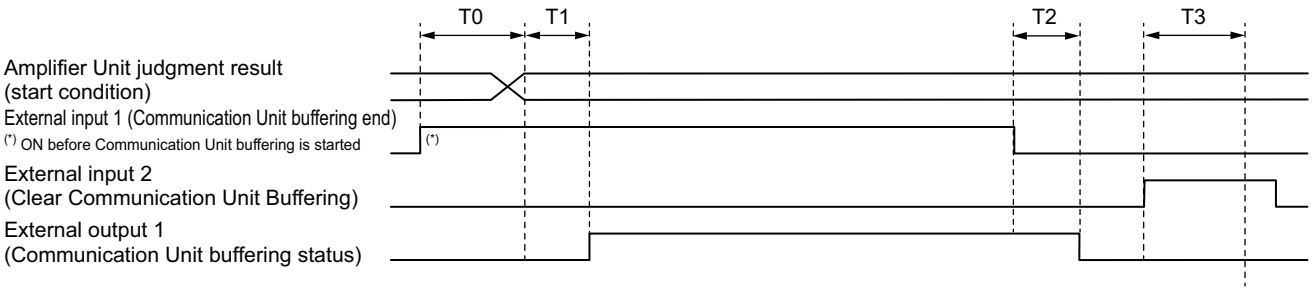
Item		Minimum	Maximum
T1	Communication Unit buffering start response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering stop response time	---	---
T3	Communication Unit buffering clear response time	---	---

● Pattern 6 (Amplifier Unit Judgment Result - Amplifier Unit Judgment Result)



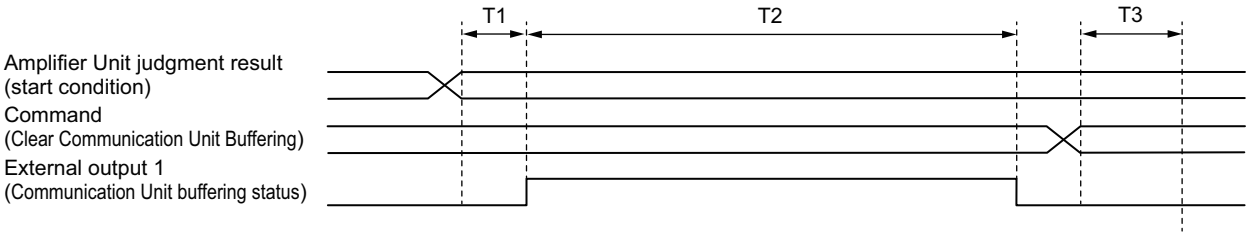
Item		Minimum	Maximum
T1	Communication Unit buffering start response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering stop response time	---	---
T3	Communication Unit buffering clear response time	---	---

● Pattern 7 (Amplifier Unit Judgment Result- External Input OFF)



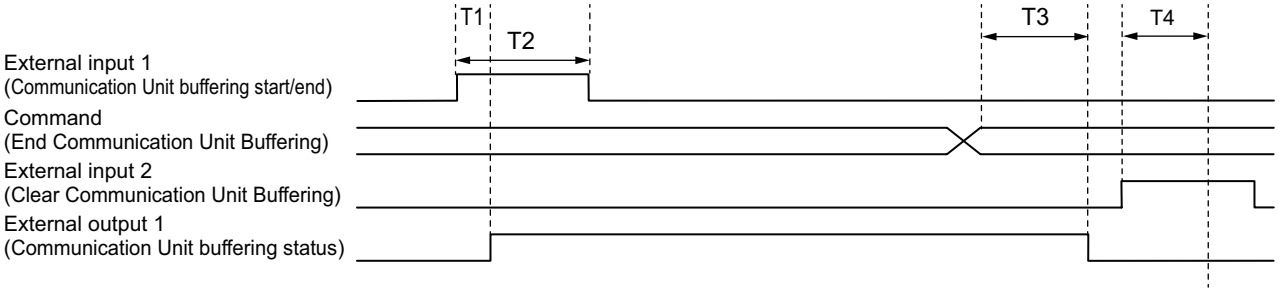
Item		Minimum	Maximum
T0	Communication Unit buffering pre-start input response	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T1	Communication Unit buffering start response time	---	---
T2	Communication Unit buffering stop response time	1 ms	2 ms
T3	Communication Unit buffering clear response time	1 ms	2 ms

● Pattern 8 (Amplifier Unit Judgment Result - Sampling Time)



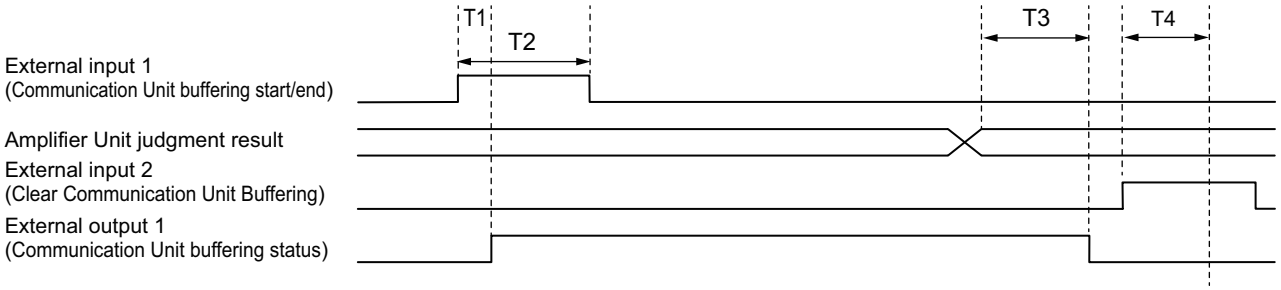
Item		Minimum	Maximum
T1	Communication Unit buffering start response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering stop response time	Sampling time	Sampling time + 1 ms
T3	Communication Unit buffering clear response time	---	---

● Pattern 9 (External Input ON - Command)



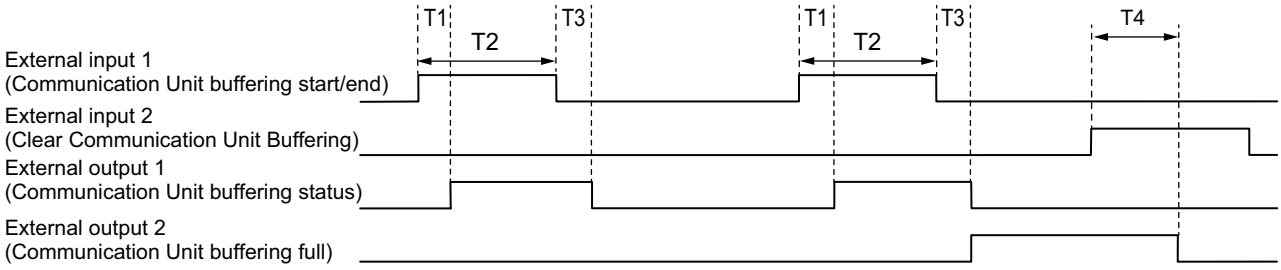
Item		Minimum	Maximum
T1	Communication Unit buffering input response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering input minimum time	1 ms	---
T3	Communication Unit buffering input OFF response time	---	---
T4	Communication Unit buffering clear response time	1 ms	2 ms

● Pattern 10 (External Input ON - Amplifier Unit Judgment Result)



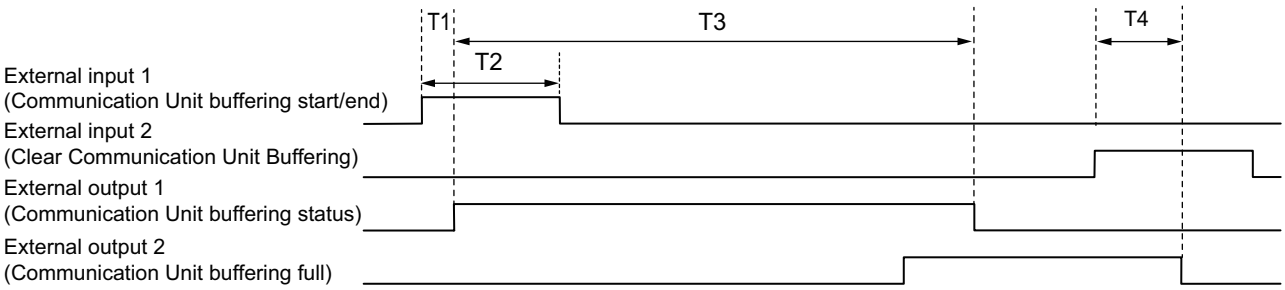
Item		Minimum	Maximum
T1	Communication Unit buffering input response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering input minimum time	1 ms	---
T3	Communication Unit buffering input OFF response time	---	---
T4	Communication Unit buffering clear response time	1 ms	2 ms

● Pattern 11 (External Input - External Input)



Item		Minimum	Maximum
T1	Communication Unit buffering input response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering input minimum time	1 ms	---
T3	Communication Unit buffering input OFF response time	1 ms	2 ms
T4	Communication Unit buffering clear delay time	1 ms	2 ms

● Pattern 12 (External Input ON -Sampling Time)



Item		Minimum	Maximum
T1	Communication Unit buffering input response time	Communication Unit buffering start delay time + 1 ms	Communication Unit buffering start delay time + 2 ms
T2	Communication Unit buffering input minimum time	1 ms	---
T3	Communication Unit buffering stop response time	1 ms	2 ms
T4	Communication Unit buffering clear response time	1 ms	2 ms

5-5-3 Setting Method

The command response specifications for commands used between the computer and the Communication Unit are shown below. Commands to be received and data to be returned by the Communication Unit except for Communication Unit buffering data output are ASCII code character strings.

● Start Communication Unit Buffering

Offset (bytes)	0	1	2	3			
Receive	L	S	CR	LF			
Offset (bytes)	0	1	2	3	4	5	6
Return	L	S	,	O	K	CR	LF

● Stop Communication Unit Buffering

Offset (bytes)	0	1	2	3			
Receive	L	E	CR	LF			
Offset (bytes)	0	1	2	3	4	5	6
Return	L	E	,	O	K	CR	LF

● Clear Communication Unit Buffering

Offset (bytes)	0	1	2	3			
Receive	L	C	CR	LF			
Offset (bytes)	0	1	2	3	4	5	6
Return	L	C	,	O	K	CR	LF

Note Even if the number of Communication Unit buffering points is 0, OK will be returned. In the Communication Unit buffering in progress status, NG will be returned.

● Get Communication Unit Buffering Status

Offset (bytes)	0	1	2							
Receive	L	I	CR							
Offset (bytes)	0	1	2	3	4	5	6	7 to 19		
Return	L	I	,	(1)	,	(2)	,	(3)	CR	LF

(1) 0: Communication Unit buffering in default state (Preparing for initialization)
1: Communication Unit buffering in progress
2: Communication Unit buffering stopped
3: Communication Unit buffering full

(2) Latest label number

(3) Present amount of Communication Unit buffering data (1 point per 16 channels)

● Stop Communication Unit Buffering Output

Offset (bytes)	0	1	2	3			
Receive	L	A	CR	LF			
Offset (bytes)	0	1	2	3	4	5	6
Return	L	A	,	O	K	CR	LF

● Output Communication Unit Buffering

Offset (bytes)	0	1	2	3	4	5	6														
Receive	L	B	,	(1)	,	(2)	,	(3)	,	(4)	CR	LF									
Offset (bytes)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...	15+N	16+N	17+N	18+N	19+N
Return	L	B	,	(5)				,	(6)		(7)	(8)				(9)			(10)		(11)	

Note N: Time stamp and data size of Communication Unit buffering data

(1) Time stamp specification

Time stamp attached: 1

Time stamp not attached: Other than 1

(2) Output target specification [1 byte]

This is processed as a decimal number without specification of the number of digits. For example, *LB,0,1*, *LB,0,01*, *LB,0,001*, etc. are judged as *Label No. specification*, regardless of the presence or absence of leading zeros.

The specifications of data to be output are as follows.

All data output: 0 (Command: LB,0,0)

Label number specification: 1

Time range specification: 2

When (2) is 1

(3) Start label number (specified in hexadecimal, 1 to 250,000 in decimal)

(4) Number of labels (Upper limit: 0x03D090 (250,000 in decimal))

Note 1. When the overwrite mode is ON and the amount of Communication Unit buffering data is 0, for the number of labels, only 1 will be judged as OK.

Note 2. The parameters are in hexadecimal big endian.
Example: Start label number: 1000 (0x), Number of labels 10 (0x0A), Command: LB,0,1,3E8,A

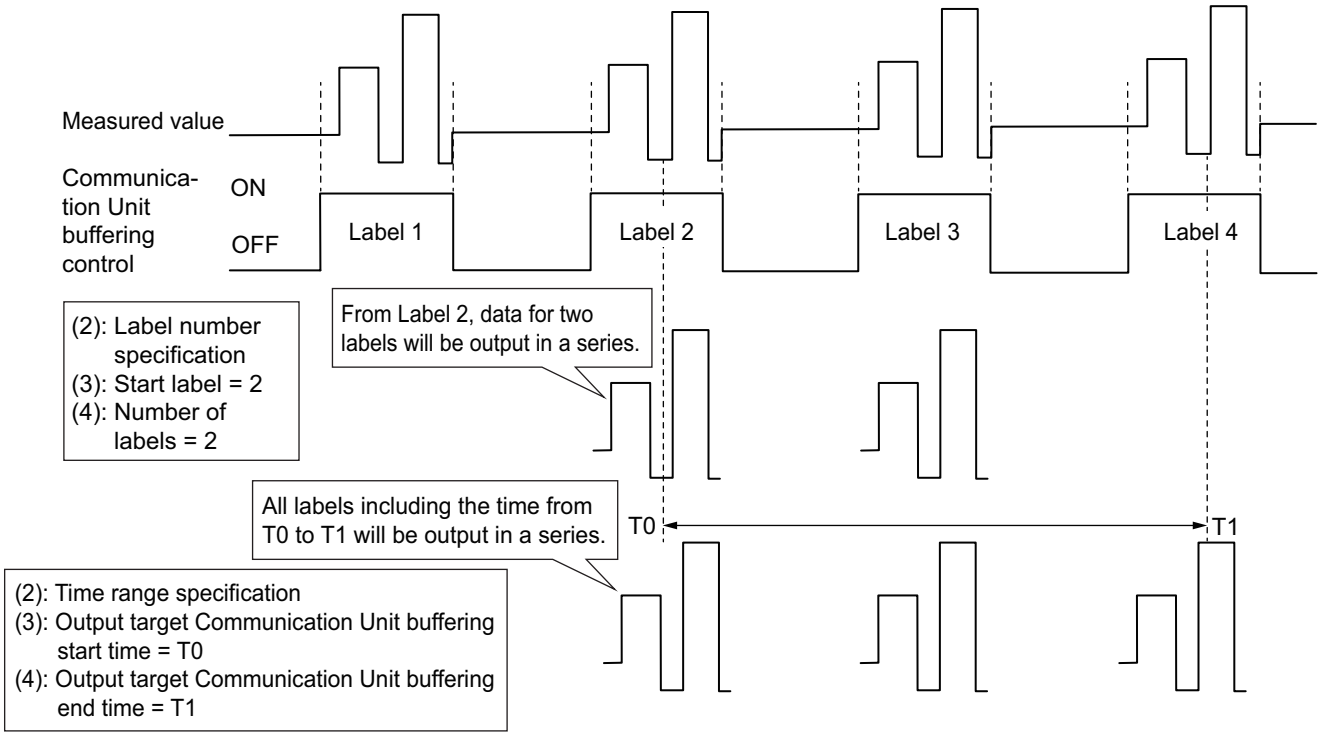
Note 3. When the number of labels exceeds the upper limit of the amount of Communication Unit buffering data, NG will be returned as a response.

When (2) is 2

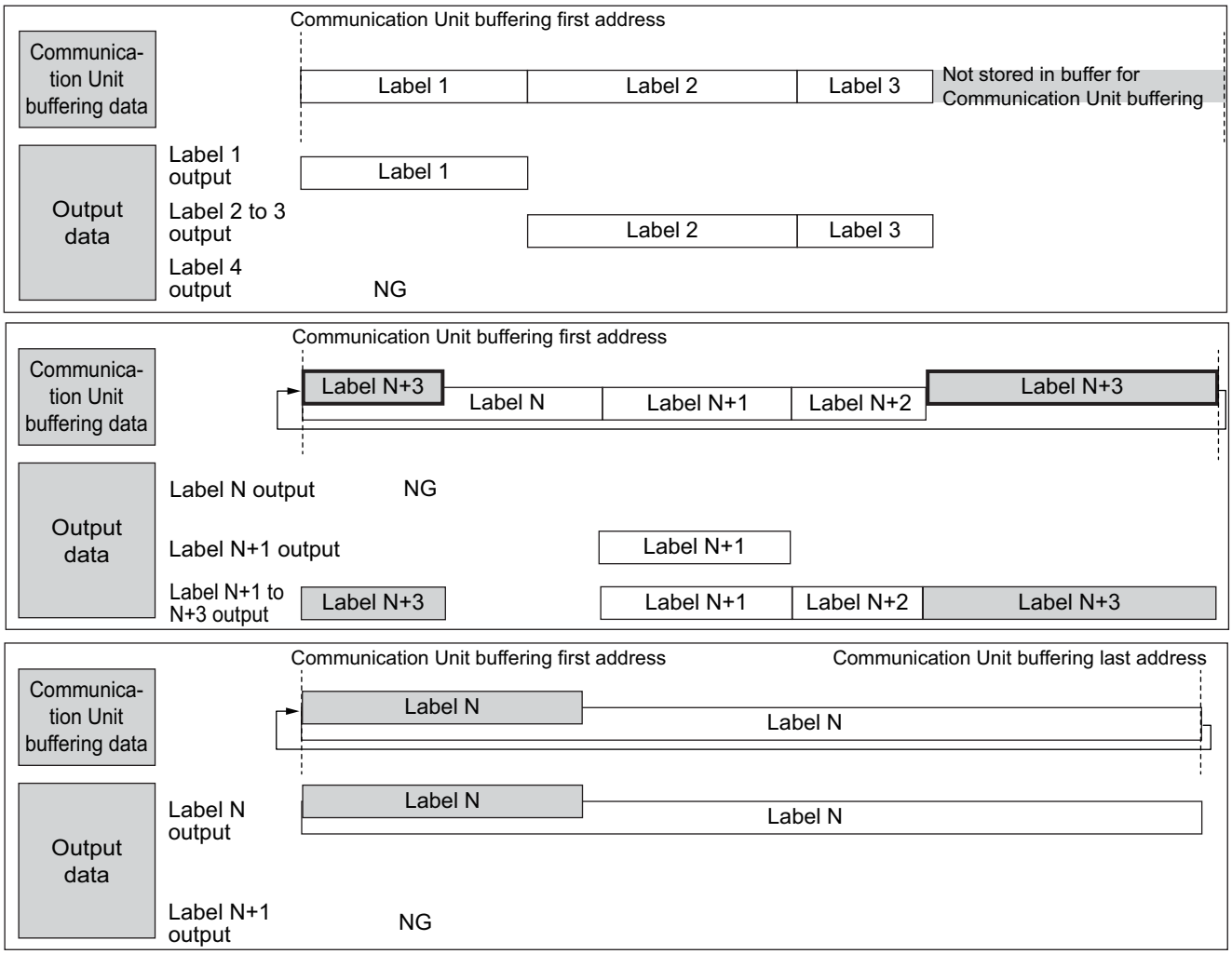
(3) Output target Communication Unit buffering start time [ms] (milliseconds elapsed since January 1, 1972)

(4) Output target Communication Unit buffering end time [ms] (milliseconds elapsed since January 1, 1972)

Note The parameters are in hexadecimal big endian.
Example: When 58,888,888 [ms] (0x00000000038292B8) to 68,888,888 [ms] (0x00000000041B2938) is specified, the command is LB,0,2,38292B8 ,41B2938.



When the output target specification is All data specification, data for all labels will be output in a series.
When a label is specified, data for the specified number of labels from the start label will be output in a series.
When a time is specified, data for labels including the specified start time to end time will be output in a series.



When the overwrite mode is applied, all label data that has been overwritten even partially is invalid and cannot be output (since it is discarded in effect). Only the output of data specified by the label that has not been overwritten is enabled.

(6) and (7) are added as a header for each output. (8) and (9) are included in single send data as much as possible, and excess data is included from the beginning of the next send data.

(5) Command data size [4-byte ASCII]: Size of data after the comma and before the delimiter ((6) to (9)). No zero-padding

(6) Communication Unit buffering data output status [2-byte binary]
This shows the output status of Communication Unit buffering data.
- First data at start of output: 0x0000
- Second and subsequent data: 0x0000 + (Number of outputs)
- Last output data: 0xFFFF

(7) Option [1 byte in binary]:
Select the availability of the time stamp option. The time stamp is attached only when the value is 0x01 (Time stamp attached).
None: 0x00, 0x02 to 0xFF
Time stamp attached: 0x01

(8) Label data size N [4-byte binary]:
Total amount of Communication Unit buffering data per label (Total size of (8) [unit in bytes])

(9) Communication Unit buffering data [1 byte in binary]. (9)-1 and (9)-2 are repeated for the number of Communication Unit buffering data and output continuously.

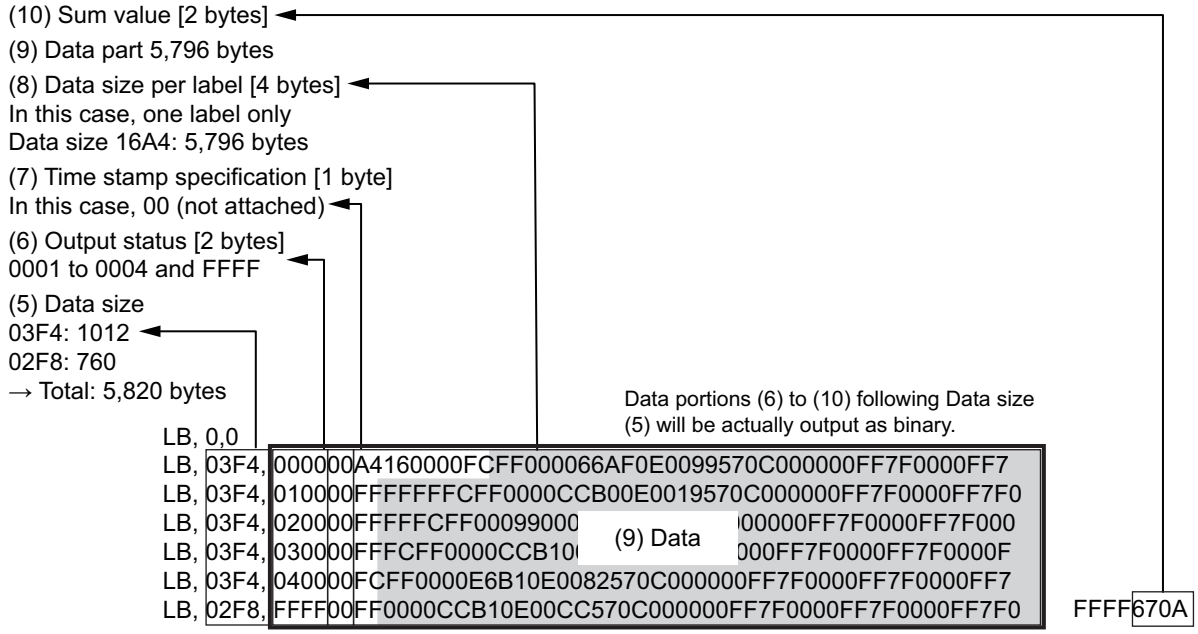
(9)-1: Time stamp [ms] (6-byte binary). None when (1) is *Time stamp not attached*

(9)-2: Communication Unit buffering data (No delimiter, 4 bytes per data in binary, 21 kinds of data including header)

(10) SUM value [2-byte binary]:
SUM value in the format of internally stored data. This data is attached only when the last split data is sent.

(11) Delimiter [2-byte ASCII]: CR + LF

- Example of data for data output and size
  (5) 5,820 bytes = ((6) 2 bytes + (7) 1 byte) × 6 + (8) 4 bytes + (9) 5,796 bytes + (10) 2 bytes



- Specifications of operation when using LB to output data
  When using the LB command to output Communication Unit buffering data, Ready is turned OFF during output.
  When Ready is OFF, only the LA command can be received although the basic commands cannot be received.

  Example:
  Outputting data for two labels to Label 1 and data for one label to Label 2 returns the response shown below.
  4C422C303131442CFFFF01B4000000FB6100000000000000000FEFFFF7F0000FF7F0000FF7F0000FF7F0
  000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000F
  F7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7FE3650000000000000000FEFFFF7F0000FF7F0000F
  F7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0
  000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F18045A000000676D0000000000000
  000FEFFFF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F
  0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F0000FF7F8196
  0D0A

  Breaking down the above response data as described reveals that the following data is output.

  4C422C -> LB,
  303131442C -> Command data size (0x011D),
  FFFF -> Output status (Last output data)

01 -> Option (Time stamp attached)
B4000000 -> Label 1 data size (0xB4)
FB6100000000 -> Time stamp (0x61FB)
00000000 -> Communication Unit buffering data (No warning, external input OFF)
FEFFFF7F -> Output data 1
0000FF7F -> Output data 2
0000FF7F -> Output data 3
0000FF7F -> Output data 4
0000FF7F -> Output data 5
0000FF7F -> Output data 6
0000FF7F -> Output data 7
0000FF7F -> Output data 8
0000FF7F -> Output data 9
0000FF7F -> Output data 10
0000FF7F -> Output data 11
0000FF7F -> Output data 12
0000FF7F -> Output data 13
0000FF7F -> Output data 14
0000FF7F -> Output data 15
0000FF7F -> Output data 16
0000FF7F -> Output data 17
0000FF7F -> Output data 18
0000FF7F -> Output data 19
0000FF7F -> Output data 20
E36500000000 -> Time stamp (0x65E3)
00000000 -> Communication Unit buffering data (No warning, external input OFF)
FEFFFF7F -> Output data 1
0000FF7F -> Output data 2
0000FF7F -> Output data 3
0000FF7F -> Output data 4
0000FF7F -> Output data 5
0000FF7F -> Output data 6
0000FF7F -> Output data 7
0000FF7F -> Output data 8
0000FF7F -> Output data 9
0000FF7F -> Output data 10
0000FF7F -> Output data 11
0000FF7F -> Output data 12
0000FF7F -> Output data 13
0000FF7F -> Output data 14
0000FF7F -> Output data 15
0000FF7F -> Output data 16
0000FF7F -> Output data 17
0000FF7F -> Output data 18
0000FF7F -> Output data 19
0000FF7F -> Output data 20
1804 -> SUM value

5A000000 -> Label 2 data size (0x5A)
676D00000000 -> Time stamp (0x6D67)
00000000 -> Communication Unit buffering data (No warning, external input OFF)
FEFFFF7F -> Output data 1
0000FF7F -> Output data 2
0000FF7F -> Output data 3
0000FF7F -> Output data 4
0000FF7F -> Output data 5
0000FF7F -> Output data 6
0000FF7F -> Output data 7
0000FF7F -> Output data 8
0000FF7F -> Output data 9
0000FF7F -> Output data 10
0000FF7F -> Output data 11
0000FF7F -> Output data 12
0000FF7F -> Output data 13
0000FF7F -> Output data 14
0000FF7F -> Output data 15
0000FF7F -> Output data 16
0000FF7F -> Output data 17
0000FF7F -> Output data 18
0000FF7F -> Output data 19
0000FF7F -> Output data 20
8196 -> SUM value
0D0A -> CR LF

Error System Operations

Under the following conditions, no-protocol commands return ER in response.

No.	Condition	Operation except for response
1	Start Communication Unit buffering is performed when the overwrite mode is OFF, although there is no available space in the buffer for Communication Unit buffering.	The system does not start Communication Unit buffering.
2	Start Communication Unit buffering is performed when Communication Unit buffering is being executed.	The system does not start Communication Unit buffering.
3	Clear Communication Unit buffering is performed when Communication Unit buffering is being executed.	The system does not clear Communication Unit buffering.
4	Output Communication Unit buffering is performed when Communication Unit buffering is being executed.	The system does not output Communication Unit buffering.
5	End Communication Unit buffering is performed when Communication Unit buffering has not been executed.	---
6	Output Communication Unit buffering is performed when there is no Communication Unit buffering data.	---
7	Output Communication Unit buffering is performed when the start label number at label number specification exceeds the number of labels for which data has been stored.	The system does not output Communication Unit buffering.

No.	Condition	Operation except for response
8	Output Communication Unit buffering is performed when the start and end time of Communication Unit buffering for the output target at time range specification is outside the complete range of data for which Communication Unit buffering has already been done.	The system does not output Communication Unit buffering.
9	Output Communication Unit buffering is performed when the start time value of Communication Unit buffering for the output target is greater than the end time value of Communication Unit buffering at time range specification.	The system does not output Communication Unit buffering.

For Communication Unit buffering using external input or Amplifier Unit judgment result, some operations are disabled under the following conditions. Even when an operation is disabled, no external notification is given in particular.

No.	Condition	Description of operation
1	Clear Communication Unit buffering is performed when the Communication Unit buffering status is ON.	The system does not execute Communication Unit buffering clear.
2	Start Communication Unit buffering is performed when the Communication Unit buffering status is full.	The system does not turn ON the Communication Unit buffering status.
3	Start/Clear Communication Unit buffering is performed in the event of a system error.	The system does not turn ON the Communication Unit buffering status.
4	Start Communication Unit buffering is performed when the number of Communication Unit buffering points is set to 0.	The system does not turn ON the Communication Unit buffering status.

The following conditions are not handled as errors.

No.	Condition	Description of operation
1	The buffer for Communication Unit buffering becomes full when the overwrite mode is OFF.	The system automatically enters the Communication Unit buffering end state.
2	Start Communication Unit buffering is performed when the overwrite mode is ON and the Communication Unit buffering status is full.	The system executes Communication Unit Buffering in the overwrite mode.
3	Output Communication Unit buffering is performed when the number of labels at label number specification exceeds the number of labels for which data has been stored.	The system outputs Communication Unit Buffering data that has already been saved as much as possible, starting from the start label number.
4	Either the start or end time of the Communication Unit buffering for the output target at time range specification is outside the range of data for which Communication Unit buffering has already been done.	The system outputs Communication Unit buffering data that falls within the range between the start and end times as much as possible.

6

Configuration with Wave Inspire ZP

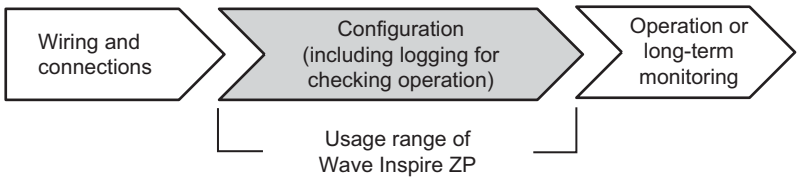
This section describes how to set up the Communication Unit with Wave Inspire ZP.

6-1 Overview

Wave Inspire ZP (hereinafter abbreviated as “the Support Software”) enables not only configuring the device mentioned below, but also graphically displaying and logging measured values and judgment results, displaying a sensor operation status list, and easily performing status monitoring on the Support Software.

Usage Range of the Support Software

Although the Support Software has a logging function to collect and save measured data, it is intended for configuration support and short-term monitoring, not for long-term operation.
For long-term data collection, use an appropriate system for your application by building it.



6-2 Installation and Uninstallation

6-2-1 Operating Environment

OS	Windows 10 (64-bit) Windows 11 (64-bit)
System language	Japanese, English
CPU	Intel® Core™ i5-6200U CPU 2.30 GHz or higher
Available disk space	10 GB or more
Communications interface	Ethernet port
Display	1,920 × 1,080 (Full HD) or higher

6-2-2 Installation

The Support Software is available for download from the Products page of the OMRON website.
https://www.ia.omron.com/product/tool/zp_tool/index.htm

To install the Support Software, log in as a user with Administrator privileges.
Execute the downloaded executable file (exe file) to start the installer.
Then, install the Support Software according to the installer's instructions.
Refer to *6-3-1 Using the IP Address Setting Tool* on page 6-4 for how to set the IP address of the computer at the time of installation.

6-2-3 Uninstallation

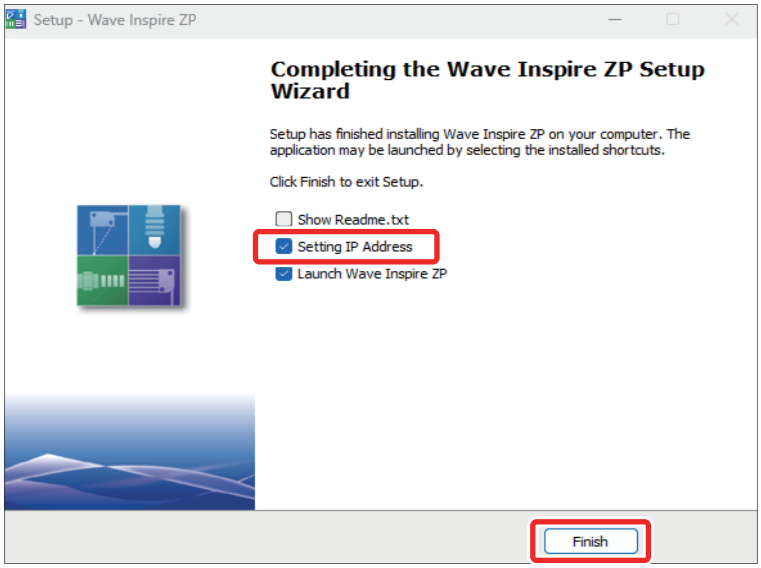
To remove the Support Software, uninstall it from the Windows Control Panel.

6-3 Setting the Computer IP Address

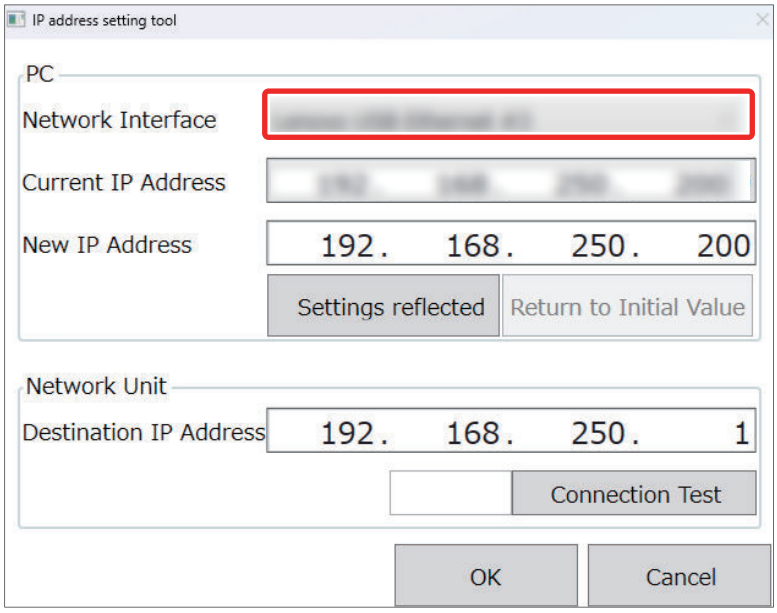
Set the IP address using either of the following methods.

6-3-1 Using the IP Address Setting Tool

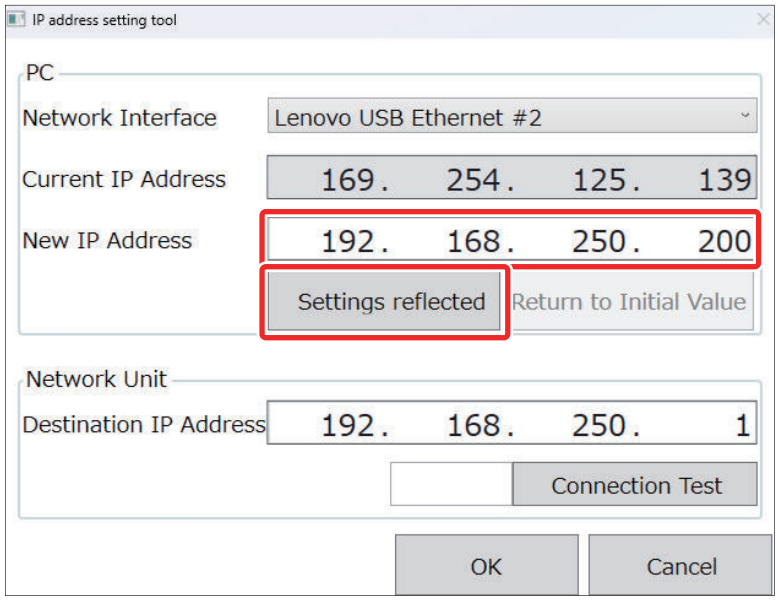
1 In the Completing Setup page of the installer, select the *Setting IP Address* check box and click the **Finish** button.



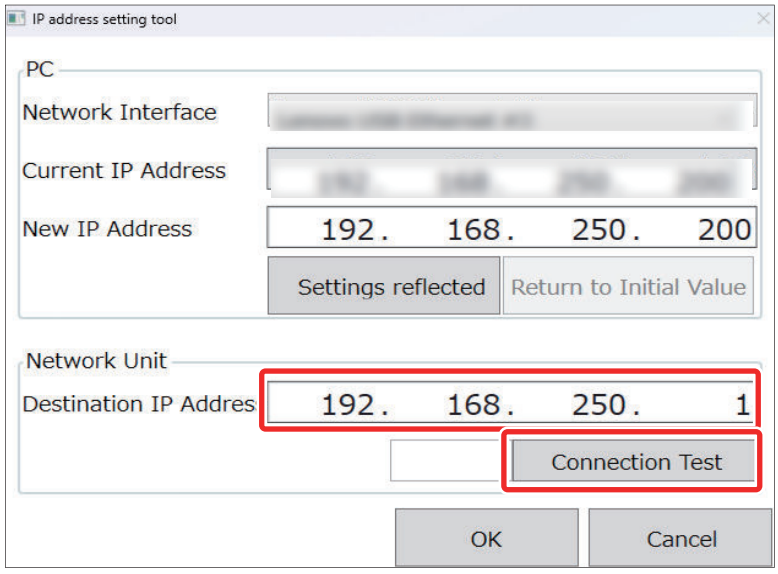
2 The IP address setting tool starts up. Specify the device name of your Ethernet adapter in **Network Interface**.



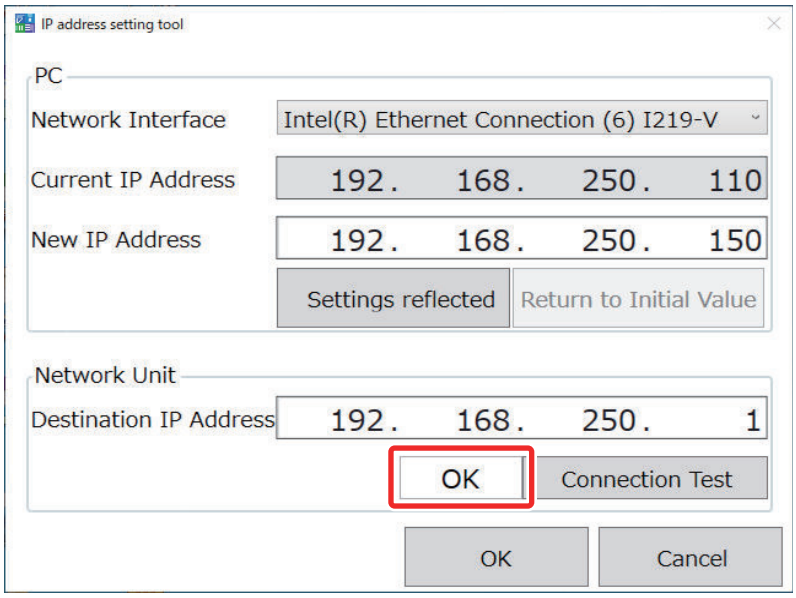
3 Enter the IP address of the computer and click the **Settings reflected** button.



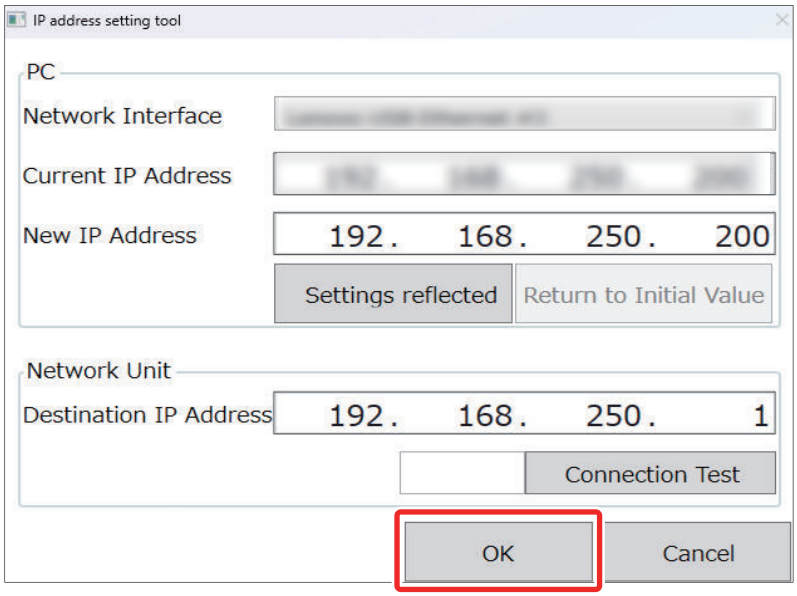
4 To confirm that the Communication Unit is connected, enter the IP address of the Communication Unit (default: 192.168.250.1), and click the **Connection Test** button.



5 When the Communication Unit is successfully connected, the **OK** button appears.

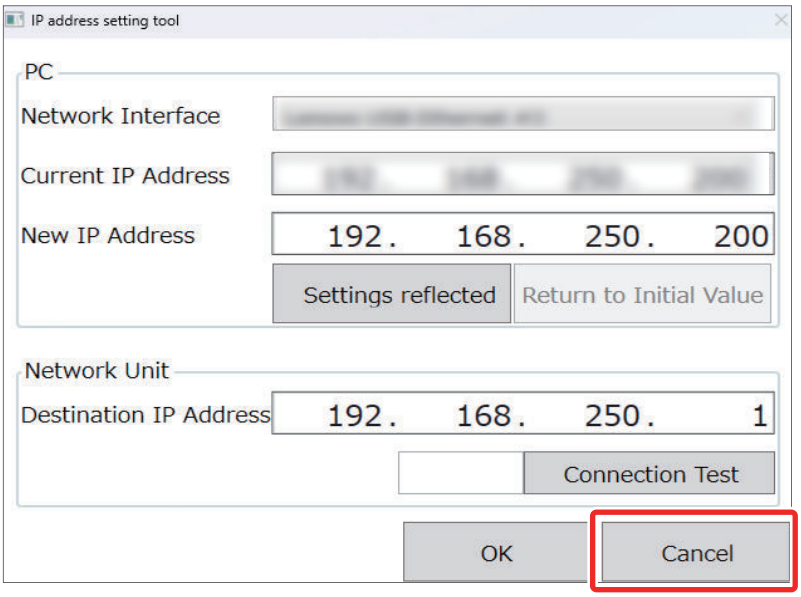


6 After completing the IP address setting, click the **OK** button to exit the IP address setting tool.



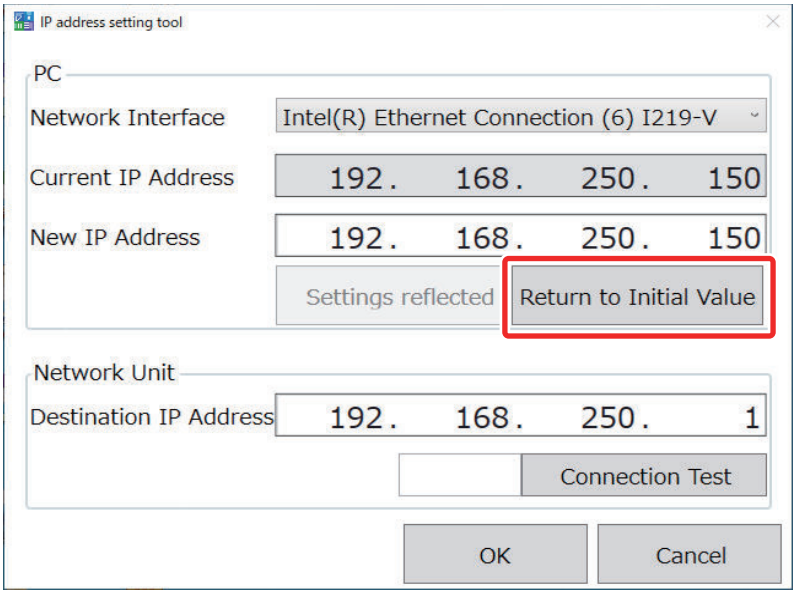
● How to Exit the Tool without Reflecting the Changed IP Address Setting

To cancel the changed IP address setting and exit the Support Software with the IP address used at the startup, click the **Cancel** button.



● How to Revert to the Initial IP Address Setting

To revert the changed IP address to the IP address used when the tool was started, click the **Return to Initial Value** button.



6-3-2 Configuring the Ethernet Properties on the Computer

Set the IP address of the computer from the Ethernet Properties dialog box of Windows.
For details on the setting method, select **Operation Manual** from the menu in the Support Software.

6-4 Wave Inspire ZP Functions and Operation Instructions

For details on how to use the Support Software, refer to the user's manual in the Support Software. After installing and starting the Support Software, select **Operation Manual** from the menu.

7

Troubleshooting

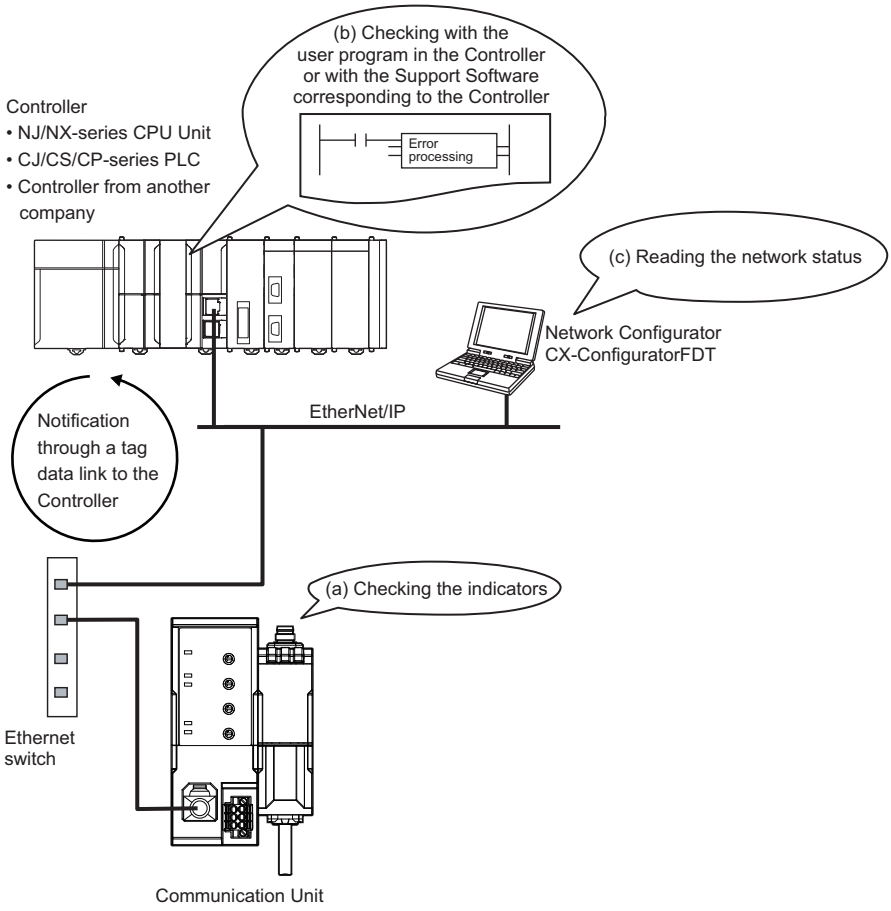
This section describes troubleshooting, inspection, and maintenance for the Communication Unit.

7-1 Checking for Errors

This section describes how an error is notified to you, and what and how you should check for errors.

7-1-1 How an Error Is Notified and What Information to Check

The Communication Unit notifies you of a detected error by the methods shown below.
If an error is notified, check for the error status and perform troubleshooting.



Letter	Notification method	Checking method	Information to check	Reference
(a)	Notification of Communication Unit errors by indicators	Visually checking the status of each indicator on the Communication Unit	Check the indicators on the Communication Unit. There are several status indicators. The status indicators show the status of the Communication Unit and EtherNet/IP network.	*7-2 Checking for Errors and Troubleshooting with Indicators* on page 7-5

Letter	Notification method	Checking method	Information to check	Reference
(b)	Notification of Communication Unit errors by the status in I/O data	Checking the status in the I/O data in the Communication Unit by the user program in the Controller or with the Support Software corresponding to the Controller*1	You can check the occurrence and cause of errors that occurred in the Communication Unit with the status in the I/O data. Errors in the Communication Unit are indicated by the following data. • Communication Unit Error Status in *Communication Unit Status* • Overall Error Status in *Communication Unit Status* • Sensor Error Status in *Communication Unit Status* You can check the following information. • Ethernet Status • Data Link Status • Configuration Error Status • Target Node Status • Target Controller Status • Connection status • Controller Log • Tag Status • Ethernet Information	*7-4 Checking for Errors and Troubleshooting with the Network Configurator* on page 7-11
(c)	Notification of the occurrences of errors in the Communication Unit and information on them by event logs	Reading and checking the event logs of the Communication Unit through a no-protocol command or explicit message.	You can check the following information recorded by the Communication Unit. • Errors that occurred in the Communication Unit • Status changes in the Communication Unit The above information that is called events is stored with the time of occurrence in the Communication Unit. *2	*7-5 Checking for Errors and Troubleshooting with the Event Codes of the Communication Unit* on page 7-22

*1. You may send an explicit message to a certain CIP object to read the error notification.
Refer to *A-3-6 Error Status Object (Class ID: 391 Hex)* on page A-37 for information on the CIP object.

*2. Some settings are required to record the time of occurrence in event logs. Refer to *A-3-4 Event Log Object (Class ID: 41 Hex)* on page A-29 for details.

7-1-2 How to Check for Errors

The following table shows the basic procedure to check for errors.

Step	Item	Description	Reference
1	Finding the occurrence of an error	Find whether or not an error occurred using the indicator status or the *Unit Error Collection Status* in the I/O data.	*7-2 Checking for Errors and Troubleshooting with Indicators* on page 7-5 *7-3 Checking for Errors with the Status in I/O Data* on page 7-10

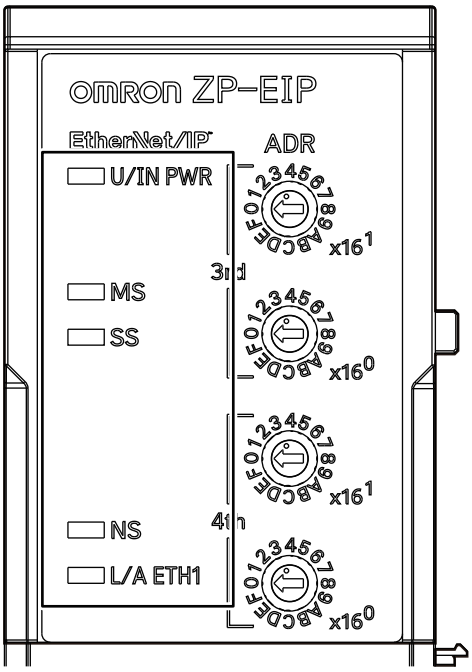
Step	Item	Description	Reference
2	Isolating the error cause	If there is an error, perform the following checks to isolate the cause of the error.	---
		Check the status of each indicator according to *7-2 Checking for Errors and Troubleshooting with Indicators* on page 7-5.	*7-2 Checking for Errors and Troubleshooting with Indicators* on page 7-5
		Check the status that indicates an error in the I/O data in the Communication Unit. • Communication Unit Error Status in *Communication Unit Status* • Overall Error Status in *Communication Unit Status* Indicates that an error occurred in one of the sensors. • Sensor Error Status Indicates in which sensor the error has occurred.	*4-2-2 Types and Data Configuration of Tag Sets* on page 4-5
		Check the network status with the Network Configurator.	*7-4 Checking for Errors and Troubleshooting with the Network Configurator* on page 7-11
		Check the event logs of the Communication Unit.	*7-5 Checking for Errors and Troubleshooting with the Event Codes of the Communication Unit* on page 7-22
3	Troubleshooting the error	After you isolate the cause of the error, perform troubleshooting.	---

7-2 Checking for Errors and Troubleshooting with Indicators

This section describes how to check for errors with indicators and perform troubleshooting.

7-2-1 Checking for Errors and Troubleshooting with Status Indicators

Status indicators show the status of the Communication Unit, Amplifier Unit, or EtherNet/IP network. The status indicators include the following indicators. The checking and troubleshooting methods with each indicators are described below.



Name	Description	Reference
MS Indicator	The module status indicator. This indicator shows the operating status of the Unit.	*Checking for Primary Errors and Troubleshooting with the MS and NS Indicators* on page 7-6
NS Indicator	The network status indicator. This indicator shows the status of the EtherNet/IP network.	
L/A ETH1 Indicator	The Link/Activity indicator for EtherNet/IP port 1. This indicator shows the linked status and communications status of EtherNet/IP port 1.	*Checking for Primary Errors and Troubleshooting with the L/A ETH1 Indicator* on page 7-8
U/IN PWR Indicator	This indicator shows the status of the Unit/input power supply.	*Checking for Errors and Troubleshooting with the U/IN PWR Indicator* on page 7-8
SS Indicator	The Amplifier Unit status indicator. This indicator shows the operating status and communications status of the Amplifier Unit.	*Checking for Errors and Troubleshooting with the SS Indicator* on page 7-9

Checking for Primary Errors and Troubleshooting with the MS and NS Indicators

MS	NS	Unit status	Cause	Correction
Not lit	Not lit	No power supply	Power is not supplied.	Check the following items and make sure that power is correctly supplied from the power supply. • Make sure that the Amplifier Unit is connected. • Make sure that the supply voltage is within the rated range. • Make sure that the power supply has enough capacity. • Make sure that the power supply has not failed. Also check the U/IN PWR indicator status. Refer to *Checking for Errors and Troubleshooting with the U/IN PWR Indicator* on page 7-8.
Lit green	Flashing green	No connection is established for EtherNet/IP communications.	No tag data link connection with the EtherNet/IP scanner and connection message (class 3) connection are established. *1	If this status is indicated when tag data link or other connection settings are configured for the EtherNet/IP scanner, the connection settings in the EtherNet/IP scanner may be incorrect. Check the EtherNet/IP scanner for any errors related to connection and then correct the connection settings for the EtherNet/IP scanner. This is the normal status when the computer and Communication Unit are connected to the network and no attempt is being made to establish a tag data link connection.
Lit green	Lit green	The Unit is operating normally.	A tag data link connection with the EtherNet/IP scanner or connection message (class 3) connection is established. *2	(This is the normal status.)
Flashing green	Not lit	BOOTP/DHCP Server Connection Error	The BOOTP or DHCP server is stopped.	Set the BOOTP or DHCP server to operate normally.
			An error occurred in communications with the BOOTP or DHCP server.	Check the communications path to the BOOTP or DHCP server and take corrective measures if there are any problems.
		Restarting is in progress for the Unit.	The Unit is restarting.	Wait for the Unit to finish initializing.

MS	NS	Unit status	Cause	Correction
Lit red	---	Non-volatile Memory Hardware Error	The non-volatile memory failed.	Cycle the power supply. If cycling the power supply does not clear the error, replace the Unit.
		Unit Processing Error	An error occurred in the software.	Cycle the power supply. If cycling the power supply does not clear the error, replace the Unit. If this error occurs again even after you replace the Unit, contact your OMRON representative.
		Hardware Failure	A hardware error occurred in the Unit.	Cycle the power supply. If cycling the power supply does not clear the error, replace the Unit.
Flashing red	---	Non-volatile Memory Checksum Error	The power supply to the Communication Unit was turned OFF while settings were written. Or, Support Software communications were disconnected.	Transfer the settings to the Communication Unit again. Do not turn OFF the power supply to the Communication Unit or disconnect communications with the Support Software while you transfer the settings to the Unit.
		TCP/IP Setting Error (Local IP Address)	The TCP/IP settings are incorrect.	Correct and transfer the settings again. Then, cycle the power supply or restart the Unit.
			The IP address delivered from the BOOTP or DHCP server is incorrect.	Set the IP address correctly in the settings of the BOOTP or DHCP server. Then, cycle the power supply or restart the Unit.
		Automatic Clock Adjustment Setting Error	The IP address setting for the NTP/SNTP Server IP Address is incorrect.	Correct the IP address of the NTP or SNTP server in *NTP/SNTP Server IP Address* and transfer it again. Then, cycle the power supply or restart the Unit.
		NTP/SNTP Server Connection Error	The NTP or SNTP Server IP address is incorrect.	Correct the IP address of the NTP or SNTP server in *NTP/SNTP Server IP Address* and transfer it again. Then, cycle the power supply or restart the Unit.
			The NTP or SNTP server is stopped.	Check if the NTP or SNTP server at the remote connection is operating normally and set it to operate normally if it is not.
			An error occurred in communications with the NTP or SNTP server.	Check the communications path to the NTP or SNTP server at the remote connection and take corrective measures if there are any problems.
Lit green	Flashing red	Exclusive Owner Tag Data Link Timeout	A connection timeout was detected in an Exclusive Owner connection for implicit message communications.	Check the following items. • The communications cable is connected correctly. • The EtherNet/IP scanner is operating normally. If the size of the input tag set for an Exclusive Owner connection to the EtherNet/IP is changed, cycle the power supply or restart the Unit.

MS	NS	Unit status	Cause	Correction
Flashing red	Lit red	IP address conflict	The IP address of the EtherNet/IP port is also used as the IP address of another node.	Perform either of the following and then cycle the power supply or restart the Unit. • Correct the IP address settings so that the same address is not used by more than one node. • Remove the node that has the duplicate IP address from the network.

*1. A state in which there are no established connections and no occurrences of timeout in Exclusive Owner connections with the IP address obtained.

*2. A state in which there are one or more established connections with the IP address obtained.

Checking for Primary Errors and Troubleshooting with the L/A ETH1 Indicator

L/A ETH1 Green	Unit status	Cause	Correction
Lit	Link established	---	(The Coupler Unit is in standby status after the link was established in the physical layer.)
Flashing	Link established and communications are active.	---	(This is the normal status.)
Not lit	No link established	---	After you check the following items for the communications cables, cycle the power supply or restart the Unit. • Make sure that the communications cable is wired correctly. • Make sure that there are no breaks in the communications cable or loose connections with the connectors. • Make sure that the cable is of the appropriate length. • Make sure that the communications cable meets the recommended specifications. If the error occurs again even after you check the above items and cycle the power supply, replace the Unit.

Checking for Errors and Troubleshooting with the U/IN PWR Indicator

U/IN PWR Green	Unit status	Cause	Correction
Lit	Power supply provided	Power is supplied.	(This is the normal status.)
Not lit	No power supply	Power is not supplied, or is insufficient.	Check the following items and make sure that power is correctly supplied from the power supply. • Make sure the Amplifier Unit is connected correctly. • Make sure that the supply voltage is within the rated range. • Make sure that the power supply has enough capacity. • Make sure that the power supply has not failed.

Checking for Errors and Troubleshooting with the SS Indicator

SS	Unit status	Cause	Correction
Lit green	Communicating with Amplifier Units	The Communication Unit is successfully communicating with the Amplifier Units.	(This is the normal status.)
Lit red	Communications error with Amplifier Units	The Communication Unit is not communicating with the Amplifier Units correctly.	Check the following items, connect and configure the Communication Units correctly, and then cycle the power supply. • Make sure that the connector is inserted properly and not disconnected. • Make sure that the registration of the number of connected channels is correct. • Make sure that 17 or more Amplifier Units are not connected.
Flashing red	Amplifier Unit System Error	In one of the Amplifier Units, a system error has occurred at least once since startup. Or the system error state has been persisting.	Clear the system error in the connected Amplifier Units and either perform the *Clear Error Status Flag* service or cycle the power supply.

7-3 Checking for Errors with the Status in I/O Data

This section provides information on checking for errors with the status in I/O data.

7-3-1 Checking for Errors in the Communication Unit

You can check the status in the I/O the data for the Communication Unit by the user program in the Controller or with the Support Software corresponding to the Controller.

The I/O data that indicates errors is as follows.

Name	Description
Unit Error Status	Indicates that some error occurred in the Communication Unit.
Sensor Overall Error Status	Indicates that some error occurred in the sensor.
Sensor Error Status	Indicates the sensor in which the error has occurred.

From the user program, etc., access the above values in the Input Assembly of I/O data.
Refer to *4-2-3 Details on Input Assembly Data* on page 4-13 for details on I/O data.

You may send an explicit message to a certain CIP object to read the error status.
Refer to *A-3-6 Error Status Object (Class ID: 391 Hex)* on page A-37 for information on the CIP object.

7-4 Checking for Errors and Troubleshooting with the Network Configurator

This section describes how to check for errors and troubleshoot them with the Network Configurator.

7-4-1 Information That You Can Access from the Network Configurator

You can check the following information that indicates the EtherNet/IP communications status and errors with the Network Configurator.
This information is called network status.
It is not the Communication Unit, but the EtherNet/IP scanner, that has the network status.

- Ethernet Status
- Data Link Status
- Configuration Error Status
- Target Node Status
- Target Controller Status
- Connection Status
- Controller Log
- Tag Status
- Ethernet Information

Refer to *7-4-2 Checking the Network Status with the Network Configurator* on page 7-11 for how to check the network status.

7-4-2 Checking the Network Status with the Network Configurator

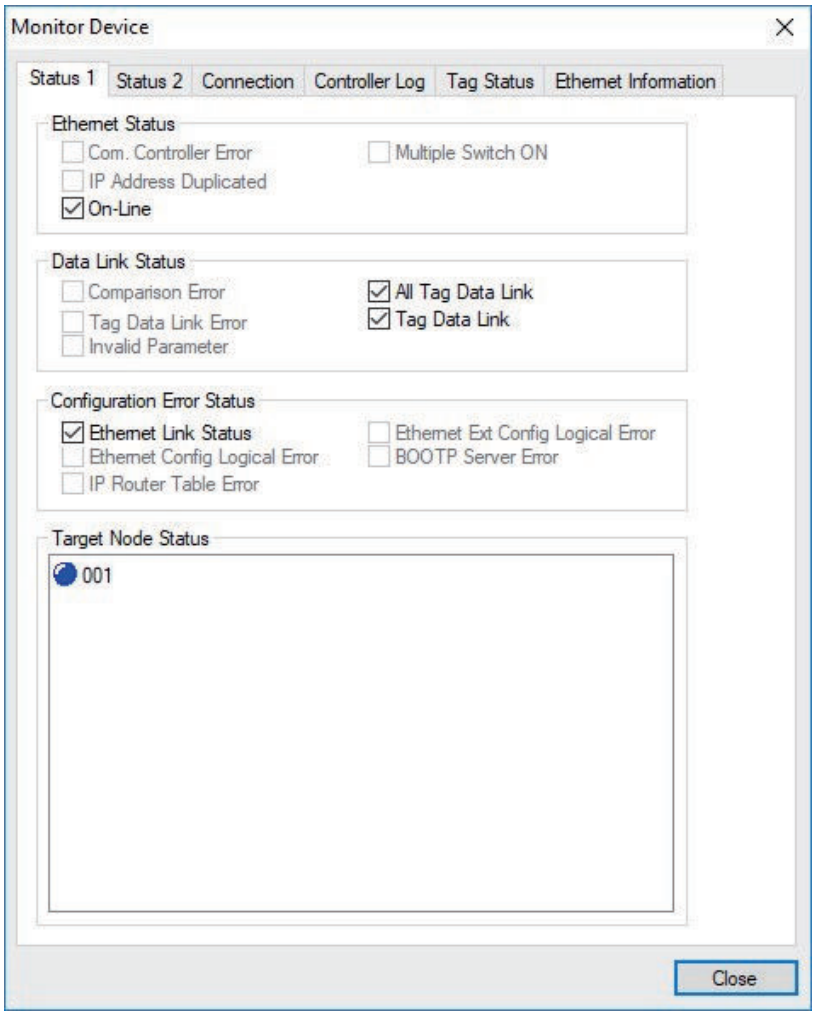
This section describes the procedure to check the network status with the Network Configurator and the information that you can get from the network status.
Note that the tab pages of the Network Configurator used here are the ones that you see when you use the built-in EtherNet/IP port on an NJ/NX-series CPU Unit as the EtherNet/IP scanner.

Checking the Network Status

Use the following procedure to check the network status in the Network Configurator's Monitor Device dialog box.

1. Go online with the network that includes the Communication Unit.
   Refer to *Going Online* on page 3-7 for information on how to go online.

2. Select the CPU Unit and select **Device** – **Monitor** from the menu, or right-click it and select **Monitor**.
   The Monitor Device dialog box is displayed.



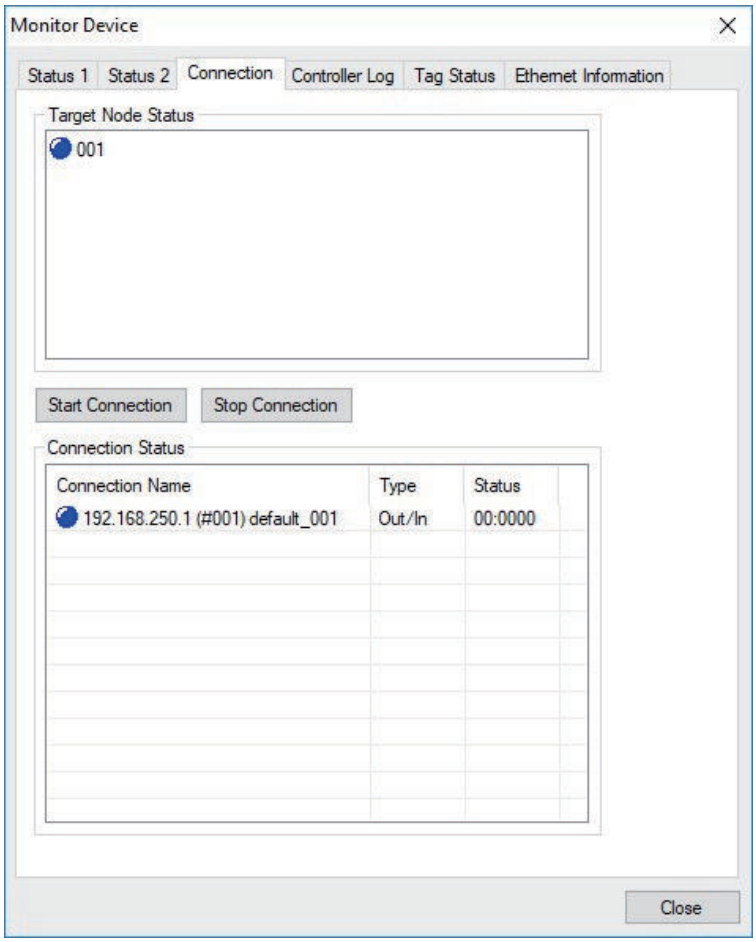
Network Status That You Access from the Monitor Device Dialog Box

● Connection Tab Page

The **Target Node Status** area displays information about the target node that acts as the originator.

If all tag data link connections to the node are established and normal, this information is displayed in blue. If any connection is broken it is displayed in red. However, this information is displayed in gray if the connection to the node is stopped.

In the **Connection Status** area, the **Status** column shows the current status of each connection that is set as the originator. This information can be used to identify the cause of tag data link errors. Refer to *7-4-3 Connection Status Codes and Troubleshooting* on page 7-16 for details on the information displayed in the **Connection Status** area.

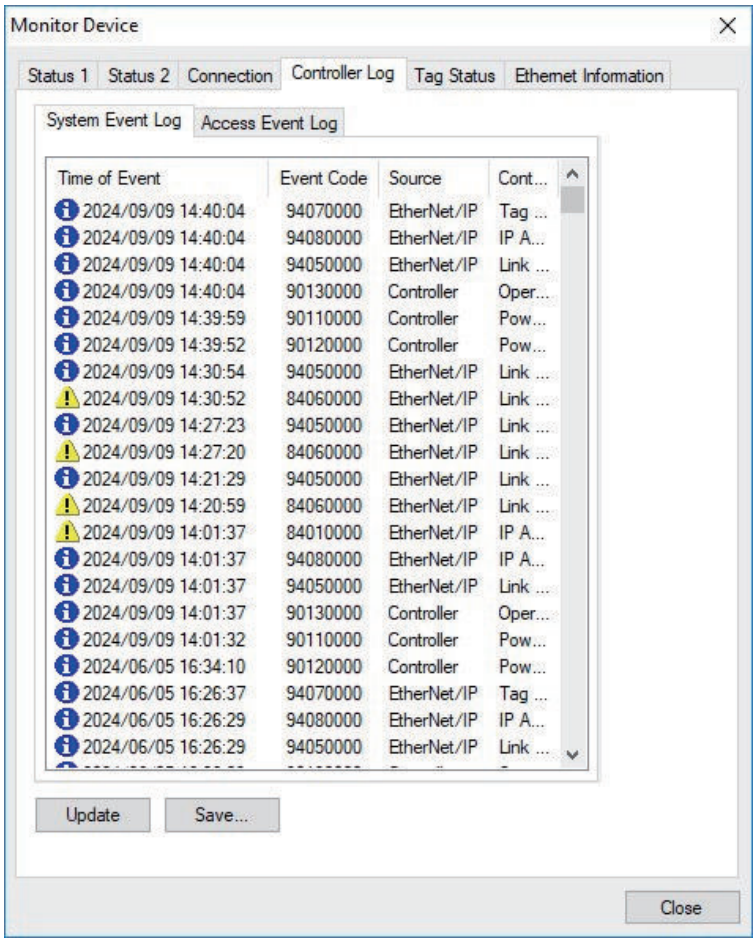


● Controller Log Tab Page

The Controller Log tab page displays the Controller event log that is stored in the NJ/NX-series CPU Unit.

The error history shows errors that have occurred. It can be saved in a file in the computer.

Refer to the *NJ/NX-series Troubleshooting Manual (Cat. No. W503)* for event details.



Additional Information

If you use a CJ/CS/CP-series CPU Unit as the EtherNet/IP scanner, note that the screen specifications are different from those of the built-in EtherNet/IP port on an NJ/NX-series CPU Unit. The Controller error logs stored in the CPU Unit are displayed in the **Controller Error History** tab page.
Refer to the user's manual for the CJ/CS/CP-series CPU Unit for details on the **Controller Error Log** tab page.

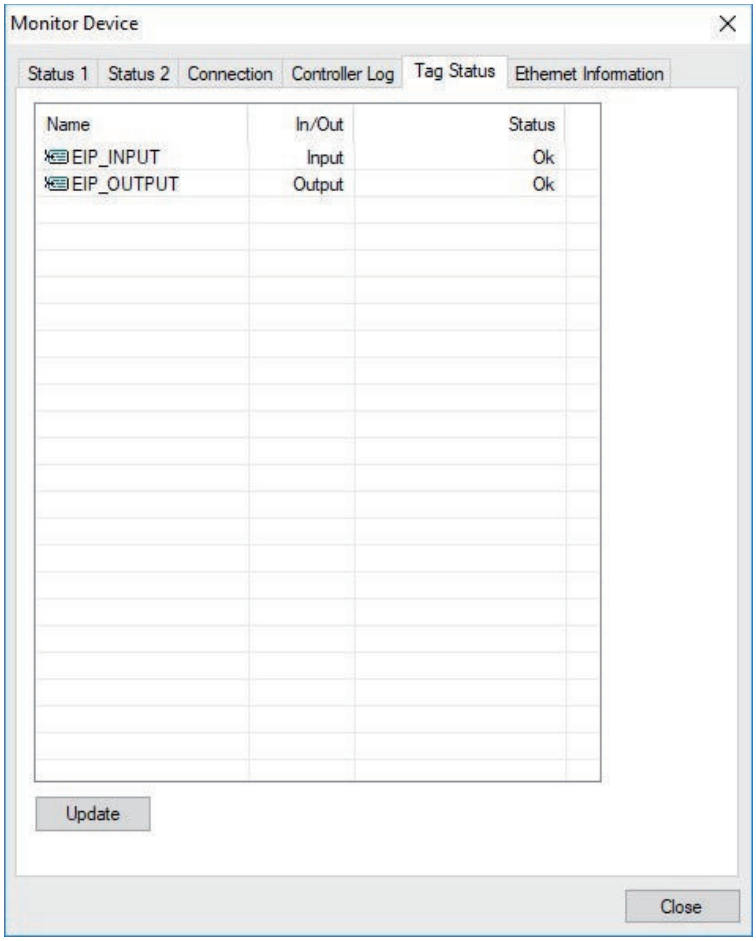
● Tag Status Tab Page

This tab page displays in the **Status** column whether the tag settings for each tag in tag data links are set so that data can be exchanged correctly with the CPU Unit.

Status	Description
Normal resolution completed	Normal data exchange is possible.
Resolving	The variables with tags are being resolved. When the resolution is completed normally, a connection will be established and the data exchange will start.
Different sizes	Different sizes are set for the network variables and the tag settings. A connection will not be established for a tag for which this error occurs.
No tag	A network variable specified in the tag setting is not listed in the CPU Unit. A connection will not be established for a tag for which this error occurs.

Status	Description
Attribute error	One of the following occurred: • A network variable specified in the tag setting cannot be written because it has the Constant attribute. • The I/O direction that is set in the tag data link settings does not agree with the I/O direction of the variable in the CPU Unit. A connection will not be established for a tag for which this error occurs.

If the status is not “Normal resolution completed”, check the tag data link settings or the network variable settings in the variable table in the CPU Unit.

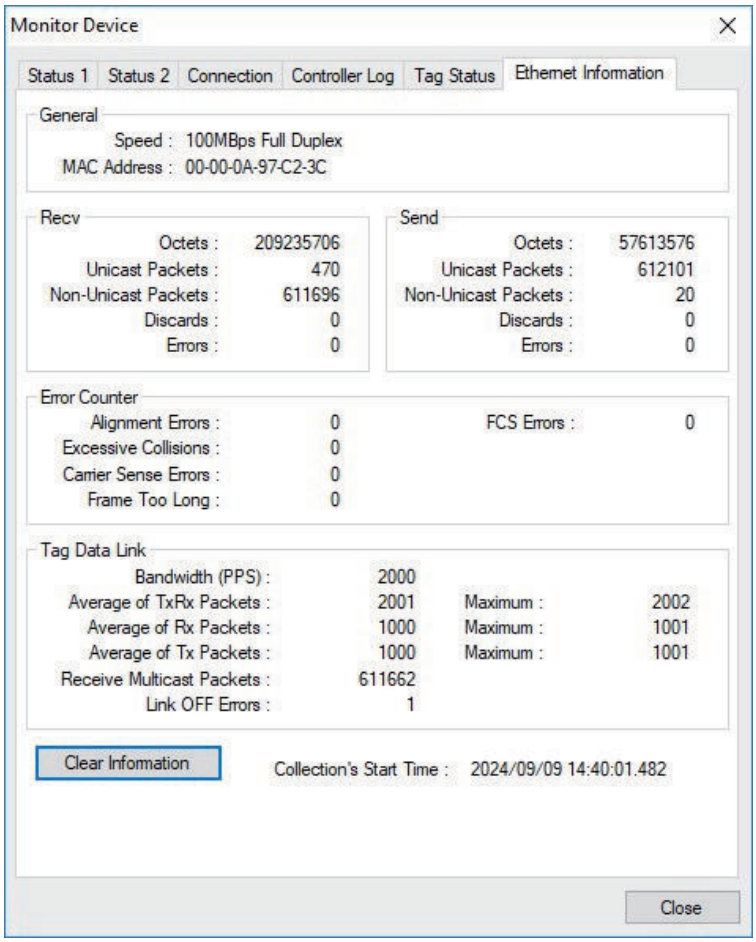


● Ethernet Information Tab Page

This tab page displays the communications status at the communications driver level of the EtherNet/IP port.

The **Error Counter** information can be used to confirm whether communications problems have occurred.

The **Tag Data Link** information can be used to confirm characteristics such as the bandwidth usage (PPS).



7-4-3 Connection Status Codes and Troubleshooting

This section explains how to identify and correct errors based on the tag data link's connection status. The corrections are described for two types of configurations below.

Configuration name	Originator	Target
Configuration 1	CJ1W-EIP21, CJ2H-CPU□□-EIP, CJ2M-CPU3□, NJ/NX-series CPU Unit built-in EtherNet/IP port, or other OMRON EtherNet/IP scanner	ZP-series EtherNet/IP Communication Unit
Configuration 2	EtherNet/IP scanner from another manufacturer	ZP-series EtherNet/IP Communication Unit

The connection status can be read in the **Connection** tab page of the Network Configurator's Monitor Device dialog box.

Additional Information

The connection status has the same meaning as the Connection Manager's General and Additional error response codes, as defined in the CIP specifications.

The following table shows the sources of errors and error correction for each configuration and connection status.

Connection status		Source of error	Correction	
General Status (hex)	Additional Status (hex)		Configuration 1	Configuration 2
00	0000	Normal status code: The connection has been opened and the tag data link is communicating normally.	---	---
01	0100	Error code returned from target: Attempted to open multiple connections for the same connection.	This error does not occur.	Depends on the originator's specifications. (This error should not occur. If it does, contact the originator device's manufacturer.)
01	0103	Error code returned from target: Attempted to open a connection with an unsupported transport class.	This error does not occur.	Confirm that the originator supports Class 1.
01	0106	Duplicate consumers: Attempted to open multiple connections for single-consumer data.	If the tag data link is stopped or started, this error may occur according to the timing, but the system will recover automatically.	If the tag data link is stopped or started, this error may occur according to the timing, but the system will recover automatically.
01	0107	Error code returned from target: Attempted to close a connection, but that connection was already closed.	This error does not occur.	This is not an error because the connection is already closed.
01	0108	Error code returned from target: Attempted to open a connection with an unsupported connection type.	This error does not occur.	Check which connection types can be used by the originator. (An error will occur if a connection other than a multicast or point-to-point connection is set.)
01	0109	Error code returned from target: The connection size settings are different in the originator and target.	Check the connection (sizes) set in the originator and target.	
01	0110	Error code returned from target: The target was unable to open the connection, because of its operating status, such as downloading settings.	Check whether the tag data link is stopped at the target. (Restart the tag data link communications with the software switch.)	
01	0111	Error code returned from target: The RPI was set to a value that exceeds the specifications.	This error does not occur.	Set the originator's RPI setting to 10 seconds or less.
01	0112	Error code returned from target: The RPI was set to a value that differs from other established Multi-cast connection.	This error does not occur.	Check the originator's connection settings.

Connection status		Source of error	Correction	
General Status (hex)	Additional Status (hex)		Configuration 1	Configuration 2
01	0113	Error code generated by originator or returned from target: Attempted to open more connections than allowed by the specifications (32).	This error does not occur.	Check the originator's connection settings.
01	0114	Error code returned from target: The Vendor ID and Product Code did not match when opening connection.	This error does not occur.	Check the originator's connection settings.
01	0115	Error code returned from target: The Product Type did not match when opening connection.	This error does not occur.	Check the originator's connection settings.
01	0116	Error code returned from target: The Major/Minor Revisions did not match when opening connection.	Check the major and minor revisions set for the target device and connection. If necessary, obtain the most recent EDS file and set it again.	Check the originator's connection settings.
01	0117	Error code returned from target: The tag set specified in the connection's target variables does not exist.	Check whether the originator and target tag sets and tags are set correctly.	Check the originator's connection settings. Check whether the target tag sets and tags are set correctly.
01	0118	Error code returned from target: There is a mistake in the size specified with the data octet included in the connection path.	This error does not occur.	Check the originator's connection settings.
01	011A	Error code generated by originator: Connection could not be established because the buffer was full due to high traffic.	Unexpected network traffic may have been received. Use the **Ethernet Information** tab page on the Monitor Device dialog box on the Network Configurator to check the bandwidth usage, and correct the load. If there are places where broadcast storms occur, such as loop connections in the network connection format, then correct them.	Depends on the target's specifications. (Contact the target device's manufacturer.)
01	011B	Error code returned from target: The RPI was set to a value that is below the specifications.	This error does not occur.	Set the originator's RPI setting to 1 ms or greater.

Connection status		Source of error	Correction	
General Status (hex)	Additional Status (hex)		Configuration 1	Configuration 2
01	0123	Error code returned from target: A request was received to open a type of connection that is not supported (a connection type going from the originator to the target).	This error does not occur.	Check the originator's connection type. An error will occur if any type other than multicast or point-to-point is specified.
01	0124	Error code returned from target: A request was received to open a type of connection that is not supported (a connection type going from the target to the originator).	This error does not occur.	Check the originator's connection type. An error will occur if any type other than multicast or point-to-point is specified.
01	0127	Error code returned from target: A different data size is set for the connection in the originator and target (data from the originator to the target).	Check the connection (sizes) set in the originator and target (data from the originator to the target).	
01	0128	Error code returned from target: A different data size is set for the connection in the originator and target (data from the target to the originator).	Check the connection (sizes) set in the originator and target (data from the target to the originator).	
01	0203	Error code generated by originator: The connection timed out.	Tag data link communications from the target timed out. Check the power supply and cable wiring of the devices in the communications path, including the target and switches. If performance has dropped due to heavy traffic, change the performance settings. For example, increase the timeout time or RPI setting.	
01	0204	Error code generated by originator: The connection open process timed out.	There was no response from the target. Check the power supply and cable wiring of the devices in the communications path, including the target and switches.	
01	0205	Error code returned from target: There was a parameter error in the frame used to open the connection.	This error does not occur.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	0302	Error code generated by originator or returned from target: The tag data link's allowable bandwidth (PPS) was exceeded.	Check the connection settings (number of connections and RPI) at the originator and target.	Check the connection settings (number of connections and RPI) at the originator and target.
01	0311	Error code returned from target: There was a parameter error in the frame used to open the connection.	This error does not occur.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	0312	Error code returned from target: There was a parameter error in the frame used to open the connection.	This error does not occur.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)

Connection status		Source of error	Correction	
General Status (hex)	Additional Status (hex)		Configuration 1	Configuration 2
01	0315	Error code returned from target: There was a parameter error in the frame used to open the connection.	This error does not occur.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	0316	Error code returned from target: There was a parameter error in the frame used to close the connection.	This error does not occur.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	031C	Error code generated by originator: Some other error occurred.	This error does not occur.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
08	---	Error code returned from target: There is no Forward Open or Large Forward Open service in the target device.	This error does not occur.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
D0	0001	Error code generated by originator: The connection operation is stopped.	The connection was stopped because the Tag Data Link Stop Bit was turned ON, or the settings data is being downloaded. Either turn ON the Tag Data Link Start Switch, or wait until the settings data has been downloaded. This code includes fatal Controller errors and Unit failure.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)
D0	0002	Error code generated by originator: The connection is being opened (opening processing in progress).	Wait until the opening processing is completed.	Depends on the originator's specifications. (Contact the originator device's manufacturer.)

OMRON error code				
Connection status		Source of error	Correction	
General Status (hex)	Additional Status (hex)		Configuration 1	Configuration 2
01	0810	Error code returned from target: New data could not be obtained from the CPU Unit when opening connection. (The Unit will automatically recover, and attempt to open the connection again.)	This error may occur if the CPU Unit's task period was long when opening the connection or some problem in the Controller caused the Controller to stop. If the task period was too long, operation recovers automatically. If the Controller has stopped, identify the error from the error information in the CPU Unit.	The meaning of this error code is defined by each vendor, so it depends on the originator's specifications. (Contact the originator device's manufacturer.)
01	0811	Error code generated by originator: New data could not be obtained from the CPU Unit when opening connection. (The Unit will automatically recover, and attempt to open the connection again.)	This error may occur if the CPU Unit's task period was long when opening the connection. If the task period was too long, operation recovers automatically.	The meaning of this error code is defined by each vendor, so it depends on the originator's specifications. (Contact the originator device's manufacturer.)

7-5 Checking for Errors and Troubleshooting with the Event Codes of the Communication Unit

This section describes how to check for errors and troubleshoot them with the event codes of the Communication Unit.

7-5-1 Event Codes

Overview

The Communication Unit records events, such as errors and status changes, that occur in it. Reading recorded event codes from event logs allows you to easily correct errors that occurred.

7-5-2 Checking for Errors with Explicit Messages

Reading Event Logs

Send an explicit message to the following CIP object to read the data.

Class ID	Event Log object (41 hex)
Instance ID	01 hex
Attribute ID (Instance)	0D hex Event/Data Log Size 0E hex Event/Data Log
Service Code	Get Attribute Single (0E hex)

Clearing Event Logs

Send an explicit message to the following CIP object to clear event logs.

Class ID	Event Log object (41 hex)
Instance ID	01 hex
Attribute ID (Instance)	Not specified
Service code	Reset (05 hex)

Refer to *A-3-4 Event Log Object (Class ID: 41 Hex)* on page A-29 for information on the CIP object.

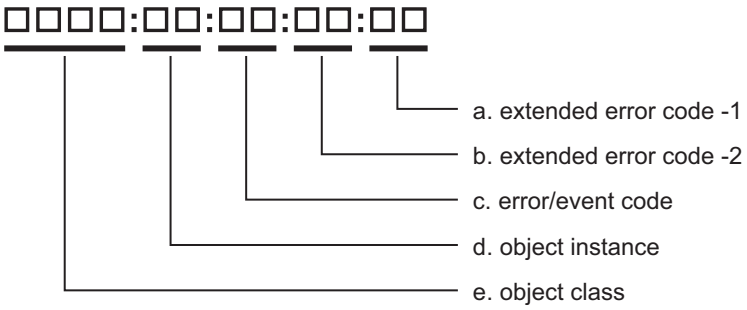
7-5-3 Event Codes for Errors and Troubleshooting Procedures

This section describes how to read the event codes of errors and troubleshoot them according to the event logs.

Format and Meaning of Event Codes

An event code consists of 12 hexadecimal digits. It is formatted as follows.

Format of event codes



a. extended error code -1	Lower digits of the expansion error code. This contains the detailed error code.
b. extended error code -2	Upper digits of the expansion error code. This contains the error code in the class. The most significant bit of these digits indicates the event category: 1 for warning and 0 for information.
c. error/event code	This is the CIP general status code. It contains IF hex that indicates a vendor-specific error for all events.
d. object instance	CIP object instance ID for the event source. “nn” indicates the port number of the port nearest to the error location.
e. object class	CIP object class ID for the event source.

Details on Events

Details on each event are described below.

Event code	Category	Retained or Not retained	Event name	Cause	Correction
0390:01:1F:81:00	Warning	Retained	Non-volatile Memory Hardware Error	Non-volatile memory failure	Cycle the power supply. If cycling the power supply does not clear the error, replace the Unit.
0390:01:1F:82:00	Warning	Retained	Non-volatile Memory Checksum Error	The power supply to the Unit was turned OFF or Support Software communications were disconnected while settings were written.	Transfer the settings to the Communication Unit again. Do not turn OFF the power supply or disconnect Support Software communications while you transfer the settings to the Communication Unit.

Event code	Category	Retained or Not retained	Event name	Cause	Correction
0390:01:1F:83:00	Warning	Retained	Communication Unit Processing Error	An error occurred in the software.	Cycle the power supply. If cycling the power supply does not clear the error, replace the Unit. If this error occurs again even after you replace the Communication Unit, contact your OMRON representative.
00F5:01:1F:81:xx xx: Fourth octet value of the IP address	Warning	Retained	IP Address Conflict	The IP address of the EtherNet/IP port is also used as the IP address of another node.	Perform either of the following and then cycle the power supply or restart the Communication Unit. • Correct the IP address settings so that the same address is not used by more than one node. • Remove the node that has the duplicate IP address from the network.
00F5:01:1F:82:00	Warning	Retained	TCP/IP Setting Error (Local IP Address)	The TCP/IP settings are incorrect.	Correct and transfer the settings again. Then, cycle the power supply or restart the Unit.
				The IP address delivered from the BOOTP or DHCP server is incorrect.	Set the IP address correctly in the settings of the BOOTP or DHCP server. Then, cycle the power supply or restart the Unit.
0390:01:1F:84:00	Warning	Retained	Automatic Clock Adjustment Setting Error	The IP address setting for the NTP/SNTP Server IP Address is incorrect.	Correct the IP address of the NTP or SNTP server in *NTP/SNTP Server IP Address* and transfer it again. Then, cycle the power supply or restart the Unit.
00F5:01:1F:83:00	Warning	Retained	BOOTP/DHCP Server Connection Error	The BOOTP or DHCP server is stopped.	Set the BOOTP or DHCP server to operate normally.
				An error occurred in communications with the BOOTP or DHCP server.	Check the communications path to the BOOTP or DHCP server and take corrective measures if there are any problems.
0390:01:1F:85:00	Warning	Retained	NTP/SNTP Server Connection Error	The NTP or SNTP Server IP address is incorrect.	Correct the IP address of the NTP or SNTP server in *NTP/SNTP Server IP Address* and transfer it again. Then, cycle the Unit/input power supply or restart the Unit.
				The NTP or SNTP server is stopped.	Check if the NTP or SNTP server at the remote connection is operating normally and set it to operate normally if it is not.
				An error occurred in communications with the NTP or SNTP server.	Check the communications path to the NTP or SNTP server at the remote connection and take corrective measures if there are any problems.

Event code	Category	Retained or Not retained	Event name	Cause	Correction
00F6:01:1F:02:00	Information	Retained	Link Down Detected	An EtherNet/IP cable is broken, disconnected, or loose.	Connect the EtherNet/IP cable securely. If the cable is broken, replace it.
				The Ethernet switch power supply is turned OFF or failed.	Turn ON the power supply to the Ethernet switch. Replace the Ethernet switch if it fails.
				The link speed does not match.	Make the port settings at the remote node to the auto negotiation setting.
				The communications are unstable due to noise.	Implement noise countermeasures.
0001:01:1F:01:00	Information	Retained	Restart Executed	A restart was executed.	---
0041:01:1F:01:00	Information	Retained	Clearing Event Logs	The event log was cleared.	---
0392:01:1F:01:xx xx: Channel number where the event occurred	Warning	Retained	Amp Information Consecutive Reception Error	Data reception from the Amplifier Unit in a certain channel has failed consecutively 16 times, or error data has been received.	Check the connection status with the Amplifier Unit and cycle the power supply. If cycling the power supply does not clear the error, replace the Communication Unit or Amplifier Unit. Check the surrounding noise environment and implement noise countermeasures.
0392:01:1F:02:00	Warning	Retained	Amplifier Unit Alive Check Error	There is no data coming from the Amplifier Units.	Check the connection status with the Amplifier Unit and cycle the power supply. If cycling the power supply does not clear the error, replace the Communication Unit or Amplifier Unit.
0392:01:1F:03:00	Warning	Retained	Amplifier Unit Channel Recognition Error	The Unit failed to recognize the channel during startup.	Check the connection status with the Amplifier Unit and cycle the power supply. If cycling the power supply does not clear the error, replace the Communication Unit or Amplifier Unit.
0392:01:1F:04:xx xx: Channel number where the system error occurred	Warning	Retained	Amplifier Unit System Error	A system error has occurred in the Amplifier Unit with a certain channel number.	Correct the system error in the Amplifier Unit and cycle the power supply. If cycling the power supply does not clear the error, replace the Amplifier Unit.

7-6 Resetting Errors

This section describes how to reset errors in the Communication Unit.

7-6-1 Overview of Resetting Errors

If an error occurs in a Communication Unit, and you remove the cause of the error, the Communication Unit automatically recovers and starts operating normally.
However, the behavior of the error status in the I/O data for the Communication Unit is determined by the combination of the Hold Setting For Error Status and Clear Error Status Flag service settings.

7-6-2 Hold Setting For Error Status

Use the following setting to set the behavior of the error status when the error cause is removed.

Use the Network Configurator or an explicit message to configure the following setting.

Setting	Description	Default	Setting range	Update timing
Hold Setting For Error Status	Set the behavior of the error status when the error cause is removed.	TRUE	TRUE or FALSE*1	After restart

*1. The set values are described as follows:

Set value	Description
TRUE	The error status does not change to FALSE when the error cause is removed. To clear the error, use the Clear Error Status Flag service.
FALSE	The error status changes to FALSE when the error cause is removed.

Refer to *7-4-2 Checking the Network Status with the Network Configurator* on page 7-11 for the setting procedure with the Network Configurator.
Refer to *A-3-6 Error Status Object (Class ID: 391 Hex)* on page A-37 for information on the CIP object that is set through an explicit message.

7-6-3 Clearing the Error Status

Send an explicit message to the following CIP object to set the error status to FALSE (i.e., clear the error status).

Class ID	Error status object (391 hex)
Instance ID	00 hex
Attribute ID (Instance)	Not specified
Service code	Clear Error Status Flag (35 hex)

Refer to *A-3-6 Error Status Object (Class ID: 391 Hex)* on page A-37 for information on the CIP object.

A

Appendices

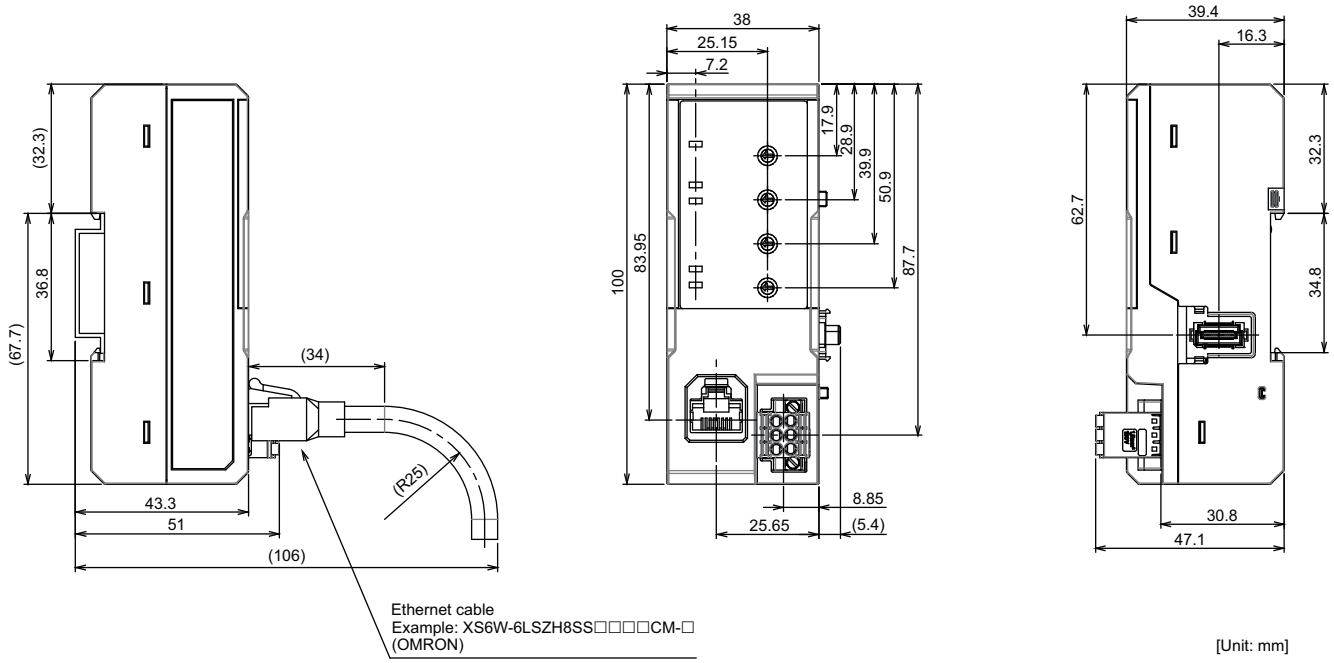
The appendices provide information on supported CIP objects, sample programming, Windows firewall configuration, and other supplemental information.

A-1 Specifications

This section describes the following specifications of the Communication Unit.

- General Specifications
- EtherNet/IP Communications Specifications
- Unit Specifications

A-1-1 Dimensions



[Unit: mm]

A-1-2 General Specifications

Item	Specification
Sensor that can be connected	ZP-series Amplifier Unit
Power supply voltage	10 to 30 VDC, including 10% ripple (p-p) (supplied from Amplifier Unit)
Power consumption	1,500 mW max. (not including Amplifier Unit)
Indicators	MS (Green/Red), NS (Green/Red), L/A ETH1 (Green), U/IN PWR (Green), SS (Green/Red)
External input	Mode 1: Control input for Communication Unit buffering (2 inputs) Mode 2: Cuing information input (2 inputs) • DC input method Input voltage: 10 to 30 VDC Input current: 8 mA typical (24 VDC) ON voltage/current: 8.8 V min./2 mA min. OFF voltage/OFF current: 4 V max./0.5 mA max.

Item	Specification
Control output	Communication Unit buffering status output (2 outputs) • Transistor output method Output voltage: 10 to 30 VDC Maximum load current: 50 mA ON residual voltage: 2 V max. OFF leakage current: 0.1 mA max.
Ambient temperature range	Operating: -10 to 50°C, Storage: -15 to 70°C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Vibration resistance	10 to 150 Hz, double amplitude 0.7 mm, 80 minutes each in X, Y, and Z directions
Shock resistance	300 m/s^2, 3 times each in 6 directions along X, Y, and Z axes
Dielectric strength	1,000 VAC, 50/60 Hz for 1 minute
Insulation resistance	20 MΩ min. (at 500 VDC)
Maximum number of connected sensors	16 units max.
Degree of protection*1	IP20 (IEC60529)
Material	Polycarbonate
Weight (Main unit only)	Approx. 85 g
Accessories	Instruction manual, compliance sheet, End Plates (2)

*1. This indicates the degree of protection when connected to an Amplifier Unit.

A-1-3 EtherNet/IP Communications Specifications

Item		Specification
Communications protocols		EtherNet/IP protocol • Implicit messages (Class1) • Explicit messages (Class 3, UCMM)
Modulation		Baseband
Link speed		10 Mbps or 100 Mbps
Ethernet physical layer*1		100BASE-TX or 10BASE-T (100BASE-TX is recommended.)
Ethernet switch		Layer-2 switch
Transmission media		Category 5 or higher twisted-pair cable (Recommended cable: double-shielded cable with aluminum tape and braiding)
Transmission distance		100 m or less (Distance between nodes and between hub and node)
Topology		Star, tree
Number of connected Units		• Star No restrictions • Tree There is no restrictions in the number of cascade connections when an Ethernet switch is used.
EtherNet/IP tag data links	**Number of connections*2**	1 (Point to Point)
	Packet Interval (RPI)	1 to 10,000 ms
	Allowed communications bandwidth per Unit	4,000 pps
Explicit message	**Class 3 (number of connections)*2**	5
	UCMM (unconnected)*2	Supported

Item		Specification
EtherNet/IP I/O connection size		Input: 276 bytes max. (including input data, status, and unused areas) Output: 24 bytes max. (including output data and unused areas)
Support functions	**Supported services**	Tag data link, CIP message communications, automatic clock adjustment (NTP/SNTP client), BOOTP client, DHCP client
	IP address conflict detection	Provided

*1. If tag data links are used, use 100BASE-TX.

*2. The maximum number of connections is 10 when tag data links (Class 1), Class 3, and UCMM are used simultaneously.

A-2 Setting Tag Data Links

This section describes the tag data link settings required for a Communication Unit to exchange data with the EtherNet/IP scanner. To set tag data links, configure the connection settings for the EtherNet/IP scanner that functions as the originator.
Use the following procedures to set tag data links.

Procedure		Description	Reference
1	Creating Network Variables for the EtherNet/IP Scanner	Create network variables to assign to the EtherNet/IP scanner.	*A-2-1 Creating Network Variables* on page A-5
2	Creating Tags and Tag Sets	Create tag sets and member tags that are required to create connections for the EtherNet/IP scanner.	*A-2-2 Creating Tags and Tag Sets* on page A-6
3	Setting the Connection	Set the connection between the EtherNet/IP scanner and the Communication Unit.	*A-2-3 Setting the Connection* on page A-10
4	Downloading Tag Data Link Parameters	Download the set tag data link parameters to the EtherNet/IP scanner.	*A-2-4 Downloading Tag Data Link Parameters* on page A-15
5	Saving the Network Configuration File	Save the set device parameters and tag data link parameters in a network configuration file.	---

A-2-1 Creating Network Variables

Use the Support Software corresponding to the Controller to connect to. Create network variables corresponding to the tags required for the device to participate in tag data links. This allows you to exchange data between the Controller and the Communication Unit with the user program.
Note that the data size of each network variable that you create must be the same as that of the tag set.

Additional Information

Network variables may not be used for some Controllers. For Controllers that cannot handle network variables, use the I/O memory addresses of the CPU Unit for tags.
Refer to the user's manual for your Controller for information on whether it can handle network variables.

An example of creating a network variable for Input Assembly Instance Number 110 with an NJ/NX-series CPU Unit is described below.

- Define a structure data type according to the data configuration of Input Assembly Instance Number 110.
- With the above data type, create a network variable for Input Assembly Instance Number 110. Assume that the variable name is *Inputs1*.
- Use the Sysmac Studio.

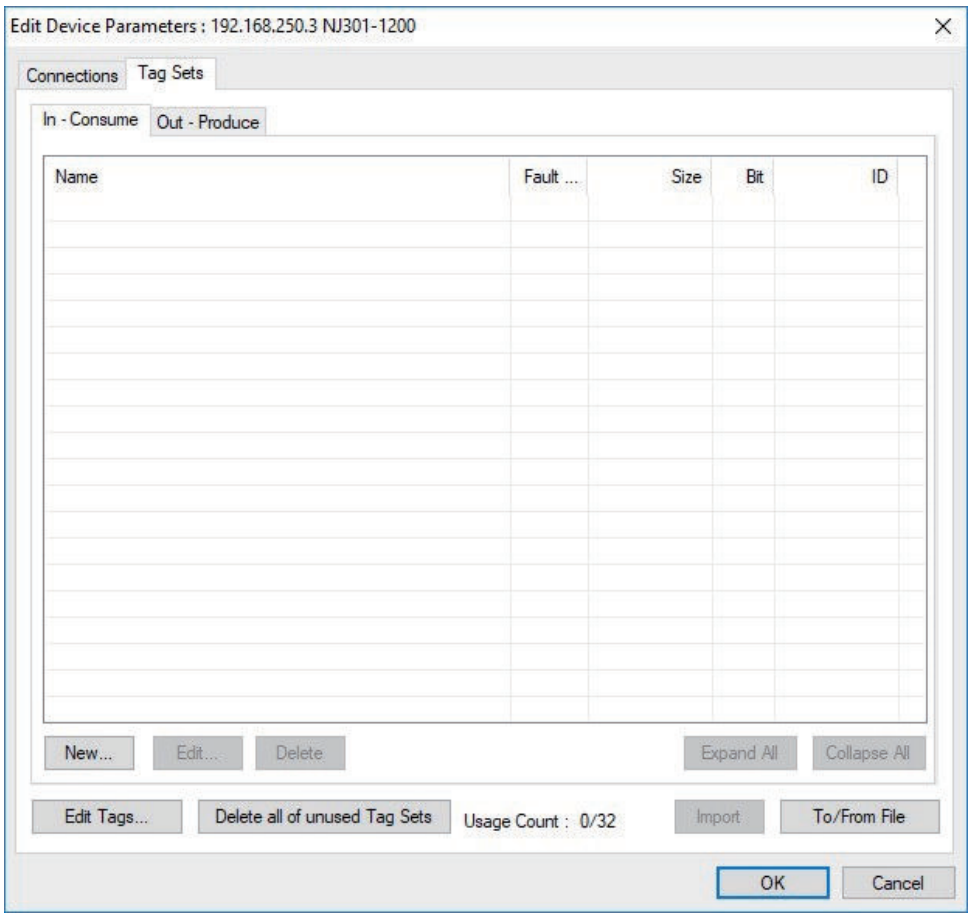
A-2-2 Creating Tags and Tag Sets

Create tag sets and member tags that are required to create connections for the registered EtherNet/IP scanner. You can set the network variables used in user programs for tags.
Refer to *Creating Tags and Tag Sets* in the user's manual for your OMRON EtherNet/IP scanner for how to change tags and tag sets.
The following shows how to create tags and tag sets with given conditions as an example.

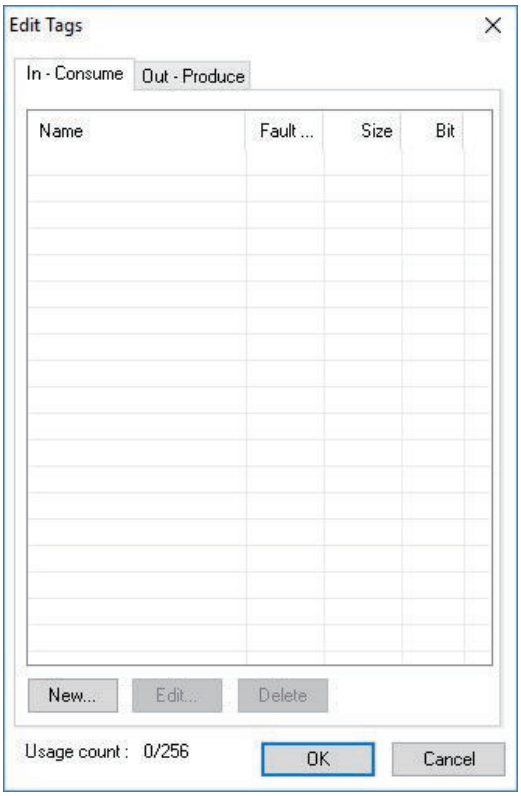
Item	Condition
EtherNet/IP scanner	Built-in EtherNet/IP port on NJ/NX-series CPU Unit
Connection type for Communication Unit	• Output Tag set: Input Assembly Instance Number 110 (276 bytes) • Input Tag Set: Output Assembly Instance Number 132 (24 bytes) • Full
Network variables created	• Input Tag Set for scanner: Inputs1 • Output Tag Set for scanner: Outputs1
Applicable Support Software	Network Configurator

1 In the Network Configuration pane of the Network Configurator, right-click the icon of the EtherNet/IP scanner with which the Communication Unit exchange data and select **Parameter** – **Edit**.
The **Edit Device Parameters** dialog box is displayed.

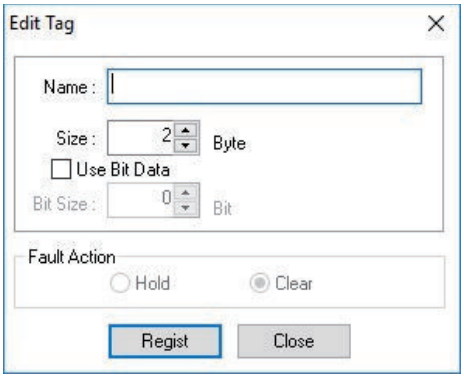
2 Click the **Tag Sets** tab at the top of the **Edit Device Parameters** dialog box.
There are two tabs for tag sets: input (consume) and output (produce).



3 Click the **Edit Tags** button.
The **Edit Tags** dialog box is displayed. Register input (consume) tags and output (produce) tags.
In this example, first set the input tags.

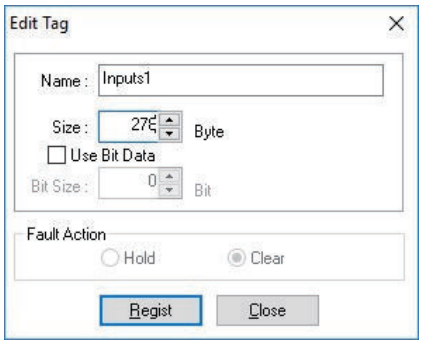


4 Select the **In – Consume** tab, and then click the **New** button.
The **Edit Tag** dialog box is displayed.



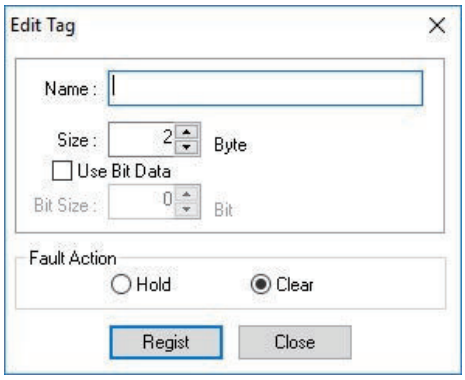
5 In the **Name** field, enter the network variable name.
In this example, enter *Inputs1*.

6 In the **Size** field, enter the size of the tag according to the size of the input or output tag set used for the Communication Unit.
In this example, enter 276 bytes, which is the size of Input Assembly Instance Number 110 that you use.



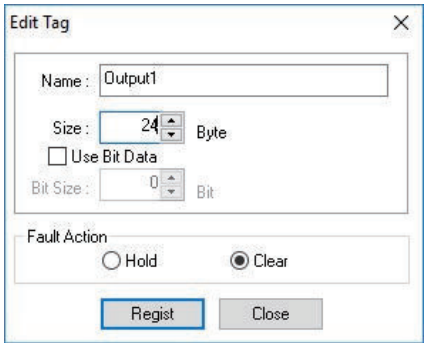
7 Click the **Regist** button to register the tag.
The **Edit Tag** dialog box is displayed so that you can continue editing the next tag.
Because this is an example of setting only one input tag *Inputs1*, click the **Close** button to complete the editing. To add tags, register all of the tags and then click the **Close** button.

8 Set an output tag. Select the **Out – Produce** tab, and then click the **New** button.
The **Edit Tag** dialog box is displayed.



9 In the **Name** field, enter the network variable name.
In this example, enter *Outputs1*.

10 In the **Size** field, enter the size of the tag according to the size of the input or output tag set used for the Communication Unit.
In this example, enter 24 bytes, which is the size of Output Assembly Instance Number 132 that you use.

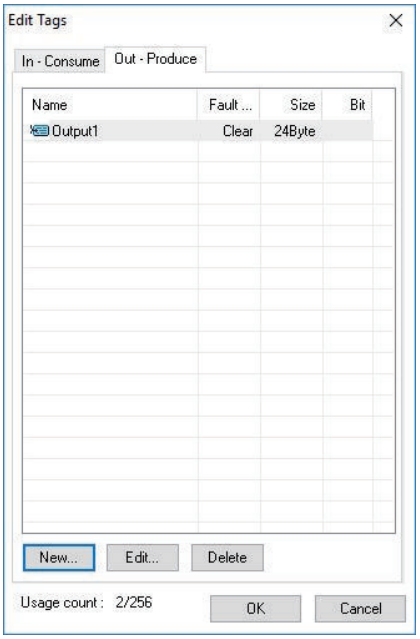


For the output (produce) tag, you need to set the following item.

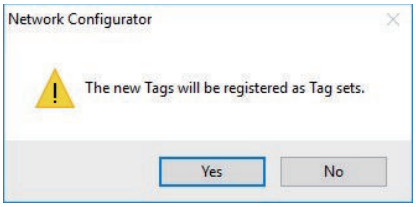
- NJ/NX-series CPU Unit: **Fault Action**

Refer to the user's manual for your OMRON EtherNet/IP scanner for details on this setting.

11 Click the **OK** button in the **Edit Tags** dialog box.



12 At this point, a confirmation dialog box is displayed to check whether the registered tag names are used as the tag set names. Click the **Yes** button.



13 Click the **OK** button in the **Edit Device Parameters** dialog box.

This completes the creation of tags and tag sets.

Additional Information

Refer to *Changing and Registering Tag Sets* in the user's manual for your OMRON EtherNet/IP scanner for how to change and register tag sets, for example, when you set incorrect tag sizes for your input and output tag sets.

At this time, when **PLC Status** is displayed in the **Edit Tag Set** dialog box, select the **Not Include** option (default). If you select the **Include** option, **I/O data size mismatch detected** is displayed in an error dialog box and you cannot change and register the tag sets.

A-2-3 Setting the Connection

This section describes how to configure connection settings. Connection settings are required for the EtherNet/IP scanner, which is the originator that creates tag data links to the Communication Unit (target device).
Set the connection after you create tag sets for all of the devices involved in tag data links.
The following shows how to set the connection with the conditions given in *A-2-2 Creating Tags and Tag Sets* on page A-6 as an example.

To configure the connection, perform the following two operations in order on the EtherNet/IP scanner.

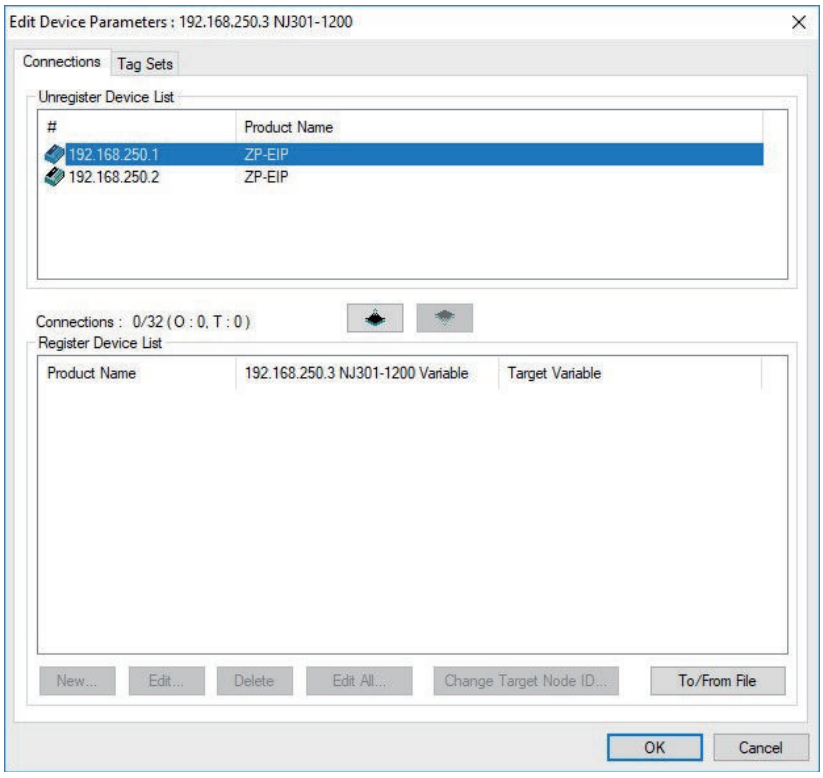
1. Registering devices in the Register Device List
2. Setting the connection

(1) Registering Devices in the Register Device List

Register the Communication Unit to establish a connection with the EtherNet/IP scanner.

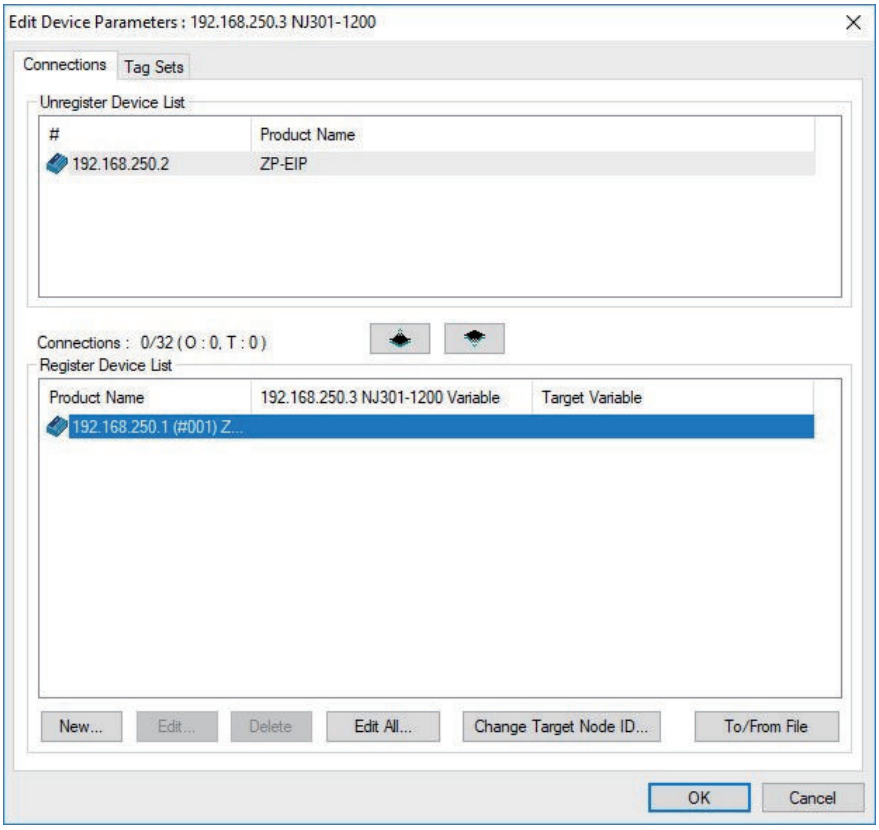
1 In the Network Configuration pane of the Network Configurator, right-click the icon of the EtherNet/IP scanner with which the Communication Unit exchange data and select **Parameter** – **Edit**.
The **Edit Device Parameters** dialog box is displayed.

2 Click the **Connections** tab page in the **Edit Device Parameters** dialog box.
Except for the selected EtherNet/IP scanner, all of the devices registered in the network are displayed.



3 In the **Unregister Device List**, click the target device that requires connection settings, and click the downward arrow button ( ).

The selected target device is displayed in the **Register Device List**, as shown below.



Target node IDs are assigned to the devices that are registered in the **Register Device List**. Refer to the user's manual for your OMRON EtherNet/IP scanner for details on the target node IDs.

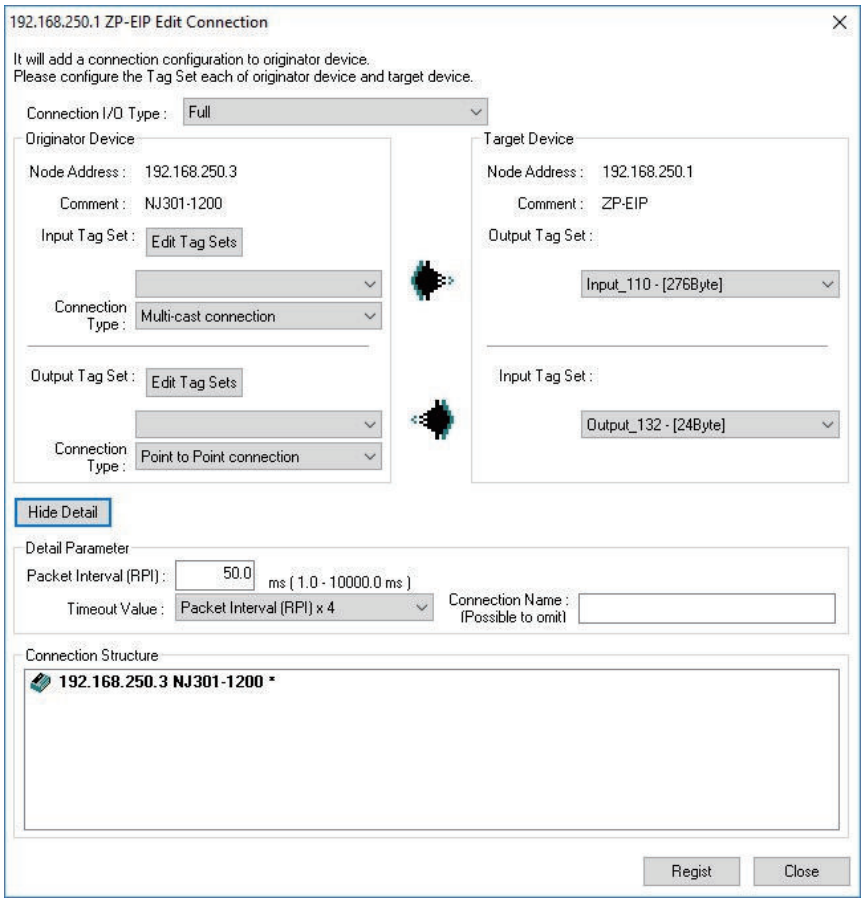
4 Repeat step 3, and register devices to participate in tag data links with the selected EtherNet/IP scanner.

(2) Setting the Connection

For the EtherNet/IP scanner, set the connection to the Communication Unit that you registered.

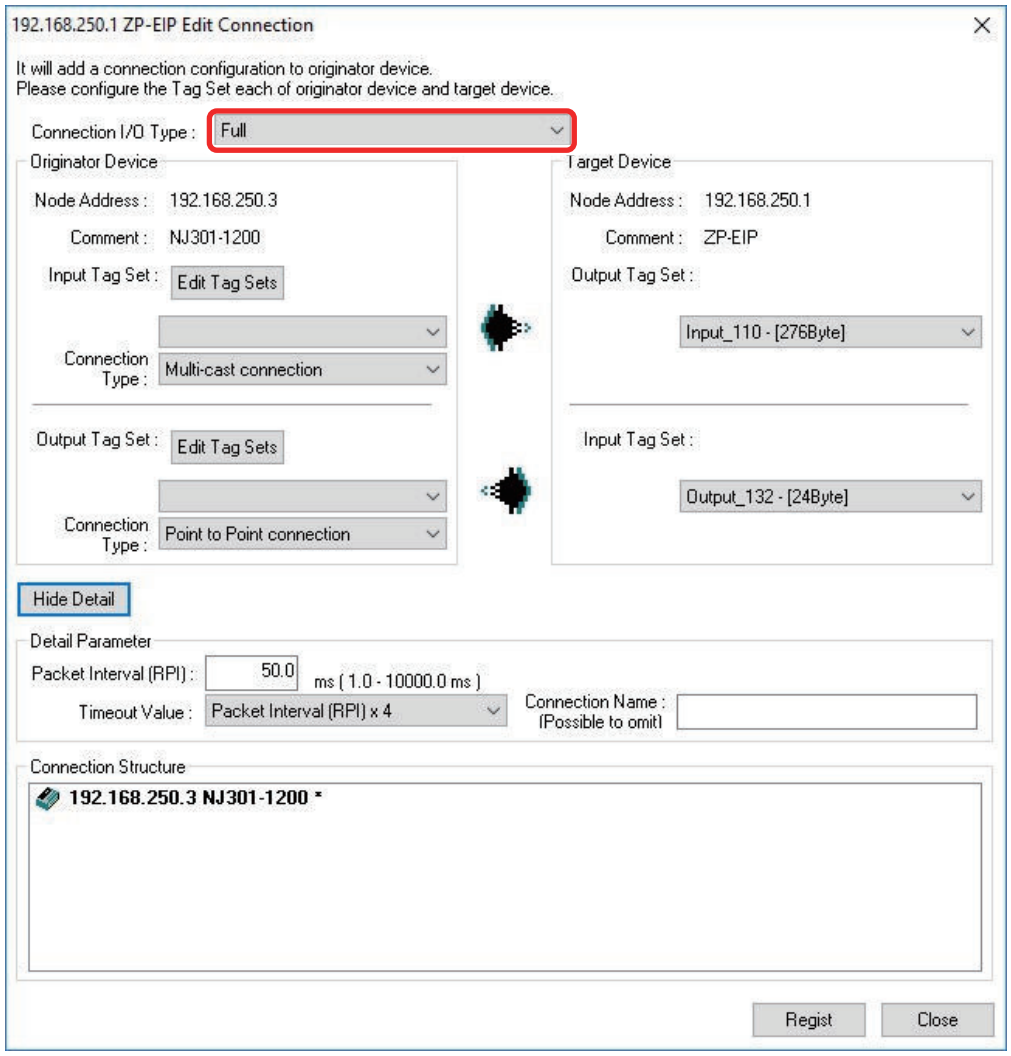
1 In the **Register Device List** of the **Connections** tab page, select the Communication Unit to which to set the connection, and then click the **New** button.

The **Edit Connection** dialog box is displayed.



2 Select the connection from the **Connection I/O Type** drop-down list.
In this example, select **Full**.
In the **Target Device** area, the **Output Tag Set** and **Input Tag Set** drop-down lists change as follows. These are input and output tag sets that the selected connection I/O type has.

- Output Tag Set: Input_110 - [276byte]
- Input Tag Set: Output_132 - [24byte]



Precautions for Correct Use

Use the input and output tag sets only in the combination specified for the connection I/O type. For example, for *Full*, the following is the specified combinations.

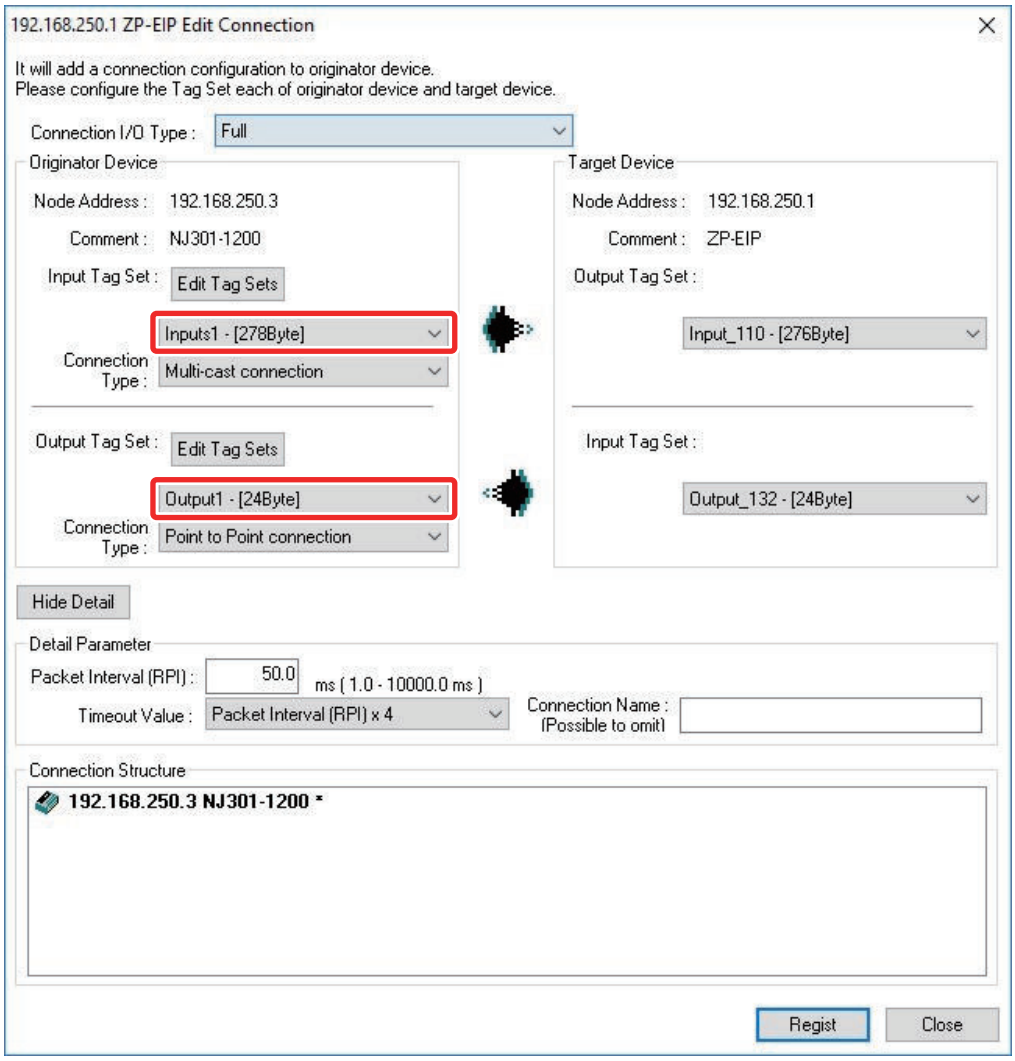
- Output Tag Set: Assembly Instance Number 110 (276 bytes)
- Input Tag Set: Assembly Instance Number 132 (24 bytes)

You cannot use the tag sets in combination with other Assembly Instance Numbers.
If you select a combination of input and output tag sets that is different from the combination specified for the connection I/O type in the Network Configurator, an error will occur when you transfer them.

3 From the **Input Tag Set** drop-down list in the **Originator Device** area, select the input tag set that you created in the example in *A-2-2 Creating Tags and Tag Sets* on page A-6.
In this example, select **Inputs1** for the tag set that you created in *A-2-2 Creating Tags and Tag Sets* on page A-6. The drop-down list contains the name of the tag set that you created in advance.

4 From the **Output Tag Set** drop-down list in the **Originator Device** area, select the output tag set that you created in the example in *A-2-2 Creating Tags and Tag Sets* on page A-6.

In this example, select **Outputs1** for the tag set that you created in *A-2-2 Creating Tags and Tag Sets* on page A-6. The drop-down list contains the name of the tag set that you created in advance.



5 Set the **Connection Type**, **Packet Interval (RPI)**, **Timeout Value**, and **Connection Name**. The settings are described as shown in the following table.

Setting	Description
Connection Type	Select whether the data is sent in multicast or unicast (Point-to-Point) form. The default is Multi-cast connection. • Multi-cast connection: Select this type when the same data is shared by multiple nodes. • Point to Point connection: Select this type when the same data is not shared by multiple nodes. In a unicast connection, other nodes are not burdened with an unnecessary load. For output tag sets, you can select Point to Point connection only.
Packet Interval (RPI)*1	Set the data update cycle (i.e., the packet interval) of each connection between the originator and target. • The minimum RPI for the Communication Unit is 1 ms. • The default setting is 50 ms (i.e., data updated once every 50 ms). • Set the RPI between 1 and 10,000 ms in 0.5-ms increments.

Setting	Description
Timeout Value*1	Set the time until a connection timeout is detected. The timeout value is set as a multiple of the packet interval (RPI) and can be set to 4, 8, 16, 32, 64, 128, 256, or 512 times the packet interval. The default setting is 4 times the packet interval (RPI).
Connection Name*1	Set a name for the connection. This is up to 32 characters in length and can be omitted.

*1. These items and the **Connection Structure** area are not displayed if the **Hide Detail** button is clicked.

6 Click the **Regist** button to register the set connection.
The **Edit Connection** dialog box is displayed so that you can continue setting the next connection.
Because this is an example of creating only one tag set, click the **Close** button to complete the setting.
To add connections, set all of the connections and then click the **Close** button.

7 After you complete the connection setting for all devices, click the **OK** button.
This completes the connecting setting.

Precautions for Correct Use

In tag data links, the data transmission period is set for each connection as the requested packet interval (RPI).
If the sizes of input and output tag sets are large, the Communication Unit may not send all data within the data transmission period, which causes a Tag Data Link Timeout. If this occurs, adjust the packet interval (RPI) value.
Refer to *Requested Packet Interval (RPI) Settings* in the user's manual for your OMRON EtherNet/IP scanner.
When set to collect measurement values at 1 ms intervals, tag data links only collect the latest measurement values and discard other measurement values. For example, assuming that the Amplifier Unit is set to measure at a measurement cycle of 250 μs and that the first measurement point from the start of measurement is 0 μs, the second 250 μs, the third 750 μs, the fourth 1 ms, and so on, tag data links will collect the measured value at fourth measurement point after the first and discard the data at the second and third measurement points.

Additional Information

You can edit the connection settings for all of the target devices selected in the Register Device List together in a table. Refer to *Editing Settings for All Connections* in the user's manual for your OMRON EtherNet/IP scanner.

● Confirming the Connection Settings

Refer to *Confirming the Connection Settings* in the user's manual for your OMRON EtherNet/IP scanner for how to confirm the connection settings.

A-2-4 Downloading Tag Data Link Parameters

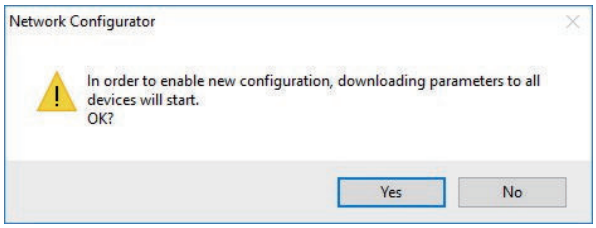
To make tag data links, you must download tag data link parameters, such as tag set settings and connection settings, to the EtherNet/IP scanner.
The following describes the download procedure with the following conditions as an example.

- Use the built-in EtherNet/IP port on an OMRON NJ/NX-series CPU Unit as the EtherNet/IP scanner.

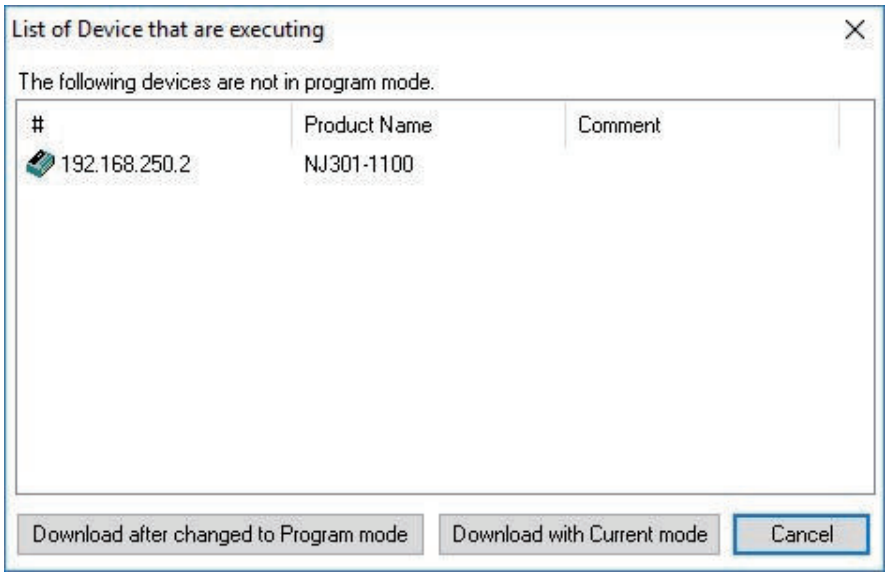
- Download all tag data link parameters with the Network Configurator.

1 Go online with the network that includes the EtherNet/IP scanner and Communication Unit to which to download tag data link parameters.

2 Select **Network** – **Download** from the menu.
The following dialog box is displayed.



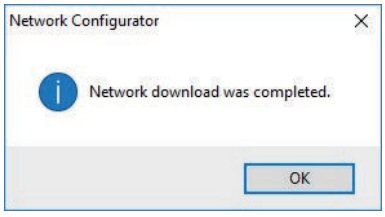
3 Click the **Yes** button to download the tag data link parameter settings to EtherNet/IP devices including the Communication Unit.
The following dialog box is displayed if any of the CPU Units is not in PROGRAM mode.



Refer to the following information for how to operate the CPU Unit with buttons provided in this dialog box.

- *Downloading Tag Data Link Parameters* in the *NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. W506)*

When the download is completed, the following dialog box is displayed.



Additional Information

Refer to *Downloading Tag Data Link Parameters* in the user's manual for your OMRON EtherNet/IP scanner for the download procedure with other OMRON EtherNet/IP scanners.
Refer to the following manuals for detailed procedures for setting tag data links with OMRON PLCs.

- *NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. W506)*
- *CS and CJ Series EtherNet/IP Units Operation Manual (Cat. No. W465)*
- *CJ-series EtherNet/IP Units Operation Manual for NJ-series CPU Unit (Cat. No. W495)*

A-2-5 Uploading Tag Data Link Parameters

You can upload tag data link parameters from EtherNet/IP devices in the EtherNet/IP network.
The tag data link parameters refer to information such as tag set information and connection information.
Refer to *Uploading Tag Data Link Parameters* in the user's manual for your OMRON EtherNet/IP scanner for how to upload tag data link parameters.

Additional Information

Refer to *Verifying Tag Data Link Parameters* in the user's manual for your OMRON EtherNet/IP scanner for how to verify tag data link parameters.

A-2-6 Starting and Stopping Tag Data Links

The methods to start and stop tag data links depend on the OMRON EtherNet/IP scanner that you use.
Refer to *Starting and Stopping Tag Data Links* in the user's manual for your OMRON EtherNet/IP scanner.

A-3 Supported CIP Objects

The supported CIP objects are listed below.
To access CIP objects in the Communication Unit, use an explicit message. Refer to *5-4-4 Explicit Messages* on page 5-16 for information on the method to access CIP objects through an explicit message.

Object name	Function	Reference
Identity object	Reads the product information from the Communication Unit or restarts the Communication Unit.	*A-3-1 Identity Object (Class ID: 01 Hex)* on page A-18
TCP/IP Interface object	Configures the TCP/IP interface settings.	*A-3-2 TCP/IP Interface Object (Class ID: F5 Hex)* on page A-20
Ethernet Link object	Reads various information on an Ethernet Link.	*A-3-3 Ethernet Link Object (Class ID: F6 Hex)* on page A-23
Event Log object	Reads errors and events that occurred in the Communication Unit.	*A-3-4 Event Log Object (Class ID: 41 Hex)* on page A-29
Unit management object	Aggregates unit Information on the Communication Unit.	*A-3-5 Unit Management Object (Class ID: 390 Hex)* on page A-32
Error status object	Sets the hold setting for error status and provides the error cause or information for troubleshooting the Communication Unit.	*A-3-6 Error Status Object (Class ID: 391 Hex)* on page A-37
Amplifier Unit operation command object	Reads and changes the settings of the Amplifier Unit and executes its operation.	*A-3-7 Amplifier Unit Operation Command Object (Class ID: 392 Hex)* on page A-39

Precautions for Correct Use

For the above CIP objects, if the data type of parameter data is INT, UINT, UDINT, ULINT, WORD, or DWORD, store the data to write in little endian format. The read data is also stored in little endian format.
However, in this manual, the attributes values are written in big endian format.

A-3-1 Identity Object (Class ID: 01 Hex)

The Identity object reads the product information from the Communication Unit or restarts the Communication Unit.

Service Code

The service code specifies the service to execute.

Service code (hex)	Parameter name	Description	Supported service range	
			Class	Instance
01	Get_Attribute_All	Reads the values of all attributes.	No	Yes
05	Reset	00 hex: Restarts 01 hex: Restarts with default settings	No	Yes
0E	Get_Attribute_Single	Reads the value of a specified attribute.	Yes	Yes

Class ID and Instance ID

The class ID and instance ID are given in the following table.

ID type	Value (hex)
Class ID	01
Instance ID	00: Specifies the class. 01: Specifies the instance.

Attribute ID

The attribute ID specifies the information to read.

● Class Attribute ID

The class attribute ID specifies the attribute of the entire object.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Revision	Revision of the object	Read	UINT	0001
02	Max Instance	Maximum instance number	Read	UINT	0001

● Instance Attribute ID

The instance attribute ID specifies the attribute ID of the instance.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Vendor ID	Vendor ID	Read	UINT	002F
02	Device Type	Device type	Read	UINT	002B
03	Product Code	Product code	Read	UINT	Refer to *Value of Product Code* on page A-19 below.
04	Revision	Device CIP revision	Read	STRUCT	---
	Major Revision	Major revision	Read	USINT	Refer to *Value of Revision* on page A-19 below.
	Minor Revision	Minor revision	Read	USINT	
05	Status	Communication Unit Status	Read	WORD	Refer to *Values of Status* on page A-20 below.
06	Serial Number	Serial number	Read	UDINT	Unique number assigned to each Communication Unit
07	Product Name	Product name	Read	SHORT STRING	Refer to *Value of Product Name* on page A-20 below.

● Value of Product Code

Model	Value of Product Code (hex)
ZP-EIP	0BFF

● Value of Revision

Unit version of Communication Unit	CIP revision	
	Value of Major Revision (hex)	Value of Minor Revision (hex)
Ver.1.0	01	01

● Values of Status

Bit	Name	Description
0	Owned	Indicates that the Communication Unit opened a connection as the target. • TRUE: Open. • FALSE: Not open.
1	Reserved	Always FALSE
2	Configured	Always TRUE
3	Reserved	Always FALSE
4 to 7	Extended Device Status	Always FALSE
8	Minor Recoverable Fault	Always FALSE
9	Minor Unrecoverable Fault	Always FALSE
10	Major Recoverable Fault	• TRUE: An IP Address Conflict occurred. • FALSE: The above error did not occur.
11	Major Unrecoverable Fault	Always FALSE
12 to 15	Reserved	Always FALSE

● Value of Product Name

Value (hex)	Description
5A502D454950	Indicates "ZP-EIP."

A-3-2 TCP/IP Interface Object (Class ID: F5 Hex)

The TCP/IP Interface object configures the TCP/IP interface settings.

Service Code

The service code specifies the service to execute.

Service code (hex)	Parameter name	Description	Supported service range	
			Class	Instance
01	Get_Attribute_All	Reads the values of all attributes.	No	Yes
0E	Get_Attribute_Single	Reads the value of a specified attribute.	Yes	Yes
10	Set_Attribute_Single	Writes the value of a specified attribute.	No	Yes

Class ID and Instance ID

The class ID and instance ID are given in the following table.

ID type	Value (hex)
Class ID	F5
Instance ID	00: Specifies the class. 01: Specifies the instance.

Attribute ID

The attribute ID specifies the information to read.

● Class Attribute ID

The class attribute ID specifies the attribute of the entire object.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Revision	Revision of the object	Read	UINT	0004

● Instance Attribute ID

The instance attribute ID specifies the attribute ID of the instance.

Attribute ID (hex)	Parameter name		Description	Attribute	Data	
					Data type	Value (hex)
01	Status		Interface IP address setting condition	Read	DWORD	Refer to *Values of Status* on page A-22 below.
02	Configuration Capability		Controller configuration and settings that are possible for the interface	Read	DWORD	Refer to *Values of Configuration Capability* on page A-22 below.
03	Configuration Control		IP address setting method when interface started	Read/ Write	DWORD	Refer to *Values of Configuration Control* on page A-23 below. Default: 00000000
04	Physical Link Object		Path to physical link object	Read	STRUCT	---
		Path size	Path size in words		UINT	0000
		Path	Fixed path to physical link object		Padded EPATH	---
05	Interface Configuration		Interface settings	Read/ Write	STRUCT	---
		IP Address	IP address		UDINT	Set value Default: C0A8FA01
		Network Mask	Subnet mask		UDINT	Set value Default: FFFFFF00
		Gateway Address	Default gateway		UDINT	Set value Default: 00000000
		Name Server	Primary name server		UDINT	00000000 (fixed)
		Name Server 2	Secondary name server		UDINT	00000000 (fixed)
		Domain Name	Domain name		STRING	0000 (fixed)
06	Host Name		Host name	Read/ Write	STRING	ZP-EIP (fixed) Default: ZP-EIP
0A	SelectAcd		ACD Setting	Read/ Write	BOOL	TRUE: Enable FALSE: Disable Default: TRUE

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
0B	LastConflictDetected	Information on the last detected IP address conflict	Read/ Write	STRUCT	---
	AcdActivity	ACD state when IP address conflict was last detected		USINT	00 to 03 Default: 00
	RemoteMAC	MAC address in the ARP PDU when IP address conflict was last detected		Array OF 6 USINT	Default: All 0s
	ArpPdu	Raw data in the ARP PDU when IP address conflict was last detected		ARRAY OF 28 USINT	Default: All 0s
0D	Encapsulation Inactivity Timeout	Encapsulation inactivity timeout time	Read/ Write	UINT	0000: Disable 0001 to 0E10: Timeout time (in seconds) Default: 0078

● Values of Status

Bit	Name	Description
0 to 3	Interface Configuration Status	Indicates the configuration status of the instance attribute ID 05 hex (Interface Configuration). • 0: Not set or initializing • 1: IP address already set by a method other than directly setting the IP address with hardware switches • 2: IP address already set by directly setting with hardware switches • 3 to 15: Reserved
4	Reserved	Always FALSE
5	Interface Configuration Pending	• TRUE: The setting of the instance attribute ID 05 hex (Interface Configuration) was changed. The Communication Unit must be restarted to enable the change. • FALSE: The setting of the instance attribute ID 05 hex (Interface Configuration) was not changed.
6	AcdStatus	• TRUE: An IP address conflict was detected. However, this IP address can be used to continue CIP communications. • FALSE: No IP address conflict was detected.
7	AcdFault	• TRUE: This IP address cannot be used to continue CIP communications. • FALSE: No IP address conflict was detected. Or, although an IP address conflict was detected, this IP address can be used to continue CIP communications.
8 to 31	Reserved	Always FALSE

● Values of Configuration Capability

Bit	Name	Description
0	BOOTP Client	Always TRUE: Indicates that an BOOTP client is supported.
1	DNS Client	Always FALSE: Indicates that no DNS client is supported.
2	DHCP Client	Always TRUE: Indicates that a DHCP client is supported.
3	DHCP-DNS Update	Always FALSE: Indicates that no DHCP-DNS Update is supported.

Bit	Name	Description
4	Configuration Settable	• TRUE: IP address was set by a method other than directly setting the IP address with hardware switches. Indicates the instance attribute ID 05 hex (Interface Configuration) can be set. • FALSE: IP address was directly set with hardware switches. Indicates the instance attribute ID 05 hex (Interface Configuration) cannot be set.
5	Hardware Configurable	Always TRUE: Indicates that directly setting the IP address with hardware switches is possible.
6	Interface Configuration Change Requires Reset	Always FALSE: Indicates that resetting the devices is unnecessary to enable a change to the instance attribute ID 05 hex (Interface Configuration).
7	AcdCapable	Always TRUE: Indicates that IP address conflict detection is supported.
8 to 31	Reserved	Always FALSE

● Values of Configuration Control

Bit	Name	Description
0 to 3	Configuration Method	Sets the method to set the IP address of the Communication Unit. • 0: Uses the setting that is saved in non-volatile memory. • 1: Sets the IP address by the BOOTP server. • 2: Sets the IP address by the DHCP server. • 3 to 15: Reserved
4	DNS Enable	Always FALSE: DNS is disabled.
5 to 31	Reserved	Always FALSE

A-3-3 Ethernet Link Object (Class ID: F6 Hex)

The Ethernet Link object reads various information on an Ethernet Link.

Service Code

The service code specifies the service to execute.

Service code (hex)	Parameter name	Description	Supported service range	
			Class	Instance
01	Get_Attribute_All	Reads the values of all attributes.	No	Yes
0E	Get_Attribute_Single	Reads the value of a specified attribute.	Yes	Yes
10	Set_Attribute_Single	Writes the value of a specified attribute.	No	Yes
4C	Get_and_Clear	Reads and then clears a specified attribute value.*1	No	Yes

*1. This service is supported by the following instance attribute IDs.
- Interface Counters (04 hex)
- Media Counters (05 hex)

Class ID and Instance ID

The class ID and instance ID are given in the following table.

ID type	Value (hex)
Class ID	F6
Instance ID	00: Specifies the class. 01: Specifies EtherNet/IP port 1.

Attribute ID

The attribute ID specifies the information to read.

● Class Attribute ID

The class attribute ID specifies the attribute of the entire object.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Revision	Revision of the object	Read	UINT	0001
02	Max Instance	Maximum instance number	Read	UINT	0001
03	Number of Instances	Number of instances of this object	Read	UINT	0001

● Instance Attribute ID

The instance attribute ID specifies the attribute ID of the instance.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Interface Speed	Interface communications speed	Read	UDINT	000A: 10 Mbps 0064: 100 Mbps
02	Interface Flags	Interface status	Read	DWORD	Refer to *Values of Interface Flags* on page A-27 below.
03	Physical Address	Interface MAC address	Read	ARRAY OF USINT*1	MAC address

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
04	Interface Counters	Interface counter	Read	STRUCT	---
	In Octets	Number of bytes of receive data		UDINT	00000000 to FFFFFFFF
	In Ucast Packets	Number of bytes of unicast receive data		UDINT	00000000 to FFFFFFFF
	In NUcast Packets	Number of bytes of non-unicast receive data		UDINT	00000000 to FFFFFFFF
	In Discards	Number of bytes of discarded receive data		UDINT	00000000 to FFFFFFFF
	In Errors	Number of bytes of error receive data		UDINT	00000000 to FFFFFFFF
	In Unknown Protos	Number of bytes of unsupported protocol receive data		UDINT	00000000 to FFFFFFFF
	Out Octets	Number of bytes of send data		UDINT	00000000 to FFFFFFFF
	Out Ucast Packets	Number of bytes of unicast send data		UDINT	00000000 to FFFFFFFF
	Out NUcast Packets	Number of bytes of non-unicast send data		UDINT	00000000 to FFFFFFFF
	Out Discards	Number of bytes of discarded send data		UDINT	00000000 to FFFFFFFF
	Out Errors	Number of bytes of error send data		UDINT	00000000 to FFFFFFFF

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
05	Media Counters	Media counters	Read	STRUCT	---
	Alignment Errors	Number of received alignment error frames		UDINT	00000000 to FFFFFFFF
	FCS Errors	FCS error reception count		UDINT	00000000 to FFFFFFFF
	Single Collisions	Number of successfully sent frames with a collision detected		UDINT	00000000 to FFFFFFFF
	Multiple Collisions	Number of successfully sent frames with more than one collision detected		UDINT	00000000 to FFFFFFFF
	SQE Test Errors	Number of occurrences of SQE test errors		UDINT	00000000 to FFFFFFFF
	Deferred Transmissions	Number of frames with a send delay		UDINT	00000000 to FFFFFFFF
	Late Collisions	Number of times of collisions detected in 512 bit time after packet transmission		UDINT	00000000 to FFFFFFFF
	Excessive Collisions	Number of unsuccessfully sent frames due to excessive collisions		UDINT	00000000 to FFFFFFFF
	MAC Transmit Errors	Number of unsuccessfully sent frames due to a MAC layer transmission error		UDINT	00000000 to FFFFFFFF
	Carrier Sense Errors	Number of times of detected carrier sensor errors		UDINT	00000000 to FFFFFFFF
	Frame Too Long	Number of frames that exceeded the maximum frame size		UDINT	00000000 to FFFFFFFF
	MAC Receive Errors	Number of unsuccessfully received frames due to a MAC layer reception error		UDINT	00000000 to FFFFFFFF
06	Interface Control	Physical interface configuration	Read/ Write	STRUCT	---
	Control Bits	Interface control bits		WORD	Refer to *Values of Interface Flags* on page A-27 below. Default: 0001
	Forced Interface Speed	Forced interface speed		UINT	Refer to *Values of Forced Interface Speed* on page A-28 below. Default: 0000
07	Interface Type	Interface type	Read	USINT	02
08	Interface State	Interface state	Read	USINT	Refer to *Values of Interface State* on page A-28 below.
0A	Interface Label	Interface identification text string	Read	SHORT STRING	"Ethernet Port 1"

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
0B	Interface Capability	Interface communications performance	Read	STRUCT	---
	Capability Bits	Communications performance setting		DWORD	Refer to *Values of Capability Bits* on page A-28 below.
	Speed/Duplex Options	Communications speed/bidirectional options		STRUCT	---
	Speed/Duplex Array Count	Communications speed/bidirectional array size		USINT	04
	Speed/Duplex Array	Communications speed/bidirectional array		ARRAY OF STRUCT	---
	Interface Speed	Interface communications speed		UINT	000A: 10 Mbps
	Interface Duplex Mode	Interface bidirectional mode		USINT	00: Half Duplex
	Speed/Duplex Array	Communications speed/bidirectional array		ARRAY OF STRUCT	---
	Interface Speed	Interface communications speed		UINT	000A: 10 Mbps
	Interface Duplex Mode	Interface bidirectional mode		USINT	01: Full Duplex
	Speed/Duplex Array	Communications speed/bidirectional array		ARRAY OF STRUCT	---
	Interface Speed	Interface communications speed		UINT	0064: 100 Mbps
	Interface Duplex Mode	Interface bidirectional mode		USINT	00: Half Duplex
	Speed/Duplex Array	Communications speed/bidirectional array		ARRAY OF STRUCT	---
	Interface Speed	Interface communications speed		UINT	0064: 100 Mbps
	Interface Duplex Mode	Interface bidirectional mode		USINT	01: Full Duplex

*1. The array size is 6.

● Values of Interface Flags

Bit	Name	Description
0	Link Status	• TRUE: An Ethernet link is established. • FALSE: No Ethernet link is established.
1	Half/Full Duplex	• TRUE: Full Duplex • FALSE: Half Duplex
2 to 4	Negotiation Status	• 00 hex: Auto-negotiation is in progress. • 01 hex: Auto-negotiation and speed detection failed. Communicating at 10 Mbps, Half Duplex. • 02 hex: Auto-negotiation failed, but speed detection was successful. Communicating at Half Duplex. • 03 hex: Auto-negotiation was successful. • 04 hex: Operating in fixed mode.

Bit	Name	Description
5	Manual Setting Requires Reset	Refer to the description of Bit 0 in *Values of Capability Bits* on page A-28 below.
6	Local Hardware Fault	Always FALSE
7 to 31	Reserved	Always FALSE

● Values of Control Bits

Bit	Name	Description
0	Auto-negotiate	• TRUE: Auto-negotiate is enabled. • FALSE: Auto-negotiate is disabled. Operating according to the Forced Duplex Mode and Forced Interface Speed settings.
1	Forced Duplex Mode	This bit is used when Auto-negotiate is FALSE. If this bit is set when Auto-negotiate is TRUE, the error code 0C hex (Object State Conflict) is returned. • TRUE: Full Duplex • FALSE: Half Duplex
2 to 15	Reserved	Always FALSE

● Values of Forced Interface Speed

If Auto-negotiate is FALSE, set the forced interface speed. If a value not listed in the following table is set, the error code 09 hex (Invalid Attribute Value) is returned.

Value (hex)	Description
0A	10 Mbps
64	100 Mbps

If this field is set when Auto-negotiate is TRUE, the error code 0C hex (Object State Conflict) is returned.

● Values of Interface State

Value (hex)	Description
00	Status unclear
01	Ready to send/receive
02	Disabled
03	Testing
04 to FF	Reserved

● Values of Capability Bits

Bit	Name	Description
0	Manual Setting Requires Reset	Indicates whether resetting the device is required after the Interface Control Attribute is changed. Always FALSE: Resetting the device is not required.
1	Auto-negotiate	Always TRUE: Auto-negotiation is supported.
2	Auto-MDIX	Always TRUE: Auto-MDIX is supported.
3	Manual Speed/Duplex	Always TRUE: Manual Speed/Duplex setting is supported.
4 to 31	Reserved	Always FALSE

A-3-4 Event Log Object (Class ID: 41 Hex)

The Event Log object reads errors and events that occurred in the Communication Unit.

Service Code

The service code specifies the service to execute.

Service code (hex)	Parameter name	Description	Supported service range	
			Class	Instance
05	Reset	Clears the event log.	No	Yes
0E	Get_Attribute_Single	• When a class is specified: Reads the value of the specified class attribute ID. • When an instance is specified: Reads the value of the specified instance attribute. When Event/Data Log (attribute ID: 0E hex) is specified, this reads all event logs.	Yes	Yes
10	Set_Attribute_Single	Writes the value of a specified attribute.	Yes	Yes

Reset (Service Code: 05 Hex)

Clears the event log.

● Request Data Format

Parameter name	Description	Data type	Value (hex)
Service	Service code	USINT	05
Request Path Size	Request path size	USINT	02
Request Path	Request path	Padded EPATH	20412401
Parameter	Parameters	USINT	• 00: Clears only the event logs in RAM. • 01: Clears all event logs in RAM and non-volatile memory.

● Response Format

When the execution is successful:

Parameter name	Description	Data type	Value (hex)
Reply Service	Reset service response	USINT	85
Reserved	Reserved	octet	00
General Status	Code that indicates normal	USINT	00
Size of Additional Status	Size of Additional status	USINT	00

When the execution failed:

Parameter name	Description	Data type	Value (hex)
Reply Service	Reset service response	USINT	85
Reserved	Reserved	octet	00

Parameter name	Description	Data type	Value (hex)
General Status	Current error code defined by CIP	USINT	Current error code*1
Size of Additional Status	Size of Additional status	USINT	00

*1. The error codes defined by CIP for the current error are as follows.

Value (hex)	Description
02	Resource unavailable
10	Device state conflict
13	Not enough data
15	Too much data
1F	Vendor specific error
20	Invalid parameter

Class ID and Instance ID

The class ID and instance ID are given in the following table.

ID type	Value (hex)
Class ID	41
Instance ID	00: Specifies the class. 01: Specifies the instance.

Attribute ID

The attribute ID specifies the information to read.

● Class Attribute ID

The class attribute ID specifies the attribute of the entire object.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Revision	Revision of the object	Read	UINT	0001
02	Max Instance	Maximum instance number	Read	UINT	0001
03	Number of Instances	Number of instances of this object	Read	UINT	0001
20	Time Format	Format of time information	Read	USINT	*1
21	Present Time	Current time	Read/ Write	TIME*2	80000000 to 7FFFFFFF Default: 00000000
				DATE AND TIME*3	DT#1972010100:00:00.000 to DT#2151060623:59:59.999 Default: 000000000000

*1. One of the following values is read depending on whether automatic clock adjustment is enabled or disabled.

Automatic clock adjustment	Value (hex)	Description
When the function is disabled	DB	Indicates that the data type is TIME.
When the function is enabled	CF	Indicates that the data type is DATE AND TIME.

*2. This is the data type for attribute ID 20 hex when the value is DB hex.
*3. This is the data type for attribute ID 20 hex when the value is CF hex. When automatic clock adjustment is enabled, the object reads the value retrieved from the NTP or SNTP server.

● Instance Attribute ID

The instance attribute ID specifies the attribute ID of the instance.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
02	State	Instance state	Read	USINT	00: Non-existent 02: Empty 03: Available 04: Full/Overwrite
09	Logged Data Configuration	Event Log Logged Data Configuration	Read/Write	BYTE	00: Event Identifier 01: Event Identifier + Time Stamp Default: 00
0C	Event/Data Log Maximum Size	Maximum number of event log entries	Read	UDINT	00000028
0D	Event/Data Log Size	Number of currently registered event logs	Read	UDINT	00000000 to 00000028
0E	Event/Data Log	Event logs	Read	ARRAY OF STRUCT	*1
18	Event Identifier Format	Event log format	Read	USINT	01: 48-bit object model/error format

*1. The data format for each event log is shown in the following table. All the registered event logs are read in order from the oldest. Refer to *7-5-3 Event Codes for Errors and Troubleshooting Procedures* on page 7-22 for details on event codes for errors and troubleshooting procedures.
The data format differs depending on the value of attribute ID 09 hex (Logged Data Configuration).

- When attribute ID 09 hex is 00 hex (Event Identifier)

Byte offset	Data type	Description
0	UINT	CIP object class ID for the event source
2	USINT	CIP object instance ID for the event source
3	USINT	CIP general status code. For the Communication Unit, this is fixed to 1F hex.
4	UINT	Expansion error code: • Lower byte: Error code in the class • Upper byte: Detailed code

- When attribute ID 09 hex is 01 hex (Event Identifier + Time Stamp)

Byte offset	Data type	Description
0	UINT	CIP object class ID for the event source
2	USINT	CIP object instance ID for the event source
3	USINT	CIP general status code. For the Communication Unit, this is fixed to 1F hex.
4	UINT	Expansion error code: • Lower byte: Error code in the class • Upper byte: Detailed code
5	TIME or DATE AND TIME	Time of event occurrence: • When automatic clock adjustment is disabled: TIME (4 bytes) • When automatic clock adjustment is enabled: DATE AND TIME (6 bytes)

A-3-5 Unit Management Object (Class ID: 390 Hex)

The Unit management object aggregates unit information on the Communication Unit.

Service Code

The service code specifies the service to execute.

Service code (hex)	Parameter name	Description	Supported service range	
			Class	Instance
01	Get_Attribute_All	Reads the values of all attributes.	Yes	No
0E	Get_Attribute_Single	Reads the value of a specified attribute.	Yes	Yes
10	Set_Attribute_Single	Writes the value of a specified attribute.	No	Yes

Class ID and Instance ID

The class ID and instance ID are given in the following table.

ID type	Value (hex)
Class ID	390
Instance ID	00: Specifies the class. 01: Specifies the instance.

Attribute ID

The attribute ID specifies the information to read.

● Class Attribute ID

The class attribute ID specifies the attribute of the entire object.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Revision	Revision of the object	Read	UINT	0001
02	Max Instance	Maximum instance number	Read	UINT	0001
03	Number of Instances	Number of instances of this object	Read	UINT	0001

● Instance Attribute ID

The instance attribute ID specifies the attribute ID of the instance.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Unit Version	Unit version	Read	DWORD	Unit version of Communication Unit*1
02	Hardware Version	Hardware version	Read	DWORD	Hardware version of the Communication Unit
03	Software Version	Software version	Read	DWORD	Software version of the Communication Unit

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
04	Lot Number	Lot number	Read	DWORD	Unique number assigned to each Communication Unit
0A	Port Number	Port number	Read/ Write	UINT	0400 to FFFF However, 08AE and AF12 cannot be set. Default: FA00
0B	Total Power-ON Time	Total power-ON time (Unit: h)	Read	UDINT	00000000 to 2AAAAAAA
0C	NTP/SNTP Server IP Address	IP address of the NTP/SNTP server from which to get time information with the automatic clock adjustment	Read/ Write	UDINT	"0": Automatic clock adjustment disabled Not "0": NTP/SNTP Server IP Address Default: All 0s
0D	Time Zone	Time zone used with the automatic clock adjustment	Read/ Write	UINT	0000 to 002A*2 Default: 000F
0E	Time Configuration	Determines the clock function adjustment method.	Read/ Write	UINT	0: Manual setting 1: Automatic adjustment (SNTP server) **Note** When Time Format is set to TIME, 1 cannot be specified. Default: 0
10	Connected CH	Gets the number of connected Amplifier Units.	Read	BYTE	1 to 16 0: Channel recognition failure Default: 0
11	Register number of connected CH	Registration of the number of connected channels	Read/ Write	BYTE	1 to 16: Number of connected channels 0: No check for number of connected channels Default: 0
20	Amount of logging data	Amount of Communication Unit buffering data	Read/ Write	UDINT	0 to 250000*3 Default: 100000
21	Logging thinning number	Communication Unit buffering thinning number	Read/ Write	UDINT	1 to 3600000 Default: 1
23	Overwrite mode	Overwrite mode	Read/ Write	BYTE	0: Standard 1: Overwrite Default: 0
24	Logging start condition	Communication Unit buffering start condition	Read/ Write	BYTE	0: Command 1: Amplifier Unit judgment result 2: External Input ON Default: 0
25	Logging start condition ch	Communication Unit buffering start judgment result specification channel	Read/ Write	BYTE	1 to 16: CH1 to CH16 Default: 1

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
26	Logging start condition judge	Communication Unit buffering start judgment result specification judgment	Read/ Write	BYTE	0: High 1: Pass 2: Low 3: All OFF (during non-measurement) 4: OR (Timing when measurement is enabled) Default: 1
27	Logging stop condition	Communication Unit buffering stop condition	Read/ Write	BYTE	0: Command 1: Amplifier Unit judgment result 2: External Input OFF 3: Sampling time Default: 0
28	Logging stop condition ch	Communication Unit buffering stop judgment result specification channel	Read/ Write	BYTE	1 to 16: CH1 to CH16 Default: 1
29	Logging stop condition judge	Communication Unit buffering stop judgment result specification judgment	Read/ Write	BYTE	0: High 1: Pass 2: Low 3: All OFF (during non-measurement) Default: 1
2A	Sampling time	Sampling time	Read/ Write	UDINT	1 to 2500000 Default: 1
2B	Logging start delay time	Communication Unit buffering start delay time	Read/ Write	UINT	0 to 1000 Default: 0
2C	Output Data1	Output target data 1 (Communication Unit buffering target data 1)	Read/ Write	BYTE	0: OFF 1 to 16: MV values for CH1 to CH16 17: OFF 18: OFF 19: OFF 20: OFF 21 to 36: RV values for CH1 to CH16 Default: 1
2D	Output Data2	Output target data 2 (Communication Unit buffering target data 2)	Read/ Write	BYTE	Same as Output Data1 Default: 2
2E	Output Data3	Output target data 3 (Communication Unit buffering target data 3)	Read/ Write	BYTE	Same as Output Data1 Default: 3
2F	Output Data4	Output target data 4 (Communication Unit buffering target data 4)	Read/ Write	BYTE	Same as Output Data1 Default: 4
30	Output Data5	Output target data 5 (Communication Unit buffering target data 5)	Read/ Write	BYTE	Same as Output Data1 Default: 5

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
31	Output Data6	Output target data 6 (Communication Unit buffering target data 6)	Read/ Write	BYTE	Same as Output Data1 Default: 6
32	Output Data7	Output target data 7 (Communication Unit buffering target data 7)	Read/ Write	BYTE	Same as Output Data1 Default: 7
33	Output Data8	Output target data 8 (Communication Unit buffering target data 8)	Read/ Write	BYTE	Same as Output Data1 Default: 8
34	Output Data9	Output target data 9 (Communication Unit buffering target data 9)	Read/ Write	BYTE	Same as Output Data1 Default: 9
35	Output Data10	Output target data 10 (Communication Unit buffering target data 10)	Read/ Write	BYTE	Same as Output Data1 Default: 10
36	Output Data11	Output target data 11 (Communication Unit buffering target data 11)	Read/ Write	BYTE	Same as Output Data1 Default: 11
37	Output Data12	Output target data 12 (Communication Unit buffering target data 12)	Read/ Write	BYTE	Same as Output Data1 Default: 12
38	Output Data13	Output target data 13 (Communication Unit buffering target data 13)	Read/ Write	BYTE	Same as Output Data1 Default: 13
39	Output Data14	Output target data 14 (Communication Unit buffering target data 14)	Read/ Write	BYTE	Same as Output Data1 Default: 14
3A	Output Data15	Output target data 15 (Communication Unit buffering target data 15)	Read/ Write	BYTE	Same as Output Data1 Default: 15
3B	Output Data16	Output target data 16 (Communication Unit buffering target data 16)	Read/ Write	BYTE	Same as Output Data1 Default: 16
3C	Output Data17	Output target data 17 (Communication Unit buffering target data 17)	Read/ Write	BYTE	Same as Output Data1 Default: 0
3D	Output Data18	Output target data 18 (Communication Unit buffering target data 18)	Read/ Write	BYTE	Same as Output Data1 Default: 0
3E	Output Data19	Output target data 19 (Communication Unit buffering target data 19)	Read/ Write	BYTE	Same as Output Data1 Default: 0
3F	Output Data20	Output target data 20 (Communication Unit buffering target data 20)	Read/ Write	BYTE	Same as Output Data1 Default: 0
40	External Input1	External Input 1 assignment	Read	BYTE	0: Cuing information 1 1: Communication Unit buffering start/end control Default: 0

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
41	External Input2	External Input 2 assignment	Read/ Write	BYTE	0: Cuing information 2 1: Clear Communication Unit Buffering Default: 0
42	External Output1	External Output 1 assignment	Read/ Write	BYTE	0: Fixed to OFF 1: Communication Unit buffering execution status Default: 0
43	External Output2	External Output 2 assignment	Read/ Write	BYTE	0: Fixed to OFF 1: Communication Unit buffering full Default: 0

*1. Bits 28 to 31: Integer part of the unit version
Bits 16 to 27: Decimal part of the unit version
Bits 0 to 15: Reserved
(Example) For Ver.1.0, 1000□□□□ hex

*2. The values of Time Zone are listed below.

Value (hex)	Description
0000	(GMT -12:00) Kwajalein
0001	(GMT -11:00) Midway Island
0002	(GMT -10:00) USA (Hawaii)
0003	(GMT -09:00) USA (Alaska)
0004	(GMT -08:00) Canada, USA (Pacific)
0005	(GMT -07:00) Canada, USA (Mountain)
0006	(GMT -06:00) Canada, USA (Central)
0007	(GMT -05:00) Canada, USA (Eastern)
0008	(GMT -04:00) Canada (Atlantic)
0009	(GMT -03:30) Canada (Newfoundland)
000A	(GMT -03:00) Argentina
000B	(GMT -02:00) Antarctica
000C	(GMT -01:00) Azores
000D	(GMT +00:00) England
000E	(GMT +00:00) United Kingdom, Portugal
000F	(GMT +00:00) Greenwich Mean Time (UTC)
0010	(GMT +01:00) France, Germany, Italy, Spain, Switzerland
0011	(GMT +01:00) Sweden
0012	(GMT +02:00) Bulgaria, Finland, Greece
0013	(GMT +03:00) Russia (Moscow, St. Petersburg)
0014	(GMT +03:30) Iran
0015	(GMT +04:00) Russia (Samara, Izhevsk)
0016	(GMT +04:30) Afghanistan
0017	(GMT +05:00) Russia (Yekaterinburg, Perm)
0018	(GMT +05:30) India
0019	(GMT +05:45) Nepal
001A	(GMT +06:00) Russia (Novosibirsk, Omsk)
001B	(GMT +06:30) Myanmar

Value (hex)	Description
001C	(GMT +07:00) Thailand
001D	(GMT +07:00) Vietnam
001E	(GMT +08:00) Australia (Western)
001F	(GMT +08:00) China
0020	(GMT +08:00) Taiwan
0021	(GMT +09:00) Japan
0022	(GMT +09:00) Republic of Korea
0023	(GMT +09:30) Australia (Northern Territory), Australia (South)
0024	(GMT +10:00) Australia (New South Wales/Queensland/Victoria)
0025	(GMT +10:30) Australia (Lord Howe Island)
0026	(GMT +11:00) New Caledonia
0027	(GMT +11:30) Norfolk Island
0028	(GMT +12:00) New Zealand
0029	(GMT +12:45) Chatham Island
002A	(GMT +13:00) Tonga

*3. Ver.1000 does not support changing the registration of the number of connected channels by the TDL command.

A-3-6 Error Status Object (Class ID: 391 Hex)

The error status object sets the hold setting for error status and provides the error cause or information for troubleshooting the Communication Unit.

Service Code

The service code specifies the service to execute.

Service code (hex)	Parameter name	Description	Supported service range	
			Class	Instance
01	Get_Attribute_All	Reads the values of all attributes.	Yes	No
0E	Get_Attribute_Single	Reads the value of a specified attribute.	Yes	Yes
10	Set_Attribute_Single	Writes the value of a specified attribute.	No	Yes
35	Clear Error Status Flag	Clears the error status.	Yes	No

Clear Error Status Flag (Service Code: 35 Hex)

Clears all error status values. This service is enabled only when the value of *Hold setting for Error Status* (attribute 01 hex) is TRUE. The request format, format for normal responses, format for error responses, and CIP error codes are given below.

● Request Data Format

Parameter name	Description	Data type	Value (hex)
Service	Service code	USINT	35
Request Path Size	Request path size	USINT	03
Request Path	Request path	Padded EPATH	210083032400

● Response Format

When the execution is successful:

Parameter name	Description	Data type	Value (hex)
Reply Service	Clear Error Status Flag service response	USINT	B5
Reserved	Reserved	octet	00
General Status	Code that indicates normal	USINT	00
Size of Additional Status	Size of Additional status	USINT	00

When the execution failed:

Parameter name	Description	Data type	Value (hex)
Reply Service	Clear Error Status Flag service response	USINT	B5
Reserved	Reserved	octet	00
General Status	Current error code defined by CIP	USINT	Current error code*1
Size of Additional Status	Size of Additional status	USINT	00 to 01
Additional Status	Additional status	UINT	Additional status

*1. The error codes defined by CIP for the current error are as follows.

Value (hex)	Description
02	Resource unavailable
10	Device state conflict
13	Not enough data
15	Too much data
1F	Vendor specific error
20	Invalid parameter

Class ID and Instance ID

The class ID and instance ID are given in the following table.

ID type	Value (hex)
Class ID	391
Instance ID	00: Specifies the class. 01: Specifies the instance.

Attribute ID

The attribute ID specifies the information to read.

● Class Attribute ID

The class attribute ID specifies the attribute of the entire object.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Revision	Revision of the object	Read	UINT	0001
02	Max Instance	Maximum instance number	Read	UINT	0001
03	Number of Instances	Number of instances of this object	Read	UINT	0001

● Instance Attribute ID

The instance attribute ID specifies the attribute ID of the instance.

Attribute ID (hex)	Parameter name	Description	Attribute	Data	
				Data type	Value (hex)
01	Hold Setting For Error Status	Hold setting for error status	Read/ Write	BOOL	• TRUE: The error status does not change to FALSE when the error cause is removed. To change the error status to FALSE, use the *Clear Error Status Flag* service. • FALSE: The error status changes to FALSE when the error cause is removed. Default: TRUE
04	Unit Error Aggregation Status	Unit error aggregation status	Read	BYTE	• 20: The value is 20 hex when any of the attributes 05 to 5B hex is TRUE. • 00: The above errors did not occur.
05	UNIT Error bit	Unit error bit	Read	WORD	Notification of the error status in the Unit. When an error occurs, the corresponding bit is turned ON (1). Bit 0: Hardware failure in the Communication Unit Bit 1: Unit Processing Error Bit 2: Communications Error between Amplifier Units Bit 3: EEPROM Error Bit 4: Amplifier Unit Recognition Error at Startup Bit 5: TCP/IP Setting Error (always 0) Bit 6: BOOTP/DHCP Server Connection Error Bit 7: IP Address Conflict Bit 8: Automatic Clock Adjustment Setting Error Bit 9: SNTP Server Connection Error Bit 10: Exclusive Owner Tag Data Link Timeout Bit 11: Connected Amplifier Unit System Error Bits 12 to 15: Reserved (always 0)

A-3-7 Amplifier Unit Operation Command Object (Class ID: 392 Hex)

The Amplifier Unit operation command object executes various operation commands (to read settings, write settings, or change status) to the Amplifier Unit connected to the Communication Unit.

Service Code

The service code specifies the service to execute.

Service code (hex)	Parameter name	Description	Supported service range	
			Class	Instance
30	Sensor command	Sends a command to the Amplifier Unit.	Yes	No

Sensor Command (Service Code: 30 Hex)

Sends an operation command to a single connected Amplifier Unit and receives the result.
The request data format and response format are given below.

● Request Data Format

Parameter name	Description	Data type	Value (hex)
Service	Service code	USINT	30
Request Path Size	Request path size	USINT	07
Request Path	Request path	Padded EPATH	210081032400
Parameter	Parameters	ARRAY OF 6 BYTE	Refer to the parameter data for the attribute ID.

● Response Format

Refer to the response data for Attribute ID.

Class ID and Instance ID

The class ID and instance ID are given in the following table.

ID type	Value (hex)
Class ID	392
Instance ID	1 to 10: Specifies the channel number of the target Amplifier Unit for the operation command.

Attribute ID

The attribute ID specifies the command code. Refer to *A-4-3 AD Command List* on page A-68 for details on the command code and data.

A-4 Supported Message Communications

A-4-1 Explicit Message, Tag Data Link, and No-protocol Command Comparison Tables

● Explicit Message, Attribute ID, and Parameter Comparison Table

Object name	Class ID (hex)*1	Service code (hex)				Instance ID	Attribute ID (hex)	Parameter name	Description
		01: Get_Attribute_All	0E: Get_Attribute_Single	10: Set_Attribute_Single*2	Original service code				
Identity	01		○			00	01	Revision	Revision of the object
			○			00	02	Max Instance	Maximum instance number
		○	○			01	01	Vendor ID	Vendor ID
		○	○			01	02	Device Type	Device type
		○	○			01	03	Product Code	Product code
		○	○			01	04	Revision	Device CIP revision
		○	○			01	05	Status	Unit Status
		○	○			01	06	Serial Number	Serial number
		○	○			01	07	Product Name	Product name
					05: Reset	01	---	---	---
TCP/IP Interface	F5		○			00	01	Revision	Revision of the object
		○	○			01	01	Status	Interface IP address setting condition
		○	○			01	02	Configuration Capability	Controller configuration and settings that are possible for the interface
		○	○	○		01	03	Configuration Control	IP address setting method when interface started
		○	○			01	04	Physical Link Object	Path to physical link object
		○	○	○		01	05	Interface Configuration	Interface configuration
		○	○	○		01	06	Host Name	Host name
		○	○	○		01	0A	SelectAcd	ACD Setting
		○	○	○		01	0B	LastConflictDetected	Information on the IP address conflict last detected by Address Conflict Detection
		○	○	○		01	0D	Encapsulation Inactivity Timeout	Encapsulation inactivity timeout time
Ethernet Link	F6					00	01	Revision	Revision of the object
						00	02	Max Instance	Maximum instance number
						00	03	Number of Instances	Number of instances of this object
		○	○			01	01	Interface Speed	Interface communications speed
		○	○			01	02	Interface Flags	Interface status

Object name	Class ID (hex)*1	Service code (hex)				Instance ID	Attribute ID (hex)	Parameter name	Description
		01: Get_Attribute_All	0E: Get_Attribute_Single	10: Set_Attribute_Single*2	Original service code				
		○	○			01	03	Physical Address	Interface MAC address
		○	○		4C: Get_and_Clear	01	04	Interface Counters	Interface counter
		○	○		4C: Get_and_Clear	01	05	Media Counters	Media counters
		○	○	○		01	06	Interface Control	Physical interface configuration
		○	○			01	07	Interface Type	Interface type
		○	○			01	08	Interface State	Interface state
		○	○			01	0A	Interface Label	Interface identification text string
		○	○			01	0B	Interface Capability	Interface communications performance
Event Log	41		○			00	01	Revision	Revision of the object
			○			00	02	Max Instance	Maximum instance number
			○			00	03	Number of Instances	Number of instances of this object
			○			00	20	Time Format	Format of time information
			○			00	21	Present Time	Current time
			○			01	02	State	Instance state
			○	○		01	09	Logged Data Configuration	Event Log Logged Data Configuration
			○			01	0C	Event/Data Log Maximum Size	Maximum number of event log entries
			○			01	0D	Event/Data Log Size	Number of currently registered event logs
			○			01	0E	Event/Data Log	Event log
			○			01	18	Event Identifier Format	Event log format
					05: Reset	01	---	---	---
Unit management	390		○			00	01	Revision	Revision of the object
			○			00	02	Max Instance	Maximum instance number
			○			00	03	Number of Instances	Number of instances of this object
			○			01	01	Unit Version	Unit version
			○			01	02	Hardware Version	Hardware version
			○			01	03	Software Version	Software version
			○			01	04	Lot Number	Lot number
			○	○		01	0A	Port No	Port number
			○			01	0B	Total Power-ON Time	Total power-ON time (Unit: h)
			○	○		01	0C	NTP/SNTP Server IP Address	IP address of the NTP/SNTP server from which to get time information with the automatic clock adjustment

Object name	Class ID (hex)*1	Service code (hex)				Instance ID	Attribute ID (hex)	Parameter name	Description
		01: Get_Attribute_All	0E: Get_Attribute_Single	10: Set_Attribute_Single*2	Original service code				
			○	○		01	0D	Time Zone	Time zone used with the automatic clock adjustment
			○	○		01	0E	Time Configuration	Determines the clock function adjustment method.
			○			01	10	Connected CH	Gets the number of connected Amplifier Units.
			○			01	11	Register number of connected CH	Registration of the number of connected channels
			○	○		01	20	Amount of logging data	Amount of Communication Unit buffering data
			○	○		01	21	Logging thinning number	Communication Unit buffering thinning number
			○	○		01	23	Overwrite mode	Overwrite mode
			○	○		01	24	Logging start condition	Communication Unit buffering start condition
			○	○		01	25	Logging start condition ch	Communication Unit buffering start judgment result specification channel
			○	○		01	26	Logging start condition judge	Communication Unit buffering start judgment result specification judgment
			○	○		01	27	Logging stop condition	Communication Unit buffering stop condition
			○	○		01	28	Logging stop condition ch	Communication Unit buffering stop judgment result specification channel
			○	○		01	29	Logging stop condition judge	Communication Unit buffering stop judgment result specification judgment
			○	○		01	2A	Sampling time	Sampling time
			○	○		01	2B	Logging start delay time	Communication Unit buffering start delay time
			○	○		01	2C	Output Data1	Output target data 1 (Communication Unit buffering target data 1)
			○	○		01	2D	Output Data2	Output target data 2 (Communication Unit buffering target data 2)
			○	○		01	2E	Output Data3	Output target data 3 (Communication Unit buffering target data 3)
			○	○		01	2F	Output Data4	Output target data 4 (Communication Unit buffering target data 4)
			○	○		01	30	Output Data5	Output target data 5 (Communication Unit buffering target data 5)

Object name	Class ID (hex)*1	Service code (hex)				Instance ID	Attribute ID (hex)	Parameter name	Description
		01: Get_Attribute_All	0E: Get_Attribute_Single	10: Set_Attribute_Single*2	Original service code				
			○	○		01	31	Output Data6	Output target data 6 (Communication Unit buffering target data 6)
			○	○		01	32	Output Data7	Output target data 7 (Communication Unit buffering target data 7)
			○	○		01	33	Output Data8	Output target data 8 (Communication Unit buffering target data 8)
			○	○		01	34	Output Data9	Output target data 9 (Communication Unit buffering target data 9)
			○	○		01	35	Output Data10	Output target data 10 (Communication Unit buffering target data 10)
			○	○		01	36	Output Data11	Output target data 11 (Communication Unit buffering target data 11)
			○	○		01	37	Output Data12	Output target data 12 (Communication Unit buffering target data 12)
			○	○		01	38	Output Data13	Output target data 13 (Communication Unit buffering target data 13)
			○	○		01	39	Output Data14	Output target data 14 (Communication Unit buffering target data 14)
			○	○		01	3A	Output Data15	Output target data 15 (Communication Unit buffering target data 15)
			○	○		01	3B	Output Data16	Output target data 16 (Communication Unit buffering target data 16)
			○	○		01	3C	Output Data17	Output target data 17 (Communication Unit buffering target data 17)
			○	○		01	3D	Output Data18	Output target data 18 (Communication Unit buffering target data 18)
			○	○		01	3E	Output Data19	Output target data 19 (Communication Unit buffering target data 19)
			○	○		01	3F	Output Data20	Output target data 20 (Communication Unit buffering target data 20)
			○			01	40	External Input1	External Input 1 assignment
			○	○		01	41	External Input2	External Input 2 assignment
			○	○		01	42	External Output1	External Output 1 assignment

Object name	Class ID (hex)*1	Service code (hex)				Instance ID	Attribute ID (hex)	Parameter name	Description
		01: Get_Attribute_All	0E: Get_Attribute_Single	10: Set_Attribute_Single*2	Original service code				
			○	○		01	43	External Output2	External Output 2 assignment
Error status	391		○				01	Revision	Revision of the object
			○				02	Max Instance	Maximum instance number
			○				03	Number of Instances	Number of instances of this object
			○	○		01	01	Hold Setting For Error Status	Hold setting for error status
		○	○			01	04	Unit Error Aggregation Status	Unit Error Collection Status
		○	○			01	05	UNIT Error bit	Unit error bit
					35: Clear error status	01	---	---	---
Amplifier operation command	392				30: Execute operation command	Channel number	Command code	Amplifier operation command	Control command to the Amplifier Unit

*1. 0x04 Assembly and 0x06 Connection Manager objects are excluded.

*2. Instance Attribute ID only

● Class ID and Parameter Specification Comparison Table

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
Identity	01	00	01	UINT		0002	Revision of the object
		00	02	UINT		0001	Maximum instance number
		01	01	UINT	002F	Fixed to 002F	Vendor ID, fixed value
		01	02	UINT	2B	0x2B	Device Type, fixed value
		01	03	UINT	0BFF	0x0BFF	Product code, fixed value
		01	04	ARRAY OF STRUCT 1. USINT 2. USINT	1. 01 2. 01	1. Major 2. Minor Same as the default	Revision, process set value
		01	05	WORD	0030	Status bit	The bit is turned ON when a connection is opened or there is IP address conflict. • Refer to *Values of Status* on page A-20.
		01	06	UDINT	---	Unique number for each unit	Unit-specific number, process set value
		01	07	SHORT STRING	"ZP-EIP" (ASCII code)	ZP-EIP	Product name, fixed value
		01	---	---	---	0: Restarts 1: Restarts with default settings	Restarts the main unit.
TCP/IP Interface	F5	00	01	UINT		0004	Revision of the object
		01	01	DWORD	00000000	Refer to *Values of Status* on page A-22.	Bits 0 to 3: Interface Configuration Status Bit 5: Interface Configuration Pending* Bit 6: AcdStatus* Bit 7: AcdFault* * Always FALSE for NR
		01	02	DWORD	00000000	Refer to *Values of Configuration Capability* on page A-22.	BOOTP Client DNS Client DHCP Client DHCP-DNS Update Configuration Settable Hardware Configurable Interface Configuration Change Requires Reset AcdCapable
		01	03	DWORD	00000000	Refer to *Values of Configuration Control* on page A-23.	Configuration Method • 0: Uses the setting that is saved in non-volatile memory. • 1: Uses the BOOTP server to configure the settings. • 2: Uses the DHCP server to configure the settings. DNS Enable

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
		01	04	STRUCT 1. UINT 2. Padded EPATH	1. 0000 2. ---	1. 0000 2. ---	1. Path size in words 2. Fixed path to physical link object
		01	05	STRUCT 1. UDINT 2. UDINT 3. UDINT 4. UDINT 5. UDINT 6. STRING	1. C0A8FA01 2. FFFFFF00 3. 00000000 4. 00000000 5. 00000000 6. 0000	1. Valid IP address 2. Valid subnet mask 3. 00000000 4. 00000000 5. 00000000 6. 0000	1. IP Address 2. Subnet mask 3. Default gateway 4. Primary name server 5. Secondary name server 6. Domain name
		01	06	STRING	"ZP-EIP" (ASCII code)	"ZP-EIP"	Host name, fixed value
		01	0A	BOOL	TRUE	TRUE FALSE	Enable/Disable ACD function
		01	0B	STRUCT 1. USINT 2. Array of 6 USINT 3. Array of 28 USINT	All 0s	---	1. ACD state at the time of MAC address conflict detection in the ARP PDU when IP address conflict was last detected 2. MAC address in the ARP PDU when IP address conflict was last detected 3. Raw data in the ARP PDU when IP address conflict was last detected
		01	0D	UINT	0078	0000: Disable 0001 to 0E10: 0078 (default)	Timeout time (in seconds)
Ether-net Link	F6	00	01	UINT		0004	Revision of the object
		00	02	UINT		0001	Maximum instance number
		00	03	UINT		0001	Number of instances of this object
		01	01	UDINT		000A 0064	10 Mbps 100 Mbps
		01	02	DWORD	00000000	Bit 0 Bit 1 Bits 2 to 4 Bit 5 Bit 6 (Always FALSE)	Refer to *Values of Interface Flags* on page A-27.
		01	03	ARRAY OF 6 USINT	---	Number of arrays: 6	MAC address

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
		01	04	STRUCT	All 0s	UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF)	Number of bytes of receive data Number of bytes of unicast receive data Number of bytes of non-unicast receive data Number of bytes of discarded receive data Number of bytes of error receive data Number of bytes of unsupported protocol receive data Number of bytes of send data Number of bytes of unicast send data Number of bytes of non-unicast send data Number of bytes of discarded send data Number of bytes of error send data
		01	05	STRUCT	All 0s	UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF) UDINT (00000000 to FFFFFFFF)	Number of received alignment error frames FCS error reception count Number of successfully sent frames with a collision detected Number of successfully sent frames with more than one collision detected Number of occurrences of SQE test errors Number of frames with a send delay Number of times of collisions detected in 512 bit time after packet transmission Number of unsuccessfully sent frames due to excessive collisions Number of unsuccessfully sent frames due to a MAC layer transmission error Number of times of detected carrier sensor errors Number of frames that exceeded the maximum frame size Number of unsuccessfully received frames due to a MAC layer reception error
		01	06	STRUCT 1. WORD 2. UINT	1. Default: 0001 2. Default: 0000	Refer to *Values of Interface Flags* on page A-27.	Refer to *Values of Control Bits* on page A-28. Refer to *Values of Forced Interface Speed* on page A-28.
		01	07	USINT	02	02	Fixed value

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
		01	08	USINT	00000000	Refer to *Values of Interface State* on page A-28.	Refer to *Values of Interface Flags* on page A-27.
		01	0A	SHORT STRING	00000000	1. Instance 1: "Ethernet Port 1" 2. Instance 2: "Ethernet Port 2"	Fixed value
		01	0B	STRUCT 1. DWORD 2. USINT 3. UINT 4. USINT 5. UINT 6. USINT 7. UINT 8. USINT 9. UINT 10. USINT	1. 0000000E (fixed) 2. 04 (fixed) 3. 000A: 10 Mbps 4. 00: Half Duplex 5. 000A: 10 Mbps 6. 01: Full Duplex 7. 0064: 100 Mbps 8. 00: Half Duplex 9. 0064: 100 Mbps 10. 01: Full Duplex	1. Ethernet Link Capability Bits 2. 4 3. 10 4. 0 5. 10 6. 1 7. 100 8. 0 9. 100 10. 1	1. Capability Bits 2. Refer to *Values of Capability Bits* on page A-28. 3. Interface communications speed 4. Interface bidirectional mode 5. Interface communications speed 6. Interface bidirectional mode 7. Interface communications speed 8. Interface bidirectional mode 9. Interface communications speed 10. Interface bidirectional mode
Event Log	41	00	01	UINT		0001	Revision of the object
		00	02	UINT		0001	Maximum instance number
		00	03	UINT		0001	Number of instances of this object
		00	20	USINT	DB	DB: TIME CF: DATE AND TIME	Format of internally held time information
		00	21	Set value of Time Format	0	• TIME 80000000 to 7FFFFFFF Default: 00000000 • DATE AND TIME DT#1972010100:00:00.000 to DT#2151060623:59:59.999 Default: 000000000000 **Note 1.** Any unused areas should be zero-padded. **Note 2.** When time is retrieved from the SNTP server using the data type TIME, the lower 4 bytes of the 6-byte time information in ms are used. Thereafter, time is managed by using 0x00000000 to 0xFFFFFFFF.	Current time information

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
		01	02	USINT	00	00 02 03 04	Non-Existent Empty Available Full/Overwrite
		01	09	BYTE	00	00 01 Default: 00	0 (default): Logs Event Identifier in log data. 1: Logs Event Identifier and Time Stamp in log data.
		01	0C	UDINT	00000028	00000028 (fixed)	Maximum number of event log entries
		01	0D	UDINT	00000000	00000000 to 00000028	Number of currently registered event logs
		01	0E	ARRAY OF STRUCT	Refer to *Instance Attribute ID* on page A-31.	Refer to *Instance Attribute ID* on page A-31.	Refer to *Instance Attribute ID* on page A-31.
		01	18	USINT	1 (48-bit object model/error format)	1 (48-bit object model/error format)	48-bit object model/error format
		01	---	---	---	---	Clears the event log.
Unit management	390	00	01	UINT		0001	Revision of the object
		00	02	UINT		0001	Maximum instance number
		00	03	UINT		0001	Number of instances of this object
		01	01	DWORD	10000000	Unit version of Unit	Unit version of Unit
		01	02	DWORD	10000000	Hardware version of the Unit	Hardware version of the Unit
		01	03	DWORD	10000000	Software version of the Unit	Software version of the Unit
		01	04	DWORD	Unit-specific	Unique number assigned to each Unit	Unique number assigned to each Unit
		01	0A	UINT	FA00	0400 to FFFF **Note 1.** 1,024 to 65,535 in decimal. 8AE and AF12 cannot be set. **Note 2.** UDP port for tag data link is 2222 (0x08AE), Encap port for CIP is 44818 (0xAF12).	Port number for TCP/IP connection
		01	0B	UDINT	0000	00000000 to 2AAAAAAA	Total power-ON time (Unit: h)
		01	0C	UDINT	00	"0" Other than "0" Default: All 0s (In the case of command input in TDL, C0A8FA6F for "192,168.250.111")	NTP/SNTP Server IP Address
		01	0D	UINT	000F	0000 to 002A Default: 000F	Time zone used with the automatic clock adjustment Refer to *Instance Attribute ID* on page A-32.

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
		01	0E	UINT	0	0: Manual setting 1: Automatic adjustment (SNTP server) **Note** When Time Format is set to TIME, or when *NTP/SNTP Server IP Address* is not set, 1 cannot be specified.	• When 0 is specified: Manual time setting is required. For the Event Log object, the Time Format and Present Time settings must be configured in advance. By default, the elapsed time (ms) after the first startup is internally managed by the Communication Unit. • When 1 is specified: SNTP server settings must be configured in advance. When the IP address of the SNTP server is set to 0 (default), an error will be returned.
		01	10	BYTE	0	1 to 16 0: Channel recognition failure	Gets the number of connected Amplifier Units after completion of startup. If connection fails, 0 will be returned.
		01	11	BYTE	0	1 to 16: Number of connected channels 0: No check for number of connected channels	Registers the number of connected channels. If the number of connected channels does not match the specified number, a channel recognition error will occur.
		01	20	UDINT	180000	0 to 250000	Number of data points to be stored per output data of internal Communication Unit buffering
		01	21	UDINT	1	1 to 3600000	Storage interval for internal Communication Unit buffering
		01	23	BYTE	0	0: Standard 1: Overwrite	Overwrite mode setting
		01	24	BYTE	0	0: Command 1: Amplifier Unit judgment result 2: External Input ON	Communication Unit buffering start condition
		01	25	BYTE	1	1 to 16: CH1 to CH16	Target Amplifier Unit channel number used when Start Communication Unit Buffering is set to Amplifier Unit judgment result
		01	26	BYTE	1	0: High 1: Pass 2: Low 3: All OFF (during non-measurement) 4: OR (Timing when measurement is enabled) (Default: 1)	Type of judgment result used when Start Communication Unit Buffering is set to Amplifier Unit judgment result
		01	27	BYTE	0	0: Command 1: Amplifier Unit judgment result 2: External Input OFF 3: Sampling time	Communication Unit buffering stop condition

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
		01	28	BYTE	1	1 to 16: CH1 to CH16	Target Amplifier Unit channel number used when Stop Communication Unit Buffering is set to Amplifier Unit judgment result
		01	29	BYTE	1	0: High 1: Pass 2: Low 3: All OFF (during non-measurement) (Default: 1)	Type of judgment result used when Stop Communication Unit Buffering is set to Amplifier Unit judgment result
		01	2A	UDINT	1	1 to 2500000	Sampling time when Communication Unit buffering stop condition is set to Sampling time
		01	2B	UINT	0	0 to 1000	Delay time to delay the actual start of Communication Unit buffering after acceptance of Start Communication Unit Buffering
		01	2C	BYTE	1	0: OFF 1 to 16: MV for CH1 to CH16 17: OFF 18: OFF 19: OFF 20: OFF 21 to 36: RV for CH1 to CH16 (Default: Communication Unit buffering target data 1 to 16 are sequentially assigned CH1 to CH16)	Communication Unit Buffering target data assigned to Communication Unit Buffering target data 1
		01	2D	BYTE	2		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 2
		01	2E	BYTE	3		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 3
		01	2F	BYTE	4		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 4
		01	30	BYTE	5		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 5
		01	31	BYTE	6		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 6
		01	32	BYTE	7		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 7

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
		01	33	BYTE	8		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 8
		01	34	BYTE	9		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 9
		01	35	BYTE	A		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 10
		01	36	BYTE	B		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 11
		01	37	BYTE	C		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 12
		01	38	BYTE	D		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 13
		01	39	BYTE	E		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 14
		01	3A	BYTE	F		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 15
		01	3B	BYTE	10		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 16
		01	3C	BYTE	0		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 17
		01	3D	BYTE	0		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 18
		01	3E	BYTE	0		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 19
		01	3F	BYTE	0		Communication Unit Buffering target data assigned to Communication Unit Buffering target data 20

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
		01	40	BYTE	0	0: Cuing information 1 1: Communication Unit buffering start/end control	Determines the function assigned to External Input 1. To use External Input 1 for Communication Unit buffering start and end control, *Communication Unit buffering start condition* or *Communication Unit buffering end condition* must be set to *External Input*.
		01	41	BYTE	0	0: Cuing information 2 1: Clear Communication Unit Buffering	Determines the function assigned to External Input 2.
		01	42	BYTE	0	0: OFF 1: Communication Unit buffering execution status	Determines the function assigned to External Output 1.
		01	43	BYTE	0	0: OFF 1: Communication Unit buffering full	Determines the function assigned to External Output 2.
Error status	391		01	UINT		0001	Revision of the object
			02	UINT		0001	Maximum instance number
			03	UINT		0001	Number of instances of this object
		01	01	BOOL	TRUE	TRUE FALSE	The error status does not change to FALSE when the error cause is removed. The error status changes to FALSE when the error cause is removed.
		01	04	BYTE	00	00: Normal status 20: Error occurred	The above error does not occur when any of the error causes in Attribute 05 to 5B hex is TRUE.
		01	05	WORD	0000	Bit 0: Hardware failure in the Communication Unit Bit 1: Unit Processing Error Bit 2: Communications Error between Amplifier Units Bit 3: EEPROM Error Bit 4: Amplifier Unit Recognition Error at Startup Bit 5: TCP/IP Setting Error (always 0) Bit 6: BOOTP/DHCP Server Connection Error Bit 7: IP Address Conflict Bit 8: Automatic Clock Adjustment Setting Error Bit 9: SNTP Server Connection Error Bit 10: Exclusive Owner Tag Data Link Timeout Bit 11: Connected Amplifier Unit System Error Bits 12 to 15: Reserved (always 0)	Notification of the error status in the Communication Unit. When an error occurs, the corresponding bit is turned ON (1).
		01	---	---	---	Clear error status	Clears all error status values.

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Data type	Default (hex)	Value (Value range)	Role
Amplifier operation command	392	Channel number	Command code	ARRAY OF 7 BYTE	0	0: Command code 1 to 6: Data*1 *1. Refer to *A-3-7 Amplifier Unit Operation Command Object (Class ID: 392 Hex)* on page A-39 for details.	Sends control commands to the Amplifier Unit (sampling period teaching, find-me, etc.).

*1. 0x04 Assembly and 0x06 Connection Manager objects are excluded.

● Explicit Message and Command Comparison Table

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Original service code	Parameter name	Description	Corresponding no-protocol command	Tag data link command support	Immediately applied or restart required	
									EM	No-protocol
Identity	01	00	01		Revision	Revision of the object	---	Not supported		
		00	02		Max Instance	Maximum instance number	---	Not supported		
		01	01		Vendor ID	Vendor ID	NR	Not supported		
		01	02		Device Type	Device type	NR	Not supported		
		01	03		Product Code	Product code	NR	Not supported		
		01	04		Revision	Device CIP revision	NR	Not supported		
		01	05		Status	Unit Status	NR	Not supported		
		01	06		Serial Number	Serial number	NR	Not supported		
		01	07		Product Name	Product name	NR	Not supported		
		01	---	05: Reset	---	---	---	---		
TCP/IP Interface	F5	00	01		Revision	Revision of the object	NR	Not supported		
		01	01		Status	Interface IP address setting condition	NR	Not supported		
		01	02		Configuration Capability	Controller configuration and settings that are possible for the interface	NR	Not supported		
		01	03		Configuration Control	IP address setting method when interface started	NW/NR	Not supported	Immediately applied	Applied by restart
		01	04		Physical Link Object	Path to physical link object	NR	Not supported		
		01	05		Interface Configuration	Interface configuration	NW/NR	Not supported	Immediately applied	Applied by restart
		01	06		Host Name	Host name	NW/NR	Not supported	Immediately applied	Immediately applied

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Original service code	Parameter name	Description	Corresponding no-protocol command	Tag data link command support	Immediately applied or restart required	
									EM	No-protocol
		01	0A		SelectAcd	ACD Setting	NW/NR	Not supported	Applied by restart	Applied by restart
		01	0B		LastConflictDetected	Information on the IP address conflict last detected by Address Conflict Detection	NW/NR	Not supported	Applied by restart	Applied by restart
		01	0D		Encapsulation Inactivity Timeout	Encapsulation inactivity timeout time	NW/NR	Not supported	Immediately applied	Applied by restart
Ethernet Link	F6	00	01		Revision	Revision of the object	NR	Not supported		
		00	02		Max Instance	Maximum instance number	NR	Not supported		
		00	03		Number of Instances	Number of instances of this object	NR	Not supported		
		01	01		Interface Speed	Interface communications speed	---	Not supported		
		01	02		Interface Flags	Interface status	---	Not supported		
		01	03		Physical Address	Interface MAC address	NR	Not supported		
		01	04	4C: Get_and_Clear	Interface Counters	Interface counter	---	Not supported		
		01	05	4C: Get_and_Clear	Media Counters	Media counters	---	Not supported		
		01	06		Interface Control	Physical interface configuration	NW/NR	Not supported	Applied by restart	Applied by restart
		01	07		Interface Type	Interface type	NR	Not supported		
		01	08		Interface State	Interface state	NR	Not supported		
		01	0A		Interface Label	Interface identification text string	NR	Not supported		
		01	0B		Interface Capability	Interface communications performance	NR	Not supported		
Event Log	41	00	01		Revision	Revision of the object	GR	Not supported		
		00	02		Max Instance	Maximum instance number	GR	Not supported		

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Original service code	Parameter name	Description	Corresponding no-protocol command	Tag data link command support	Immediately applied or restart required	
									EM	No-protocol
		00	03		Number of Instances	Number of instances of this object	GR	Not supported		
		00	20		Time Format	Format of time information	GW/GR	Not supported	Applied by restart	Applied by restart
		00	21		Present Time	Current time	GW/GR	Not supported	Immediately applied	Immediately applied
		01	02		State	Instance state	GR	Not supported		
		01	09		Logged Data Configuration	Event Log Logged Data Configuration	GW/GR	Not supported	Applied by restart	Applied by restart
		01	0C		Event/Data Log Maximum Size	Maximum number of event log entries	GR	Not supported		
		01	0D		Event/Data Log Size	Number of currently registered event logs	GR	Not supported		
		01	0E		Event/Data Log	Event logs	GR	Not supported		
		01	18		Event Identifier Format	Event log format	GR	Not supported		
		01	---	05: Reset	---	---				
Unit management	390	00	01		Revision	Revision of the object	NR	Not supported		
		00	02		Max Instance	Maximum instance number	NR	Not supported		
		00	03		Number of Instances	Number of instances of this object	NR	Not supported		
		01	01		Unit Version	Unit version	DR	Supported		
		01	02		Hardware Version	Hardware version	DR	Supported		
		01	03		Software Version	Software version	DR	Supported		
		01	04		Lot Number	Lot number	DR	Supported		
		01	0A		Port No	Port number	DW/DR	Supported	Applied by restart	Applied by restart

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Original service code	Parameter name	Description	Corresponding no-protocol command	Tag data link command support	Immediately applied or restart required	
									EM	No-protocol
		01	0B		Total Power-ON Time	Total power-ON time (Unit: h)	DR	Supported		
		01	0C		NTP/SNTP Server IP Address	IP address of the NTP/SNTP server from which to get time information with the automatic clock adjustment	DW/DR	Supported	Applied by restart	Applied by restart
		01	0D		Time Zone	Time zone used with the automatic clock adjustment	DW/DR	Supported	Applied by restart	Applied by restart
		01	0E		Time Configuration	Determines the clock function adjustment method.	DW/DR	Supported	Applied by restart	Applied by restart
		01	10		Connected CH	Gets the number of connected Amplifier Units.	DR	Supported		
		01	11		Register number of connected CH	Registration of the number of connected channels	DW/DR	Supported	Applied by restart	Applied by restart
		01	20		Amount of logging data	Amount of Communication Unit buffering data	DW/DR	Supported	Immediately applied	Immediately applied
		01	21		Logging thinning number	Communication Unit buffering thinning number	DW/DR	Supported	Immediately applied	Immediately applied
		01	23		Overwrite mode	Overwrite mode	DW/DR	Supported	Immediately applied	Immediately applied
		01	24		Logging start condition	Communication Unit buffering start condition	DW/DR	Supported	Immediately applied	Immediately applied
		01	25		Logging start condition ch	Communication Unit buffering start judgment result specification channel	DW/DR	Supported	Immediately applied	Immediately applied
		01	26		Logging start condition judge	Communication Unit buffering start judgment result specification judgment	DW/DR	Supported	Immediately applied	Immediately applied

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Original service code	Parameter name	Description	Corresponding no-protocol command	Tag data link command support	Immediately applied or restart required	
									EM	No-protocol
		01	27		Logging stop condition	Communication Unit buffering stop condition	DW/DR	Supported	Immediately applied	Immediately applied
		01	28		Logging stop condition ch	Communication Unit buffering stop judgment result specification channel	DW/DR	Supported	Immediately applied	Immediately applied
		01	29		Logging stop condition judge	Communication Unit buffering stop judgment result specification judgment	DW/DR	Supported	Immediately applied	Immediately applied
		01	2A		Sampling time	Sampling time	DW/DR	Supported	Immediately applied	Immediately applied
		01	2B		Logging start delay time	Communication Unit buffering start delay time	DW/DR	Supported	Immediately applied	Immediately applied
		01	2C		Output Data1	Output target data 1 (Communication Unit buffering target data 1)	DW/DR	Supported	Immediately applied	Immediately applied
		01	2D		Output Data2	Output target data 2 (Communication Unit buffering target data 2)	DW/DR	Supported	Immediately applied	Immediately applied
		01	2E		Output Data3	Output target data 3 (Communication Unit buffering target data 3)	DW/DR	Supported	Immediately applied	Immediately applied
		01	2F		Output Data4	Output target data 4 (Communication Unit buffering target data 4)	DW/DR	Supported	Immediately applied	Immediately applied
		01	30		Output Data5	Output target data 5 (Communication Unit buffering target data 5)	DW/DR	Supported	Immediately applied	Immediately applied
		01	31		Output Data6	Output target data 6 (Communication Unit buffering target data 6)	DW/DR	Supported	Immediately applied	Immediately applied

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Original service code	Parameter name	Description	Corresponding no-protocol command	Tag data link command support	Immediately applied or restart required	
									EM	No-protocol
		01	32		Output Data7	Output target data 7 (Communication Unit buffering target data 7)	DW/DR	Supported	Immediately applied	Immediately applied
		01	33		Output Data8	Output target data 8 (Communication Unit buffering target data 8)	DW/DR	Supported	Immediately applied	Immediately applied
		01	34		Output Data9	Output target data 9 (Communication Unit buffering target data 9)	DW/DR	Supported	Immediately applied	Immediately applied
		01	35		Output Data10	Output target data 10 (Communication Unit buffering target data 10)	DW/DR	Supported	Immediately applied	Immediately applied
		01	36		Output Data11	Output target data 11 (Communication Unit buffering target data 11)	DW/DR	Supported	Immediately applied	Immediately applied
		01	37		Output Data12	Output target data 12 (Communication Unit buffering target data 12)	DW/DR	Supported	Immediately applied	Immediately applied
		01	38		Output Data13	Output target data 13 (Communication Unit buffering target data 13)	DW/DR	Supported	Immediately applied	Immediately applied
		01	39		Output Data14	Output target data 14 (Communication Unit buffering target data 14)	DW/DR	Supported	Immediately applied	Immediately applied
		01	3A		Output Data15	Output target data 15 (Communication Unit buffering target data 15)	DW/DR	Supported	Immediately applied	Immediately applied

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Original service code	Parameter name	Description	Corresponding no-protocol command	Tag data link command support	Immediately applied or restart required	
									EM	No-protocol
		01	3B		Output Data16	Output target data 16 (Communication Unit buffering target data 16)	DW/DR	Supported	Immediately applied	Immediately applied
		01	3C		Output Data17	Output target data 17 (Communication Unit buffering target data 17)	DW/DR	Supported	Immediately applied	Immediately applied
		01	3D		Output Data18	Output target data 18 (Communication Unit buffering target data 18)	DW/DR	Supported	Immediately applied	Immediately applied
		01	3E		Output Data19	Output target data 19 (Communication Unit buffering target data 19)	DW/DR	Supported	Immediately applied	Immediately applied
		01	3F		Output Data20	Output target data 20 (Communication Unit buffering target data 20)	DW/DR	Supported	Immediately applied	Immediately applied
		01	40		External Input1	External Input 1 assignment	DR	Supported		
		01	41		External Input2	External Input 2 assignment	DW/DR	Supported	Immediately applied	Immediately applied
		01	42		External Output1	External Output 1 assignment	DW/DR	Supported	Immediately applied	Immediately applied
		01	43		External Output2	External Output 2 assignment	DW/DR	Supported	Immediately applied	Immediately applied
Error status	391		01		Revision	Revision of the object	SR	Not supported		
			02		Max Instance	Maximum instance number	SR	Not supported		
			03		Number of Instances	Number of instances of this object	SR	Not supported		

Object name	Class ID (hex)*1	Instance ID	Attribute ID (hex)	Original service code	Parameter name	Description	Corresponding no-protocol command	Tag data link command support	Immediately applied or restart required	
									EM	No-protocol
		01	01		Hold Setting For Error Status	Hold setting for error status	SW/SR	Not supported	Applied by restart	Applied by restart
		01	04		Unit Error Aggregation Status	Unit Error Collection Status	SR	Not supported		
		01	05		UNIT Error bit	Unit error bit	SR	Not supported		
		01	---	35: Clear error status	---	---		Not supported		
Amplifier operation command	392	Channel number	Command code	30: Execute operation command	Amplifier operation command	Control command to the Amplifier Unit	AD	Supported		

*1. 0x04 Assembly and 0x06 Connection Manager objects are excluded.

A-4-2 AW and AR Command Parameter List

The parameters used to send the AW or AR command are shown in the table below.

○: Possible/×: Not possible

Data	Index1 (hex)	Parameter	Default	Write data setting range or output range	Unit	Re-trieval	Set-ting
BANK0	0	High Threshold [BANK0]	Measurement range × 0.1	-999,999,999 to 999,999,999	0.01 µm	○	○
	1	Low Threshold [BANK0]	- (Measure-ment range × 0.1)	-999,999,999 to 999,999,999	0.01 µm	○	○
	2	Zero Reset Indicator Value [BANK0]	0	-999,999,999 to 999,999,999	0.01 µm	○	○
	3	Zero Reset Level [BANK0]	0	-999,999,999 to 999,999,999	0.01 µm	○	×
	4	Zero Reset Flag [BANK0]	0	0: Zero reset not executed (OFF), 1: Zero reset executed (ON)	---	○	×
	5	Analog Output Scal-ing [BANK0]	0	0: Disable analog output scaling, 1: Enable analog output scaling	---	○	○
	6	Analog Output Scal-ing Upper Limit [BANK0]	Maximum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
	7	Analog Output Scal-ing Lower Limit [BANK0]	Minimum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
BANK1	20	High Threshold [BANK0]	Measurement range × 0.1	-999,999,999 to 999,999,999	0.01 µm	○	○
	21	Low Threshold [BANK0]	- (Measure-ment range × 0.1)	-999,999,999 to 999,999,999	0.01 µm	○	○
	22	Zero Reset Indicator Value [BANK0]	0	-999,999,999 to 999,999,999	0.01 µm	○	○
	23	Zero Reset Level [BANK0]	0	-999,999,999 to 999,999,999	0.01 µm	○	×
	24	Zero Reset Flag [BANK0]	0	0: Zero reset not executed (OFF), 1: Zero reset executed (ON)	---	○	×
	25	Analog Output Scal-ing [BANK0]	0	0: Disable analog output scaling, 1: Enable analog output scaling	---	○	○
	26	Analog Output Scal-ing Upper Limit [BANK0]	Maximum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
	27	Analog Output Scal-ing Lower Limit [BANK0]	Minimum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○

Data	Index1 (hex)	Parameter	Default	Write data setting range or output range	Unit	Re-trieval	Set-ting
BANK2	40	High Threshold [BANK0]	110% of measurement range	-999,999,999 to 999,999,999	0.01 µm	○	○
	41	Low Threshold [BANK0]	90% of measurement range	-999,999,999 to 999,999,999	0.01 µm	○	○
	42	Zero Reset Indicator Value [BANK0]	0	-999,999,999 to 999,999,999	0.01 µm	○	○
	43	Zero Reset Level [BANK0]	0	-999,999,999 to 999,999,999	0.01 µm	○	×
	44	Zero Reset Flag [BANK0]	0	0: Zero reset not executed (OFF), 1: Zero reset executed (ON)	---	○	×
	45	Analog Output Scaling [BANK0]	0	0: Disable analog output scaling, 1: Enable analog output scaling	---	○	○
	46	Analog Output Scaling Upper Limit [BANK0]	Maximum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
	47	Analog Output Scaling Lower Limit [BANK0]	Minimum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
BANK3	60	High Threshold [BANK0]	Measurement range × 0.1	-999,999,999 to 999,999,999	0.01 µm	○	○
	61	Low Threshold [BANK0]	- (Measurement range × 0.1)	-999,999,999 to 999,999,999	0.01 µm	○	○
	62	Zero Reset Indicator Value [BANK0]	0	-999,999,999 to 999,999,999	0.01 µm	○	○
	63	Zero Reset Level [BANK0]	0	-999,999,999 to 999,999,999	0.01 µm	○	×
	64	Zero Reset Flag [BANK0]	0	0: Zero reset not executed (OFF), 1: Zero reset executed (ON)	---	○	×
	65	Analog Output Scaling [BANK0]	0	0: Disable analog output scaling, 1: Enable analog output scaling	---	○	○
	66	Analog Output Scaling Upper Limit [BANK0]	Maximum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
	67	Analog Output Scaling Lower Limit [BANK0]	Minimum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
Basic Sensor Settings	80	Measurement Cycle	3	0: 125 µs, 1: 250 µs, 2: 500 µs, 3: 1 ms, 4: 2 ms, 5: 4 ms, 6: 20 ms, 7: 50 ms, 8: 100 ms		○	○
	81	Calculation	0	0: OFF, 1: Thickness calculation mode, 2: Subtraction mode		○	○
	82	- Thick	0	0 to 999,999,999	0.01 µm	○	○
	83	Analog Output	2	0: ±5 V, 1: 1 to 5 V, 2: 4 to 20 mA, 3: 0 to 5 V, 4: OFF		○	○

Data	Index1 (hex)	Parameter	Default	Write data setting range or output range	Unit	Re-trieval	Set-ting
Advanced Sensor Settings (Meas-urement)	90	Number of Samples to Average	4	(0: 1 time, 1: 2 times, 2: 4 times, 3: 8 times, 4: 16 times, 5: 32 times, 6: 64 times, 7: 128 times, 8: 256 times, 9: 512 times/10: 1,024 times, 11: 2,048 times, 12: 4,096 times)		○	○
	91	Meas. Scaling	0	0: 2-point scaling OFF, 1: 2-point scaling ON		○	○
	92	- Scale1 Before	Maximum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
	93	- Scale1 After	Maximum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
	94	- Scale2 Before	Minimum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
	95	- Scale2 After	Minimum measurement value	-999,999,999 to 999,999,999	0.01 µm	○	○
	96	Sensing Surface	0	0: MAX, 1: NEAR, 2: FAR		○	○
	97	Meas. Direction	0	0: Normal (NEAR plus), 1: Reverse (FAR plus)		○	○
	98	Diff. Calculation	0	0: OFF, 1: ON		○	○
	99	Diff. Cycle	1	1 to 8,000	Number of times	○	○
Advanced Sensor Settings (I/O)	A0	Output Logic	0	0: N.O., 1: N.C.		○	○
	A1	Hold Function	0	0: OFF, 1: Peak, 2: Bottom, 3: Sample, 4: Peak to Peak, 5: Auto Peak/6: Auto Bottom		○	○
	A2	- Trigger Level	0	-999999999 to 999999999	0.01 µm	○	○
	A3	Timer Mode	0	0: OFF, 1: ON-delay timer, 2: OFF-delay timer, 3: One-shot timer		○	○
	A4	- Timer Time	1	1 to 9,999	ms	○	○
	A5	Hysteresis	0	0 to 999,999,999	0.01 µm	○	○
	A6	Input Select	0	0: Button, 1: External Input		○	○
	A7	External Input	0	0: Timing Reset, 1: Bank A/Bank B		○	○
	A8	Zero Reset Memory	0	0: Memory storage OFF, 1: Memory storage ON		○	○
	A9	Synchronization	0	0: Timing A, 1: Timing B		○	○
	AA	Keep Function	0	0: OFF, 1: ON		○	○
	AB	Keep Count	0	0 to 1000	Number of times	○	○
	AC	Initial Output (at ±5 V)	11	0: -5 V, 1: -4 V, ... , 10: 5 V, 11: MAX (5.5 V)		○	○
	AD	Initial Output (at 1 to 5 V)	5	0: 1 V, 1: 2 V, ... , 4: 5 V, 5: MAX (5.5 V)		○	○
	AE	Initial Output (at 0 to 5 V)	6	0: 0 V, 1: 1 V, ... , 4: 4 V, 5: 5 V, 6: MAX (5.5 V)		○	○
	AF	Initial Output (at 4 to 20 mA)	17	0: 4 mA, 1: 5 mA, ... , 16: 20 mA, 17: MAX (22 mA)		○	○

Data	Index1 (hex)	Parameter	Default	Write data setting range or output range	Unit	Re-trieval	Set-ting
Advanced Sensor Settings (Display/ Operation)	C0	Reverse	0	0: OFF, 1: ON		○	○
	C1	Brightness	0	0: Normal, 1: OFF		○	○
	C2	Number of Display Digits	LS025, LS050, LS100: 1 LS300, LS600: 2	0: 0.001, 1: 0.01, 2: 0.1/ 3: 1 [mm]		○	○
	C3	Head Display Mode	0	0: Measurement mode, 1: OFF		○	○
	C4	Display Select	0	0: Normal, 1: High Thresh, 2: Low Thresh, 3: Analog, 4: Resolution, 5: Real Value, 6: Channel No., 7: En-large View		○	○
Shortcut	CA	Change BANK	0	0: BANK0, 1: BANK1, 2: BANK2, 3: BANK3		○	×
	CB	Key Lock	0	0: Lock OFF, 1: Lock ON		○	○
	CC	Setting Tolerance	LS025: 10000 LS050: 20000 LS100: 50000 LS300: 200000 LS600: 800000	0 to 999,999,999	0.01 μm	○	○
Others	E0	Amplifier Unit Control Status	0x00	0x00 to 0xFF (Bit control) Bit 0: Laser emission status (0: Emitting, 1: OFF) Bit 1: Zero reset status (0: Cancel, 1: Execute) Bit 2: Timing status (0: Non-sampling, 1: Sampling) Bit 3: Reset status (0: Not reset, 1: Resetting) Bit 4: Find-me status (0: Not executed, 1: Executing) Bit 5: Reserved Bit 6: Reserved Bit 7: Reserved		○	×
	E1	Language	1	1: English, 2: Japanese, 3: Simplified Chinese, 4: Korean		○	○

A-4-3 AD Command List

The command format of AD commands is shown in the table below.

Command code (hex)	Command	Amplifier Unit operation at reception	Parameter data			Response data			
			1 byte	1 byte	4 bytes	1 byte	1 byte	1 byte	4 bytes
03	Read Set Value	Reads the set value from the Amplifier Unit.	Index1*1	Index2 (Fixed to 0x00)	0x00	Normally received: 03 Not received: F1 Parameter error: F2	Index1	Index2 (0x00)	Read data
04	Write Set Value	Writes the set value to the Amplifier Unit.	Index1*1	Index2 (Fixed to 0x00)	Write data	Normally received: 04 Not received: F1 Parameter error: F2	Index1	Index2 (0x00)	0x00
05	Read Model IDs	Reads the model IDs of the Amplifier Unit and Sensor Head.	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	0x00		Normally received: 05 Not received: F1 Parameter error: F2	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	0x00	Read data
06	Read Model Information	Reads the model information of the Amplifier Unit and Sensor Head.	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	ID (0x01 to 0x08)	0x00	Normally received: 06 Not received: F1 Parameter error: F2	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	ID (0x01 to 0x08)	Read data (4-byte ASCII, 32 bytes in total (Send data split into 8 parts by ID))
07	Read Serial Numbers	Reads the serial numbers of the Amplifier Unit and Sensor Head.	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	ID (0x01 to 0x02)	0x00	Normally received: 07 Not received: F1 Parameter error: F2	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	ID (0x01 to 0x02)	Read data (4-byte ASCII, 8 bytes in total (Send data split into 2 parts by ID))
08	Read Hardware Versions	Reads the hardware versions of the Amplifier Unit and Sensor Head.	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	0x00		Normally received: 08 Not received: F1 Parameter error: F2	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	0x00	Read data (4-byte ASCII)
09	Read Software Versions	Reads the software versions of the Amplifier Unit and Sensor Head.	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	0x00		Normally received: 09 Not received: F1 Parameter error: F2	PARAM1 (0x00: Amplifier Unit) (0x01: Sensor Head)	0x00	Read data (4-byte ASCII)

Command code (hex)	Command	Amplifier Unit operation at reception	Parameter data			Response data			
			1 byte	1 byte	4 bytes	1 byte	1 byte	1 byte	4 bytes
10	Initialize to Factory Defaults	Initializes the Amplifier Unit's EEPROM settings to the factory defaults.	0x00			Normally received: 10 Not received: F1 Parameter error: F2	0x00		
20	Execute Automatic Measurement Cycle Adjustment	Sends a command to execute sampling period teaching to the Sensor Head.	0x00			Normally received: 20 Not received: F1 Parameter error: F2	PARAM1 (0x00: OK) (0x0F: NG)	PARAM2 Sampling period adjustment result	0x00
21	Execute Threshold Teaching	Executes threshold teaching using tolerances set in advance.	0x00			Normally received: 21 Not received: F1 Parameter error: F2	PARAM1 (0x00: OK) (0x0E: Teaching executed during non-measurement) (0x0F: Threshold out of measurement range)	0x00	
22	Control Laser Emission OFF	Controls laser emission OFF.	PARAM1 (0x00: ON) (0x01: OFF)	0x00		Normally received: 22 Not received: F1 Parameter error: F2	PARAM1 (0x00: OK) (0x0F: NG)	0x00	
23	Control Zero Reset	Executes or cancels zero reset.	PARAM1 (0x00: Cancel) (0x01: Execute)	0x00		Normally received: 23 Not received: F1 Parameter error: F2	PARAM1 (0x00: OK) (0x0F: NG)	0x00	
24	Control Bank Change	Executes bank change.	PARAM1 (0x00: BANK0) (0x01: BANK1) (0x02: BANK2) (0x03: BANK3)	0x00		Normally received: 24 Not received: F1 Parameter error: F2	PARAM1 (0x00: OK) (0x0F: NG)	0x00	

Command code (hex)	Command	Amplifier Unit operation at reception	Parameter data			Response data			
			1 byte	1 byte	4 bytes	1 byte	1 byte	1 byte	4 bytes
25	Control Timing Input	Executes timing input.	PARAM1 (0x00: Cancel) (0x01: Execute)	0x00		Normally received: 25 Not received: F1 Parameter error: F2	PARAM1 (0x00: OK) (0x0F: NG)	0x00	
26	Control Reset Input	Executes reset input.	PARAM1 (0x00: Cancel) (0x01: Execute)	0x00		Normally received: 26 Not received: F1 Parameter error: F2	PARAM1 (0x00: OK) (0x0F: NG)	0x00	
27	Control Find-me Enable	Executes find-me control.	PARAM1 (0x00: Cancel) (0x01: Execute)	0x00		Normally received: 27 Not received: F1 Parameter error: F2	PARAM1 (0x00: OK) (0x0F: NG)	0x00	

*1. Refer to the *Index1* column in *A-4-2 AW and AR Command Parameter List* on page A-64.

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