

NE1A Series
NE1A-EDR01

EtherNet/IP-DeviceNet Router

OPERATION MANUAL

OMRON

Notice:

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

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



WARNING

Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally, there may be significant property damage.



Caution

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



Indicates general prohibitions for which there is no specific symbol.



Indicates general mandatory actions for which there is no specific symbol.

OMRON Product References

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

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

Visual Aids

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

IMPORTANT Indicates important information on what to do or not to do to prevent failure to operation, malfunction, or undesirable effects on product performance.

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

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

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About this Manual:

This manual describes the installation and operation of the NE1A-EDR01 EtherNet/IP-DeviceNet Router. The NE1A-EDR01 EtherNet/IP-DeviceNet Router was developed using OMRON's advanced control technology and vast know-how. It functions to route FA data between EtherNet/IP and DeviceNet networks.

Please read this manual carefully and be sure you understand the information provided before attempting to install or operate the NE1A-EDR01 EtherNet/IP-DeviceNet Router. The following manuals are also related to the NE1A-EDR01 EtherNet/IP-DeviceNet Router or NE1A-series Safety Network Controllers. Refer to these manuals as required during installation and operation.

EtherNet/IP-DeviceNet Router Operation Manual (this manual) (Z912)

This manual describes the specifications, functions, and application methods of the EtherNet/IP-DeviceNet Router in detail.

DeviceNet Safety System Configuration Manual (Z905)

This manual explains how to configure the DeviceNet Safety system using the Network Configurator.

DeviceNet Safety NE1A Series Safety Network Controller Operation Manual (Z906)

This manual describes the specifications, functions, and usage of the NE1A-SCPU01 and NE1A-SCPU02.

DeviceNet Safety Safety I/O Terminal Operation Manual (Z904)

This manual describes the DST1-series Slave models, specifications, functions, and application methods in detail.

DeviceNet Operation Manual (W267)

This manual describes the construction and connection of a DeviceNet network. It provides detailed information on the installation and specifications of cables, connectors, and other peripheral equipment used in the network, and on the supply of communications power. Obtain this manual and gain a firm understanding of its contents before using a DeviceNet system.

Read and Understand this Manual

Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments.

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PRECAUTIONS

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1 Intended Audience

This manual is intended for the following personnel, who must have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of introducing FA and safety systems into production facilities
- Personnel in charge of designing FA and safety systems
- Personnel in charge of managing FA facilities
- Personnel who have the qualifications, authority, and obligation to provide safety during each of the following product phases: mechanical design, installation, operation, maintenance, and disposal

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for programming and operating the Unit. Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during operation.

 **WARNING** It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications

3 Precautions for Safe Use

■ Handling with Care

Do not drop the EtherNet/IP-DeviceNet Router or subject it to excessive vibration or mechanical shock. The EtherNet/IP-DeviceNet Router may be damaged and may not function properly.

■ Installation and Storage Environment

Do not use or store the EtherNet/IP-DeviceNet Router in any of the following locations:

- Locations subject to direct sunlight
- Locations subject to temperatures or humidity outside the range specified in the specifications
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts

- Locations subject to water, oil, or chemicals
- Locations subject to shock or vibration

Take appropriate and sufficient measures when installing systems in the following locations. Inappropriate and insufficient measures may result in malfunction.

- Locations subject to static electricity or other forms of noise
- Locations subject to strong electromagnetic fields
- Locations subject to possible exposure to radioactivity
- Locations close to power supplies

■ Installation and Mounting

- Use the EtherNet/IP-DeviceNet Router within an enclosure with IP54 protection or higher according to IEC/EN 60529.
- Use DIN rail (TH35-7.5/TH35-15 according to IEC 60715) to install the EtherNet/IP-DeviceNet Router into the control panel. Mount the EtherNet/IP-DeviceNet Router to the DIN rail using PFP-M End Plates (not included with the EtherNet/IP-DeviceNet Router) to prevent it falling off the DIN rail because of vibration.
- Space must be provided around the EtherNet/IP-DeviceNet Router, at least 5 mm from its side and at least 50 mm from its top and bottom surfaces, for ventilation and wiring.

■ Installation and Wiring

- Use the following to wire external I/O devices to the EtherNet/IP-DeviceNet Router.

Solid wire	0.2 to 2.5 mm ² (AWG 24 to AWG 12)
Stranded (flexible) wire	0.34 to 1.5 mm ² (AWG 22 to AWG 16) Stranded wires should be prepared by attaching insulated bar terminals (DIN 46228-4 standard compatible) to the ends before connecting them.

- Disconnect the EtherNet/IP-DeviceNet Router from the power supply before starting wiring.
- Properly apply the specified voltage to the EtherNet/IP-DeviceNet Router inputs. Applying an inappropriate DC voltage or any AC voltage may interfere with functionality, may reduce safety, or may cause the EtherNet/IP-DeviceNet Router to be damaged or burnt.
- Be sure to separate the communications cables and I/O cables from near high-voltage/high-current lines.
- Be cautious not to get your fingers caught when attaching connectors to the plugs on the EtherNet/IP-DeviceNet Router.
- Tighten the DeviceNet connector screws correctly (0.25 to 0.3 N·m).
- Incorrect wiring may lead to loss of safety functions. Wire conductors correctly and verify the operation of the EtherNet/IP-DeviceNet Router before using the system in which the EtherNet/IP-DeviceNet Router is incorporated.
- After wiring is completed, be sure to remove label for wire clipping prevention on the EtherNet/IP-DeviceNet Router to enable heat to escape or proper cooling.

■ Power Supply Selection

Use a DC power supply satisfying the following requirements.

- The secondary circuits of the DC power supply must be isolated from the primary circuit by double insulation or reinforced insulation.
- The DC power supply must satisfy the requirements for class 2 circuits or limited voltage/current circuits given in UL 508.
- The output hold time must be 20 ms or longer.

■ Periodic Inspections and Maintenance

- Disconnect the EtherNet/IP-DeviceNet Router from the power supply before replacing the EtherNet/IP-DeviceNet Router. Devices connected to the EtherNet/IP-DeviceNet Router may operate unexpectedly.
- Do not disassemble, repair, or modify the EtherNet/IP-DeviceNet Router. Doing so may lead to loss of safety functions.

■ Disposal

- Be cautious not to injure yourself when dismantling the EtherNet/IP-DeviceNet Router.

4 Regulations and Standards

The EtherNet/IP-DeviceNet Router has been certified as follows:

Certifying organization	Standards
UL	UL508, UL1604, CSA22.2 No142, CSA22.2 No213

SECTION 1

Overview

This section introduced the EtherNet/IP-DeviceNet Router and it's functionality.

1-1	EtherNet/IP-DeviceNet Router	2
1-1-1	Accessing All Devices on a Network from a Network Configurator	2
1-1-2	Monitoring DeviceNet or DeviceNet Safety Systems via Ethernet from Controllers Made by Other Manufacturers	3
1-2	Nomenclature	4

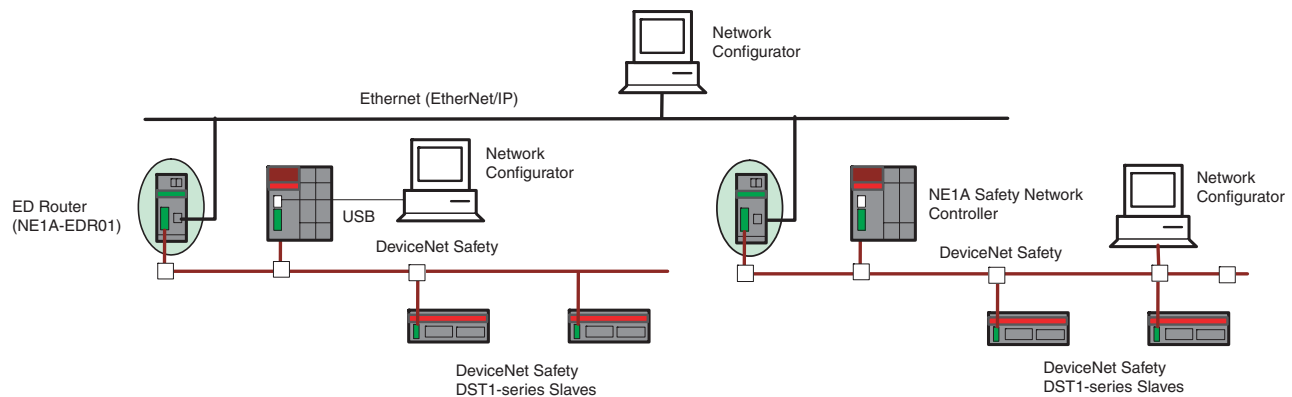
1-1 EtherNet/IP-DeviceNet Router

The NE1A-EDR01 EtherNet/IP-DeviceNet Router is an FA router with one Ethernet port and one DeviceNet port, and is used for routing messages between Ethernet and DeviceNet Networks. In this manual the NE1A-EDR01 EtherNet/IP-DeviceNet Router is called the “ED Router.”

1-1-1 Accessing All Devices on a Network from a Network Configurator

Using an ED Router makes it possible to set devices, such as NE1A-series Controllers and DST1-series Slaves, from a Network Configurator running on a PC connected to an Ethernet or EtherNet/IP Network.

In addition, when multiple DeviceNet or DeviceNet Safety Networks are configured for an Ethernet or EtherNet/IP connection using an ED Router, it is possible to set devices such as NE1A-series Controllers and DST1-series Slaves connected to another DeviceNet or DeviceNet Safety network from a Network Configurator running on a PC connected to a DeviceNet or NE1A-series USB port.

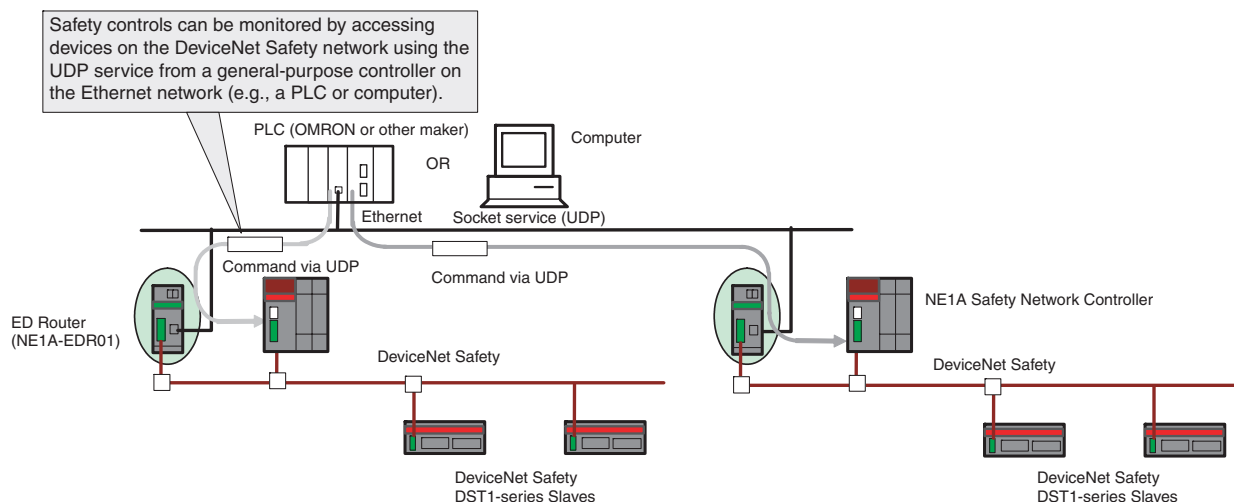


- Note**
- (1) To access other networks, use the NE1A-SCPU01-V1 (unit version 2.0 or later) or the NE1A-SCPU02 (unit version 2.0 or later) to connect the Network Configurator.
 - (2) To access other networks, use Network Configurator version 2.0□ or higher.

1-1-2 Monitoring DeviceNet or DeviceNet Safety Systems via Ethernet from Controllers Made by Other Manufacturers

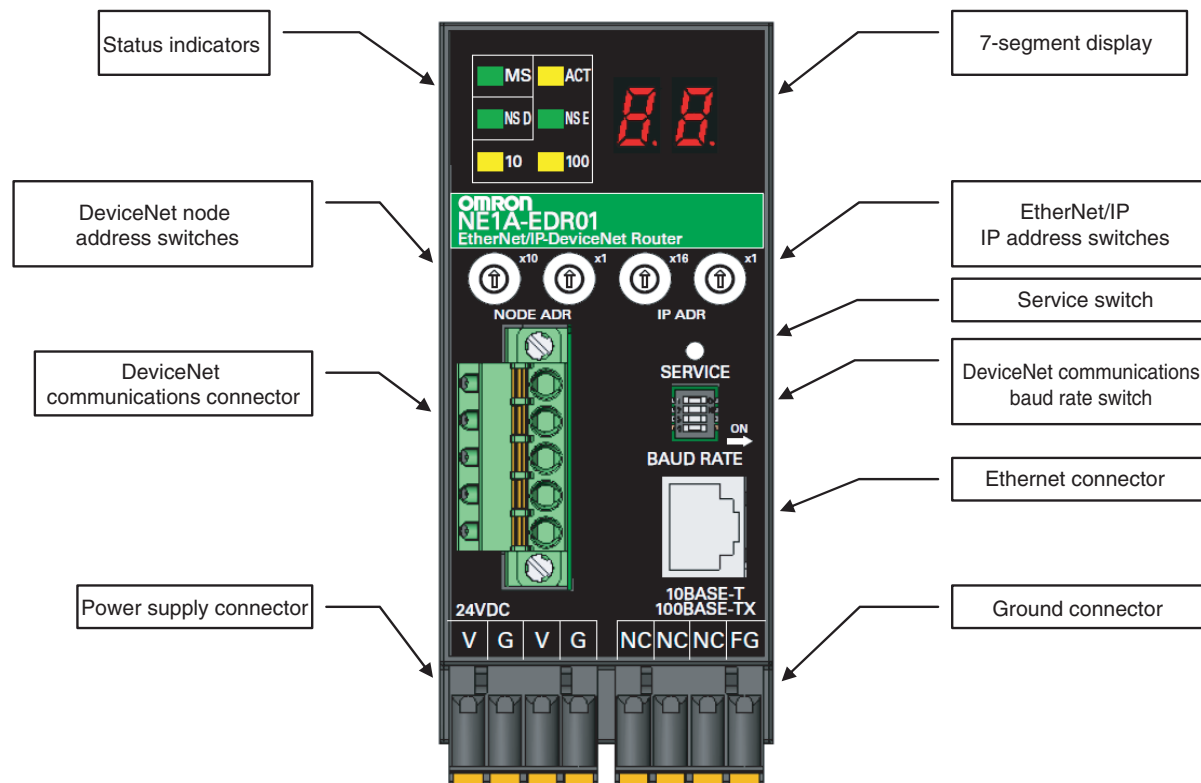
Devices on a DeviceNet or DeviceNet Safety network can be accessed from general-purpose controllers (e.g., PLCs or computers) in an Ethernet network using the UDP service.

This enables monitoring a DeviceNet or DeviceNet Safety control system via Ethernet from a machine controller or monitor computer that does not support a DeviceNet interface. This can be used to easily add a DeviceNet Safety control system to an existing system.



1-2 Nomenclature

The following illustration shows the part names of the ED Router.



SECTION 2

Installation and Network Connections

This section describes how to install and connect the networks.

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2-1 Installation

2-1-1 Requirements for Installation and Wiring

Take the following into account during installation to improve the reliability of the system and to fully utilize the system's capabilities.

Installation and Storage Environment

Do not use or store the ED Router in the following locations.

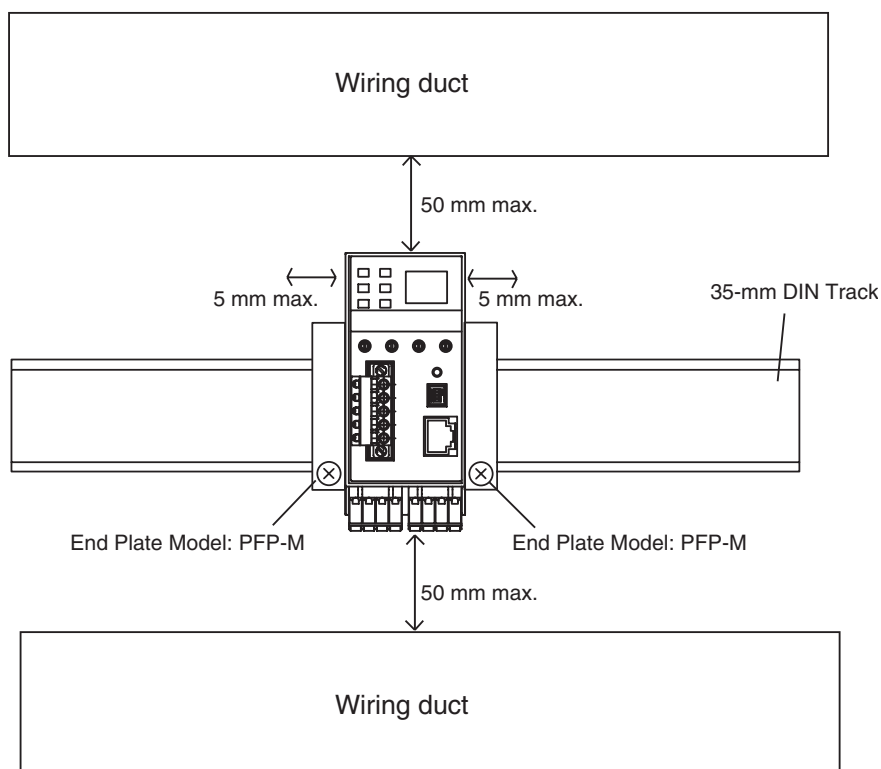
- Locations subject to direct sunlight
- Locations subject to temperatures or humidity outside the ranges specified in the specifications
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts
- Locations subject to water, oil, or chemicals
- Locations subject to shock or vibration

Take appropriate and sufficient measures when installing systems in the following locations. Inappropriate and insufficient measures may result in malfunction.

- Locations subject to static electricity or other forms of noise
- Locations subject to strong electromagnetic fields
- Locations subject to possible exposure to radioactivity
- Locations close to power supplies

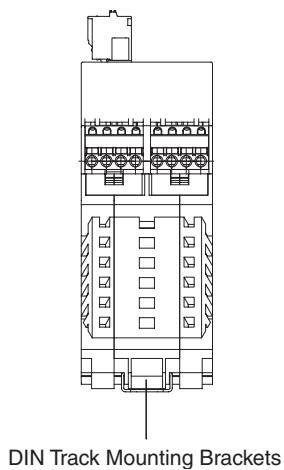
2-1-2 Mounting to the Control Panel

- Use the ED Router in an enclosure with IP54 degree of protection or higher according to IEC/EN 60529.
- Use DIN Track (TH35-7.5/TH35-15 according to IEC 60715) to mount the ED Router in the control panel. Mount the Router to the DIN Track using PFP-M End Plates (not included with the ED Router) to prevent it from falling off the DIN Track because of vibration.
- Provide sufficient space around the ED Router for ventilation and wiring, at least 5 mm at the sides and at least 50 mm at the top and bottom.
- The ED Router can be mounted in any direction.



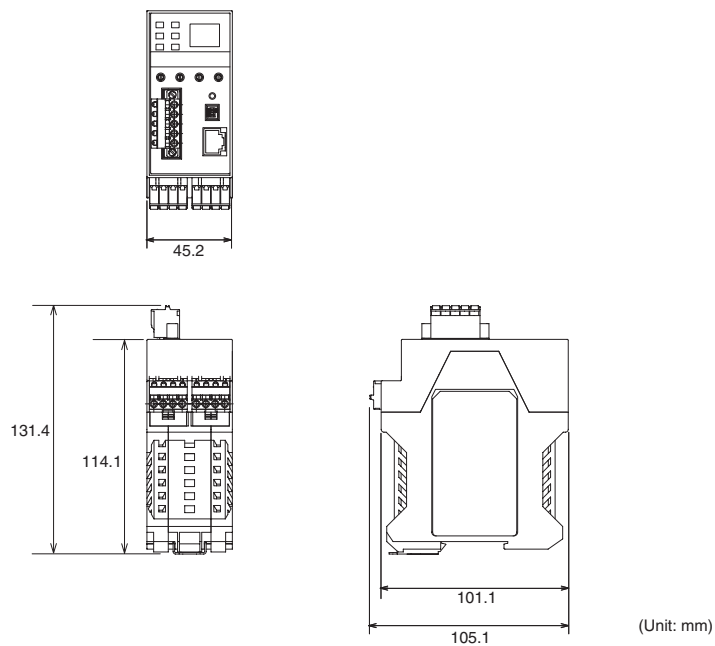
Note The ED Router can be mounted only to a DIN Track. Do not screw the Router to the control panel.

DIN Track Mounting Bracket Positions for the ED Router



2-1-3 ED Router Dimensions and Weight

Dimensions



Weight

Model	Weight
NE1A-EDR01	220 g max.

2-2 Wiring

2-2-1 General Instructions on Wiring

Precaution:

- To prevent wire clippings from getting into the ED Router, do not remove the label on the ED Router before wiring has been completed.
- After wiring has been completed, be sure to remove the label from the Controller to enable heat dissipation for proper cooling.
- Disconnect the ED Router from the power supply before starting any wiring operations. Devices connected to the ED Router may operate unexpectedly if wiring is performed with the power supply connected.
- Be careful not to get your fingers caught when attaching connectors.
- Faulty wiring can result in a loss of safety functions. Be sure to perform the wiring correctly, and check it before operation.

2-2-2 Wiring the Power Supply

Wire Sizes

Use the following wires.

Solid wire	0.2 to 2.5 mm ² (AWG 24 to AWG 12)
Stranded (flexible) wire	0.34 to 1.5 mm ² (AWG 22 to AWG 16) Stranded wires should be prepared by attaching ferrules with plastic insulation collars (DIN 46228-4 standard compatible) before connecting them.

Recommended Materials and Tools

Insulated Pin Terminals

Use a pin terminal with an insulated cover compliant with the DIN 46228-4 standard. Pin terminals similar in appearance but not compliant with the standard may not match the terminal block on the ED Router Controller. (The wiring dimensions are rough standards. Confirm the dimensions beforehand.) Use wires of the same diameter if two-wire pin terminals are used.

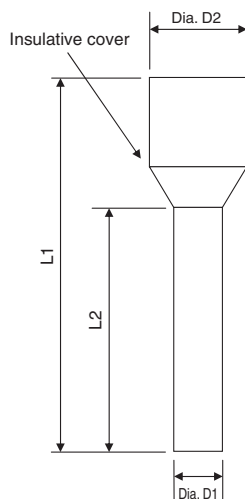
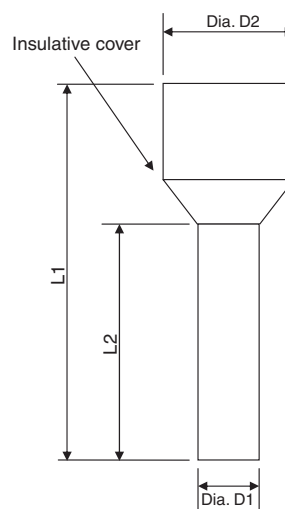
Note

- (1) When wiring with pin terminals, be sure to insert pin terminals all the way into the terminal block.
- (2) When using two-wire pin terminals, use wires of the same diameter.
- (3) When using two-wire pin terminals, insert the pin terminal so that metal portion of the pin terminal is inserted straight into the terminal block, i.e., so that the long sides of the insulating cover are vertical.

Reference Specifications (Product Specifications for Phoenix Contact)

Model of pin terminal		Wire dimensions		Pin terminal specifications					Dimensions
		Cross-sectional area of conductor (mm ²)	AWG	Stripped length of insulation (mm)	Overall length L1 (mm)	Length of metal part L2 (mm)	Inner diameter of conductor D1 (mm)	Inner diameter of insulative cover D2 (mm)	
One-wire pin terminals	AI 0,34-8TQ	0.34	22	10	12.5	8	0.8	2.0	*1
	AI 0,5-10WH	0.5	20	10	16	10	1.1	2.5	
	AI 0,75-10GY	0.75	18	10	16	10	1.3	2.8	
	AI 1-10RD	1.0	18	10	16	10	1.5	3.0	
	AI 1,5-10BK	1.5	16	10	18	10	1.8	3.4	

Model of pin terminal		Wire dimensions		Pin terminal specifications					Dimensions
		Cross-sectional area of conductor (mm ²)	AWG	Stripped length of insulation (mm)	Overall length L1 (mm)	Length of metal part L2 (mm)	Inner diameter of conductor D1 (mm)	Inner diameter of insulative cover D2 (mm)	
Two-wire pin terminals	AI-TWIN 2 x 0,75-10GY	2 x 0.75	–	10	17	10	1.8	2.8/5.0	*2
	AI-TWIN 2 x 1-10RD	2 x 1	–	10	17	10	2.05	3.4/5.4	

1: One-wire Pin Terminal**2: Two-wire Pin Terminal**

Terminal Crimping Tool

Manufacturer	Model
Phoenix Contact	CRIMPFOX UD6

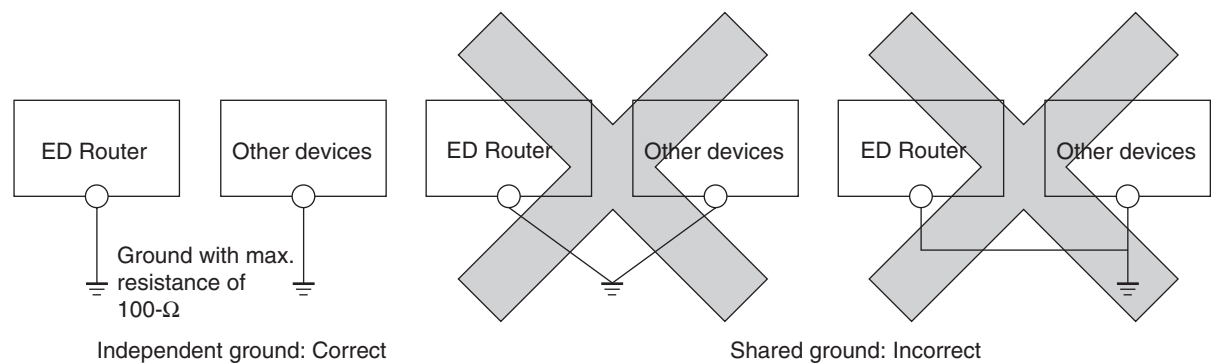
Power Supply Selection

Use a DC power supply satisfying the following requirements.

- The secondary circuits of the DC power supply must be isolated from the primary circuit by double insulation or reinforced insulation.
- The DC power supply must satisfy the requirements for class 2 circuits or limited voltage/current circuits defined in UL 508.
- The output hold time must be 20 ms or longer.

Ground Wiring

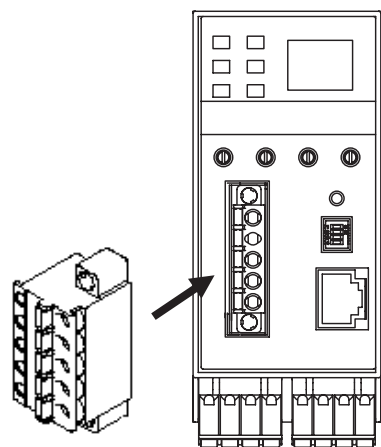
The ED Router has a functional ground terminal. To prevent electric shock or malfunctioning due to excessive noise, use an independent ground wire (2 mm min.) with a maximum ground resistance of 100 Ω. The length of the ground wire should be no more than 20 m. To avoid grounding problems, do not share the ground wiring with other devices or connect it to the building structure. To further reduce noise, connect a noise filter.



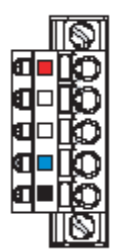
Note Ground correctly to avoid malfunctioning due to noise.

2-2-3 DeviceNet Wiring

Wiring Cables Wire the DeviceNet communications cable as shown in the following diagram.



Stickers are placed on the communication connectors based on the color of each communications wire. By matching the communications wire colors with the connector sticker colors, you can check to see if wires are in the correct locations. The colors of the wires are as follows:

	Color	Description
	Red	V+
	White	Signal (CAN H)
	-	Drain
	Blue	Signal (CAN L)
	Black	V-

IMPORTANT

- Turn OFF the power supply to the NE1A-series Controller, to all nodes on the network, and to communications lines before starting any wiring operations.
- Tighten the DeviceNet connector to the appropriate torque (0.25 to 0.3 N·m).
- Separate the DeviceNet communications cables from high-voltage/current lines.

Note Refer to the *DeviceNet Operation Manual* (W267) for further information on wiring.

2-2-4 Ethernet (EtherNet/IP) Network Installation

Basic Installation Precautions

- Take the greatest care when installing the Ethernet System, being sure to follow ISO 8802-3 specifications. You must obtain a copy of these specifications and be sure you understand them before attempting to install an Ethernet System.
- Unless you are already experienced in installing communications systems, we strongly recommend that you employ a professional to install your system.
- Do not install Ethernet equipment near sources of noise. If a noisy environment is unavoidable, take adequate measures against noise interference, such as installing network components in grounded metal cases or using optical cable in the system.

Recommended Network Devices

The following table shows the devices recommended for use with the ED Router.

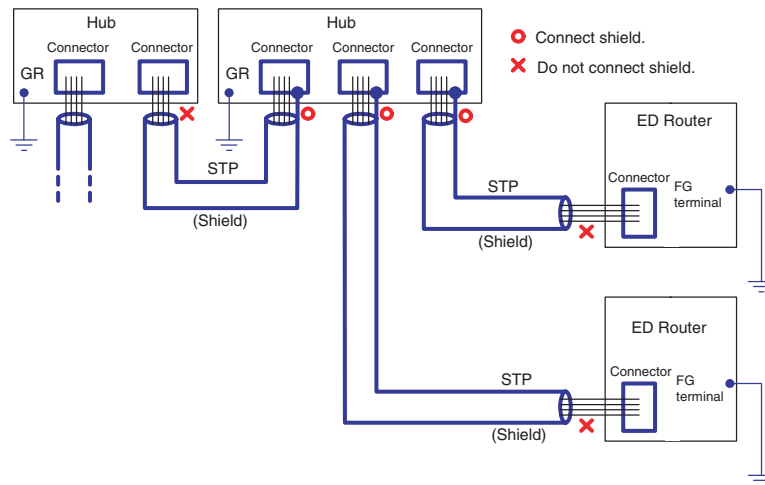
Part	Maker	Model number	Inquires
Switching Hub	Cisco Systems, Inc.	Consult the manufacturer.	Cisco Systems, Inc. Main Corporate HQ
	Contec USA, Inc.	Consult the manufacturer.	CONTEC USA Inc.
	Phoenix Contact	Consult the manufacturer.	Phoenix Contact USA Customer Service
Twisted-pair cable	100BASE-TX		
	Fujikura	F-LINK-E 0.5mm × 4P	Fujikura America, Inc.
	EtherNet/IP compliant cable		---
Connectors (Modular plug)	STP Plug		
	Panduit Corporation	MPS588	Panduit Corporation US Headquarters
Boots	Tsuko Company	MK boot (IV) LV	Tsuko Company Japan Headquarters

- Note**
- Ask the switching hub manufacturer for setting procedures for the switching hub.
 - Install the switching hub so that its environmental resistance capabilities are not exceeded.
Ask the switching hub manufacturer for information on the environmental resistance of the switch hub.

Precautions

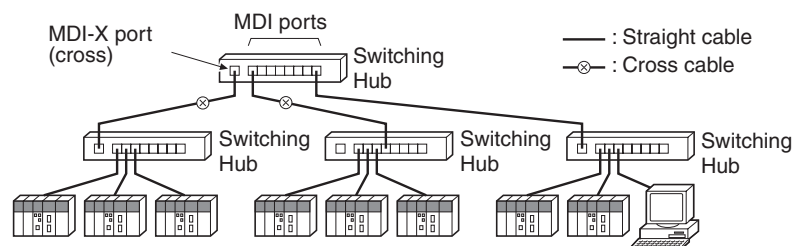
Precautions on Laying Twisted-pair Cable

- Noise resistance may be reduced by ground loops, which can occur due to improper shield connections and grounding. Ground the shield at one location, as shown in the following diagram.
- Do not connect the shield to the ED Router connector.
- If a cable connects two hubs, connect the shields at only one end.



- Press the cable connector in firmly until it locks into place at both the switching hub and the ED Router.
- Do not lay the twisted-pair cable together with high-voltage lines.
- Do not lay the twisted-pair cable near devices that generate noise.
- Do not lay the twisted-pair cable in locations subject to high temperatures or high humidity.
- Do not lay the twisted-pair cable in locations subject to excessive dirt and dust or to oil mist or other contaminants.
- Do not ground the switching hub in the same location as a drive-system component such as an inverter.
- Always use a dedicated power supply for the switching hub's power supply. Do not use the same power supply used for other equipment, such as an I/O power supply, motor power supply, or control power supply.
- Before installation, check the switching hub's environment-resistance specifications, and use a switching hub appropriate for the ambient conditions. Contact the switching hub manufacturer for details on switching hub's environment-resistance specifications.
- Connect two hubs to each other as follows: Connect an MDI port to an MDI-X port with a straight cable; connect two MDI ports with a cross cable; and connect two MDI-X ports with a cross cable.

Note It is very difficult to distinguish cross cables and straight cables by appearance. Incorrect cables will cause communications to fail. We recommend using cascade connections with straight cables whenever possible.



- Some switching hubs can automatically distinguish between MDI and MDI-X. When this kind of switching hub is being used, straight cable can be used between switching hubs.

Switching Hub Installation Environment Precautions

Switching Hub Connection Methods

Note Adjust the ED Router link settings to match the communications settings of the connected switching hub. If the settings do not match, the link will become unstable and prevent normal communications. The following table shows the allowed settings for each switching hub communications mode.

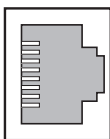
ED Router Switching hub setting		Auto-negotiation	10 Mbps (fixed)		100 Mbps (fixed)	
			Full duplex	Half duplex	Full duplex	Half duplex
Auto-negotiation		Best	---	OK	---	OK
10 Mbps (fixed)	Full duplex	---	OK	---	---	---
	Half duplex	OK	---	OK	---	---
100 Mbps (fixed)	Full duplex	---	---	---	Best	---
	Half duplex	OK	---	---	---	OK

Best = Recommended; OK = Allowed; --- = Not allowed.

Ethernet Connectors

The following standards and specifications apply to the connectors for the Ethernet twisted-pair cable.

- Electrical specifications: Conforming to IEEE802.3 standards.
- Connector structure: RJ45 8-pin Modular Connector (conforming to ISO 8877)



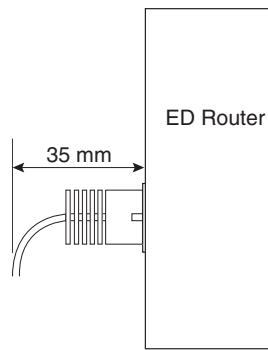
Connector pin	Signal name	Abbr.	Signal direction
1	Transmission data +	TD+	Output
2	Transmission data –	TD–	Output
3	Reception data +	RD+	Input
4	Not used.	---	---
5	Not used.	---	---
6	Reception data –	RD–	Input
7	Not used.	---	---
8	Not used.	---	---
Hood	Frame ground	FG	---

Note The ED Router Ethernet port has auto MDI/MDI-X functionality, so either a straight or cross cable can be used.

Connecting the Cable

Caution Turn OFF the ED Router power supply before connecting or disconnecting twisted-pair cable.

Caution Allow enough space for the bending radius of the twisted-pair cable as shown in below.



- 1,2,3...**
1. Lay the twisted-pair cable.
 2. Connect the cable to the switching hub. Be sure to press in the cable until it locks into place. This procedure should only be performed by qualified personnel.
 3. Connect the twisted-pair cable to the connector on the ED Router. Be sure to press the connectors (both the switching hub side and Ethernet side) until they lock into place.

2-3 Connecting to DeviceNet

2-3-1 Setting the DeviceNet Node Address

Set the DeviceNet node address using the rotary switches (NODE ADR) on the front of the ED Router.



Method	Two-digit decimal number
Range	0 to 63

Note The node address is set to 63 at the factory.

Any node address in the setting range can be used as long as the same address is not used by another node. If a value between 64 and 99 is set on the rotary switches, the node address can be set using a software setting on the Network Configurator.

IMPORTANT

- Turn OFF the power to the ED Router before setting the rotary switches.
- Do not change the rotary switches while the power is ON.
- A node address duplication error will occur if the same address is set for more than one node. Communications will not start if this error occurs.

Note

- Use a small flat-blade screwdriver to set the rotary switches, being careful not to scratch them.
- Refer to *2-3-3 DeviceNet Node Address and Baud Rate Software Settings* for software setting procedures.

2-3-2 Setting the DeviceNet Baud Rate

The DeviceNet baud rate is set using the DIP switch on the front of the ED Router. The baud rate settings are shown in the following table:



Pin				Baud rate
1	2	3	4	
OFF	OFF	OFF	OFF	125 kbit/s
ON	OFF	OFF	OFF	250 kbit/s
OFF	ON	OFF	OFF	500 kbit/s
ON	ON	OFF	OFF	Software setting
ON or OFF	ON or OFF	ON	OFF	
ON or OFF	ON or OFF	ON or OFF	ON	Automatic baud rate detection

Note The baud rate is set to 125 kbit/s at the factory.

Note Refer to *2-3-3 DeviceNet Node Address and Baud Rate Software Settings* for software setting procedures.

2-3-3 DeviceNet Node Address and Baud Rate Software Settings

Use the following procedure to set the ED Router DeviceNet node address and baud rate from the Network Configurator.

- 1,2,3...
1. Select **Programs - OMRON Network Configurator for DeviceNet Safety - Network Configurator** from the Start Menu. The Network Configurator will be started.
 2. Connect the Network Configurator online. (First set the interface with **Option - Select Interface**, and then select **Network - Connect**.)
 3. Select DeviceNet in the Network Configuration Window. (For example, click the **DeviceNet_1** Tab.)
 4. Select **Tool - Node Address/Baud Rate Setting**.
The following dialog box will be displayed.

The screenshot shows a Windows-style dialog box titled "Setup Node Address/Baud rate". It contains three main sections. The first section, "Target Node Address", has a numeric spinner box set to "0" and the text "Setup Range 0 - 63". The second section, "Change Node Address", has a "New Node Address" spinner box set to "0", "Setup Range 0 - 63", and a "Change" button. The third section, "Change Baud rate", has "Current Setup : ---", a "New Setup" dropdown menu set to "125K Bit/s", and a "Change" button. A "Close" button is located at the bottom right of the dialog.

5. Specify the present node address of the target ED Router in the *Target Node Address* Field.
6. To change the node address, specify a new node address in the *New Node Address* Field and click the **Change** Button.
The node address of the ED Router will be changed.
7. To change the baud rate, select the rate in the *New Baud Rate* Field and click the **Change** Button.
The baud rate of the ED Router will be changed.

2-4 Connecting to Ethernet (EtherNet/IP)

2-4-1 Setting the IP Address

This section describes methods for setting the IP address for the ED Router.

Method 1: The default IP address is 192.168.250.*IP_address_switch_set value*.

The IP address is set with the rotary switches on the front of the ED Router (IP ADR).

→ This method can be used to make a temporary or preliminary connection to the Ethernet.

In this case, leave the TCP/IP Configuration setting at its default value.

Method 2: Setting the TCP/IP Configuration from the Network Configurator:

→ To set a particular local IP address, use the Network Configurator.

The methods for setting the ED Router IP address are described below.

Method 1: Using the Default IP Address (192.168.250.*IP_address_switch_set value*)

The default IP address for the ED Router is 192.168.250.*IP_address_switch_set value*. The IP address switch is used to set the IP address host ID.

*IP address = 192.168.250.*IP_address_switch_set value**

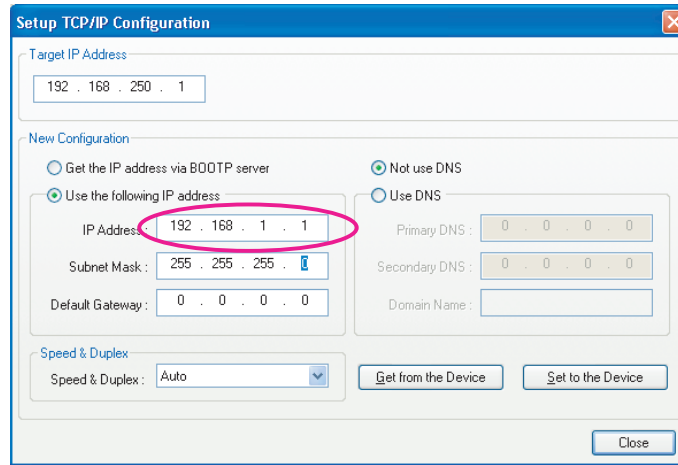
The host IC can be changed with the IP address switch. If 00 or FF is set, 01 will be used as the host ID.

The TCP/IP settings will be in the following default settings.

Setting	Operating status
IP address	192.168.250. <i>IP_address_switch_set value</i>
Subnet mask	255.255.255.0 (class C mask)
Default gateway	None (IP routing disabled)
Preferred DNS server	None
Alternate DNS server	None
Host name	None
Domain name	None
Baud rate	Auto-detect

Method 2: Setting the TCP/IP Configuration from the Network Configurator

With this method, set the TCP/IP configuration, including the IP address, from the Network Configurator.



2-4-2 TCP/IP Configuration

This section describes the TCP/IP-related settings, such as the ED Router local IP address and subnet mask. Use the Network Configurator to make these settings. The settings are stored in the ED Router non-volatile memory.

- Note**
- (1) With the default settings, the IP address will be 192.168.250.1 if 00 or FF is set.
 - (2) If the IP address switch is set to a value other than 00 or FF, the switch setting will be used for the rightmost bit of the IP address. To use the value set from the Network Configurator, set the IP address switch to 00 or FF.
 - (3) To use the BOOTP server, set the IP address switch to 00 or FF.

Making TCP/IP Settings with the Network Configurator

- 1,2,3...
1. Select **Programs - OMRON Network Configurator for DeviceNet Safety - Network Configurator** from the Start Menu. The Network Configurator will be started.
 2. Connect the Network Configurator online. (First set the interface with **Option - Select Interface**, and then select **Network - Connect**.)
 3. Select EtherNet/IP in the Network Configuration Window. (For example, click the **EtherNet/IP** Tab.)
 4. Select **Tools - Setup TCP/IP Configuration**. The Setup TCP/IP Configuration Dialog Box will be displayed. The settings are all at their default values.

Setup TCP/IP Configuration

Target IP Address

New Configuration

☐ Get the IP address via BOOTP server
 ☒ Not use DNS

☒ Use the following IP address
 ☐ Use DNS

IP Address : 0 . 0 . 0 . 0
 Subnet Mask : 0 . 0 . 0 . 0
 Default Gateway : 0 . 0 . 0 . 0

Primary DNS : 0 . 0 . 0 . 0
 Secondary DNS : 0 . 0 . 0 . 0
 Domain Name :

Speed & Duplex

Speed & Duplex : Auto

Get from the Device Set to the Device

Close

5. For the *Target IP Address*, specify the present IP address of the ED Router for which the IP address is to be set.
6. To change the IP address, select *Use the following IP address* and then set the new IP address.

Setup TCP/IP Configuration

Target IP Address

192 . 168 . 250 . 1

New Configuration

☐ Get the IP address via BOOTP server
 ☒ Not use DNS

☒ Use the following IP address
 ☐ Use DNS

IP Address : 10 . 2 . 1 . 100
 Subnet Mask : 255 . 255 . 255 . 0
 Default Gateway : 10 . 2 . 1 . 1

Primary DNS : 0 . 0 . 0 . 0
 Secondary DNS : 0 . 0 . 0 . 0
 Domain Name :

Speed & Duplex

Speed & Duplex : Auto

Get from the Device Set to the Device

Close

7. Click the **Set to the Device** Button.
The ED Router will restart automatically.
8. Check the 7-segment display on the ED Router.
If the 7-segment display is tested again after it goes OFF, and finally displays the DeviceNet node address, it indicates that the ED Router has recognized the new TCP/IP Configuration settings.

Note

- (1) The ED Router will restart automatically when the TCP/IP Configuration's IP address parameters are downloaded to the ED Router from the Network Configurator. The ED Router must restart to enable the parameter settings. Download the TCP/IP Configuration's IP address parameters only after verifying that restarting the Unit will not cause any problems in the system.
- (2) The IP address can be checked on the 7-segment display by pressing the ED Router service switch for 1 s or longer and then releasing it.
- (3) With an ED Router parameter setting, the value normally displayed on the 7-segment display can be changed to the rightmost byte of the IP address.

TCP/IP Setting Details

The ED Router TCP/IP Configuration settings include the following settings.

- IP address
- Subnet mask
- Default gateway
- Preferred DNS server
- Alternate DNS server
- Domain name
- Link setting

IP Address

Sets the ED Router local IP address.

Set the local IP address in this TCP/IP Configuration when not using the default IP address (default IP address = 192.168.250.IP_address_switch_set_value).

Subnet Mask

For the subnet mask, all bits corresponding to the bits in the IP address used as either the net number or the subnet number are set to 1, and the bits corresponding to the host number are set to 0.

If no subnet mask is set, or if an illegal value is set, the following values will be used depending on the IP address class.

Class	Subnet mask
Class A	255.0.0.0
Class B	255.255.0.0
Class C	255.255.255.0

With the default setting (0.0.0.0), a subnet mask corresponding to the IP address class is used.

Default Gateway

Sets the default gateway's IP address.

This setting is not required when the default gateway is not being used.

Preferred DNS Server and Alternate DNS Server

When accessing another node from the ED Router using the host name, the DNS server searches for the other node's IP address from the other node's host name to the DNS server. These settings register the IP addresses of the preferred and alternate DNS servers that will perform the search. At this time, the NEIA Series and the ED Router are not equipped with any functions that require a DNS server, so these settings are not used. Even if the settings are made, however, they will not cause faulty operation.

Domain Name

Sets the domain name of the domain to which the ED Router belongs.

The ED Router does not use a domain name in actual communications.

Link Setting

Sets the communications baud rate.

Setting	Meaning
Auto (default)	The baud rate with the switching hub is detected automatically. If possible, the Unit operates in 100BASE-T (full duplex).
10 Mbps, Half Duplex	Operates in 10BASE-T, half duplex.
10 Mbps, Full Duplex	Operates in 10BASE-T, full duplex.
100 Mbps, Half Duplex	Operates in 100BASE-TX, half duplex.
100 Mbps, Full Duplex	Operates in 100BASE-TX, full duplex.

Note Adjust the ED Router link settings to match the communications settings of the connected switching hub. If the settings do not match, the link will become unstable and prevent normal communications. The following table shows the allowed settings for each switching hub communications mode.

ED Router Switching hub setting		Auto- negotiation	10 Mbps (fixed)		100 Mbps (fixed)	
			Full duplex	Half duplex	Full duplex	Half duplex
Auto-negotiation		OK	---	OK	---	OK
10 Mbps (fixed)	Full duplex	---	OK	---	---	---
	Half duplex	OK	---	OK	---	---
100 Mbps (fixed)	Full duplex	---	---	---	OK	---
	Half duplex	OK	---	---	---	OK

OK = Allowed; --- = Not allowed.

2-5 ED Router Settings

2-5-1 Setting the UDP Port Address and the Address Displayed at the ED Router

Use the Network Configurator to set the address displayed on the ED Router 7-segment display and to set the UDP port address.

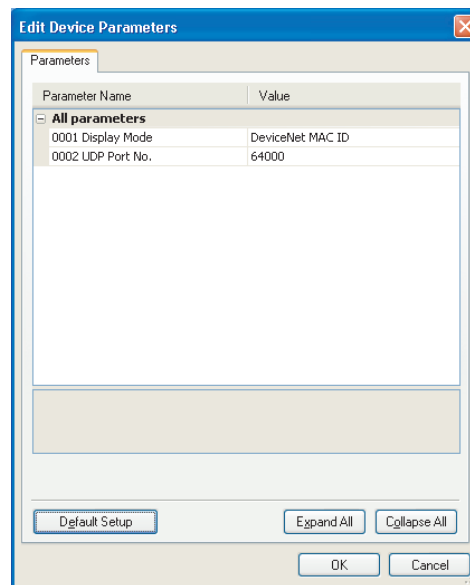
■ Setting the Address Displayed at the ED Router

Select either the EtherNet/IP IP address or the DeviceNet node address as the address to be displayed on the ED Router 7-segment display when the status is normal.

■ Setting the UDP Port Address

Select a number from 1,024 to 65,535 for the UDP port to be used for device access by UDP.

- 1,2,3...
1. Select **Programs - OMRON Network Configurator for DeviceNet Safety - Network Configurator** from the Start Menu. The Network Configurator will be started.
 2. Connect the Network Configurator online. (First set the interface with **Option - Select Interface**, and then select **Network - Connect**.)
 3. In the Network Configuration Window, double-click the ED Router that is to be set. The following dialog box will be displayed.



4. Set the address to be displayed at the ED Router, or set the UDP port address.
 - To set the address to be displayed at the ED Router, click *0001 Display Mode* and select *Low byte of Ethernet IP address (EtherNet/IP IP address)* or *DeviceNet MAC ID (DeviceNet node address)*.
 - To set the UDP port address, click *0002 UDP Port No.* and input a number from 1,024 to 65,535.
5. After making the setting, click the **OK** Button.
6. In the Network Configuration Window, select the ED Router. Right-click and select **Parameter - Download**. After the parameters have been downloaded, the ED Router will be automatically reset and it will then operate using the new parameters.

SECTION 3

Status Indicators and Troubleshooting

This section describes how to interpret the status indicators and how to troubleshoot problems that may occur with the ED Router.

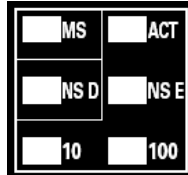
3-1	Status Indicators	26
3-1-1	Overview	26
3-1-2	Seven-segment Display	27
3-2	Troubleshooting	29
3-2-1	ED Router Errors and Error Processing	29
3-3	Error History	32
3-3-1	Error History Table	32
3-3-2	Error History Code List	34

3-1 Status Indicators

This section describes the ED Router status indicators (LEDs).

3-1-1 Overview

ED Router and network status are displayed on the following status indicators.



- MS (Module Status): Displays the status of the ED Router.
- NS E (Network Status, EtherNet/IP): Displays the status of the EtherNet/IP network.
- NS D (Network Status, DeviceNet): Displays the status of the DeviceNet network.
- 10: Lit when Ethernet is connected by 10Base-T.
- 100: Lit when Ethernet is connected by 100Base-T.
- ACT: Lit when Ethernet communications are detected.

The following table describes the MS, NS E, and NS D indicators in detail.

Indicator name	Color	Status	Meaning
MS (module status)	Green		Operation status
	Red		Fatal error (Critical fault) An ED Router failure has occurred, and recovery is not possible. ED Router operation stops and the NS E and NS D indicators turn OFF. • ED Router failure.
			Fatal error (Abort) One of the following recoverable errors has occurred. Message communications routing is enabled. • Switch changed during operation (failure, unintended operation, etc.) • Setting error due to power interruption while making settings
			Power is not being supplied.
NS E, NS D (Network Status)	Green		While online, at least one CIP connection is established.
			While online, not even one CIP connection is established.
	Red		Communications are not possible. A non-recoverable communications error was detected in the network. • DeviceNet bus OFF error • DeviceNet node address duplication error • EtherNet/IP IP address duplication error
			A recoverable communications error was detected in the network. • DeviceNet network power supply error • DeviceNet communications timeout error • BOOTP server connection error • DeviceNet node address switch setting changed after startup. • EtherNet/IP IP address switch setting changed after startup. • DeviceNet node baud rate switch setting changed after startup.
	-		Not connected online.

: ON : Flashing : OFF

3-1-2 Seven-segment Display

This section describes the meanings of the 7-segment display.



Normal Status

When no error has occurred and communications are enabled, the ED Router DeviceNet node address is displayed as the initial status on the 7-segment display.

- Display Example: When the Node Address Is 01

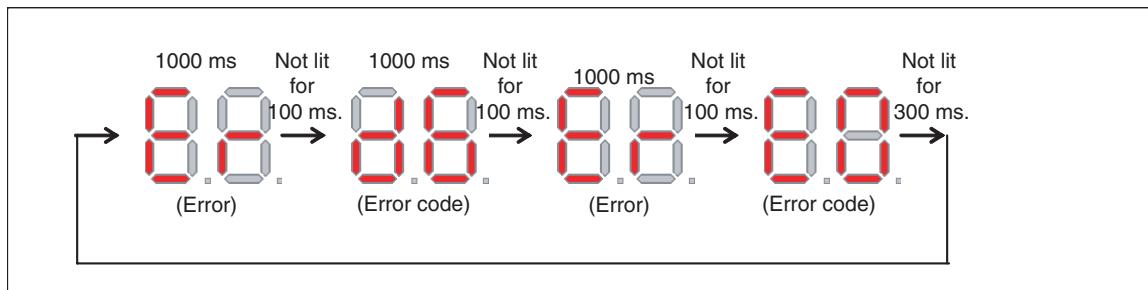


The rightmost byte of the EtherNet/IP IP address can be displayed by a setting from the Network Configurator.

Error Status

When an error occurs, the error code is displayed following *Er*. If multiple errors occur, the error codes are displayed in order.

- Display Example: When the Error Codes Are d6 and E0



Displaying the EtherNet/IP IP Address and the DeviceNet Node Address

The EtherNet/IP IP address and the DeviceNet node address can be displayed on the 7-segment display by pressing the service switch for 1 s or longer before releasing it.



- Display Example: EtherNet/IP IP Address



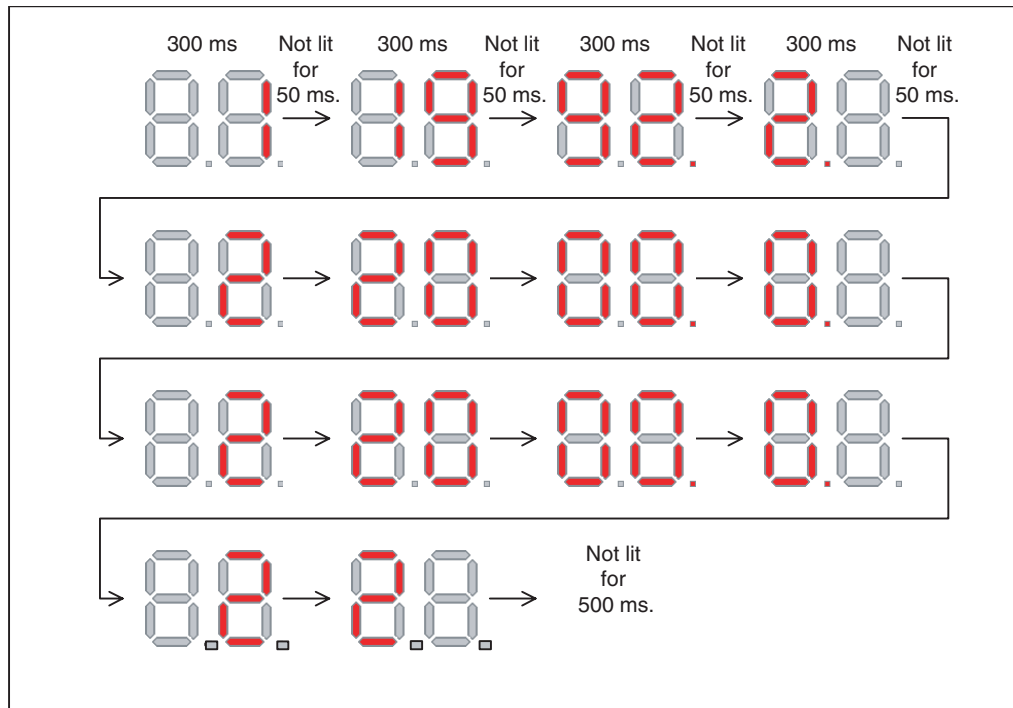
- Display Example: EtherNet/IP IP Address when BOOTP Is Set



- Display Example: DeviceNet Node Address



- Display Example: When IP Address is 192.200.200.2
The IP address moves across the display from right to left.



Note Errors are indicated by combining the MS indicator, NS indicator, and the 7-segment display. For further details on specific meanings, refer to *3-2 Troubleshooting*.

3-2 Troubleshooting

3-2-1 ED Router Errors and Error Processing

Indicators/Display				Error	Cause	ED Router operation	Error code (hex)	Countermeasures
MS	NS D	NS E	7-segment					
Hardware-related Errors								
Lit red	Not lit	Not lit	Not lit or H3	System error	ED Router failure	Operation stops.	None or 0601	Replace the ED Router if the problem recurs after restarting.
Flashing red	---	---	E9	Memory access error	An error occurred in involatile memory in the Unit.	Operation stops.	0602	
Flashing red	---	Not lit	F4	Ethernet communications controller error	An Ethernet communications controller error occurred.	Ethernet communications stop.	020F	
Communications-related Error								
---	---	---	---	Illegal message discarded.	The message was discarded due to illegal packet communications.	Operation stops.	0118	Check the system communications status.
Ethernet Communications-related Errors								
---	---	---	E1	Link OFF error	No link was detected between switching hubs.	Operation continues after error recovery.	03D3	Check the Ethernet cable, hub, etc.
---	---	Not lit	E3	Server connection error	An error occurred between the ED Router and the BOOTP server. • There is no response from the BOOTP server. • The IP address received from the BOOTP server is illegal.	Ethernet communications stop until a legal IP address can be received.	03C4	Check the BOOTP server.
---	---	Lit red	F0	IP address duplication error	The ED Router IP address is the same as the IP address set for another device.	Ethernet communications stop.	0211	Check the IP address settings and the network connections.

Indicators/Display				Error	Cause	ED Router operation	Error code (hex)	Countermeasures
MS	NS D	NS E	7-seg-ment					
DeviceNet Communications-related Errors								
---	Lit red	---	F0	Node address duplication error	The ED Router DeviceNet node address is the same as the node address set for another device.	DeviceNet operation stops.	0211	Check the node addresses and the network connections for all devices on the DeviceNet network.
---	Lit red	---	F1	Bus OFF error	A DeviceNet bus OFF error was detected.	DeviceNet communications stop.	0340	Check the DeviceNet network for short-circuiting and check the baud rate.
---	Not lit	---	E0	DeviceNet network power supply error	The DeviceNet network power supply is OFF.	DeviceNet communications stop until the network power supply is restored.	0341	Check the DeviceNet network power supply and the communications cable connections.
---	Flashing red	---	E2	DeviceNet communications timeout error	Data could not be sent in DeviceNet for 1 s or longer.	DeviceNet communications stop until normal communications are restored.	0342	Check the following items: • Is the baud rate the same for each node? • Are the cable lengths (main and branch lines) correct? • Are any cables disconnected or loose? • Is terminating resistance connected at both ends of the main line?
Settings-related Error								
Flashing red	---	---	F2	Ethernet basic setting error	An error occurred in the data set for the TCP/IP Configuration.	Operation continues, using the default values for the TCP/IP Configuration.	03D0	Check the Ethernet settings.
Flashing red	Flashing red	---	C8	DeviceNet node address setting changed during operation	The node address switch setting was changed during operation.	Operation continues, using the value from before the change.	0214	Check the node address switch setting. If the error persists after the correct setting has been made, replace the ED Router.
Flashing red	---	Flashing red	C8	IP address setting changed during operation	The IP address switch setting was changed during operation.	Operation continues, using the value from before the change.	0214	Check the IP address switch setting. If the error persists after the correct setting has been made, replace the ED Router.
Flashing red	Flashing red	---	C8	Baud rate setting changed during operation	The baud rate switch setting was changed during operation.	Operation continues, using the value from before the change.	0214	Check the baud rate switch setting. If the error persists after the correct setting has been made, replace the ED Router.

Indicators/Display				Error	Cause	ED Router operation	Error code (hex)	Countermeasures
MS	NS D	NS E	7-segment					
Flashing red	---	Flashing red	F3	Invalid IP address setting	The IP address is set to be received from the BOOTP server, but the IP address switch is set for a value other than 00 or FF.	Operation continues, using the value set by the IP address switch.	0214	Check the IP address switch setting and the configuration, and make the settings again.
Flashing red	---	---	E8	Device parameter error	An error occurred in the parameters downloaded from the Network Configurator.	Operation continues, using the default setting.	021A	Make the settings again from the Network Configurator. If the error persists after the correct settings have been made, replace the ED Router.

3-3 Error History

The error history records errors that the ED Router detects, along with the total operating time of the ED Router. The results recorded in the error history can then be read or cleared from the Network Configurator.

Depending on the contents of the error history, some parts are cleared and some are not cleared when the CPU Unit power is turned OFF or reset.

3-3-1 Error History Table

Error History Table

When an error is detected in the ED Router, the error is recorded in the error history table in the RAM of the ED Router. The error history contains one record per error and can hold up to 64 records. If the error history table already contains 64 records, the oldest record is deleted and the new error data is stored.

The following information is stored in the error history table:

- Time that error occurred (total ED Router operating time)
- Error information
- Detailed information

Error History Saving Area

The description of an error is recorded in the error history in the RAM of the ED Router, and if the error is critical, it is also saved in the nonvolatile memory. The error history recorded in nonvolatile memory is retained even when the power supply of the ED Router is not supplied or restarted. The error history in the nonvolatile memory is copied to the RAM at the start of the ED Router power cycle.

The error history in RAM is read when reading the error history from the Network Configurator. When clearing the error history, however, the error history in both the RAM and nonvolatile memory are cleared.

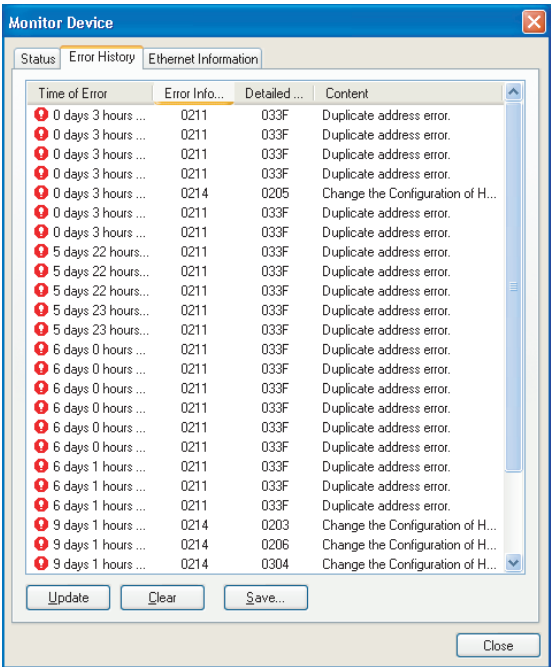
Reading and Clearing the Error History Table

The error history can be displayed in realtime using the Error History Display function of the Network Configurator. (Select the device, and then select **Device - Monitor**.) The error history data can also be saved on the computer.

Note

The total operating time of the ED Router is recorded as the accumulated time in 6-minute increments while the power supply for the internal circuit is ON.

When the error history is read using the Network Configurator, the time at which the error occurred (the ED Router total operating time), error information, detailed error information, and the contents of the error are displayed as shown in the following illustration.



3-3-2 Error History Code List

Error code (hex)	Error	Detailed information		Non-volatile memory
		1st byte	2nd byte	
0118	Illegal message discarded	FF hex	FF hex	Not stored
020F	Ethernet communications controller error	00 hex	01 hex	Stored
0211	Ethernet IP address duplication error	Port No. (Ethernet: 02 hex)	Rightmost 8 bits of IP address (hex)	Stored
0211	DeviceNet node address duplication error	Port No. (DeviceNet: 03 hex)	Node address (hex)	Stored
0214	DeviceNet node address setting changed during operation	Port No. (DeviceNet: 03 hex)	Node address (hex) detected as changed	Stored
0214	IP address setting changed during operation	Port No. (Ethernet: 03 hex)	Rightmost 8 bits of IP address (hex) detected as changed	Stored
0214	Baud rate setting changed during operation	00 hex	Value (hex) detected as changed	Stored
0214	Invalid IP address setting	FF hex	FF hex	Stored
021A	Device parameter error	00 hex	OE hex: Unit name	Stored
0340	Bus OFF error	00 hex	00 hex	Not stored
0341	DeviceNet network power supply error	00 hex	00 hex	Not stored
0342	DeviceNet communications timeout error	00 hex	00 hex	Not stored
03C4	Server connection error	04 hex: BOOTP	01 hex: Specified host does not exist. 02 hex: No such service at specified host. 03 hex: Timeout 06 hex: Host name resolution error 07 hex: Transmission error 08 hex: Reception error 09 hex: Other error 0A hex: Obtaining IP address error	Not stored
03D0	Ethernet basic setting error	01 hex: Ethernet setting error 02 hex: TCP/IP basic setting error	01 hex: CRC error 11 hex: Invalid IP address 12 hex: Invalid subnet mask 13 hex: Invalid default gateway address 14 hex: Invalid primary name server 15 hex: Invalid secondary name server 16 hex: Invalid domain name 17 hex: Invalid host name	Stored
03D3	Link OFF error	00 hex	00 hex	Not stored

Error code (hex)	Error	Detailed information		Non-volatile memory
		1st byte	2nd byte	
0601	System error	Undetermined	Undetermined	Stored
0602	Memory access error	01 hex: Read error 02 hex: Write error	06 hex: Error history 07: Protocol data 09 hex: Identity data 0E hex: Unit name 0F hex: Ethernet basic setting 11 hex: Node address	Stored (See note.)

Note If an error occurs in the error log area (non-volatile memory), the record will not be stored in non-volatile memory.

SECTION 4

Accessing Devices by UDP

This section describes how to access network devices using UDP.

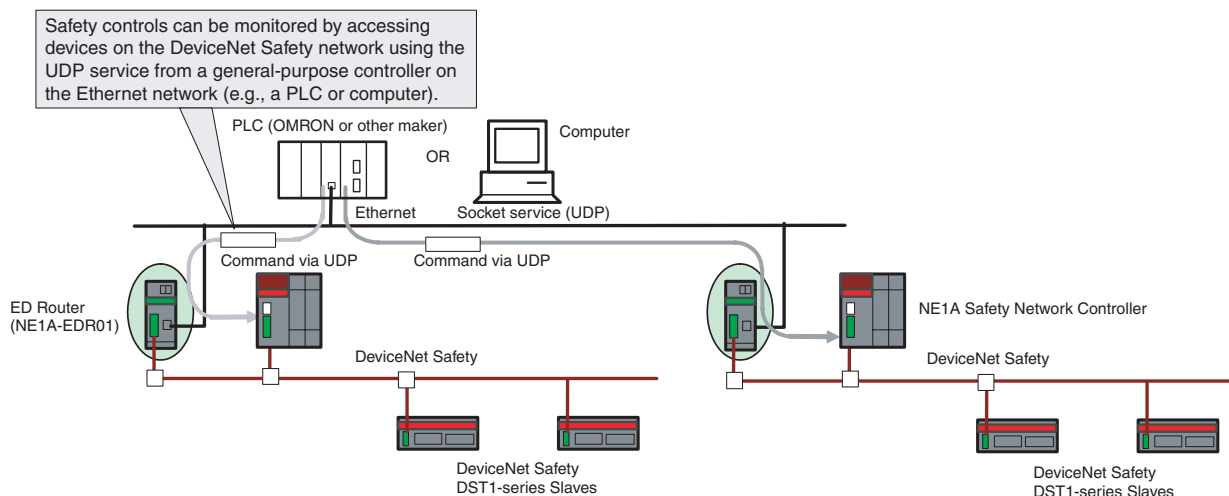
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4-1 Overview

4-1-1 Accessing Devices by UDP/IP

Devices on a DeviceNet or DeviceNet Safety network can be accessed from general-purpose controllers (e.g., PLCs or computers) in an Ethernet network using UDP/IP frame message communications via an ED Router.

This enables monitoring a DeviceNet or DeviceNet Safety control system via Ethernet from a machine controller or monitor computer that does not support a DeviceNet interface. This can be used to easily add a DeviceNet Safety control system to an existing system.



4-2 Formats

4-2-1 Command Format

This section describes the format for UDP/IP messages (i.e., commands) sent from a device on an Ethernet network. The LSB is placed in the rightmost address for each parameter.

When this command is sent from a device on the Ethernet network to the ED Router, an Explicit Message is sent to the destination node on the DeviceNet network.

+0	Message sequence number	2 bytes
+2	Timeout monitor time	2 bytes
+4	Data size	2 bytes
+5	Destination node address	1 byte
+6	Service code	1 byte
+8	Class ID	2 bytes
+10	Instance ID	2 bytes
+12	Data	552 bytes max.

Parameter	Description
Message sequence number	Set a number to classify multiple transmission frames. The value is freely assigned by the message transmission source, and the same value is stored in the response. Setting range: 0 to 65,535
Timeout monitor time	Set the timeout monitor time, in units of 10 ms, for monitoring at the ED Router. Setting 0 will set the default time of 10 ms. At the message transmission source, timeout monitoring is required for a longer time than the value set here. Setting range: 0 to 65,535
Data size	Sets the data size, in bytes, from the destination node address onwards. Setting range: 1 to 511
Destination node address	Sets the destination node address on the DeviceNet network. Setting range: 0 to 63
Service code	Sets the service code for the destination object. The service code set here is sent to the destination node as is.
Class ID	Sets the class ID for the destination object. The class ID set here is sent to the destination node as is.

Parameter	Description
Instance ID	Sets the instance ID for the destination object. The instance ID set here is sent to the destination node as is.
Data	Sets the data. The contents of the data vary depending on the service code.

4-2-2 Response Format

When a response is returned from the destination device on the DeviceNet network, the ED Router sends the response (a UDP/IP message) to the transmission source on the Ethernet network.

The following tables show the response format.

+0	Message sequence number	2 bytes
+2	Data size	2 bytes
+4	Destination node address	1 byte
+5	Service code	1 byte
+6	Data	552 bytes max.

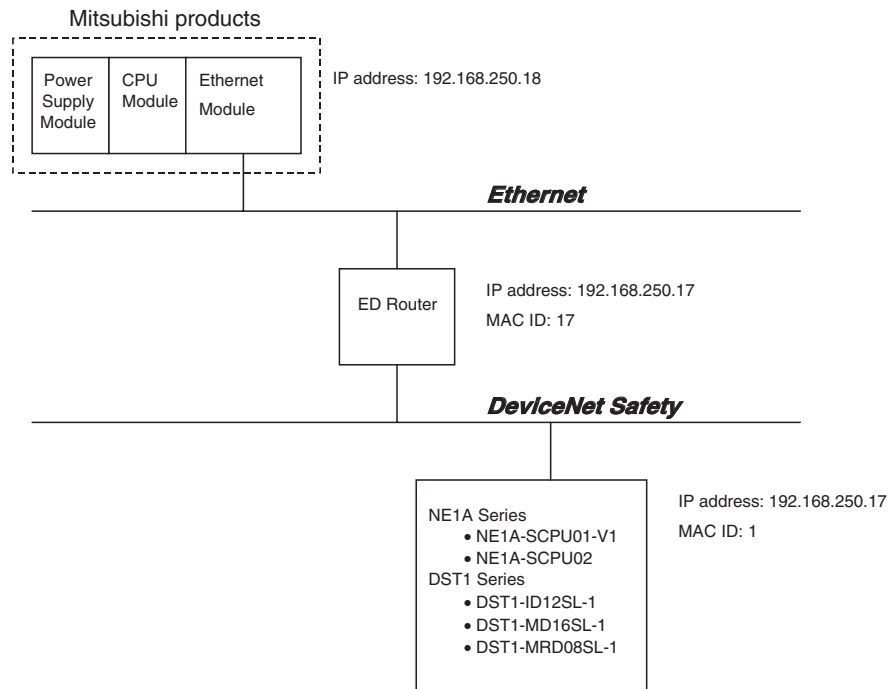
Parameter	Description
Message sequence number	The sequence number set when the command was sent is returned.
Data size	The data size from the destination node address onwards is stored here, in bytes.
Destination node address	The destination node address (transmission source address) on the DeviceNet network is stored here.
Service code	The service code for the destination object set when the command is sent is stored here. If the response is normal, the leftmost bit of the requested service code turns ON. If it is an error response, 94 hex is returned.
Data	The response data is stored here. If there is an error response, the following data is returned. • General Error Code (1 byte) • Additional Error Code (1 byte)

4-3 Operating Examples

4-3-1 Overview

This section describes how to access a device on a DeviceNet or DeviceNet Safety network from a general-purpose controller (e.g., a PLC or computer) on an Ethernet network using UDP/IP frame message communications via an ED Router.

In this example, a Mitsubishi CPU Module and a Mitsubishi Ethernet Interface Module on an Ethernet network monitor an NE1A-series or DST1-series device using UDP/IP message communications via an NE1A-EDR01 ED Router.



Note The following Mitsubishi products are used in this example.

Module/Software	Model/Version
Power Supply Module	Q61P
CPU Module	Q02CPU
Ethernet Interface Module	QJ71E71-100
Ladder Creation Software	GX Developer

Note For details on settings and programming, refer to *4-4 Mitsubishi Ethernet Interface Module Settings* and *4-5 Sample Ladder Programs*. For advanced monitor settings, refer to *4-6 NE1A Series Monitoring* *4-7 DST1 Series Monitoring*.

4-3-2 Settings

In this example, the following settings are made.

Mitsubishi Ethernet Interface Module Settings

PC Parameter Settings (Refer to 4-4-1 PC Parameters.)

- I/O allocation settings
- Program settings

Network Parameter Settings (Refer to 4-4-2 Network Parameters.)

- Ethernet operation settings
- Initial settings
- Open settings

**Creating Ladder Programs
(Refer to 4-5 Sample
Ladder Programs.)**

Note For advanced monitor settings, refer to 4-6 *NE1A Series Monitoring* and 4-7 *DST1 Series Monitoring*.

4-4 Mitsubishi Ethernet Interface Module Settings

This section describes how to make the settings for the Mitsubishi QJ71E71-100 Ethernet Interface Module.

Note Refer to the following manuals for more details on subjects such as procedures for making settings.

- QSCPU User's Manual (Function Explanation, Program Fundamentals)
- Q Corresponding Ether Interface Module User's Manual (Basic)

4-4-1 PC Parameters

I/O Allocations

Set the type of Module mounted on the Base Unit, the I/O signal range, etc. Make the following I/O allocation settings.

Item	Contents	Setting
Type	Set the type of Module that is mounted.	Intelli
Model name	Set the model name of the Module that is mounted.	QJ71E71-100
Points	Set the number of points for each slot.	32 (32 points)
Start XY	Set the starting I/O number for each slot.	0000

Program

Set the program file name and the execution type (execution condition). The program can be written to the CPU Module according to these settings. In this example, the settings are made as shown in the following table.

Item	Contents	Setting
Program name	Set the name of the program.	MAIN
Execute type	Execution type (execution condition)	Scan

4-4-2 Network Parameters

Make the settings for using the Ethernet Module as a network module. Select *MELSECNET/Ethernet* in the Network Parameters Window, and then make the settings as shown in the following table.

Item	Contents	Setting
Network type	Select the mounted Module.	Ethernet
Starting I/O No.	Set the starting address for the Module.	0000
Network No.	Set the network number for the Module.	1
Group No.	Set the group number for the Module.	1
Station No.	Select the station number for the Module.	1
Mode	Select the operating mode for the Module.	Online

EtherNet Operations

Make the common Module settings for using the Ethernet Module.

The settings for Ethernet operations are shown in the following table.

Item	Contents	Setting
Communication data code setting	Select the communications data code.	Binary code communication
Initial Timing	Make the OPEN setting.	Do not wait for OPEN
IP address setting	Input format	Select the input format for the IP address.
	IP address	Set the local IP address.
		Decimal 192.168.250.18

Item	Contents	Setting
Send frame setting	Select the frame format for transmission.	Ethernet (V2.0)
TCP Existence Confirmation setting	Select the method for existence confirmation for TCP protocol communications.	Use the KeepAlive

Initial Setting

Set the TCP/IP communications timer value for using the Ethernet Module, and make the DNS server settings for using the e-mail function.

Make the initial setting as shown in the following table.

Item	Contents	Setting
Response monitoring timer	Set the response wait time.	100

Opening Settings

For communicating with a remote device, make the settings related to connection open processing and buffer memory applications for fixed buffer communications.

The open settings are as shown in the following table.

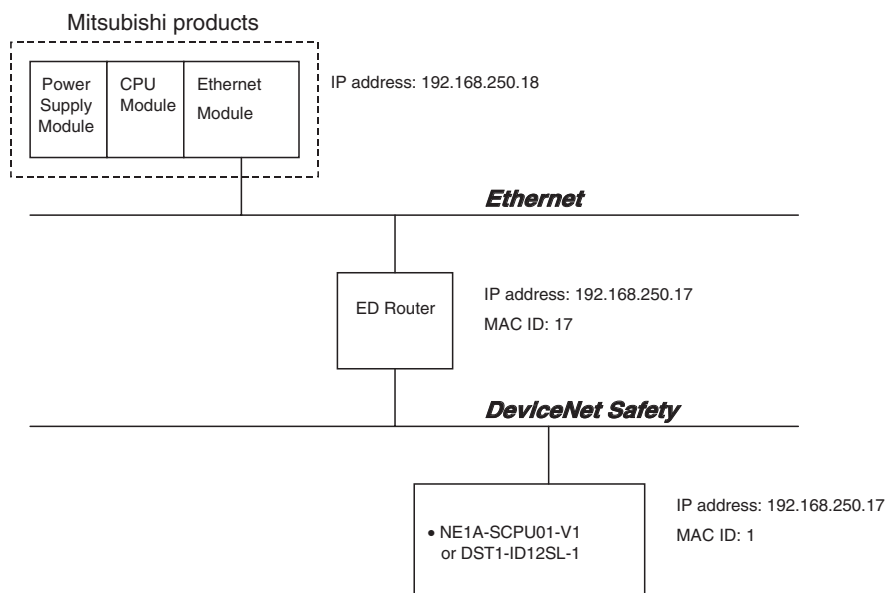
Item	Contents	Setting
Protocol (See note.)	Set the communications method (protocol).	UDP/IP
Fixed buffer (See note.)	Select the application for using the fixed buffer.	This setting is made automatically when pairing open is set to pairs.
Fixed buffer communication (See note.)	Select whether the protocol is to be enabled when using fixed buffer communication.	No procedure
Pairing open (See note.)	Select whether pairing open is to be enabled.	Pairs
Existence confirmation	Select whether existence of the object is to be confirmed.	Confirm
Local station Port No.	Set the location station port number.	0401 hex
Destination IP address	Set the IP address for the remote device.	192.168.250.17 (NE1A-EDR01)
Dest. Port No.	Set the port number for the remote device.	FA00 hex (64,000 decimal)

Note For this item, be sure to make the same setting as shown in the *Setting* column.

4-5 Sample Ladder Programs

4-5-1 System Configuration for Sample Ladder Programs

In this example, a Mitsubishi CPU Module and a Mitsubishi Ethernet Interface Module on an Ethernet network monitor the safety input terminals of an NE1A-SCPU01-V1 or DST1-ID12SL-1 using UDP/IP message communications via an NE1A-EDR01 ED Router.



Note The following Mitsubishi products are used in this example.

Module/Software	Model/Version
Power Supply Module	Q61P
CPU Module	Q02CPU
Ethernet Module	QJ71E71-100
Ladder Creation Software	GX Developer

4-5-2 PC Parameters

The following table shows the locations in CPU Module memory of the data used in the sample ladder programs.

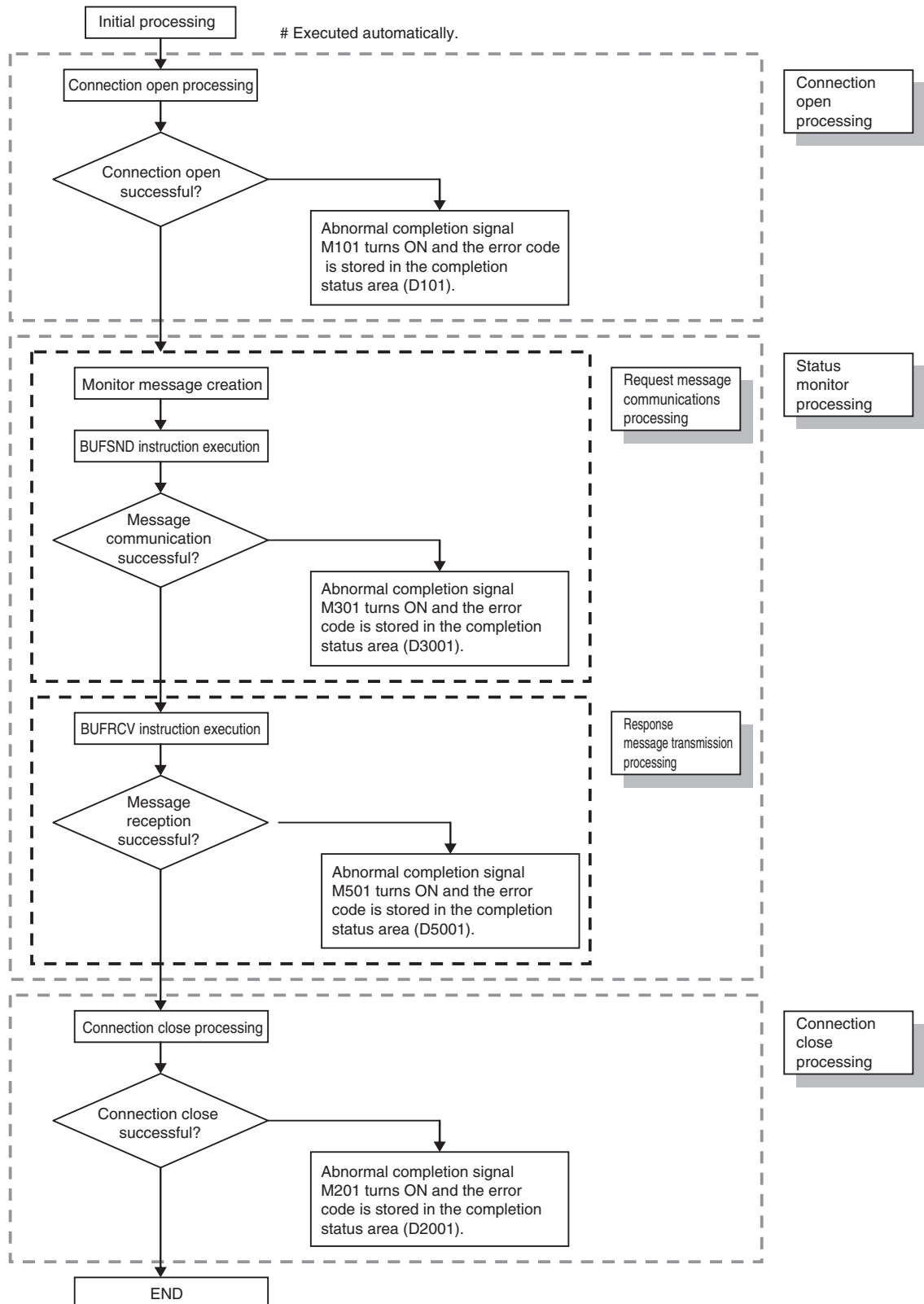
Address	Contents	Remarks
:		
D100	OPEN instruction execution type	
D101	OPEN instruction completion status	
:		
D200	System area	
D201	CLOSE instruction completion status	
:		
D300	Send data length (bytes)	Area used for BUFSEND instructions
D301	Send data	
D302	Send data	
:	:	
D500	Receive data length (bytes)	Area used for BUFRVC instructions
D501	Receive data	
D502	Receive data	
:	:	
:		
D3000	System area	
D3001	BUFSEND instruction completion status	
:		
D5000	System area	
D5001	BUFRVC instruction completion status	
:		

Address Numbers:

- D: Data register
- D0 to D11135 can be used.
- Each memory unit is 2 bytes.

4-5-3 Sample Ladder Program Processing Flow

The following flowchart shows the flow of processes in the sample ladder programs.

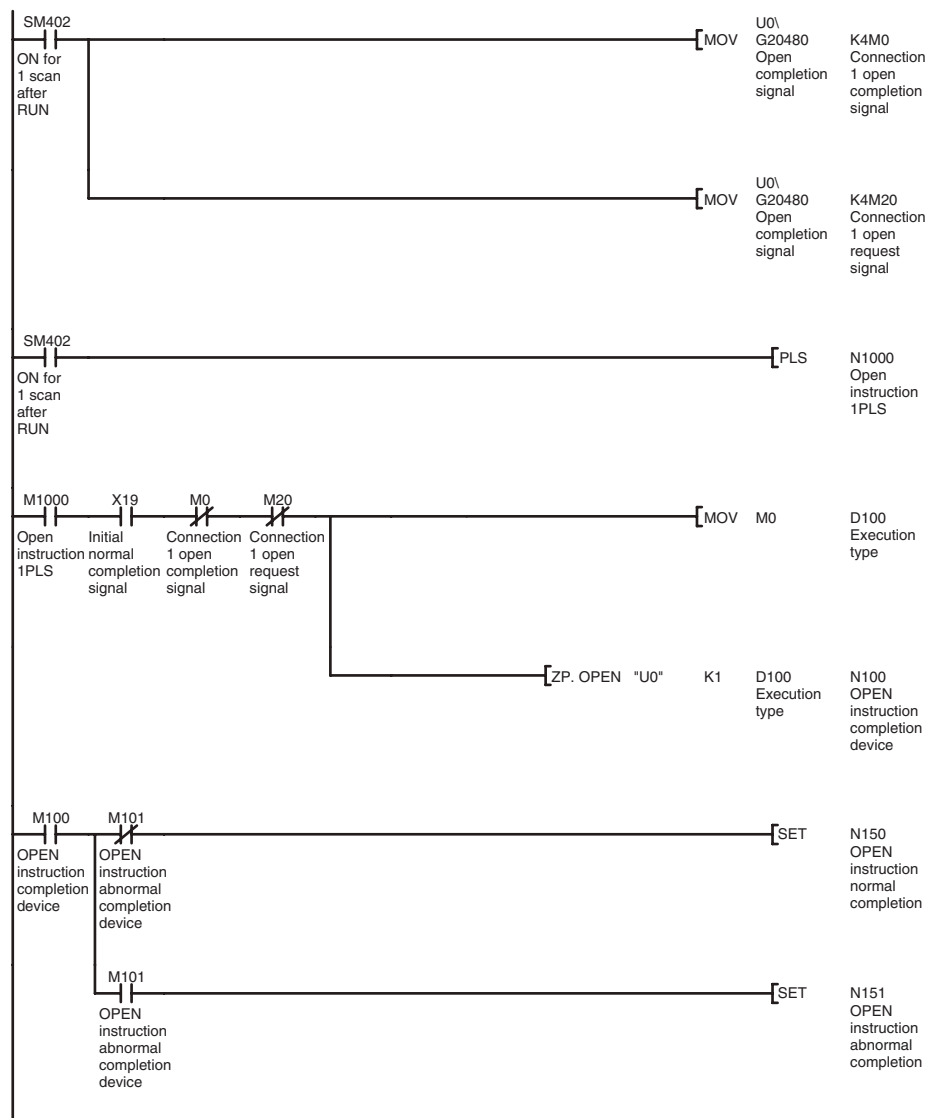


- Note**
- (1) The BUFSND instruction is a special instruction for Ethernet Modules, used to send data to remote devices using fixed buffer communications.
 - (2) The BUFRCV instruction is a special instruction for Ethernet Modules, used for reading data received from remote devices using fixed buffer communications.

4-5-4 Sample Ladder Programs

This section provides sample ladder programs, in order, for the processes indicated in the flowchart.

Connection Open Processing



Status Monitor Processing

Example: Monitoring NE1A-SCPU01-V1 Safety Input Terminals

This section provides, in order, the sample programs for acquiring NE1A-SCPU01-V1 and DST1-ID12SL-1 safety input monitor data.

The settings for acquiring the safety input monitor data are shown here.

■ Request Message Contents

Item	Setting
Target Node	01 hex
Service Code	4B hex
Class ID	306 hex
Instance ID	01 hex
Request data (Attribute ID)	00000002 hex

■ Fixed Buffer Data Arrangement (Memory Maps)

The settings are shown here for communications (no protocol) using fixed buffers, with Fixed Buffer No. 2 used for request messages and Fixed Buffer No. 1 used for response messages.

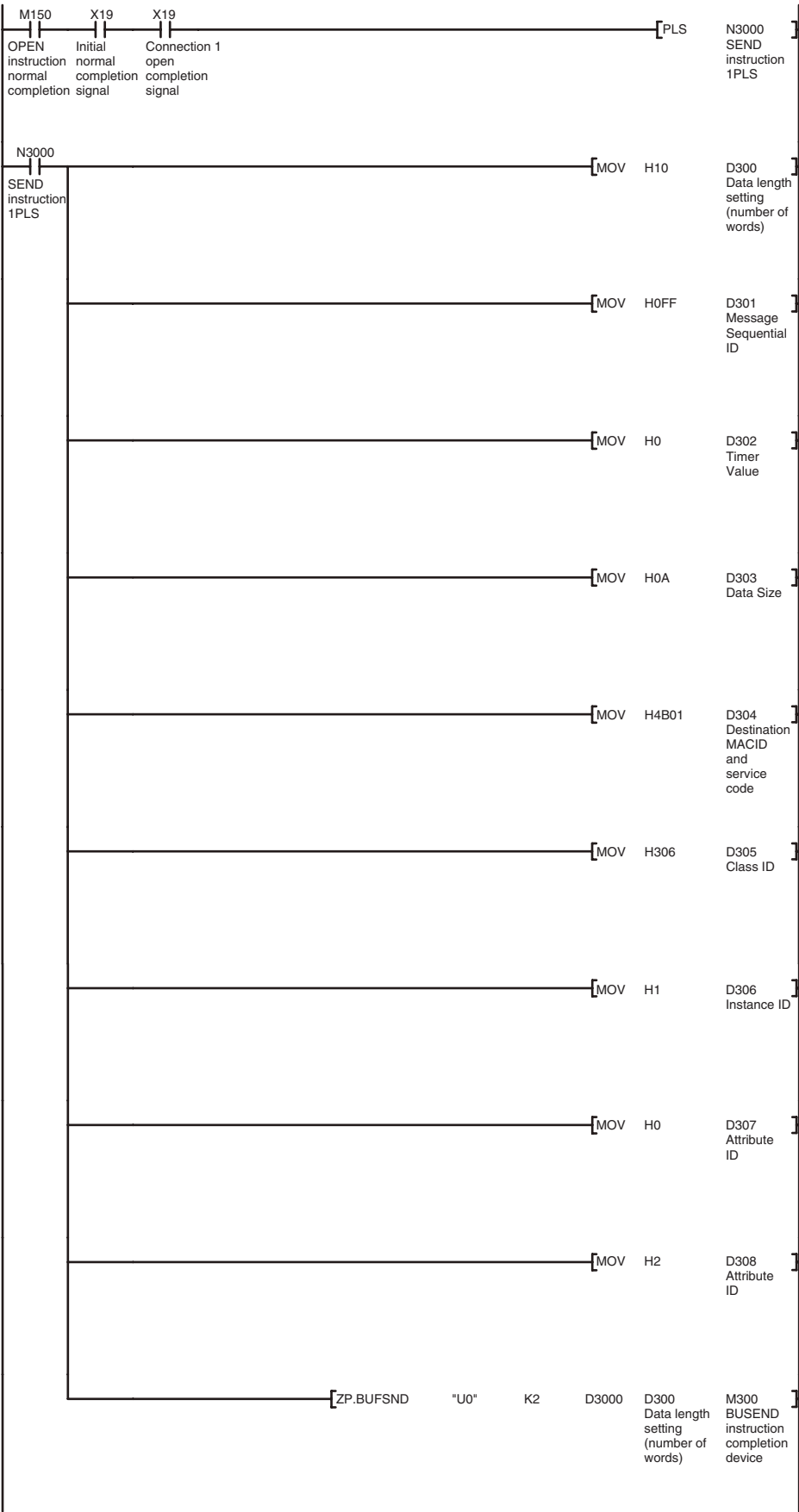
Fixed Buffer No. 2: BUFSND Instruction Area

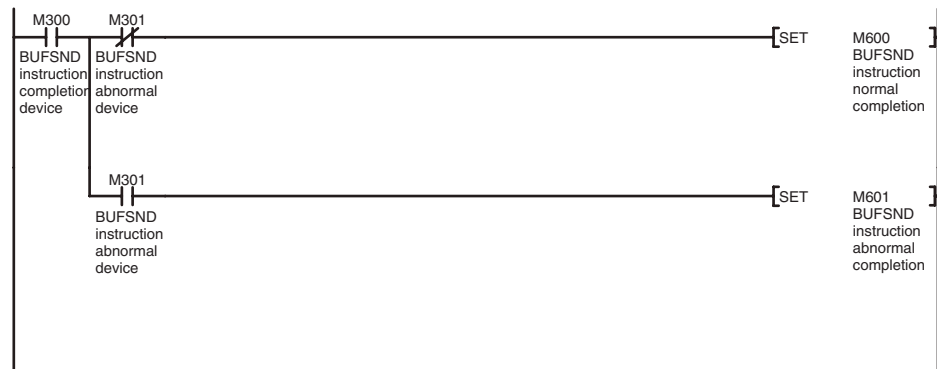
Address	15	8	7	0	Remarks
D300	00 hex		10 hex		Send data length
D301	00 hex		FF hex		Send data (message sequence number)
D302	00 hex		00 hex		Send data (timeout monitor time)
D303	00 hex		0A hex		Send data (data size)
D304	4B hex		01 hex		Send data (node address, service code)
D305	03 hex		06 hex		Send data (class ID)
D306	00 hex		01 hex		Send data (instance ID)
D307	00 hex		00 hex		Send data (request data (offset address))
D308	00 hex		02 hex		Send data (request data (data size))

Fixed Buffer No. 1: BUFRVC Instruction Area

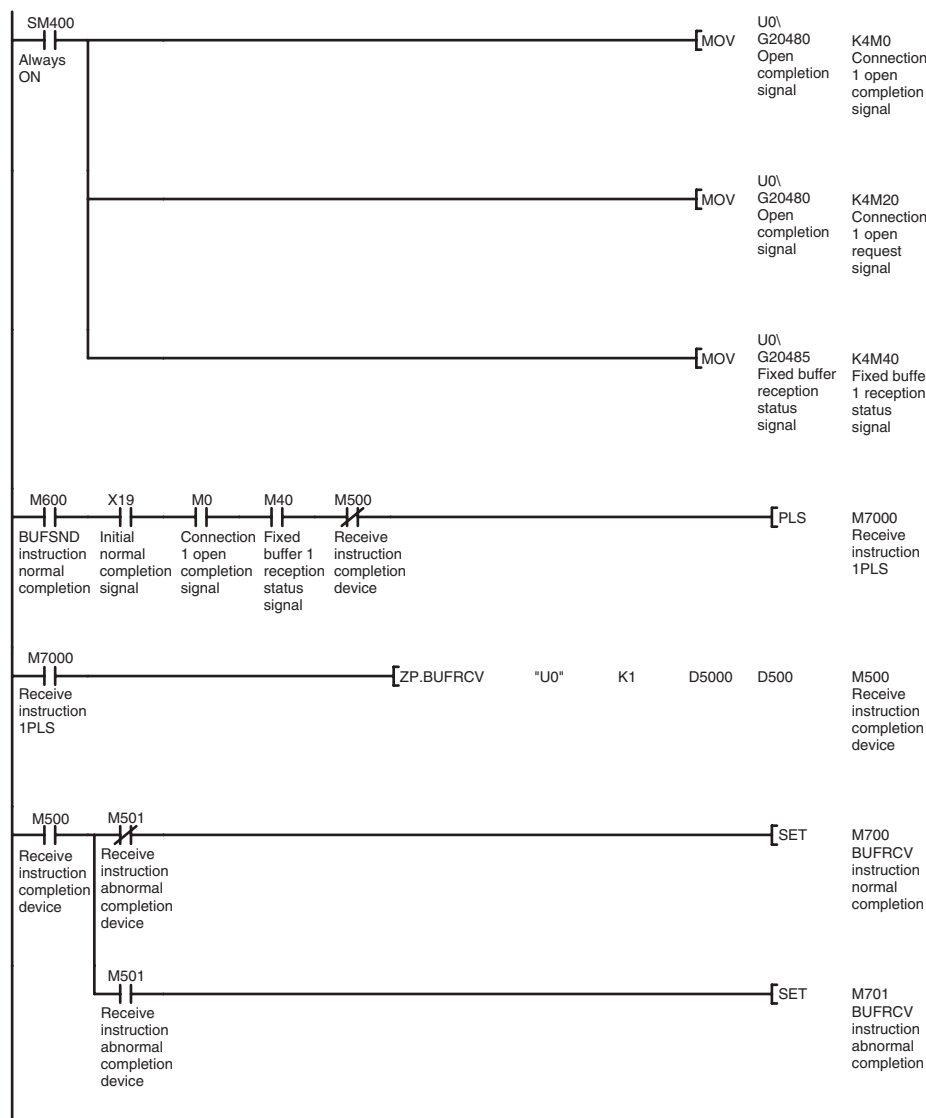
Address	15	8	7	0	Remarks
D500	00 hex		08 hex		Receive data length
D301	00 hex		FF hex		Receive data (message sequence number)
D302	00 hex		04 hex		Receive data (data size)
D303	CB hex		01 hex		Receive data (node address, service code)
D304	**		**		Receive data (data)

Request Message Transmission Processing





■ Response Message Reception Processing



**Example: Monitoring
DST1-ID12SL-1 Safety
Input Terminals**

The settings are shown here for acquiring safety input monitor data.

■ Request Message Contents

Item	Setting
Destination node address	01 hex
Service code	0E hex
Class ID	04 hex
Instance ID	310 hex
Send data (attribute ID)	03 hex

■ Fixed Buffer Data Arrangement (Memory Maps)

The settings are shown here for communications (no protocol) using fixed buffers, with Fixed Buffer No. 2 used for request messages and Fixed Buffer No. 1 used for response messages.

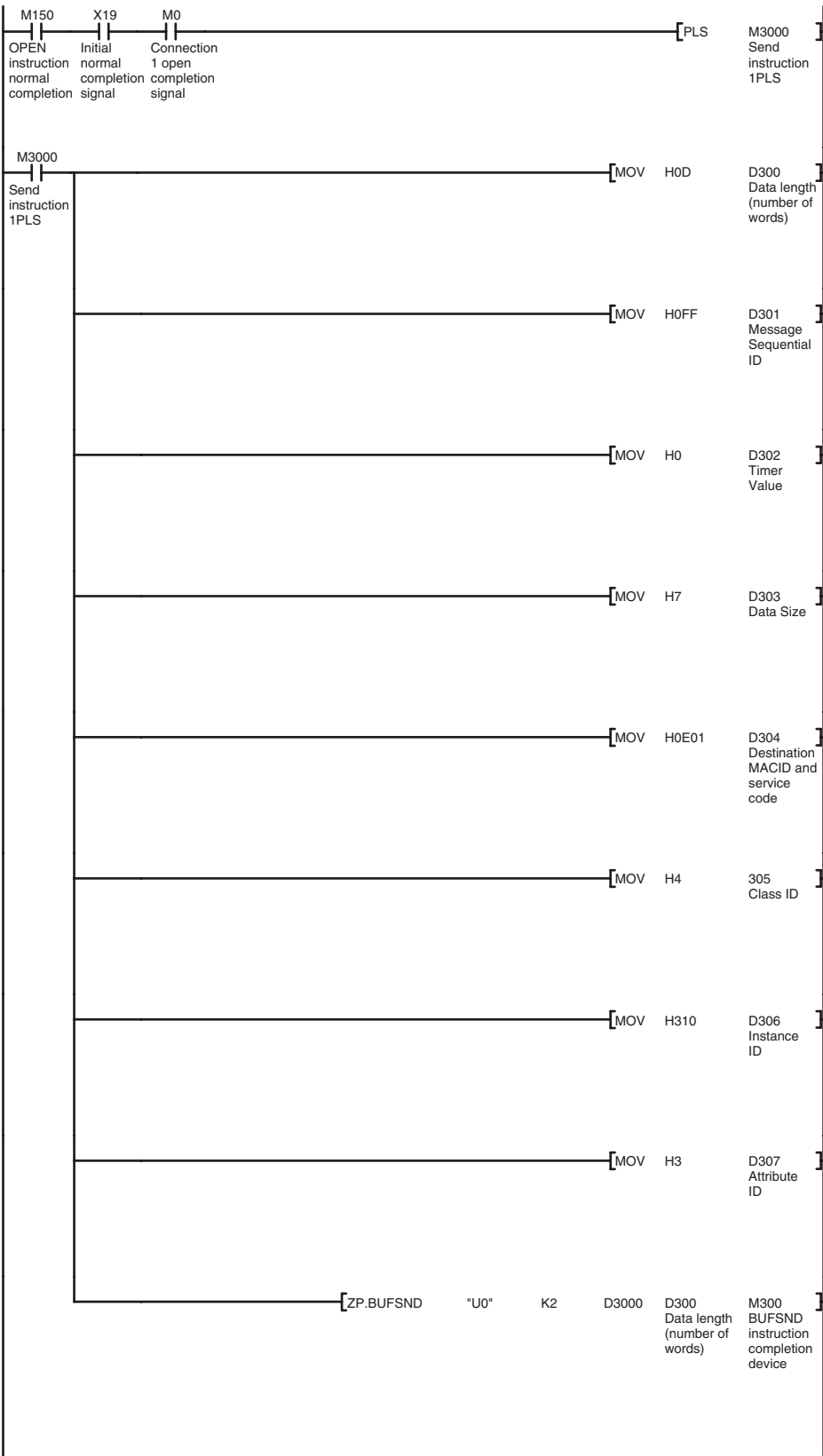
Fixed Buffer No. 2: BUFSND Instruction Area

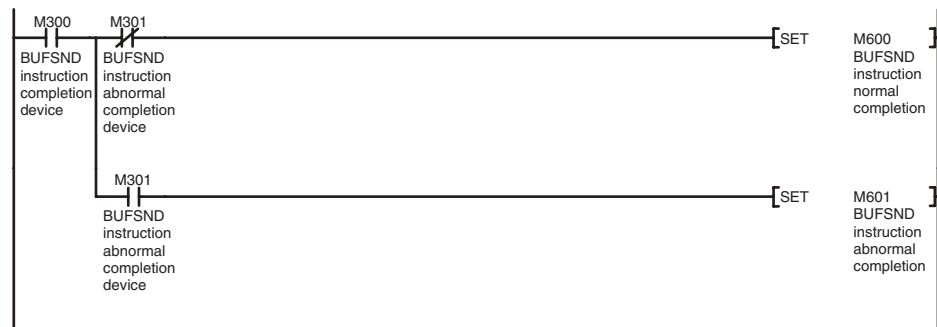
Address	15	8	7	0	Remarks
D300	00 hex		0D hex		Send data length
D301	00 hex		FF hex		Send data (message sequence number)
D302	00 hex		00 hex		Send data (timeout monitor time)
D303	00 hex		07 hex		Send data (data size)
D304	0E hex		01 hex		Send data (node address, service code)
D305	00 hex		04 hex		Send data (class ID)
D306	03 hex		10 hex		Send data (instance ID)
D307	00 hex		03 hex		Send data (request data (attribute ID))

Fixed Buffer No. 1: BUFRVC Instruction Area

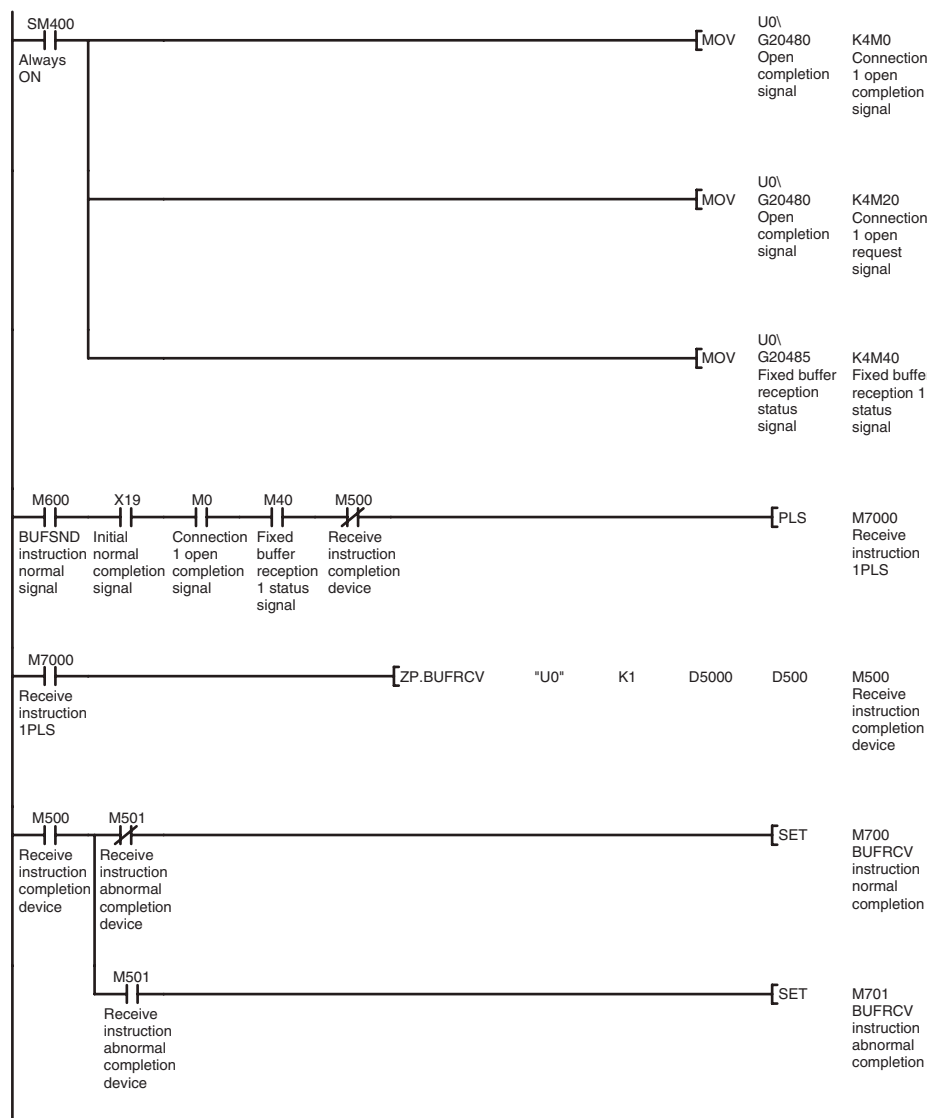
Address	15	8	7	0	Remarks
D500	00 hex		08 hex		Receive data length
D301	00 hex		FF hex		Receive data (message sequence number)
D302	00 hex		04 hex		Receive data (data size)
D303	CB hex		01 hex		Receive data (node address, service code)
D304	**		**		Receive data (data)

Request Message Transmission Processing

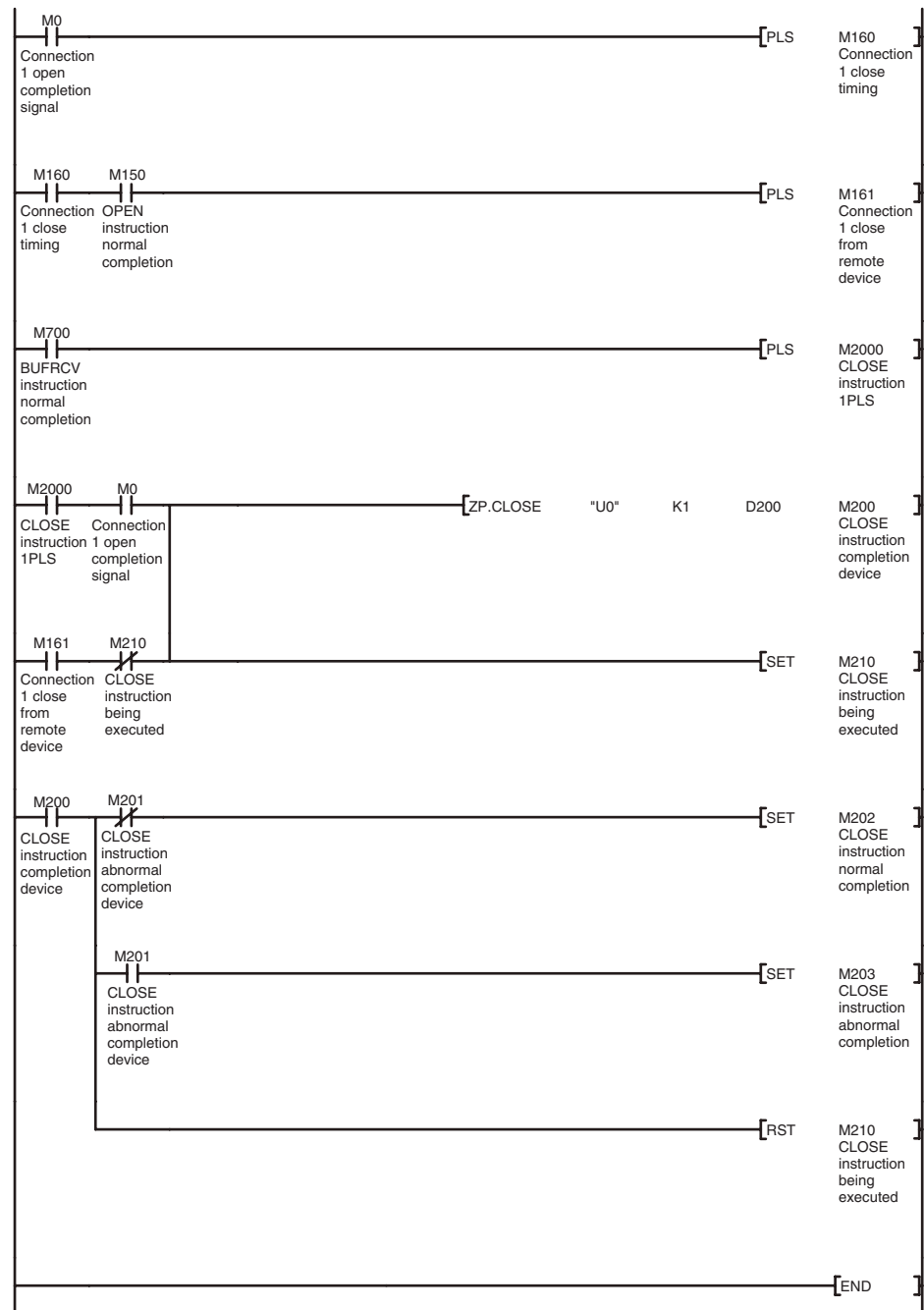




■ Response Message Reception Processing



Connection Close Processing



4-6 NE1A Series Monitoring

NE1A-SCPU01-V1 or NE1A-SCPU02 data can be monitored by changing to the values shown below the communications messages (service code, class ID, instance ID, and request data (attribute ID)) indicated in 4-5 Sample Ladder Programs.

4-6-1 Monitoring the NE1A-SCPU01-V1

	Service code	Class ID	Instance ID	Request data (attribute ID)
Safety input terminal monitor				
Safety input monitor	4B hex	306 hex	01 hex	00000002 hex (See note 4.)
Safety input status	4B hex	306 hex	0B hex	00000002 hex (See note 5.)
Safety input error cause (See note 1.)	0E hex	3D hex	01 to 10 hex	6E hex
Safety output terminal monitor				
Safety output monitor	4B hex	306 hex	02 hex	00000001 hex (See note 6.)
Safety output status	4B hex	306 hex	0C hex	00000004 hex (See note 7.)
Safety output error cause (See note 2.)	0E hex	3B hex	01 to 08 hex	6E hex
Overall status monitor				
Overall status (See note 3.)	0E hex	39 hex	01 hex	6E hex

Note

(1) Safety Input Error Cause

When an error is indicated for the safety input status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the specified instance ID specified. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error cause

Value	Meaning
0	No error
1	Illegal configuration
2	Test signal error
3	Internal circuit error
4	Discrepancy error
5	Error at dual channel partner

(2) Safety Output Error Cause

When an error is indicated for the safety output status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error Cause

Value	Meaning
0	No error
1	Illegal configuration
2	Overcurrent detected
3	Short-circuit detected

Value	Meaning
4	Output ON error
5	Error at dual channel partner
6	Internal bit circuit error
7	Bit error
8	Illegal data between dual channel outputs
9	Short-circuit detected between wires

(3) Overall Status

Read Data Format (Read Size: 1 Byte)

+0	Status
----	--------

Status

Bit	Meaning
0	Input Power Supply Voltage Status Flag OFF: Always ON, ON: Voltage error or power supply OFF
1	Output Power Supply Voltage Status Flag OFF: Always ON, ON: Voltage error or power supply OFF
2	Standard I/O Communications Error Flag OFF: No error, ON: Error
3	Standard I/O Communications Status Flag OFF: I/O communications stopped or error, ON: I/O communications being executed
4	Safety I/O Communications Error Flag OFF: No error, ON: Error
5	Safety I/O Communications Status Flag OFF: I/O communications stopped or error, ON: I/O communications being executed
6	Operation Mode Flag OFF: Other than RUN, ON: RUN
7	NE1A-series Status Flag OFF: Error, ON: Normal

(4) Safety Input Monitor

Two bytes of data are read. For details on the data format that is read, refer to *Safety Input Terminal Monitor Format* below.

(5) Safety Input Status

Two bytes of data are read. For details on the data format that is read, refer to *Safety Input Terminal Monitor Format* below.

(6) Safety Output Monitor

One byte of data is read. For details on the data format that is read, refer to *Safety Output Terminal Monitor Format* below.

(7) Safety Output Status

Four bytes of data are read. For details on the data format that is read, refer to *Safety Output Terminal Monitor Format* below.

Safety Input Terminal Monitor Format

Safety Input Monitor

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 15 monitor	Safety input terminal No. 14 monitor	Safety input terminal No. 13 monitor	Safety input terminal No. 12 monitor	Safety input terminal No. 11 monitor	Safety input terminal No. 10 monitor	Safety input terminal No. 9 monitor	Safety input terminal No. 8 monitor

Monitor value: 1: ON, 0: OFF

Safety Input Status

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status
+1	Safety input terminal No. 15 status	Safety input terminal No. 14 status	Safety input terminal No. 13 status	Safety input terminal No. 12 status	Safety input terminal No. 11 status	Safety input terminal No. 10 status	Safety input terminal No. 9 status	Safety input terminal No. 8 status

Status value: 1: Normal, 0: Error

Safety Output Terminal Monitor Format

Safety Output Monitor

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety output terminal No. 7 monitor	Safety output terminal No. 6 monitor	Safety output terminal No. 5 monitor	Safety output terminal No. 4 monitor	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor

Monitor value: 1: ON, 0: OFF

Safety Output Status

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Reserved				Safety out-put terminal No. 3 status	Safety out-put terminal No. 2 status	Safety out-put terminal No. 1 status	Safety out-put terminal No. 0 status
+1	Reserved				Safety out-put terminal No. 3 status	Safety out-put terminal No. 2 status	Safety out-put terminal No. 1 status	Safety out-put terminal No. 0 status
+2	Reserved				Muting lamp status No. 3	Reserved		
+3	Reserved							

Status value: 1: Normal, 0: Error

4-6-2 Monitoring the NE1A-SCPU02

	Service code	Class ID	Instance ID	Request data (attribute ID)
Safety input terminal monitor				
Safety input monitor	4B hex	306 hex	01 hex	00000005 hex (See note 4.)
Safety input status	4B hex	306 hex	0B hex	00000006 hex (See note 5.)
Safety input error cause (See note 1.)	0E hex	3D hex	01 to 28 hex	6E hex
Safety output terminal monitor				
Safety output monitor	4B hex	306 hex	02 hex	00000001 hex (See note 6.)
Safety output status	4B hex	306 hex	0C hex	00000004 hex (See note 7.)
Safety output error cause (See note 2.)	0E hex	3B hex	01 to 08 hex	6E hex
Overall status monitor				
Overall status (See note 3.)	0E hex	39 hex	01 hex	6E hex

Note

(1) Safety Input Error Cause

When an error is indicated for the safety input status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the specified instance ID specified. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error Cause

Value	Meaning
0	No error
1	Illegal configuration
2	Test signal error
3	Internal circuit error
4	Discrepancy error
5	Error at dual channel partner

(2) Safety Output Error Cause

When an error is indicated for the safety output status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error Cause

Value	Meaning
0	No error
1	Illegal configuration
2	Overcurrent detected
3	Short-circuit detected
4	Output ON error
5	Error at dual channel partner
6	Internal bit circuit error
7	Bit error
8	Illegal data between dual channel outputs
9	Short-circuit detected between wires

(3) Overall Status

Read Data Format (Read Size: 1 Byte)

+0	Status
Status	
Bit	Meaning
0	Input Power Supply Voltage Status Flag OFF: Always ON, ON: Voltage error or power supply OFF
1	Output Power Supply Voltage Status Flag OFF: Always ON, ON: Voltage error or power supply OFF
2	Standard I/O Communications Error Flag OFF: No error, ON: Error
3	Standard I/O Communications Status Flag OFF: I/O communications stopped or error, ON: I/O communications being executed
4	Safety I/O Communications Error Flag OFF: No error, ON: Error
5	Safety I/O Communications Status Flag OFF: I/O communications stopped or error, ON: I/O communications being executed
6	Operation Mode Flag OFF: Other than RUN, ON: RUN
7	NE1A-series Status Flag OFF: Error, ON: Normal

(4) Safety Input Monitor

Five bytes of data are read. For details on the data format that is read, refer to *Safety Input Terminal Monitor Format* below.

(5) Safety Input Status

Six bytes of data are read. For details on the data format that is read, refer to *Safety Input Terminal Monitor Format* below.

(6) Safety Output Monitor

One byte of data is read. For details on the data format that is read, refer to *Safety Output Terminal Monitor Format* below.

(7) Safety Output Status

Four bytes of data are read. For details on the data format that is read, refer to *Safety Output Terminal Monitor Format* below.

Safety Input Terminal Monitor Format

Safety Input Monitor

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 15 monitor	Safety input terminal No. 14 monitor	Safety input terminal No. 13 monitor	Safety input terminal No. 12 monitor	Safety input terminal No. 11 monitor	Safety input terminal No. 10 monitor	Safety input terminal No. 9 monitor	Safety input terminal No. 8 monitor
+2	Safety input terminal No. 23 monitor	Safety input terminal No. 22 monitor	Safety input terminal No. 21 monitor	Safety input terminal No. 20 monitor	Safety input terminal No. 19 monitor	Safety input terminal No. 18 monitor	Safety input terminal No. 17 monitor	Safety input terminal No. 16 monitor

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+3	Safety input terminal No. 31 monitor	Safety input terminal No. 30 monitor	Safety input terminal No. 29 monitor	Safety input terminal No. 28 monitor	Safety input terminal No. 27 monitor	Safety input terminal No. 26 monitor	Safety input terminal No. 25 monitor	Safety input terminal No. 24 monitor
+4	Safety input terminal No. 39 monitor	Safety input terminal No. 38 monitor	Safety input terminal No. 37 monitor	Safety input terminal No. 36 monitor	Safety input terminal No. 35 monitor	Safety input terminal No. 34 monitor	Safety input terminal No. 33 monitor	Safety input terminal No. 32 monitor

Monitor value: 1: ON, 0: OFF

Safety Input Status

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status
+1	Safety input terminal No. 15 status	Safety input terminal No. 14 status	Safety input terminal No. 13 status	Safety input terminal No. 12 status	Safety input terminal No. 11 status	Safety input terminal No. 10 status	Safety input terminal No. 9 status	Safety input terminal No. 8 status
+2	Reserved				Safety input terminal No. 19 status	Safety input terminal No. 18 status	Safety input terminal No. 17 status	Safety input terminal No. 16 status
+3	Safety input terminal No. 27 status	Safety input terminal No. 26 status	Safety input terminal No. 25 status	Safety input terminal No. 24 status	Safety input terminal No. 23 status	Safety input terminal No. 22 status	Safety input terminal No. 21 status	Safety input terminal No. 20 status
+4	Safety input terminal No. 35 status	Safety input terminal No. 34 status	Safety input terminal No. 33 status	Safety input terminal No. 32 status	Safety input terminal No. 31 status	Safety input terminal No. 30 status	Safety input terminal No. 29 status	Safety input terminal No. 28 status
+5	Reserved				Safety input terminal No. 39 status	Safety input terminal No. 38 status	Safety input terminal No. 37 status	Safety input terminal No. 36 status

Status value: 1: Normal, 0: Error

Safety Output Terminal Monitor Format

Safety Output Monitor

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety output terminal No. 7 monitor	Safety output terminal No. 6 monitor	Safety output terminal No. 5 monitor	Safety output terminal No. 4 monitor	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor

Monitor value: 1: ON, 0: OFF

Safety Output Status

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety output terminal No. 7 status	Safety output terminal No. 6 status	Safety output terminal No. 5 status	Safety output terminal No. 4 status	Safety output terminal No. 3 status	Safety output terminal No. 2 status	Safety output terminal No. 1 status	Safety output terminal No. 0 status
+1	Test output terminal No. 7 status	Test output terminal No. 6 status	Test output terminal No. 5 status	Test output terminal No. 4 status	Test output terminal No. 3 status	Test output terminal No. 2 status	Test output terminal No. 1 status	Test output terminal No. 0 status

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+2	Muting lamp status No. 7	Reserved			Muting lamp status No. 3	Reserved		
+3	Reserved							

Status value: 1: Normal, 0: Error

4-7 DST1 Series Monitoring

DST1-ID12SL-1, DST1-MD16SL-1, DST1-MRD08SL-1, or DST1-XD0808SL-1 data can be monitored by changing to the values shown below the communications messages (service code, class ID, instance ID, and request data (attribute ID)) indicated in *4-5 Sample Ladder Programs*.

4-7-1 Monitoring the DST1-ID12SL-1

		Service code	Class ID	Instance ID	Request data (attribute ID)
Safety input monitor Safety input status Overall status (See note 1.)	Input value/status	0E hex	04 hex	Refer to the table in note 3.	03 hex
Safety input error cause (See note 2.)	Error cause	0E hex	3D hex	01 to 0C hex	6E hex

Note (1) Overall Status

Read Data Format (Read Size: 1 Byte)

+0	Status
----	--------

Status

Bit	Meaning
0	Input Power Supply Voltage Monitor Flag OFF: I/O power supply ON, ON: I/O power supply OFF
1	Output Power Supply Voltage Monitor Flag OFF: I/O power supply ON, ON: I/O power supply OFF
2	Network Power Supply Voltage Monitor Error Flag OFF: Normal (higher than monitor set value), ON: Error (equal to or higher than monitor)
3	Module Maintenance Flag OFF: Within range (lower than monitor set value), ON: Out of range (equal to or lower than monitor set value)
4	Reserved
5	I/O Error Flag OFF: Normal (all I/O points normal), ON: Error (one or more I/O points abnormal)
6	Operation Time Monitor Error Flag OFF: Within range (all I/O sets lower than monitor set value), ON: Out of range (one or more I/O sets equal to or greater than monitor set value)
7	Connected Device Maintenance Flag OFF: Within range (all I/O points lower than monitor set value), ON: Out of range (one or more I/O points equal to or greater than monitor set value)

(2) Safety Input Error Cause

When an error is indicated for the safety input status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error Cause

Value	Meaning
0	No error
1	Illegal configuration
2	Test signal error
3	Internal circuit error
4	Discrepancy error
5	Error at dual channel partner

(3) Instance ID

Status held in the DST1-ID12SL-1 can be monitored by reading the instance IDs shown in the following table.

Instance ID (hex)	Safety input	Safety input batch status	Safety input status	Safety output batch status	Safety output status	Muting lamp status	Safety output monitor	Test output status	Overall status
20C	●								
224	●		●						
22C	●		●						
300									●
310	●	●				●			
311	●		●			●			
312	●		●			●		●	
340								●	●

Data (status) indicated by a black dot (●) can be read.

I/O Assembly Data Format

Instance ID: 20C

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Reserved				Safety input terminal No. 11 monitor	Safety input terminal No. 10 monitor	Safety input terminal No. 9 monitor	Safety input terminal No. 8 monitor

Monitor value: 1: ON, 0: OFF

Instance ID: 224

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 22C

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status	Safety input terminal No. 11 monitor	Safety input terminal No. 10 monitor	Safety input terminal No. 9 monitor	Safety input terminal No. 8 monitor
+2	Safety input terminal No. 11 status	Safety input terminal No. 10 status	Safety input terminal No. 9 status	Safety input terminal No. 8 status	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 300

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Overall status							

For details on overall status, refer to 4-7-1 *Monitoring the DST1-ID12SL-1*.

Instance ID: 310

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Muting lamp status	Safety input batch status	Reserved		Safety input terminal No. 11 monitor	Safety input terminal No. 10 monitor	Safety input terminal No. 9 monitor	Safety input terminal No. 8 monitor

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 311

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status	Safety input terminal No. 11 monitor	Safety input terminal No. 10 monitor	Safety input terminal No. 9 monitor	Safety input terminal No. 8 monitor
+2	Safety input terminal No. 11 status	Safety input terminal No. 10 status	Safety input terminal No. 9 status	Safety input terminal No. 8 status	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status
+3	Muting lamp status	Reserved						

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 312

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status	Safety input terminal No. 11 monitor	Safety input terminal No. 10 monitor	Safety input terminal No. 9 monitor	Safety input terminal No. 8 monitor

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+2	Safety input terminal No. 11 status	Safety input terminal No. 10 status	Safety input terminal No. 9 status	Safety input terminal No. 8 status	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status
+3	Muting lamp status	Reserved			Test output terminal No. 3 status	Test output terminal No. 2 status	Test output terminal No. 1 status	Test output terminal No. 0 status

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 340

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Overall status							
+1	Reserved				Test output terminal No. 3 status	Test output terminal No. 2 status	Test output terminal No. 1 status	Test output terminal No. 0 status

For details on overall status, refer to 4-7-1 *Monitoring the DST1-ID12SL-1*.

Status value: 1: Normal, 0: Error

4-7-2 Monitoring the DST1-MD16SL-1

		Service code	Class ID	Instance ID	Request data (attribute ID)
Safety input monitor Safety input status Safety output monitor Safety output status Overall status (See note 1.)	Input value/status	0E hex	04 hex	Refer to the table in note 4.	03 hex
Safety input error cause (See note 2.)	Error cause	0E hex	3D hex	01 to 08 hex	6E hex
Safety output error cause (See note 3.)	Error cause	0E hex	3B hex	01 to 08 hex	6E hex

Note (1) Overall Status

Read Data Format (Read Size: 1 Byte)

+0	Status
----	--------

Status

Bit	Meaning
0	Input Power Supply Voltage Monitor Flag OFF: I/O power supply ON, ON: I/O power supply OFF
1	Output Power Supply Voltage Monitor Flag OFF: I/O power supply ON, ON: I/O power supply OFF
2	Network Power Supply Voltage Monitor Error Flag OFF: Normal (higher than monitor set value), ON: Error (not higher than monitor set value)
3	Module Maintenance Flag OFF: Within range (lower than monitor set value), ON: Out of range (not lower than monitor set value)
4	Reserved
5	I/O Error Flag OFF: Normal (all I/O points normal), ON: Error (one or more I/O points abnormal)

Bit	Meaning
6	Operation Time Monitor Error Flag OFF: Within range (all I/O sets lower than monitor set value), ON: Out of range (one or more I/O sets equal to or greater than monitor set value)
7	Connected Device Maintenance Flag OFF: Within range (all I/O points lower than monitor set value), ON: Out of range (one or more I/O points equal to or greater than monitor set value)

(2) Safety Input Error Cause

When an error is indicated for the safety input status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error cause

Value	Meaning
0	No error
1	Illegal configuration
2	Test signal error
3	Internal circuit error
4	Discrepancy error
5	Error at dual channel partner

(3) Safety Output Error Cause

When an error is indicated for the safety output status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error cause

Value	Meaning
0	No error
1	Illegal configuration
2	Overcurrent detected
3	Short-circuit detected
4	Output ON error
5	Error at dual channel partner
6	Internal bit circuit error
7	Bit error
8	Illegal data between dual channel outputs
9	Short-circuit detected

(4) Instance ID

Status held in the DST1-MD16SL-1 can be monitored by reading the instance IDs shown in the following table.

Instance ID (hex)	Safety input	Safety input batch status	Safety input status	Safety output batch status	Safety output status	Muting lamp status	Safety output monitor	Test output status	Overall status
204	●								
300									●
320	●	●		●		●			
321	●		●		●	●			
322	●		●		●	●	●		
323	●		●		●	●	●	●	
341							●	●	

Data (status) indicated by a black dot (●) can be read.

I/O Assembly Data Format

Instance ID: 204

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor

Monitor value: 1: ON, 0: OFF

Instance ID: 300

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	General status							

For details on overall status, refer to 4-7-2 *Monitoring the DST1-MD16SL-1*.

Instance ID: 320

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Muting lamp status	Safety input batch status	Safety output batch status	Reserved				

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 321

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+2	Safety output terminal No. 7 status	Safety output terminal No. 6 status	Safety output terminal No. 5 status	Safety output terminal No. 4 status	Safety output terminal No. 3 status	Safety output terminal No. 2 status	Safety output terminal No. 1 status	Safety output terminal No. 0 status
+3	Muting lamp status	Reserved						

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 322

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status
+2	Safety output terminal No. 7 status	Safety output terminal No. 6 status	Safety output terminal No. 5 status	Safety output terminal No. 4 status	Safety output terminal No. 3 status	Safety output terminal No. 2 status	Safety output terminal No. 1 status	Safety output terminal No. 0 status
+3	Safety output terminal No. 7 monitor	Safety output terminal No. 6 monitor	Safety output terminal No. 5 monitor	Safety output terminal No. 4 monitor	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor
+4	Muting lamp status	Reserved						

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 323

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status
+2	Safety output terminal No. 7 status	Safety output terminal No. 6 status	Safety output terminal No. 5 status	Safety output terminal No. 4 status	Safety output terminal No. 3 status	Safety output terminal No. 2 status	Safety output terminal No. 1 status	Safety output terminal No. 0 status
+3	Safety output terminal No. 7 monitor	Safety output terminal No. 6 monitor	Safety output terminal No. 5 monitor	Safety output terminal No. 4 monitor	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor
+4	Muting lamp status	Reserved			Test output terminal No. 3 status	Test output terminal No. 2 status	Test output terminal No. 1 status	Test output terminal No. 0 status

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 341

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety output terminal No. 7 monitor	Safety output terminal No. 6 monitor	Safety output terminal No. 5 monitor	Safety output terminal No. 4 monitor	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor
+1	Reserved				Test output terminal No. 3 status	Test output terminal No. 2 status	Test output terminal No. 1 status	Test output terminal No. 0 status

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

4-7-3 Monitoring the DST1-MRD08SL-1

		Service code	Class ID	Instance ID	Request data (attribute ID)
Safety input monitor Safety input status Safety output monitor Safety output status Overall status (See note 1.)	Input value/status	0E hex	04 hex	Refer to the table in note 4.	03 hex
Safety input error cause (See note 2.)	Error cause	0E hex	3D hex	01 to 04 hex	6E hex
Safety output error cause (See note 3.)	Error cause	0E hex	04 hex	01 to 04 hex	6E hex

Note (1) Overall Status

Read Data Format (Read Size: 1 Byte)

+0	Status
----	--------

Status

Bit	Meaning
0	Input Power Supply Voltage Monitor Flag OFF: I/O power supply ON, ON: I/O power supply OFF
1	Output Power Supply Voltage Monitor Flag OFF: I/O power supply ON, ON: I/O power supply OFF
2	Network Power Supply Voltage Monitor Error Flag OFF: Normal (higher than monitor set value), ON: Error (not higher than monitor set value)
3	Module Maintenance Flag OFF: Within range (lower than monitor set value), ON: Out of range (not lower than monitor set value)
4	Reserved
5	I/O Error Flag OFF: Normal (all I/O points normal), ON: Error (one or more I/O points abnormal)
6	Operation Time Monitor Error Flag OFF: Within range (all I/O sets lower than monitor set value), ON: Out of range (one or more I/O sets equal to or greater than monitor set value)
7	Connected Device Maintenance Flag OFF: Within range (all I/O points lower than monitor set value), ON: Out of range (one or more I/O points equal to or greater than monitor set value)

(2) Safety Input Error Cause

When an error is indicated for the safety input status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error cause

Value	Meaning
0	No error
1	Illegal configuration
2	Test signal error
3	Internal circuit error
4	Discrepancy error
5	Error at dual channel partner

(3) Safety Output Error Cause

When an error is indicated for the safety output status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error Cause

Bit	Meaning
0	No error
1	Illegal configuration
2	Overcurrent detected
3	Short-circuit detected
4	Output ON error
5	Error at dual channel partner
6	Internal bit circuit error
7	Bit error
8	Illegal data between dual channel outputs
9	Short-circuit detected

(4) Instance ID

Status held in the DST1-MRD08SL-1 can be monitored by reading the instance IDs shown in the following table.

Instance ID (hex)	Safety input	Safety input batch status	Safety input status	Safety output batch status	Safety output status	Muting lamp status	Safety output monitor	Test output status	Overall status
203	●								
300									●
330	●	●		●		●			
331	●		●		●	●			
332	●		●		●	●	●		
333	●		●		●	●	●	●	
342			●				●	●	

Data (status) indicated by a black dot (●) can be read.

I/O Assembly Data Format

Status ID: 203

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Reserved				Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor

Monitor value: 1: ON, 0: OFF

Instance ID: 300

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Overall status							

For details on overall status, refer to 4-7-3 *Monitoring the DST1-MRD08SL-1*.

Instance ID: 330

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Muting lamp status	Safety input batch status	Safety output batch status	Reserved	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 331

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Muting lamp status	Reserved			Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 332

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor	Safety output terminal No. 3 status	Safety output terminal No. 2 status	Safety output terminal No. 1 status	Safety output terminal No. 0 status
+2	Muting lamp status	Reserved						

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 333

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor	Safety output terminal No. 3 status	Safety output terminal No. 2 status	Safety output terminal No. 1 status	Safety output terminal No. 0 status
+2	Muting lamp status	Reserved			Test output terminal No. 3 status	Test output terminal No. 2 status	Test output terminal No. 1 status	Test output terminal No. 0 status

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Instance ID: 342

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Test output terminal No. 3 status	Test output terminal No. 2 status	Test output terminal No. 1 status	Test output terminal No. 0 status	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

4-7-4 Monitoring the DST1-XD0808SL-1

		Service code	Class ID	Instance ID	Request data (attribute ID)
Safety input monitor Safety input status Safety output monitor Safety output status Overall status (See note 1.)	Input value/ status	0E hex	04 hex	Refer to the table in note 4.	03 hex
Safety input error cause (See note 2.)	Error cause	0E hex	3D hex	01 to 08 hex	6E hex
Safety output error cause (See note 3.)	Error cause	0E hex	3B hex	01 to 08 hex	6E hex

Note (1) Overall Status

Read Data Format (Read Size: 1 Byte)

+0	Status
----	--------

Status

Bit	Meaning
0	Input Power Supply Voltage Monitor Flag 0: I/O power supply ON, ON: I/O power supply OFF
1	Output Power Supply Voltage Monitor Flag OFF: I/O power supply ON, ON: I/O power supply OFF
2	Network Power Supply Voltage Monitor Error Flag 0: Normal (higher than monitor set value), ON: Error (not higher than monitor set value)
3	Module Maintenance Flag OFF: Within range (lower than monitor set value), ON: Out of range (not lower than monitor set value)
4	Operation Mode Flag OFF: Other than RUN, ON: RUN

Bit	Meaning
5	I/O Error Flag OFF: Normal (all I/O points normal), ON: Error (one or more I/O points abnormal)
6	Error Flag OFF: Error, ON: Normal
7	Connected Device Maintenance Flag OFF: Within range (all I/O points lower than monitor set value), ON: Out of range (one or more I/O points equal to or greater than monitor set value)

(2) Safety Input Error Cause

When an error is indicated for the safety input status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error cause

Value	Meaning
0	No error
1	Illegal configuration
2	Test signal error
3	Internal circuit error
4	Discrepancy error
5	Error at dual channel partner

(3) Safety Output Error Cause

When an error is indicated for the safety output status, the cause of the error can be acquired by reading this information.

Specify the terminal number for which the error cause is to be acquired, plus 1, for the instance ID specified at that time. For example, to acquire the error cause for terminal No. 0, specify 01 hex for the instance ID.

Read Data Format (Read Size: 1 Byte)

+0	Error cause
----	-------------

Error cause

Bit	Meaning
0	No error
1	Illegal configuration
2	Overcurrent detected
3	Short-circuit detected
4	Output ON error
5	Error at dual channel partner
6	Internal bit circuit error
7	Bit error
8	Illegal data between dual channel outputs
9	Short-circuit detected between wires
10	EDM error

(4) Instance ID

Status held in the DST1-XD0808SL-1 can be monitored by reading the instance IDs shown in the following table.

Instance ID (hex)	Safety input	Safety input batch status	Safety input status	Safety output batch status	Safety output status	Muting lamp status	Safety output monitor	Test output status	Overall status
204	●								
3A0	●						●	●	
3A1	●	●	●	●	●	●	●	●	●

Data (status) indicated by a black dot (●) can be read.

I/O Assembly Data Format

Instance ID: 204

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor

Monitor value: 1: ON, 0: OFF

Instance ID: 3A0

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Reserved	Reset request signal	Safety input operation result No. 5	Safety input operation result No. 4 (4/5)	Safety input operation result No. 3	Safety input operation result No. 2 (2/3)	Safety input operation result No. 1	Safety input operation result No. 0 (0/1)

Monitor value: 1: ON, 0: OFF Operation result: 1: ON, 0: OFF

Instance ID: 3A1

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Safety input terminal No. 7 monitor	Safety input terminal No. 6 monitor	Safety input terminal No. 5 monitor	Safety input terminal No. 4 monitor	Safety input terminal No. 3 monitor	Safety input terminal No. 2 monitor	Safety input terminal No. 1 monitor	Safety input terminal No. 0 monitor
+1	Safety input terminal No. 7 status	Safety input terminal No. 6 status	Safety input terminal No. 5 status	Safety input terminal No. 4 status	Safety input terminal No. 3 status	Safety input terminal No. 2 status	Safety input terminal No. 1 status	Safety input terminal No. 0 status
+2	Safety output terminal No. 7 status	Safety output terminal No. 6 status	Safety output terminal No. 5 status	Safety output terminal No. 4 status	Safety output terminal No. 3 status	Safety output terminal No. 2 status	Safety output terminal No. 1 status	Safety output terminal No. 0 status
+3	Safety output terminal No. 7 monitor	Safety output terminal No. 6 monitor	Safety output terminal No. 5 monitor	Safety output terminal No. 4 monitor	Safety output terminal No. 3 monitor	Safety output terminal No. 2 monitor	Safety output terminal No. 1 monitor	Safety output terminal No. 0 monitor
+4	Muting lamp status	Reserved			Test output terminal No. 3 status	Test output terminal No. 2 status	Test output terminal No. 1 status	Test output terminal No. 0 status

Offset (bytes)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+5	Reserved	Reset request signal	Safety input operation result No. 5	Safety input operation result No. 4 (4/5)	Safety input operation result No. 3	Safety input operation result No. 2 (2/3)	Safety input operation result No. 1	Safety input operation result No. 0 (0/1)
+6	Overall status							

Monitor value: 1: ON, 0: OFF Status value: 1: Normal, 0: Error

Operation result: 1: ON, 0: OFF

For details on overall status, refer to 4-7-4 *Monitoring the DST1-XD0808SL-1*.

Appendix A

Specifications and Dimensions

General Specifications

Item		Specifications
DeviceNet supply voltage		11 to 25 VDC (Supplied from communications connector.)
Device supply voltage		20.4 to 26.4 VDC (24 VDC, -15% to 10%)
Current consumption	DeviceNet	15 mA at 24 VDC
	Internal logic circuits	230 mA at 24 VDC
Overvoltage category		II
EMC		Compliant with IEC 61131-2.
Vibration resistance		0.35 mm at 10 to 57 Hz, 50 m/s ² at 57 to 150 Hz
Shock resistance		150 m/s ² for 11 ms
Mounting		DIN Track (TH35-7.5/TH35-15 according to IEC 60715)
Operating temperature		-10 to 55°C
Humidity		10% to 95% (with no condensation)
Storage temperature		-40 to 70°C
Degree of protection		IP20
Weight		220 g max.

DeviceNet Communications Specifications

Item	Specifications			
Communications protocol	Conforms to DeviceNet and DeviceNet Safety.			
Topology	Combination of multi-drop and T-branch connections (for trunk or branch lines)			
Baud rate	125 kbps, 250 kbps, or 500 kbps			
Communications media	Special 5-wire cable (2 signal lines, 2 power lines, 1 shield line)			
Communications distances	Baud rate	Network length	Branch line length	Total branch line length
	500 kbps	100 m max. (100 m max.)	6 m max.	39 m max.
	250 kbps	250 m max. (100 m max.)	6 m max.	78 m max.
	125 kbps	500 m max. (100 m max.)	6 m max.	156 m max.
	Values in parentheses are the lengths when using Thin Cables.			
Communications power supply	11 to 25 VDC			
Maximum number of nodes	63 nodes			
Explicit message communications	Maximum message length: 511 bytes			

EtherNet/IP Communications Specifications

Item	Specifications
Media access method	CSMA/CD
Modulation method	Baseband
Transmission path	Star type
Baud rate	10 Mbit/s (10Base-T) 100 Mbit/s (100Base-TX)
Transmission media	Shielded twisted-pair cable (STP), categories 5, 5e
Transmission distance	100 m (distance between hub and nodes)
Number of cascade connections	No limit when a switching hub is used.

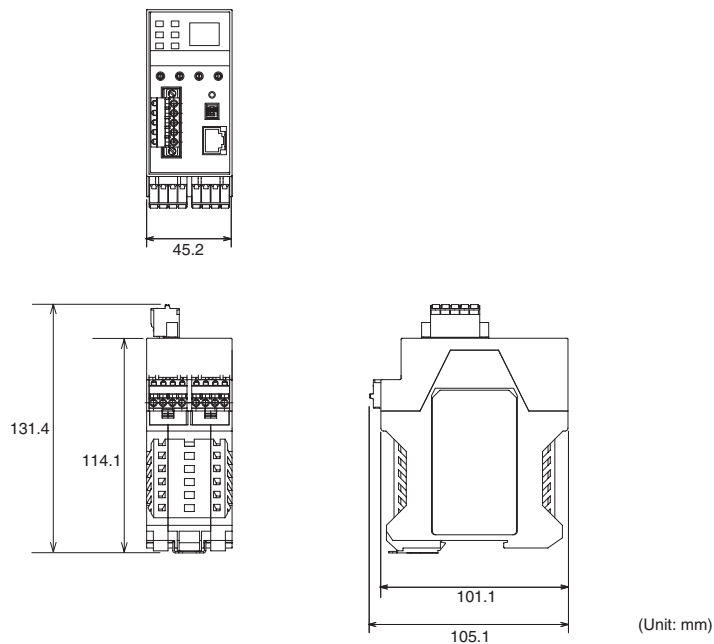
Item	Specifications
Number of CIP connections	128
Allowable Module communications bandwidth	6,000 pps (See note.)
Explicit message communications	Class 3 connection: Maximum message length of 502 bytes UCMM connection: Maximum message length of 502 bytes

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

CIP Routing Specifications

Item	Specifications
Port ID	EtherNet/IP: 2 (fixed) DeviceNet: 3 (fixed)
Number of routing connections	16

Dimensions

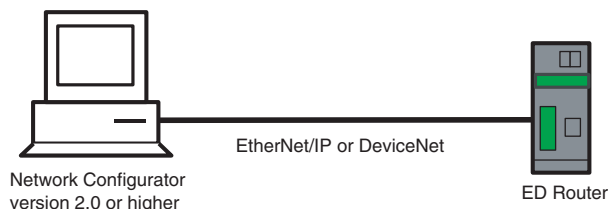


Appendix B

Settings from the Network Configurator

The following parameters can be set from the Network Configurator.

Note Network Configurator version 2.0 or higher is required to set the ED Router parameters.



Classification	Setting	Description	Initial value	Reference
ED Router device settings	Displayed address	Select whether the EtherNet/IP IP address or the DeviceNet node address is to be displayed at the ED Router 7-segment display under normal conditions.	DeviceNet node address	2-5 ED Router Settings
	UDP port number	Set a number from 1,024 to 65,535 as the UDP port number to be used for device access by UDP.	64,000	
DeviceNet settings	Baud rate for software settings	Select 125 Kbit/s, 250 Kbit/s, or 500 Kbit/s.	125 Kbit/s	2-3 Connecting to DeviceNet.
	Node address for software settings	Set an address from 0 to 63.	63 (decimal)	
Ethernet (EtherNet/IP) settings	IP address setting method	Select either acquire from BOOTP or use the next IP address ⁱ as the IP address setting method.	Use the next IP address	2-4 Connecting to Ethernet (EtherNet/IP)
	DNS usage	Select to either use or not use DNS.	Do not use DNS	
	IP address	Specify the IP address for when use the next IP address ⁱ is selected as the IP address setting method.	192.168.250.1	
	Network mask		255.255.255.0	
	Default gateway		None (0.0.0.0)	
	Primary DNS server	Specify the DNS server for when use DNS is selected.	None (0.0.0.0)	
	Secondary DNS server		None (0.0.0.0)	
	Domain name		None (0000 hex) A maximum of 48 ASCII characters can be set.	
	LINK settings	Select Auto, 10-Mbit/s half duplex, 10-Mbit/s full duplex, 100-Mbit/s half duplex, or 100-Mbit/s full duplex as the Ethernet (EtherNet/IP) baud rate.	Auto	

Glossary

Term	Definition
assembly	Internal data in a device gathered as one group to be accessed externally.
bit-strobe connection	One of the connection types for I/O communications in DeviceNet standard communications. For a bit-strobe connection, the Master broadcasts a message and the Slaves that receive the message return input data. Communications are performed on a communication cycle, just as for poll connections, but effective communications are possible for Input Slaves.
Busoff	Status that occurs when the error rate on the DeviceNet network is extremely high over a communications cable. An error is detected when the internal error counter in a device exceeds a certain threshold value. Countermeasures based on error corrective actions are required when a busoff occurs.
CAN	An acronym for Controller Area Network. CAN is a highly reliable yet low-cost communications protocol standardized by the ISO.
CIP	An acronym for Common Industrial Protocol. CIP is an open multivender communications protocol. It enables communications between various devices without restrictions due to network types or differences in devices. DeviceNet and EtherNet/IP and CIP networks.
CIP safety	A safety extension of the CIP that supports IEC 61508 SIL3 and EN 954-1 Safety Category 4. A safety layer is added to the CIP application layer so that traditional CIP communications and CIP safety communication can coexist simultaneously without interfering with each other, achieving highly reliable safety communications. DeviceNet Safety and EtherNet/IP Safety are CIP Safety-compliant networks based on DeviceNet and EtherNet/IP Safety.
configuration	Using the Network Configurator to build a network and set devices.
configuration data	The device setting parameters. Configuration data is set in devices using the Network Configurator. There are parameters related to safety functions and parameter not related to safety functions. Parameters related to safety functions are protected by a safety signature.
configuration lock	Indicates that device operation has been checked by user testing and that the parameters that have been set related to safety functions have been verified.
connection	A logical communications path used to communicate between devices.
connection type	The connection types are as follows depending on the communications method. DeviceNet Standard Communications • Poll connection • Bit-strobe connection • COS connection • Cyclic connection • Explicit message connection DeviceNet Safety Communications • Single-cast connection • Double-cast connection
COS connection	An acronym for Change of State. One of the connection types for I/O communications in DeviceNet standard communications. For this connection type, data is sent after a set period of time elapses, just as for a cyclic connection, but data can also be sent when data changes or a data send request is received from the application. Conditions depend on the device. A COS connection enables effective communications for changes in data or requests from applications without being dependent on the communications cycle of the Master. COS connections cannot be used at the same time as cyclic connections.

Glossary

Term	Definition
cyclic connection	One of the connection types for I/O communications in DeviceNet standard communications. For a cycle connection, data is sent after a set period of time elapses. A cyclic connection enables sending data on a cycle that is different from the communications cycle of the Master.
DeviceNet	A CIP-compliant network that uses CAN technology. DeviceNet is mainly used as a field network to connect controllers, sensors, and other devices.
DeviceNet Safety	A DeviceNet that complies with CIP Safety, i.e., IEC 61508 SIL3 and EN 954-1 Safety Category 4.
discrepancy time	The time period from a change in one of two inputs until the other input changes. When using a dual-channel input, a suitable time must be set depending on the characteristics of the connected devices.
dual channel	Using two inputs or outputs as the input or output for redundancy.
Dual Channel Complementary	Setting to evaluate that two logic states are complementary.
Dual Channel Equivalent	Setting to evaluate that two logic states are equivalent.
EPI	An acronym for Expected Packet Interval. The interval of safety data communications between the Safety Master and the Safety Slave through an established connection.
error latch time	The time period to hold an error state (control data, status data, and LED indications).
EtherNet/IP	A CIP-compliant network that uses TCP/IP technology. EtherNet/IP can coexist with other TCP/IP-based protocols in high-capacity, high-speed networks.
EtherNet/IP Safety	An EtherNet/IP network that complies with CIP Safety, i.e., IEC 61508 SIL3 and EN 954-1 Safety Category 4.
explicit message connection	A connection type for explicit messages in DeviceNet standard communications.
Fault Present	Several function blocks have Fault Present as an optional output. This is an error output that indicates that the applicable function block has detected an internal logic error or an input data timing error.
multi-cast connection	One of the connection types for DeviceNet Safety communications. With a multi-cast connection, multi-cast input data can be sent from a Safety Slave to up to 15 Safety Masters. This connection type can be set only for a Safety Slave input. It cannot be set for outputs. This connection type enables effective communications when sharing the data from one Safety Slave between more than one Safety Master.
Network Configurator	A software tool used to set networks and devices for CIP and CIP Safety.
node	A generic name for devices to which addresses are allocated in a network. Nodes are sometimes also called devices.
offline	The state in which a device is not connected to the network or in which communications are not possible because they have not been set from the Network Configurator.
online	The state in which communications through the network are possible.
open type	The opening method for a safety connection. One of three types is selected in the settings of a connection to the Safety Master. Refer to 5-1 Setting Safety Connections in the <i>DeviceNet Safety System Configuration Manual</i> (Cat. No. Z905) for details. • Configuring the target device • Checking the safety signature • Only opening
PFD	An acronym for Probability of Failure on Demand. Shows the average failure rate for a system or device demand. Used for calculating the SIL (Safety Integrity Level) for a safety system.
PFH	An acronym for Probability of Failure per Hour. Shows the failure rate per hour for a system or device. Used for calculating the SIL (Safety Integrity Level) for a safety system.

Glossary

Term	Definition
poll connection	One of the connection types for I/O communications in DeviceNet standard communications. For a poll connection, output data is sent from the Master and Slaves that receive the output data return input data. This connection type is used for cyclic communications with Slaves that have both inputs and outputs.
reaction time	The worst-case response time required to move the system to a safe state after a safety input occurs (e.g., an emergency stop switch is pressed, a light curtain is interrupted, or a safety door is opened) or a device fails. The system reaction time includes the reaction time of sensors and actuators, just as it includes the reaction time of controllers and networks.
safe state	The state of a component or device when the risk of human harm reduced to a permissible level.
safety chain	The logical chain to actualize a safety function, that consists of the input device (sensor), the control device (including a remote I/O device), and the output device (actuator).
safety controller	A controller with high reliability used for safety control. A safety network controller is a controller that is compatible with a safety network. Safety controllers and safety network controllers are sometimes generically referred to as safety PLCs.
safety network controller	
safety data	Extremely reliable data, with the risk of human harm reduced to a permissible level.
safety function	A function executed by a safety-related system to achieve a safe state for a machine hazard.
safety network number	A unique number set for a safety network. With CIP Safety, a system can be built that included multiple networks. In this type of configuration, devices are uniquely identified and mutually confirmed using a TUNID that combines the network number and node address. The Network Configurator automatically sets network numbers for communications. Network numbers can also be specified by the user.
safety protocol	The communications hierarchy added to actualize highly reliable communications.
safety signature	A certificate of the configuration data issued to a device from the Network Configurator. The device verifies that the configuration data is correct by using the safety signature.
single channel	Using only one input or output as the input or output.
single-cast connection	One of the connection types for DeviceNet Safety communications. With a single-cast connection, a Safety Master and Safety Slave communications 1:1. This connection can be set for either an input or an output, and separate connections are needed for each.
standard	In this manual, items used for general control purposes are called “standard” to differentiate them from devices, functions, data, and other items for which which safety measures have been applied.
test pulse	A signal used to detect external wiring coming into contact with the power supply (positive) or short circuits between signal lines.
TUNID	An acronym for Target Unique Network Network Identifier. The TUNID is the UNID of the local node. The TUNID is automatically set when configuring devices with the Network Configurator. The set TUNID is saved in nonvolatile memory in the device and used in the future.
UNID	An acronym for Unique Network Network Identifier. An ID used to uniquely identify once device in and configuration of multiple networks. The UNID consists of the Safety Network number and node address.

Revision History

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

Cat. No. Z912-E1-01



Revision code

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
01	July 2007	Original production