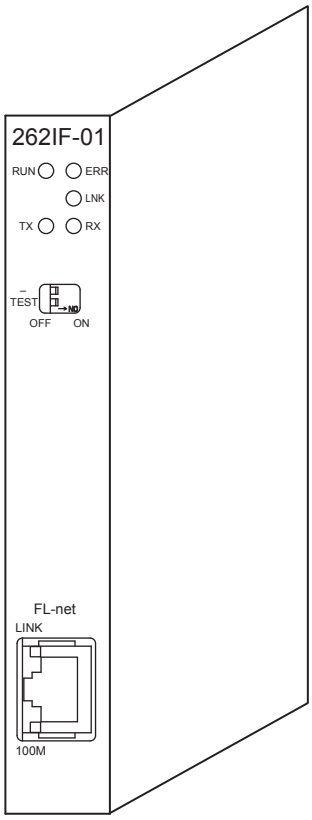
YASKAWA

Machine Controller MP2000 Series

262IF-01
FL-net Communication Module
USER'S MANUAL

Model: JAPMC-CM2303-E



MANUAL NO. SIEP C880700 36C

Using this Manual

Read this manual thoroughly before using 262IF-01. This manual describes MP2000 Series Machine Controller FL-net Communication Module 262IF-01. Keep this manual in a safe place for future reference.

■ Basic Terms

Unless otherwise specified, the following definitions are used:

• MP2000 Series Machine Controller:	MP2100M, MP2200, MP2300, MP2310, and MP2300S Machine Controllers
• PLC:	Programmable Logic Controller
• MPE720:	The Programming Device Software or a personal computer running the Programming Device Software

■ Manual Configuration

This manual consists of the chapters listed in the following table. Read the chapters of this manual as required by the purpose.

Purpose / Chapter	Selecting Models and Peripheral Devices	Studying Specifications and Ratings	Designing the System	Panel Installation and Wiring	Trial Operation	Maintenance and Inspection
Chapter 1 FL-net Overview	✓	–	✓	–	–	–
Chapter 2 Overview of 262IF-01 Module	✓	✓	✓	✓	✓	✓
Chapter 3 Mounting and Starting the Module	–	✓	✓	✓	✓	✓
Chapter 4 FL-net Transmission Definition	–	✓	✓	–	✓	✓
Chapter 5 Details of FL-net	✓	–	✓	✓	✓	✓
Chapter 6 Message Send and Receive Functions	–	–	✓	–	✓	–
Chapter 7 Troubleshooting	–	✓	✓	✓	✓	✓

■ Graphic Symbols Used in this Manual

The graphic symbols used in this manual indicate the following type of information.

• This symbol is used to indicate important information that should be memorized or minor precautions, such as precautions that will result in alarms if not heeded.

■ Indication of Reverse Signals

In this manual, the names of reverse signals (ones that are valid when low) are written with a forward slash (/) before the signal name, as shown in the following example:

<Notation Examples> $\overline{\text{S-ON}}$ = /S-ON

$\overline{\text{P-CON}}$ = /P-CON

■ Related Manuals

The following table lists the manuals relating to the MP2000 Series Machine Controller 262IF-01 Module. Refer to these manuals as required.

Manual Name	Manual Number	Contents
Machine Controller MP2100/MP2100M User's Manual Design and Maintenance	SIEPC88070001	Describes how to use the MP2100 and MP2100M Machine Controllers.
Machine Controller MP2200 User's Manual	SIEPC88070014	Describes how to use the MP2200 Machine Controller and the modules that can be connected.
Machine Controller MP2300 Basic Module User's Manual	SIEPC88070003	Describes how to use the MP2300 Basic Module and the modules that can be connected.
Machine Controller MP2310 Basic Module User's Manual	SIEPC88073201	Describes how to use the MP2310 Basic Module and the modules that can be connected.
Machine Controller MP2300S Basic Module User's Manual	SIEPC88073200	Describes how to use the MP2300S Basic Module and the modules that can be connected.
Machine Controller MP2000 Series Motion Module Built-in SVB/SVB-01 User's Manual	SIEPC88070033	Provides a detailed description on the MP2000 Series Machine Controller built-in SVB Module and slot-mounting optional SVB-01 Module.
Machine Controller MP2000 Series Communication Module User's Manual	SIEPC88070004	Provides the information on the Communication Module that can be connected to MP2000 Series Machine Controller and the communication methods.
Machine Controller MP900/MP2000 Series User's Manual: Ladder Programming	SIE-C887-1.2	Describes the instructions used in MP900/MP2000 ladder programming.
Machine Controller MP2000 Series User's Manual: Motion Programming	SIEPC88070038	Describes the instructions used in MP2000 motion programming.
Machine Controller MP2000 Series MPE720 Programming Device Version 6 User's Manual	SIEPC88070030	Describes how to install and operate the programming tool MPE720 version 6 for MP2000 Series Machine Controllers.
Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual	SIEPC88070005	Describes how to install and operate the MP900/MP2000 Series programming system (MPE720).
Machine Controller MP900/MP2000 Series New Ladder Editor Programming Manual	SIE-C887-13.1	Describes the programming instructions of the New Ladder Editor, which assists MP900/MP2000 Series design and maintenance.
Machine Controller MP900/MP2000 Series New Ladder Editor User's Manual	SIE-C887-13.2	Describes the operating methods of the New Ladder Editor, which assists MP900/MP2000 Series design and maintenance.
Machine Controller MP920 User's Manual Communication Modules	SIE-C887-2.6	Describes the functions, specifications, and application methods of the MP920 Communication Modules (217IF, 215IF, and 218IF).

■ Copyrights

Safety Information

The following conventions are used to indicate precautions in this manual. Information marked as shown below is important for the safety of the user. Always read this information and heed the precautions that are provided. The conventions are as follows:

⚠ WARNING	Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.
⚠ CAUTION	Indicates precautions that, if not heeded, could result in relatively serious or minor injury, or property damage. If not heeded, even precautions classified under ⚠ CAUTION can lead to serious results depending on circumstances.
⃠ PROHIBITED	Indicates prohibited actions. Specific prohibitions are indicated inside ⃠. For example,  indicates no fire or open flame.
MANDATORY	Indicates mandatory actions. Specific actions are indicated inside ●. For example,  indicates that grounding is required.

Safety Precautions

The following precautions are for checking products on delivery, storage, transportation, installation, wiring, operation, application, inspection, and disposal. These precautions are important and must be observed.

■ General Precautions

⚠ WARNING

- Before starting operation while connected to the machine, ensure that an emergency stop procedure has been provided and is working correctly.
  There is a risk of injury.
- Do not touch anything inside the product.
  There is a risk of electrical shock.
- Always keep the front cover attached when power is being supplied.
  There is a risk of electrical shock.
- Observe all procedures and precautions given in this manual for trial operation.
  Operating mistakes while the Servomotor and machine are connected can cause damage to the machine or even accidents resulting in injury or death.
- Do not remove the front cover, cables, connector, or options while power is being supplied.
  There is a risk of electrical shock.
- Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.
  There is a risk of electrical shock, operational failure of the product, or burning.
- Do not attempt to modify the product in any way.
  There is a risk of injury or device damage.
- Do not approach the machine when there is a momentary interruption to the power supply. When power is restored, the MP2000 Series Machine Controller or machine connected to it may start operation suddenly. Provide suitable safety measures to protect people when operation restarts.
  There is a risk of injury.
- Do not allow installation, disassembly, or repairs to be performed by anyone other than specified personnel.
  There is a risk of electrical shock or injury.

■ Storage and Transportation

⚠ CAUTION

- Do not store or install the product in locations subject to the following. There is a risk of fire, electric shock, and machine product damage.
  - Direct sunlight
  - Ambient temperatures exceeding the storage or operating conditions
  - Ambient humidity exceeding the storage or operating conditions
  - Extreme changes in temperature that would result in condensation
  - Corrosive or flammable gas
  - Excessive dust, dirt, salt, or metallic powder
  - Water, oil, or chemicals
  - Vibration or shock
- Do not overload the product during transportation.
  There is a risk of injury or an accident.
- Never subject the product to an atmosphere containing halogen (fluorine, chlorine, bromine, or iodine) during transportation or installation.
  There is a risk of device damage or an accident.
- If disinfectants or insecticides must be used to treat packing materials such as wooden frames, pallets, or plywood, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.
  Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.
  If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.

■ Installation

⚠ CAUTION

- Never use the product in locations subject to water, corrosive atmospheres, or flammable gas, or near burnable objects.
  There is a risk of electrical shock or fire.
- Do not step on the product or place heavy objects on the product.
  There is a risk of injury.
- Do not block the air exhaust port on the product. Do not allow foreign objects to enter the product.
  There is a risk of element deterioration inside, an accident, or fire.
- Always mount the product in the specified orientation.
  There is a risk of an accident.
- Do not subject the product to strong shock.
  There is a risk of an accident.

■ Wiring

⚠ CAUTION

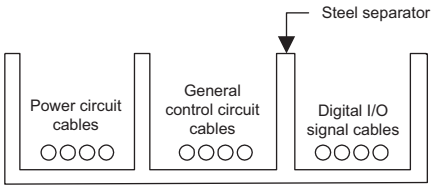
- Check the wiring to be sure it has been performed correctly.
  There is a risk of motor run-away, injury, or an accident.
- Always use a power supply of the specified voltage.
  There is a risk of burning.
- In places with poor power supply conditions, take all steps necessary to ensure that the input power is supplied within the specified voltage range.
  There is a risk of device damage.
- Install breakers and other safety measures to provide protection against shorts in external wiring.
  There is a risk of fire.
- Provide sufficient shielding when using the product in the locations subject to the following.
  There is a risk of device damage.
  - Noise, such as from static electricity
  - Strong electromagnetic or magnetic fields
  - Radiation
  - Near power lines

■ Selecting, Separating, and Laying External Cables

⚠ CAUTION

- Consider the following items when selecting the I/O signal lines (external cables) to connect the product to external devices.
  - Mechanical strength
  - Noise interference
  - Wiring distance
  - Signal voltage, etc.
- Separate the I/O signal lines from the power lines both inside and outside the control box to reduce the influence of noise from the power lines.
  If the I/O signal lines and power lines are not separated properly, malfunctioning may result.

Example of Separated External Cables



■ Maintenance and Inspection Precautions

⚠ CAUTION
• Do not attempt to disassemble the product. There is a risk of electrical shock or injury. • Do not change wiring while power is being supplied. There is a risk of electrical shock or injury.

■ Disposal Precautions

⚠ CAUTION
• Dispose of the product as general industrial waste.

■ General Precautions

Observe the following general precautions to ensure safe application.
• The products shown in illustrations in this manual are sometimes shown without covers or protective guards. Always replace the cover or protective guard as specified first, and then operate the products in accordance with the manual. • The drawings presented in this manual are typical examples and may not match the product you received. • If the manual must be ordered due to loss or damage, inform your nearest Yaskawa representative or one of the offices listed on the back of this manual.

Warranty

(1) Details of Warranty

■ Warranty Period

The warranty period for a product that was purchased (hereinafter called “delivered product”) is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

■ Warranty Scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the warranty period above. This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.
This warranty does not cover failures that result from any of the following causes.

1. Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
2. Causes not attributable to the delivered product itself
3. Modifications or repairs not performed by Yaskawa
4. Abuse of the delivered product in a manner in which it was not originally intended
5. Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
6. Events for which Yaskawa is not responsible, such as natural or human-made disasters

(2) Limitations of Liability

1. Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
2. Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
3. The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
4. Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

(3) Suitability for Use

1. It is the customer's responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
2. The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
3. Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
    - Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals
    - Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
    - Systems, machines, and equipment that may present a risk to life or property
    - Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
    - Other systems that require a similar high degree of safety
4. Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
5. The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
6. Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

(4) Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

Contents

1

FL-net Overview

This chapter gives an overview of FL-net.

- For details on FL-net, refer to *Chapter 5 Details of FL-net*.

1.1 What is FL-net?

As shown in Fig. 1.1, FL-net is a network capable of interconnecting various FA controllers such as the programmable controllers (PLC) and computer numeric control equipment (CNC) from many manufacturers, and personal computers for control and monitoring.

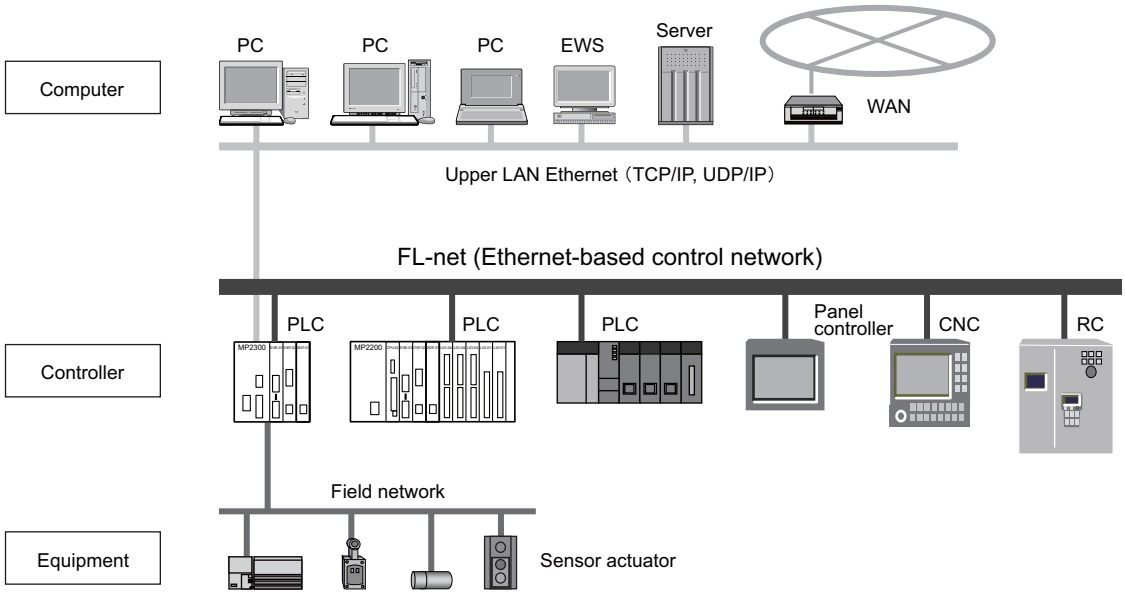


Fig. 1.1 Example of FA Control Network Configuration

1.2 FL-net Protocol

The following shows a basic FL-net protocol structure.

Application layer	Controller or interface	
FA link protocol layer	Cyclic transmission	Service function
		Message transmission
	Token function	
Transport layer	UDP	
Network layer	IP	
Data link layer	Ethernet (Based on IEEE802.3)	
Physical layer		

FL-net protocol

Fig. 1.2 Basic FL-net Protocol Structure

The transport and network layers use UDP/IP, while the data link and physical layers use Ethernet.

1.3 FL-net Features

FL-net has the following features:

- Open control network
- Realization of multi-vendor environments
- FL-net is capable of interconnecting controllers such as the programmable controllers (PLC) and computer numeric control equipment (CNC) from many manufacturers, and personal computers for control and monitoring.

In addition, FL-net has the following features.

■ Compliant with Worldwide Standards

Efficient communication based on standard UDP/IP is realized as well as de facto standard Ethernet for OA equipment communication. Ethernet provides the following advantages.

– Low cost

Prevailing communication devices can be used, resulting in low cost.

– Availability of prevailing network devices

A wide variety of prevailing network devices such as transceivers, hubs, cables, and PC LAN cards for Ethernet can be used.

– Realization of high-speed communication

In the future, the baud rate can be increased to support 10 Mbps, 100 Mbps, and 1 Gbps.

– Communication via optical fiber cables

The prevailing Ethernet optical repeater allows optical fibers to be used in the corresponding section for communication over distances of 500 m or more, improves noise resistance, and prevents of surge currents caused by lightning strikes in outside wiring.

■ Support of Necessary Communication Functions between FA Controllers

Because user requirements are fully examined as specifications, various features required for FA are supported.

– Large network

A maximum of 254 pieces of equipment (nodes) can be connected.

– Support of two types of communication functions according to purpose

The common memory function allows each node to share the same data through cyclic communication, and the message communication function allows only necessary information to be transferred on demand.

– Large common memory

A large common memory (8 kbits + 8 kwords) is supported.

– Fast response

A fast response of 50 ms/32 nodes (2 kbits +2 kwords) can be realized.

– High reliability by masterless system

Because no master station is needed, each node can join or leave without affecting communications between other nodes. Thus, each node can be turned ON or OFF and maintained independently.

1.4 FAQ on FL-net

The following gives a list of frequently asked questions and answers.

	Question	Answer
1	What is Ethernet?	Ethernet refers to a cable type specification, and is available with local area networks (LAN). Ethernet enables data transfer between computers at a baud rate from 10 Mbps to 100 Mbps. Presently, the prevailing Ethernet cable for office automation is a 100-Mbp twisted pair cable (UTP). Ethernet allows communication through the use of multi-vendor software protocols.
2	What is FL-net?	FL-net refers to a network capable of interconnecting FA controllers such as programmable controllers (PLC) and computer numeric control (CNC) equipment so as to transfer control data at high speed between controllers. Cables are identical to those employed for Ethernet.
3	What is the difference between FL-net and Ethernet?	Ethernet is used to connect controllers to the host computer or PC so that production directions can be given or performance information can be obtained for informational or control purposes. On the other hand, FL-net is used to connect controllers for high-speed control data transfer. When one controller is used for both an FL-net to connect controllers and an Ethernet to connect controllers to the host devices, care should be taken for correct cable connection.
4	How should we use the FN-net unit?	The FL-net unit should be installed in FA controllers such as a programmable controller (PLC) and computer numeric control (CNC) equipment so that data transfer can take place cyclically between the controllers as long as link assignments for station numbers (node numbers) and common memory (also called “link register”) are simply made in the same manner as for regular PLC CPU link units. In this case, no special communication program is required for PLC, etc. In addition, when PLC memory contents or communication parameters are read or written from PC, no special communication program is required for PLC, etc. However, note that each controller should be provided with a communication program when data transfer is attempted between controllers through message transmission.
5	What is a protocol? What protocol is supported by FL-net?	Protocol refers to a set of rules required for communication. FL-net employs an FL-net-dedicated FA link protocol that lies in the UDP/IP or upper layers.
6	Does FL-net allow general PC connections?	The FL-net units to be installed in FA controllers such as a programmable controller (PLC) and computer numeric control (CNC) equipment are intelligent units with processors on their boards. Because PC Ethernet cards are non-intelligent cards called “dumb cards,” it is generally recommended to use FL-net boards according to PC performance and usage.
7	What is topology?	A networking topology refers to a network wiring method. Though star (tree), bus, and ring topologies are available as main topologies, they can be understood more easily from a viewpoint of logical wiring rather than physical wiring. A star topology is used for 10BASE-T/100BASE-TX in FL-net. On the other hand, a bus topology is used for 10BASE5 in FL-net.
8	What types of network cables are available? How long are the cables and how many nodes can be connected to them?	The following summarizes the standards, characteristics, and restrictions of the most popular Ethernet cables. • 10BASE-T/100BASE-TX: Twisted pair cable (UTP), maximum transmission distance per segment: 100 m (500 m), maximum number of connectable nodes per segment: 254 • 10BASE5: Thick coaxial cable (yellow cable), maximum transmission distance per segment: 500 m (2,500 m), maximum number of connectable nodes per segment: 100 (254) • 10BASE-FL/100BASE-FX: Optical fiber cable, maximum transmission distance per segment: 2,000 m, maximum number of connectable nodes per segment: 254 * Values in ( ) assume the use of repeaters.
9	When a system uses FL-net, does it need a special Ethernet?	No. To build an FL-net system, Ethernet is used (which is formally compliant with IEEE802.3). Special specifications are not required.
10	How should we make FL-net connections?	Different types of Ethernet media can be interconnected with Ethernet cables through repeaters, media conversion adaptors, etc. These products can be purchased from many vendors.

(cont'd)

	Question	Answer
11	What cable should be used to build an FL-net system?	Generally, cables should be used as follows. • 10BASE5 (thick coaxial cable: yellow cable) is used for the backbone. • 10BASE-T/100BASE-TX (twisted pair cable: UTP category 5) is used for cabling in control panels and offices. • 10BASE-FL/100-BASE-FX (optical fiber cable) is used for cabling near high-voltage power supplies or places affected by electrical noise.
12	How should we set FL-net IP addresses?	The FL-net IP addresses are: Network address: 192.168.250, Host number (node number): 1 to 254 These settings are standard. Note that numbers 250 to 254 have been reserved for use by maintenance tools.
13	How conformance and interconnectivity have been assured among FL-net support devices?	There is an FL-net certification organization that conducts conformance and interconnectivity tests. Because certificates are issued to devices that have passed the tests, they can be used safely.

1.5 Basic FL-net Terminology

The following gives an overview of basic FL-net terminology.

FA equipment

Refers to an FA system component device connected to FL-net. Control equipment (controllers) such as the programmable controller (PLC), computer numeric control (CNC) equipment, and personal computer (PC) are all classified as FA equipment.

Network

Refers to a local area network (LAN) whose data link level complies with IEEE802.3 in FL-net. The existing standard supports a baud rate of 10 Mbps in both 10BASE5 and 10BASE-T.

Node

Refers to FA equipment connected to FL-net. Each node is assigned a node number (1 to 254) for identification.

Communication unit

Generally, refers to a set of a communication board and communication module necessary for communication via FL-net.

Networking equipment

Refers to IEEE802.3-compliant communication devices such as communication cables, transceivers, and hubs necessary for communication via FL-net.

Switching hub

Refers to a hub (line concentrator) equipped with a bridge function. A received packet is temporarily stored in the buffer for regenerative relaying.

Repeater hub

Refers to a hub (line concentrator) equipped with functions for electrically regenerating and relaying transmission signals on cables.

2

Overview of 262IF-01 Module

This chapter describes the 262IF-01 Module specifications and system configuration examples.

2.1 Overview of 262IF-01 Module

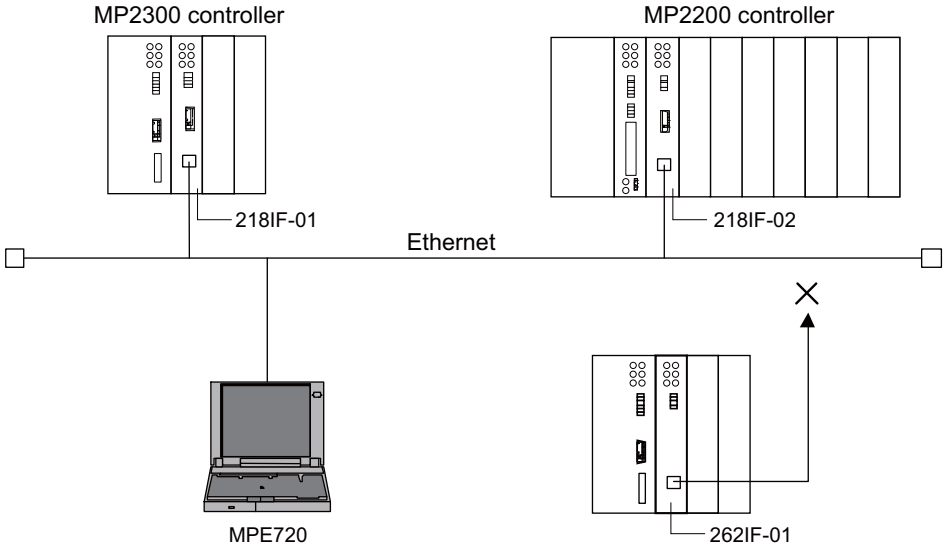
The 262IF-01 has been designed as a communication module for connecting to FL-net via an Ethernet interface (100BASE-TX or 10BASE-T). FL-net allows this module to be connected to equipment of other manufacturers. The 262IF-01 supports FL-net Version 2.0.

■ Notes on 262IF-01

The 262IF-01 Module has been designed as a communication module dedicated for use in FL-net. Note the following points:

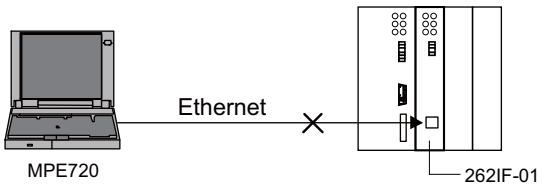
① The 262IF-01 cannot be connected to a regular Ethernet from the 218IF-01 or 218IF-02.

Though the 262IF-01 Module uses a standard Ethernet cable, it does not allow connection for communications based on general-purpose TCP/IP or UDP/IP because it serves only as an FL-net-dedicated module.

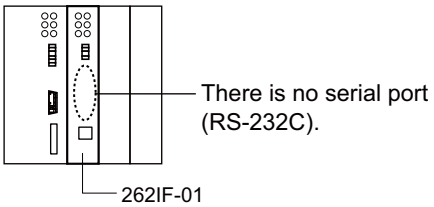


② The MPE720 engineering tool cannot be connected to the 262IF-01 directly.

When connecting the MPE720, separately prepare a module with any of the RS232C, Ethernet, and CP-215 ports for connection.



③ The 262IF-01 is not equipped with a serial port (RS-232C).



2.1.1 Module Specifications

This section provides the specifications of the 262IF-01 Module.

(1) Hardware Specifications

Item	Specifications
Name	262IF-01
Model Number	JAPMC-CM2303-E
Communication Port	FL-net: 1 port
Indicators	Module status indicators LED RUN (green) ERR (red) LNK (green) TX (green) RX (green)
	FL-net status indicator LED LINK (orange), 100M (green)
Switch	TEST
Dimensions (mm)	125 × 95 mm (H × D)
Mass	80 g

(2) Transmission Specifications

Item		Specifications	
		100BASE-TX	10BASE-T
Ethernet Transmission Specifications	Interface	RJ-45 connector	
	Compliance Standard	IEEE802.3u	IEEE802.3i
	Media Access Mode	CSMA/CD	
	Communication Mode	Full duplex/half duplex	
	Modulation Method	Baseband	
	Transmission Path Type	Star topology	
	Baud Rate	100 Mbps	10 Mbps
	Maximum Number of Cascade Connections	2 layers	4 layers
	Transmission Path Length (Full length at repeater usage)	100 m (205 m max.*1)	100 m (500 m max.*1)
	Transmission Media	Twisted pair cable (UTP) Category 5 or 5e Twisted pair cable (STP) Category 5 or 5e (100 W)	Twisted pair cable (UTP) Category 3, 4, 5, or 5e Twisted pair cable (STP) Category 3, 4, 5, or 5e (100 W)
	Maximum Segment Length	100 m (distance between hub and node at UTP usage)	
	Link Function	Support for auto-negotiation	
		Support for Auto MDI/MDI-X	
FL-net Specifications	Transmission Control System	Token passing	
	IP Address	Class C is used. 192. 168. 250.□□□ is used as standard (□□□ indicates a number from 1 to 254 and corresponds to a node number).	
	Port Number	For receiving: 3 ports (55000, 55001, and 55002) are used by the system. For sending: 1 port (55003) is used by the system.	
	Protocol	FA link protocol	
	Version	2.0	

(cont'd)

Item		Specifications	
		100BASE-TX	10BASE-T
Cyclic Transmission Specifications	Number of Nodes	Up to 254 nodes (at repeater usage) (262IF-01 I/O can be assigned to 64 nodes only including the self-node.) *2	
	Maximum Data Size	Within network: Area 1 (bit data): 8 kbits Area 2 (word data): 8 kwords Per station: Area 1 + area 2: Area allocation is allowed up to 8 kbits + 8 kwords.	
	Data Exchange	N : N	
Message Transmission Specifications	Number of Message Channels	10	
	Engineering Communication	Not supported	
	Message Service	Word block read, word block write, network parameter read, network parameter write*3, stop command*3, start command*3, profile read, transparent message, log data read, log data clear, message loopback	
	Number of Transmission Words	Up to 512 words	

∗ 1. The cable length restriction in repeater (repeater hub or switching hub) usage varies depending on a selected baud rate.
For repeater or switching hubs, use a commercially available hub for Ethernet. Hubs manufactured by the Japan Electrical Manufacturer's Association (JEMA) are recommended.

• Restrictions on 100BASE-TX connection

Item	When Repeater Hub Is Connected	When Switching Hub Is Connected
Cable length between node and hub	100 m or less	100 m or less
Cable length between hubs	5 m or less	100 m or less
Number of hubs between nodes	Up to 2 hubs	Not limited

• Restrictions on 10BASE-T connection

Item	When Repeater Hub Is Connected	When Switching Hub Is Connected
Cable length between node and hub	100 m or less	100 m or less
Cable length between hubs	100 m or less	100 m or less
Number of hubs between nodes	Up to 4 hubs	Not limited

∗ 2. The I/O assignment restriction, which defines that the maximum number of nodes as 64 nodes including the self-node, is based on MP Series Machine Controller specifications.

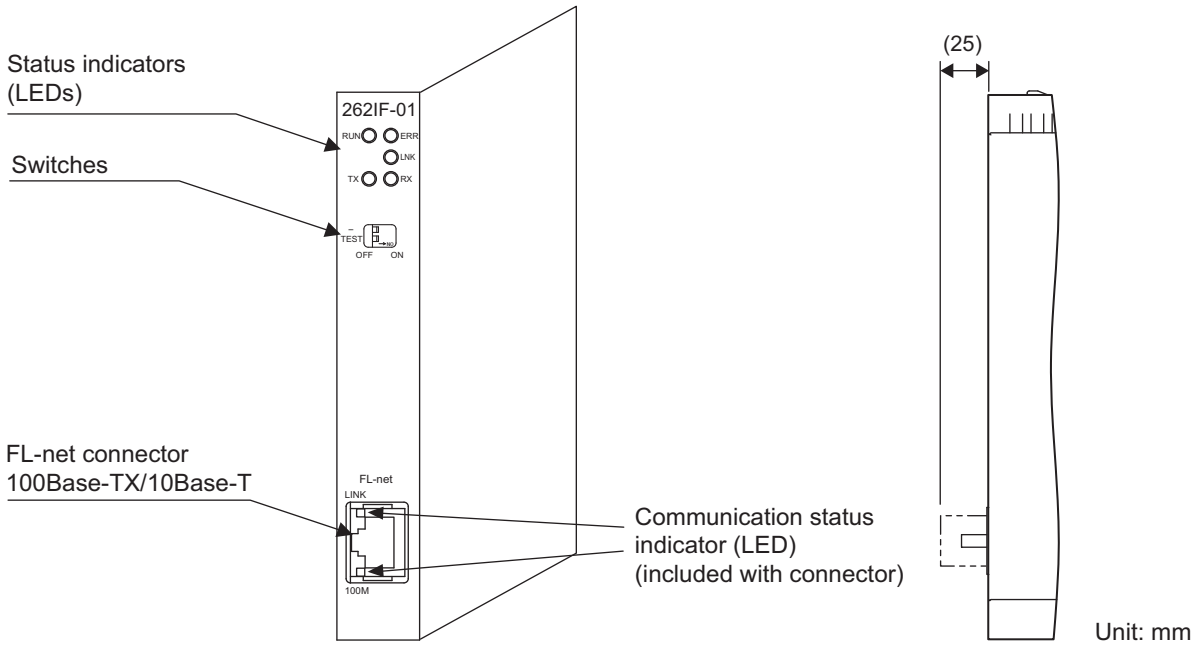
∗ 3. A message can be only sent from the client. (Client: Data sending side, Server: Data receiving side)

(3) Operating Environment Specifications

Item		Specifications
Environmental Conditions	Ambient Operating Temperature	0 to +55 °C
	Ambient Storage Temperature	-25 to +85 °C
	Ambient Operating Humidity	30% to 95% (with no condensation)
	Ambient Storage Humidity	5% to 95% (with no condensation)
	Pollution Level	Pollution level: 2 (conforming to JIS B3502)
	Corrosive Gas	There must be no combustible or corrosive gas.
	Operating Altitude	2,000 m above sea level or lower
Mechanical Operating Conditions	Vibration Resistance	Conforming to JIS B3502 (1) Frequency: 16.7 Hz Vibration strength: 14.7 m/s^2 (2) Frequency: 10 to 57 Hz Vibration strength: 0.075 mm of single-amplitude (3) Frequency: 57 to 150 Hz Vibration strength: 9.8 m/s^2 of fixed acceleration
	Shock Resistance	Conforming to JIS B3502 Peak acceleration of 147 m/s^2 (15G) twice for 11 ms each in the X, Y, and Z directions
Electrical Operating Conditions	Noise Resistance	Conforming to EN 61000-6-2, EN 61000-6-4, EN 55011 (Group 1 Class A)
Installation Requirements	Ground	Ground to 100Ω max.
	Cooling Method	Natural cooling

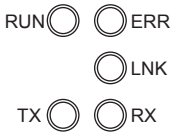
2.1.2 Appearance and Connectors

The following diagram shows the appearance of the 262IF-01 Module and gives the external dimensions of the connectors.



2.1.3 Status Indicators (LEDs)

The following table shows the status of the 262IF-01 Module shown by the LED indicators.



Indicator	Color	Meaning When Lit	Meaning When Blinking	Meaning When Not Lit
RUN	Green	Operating normally	–	An error has occurred.
ERR	Red	–	• When RUN is lit: Parameter setting error • When RUN is not lit: Hardware error	Normal
LNK	Green	Joining FL-net	–	Not joining FL-net
TX	Green	Sending data	–	Not sending data
RX	Green	Receiving data	–	Not receiving data

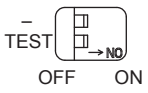
2.1.4 Communication Status Indicators (LED) (Included with Ethernet Connector)

The indicators (LEDs) included with the Ethernet connector show the status of Ethernet communication.

Indicator	Color	Meaning When Lit	Meaning When Not Lit
LINK	Yellow	FL-net link established.	FL-net link not established.
100M	Green	Green: 100 Mbps	10 Mbps or not connected

2.1.5 Switch Settings

The following table shows the 262IF-01 Module switch settings.



Label (Switch No.)	Name	Status	Function	Factory Setting
– (2)	–	ON / OFF	–	OFF
TEST (1)	Operating Mode Selection	ON / OFF	Reserved • Leave this switch set to OFF.	OFF

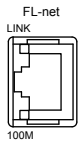
- Always leave the unused switches (3 and 4) set to OFF.

2.2 Connection Specifications

2.2.1 Connector Specifications

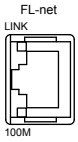
This section provides the connector specifications for the 262IF-01 Module.

(1) Connector Specifications

Connector Shape	Name	Connector Name	No. of Pins	Connector Model		
				Module	Cable	Manufacturer
	FL-net	FL-net	8	JOG-0001NL (LED/Pulse transformer built-in modular jack)		Pulse Engineering

(2) Connector Pin Arrangement

The connector is used to connect the MP2000 Series Machine Controller to the devices on the FL-net via an FL-net connection.



Pin Number	Signal Name	IO	Description	Pin Number	Signal Name	IO	Description
1	TXD+	O	Send data+	5	–	–	–
2	TXD-	O	Send data-	6	RXD-	I	Receive data-
3	RXD+	I	Receive data+	7	–	–	–
4	–	–	–	8	–	–	–

2.2.2 Cable Specifications

Yaskawa does not provide FL-net cables. Obtain a commercially available category 5 cross or straight cable.

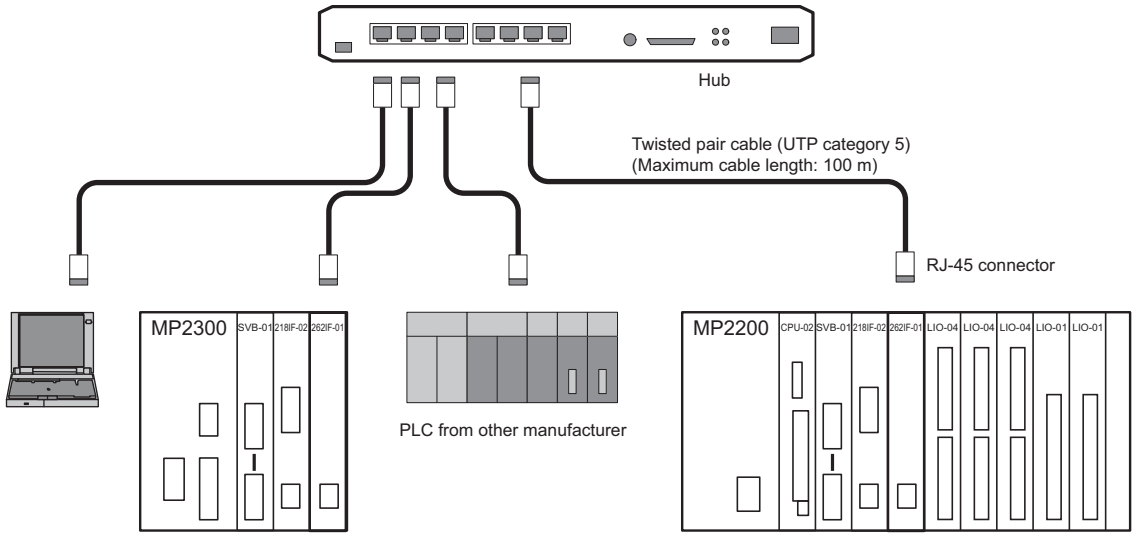
- The AUTO MDI/MDI-X automatically determines cross/straight when using the 262IF-01 Module.

2.3 System Configuration Example

The following shows a system configuration example using the 262IF-01.

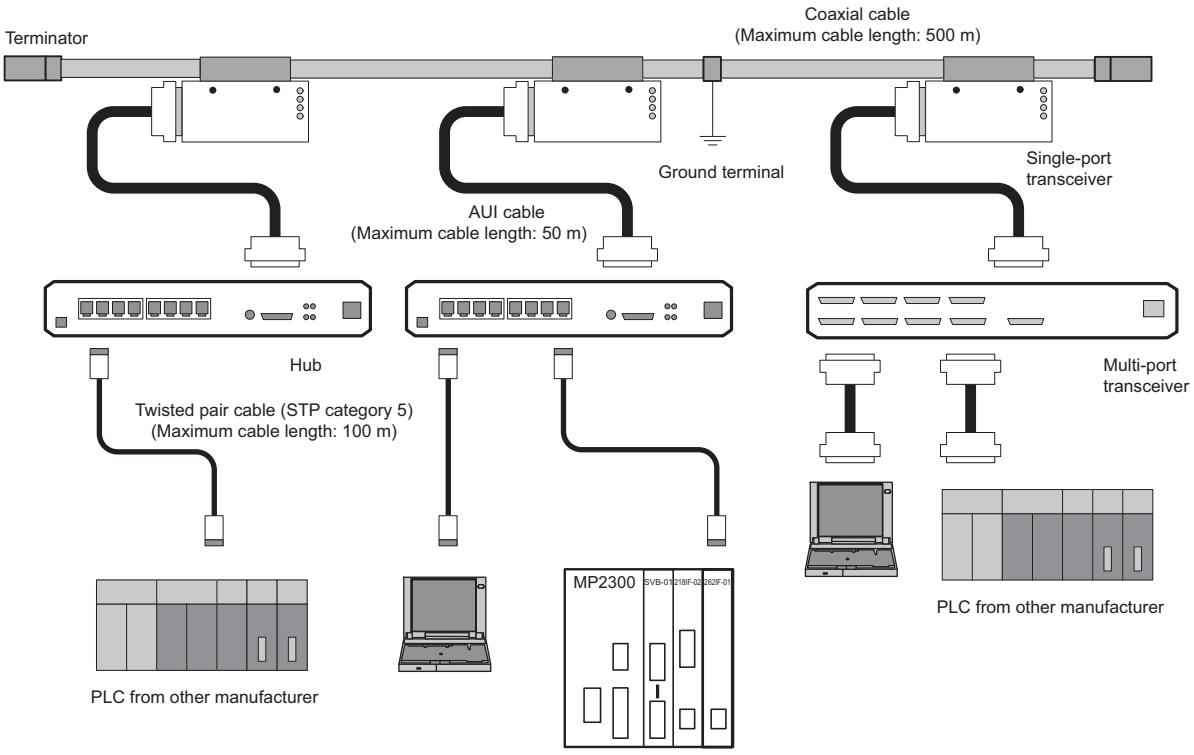
2.3.1 Small-scale Configuration

A network system of several devices can be constructed through the use of one hub.



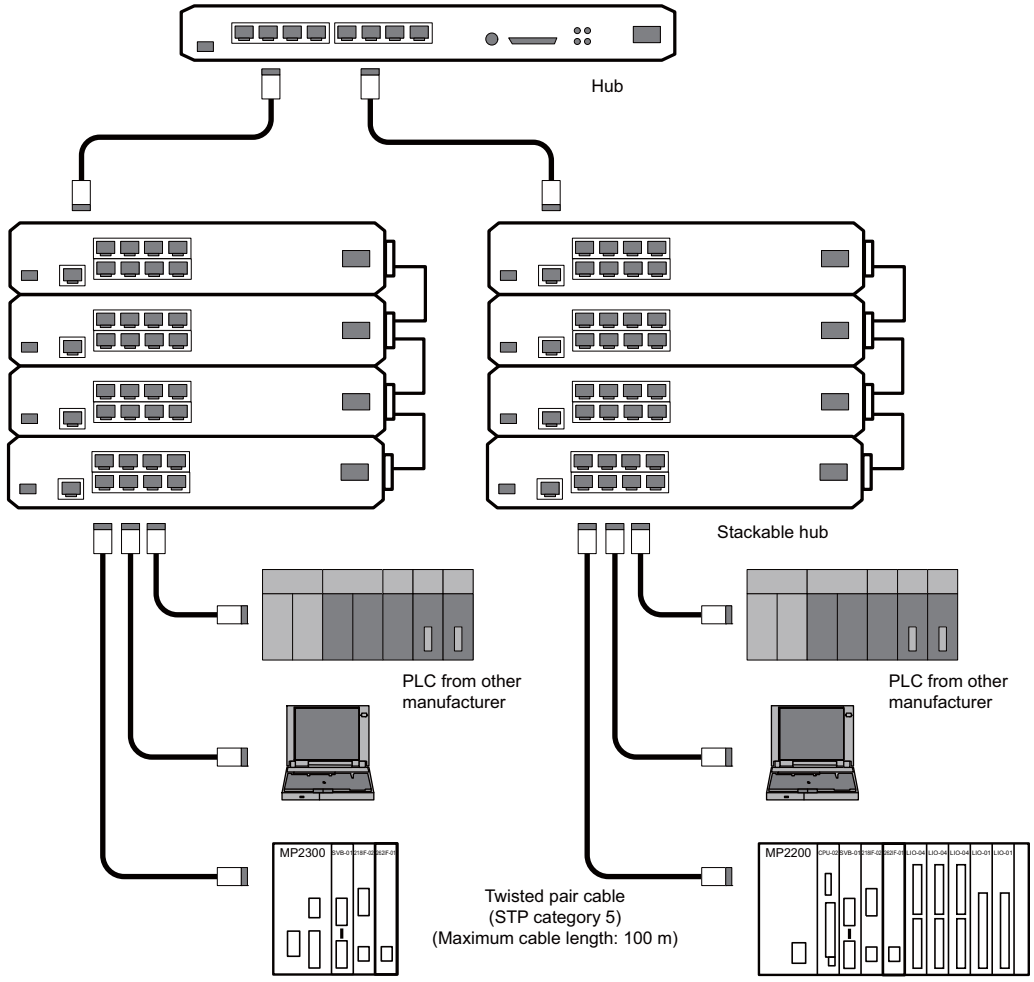
2.3.2 Basic Configuration

A network system of dozens of devices can be constructed by connecting several multi-transceivers and hubs to one coaxial cable.



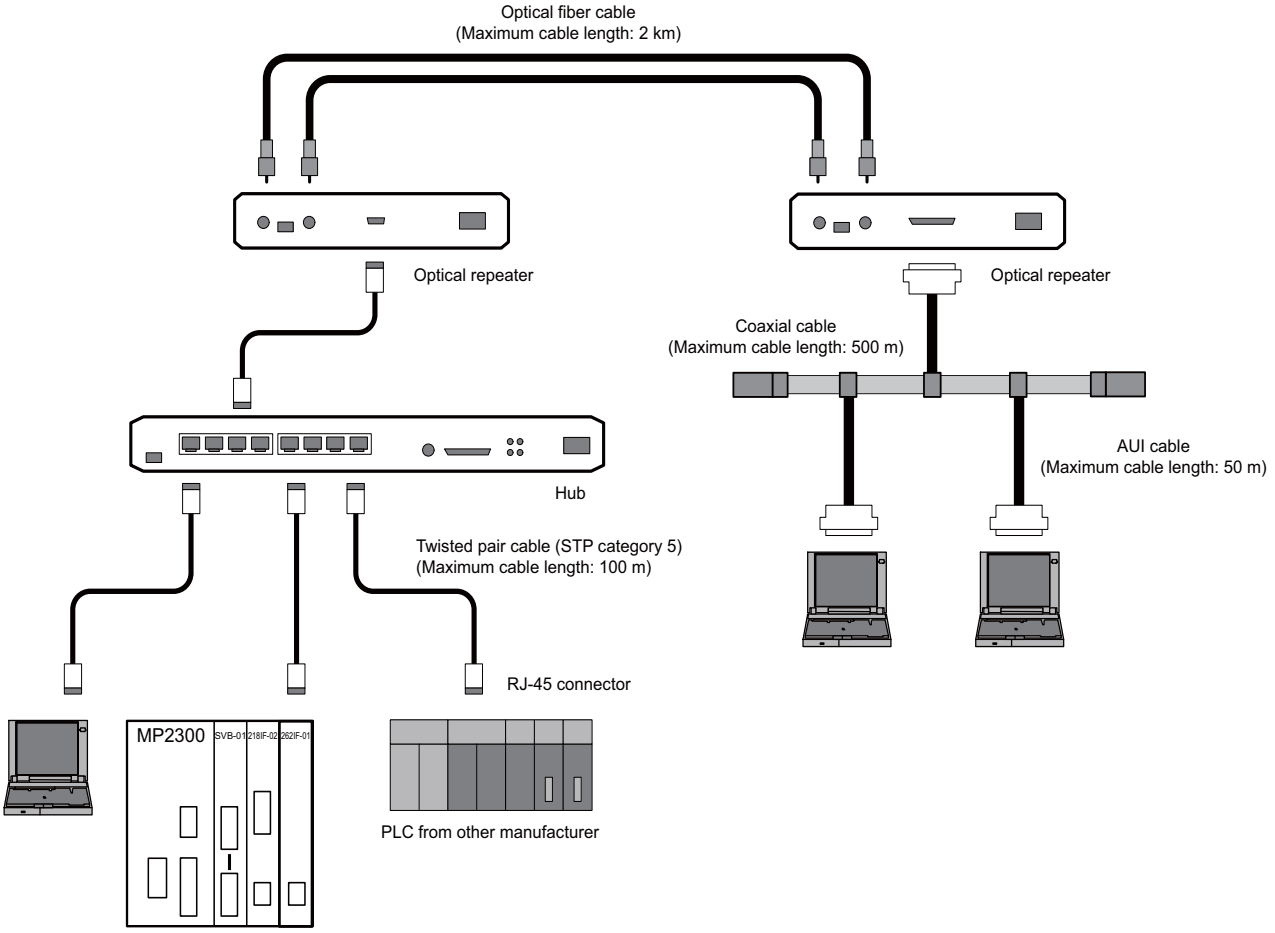
2.3.3 Locally Concentrated Device Configuration

When dozens of devices locally concentrate in a location, a stackable hub can be used to build a network system.



2.3.4 Long Distant, Locally Distributed Device Configuration

When a particular controller is far away in a basic configuration of a network system or there is a high-voltage power supply or noise source near the network, the network can be divided into two segments that are connected with an optical repeater so that a long distant noise-proof network system can be built.



3

Mounting and Starting the Module

This chapter describes how to mount the 262IF-01 Module and use self-configuration.

3.1 Applicable Machine Controllers and Supported Versions

3.1.1 Applicable Machine Controllers

The MP2000 Series Machine Controllers to which the 262IF-01 Modules can be mounted are listed in the following table.

Name		Model	Max. No. of Connectable Modules	Applicable Version		Remarks
				CPU Module	MPE720	
MP2300		JEPMC-MP2300 (-E)	2 modules	Ver. 2.63 or later	Ver. 5.40A Ver. 6.06 Ver. 7.10 or later	–
MP2310		JEPMC-MP2310 (-E)	3 modules			–
MP2300S		JEPMC-MP2300S (-E)	1 module			–
MP2200 *1	CPU-01	JAPMC-CP2200 (-E)	8 modules			The maximum number of connectable Modules is the total for the maximum expansion to four racks.*2
	CPU-02	JAPMC-CP2210 (-E)				
	CPU-03	JAPMC-CP2220-E		All versions	Ver. 5.50 Ver. 6.20 Ver. 7.10 or later	
	CPU-04	JAPMC-CP2230-E			Ver. 5.52 Ver. 6.22 Ver. 7.10 or later	
MP2100M		JAPMC-MC2140 (-E)	8 modules	Ver. 2.63 or later	Ver. 5.40A Ver. 6.06 Ver. 7.10 or later	The maximum number of connectable Modules is the total for the maximum expansion to three racks.*2
MP2101M		JAPMC-MC2142-E				
MP2101TM		JAPMC-MC2142T-E				

∗ 1. Mount a CPU module on the following base units.

Name	Model	Remarks
MBU-01	JEPMC-BU2200 (-E)	100/200-VAC input base unit (9 slots)
MBU-02	JEPMC-BU2210 (-E)	24-VDC input base unit (9 slots)
MBU-03	JEPMC-BU2220-E	24-VDC input base unit (4 slots)

∗ 2. The following module or board is required between racks.

Name	Model	Remarks
EXIOIF	JAPMC-EX2200 (-E)	Inter-rack connection module
MP2100MEX	JAPMC-EX2100 (-E)	I/F board for MP2100M, MP2101M, and MP2101TM

3.2 Mounting and Removing a Module on Machine Controller

This section describes mounting and removing a 262IF-01 Module.

3.2.1 Mounting a 262IF-01 Module

Use the following procedure to mount a 262IF-01 Module.

- When replacing a 262IF-01 Module, first refer to *3.2.2 Removing a 262IF-01 Module* on page 3-6 and remove the 262IF-01 Module that needs to be replaced.

(1) Preparation

1. Backup the Programs.

Save the programs written to the Machine Controller in the personal computer using MPE720.

- MPE720 Ver. 6, Ver. 7: Open the project file and then select ***Online - Transfer - Read from Controller***.
  MPE720 Ver. 5: Right-click the PLC folder and then select ***Transfer - All Files - From Controller to MPE720***.

2. Save in the Flash Memory.

Using the MPE720, save the program data from the Machine Controller in the flash memory.

- MPE720 Ver. 6, Ver. 7: Open the project file and then select ***Online - Transfer - Save to Flash***.
  MPE720 Ver. 5: Right-click the PLC folder and then select ***Transfer - Other - Save to Flash***.

3. Remove the Machine Controller and Expansion Rack.

Turn OFF the power supply and remove all the cables connected to the Machine Controller or Expansion Rack (MP2200 Base Unit). Then, remove the Machine Controller and Expansion Rack from the panel or rack, and place them where there is sufficient space, such as on a work table.

(2) Removing the Option Cover

If there is an Option Cover attached to the slot in which the 262IF-0 Module is mounted, remove it using the following procedure.

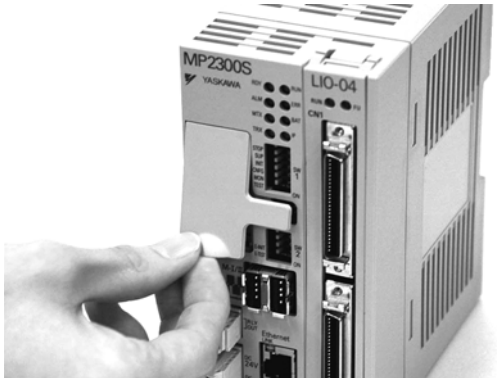
1. Remove the Battery Cover.

<MP2200/MP2300/MP2200 Base Unit>

Insert a hard thin metal object, such as a coin, into the notch on the side of the battery cover and open the cover forward to remove the battery cover.

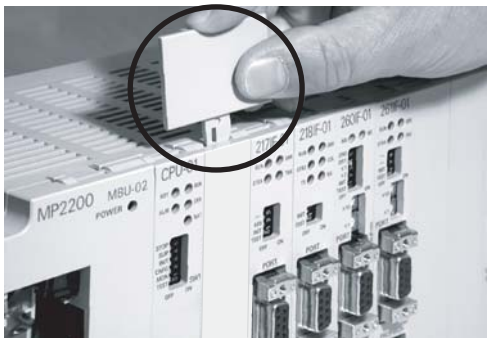
<MP2310/MP2300S>

Pull the notch on the side of the MP2300S towards you to remove the battery cover.



2. Remove the Option Cover.

Hold the battery cover with the front facing forward, insert the protrusion on the battery cover into the notch at the top of the Option Cover, and release the hook on the Option Cover.



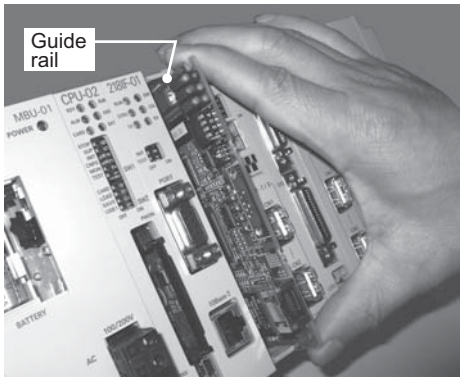
Release the hook on the bottom in the same way and remove the Option Cover.

(3) Mounting the 262IF-01 Module

1. Insert the 262IF-01 Module.

Hold onto the top and bottom of the 262IF-01 Module, align the Module with the left side of the guide rail inside the option slot, and insert the Module straight in.

* If the Module is not inserted on the guide rail, the FG bar on the bottom of the slot may be damaged.

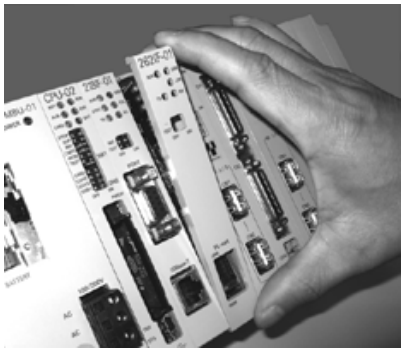


2. Connect to the Mounting Base Connector.

After inserting the Module all the way to the back, press the Module firmly until it connects securely to the Mounting Base connected. If the Module is connected securely, the front of the Module should approximately align with the hooks.

3. Mount the Option Panel.

Insert the hole on the bottom of the option panel into the bottom hook and then securely attach the hole to the top hook.



This completes the mounting procedure.

(4) Procedure after Mounting the Module

1. Connect the Hub.

Connect the hub to the 262IF-01 Module using the Ethernet cable.

- Refer to *2.2.2 Cable Specifications* on page 2-8 for cables that can be used.

2. Create Module Configurations.

a) Mounting New Modules

Execute self-configuration for each slot in which a 262IF-01 Module was mounted.

- Refer to *3.3 Self-configuration* on page 3-8 for information on self-configuration.

b) Replacing Modules

Turn OFF the CNFG and INIT DIP switch pins on the Machine Controller and turn ON the power supply. Once the power has been turned ON, the module configuration can be modified as required.

- Refer to *4.1.1 Displaying the Module Configuration Window* on page 4-2 for information on the Module configuration.

- An Ethernet or serial communications function other than that on the 262IF-01 is required for communications between the Machine Controller and the personal computer running the MPE720. Before creating the module configurations, be sure to mount a CPU Module with built-in Ethernet or to mount a separate Ethernet or Serial Communications Module, and then configure the communications process, use self-configuration, and configure the communications settings.

  Refer to the following manuals for the operation procedures.
  - Machine Controller MP2000/MP3000 Series Engineering Tool MPE720 Version 7 User's Manual (Manual No.: SIEPC88076103)
  - Engineering Tool for MP2000 Series Machine Controller MPE720 Version 6 User's Manual (Manual No.: SIEPC88070030)
  - Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device (Manual No.: SIEPC88070005)

3.2.2 Removing a 262IF-01 Module

Use the following procedure to remove a 262IF-01 Module.

(1) Preparation

1. Backup the Programs.

Save the programs written to the Machine Controller in the personal computer using MPE720.

- MPE720 Ver. 6, Ver. 7: Open the project file and then select ***Online - Transfer - Read from Controller***.
  MPE720 Ver. 5: Right-click the PLC folder and then select ***Transfer - All Files - From Controller to MPE720***.

2. Remove the Machine Controller and Expansion Rack.

Turn OFF the power supply and remove all the cables connected to the Machine Controller or Expansion Rack. Then, remove the Machine Controller and Expansion Rack from the panel or rack, and place them where there is sufficient space, such as on a work table.

(2) Removing the 262IF-01 Module

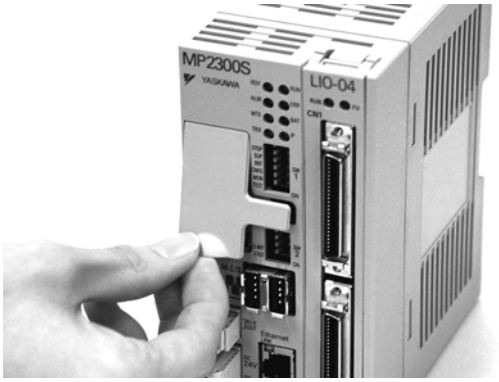
1. Remove the Battery Cover.

<MP2200/MP2300/MP2200 Base Unit>

Insert a hard thin metal object, such as a coin, into the notch on the side of the battery cover and open the cover forward to remove the battery cover.

<MP2310/MP2300S>

Pull the notch on the side of the MP2300S towards you to remove the battery cover.



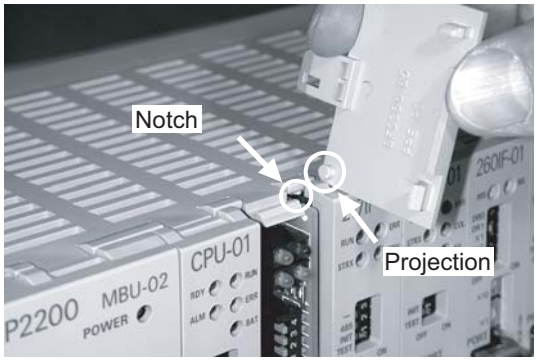
2. Remove the Option Panel.

Hold the battery cover with the front facing forward, insert the protrusion on the battery cover into the notch at the top of the Module's option panel, and release the hook on the option panel.

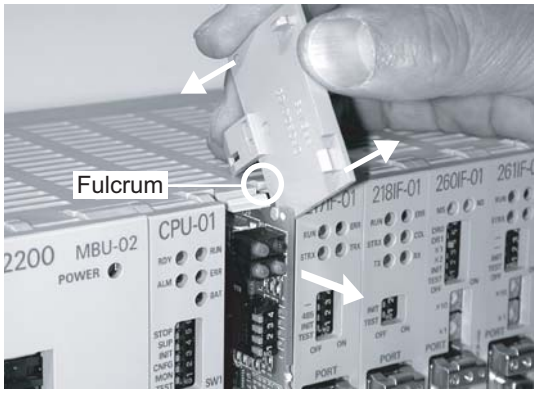
Release the hook on the bottom in the same way and remove the option panel.

3. Remove the 262IF-01 Module from the Mounting Base.

Pull out on the top of the option panel and remove it. A notch can be seen in the I/O Module from the gap in the panel. Insert the round projection on the battery cover (see the following figure) into the gap in the panel so that it is inserted in the notch in the Module.

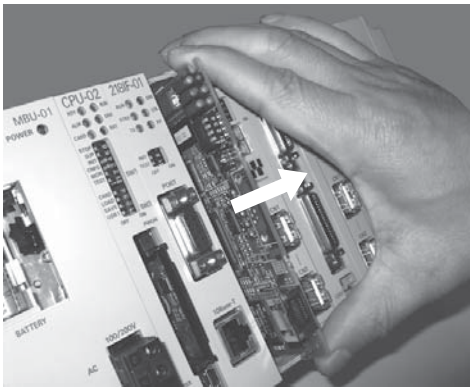


Hold the battery cover as shown in the following figure and use it to gently pull back on the Module, rotating it indicated by the arrows, to disconnect the Module from the Mounting Base. The Module will move towards you.



4. Pull Out the 262IF-01 Module.

Hold onto the top and bottom of the Module with your fingers and pull the Module straight out. Be sure to hold onto the edges of the Module. Do not touch the components mounted to the Module.



Place the Module that you removed into the bag that it was delivered in and store it.

- Always attach an Option Cover (JEPMC-OP2300) to any unused slot.

3.3 Self-configuration

The self-configuration function automatically detects the Option Modules connected to the Machine Controller and automatically generates the files for the Module configuration definitions and the detailed definition of each Module. Executing self-configuration will greatly reduce the system startup procedure.

- After executing self-configuration, always save data to flash memory so that the results of self-configuration are saved in the Machine Controller.

3.3.1 Executing Self-configuration

The methods used to execute self-configuration are described below.

(1) Setting the CNFG DIP Switch Pin and Cycling Power (MP2200/MP2300/MP2310/ MP2300S)

Self-configuration can be executed by turning ON the CNFG DIP switch pin on the Machine Controller and turning the power OFF and then ON again. The result will depend on the setting of the INIT DIP switch pin.

CNFG	INIT	Result
ON	ON	• The Module configuration definitions are updated. • The default allocations are made for all of the Modules that are detected.
ON	OFF	• The Module configuration definitions are updated. • The definitions for any Modules for which there are already definitions are not changed. • The default values are allocated in the definitions for any new Modules that are detected.

- The DIP switch is not normally used for the MP2100M. For these Machine Controllers, use the MPE720 as described next.

(2) Using the MPE720 (MP2100M)

Start the MPE720 and perform one of the following operations on the **Module Configuration** Window.
The operation procedures will depend on the range of self-configuration and the version of the MPE720.

- Refer to *4.1.1 Displaying the Module Configuration Window* on page 4-2 for the procedure to display the **Module Configuration** Window.

Command	MPE720 Operation Procedures	Result
Self-configuration for all Modules	■ MPE720 Ver.7 At the top of the window, select ***Self Configuration - All modules***. ■ MPE720 Ver. 6 and Older Select ***Order - Self Configure All Modules*** from the Main Menu.	• The Module configuration definitions are updated. • The definitions for any Modules for which there are already definitions are not changed. • The default values are allocated in the definitions for any new Modules that are detected.
Module Self-configuration	■ MPE720 Ver.7 First select the module for self-configuration. Then at the top of the window, select ***Self Configuration - Specified modules***. ■ MPE720 Ver. 6 and Older Select ***Order - Self Configure All Modules*** from the Main Menu.	• Definitions are allocated only for the selected Module. • The definitions for any Modules for which there are already definitions are not changed. • The default values are allocated in the definitions for any new Modules that are detected.

4

FL-net Transmission Definition

For 262IF-01 FL-net communication using a MP2000 Series Machine Controller, an FL-net transmission definition file must be created. This chapter discusses how to make an FL-net transmission definition on the MPE720 screen.

4.1 Displaying the FL-net Transmission Configuration Window

This section describes how to open the **Module Configuration** Window from the MPE720, open the **Transmission Configuration** Window from the **Module Configuration** Window, and set the transmission definitions for the FL-net Module.

4.1.1 Displaying the Module Configuration Window

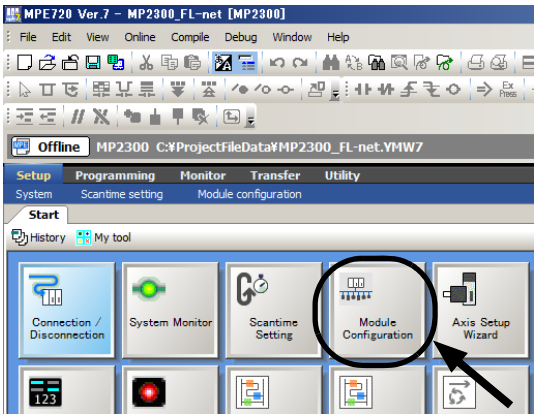
Use the following procedure to display the **Module Configuration** Window.

(1) MPE720 Ver. 7

1. Start the MPE720 on the personal computer connected to the Machine Controller and open the project file.

- For information on starting the MPE720 and logging on, refer to *Machine Controller MP2000/MP3000 Series Engineering Tool MPE720 Version 7 User's Manual* (Manual No.: SIEPC88076103)

2. Click **the Module Configuration** Button on the My Tool View.



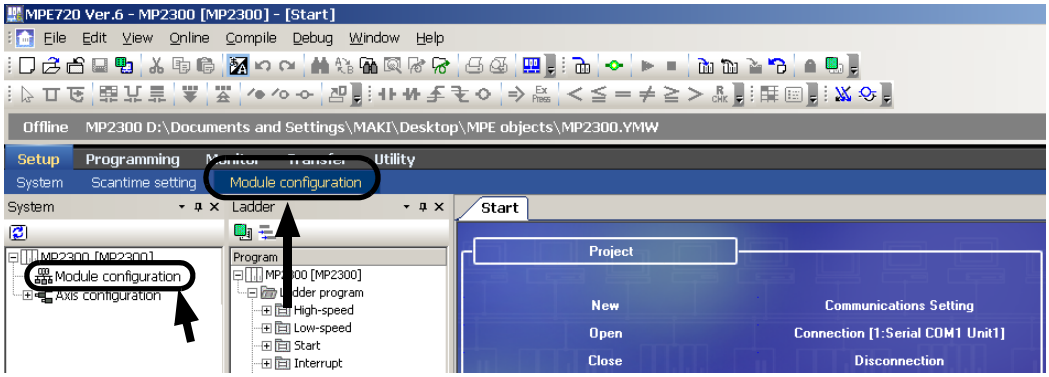
The **Module Configuration** Window will be displayed (see page 4-3).

(2) MPE720 Ver. 6

1. Start the MPE720 on the personal computer connected to the Machine Controller and open the project file.

- For information on starting the MPE720, refer to *Engineering Tool for MP2000 Series Machine Controller MPE720 Version 6 User's Manual (Manual No.: SIEPC88070030)*.

2. Select ***Setup - Module configuration*** in the Launcher, or double-click the **Module configuration** Icon in the system subprogram.



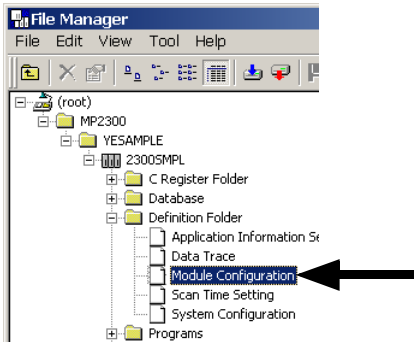
The Engineering Manager will be started and the **Module Configuration** Window will be displayed (see page 4-3).

(3) MPE720 Ver. 5

1. Start the MPE720 on the personal computer connected to the Machine Controller and use the File Manager to log in and go online with the application for the Machine Controller.

- For information on starting the MPE720 and logging on, refer to *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (Manual No.: SIEPC88070005).*

2. Double-click the **Module Configuration** Icon in the **Definition Folder**.

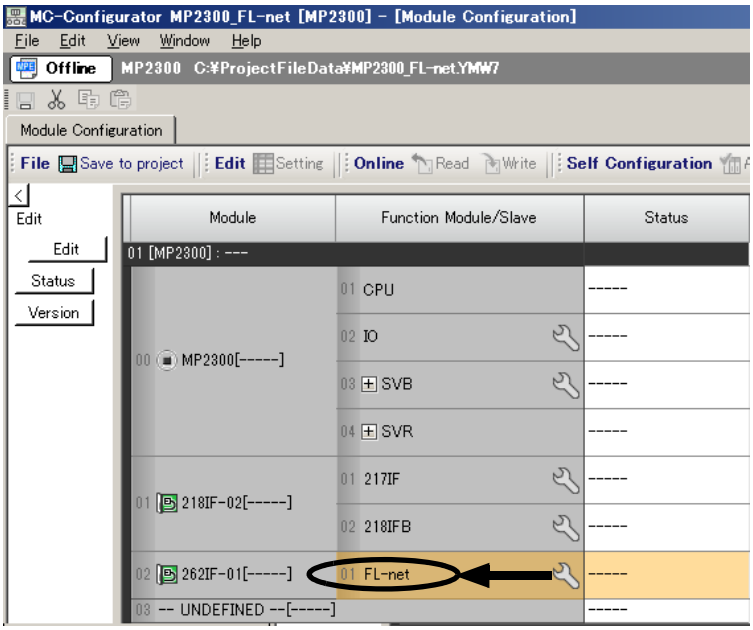


The Engineering Manager will be started and the **Module Configuration** Window will be displayed (see page 4-3).

4.1.2 Displaying the FL-net Transmission Configuration Window from the Module Configuration Window

(1) MPE720 Ver. 7

As the result of executing self-configuration, all Option Modules connected to the Machine Controller will be displayed on the **Module Configuration** Window. (Refer to *3.3.1 Executing Self-configuration* on page 3-8.)
Double-click **FL-net** on the **Module Configuration** Window, and the **FL-net Transmission Configuration** Window (see page 4-5) will be displayed.



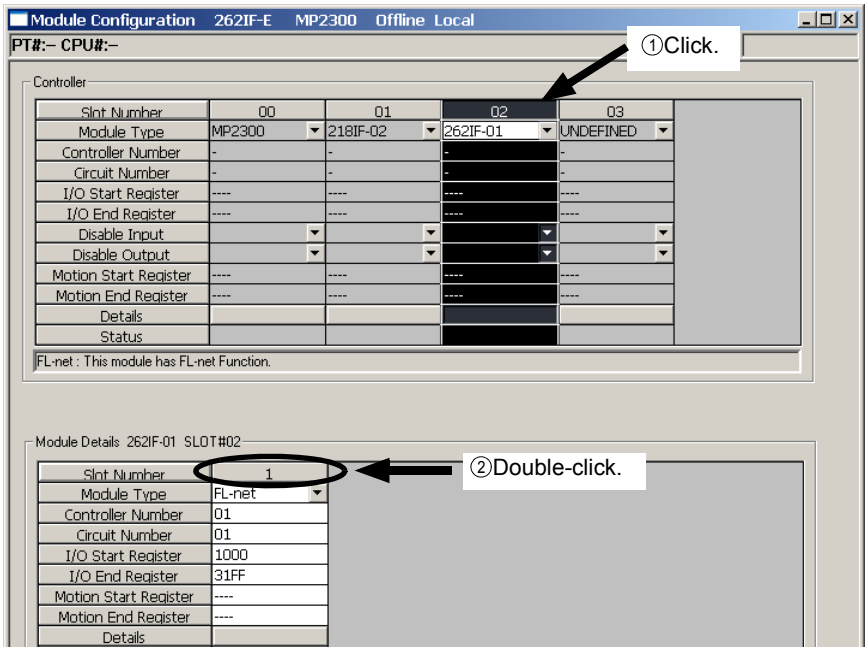
In Online Mode, the FL-net transmission definitions data saved in the Machine Controller are displayed. In Offline Mode, the definitions data saved in the personal computer on which MPE720 is running is displayed.
The **FL-net Transmission Configuration** Window is composed of four tab pages: **Transmission Parameters, Link Assignment, Link Status**, and **Status**. These tab pages are used to set the definitions and monitor the settings.

- If the **Transmission Configuration** Window is being opened for the first time, a "new file" message box will be displayed and the **FL-net Transmission Configuration** Window will be displayed when the **OK** Button is clicked.

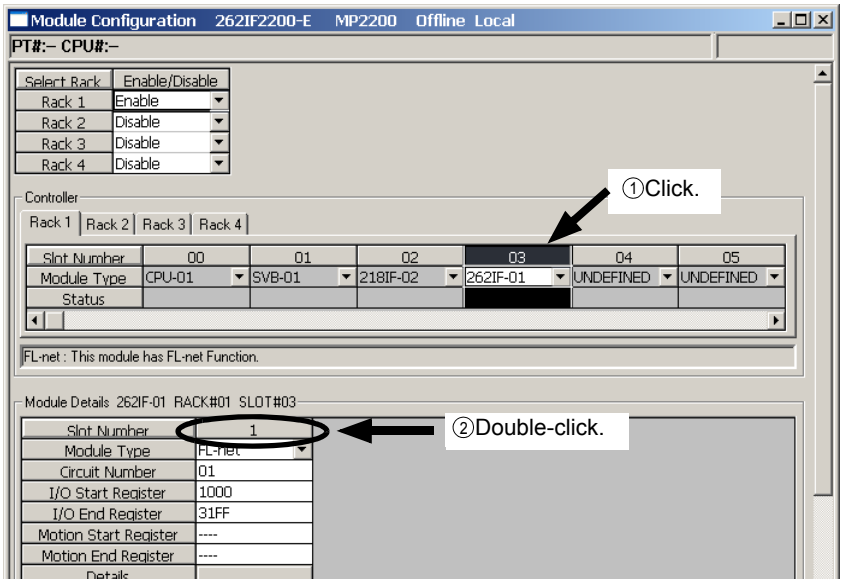
(2) MPE720 Ver. 6 and Ver. 5

As the result of executing self-configuration, all Option Modules connected to the Machine Controller will be displayed in the **Controller** Area of the **Module Configuration** Window. (Refer to *3.3.1 Executing Self-configuration* on page 3-8.)
In the **Controller** Area, select the 262IF-01 cell, and then double-click the slot number cell for FL-net in the **Module Details** Area. The **FL-net Transmission Configuration** Window (see page 4-5) will be displayed.

<MP2300/MP2310/MP2300S Module Configuration Window>



<MP2100M/MP2200 Module Configuration Window>



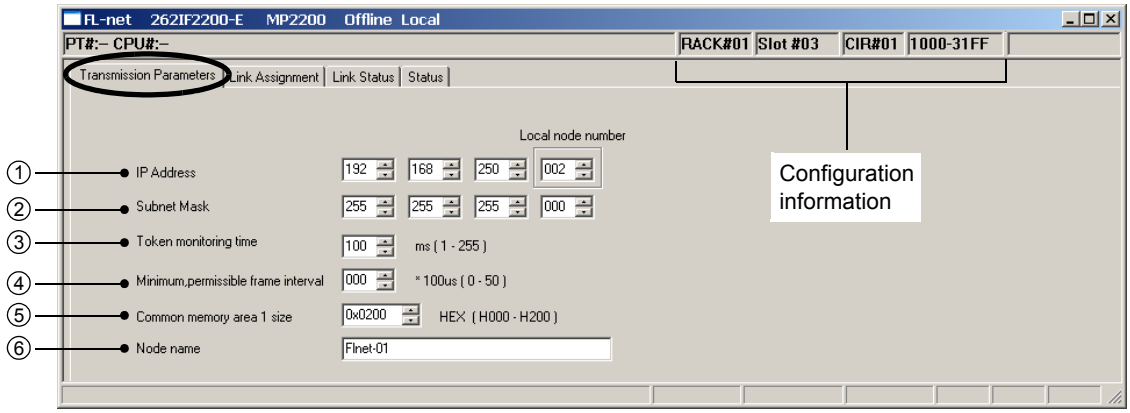
In Online Mode, the FL-net transmission definitions data saved in the Machine Controller are displayed. In Offline Mode, the definitions data saved in the personal computer on which MPE720 is running is displayed.
The **FL-net Transmission Configuration** Window is composed of four tab pages: **Transmission Parameters, Link Assignment, Link Status**, and **Status**. These tab pages are used to set the definitions and monitor the settings.

- If the **Transmission Configuration** Window is being opened for the first time, a “new file” message box will be displayed and the **FL-net Transmission Configuration** Window will be displayed when the **OK** Button is clicked.

4.2 FL-net Transmission Definition

4.2.1 Transmission Parameters Tab Page

Set the parameters required for FL-net communication. The following gives a detailed description.



■ Configuration Information

The 262IF-01 configuration information is displayed. This configuration information is the same as the information displayed in the **Module Details** Area in the **Module Configuration** Window.

RACK#: The rack number of the rack in which the 262IF-01 is defined.

Slot#: The slot number of the slot in which the 262IF-01 is defined.

CIR#: The circuit number of the Ethernet port on the 262IF-01.

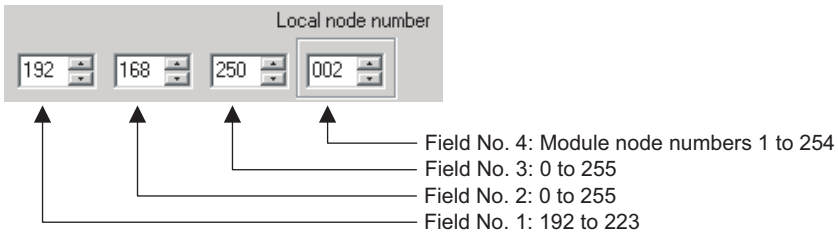
- When the MSG-SND or MSG-RCV function is used, set the circuit number displayed here for **CIR#** (circuit number).

■ Setting the Transmission Parameters

① IP Address

Set the IP address of the local node. The last digit is used as a module node number.

There are four 8-bit fields delimited by periods (.). Input a decimal number for each field.



- Do not use the same address as another node. If a duplicate IP address is entered, **undetect** will be selected as **Bit 7 Address overlapping detection** in the **Status Detail** Window (refer to page 4-12), resulting in a disabled network connection.

② Subnet Mask

Set the subnet mask for the IP address of the local node.

Since “255.255.255.0” is automatically set in FL-net, use this default value.

③ Token monitoring time

Set the monitoring time in units of ms from when the node acquires the token until the node issues a token.

This time can be set in a range from 1 to 255 (ms).

④ Minimum permissible frame interval

Set the minimum time in units of 100 μs that the 262IF-01 must wait until the local node sends a frame from when a token is received from another node.

This time can be set in a range from 0 to 50 (0-5 ms).

⑤ Common memory area 1 size

Make this setting to assign registers to respective areas 1 and 2 in the entire common memory within an I/O register range assigned in the **Module Configuration** Window. The 1 size of common memory area beginning with an I/O leading register number is assigned for area 1, and the remaining range (from [I/O leading register number + 1 size of common memory area] to I/O ending register number) is assigned for area 2.
Set the size in units of words within a range from 0 to 200H (0 to 512 words).

- The maximum value of the area 1 size is 200H and that of the area 2 size is 2000H.
- The default value is 200(H). When reducing this value, reduce the I/O register range in advance on the **Module Configuration** Window by the value to be reduced (or by the value greater than the value to be reduced).When an attempt is made to reduce a common memory area 1 range without this operation, an error will occur.
  <Example>
  To set common memory area 1 size to 100(H) when an I/O leading register number is 0402 and an I/O ending register number is 2601, the I/O register number must be reduced to 2501 or less or the I/O leading register number must be set to 0302 or more.
  When the default value is changed, an error occurs for the following reasons.
  Because the common memory area 1 size is 200H and the I/O register size is 2200H by default, the default common memory area 2 size (I/O register size - common memory area 1 size) is 2000H (maximum value of common memory area 2 size). When the common memory area 1 size is less than the default value of 200, an error will occur because the common memory area 2 size exceeds the maximum value of 2000H.
- For common memory and areas 1 and 2, refer to *5.3.1 (4) Common Memory and Areas 1 and 2* on page 5-9 and *5.3.1 (5) Assignment of I/O Register and Common Memory* on page 5-10.
- For relationship between common memory assigned to the I/O register and common memory assigned to each node, refer to *4.2.2 (3) Link Assignment Setting Example and Common Memory Assignment Image* on page 4-10.

⑥ Node name

Enter a name of the local node up to ten characters.

■ Terminology: Minimum Permissible Frame Interval

FL-net shares this minimum permissible frame interval in the network. Each node calculates and updates the maximum value of minimum permissible frame intervals set by nodes joined to the network each time a node joins or leaves the network.

4.2.2 Link Assignment Tab Page

(1) Details of the Link Assignment Tab Page

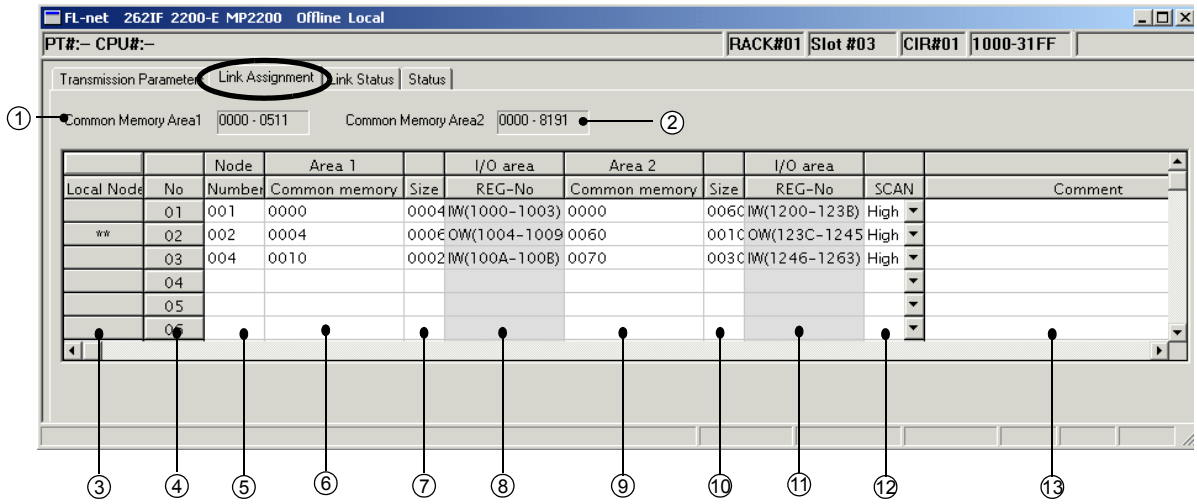
Link assignments refers to assigning data that holds information to share with another node (common memory) to MP I/O registers.

For the relationship between common memory and I/O registers, refer to *4.2.2 (3) Link Assignment Setting Example and Common Memory Assignment Image* on page 4-10.

Set link assignment for each node in FL-net on the **Link Assignment** Tab Page.

Information on common memory areas 1 and 2 of each node, which has been received through cyclic transmission, is stored in the registers of areas 1 and 2 of each node set here. In addition, information on common memory areas 1and 2 of a local node is broadcast to other nodes on FL-net when it holds the token.

- Information on common memory areas 1 and 2 of other nodes, which is to be assigned here, must be identical to that assigned to the nodes for themselves. To assign other nodes, assignment information must be obtained in advance or the **Network Configuration** Window (refer to page 4-15) must be opened with the node joined to FL-net to confirm the node information.



The following gives a detailed description.

① Common Memory Area 1

Displays the area 1 address range determined according to the setting of the transmission parameter **Common memory area 1 size** on the **Transmission Parameters** Tab Page. This range cannot be changed.

② Common Memory Area 2

Displays the area 2 address range determined according to the setting of the transmission parameter **Common memory area 1 size** on the **Transmission Parameters** Tab Page. This range cannot be changed.

③ Local Node

When a node number (⑤) is identical to the least significant digit in **IP address** on the **Transmission Parameters** Tab Page, "**" is displayed here to indicate a local node.

④ No.

Displays the interface number for CPU (fixed).

⑤ Node Number

Enter the node number (least significant digit in **IP address**) of a node to be assigned.
This value can be set in a range from 1 to 254. Note that the setting value must be unique.

⑥ Area 1 Common memory

Set the I/O leading register address of FL-net common memory area 1 of a target node for assignment in units of words. This value can be set in a range from 0 to 511.

⑦ Size (area 1 size)

Set the assignment size of FL-net common memory area 1 of a target node for assignment in units of words. This value can be set in a range from 0 to 512.

⑧ I/O area REG-No

Displays the address range of corresponding I/O registers according to the common memory area 1 assignment. "OW(□□□□ to □□□□)" is displayed for the local node and "IW(□□□□ to □□□□)" for other nodes.

⑨ Area 2 Common memory

Set the I/O leading register address of FL-net common memory area 2 of a target node for assignment in units of words. This value can be set in a range from 0 to 8191.

⑩ Size (area 2 size)

Set the assignment size of FL-net common memory area 2 of a target node for assignment in units of words. This value can be set in a range from 0 to 8192.

⑪ I/O area REG-No

Displays the address range of corresponding I/O registers according to the common memory area 2 assignment. "OW(□□□□ to □□□□)" is displayed for the local node and "IW(□□□□ to □□□□)" for other nodes.

⑫ SCAN

Set the refresh cycle of the I/O area assigned for each node to "High" or "Low."

⑬ Comment

Enter each node name up to ten characters.

(2) Link Assignment Deletion

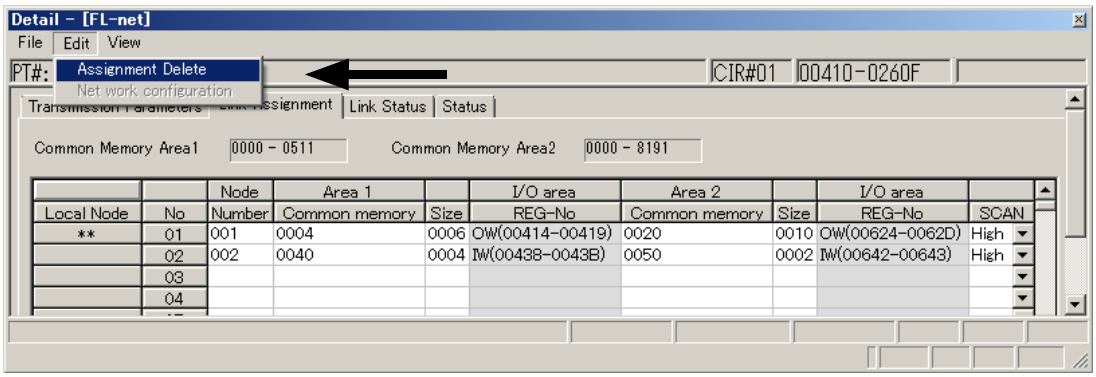
Link assignments can be deleted in units of lines according to the following procedure.

- Care should be taken for assignment deletion because the deleted assignment cannot be restored.

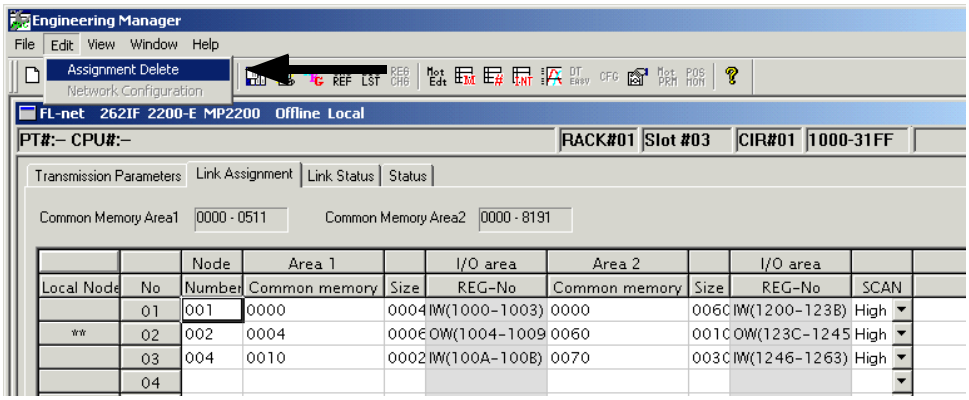
1. Click any cell on an assignment line to be deleted from the **Link Assignment** Tab Page.

2. Select ***Edit-Assignment Delete*** from the Main Menu.

<MPE720 Ver. 7>



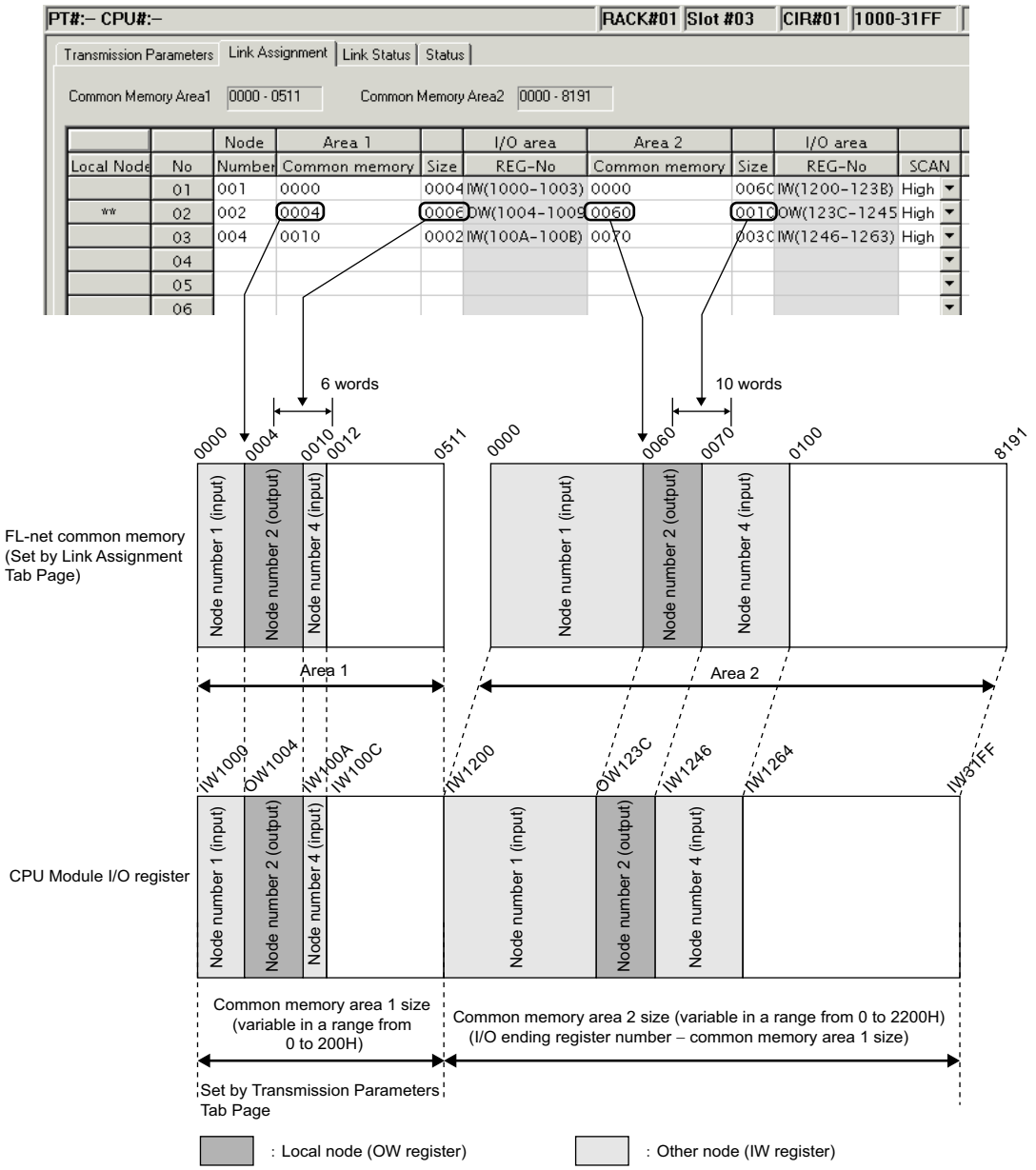
<MPE720 Ver. 6 and Ver. 5>



The selected assignment line will be deleted.

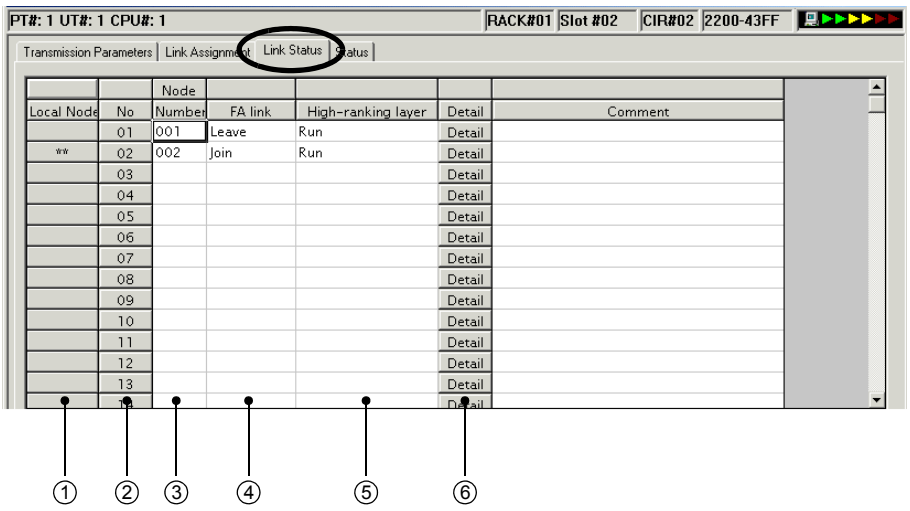
(3) Link Assignment Setting Example and Common Memory Assignment Image

The following figure shows a link assignment example and a common memory assignment image.
Because areas 1 and 2 in the local node are used only for sending, they work as output registers (OW). Because areas 1 and 2 in other nodes are used only for reception, they work as input registers (IW).



4.2.3 Link Status Tab Page

The FL-net link status can be monitored on the **Link Status** Tab Page.



The following gives a detailed description.

① Local Node

Displays "**" as a local node number.

② No.

Dispalys the Interface number for CPU (fixed).

③ Node Number

Dispalys the node number of each node set in the **Link Assignment** Tab Page.

④ FA link

Displays the current status regarding whether each node set in the **Link Assignment** Tab Page has joined or left FL-net as "Join" or "Leave."
This information is bit 0 link information of the FL-net link information. The other information can be referenced on the **Status Detail** Window displayed by clicking the **Detail** Button (⑥).

⑤ High-ranking layer (Upper layer RUN/STOP)

Displays the bit 7 RUN/STOP status of the FL-net upper layer status as "RUN" or "Stop." The other information can be referenced on the **Status Detail** Window displayed by clicking the **Detail** Button (⑥).

⑥ **Detail** Button

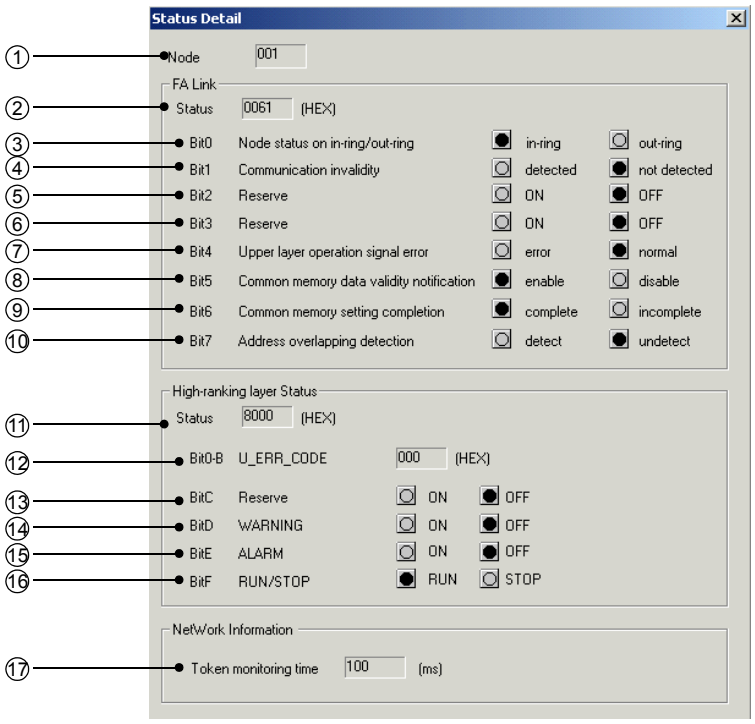
Click this button, and the **Status Detail** Window will be displayed to show information such as **FA Link** and **High-ranking layer status** of a selected node with a code as a bitwise explanation.

⑦ Comment

Displays each node comment set in the **Comment** of the **Link Assignment** Tab Page.

4.2.4 Status Detail Window

This window is displayed by clicking the **Detail** Button on the **Link Status** Tab Page.
The FL-net link information, upper layer status, and token monitoring time of the selected node are displayed.



The following gives a detailed description.

① Node (Node number)

Displays a node number selected on the **Link Status** Tab Page.

② Status

Displays a status code of the link status of the selected node.

③ Bit 0: Node status on in-ring/out-ring (Joined/not joined)

Displays whether a selected node has joined or left FL-net.
ON = In-ring (joined), OFF = Out-ring (not joined)

④ Bit 1: Communication invalidity

Displays whether the communication disabled status of a selected node has been detected.
ON = Detected, OFF = Not detected

⑤•⑥ Bits 2 and 3: Reserve

Reserved by system. Always set to OFF.

⑦ Bit 4: Upper layer operation signal error

Displays whether there is an operation signal error in the upper layer.
ON = Error, OFF = Normal

⑧ Bit 5: Common memory data validity notification

Displays whether common memory data in the selected node is valid.
ON = Enable (valid), OFF = Disable (invalid)

⑨ Bit 6: Common memory setting completion

Displays whether the settings for common memory areas 1 and 2 have been completed on the **Link Assignment** Tab Page.
ON = Complete, OFF = Incomplete

⑩ Bit 7: Address overlapping detection

Displays whether duplication of the I/O area address in the common memory has been detected.
ON = Detect (duplicate), OFF = Undetect

⑪ Status

Displays a status code of the upper layer status of the selected node.

⑫ Bit 0 to B: U_ERR_CODE

Not used.

⑬ Bit C: Reserve

Reserved by system. Always set to OFF.

⑭ Bit D: WARNING

Displays the upper layer error status (continue operation).
ON = Warning, OFF = Normal

- If the node is 262IF, this bit is not used and always OFF.

⑮ Bit E: ALARM

Displays the upper layer error status (stop operation).
ON = Error, OFF = Normal

- If the node is 262IF, this bit is not used and always OFF.
- Received data from a node on which an alarm has occurred will not be reflected in the input register.

⑯ Bit F: RUN/STOP

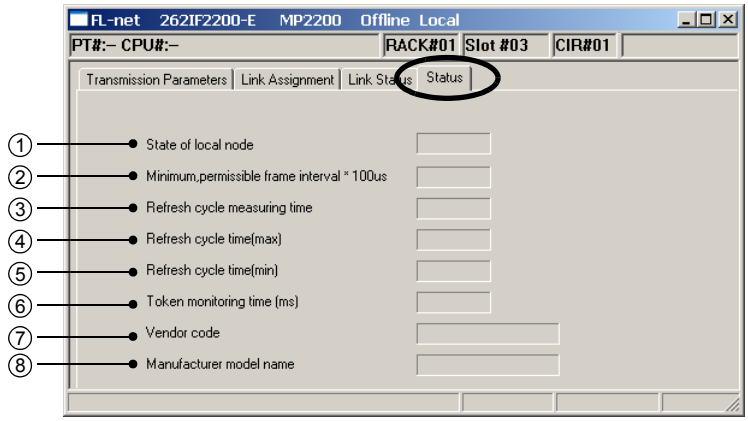
Displays an operating status of the upper layer.
ON = RUN (operating), OFF = STOP (stopped)

⑰ Token monitoring time

Displays the network monitoring time set on the **Transmission Parameter** Tab Page.

4.2.5 Status Tab Page

The FL-net status can be monitored on the **Status** Tab Page.
The display contents are updated as needed.



The following gives a detailed description.

① Status of local node

Displays the local node status in the lower-place two digits of a four-digit hexadecimal number.
Bit 0 to 2: Reserved (Not used. Always set to 0.)
Bit 3: Token monitoring time error (1: End of time period set in token monitoring timer, 0: Normal)
Bit 4: Common memory setting range error (1: Error, 0: Normal)
Bit 5: Frame waiting status (1: Wait for frame reception from other node, 0: Frame wait reset)
Bit 6: Duplicated node number detection (1: Duplicated number detected, 0: Normal)
Bit 7: Joined to network (1: Joined, 0: Not joined)
Bit 8 to Bit F: Reserved (Not used. Always set to 0.)

② Minimum permissible frame interval

Displays the minimum permissible frame interval set on the **Transmission Parameters** Tab page. (Unit: ms)

③ Refresh cycle measuring time

Displays the refresh cycle time measurement value (current value). (Unit: ms)

④ Refresh cycle time (max.)

Displays the maximum refresh cycle time. (Unit: ms)

⑤ Refresh cycle time (min.)

Displays the minimum refresh cycle time. (Unit: ms)

⑥ Token monitoring time

Displays the token monitoring time set on the **Transmission Parameters** Tab Page. (Unit: ms)

⑦ Vendor code

Displays the vendor name “YASKAWA.”

⑧ Manufacturer model name

Displays the first ten bytes, “JAPMC-CM23,” of “JAMPMC-CM2303-E” in the 262IF-01 model number.

4.2.6 Network Configuration Window

The status of all nodes connected to FL-net can be monitored on the **Network Configuration** Window.

(1) Displaying the Network Configuration Window and Searching for the Statuses of the Connected Nodes

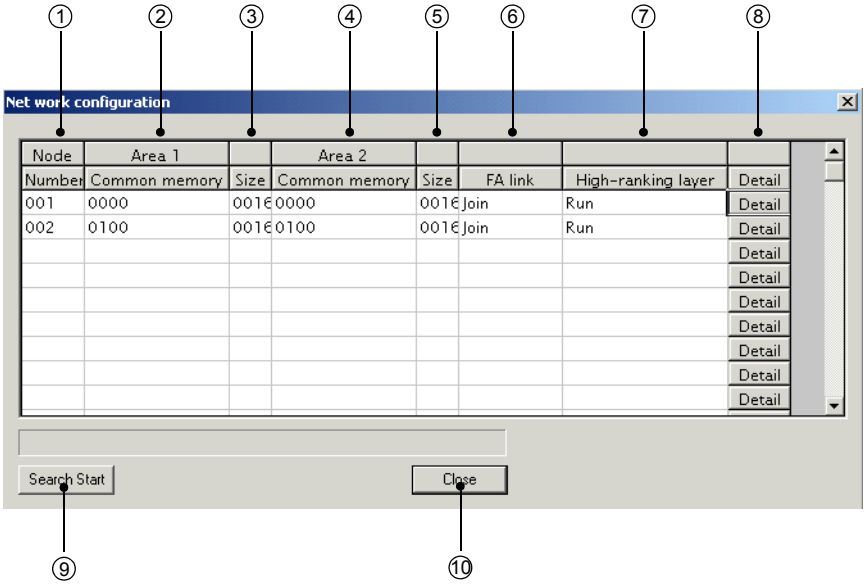
Select ***Edit - Network configuration*** from the Main Menu to display the **Network Configuration** Window.

- ***Network configuration*** under the ***Edit*** menu is enabled only in Online Mode.

Click the **Search Start** Button on the **Network Configuration** Window to display the statuses of all nodes connected to FL-net.

Click the **Close** Button to close the **Network Configuration** Window.

(2) Displayed Contents of the Network Configuration Window



The following gives a detailed description.

① Node Number

Displays the node number of FL-net equipment.

② Area 1 Common memory

Displays the address number of common memory area 1 occupied by the node.

③ Size (area 1 size)

Displays the register size of common memory area 1 occupied by the node in units of words.

④ Area 2 Common memory

Displays the address number of common memory area 2 occupied by the node.

⑤ Size (area 2 size)

Displays the register size of common memory area 2 occupied by the node in units of words.

⑥ FA link

Displays the current status whether the node joins or leaves FL-net as “Join” or “Leave.”

⑦ High-ranking layer (Upper layer RUN/STOP)

Displays the bit 7 RUN/STOP status of the FL-net upper layer status as “RUN” or “Stop.”

⑧ **Details** Button

Clicking this button displays the **Status Detail** Window so that the FA link or upper layer status of the node can be monitored.

- For the **Status Detail** Window, refer to *4.2.4 Status Detail Window* on page 4-12.

⑨ **Search Start** Button

Clicking this button starts a status search of all nodes connected to FL-net and updates status information.

⑩ **Close** Button

Clicking this button closes the **Network Configuration** Window.

4.2.7 Saving FL-net Transmission Definitions

When an FL-net transmission definition has been set or changed, select ***File - Save & Save into flash memory*** from the Main Menu to save the FL-net transmission definitions. If not saved, the set content will not be enabled.

5

Details of FL-net

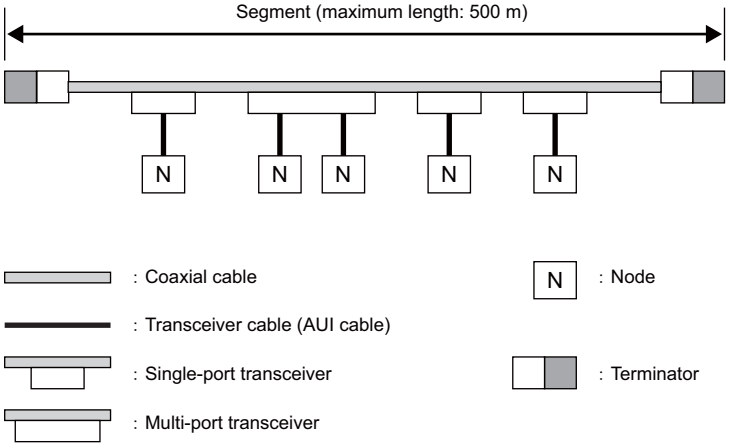
This chapter describes the FL-net transmission system in detail.

5.1 Ethernet Segment Configuration Example

FL-net is an FA control network that employs Ethernet as a communication medium (physical level, data link) between FA controllers.
When the baud rate is 10 Mbps, the Ethernet physical layer supports five transmission methods: 10BASE5, 10BASE2, 10BASE-T, 10BASE-F, and 10BROAD36. When the baud rate is 100 Mbps, it supports four transmission methods: 100ASE-T2, 100BASE-T4, 100BASE-TX, and 100BASE-FX.
FL-net recommends the use of 10BASE5, 10BASE2, 10BASE-T, 100BASE-TX, and 100BASE-FX.
The following shows segment configuration examples for 10BASE5, 10BASE-T, and 100BASE-TX.

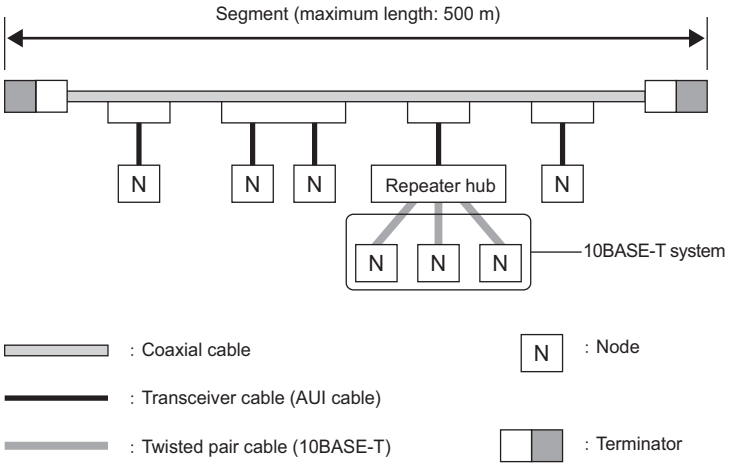
5.1.1 10BASE5 System

As shown in the following figure, the basic configuration consists of a 500-m (maximum length) coaxial cable and nodes connected to the cable. This basic configuration is called a segment and one segment comprises a maximum of 100 nodes.
Each node is connected to the coaxial cable via a transceiver cable (AUI cable) and a transceiver.
There are two types of transceivers: a single-port transceiver that allows the connection of only one transceiver cable (AUI cable) and a multi-port transceiver that allows the connection of multiple transceiver cables.



5.1.2 10BASE-T System

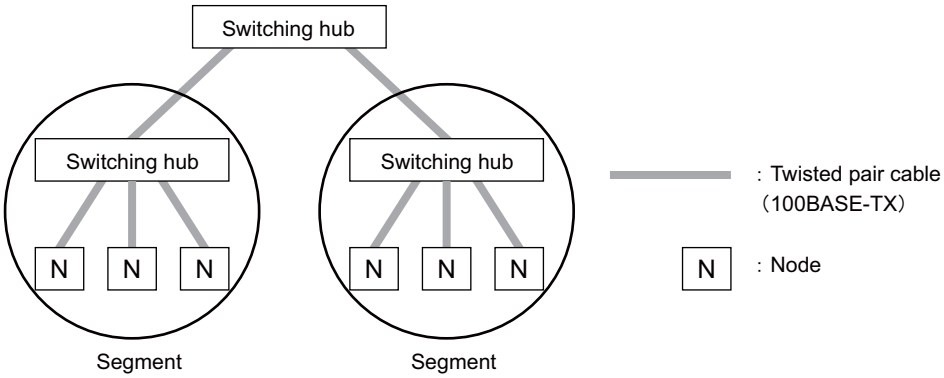
A hub (repeater hub) can be connected to a transceiver cable (AUI cable) to allow the connection of multiple nodes.
Use a twisted pair cable (10BASE-T) between the hub and node.
The maximum length between the hub and node is 100 m.



5.1.3 100BASE-TX system

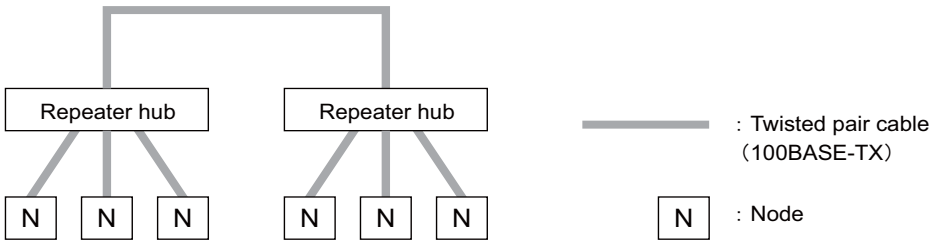
(1) Example Using a Switching Hub

The system is generally called “Fast Ethernet,” supporting a baud rate of 100 Mbps. Generally, the 100BASE-TX system employs a twisted pair cable for connection via a switching hub. The maximum length of each twisted pair cable is 100 m and is identical to that of 10BAESE-T system.
The switching hub serves as a bridge. When segments are connected via the switching hub, the cascade connection count of the repeater is cleared and cascade restrictions are removed unlike with a repeater hub.
In addition, some switching hubs support multiple baud rates such as 100BASE-TX and 10BASE-T. The use of these switching hubs enables 100BASE-TX and 10BASE-T equipment in the same system.
In this case, however, care should be taken because the switching hub causes a greater delay than the repeater hub.



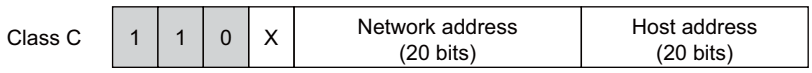
(2) Example Using a Repeater Hub

When a 100BASE-TX repeater hub is used, it is subject to cascade connection restrictions. When a Class II repeater hub has been used, a maximum of two cascade connections can be made for the repeater hub. In this case, however, the maximum distance between repeater hubs is 5 m.
The following figure shows a system configuration example.

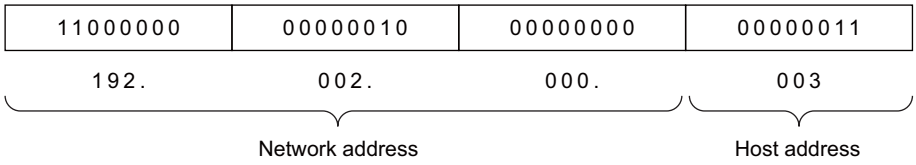


5.1.4 Ethernet IP Address

Generally, UDP/ID employs a 32-bit logical address called as an “IP address.” The IP address consists of a network address and a host address.
Generally, Class C having a structure shown in the following figure is used in the FA field.



This address is given a period every eight bits and is represented in decimal numbers. For example, this address is represented as follows for class C.



- In FL-net, the IP address default value is “192.168.250.N” (N is a node number from 1 to 254).

5.2 About FL-net

The following gives an overview of FL-net and transmission method features.

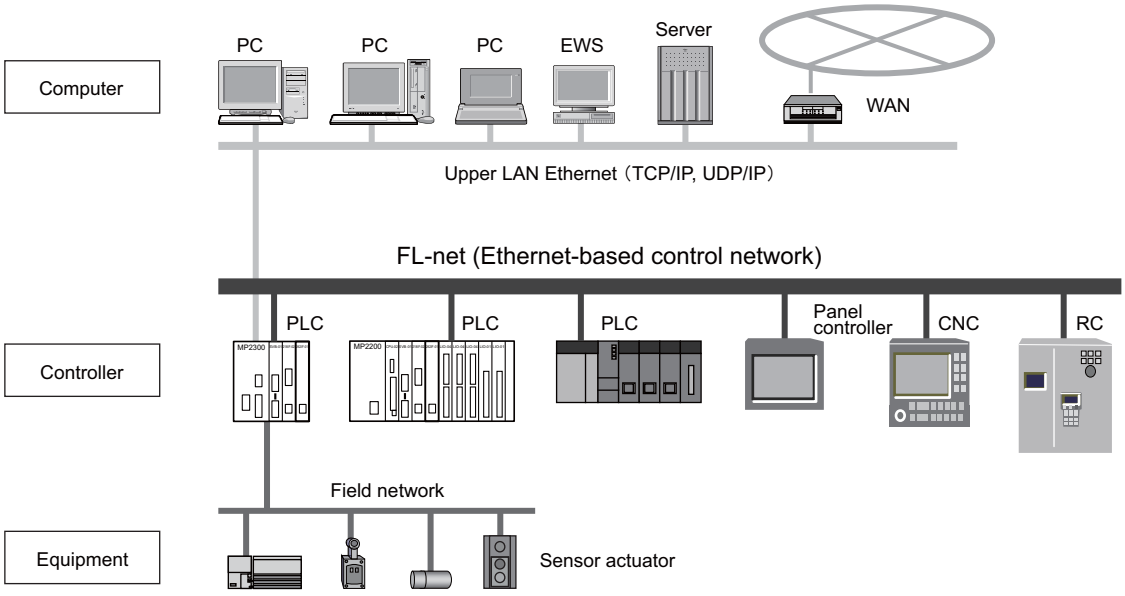
5.2.1 FL-net Overview

(1) FL-net Concept

FL-net acts as an Ethernet-based FA control network and comprises cyclic and message transmission functions.
The basic concept of FL-net is shown below.

- Ethernet works as a communication media (physical level and data link) between FA controllers.
- UDP/IP, which has been widely employed in Ethernet, is used as a basic data transmission means.
- The basic transmission means above are used to manage and control communication media access of each node in the network (avoid collisions), to assure that transmission is performed in a specific time.

FL-net acts as an FA control network for data exchange between controllers such as the programmable controller (PLC), robot controller (RC), and computer numeric control (CNC) equipment in a production system with personal computers for control.
The following figure shows FL-net and its surroundings.



(2) FL-net Protocol

FL-net consists of six protocol layers as shown below.

Application layer		Controller interface	FL-net protocol
FA link protocol layer		Cyclic transmission / Service function	
		Cyclic transmission / Message transmission	
		Token function	
Transport layer		UDP	
Network layer		IP	
Data link layer		Ethernet (Based on IEEE802.3)	
Physical layer			

The transport and network layers use UDP/IP, while the data link and physical layers use Ethernet.

(3) FL-net Transmission Method Features

The features of FA link protocol layer of FL-net are as follows.

- The masterless token system is employed for transmission management to avoid collisions.
- A token is circulated in a specific time to regulate a refresh cycle.
- After the cyclic data is sent, a defined token is sent.
- The first started node sends a token first.
- When no token is sent in a specific time, the next node sends a token.
- Even when some nodes fail, the masterless token system ensures that the network continues to work.
- The operation mode (RUN/STOP) and hardware failure (ALARM) information control tables are prepared to reference the operating status of other nodes.

(4) FL-net IP Address

The IP address of each FL-net node must be defined using class C individually. The IP address is an address indicating a specific node (station) for transmission by IP (Internet Protocol). For this reason, the IP address must be set and managed without duplication. FL-net uses the IP address of class C.
The default value of the FL-net IP address is 192.168.250.N (N is the node number: 1 to 254).

• For details on node number N, refer to *5.2.1 (5) Number of Connected Nodes and Node Numbers* on page 5-6.

	Network address	Host address (node number)
FL-net IP address	192.168.250.	n (1 to 254)

(5) Number of Connected Nodes and Node Numbers

The maximum number of connected nodes is 254. Numbers 1 to 254 are used as node numbers.

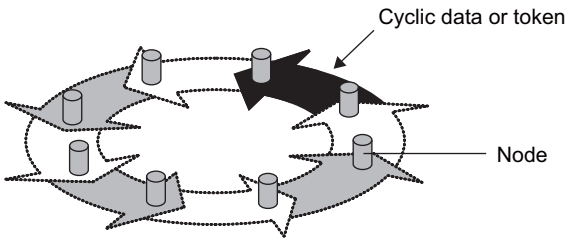
- Node numbers 1 to 249: For regular FL-net equipment
- Node numbers 250 to 254: For FL-net maintenance
- Node number 255: For internal use in FL-net. This number cannot be used by users.
  (To be used for global address broadcast transmission)
- Node number 0: For internal use in FL-net. This number cannot be used by users.

(6) Data Communication Types

FL-net data communication supports cyclic transmission and message transmission.

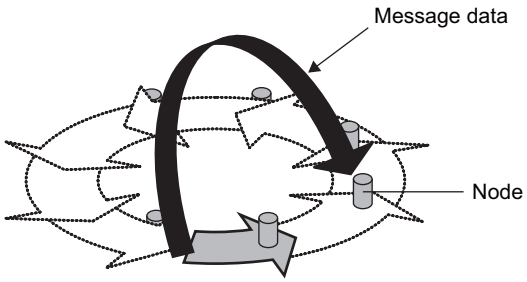
■ Cyclic Transmission

Cyclic transmission is token-based cyclic data transmission. Each node shares data via the common memory.



■ Message Transmission

Message transmission is non-cyclic data transmission.
Usually, communication with a specific node is performed when a send request is sent.

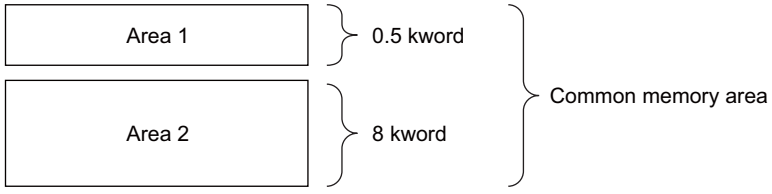


- For details of data communication, refer to *5.3 FL-net Data Communication* on page 5-9.

(7) Amount of Transmission Data

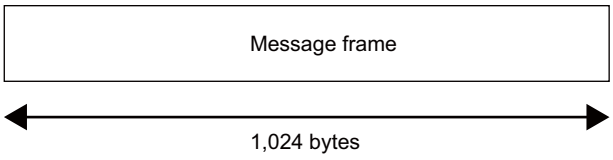
■ Cyclic Transmission

The network has an area of 8.5 kwords (= 8 kbits [0.5 kword] + 8 kword) in all.
The maximum amount of send data available per node is 8.5 kwords. However, one word corresponds to two bytes.



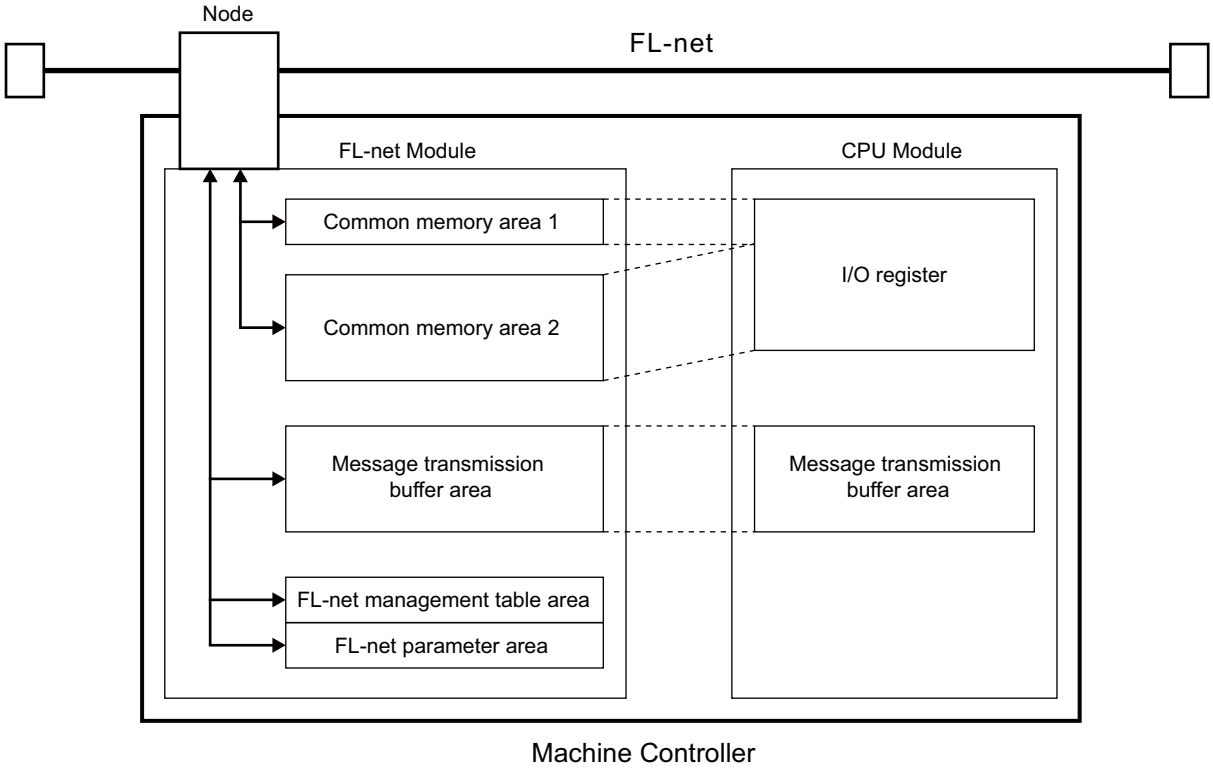
■ Message Transmission

The maximum amount of data in one message frame is 1,024 bytes (without header).



(8) Data Area and Memory

The following shows the correspondence of memories in the CPU Module and FL-net Module (262IF-01) of the Machine Controller.
The common memory area corresponds to the I/O registers (IW register, OW register), and the message transmission buffer area to the MW register.



5.3 FL-net Data Communication

The following describes data communication, cyclic transmission, and message transmission supported by FL-net in detail.

5.3.1 Cyclic Transmission

(1) Overview of Cyclic Transmission

Cyclic transmission is a function for cyclic data exchange between nodes.

- The common memory function for each node is realized.
- When the node holds a token, cyclic data to be sent is all sent.
- Nodes not performing cyclic transmission (nodes performing only message transmission) are allowed to join FL-net.

(2) Token and Token Frame

Basically, only one token is present in a network. When the network contains two or more tokens, the node preferentially selects the token with a smaller destination node number and discards the others.
A frame including a token (token frame) has a token destination node number and a token source node number. When the node number of a node matches the destination node number of a token in a received token frame, the node changes to a token holder node.
The order of token rotation is determined by the node number. Each node passes the token in the ascending order of node numbers registered in the joined node management table. A node having the maximum node number passes the token to a node having the minimum node number.

(3) Refresh Cycle and Refresh Cycle Allowable Time

Cyclic communication refreshes (updates) the common memory at a constant cycle. This update cycle is called a “refresh cycle.”
FL-net controls the sending of message communication so that the common memory refresh cycle does not exceed the refresh cycle allowable time during a single message communication.
Each node monitors the message communication frame that flows through the network from when the node receives a token addressed to itself until it receives another token addressed to itself. When no message communication frame flows in this specific cycle, a 120% value of this one cycle time is set as the refresh cycle allowable time.
The refresh cycle allowable time is determined automatically by the number of nodes to join the network through the above monitoring.

(4) Common Memory and Areas 1 and 2

The common memory can be shared among nodes for cyclic transmission.
A node can assign two data areas (called “area 1” and “area 2”) to the common memory. To define a send area, the leading address and size of an area must be specified.
Area access is performed in units of words. The size of area 1 is 0.5 kword (8 kbits) and that of area 2 is 8 kwords. Each node can define a node send area freely within the maximum area size of area 1 or area 2.

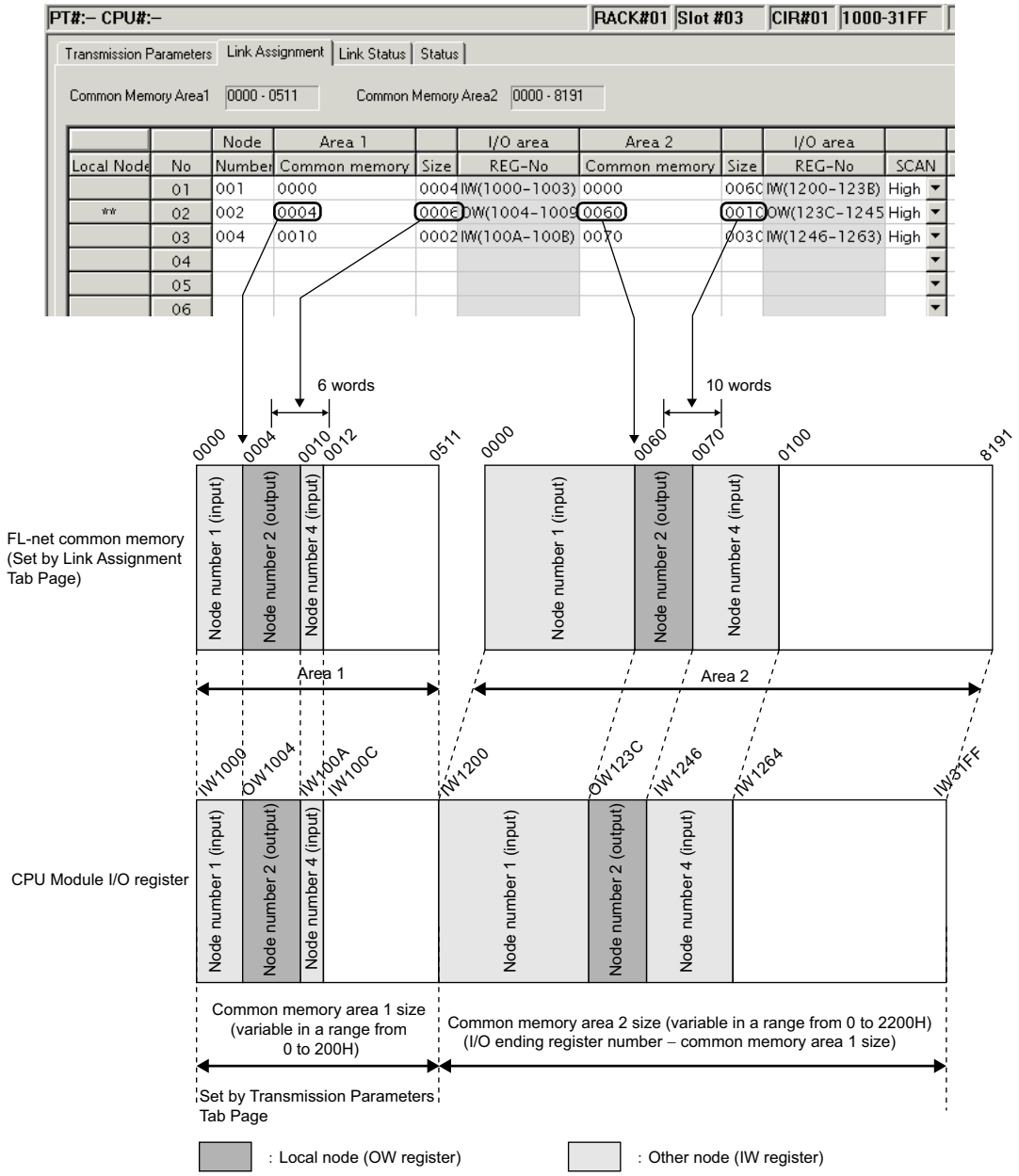
- For details of common memory assignment, refer to *5.3.1 (5) Assignment of I/O Register and Common Memory* on page 5-10.

(5) Assignment of I/O Register and Common Memory

The FL-net common memory function reads data from or writes it in each node area assigned for the CPU module I/O registers (IW register, OW register). The 262IF-01 Module uses the engineering tool MPE720 for I/O register assignment and defines the following four items.

- Node number
- Leading address and size of I/O registers
- Address and size of FL-net common memory area 1
- Address and size of FL-net common memory area 2

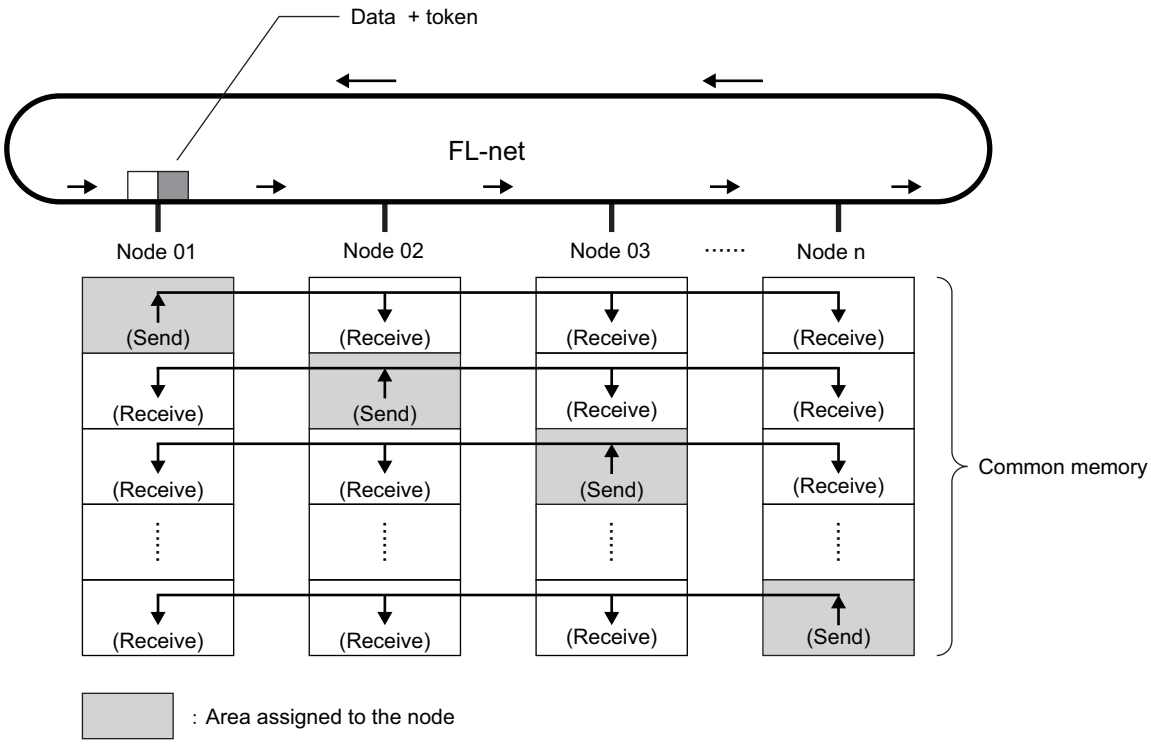
The following figure shows an assignment example of the FL-net common memory and I/O registers.
The local node areas 1 and 2 serve as the output register (OW) dedicated to sending, and other node areas 1 and 2 as the input register (IW) dedicated to receiving.



The I/O registers (IW register, OW register) are defined as a continuous area consisting of areas 1 and 2, and are filled starting with area 1. In link assignment definition, it is allowed to define only area 1 or area 2.

(6) Common Memory Broadcast

In FL-net cyclic transmission, a token holding node broadcasts data in the area assigned for the node (simultaneous send communication).
The common memory provides a function for allowing each node to broadcast data in a specific period so that the same data can be shared in the entire system. Nodes on FL-net respectively employ non-duplicate send areas for data exchange. In common memory operations, a send area assigned for a certain node serves as a receive area for the other node.



- The common memory can be used only for a receive area.

(7) Assurance of Data Concurrency

When the data size sent by one node exceeds the single frame transmission size, i.e., 1,024 bytes, data is transmitted by multiple frames. When a segmented data frame is received, common memory is not updated until all frame from one node is received. The common memory assures data concurrency in units of nodes according to the following procedure.

[a] Frame Segmentation when Sending

When a data send request is sent from the upper layer (at the SCAN timing set by link assignment), the node copies its cyclic data to the buffer, makes preparations for sending, and then sends data sequentially. In this case, however, when the sending node data size is larger than the size of single frame send data, buffer data is segmented into multiple frames for sending.

[b] Refresh Operation when Receiving

When a receiving node has received all cyclic data from one node, it updates the upper layer and the area to be processed synchronously (it updates the input register value at the SCAN timing set by link assignment).
Even when cyclic data is sent in units of frames, it updates area at the timing when all frame data from one node is received. When all frame data from the node is not received, all data sent from the node is discarded.

5.3.2 Message Transmission

(1) Overview of Message Transmission

Message transmission is a function for exchanging data between nodes asynchronously.
The following gives a brief description of the basic message transmission function.

- When a node receives a token, a maximum of one frame can be sent prior to cyclic frame send.
- A maximum of 1,024 bytes can be sent at once.
- An algorithm is employed not to exceed the refresh cycle allowable time for cyclic transmission.
- Two transmission modes are supported: One-to-one transmission to a specified node, and one-to-n transmission to all nodes.
  - ∗ The one-to-n transmission mode is available only for transparent messages, log data clearing, and vendor-specific messages.
- The one-to-one transmission mode has a delivery confirmation function for checking whether or not the destination has received data correctly.

In message transmission, the data sending side is called “client,” and the data receiving side called “server.”

(2) List of Supported Messages

The following table summarizes the message functions supported by the 262IF-01 Module.

Message	Function	Server	Client
Byte block read	Reads data in units of bytes.	×	×
Byte block write	Writes data in units of bytes.	×	×
Word block read	Reads data in units of words.	○	○
Word block write	Writes data in units of words.	○	○
Network parameter read	Reads network parameter data.	○	○
Network parameter write	Writes network parameter data.	×	○
Stop command	Stops operation of equipment such as the PC connected to the upper layer of the FA link protocol.	×	○
Start command	Starts operation of equipment such as the PC connected to the upper layer of the FA link protocol.	×	○
Profile read	Reads a device profile.	○	○
Transparent message	Provides a transparent service to the upper layer of the FA link protocol.	○	○
Log data read	Reads log data concerning a specified node.	○	○
Log data clear	Clears log data concerning a specified node.	○	○
Message loopback	Loops back a received message.	○	○
Vendor-specific message	Indicates vendor-specific message service.	×	×

- ○ indicates that the function is supported, and × indicates that the function is not supported.
- For the relationship between support messages and message functions, refer to *6.3 Combination of FL-net Messages and Message Functions* on page 6-29.

(3) List of Transaction Codes

Each message has a request or response transaction code in its header for message frame identification.

Message Function	Transaction Code			
	Request		Response	
	Decimal	Hexadecimal	Decimal	Hexadecimal
Transparent message	10000 to 59999	2710 to EA5F	–	–
Word block read	65005	FDED	65205	FEB5
Word block write	65006	FDEE	65206	FEB6
Network parameter read	65007	FDEF	65207	FEB7
Network parameter write	65008	FDF0	65208	FEB8
Stop command	65009	FDF1	65209	FEB9
Start command	65010	FDF2	65210	FEBA
Profile read	65011	FDF3	65211	FEBB
Log data read	65013	FDF5	65213	FEBD
Log data clear	65014	FDF6	65214	FEBE
Message loopback	65015	FDF7	65215	FEBF

- For notes on actual transaction code input to registers, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

(4) Virtual Address Space and Physical Address

A CPU Module register to be accessed by the message transmission command and a register number range are indicated.
A virtual address is represented in 32 bits.
The virtual address and physical address of the MP Series Machine Controller correspond as shown in the following table.

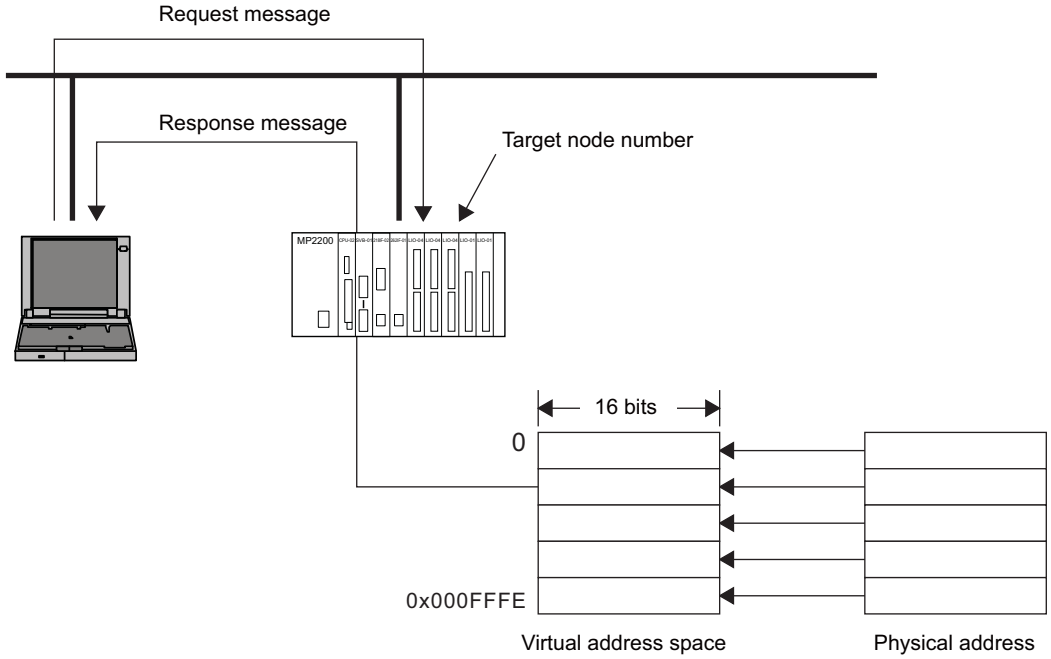
Register Name	Physical Address	Virtual Address (hexadecimal notation)
MW register	MW00000 to MW65534	0□00000000 to 0□000FFFE

5.3.3 Details of Supported Messages

The following describes each supported message in detail.

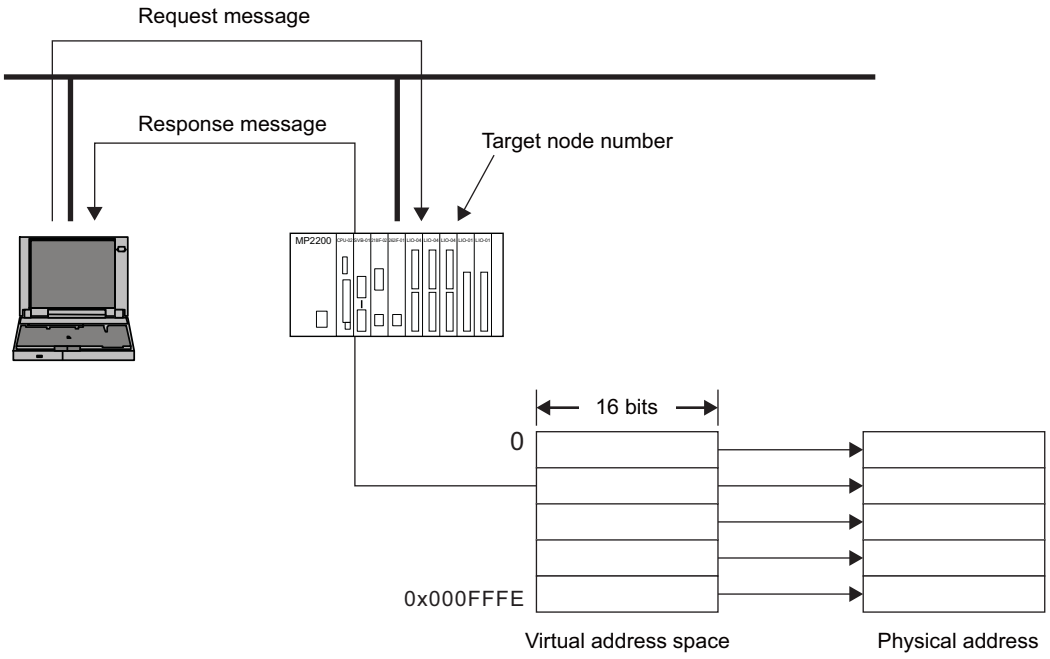
(1) Word Block Read

This message function reads data for virtual address space (32-bit address space) of remote node in words (in units of 16 bits for one address) via the network.
The virtual address space has been assigned for a CPU Module MW register (physical address).



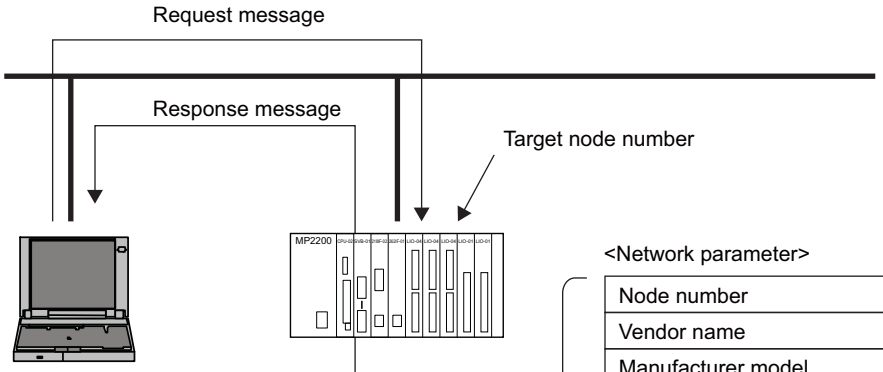
(2) Word Block Write

This message function writes data for virtual address space (32-bit address space) of remote node in words (in units of 16 bits for one address) via the network.
The virtual address space has been assigned for a CPU Module MW register (physical address).



(3) Network Parameter Read

This message function reads network parameter information of the remote node via the network.

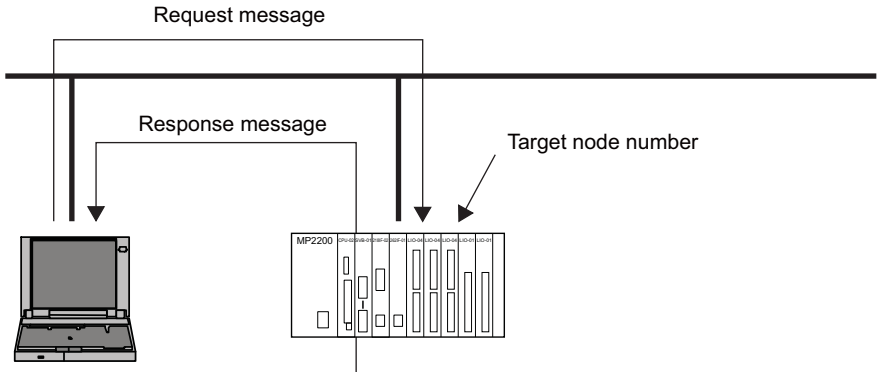


<Network parameter>

Node number
Vendor name
Manufacturer model
Area 1 leading address
Area 1 size
Area 2 leading address
Area 2 size
Token monitoring time
Minimum allowable frame interval
FA link status
Protocol type
Upper layer status
Refresh cycle allowable time setting value
Refresh cycle measurement value (current value)
Refresh cycle measurement value (maximum value)
Refresh cycle measurement value (minimum value)

(4) Device Profile Read

This message function reads system parameter, i.e., device profile information of the remote node via the network.

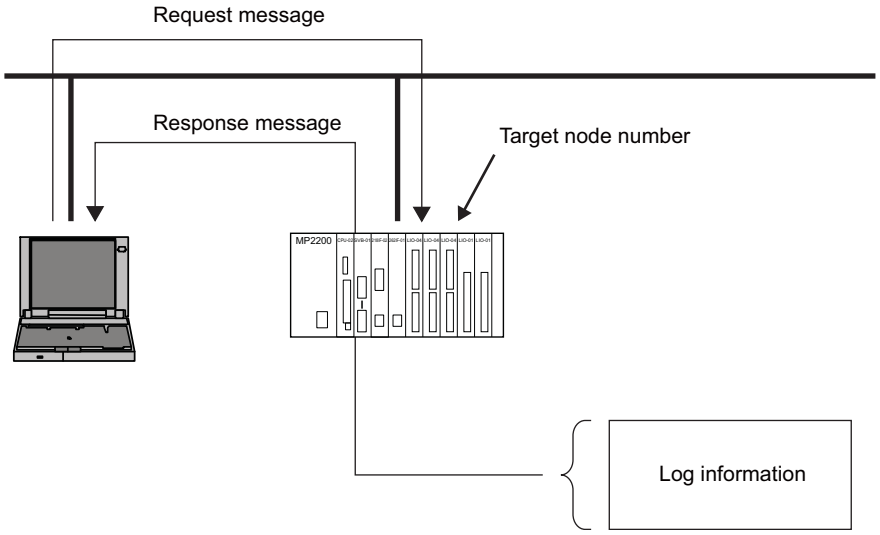


<System parameter>

Common specification version
Identification character
Revision number
Revision date
Device type
Vendor name
Product type name

(5) Log Data Read

This message function reads remote node log information via the network.

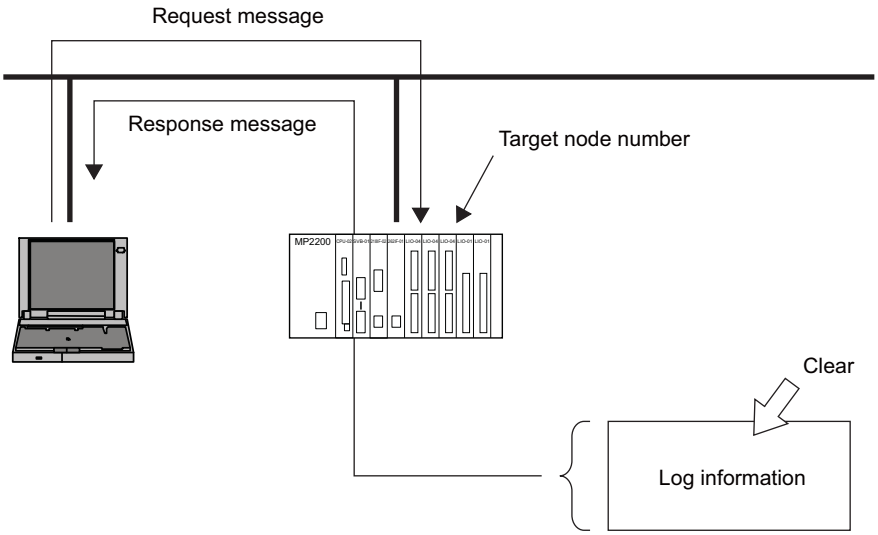


The contents of 262IF-01 Module log data are as follows:

Item	Offset (byte address)	Contents
Sending/receiving data	000 (0000H)	Communication socket send count
	004 (0004H)	Communication socket send error count
	008 (0008H) to 023 (0017H)	Not used
	024 (0018H)	Total reception count
	028 (001CH)	Total reception error count
	032 (0020H) to 095 (005FH)	Not used
Cyclic transmission	096 (0060H)	Cyclic transmission error count
	100 (0064H) to 143 (008FH)	Not used
Message transmission	144 (0090H)	Message retransmission count
	148 (0094H9)	Message retransmission error count
	152 (0098H) to 167 (00A7H)	Not used
	168 (00A8H)	Message reception error count
	172 (00ACH) to 191 (00BFH)	Not used
ACK	192 (00C0H)	ACK error count
	196 (00C4H) to 239 (00EFH)	Not used
Token	240 (00F0H)	Token multiplexing recognition count
	244 (00F4H)	Token discard count
	248 (00F8H)	Token resending count
	252 (00FCH) to 287 (011FH)	Not used
Node status	288 (012H)	Not used
	292 (0124H)	Frame waiting status count
	296 (0128H)	Join count
	300 (012CH)	Local node leaving count
	304 (0130H)	Local node leaving count by token skip
	308 (0134H)	Other node leaving recognition count
	312 (0138H) to 511 (01FFH)	Not used

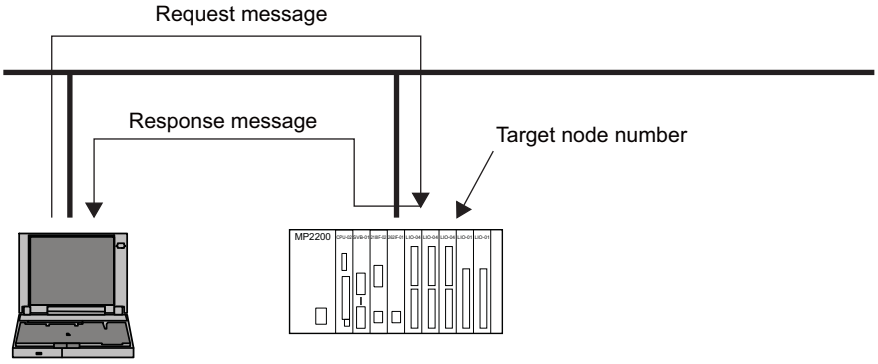
(6) Log Data Clear

This message function clears remote node log information via the network.



(7) Message Loopback

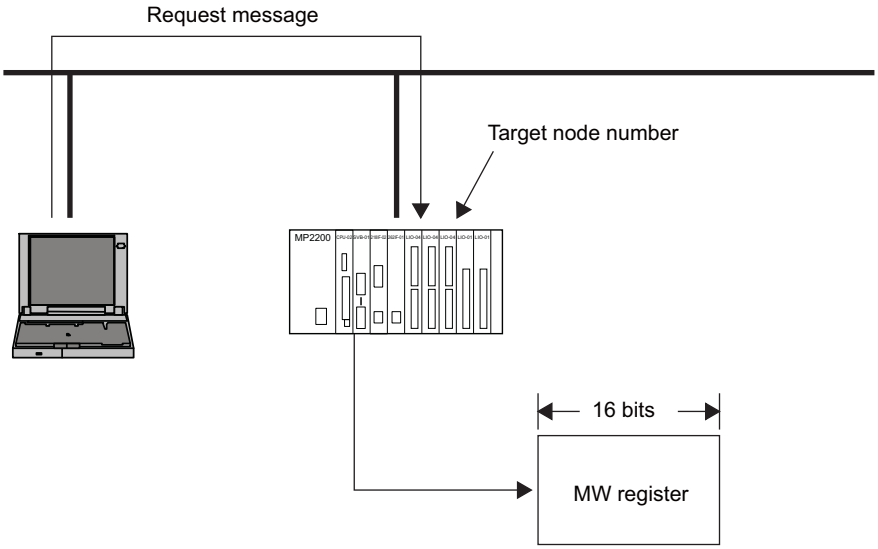
This message function loops back a received message.
Loopback is performed automatically in the 262IF-01 Module.



(8) Transparent Message Transmission

This message function writes a message to a receive message area of the remote node via the network.

- The 262IF-01 Module does not return an automatic response message even if a transparent message is received. For this reason, a sequence program must have a response message creation process when it is necessary to return the response message.



6

Message Send and Receive Functions

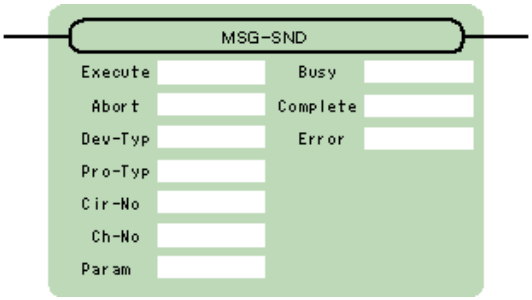
This chapter describes message send (MSG-SND) and message receive (MSG-RCV) functions in detail and sample programs necessary for transmission and reception.

6.1 Message Send Function

When a request is sent assuming that the 262IF-01 is a client for FL-net message transmission or a response is sent assuming that it is a server, the message send function “MSG-SND” is used.
When no response comes from remote device, retransmission is performed in the 262IF-01 according to the FL-net protocol. When a timeout is detected in the 262IF-01, the MSG-SND function is terminated abnormally.

- A timeout is detected when no response comes in spite three attempts (each involving a waiting time of 100 ms) made to receive ACK after sending message.

6.1.1 Outline Specifications

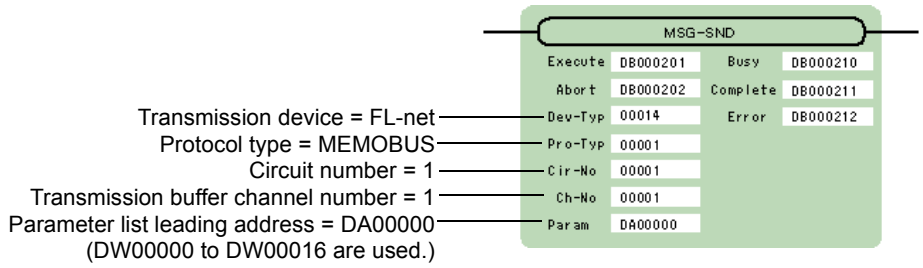
Function Name	MSG-SND			
Function	Sends a message to a remote station on the line specified by the Transmission Device Type parameter (DEV-TYP). The function supports multiple protocols. The Execute command must be held ON until the Complete or Error output turns ON.			
Function Definition				
I/O Definitions	No.	Name	I/O Designation*1	Description
Inputs	1	Execute	B-VAL	Send Message command
	2	Abort	B-VAL	Send Message Abort command
	3	Dev-Typ	I-REG	Transmission Device Type FL-net = 14
	4	Pro-Typ	I-REG	Communication Protocol MEMOBUS = 1, Non-procedure 1*2 = 2
	5	Cir-No	I-REG	Circuit Number FL-net = 1 to 8
	6	Ch-No	I-REG	Transmission Buffer Channel Number FL-net = 1 to 10
	7	Param	Address input	Parameter List Leading Address (MA, DA)
Outputs	8	Busy	B-VAL	Processing in progress.
	9	Complete	B-VAL	Processing completed.
	10	Error	B-VAL	Error has occurred.

∗ 1. The I/O designations are as follows:
B-VAL: I/O is specified as bit data.
I-REG: I/O is specified as integer data. Specify the number of an integer register.
Constants (immediate data) can also be specified for inputs.
Address input: The address of the specified register (any integer register) is passed to the function.

∗ 2. Non-procedure 1: Data is sent in word units.

6.1.2 MSG-SND Function Setting Example

This example shows the settings for using the FL-net as the transmission device.



To use the Extended MEMOBUS protocol, the protocol type is set to MEMOBUS.
The circuit number is set to the circuit number assigned to the 262IF-01 transmission device.
Transmission buffer channel numbers in the same line must all be unique.
For details on the settings, refer to *6.1.3 Inputs and Outputs for the Message Send Function* on page 6-3.

6.1.3 Inputs and Outputs for the Message Send Function

(1) Inputs

The following table gives the registers that can be used for the inputs.

Inputs	I/O Designation	Applicable Registers
Execute Abort	B-VAL	Any bit registers (including those with subscripts) except for # and C registers
Dev-Typ Pro-Typ Cir-No Ch-No	I-REG	Any integer registers (including those with subscripts) and constants
Param	Address input	Any register addresses (including those with subscripts) except for # and C registers

The following sections describe the inputs in more detail.

[a] Execute (Send Message Execute Command)

Specify the bit that will be used to control execution of the Message Send function.
Message send processing is started when the Execute command turns ON. To execute processing, this bit must be turned ON and OFF, e.g., from the ladder program.

- The Execute command must be held at ON until the Complete or Error output turns ON. The message is sent when the Execute command turns ON. To send another message, always turn OFF the Execute command for at least one scan.

[b] Abort (Send Message Abort Command)

Specify the bit that will be used to abort the Message Send function.
Sending the message will be aborted when the Abort command turns ON. The Abort command takes priority over the Execute command.
To abort processing, this bit must be turned ON and OFF, e.g., from the ladder program.

[c] Dev-Typ (Transmission Device Type)

The Dev-Typ input specifies the transmission device type. The transmission device type of FL-net is 14.

[d] Pro-Typ (Communication Protocol)

The Pro-Typ input specifies the communication protocol as shown in the following table.
Select 1 (MEMOBUS) or 2 (Non-procedure protocol 1) according to the type of an FL-net message.

Type Code	Communication Protocol	Remarks
1	MEMOBUS	Select for word block read or word block write of FL-net messages.
2	Non-procedure 1 (in units of words)	Select for other than the above message. Data will be sent in word units using the non-procedure protocol. No response is received from the remote station.
3	Non-procedure 2 (in units of bytes)	Not used in FL-net.

The following table summarizes the correspondence between the FL-net message and Pro-Typ.

Message Type	Function	Communication Protocol	
		Server (Send Response)	Client (Send Request)
Word block read	Reads data in units of words.	–*1	MEMOBUS
Word block write	Writes data in units of words.	–*1	MEMOBUS
Network parameter read	Reads network parameter data.	–*2	Non-procedure 1
Network parameter write	Writes network parameter data.	Not supported	Non-procedure 1
Stop command	Stops operation of equipment such as the PC connected to the upper layer of the FA link protocol.	Not supported	Non-procedure 1
Start command	Starts operation of equipment such as the PC connected to the upper layer of the FA link protocol.	Not supported	Non-procedure 1
Profile read	Reads a device profile.	–*2	Non-procedure 1
Transparent message	Provides a transparent service to the upper layer of the FA link protocol.	Non-procedure 1	Non-procedure 1
Log data read	Reads log data concerning a specified node.	–*2	Non-procedure 1
Log data clear	Clears log data concerning a specified node.	–*2	Non-procedure 1
Message loopback	Loops back a received message.	–*2	Non-procedure 1

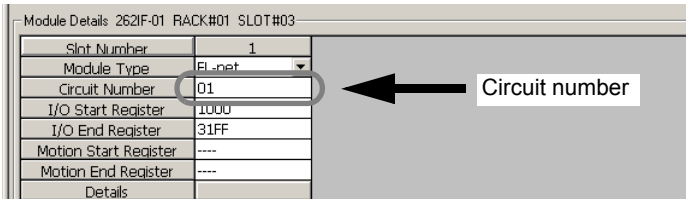
∗ 1. A response is returned by application receive processing (MSG-RCV function).The MSG-SND function is not required.

∗ 2. Because the response is sent in the 262IF-01, no send processing by applications (MSG-SND function) is required.

- For the relationship between the FL-net message and message function, refer to *6.3 Combination of FL-net Messages and Message Functions* on page 6-29.

[e] Cir-No (Circuit Number)

The Cir-No input specifies the circuit number of the transmission device.
Set the circuit number to the value displayed in the **MPE720 Module Configuration** Window.



The valid circuit number range of FL-net is 1 to 8.

[f] Ch-No (Channel Number)

The Ch-No input specifies the channel number of the transmission buffer.
Any channel number can be specified as long as it is within the valid range. If more than one function is being executed at the same time, do not specify the same channel number more than once for the same modem number. (The same channel number can be used as long as the functions are not executed at the same time.)

The valid channel number range of FL-net is 1 to 10.

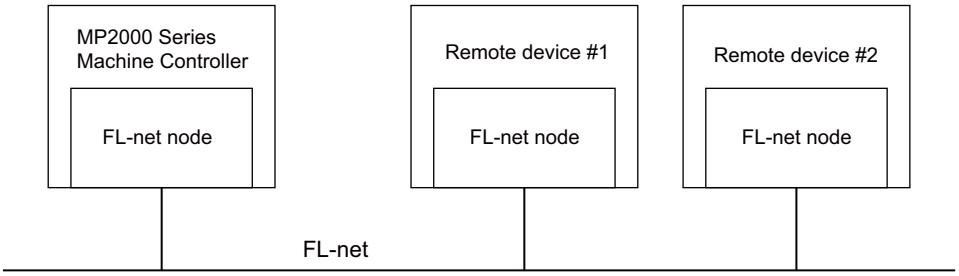
<Example>

In FL-net (262IF-01), there are 10 channels of transmission buffers from 1 to 10 for sending and receiving combined, so up to 10 messages can be sent and received at the same time.

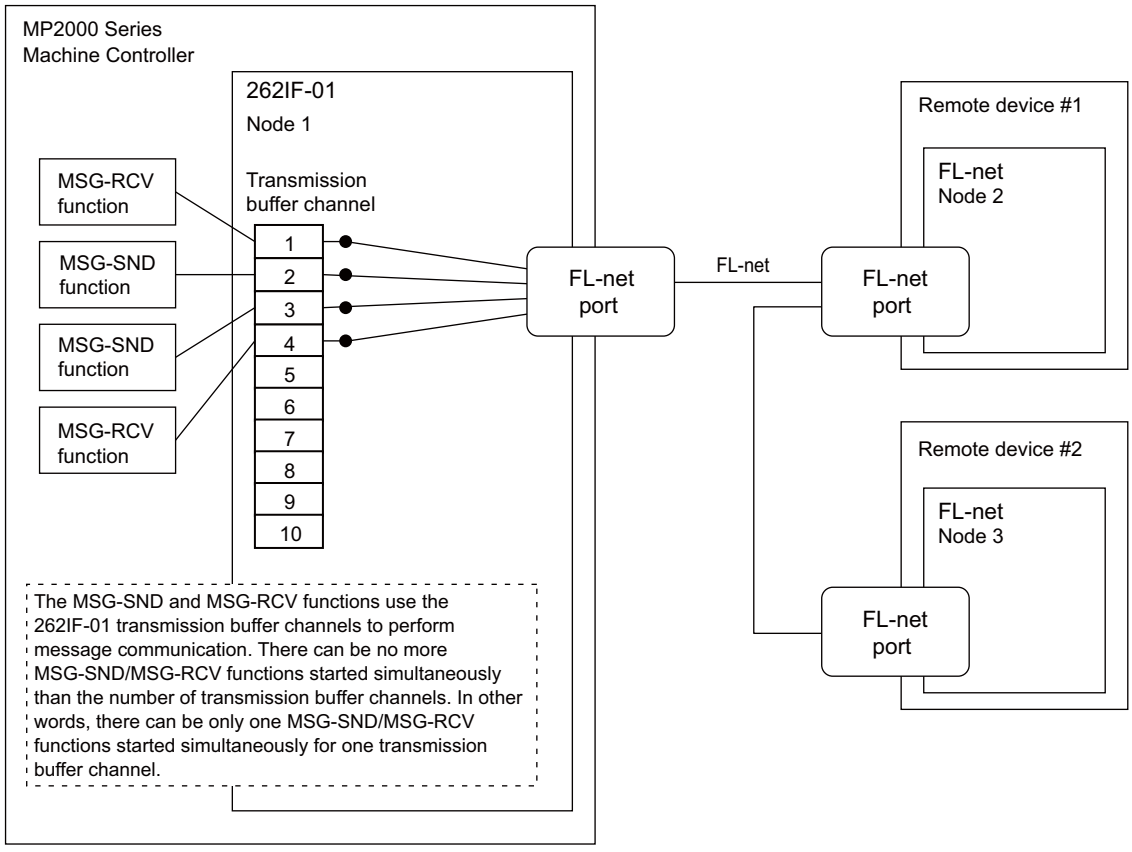
- One MSG-SND (or MSG-RCV) function must be programmed for each circuit being used at the same time.

■ Conceptual Diagram of Transmission Buffer Channels

The following shows a conceptual diagram of the transmission buffer channels.



Network Configuration Diagram



[g] Param (Parameter List Leading Address)

The PARAM input specifies the leading address of the parameter list. A parameter list will be automatically created from the 17 words starting with the specified address. Use the parameter list to input the function code and other related parameters. The processing results and status are also output to the parameter list.

- Refer to *6.1.4 Parameter List for MSG-SND Function* on page 6-9 for information on the parameter list.

Example: The following parameter list will be created when the Parameter List Leading Address is set to DA000000.

Register	Parameter F・・・・・・0
DW000000	PARAM00
DW000001	PARAM01
DW000002	PARAM02
DW000003	PARAM03
DW000004	PARAM04
DW000005	PARAM05
DW000006	PARAM06
DW000007	PARAM07
DW000008	PARAM08
DW000009	PARAM09
DW000010	PARAM10
DW000011	PARAM11
DW000012	PARAM12
DW000013	PARAM13
DW000014	PARAM14
DW000015	PARAM15
DW000016	PARAM16

(2) Outputs

The following table gives the registers that can be used for the outputs.

Inputs	I/O Designation	Applicable Registers
Busy Complete Error	B-VAL	Any bit registers (including those with subscripts) except for # and C registers

The following sections describe the outputs in more detail.

[a] Busy (Processing in Progress)

Specify the bit that will report when sending the message is being processed.
The Busy output will be ON while message send processing or abort processing is in progress.
Keep the Execute command or Abort command ON while the Busy output is ON.

[b] Complete (Processing Completed)

Specify the bit that will report when processing to send the message has been completed.
The Complete output will be ON for only one scan after message send processing or abort processing has been completed normally.

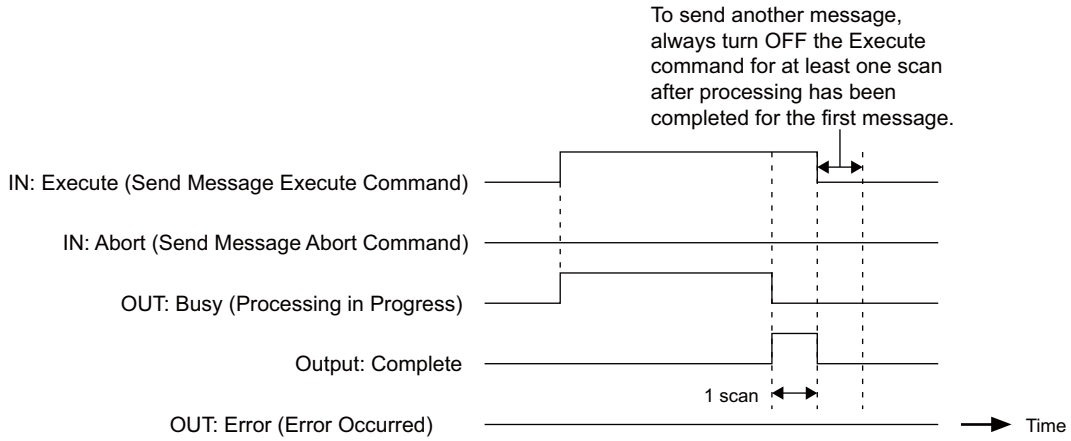
[c] ERROR (Error Occurred)

Specify the bit that will report when an error has occurred while sending the message.
The Error output will turn ON for only one scan when an error occurs.

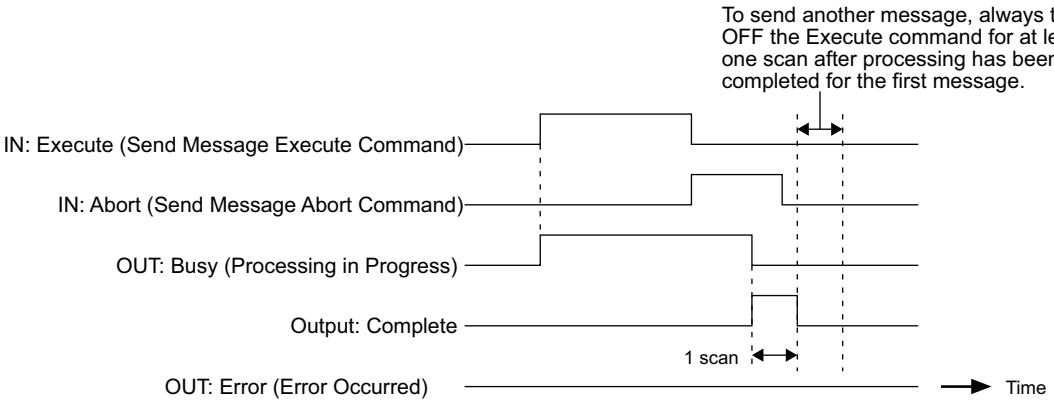
(3) I/O Timing Chart

The following timing charts show the bit inputs and outputs used with the MSG-SND function.

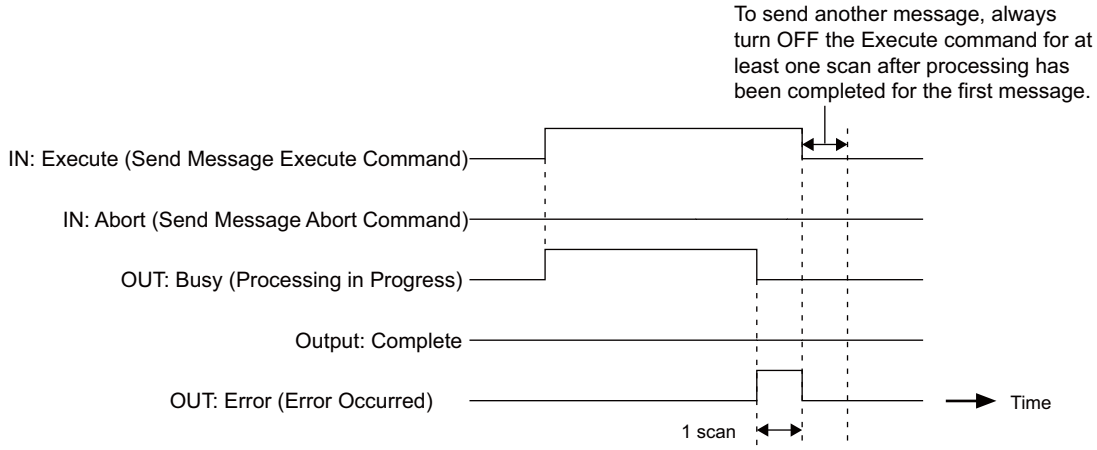
<Normal Processing>



<Abort Processing>



<Error Processing>



6.1.4 Parameter List for MSG-SND Function

The Param input to the MSG-SND function is a parameter list structure consisting of 17 words. The value of the Param input is the leading address (MA or DA) of the parameter list.
Use the parameter list to input the connection number, function code, and other related parameters. The processing results and status are also output to the parameter list.
The parameter lists for the MEMOBUS and non-procedure communication protocols in FL-net are given below.

PARAM No.	IN/OUT	Contents	Description	
			Pro-Typ=1 (MEMOBUS)	Pro-Typ=2 (Non-procedure)
00	OUT	Processing result	The processing results are output here.	
01	OUT	Status	The status of the current MSG-SND function is output here.	
02	IN	Remote node number	Specifies the destination node number (1 to 254). • When the remote station number is set to 255, data is sent to all nodes on the FL-net. However, this is valid only for transparent message and log data clear.	
03	IN	Option	Not used.	
04	IN	Function code	09H: Word block read 0BH: Word block write Others: Not used.	Setting not required.
05	IN	Data address	Specifies the FL-net virtual address in the range of 0 to 65535.	Specifies the transaction code as data leading address.
06	IN	Data size	Specifies the data size in the range of 1 to 512 words.	Specifies the data size in the range of 1 to 513 words.
07	IN	Remote CPU number (address upper word)	Specifies the FL-net virtual address. When the remote station is 262IF-01: 0 When the remote station is other than 262IF-01: 0 to 15 *	
08	IN	Coil offset	Not used.	
09	IN	Input relay offset	Not used.	
10	IN	Input register offset	Not used.	
11	IN	Holding register offset	Sets the offset word address of the holding registers.	
12	SYS	Reserved by the system (1).		
13 to 16	SYS	Reserved by the system (2).		

- IN: Input, OUT: Output, SYS: Used by the system.
- Refer to *6.1.5 Parameter Details for MSG-SND Function* on page 6-10 for details on the parameters.

* Set the lower-place four bits of upper words of the remote station address when the remote station is another manufacturer's product, and set the remote station CPU number when the remote station is Yaskawa CP series.

6.1.5 Parameter Details for MSG-SND Function

This section describes the parameter list in detail for MSG-SND function.

(1) PARAM00: Processing Result

The processing result is output to the upper-place byte of PARAM00. The lower-place byte is for system analysis.

Value of Processing Result	Meaning
00□□H	Processing in progress (busy)
10□□H	Processing completed (Complete)
8y□□H	Error occurred (Error)

If an error occurs, troubleshoot the problem according to the value of the processing result as listed below.

Error	Error Contents	Description
80□□H	–	Reserved by the system.
81□□H	Function code error	An undefined function code was sent or received. Check PARAM04 (function code).
82□□H	Address setting error	One of the following settings in not within the valid range. Check the settings. PARAM05 (data address) PARAM11 (holding register offset)
83□□H	Data size error	The size of the sent or received data is not within the allowable range. Check PARAM06 (data size).
84□□H	Circuit number setting error	The circuit number is not within the allowable range. Check the circuit number in the MSG-SND function.
85□□H	Channel number setting error	The transmission buffer channel number is not within the allowable range. Check the transmission buffer channel number in the MSG-SND function.
86□□H	Remote node number error	The remote node number is not within the allowable range. Check PARAM02 (remote node number).
87□□H	–	–
88□□H	Transmission device error	An error response was returned from the transmission device. Check the connection to the equipment. Also, be sure that the remote device can communicate.
89□□H	Device selection error	An unavailable device was set. Check the transmission device type in the MSG-SND function.
8072H to FF72H	Remote node error	An error response was returned from the remote node. Refer to error code and remove the cause. • Refer to the following ■ *Datails of Remote Node Error* on page 6-10.

■ Datails of Remote Node Error

The following shows the contents of the message function PARAM00 (processing results) at error response reception from a remote node.

Processing result (PARAM00): □□72H (□□ indicates the error code.)

- While the FA link specification states that an error code is one byte (eight bits), the MP specification states the highest bit of a processing result is fixed to “1”, so the parameters that can be identified error codes are the remaining seven bits.
  (“1 * * * * * * * ”... * indicates a bit available as an error code.)
  Accordingly, 00H to 7FH for seven bits can be represented as error codes.
  <When the remote node is an MP Machine Controller>

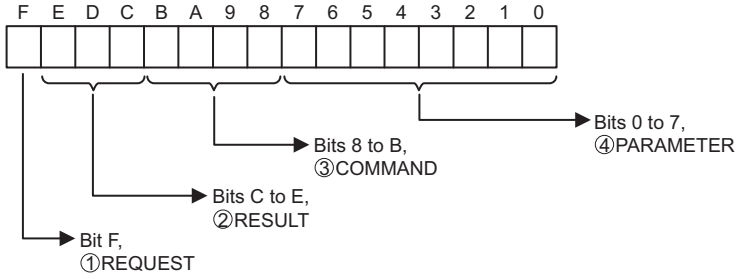
Processing Result	Error Contents
8172H	Error code=1 (function error)
8272H	Error code=2 (reference number error)
8372H	Error code=3 (data count error)
FF72H	Remote device does not respond.

<When the remote node is another manufacturer's controller>

Processing Result	Error contents
8072H	Error with error code=80H occurred (Error contents vary depending on manufacturers.)
8172H to FE72H	Error with error code=01H to 7EH occurred (Error contents vary depending on manufacturers.) Or, error with error code=81H to FFH occurred (Error contents vary depending on manufacturers.)
FF72H	Error with error code=00H occurred (Error contents vary depending on manufacturers.) Or, error with error code=7FH occurred (Error contents vary depending on manufacturers.) Or, error with error code=FFH occurred (Error contents vary depending on manufacturers.) Or, remote device does not respond.

(2) PARAM01: Status

The status of the transmission device is output to PARAM01.
Bit allocations are shown in the following figure and described after the figure.



① REQUEST

The status of the processing request for the MSG-SND function is output to this bit.

Bit Status	Meaning
1	Processing is being requested.
0	Processing request has been accepted.

② RESULT

The result of executing MSG-SND function is output to these bits.

Code	Abbreviation	Meaning
0	CONN_NG	Sending or connection has ended abnormally for FL-net communication.
1	SEND_OK	Sending has been completed normally.
2	REC_OK	Receiving has been completed normally.
3	Abort_OK	Abort completed.
4	FMT_NG	Parameter format error
5	SEQ_NG or INIT_NG	Command sequence error. Not connected to the transmission system.
6	RESET_NG or O_RING_NG	Reset status or out of ring. The token could not be received because the token monitoring time was exceeded.
7	REC_NG	Data receive error (Error detected by a lower-layer program.)

③ COMMAND

The processing command for the MSG-SND function is output to these bits. The processing that is executed depends on the setting of the COMMAND bits.

Code (Hex)	Abbreviation	Meaning
1	U_SEND	Send General-purpose Message with Non-procedure Protocol
2	U_REC	Receive General-purpose Message with Non-procedure Protocol
3	ABORT	Abort
8	M_SEND	Send MEMOBUS command; executing the command is completed upon receiving a response.
9	M_REC	Receive MEMOBUS command; executing the command is followed by sending a response.
C	MR_SEND	Send MEMOBUS response

④ PARAMETER

The following error code is output if RESULT is set to 4 (FMT_NG: parameter format error). In other cases, the remote node number is output.

RESULT	Code	Meaning
RESULT = 4 (FMT_NG: parameter format error)	00	No errors
	01	Remote node number out of range
	02	MEMOBUS response receive monitor time error
	03	Retry count setting error
	04	Cyclic area setting error
	05	CPU No. error
	06	Data address error
	07	Data size error
	08	Function code error
Other values of RESULT	□□	Remote node number

(3) PARAM02: Remote Node Number

Specifies the destination node number (1 to 254).

- The details of the remote node information including node number can be checked on the **Network Configuration** Window. Refer to *4.2.6 Network Configuration Window* on page 4-15 for the **Network Configuration** Window.

(4) PARAM04: Function Code (Only When Extended MEMOBUS Is Used)

PARAM04 sets the function code to be sent (setting is not required for non-procedure protocol).
The function registered to the function code is used by specifying the function code here. Functions include reading coil and input relay status and writing holding registers.
The function codes used for the MEMOBUS or Extended MEMOBUS protocol are listed in the following table.

<Function Codes>

Function Code	Applicable Data Type	Function	Protocol Type	
			Extended MEMOBUS	MEMOBUS
00H to 07H	–	Not used.	–	–
09H	W	Word block read	○	×
0AH	–	Not used.	–	–
0BH	W	Word block write	○	×
0CH to 10H	–	Not used.	–	–

- W: Word data
- ○: Can be set, ×: Cannot be set.

(5) PARAM05: Data Address

- For the relationship among data address (PARAM05), data size (PARAM06), and holding register offset (PARAM011), refer to *6.1.7 Relationship among the Data Address, Data Size, and Offset in the MSG-SND Function* on page 6-16.

[a] When Pro-Typ=1 (MEMOBUS)

PARAM05 sets an FL-net virtual address in the range of 0 to 65535 as the leading address of the data.
The address is input as a decimal or hexadecimal value.

- Example: To set a leading address of MW01000, set 1000 (decimal) or 3E8H (hexadecimal).

In FL-net, the offset address of the FL-net virtual address space (M_ADD) is specified by the data address (PARAM05) and the remote CPU number (PARAM07). For details, refer to *6.1.6 Specifying an FL-net Virtual Address Space Using the MSG-SND Function* on page 6-15.

[b] When Pro-Typ=2 (non-procedure protocol)

Specify the transaction code in the leading register of the data address in decimal or hexadecimal value.
The following table lists transaction codes.

Message Type	Transaction Code			
	Request		Response	
	Decimal	Hexadecimal	Decimal	Hexadecimal
Transparent message	10000 to 59999*	2710 to EA5F*	–	–
Word block read	65005	FDED	65205	FEB5
Word block write	65006	FDEE	65206	FEB6
Network parameter read	65007	FDEF	65207	FEB7
Network parameter write	65008	FDF0	65208	FEB8
Stop command	65009	FDF1	65209	FEB9
Start command	65010	FDF2	65210	FEBA
Profile read	65011	FDF3	65211	FEBB
Log data read	65013	FDF5	65213	FEBD
Log data clear	65014	FDF6	65214	FEBE
Message loopback	65015	FDF7	65215	FEBF

* Any value is valid as long as it is within the range.

- Example: To set a leading address of MW10000, set 10000 (decimal) or 2710 (hexadecimal).
- For notes at actual register input, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

(6) PARAM06: Data Size

PARAM06 specifies the data size to be read or written in the range of 1 to 513 words.
Do not allow the final address of the data, which is determined by the offset (PARAM11), data address (PARAM05), and data size, to exceed the valid range of addresses.
Because a one-word transaction code is set at the beginning of the data when Pro-Typ=2 (non-procedure protocol) is used, the size must be set including the transaction code size.

The following table shows a setting data size (including a one-word transaction code) for each message.

Message Type	Pro-Typ	Data Size (word)	Remarks
Word block read	MEMOBUS	1 to 512 (arbitrary)	
Word block write	MEMOBUS	1 to 512 (arbitrary)	
Network parameter read	Non-procedure protocol	1	Only transaction data is sent.
Network parameter write	Non-procedure protocol	11	
Stop command	Non-procedure protocol	1	Only transaction data is sent.
Start command	Non-procedure protocol	1	Only transaction data is sent.
Profile read	Non-procedure protocol	1	Only transaction data is sent.
Transparent message	Non-procedure protocol	2 to 513 (arbitrary)	
Log data read	Non-procedure protocol	1	Only transaction data is sent.
Log data clear	Non-procedure protocol	1	Only transaction data is sent.
Message loopback	Non-procedure protocol	2 to 513 (arbitrary)	

- For the relationship among data address (PARAM05), data size (PARAM06), and holding register offset (PARAM011), refer to *6.1.7 Relationship among the Data Address, Data Size, and Offset in the MSG-SND Function* on page 6-16.

(7) PARAM07: Remote CPU Number

PARAM07 sets the remote CPU number.

- Set the remote CPU number to 0 if the remote device is a 262IF-01.
- When a remote device is another manufacturer's product, set the low-place four bits of upper word of a remote device address.
- When a remote device is YASKAWA CP series, set a remote CPU number.
- In FL-net, the offset address of the FL-net virtual address space (M_ADD) is specified by the data address (PARAM05) and the remote CPU number (PARAM07). For details, refer to *6.1.6 Specifying an FL-net Virtual Address Space Using the MSG-SND Function* on page 6-15.

(8) PARAM11: Holding Register Offset

PARAM11 sets the offsets for the data read or write location at the device sending the message.
The position of the data is shifted backward by the number of words set for the offset at the device sending the message.

- For the relationship among data address (PARAM05), data size (PARAM05), and holding register offset (PARAM011), refer to *6.1.7 Relationship among the Data Address, Data Size, and Offset in the MSG-SND Function* on page 6-16.
- Negative offsets cannot be set.

(9) PARAM12: Reserved by the system (1).

PARAM12 is used by the system. (The current transmission buffer channel number is held here.)

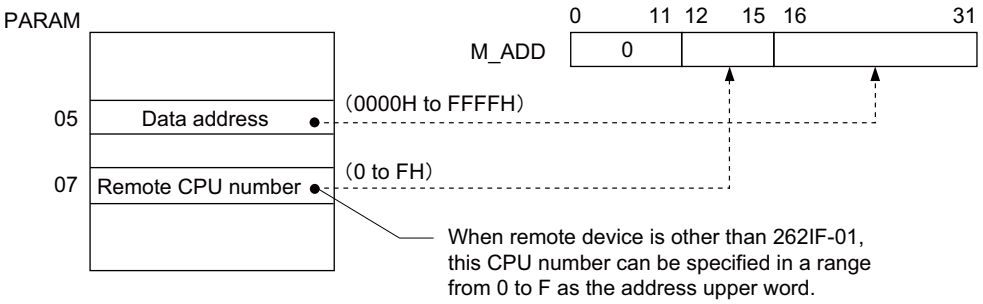
- Make sure that the user program sets this parameter to 0 in the first scan after the power is turned ON. Thereafter, do not change the value set for this parameter because the system will use it.

(10) PARAM13 to PARAM16: Reserved by the System (2)

These parameters are used by the system. Do not change the values set for these parameters.

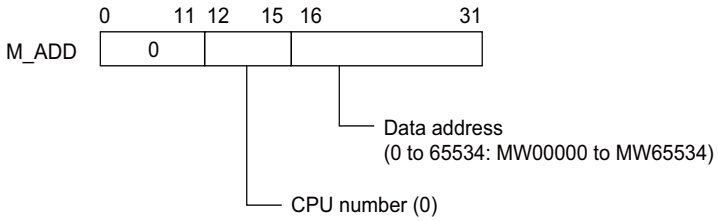
6.1.6 Specifying an FL-net Virtual Address Space Using the MSG-SND Function

An offset address (M_ADD) on the FL-net virtual address space in the FL-net message header information is specified by a data address (PARAM05) and a remote CPU number (address upper word: PAEAM07). In this case, however, the 262IF-02 is allowed to specify 32-bit addresses in a range of virtual address space from 0 to FFFFFH.



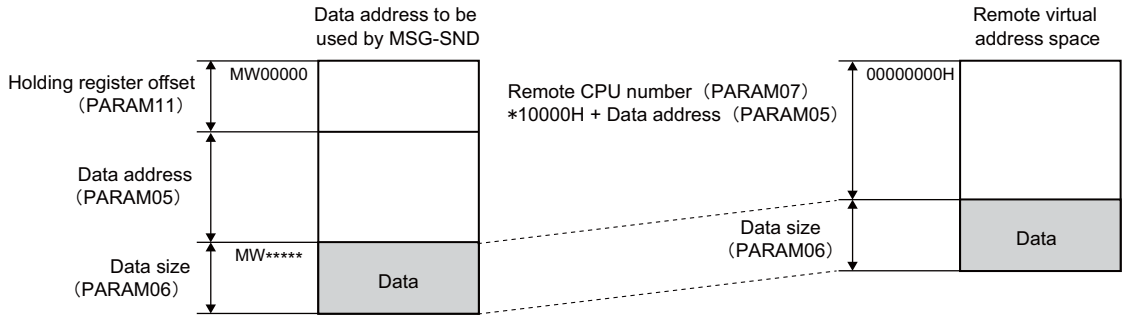
■ When the FL-net Equipment Other Than the 262IF-01 Accesses the 262IF-01:

When the FL-net equipment other than the 262IF-01 accesses the 262IF-01, an offset address (M_ADD) for virtual address space must be specified as shown in the following figure.



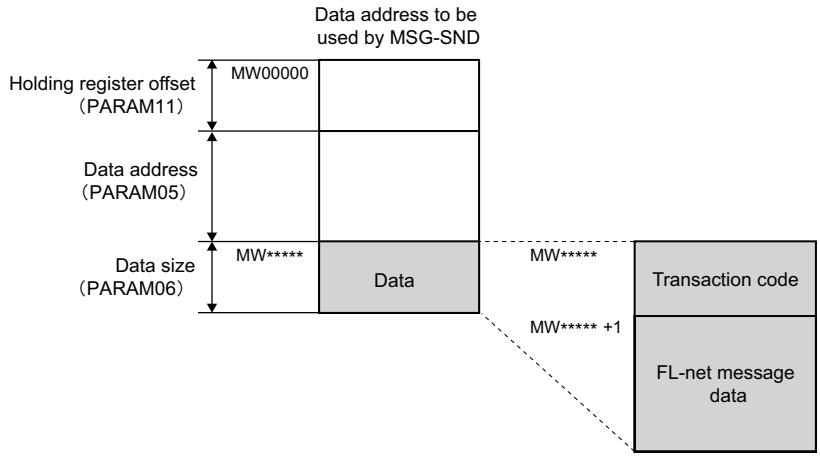
6.1.7 Relationship among the Data Address, Data Size, and Offset in the MSG-SND Function

As MSG-SND function source data, the 262IF-01 reads the MW register by the specified data size (PARAM06), assuming an offset of the holding register offset (PARAM11) + data address (PARAM05). For FL-net message word block read, the 262IF-01 writes the contents read from the remote device to the same area.



■ When Pro-Typ=2 (Non-procedure Protocol)

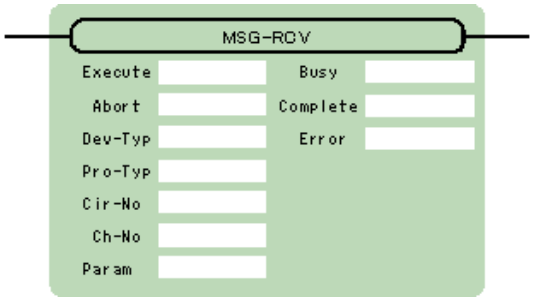
When non-procedure protocol 1 (=2) has been specified in Pro-Typ, set a transaction code in the leading register of the data address and store the FL-net message data to be sent in the subsequent register. Specify the data size (maximum: 513 words) including one word for the transaction code in the data size (PARAM06).



6.2 Message Receive Function

When a request is received assuming that the 262IF-01 is an FL-net message transmission server or a response is received as a client, the message receive function MSG-RCV is used.
Upon FL-net message reception by the MSG-RCV function, the 262IF-01 automatically sends a response message and quits the message function. When the MSG-RCV function has not been started, the received FL-net message is retained in the 262IF-01 for 5 seconds, but is discarded unless the MSG-RCV function is started after 5 seconds passes.
As for FL-net messages to be looped back within the 262IF-01, the MSG-RCV function does not need to be started.

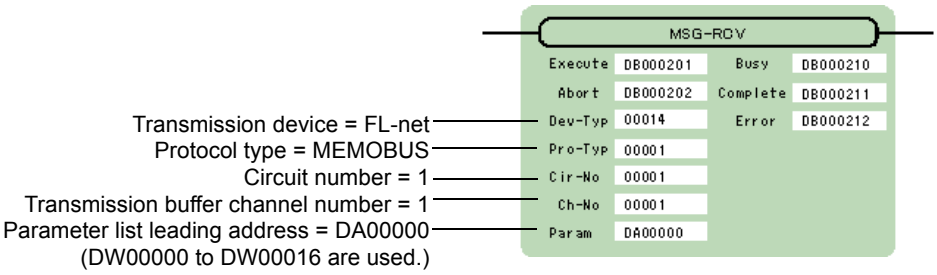
6.2.1 Basic Specifications

Function Name	MSG-RCV			
Function	Receives a message from a remote station on the line specified by the Transmission Device Type parameter (DEV-TYP). The function supports multiple protocols. The Execute command must be held ON until the Complete or Error output turns ON.			
Function Definition				
I/O Definitions	No.	Name	I/O Designation*1	Description
Inputs	1	Execute	B-VAL	Receive message command
	2	Abort	B-VAL	Reception abort command
	3	Dev-Typ	I-REG	Transmission device type FL-net = 14
	4	Pro-Typ	I-REG	Communication protocol MEMOBUS = 1, Non-procedure 1*2 = 2
	5	Cir-No	I-REG	Circuit number FL-net = 1 to 8
	6	Ch-No	I-REG	Transmission buffer channel number FL-net = 1 to 10
	7	Param	Address input	Parameter List Leading Address (MA, DA)
Outputs	8	Busy	B-VAL	Processing in progress.
	9	Complete	B-VAL	Processing completed.
	10	Error	B-VAL	Error has occurred.

* 1. The I/O designations are as follows:
B-VAL: I/O is specified as bit data.
I-REG: I/O is specified as integer data. Specify the number of an integer register.
Constants (immediate data) can also be specified for inputs.
Address input: The address of the specified register (any integer register) is passed to the function.
* 2. Non-procedure 1: Data is received in word units.

6.2.2 MSG-RCV Function Setting Example

This example shows the settings for using the FL-net as the transmission device (when the MOMOBUS is used).



To use the Extended MEMOBUS protocol, the protocol type is set to MEMOBUS.
The circuit number is set to the circuit number assigned to the 262IF-01 transmission device.
Transmission buffer channel numbers in the same line must all be unique.
For details on settings, refer to *6.2.3 Inputs and Outputs for the Message Receive Function* on page 6-18.

6.2.3 Inputs and Outputs for the Message Receive Function

(1) Inputs

The following table gives the registers that can be used for the inputs.

Inputs	I/O Designation	Applicable Registers
Execute Abort	B-VAL	Any bit registers (including those with subscripts) except for # and C registers
Dev-Typ Pro-Typ Cir-No Ch-No	I-REG	Any integer registers (including those with subscripts) Constants
Param	Address input	Any register addresses (including those with subscripts) except for # and C registers

The following sections describe the inputs in more detail.

[a] Execute (Receive Message Execute Command)

Specify the bit that will be used to control execution of the Message Receive function.
Message receive processing is started when the Execute command turns ON. To execute processing, this bit must be turned ON and OFF, e.g., from the ladder program.

- The Execute command must be held at ON until the Complete or Error output turns ON. A message is received when the Execute command turns ON. To receive another message, it is not necessary to turn OFF the Execute command.

[b] Abort (Receive Message Abort Command)

Specify the bit that will be used to abort the Message Receive function.
Receiving the message will be aborted when the Abort command turns ON. The Abort command takes priority over the Execute command.
To abort processing, this bit must be turned ON and OFF, e.g., from the ladder program.

[c] Dev-Typ (Transmission Device Type)

The Dev-Typ input specifies the transmission device type. The FL-net transmission device type is 14.

[d] Pro-Typ (Communication Protocol)

The Pro-Typ input specifies the communication protocol as shown in the following table.

Type code	Communication Protocol	Remarks
1	MEMOBUS	Select for word block read or word block write of FL-net messages.
2	Non-procedure protocol 1 (in units of words)	Select for other than the above message. Data will be received in word units using the non-procedure protocol. No response is sent to the remote station.
3	Non-procedure protocol 2 (in units of bits)	Not used in FL-net.

The following table summarizes the correspondence between the FL-net message and Pro-Typ.

Message Type	Function	Communication Protocol	
		Server (Send Response)	Client (Send Request)
Word block read	Reads data in units of words.	MEMOBUS	–*2
Word block write	Writes data in units of words.	MEMOBUS	–*2
Network parameter read	Reads network parameter data.	–*1	Non-procedure 1
Network parameter write	Writes network parameter data.	Not supported	Non-procedure 1
Stop command	Stops operation of equipment such as the PC connected to the upper layer of the FA link protocol.	Not supported	Non-procedure 1
Start command	Starts operation of equipment such as the PC connected to the upper layer of the FA link protocol.	Not supported	Non-procedure 1
Profile read	Reads a device profile.	–*1	Non-procedure 1
Transparent message	Provides a transparent service to the upper layer of the FA link protocol.	Non-procedure 1	Non-procedure 1
Log data read	Reads log data concerning a specified node.	–*1	Non-procedure 1
Log data clear	Clears log data concerning a specified node.	–*1	Non-procedure 1
Message loopback	Loops back a received message.	–*1	Non-procedure 1

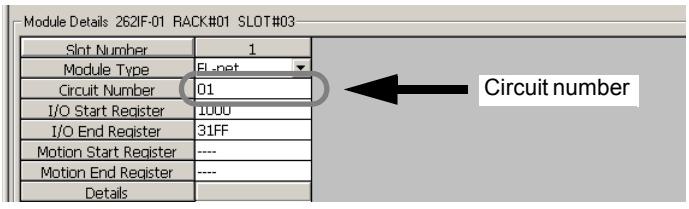
∗ 1. Because a response is sent from within the 262IF-01, neither receive processing by applications (MSG-RCV function) nor send processing by applications (MSG-SND function) is required.

∗ 2. A response is received by application send processing (MSG-SND function). The MSG-RCV function is not required.

- For the relationship between the FL-net message and message function, refer to *6.3 Combination of FL-net Messages and Message Functions* on page 6-29.

[e] Cir-No (Circuit Number)

The Cir-No input specifies the circuit number of the transmission device.
Set the circuit number to the value displayed in the **MPE720 Module Configuration** Window.



The valid circuit number range of FL-net is 1 to 8.

[f] Ch-No (Channel Number)

The Ch-No input specifies the channel number of the transmission buffer.

Any channel number can be specified as long as it is within the valid range. If more than one function is being executed at the same time, do not specify the same channel number more than once for the same modem number. (The same channel number can be used as long as the functions are not executed at the same time.)

The valid channel number range of FL-net is 1 to 10.

<Example>

In FL-net (262IF-01), there are 10 channels of transmission buffers from 1 to 10 for sending and receiving combined, so up to 10 messages can be sent and received at the same time.

- One MSG-RCV (or MSG-SND) function must be programmed for each circuit being used at the same time.
- Refer to ■ *Conceptual Diagram of Transmission Buffer Channels* on page 6-6 for information on transmission buffer channels.

[g] Param (Parameter List Leading Address)

The PARAM input specifies the leading address of the parameter list. A parameter list will be automatically created from the 17 words starting with the specified address. Use the parameter list to input the holding register offset value and write range LO/HI. The processing results and connection number are also output to the parameter list.

- Refer to *6.2.4 Parameter List for MSG-RCV Function* on page 6-23 for information on the parameter list.

Example: The following parameter list will be created when the Parameter List Leading Address is set to DA000000.

Register	Parameter F · · · · · · · 0
DW000000	PARAM00
DW000001	PARAM01
DW000002	PARAM02
DW000003	PARAM03
DW000004	PARAM04
DW000005	PARAM05
DW000006	PARAM06
DW000007	PARAM07
DW000008	PARAM08
DW000009	PARAM09
DW000010	PARAM10
DW000011	PARAM11
DW000012	PARAM12
DW000013	PARAM13
DW000014	PARAM14
DW000015	PARAM15
DW000016	PARAM16

(2) Outputs

The following table gives the registers that can be used for the outputs.

Inputs	I/O Designation	Applicable Registers
Busy Complete Error	B-VAL	Any bit registers (including those with subscripts) except for # and C registers

The following sections describe the outputs in more detail.

[a] Busy (Processing in Progress)

Specify the bit that will report when receiving the message is being processed.
The Busy output will be ON while message receive processing or abort processing is in progress.
Keep the Execute command or Abort command ON while the Busy output is ON.

[b] Complete (Processing Completed)

Specify the bit that will report when processing to receive the message has been completed.
The Complete output will be ON for only one scan after message receive processing or abort processing has been completed normally.

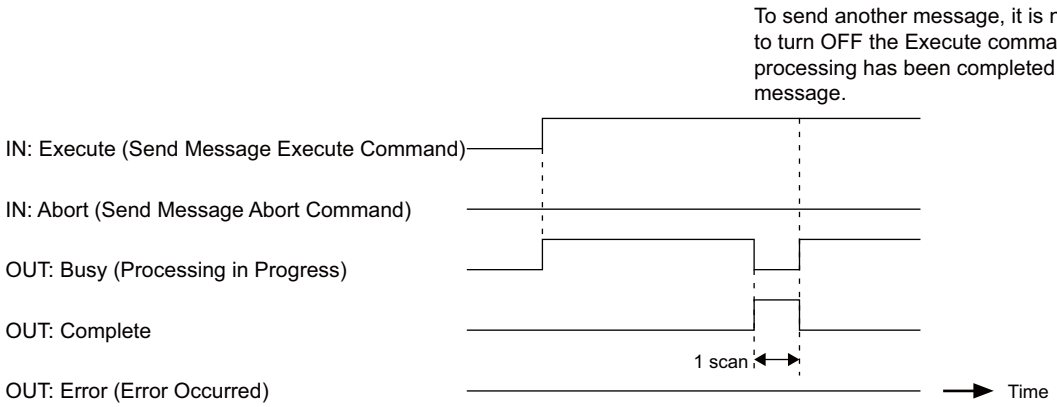
[c] ERROR (Error Occurred)

Specify the bit that will report when an error has occurred while receiving the message.
The Error output will turn ON for only one scan when an error occurs.

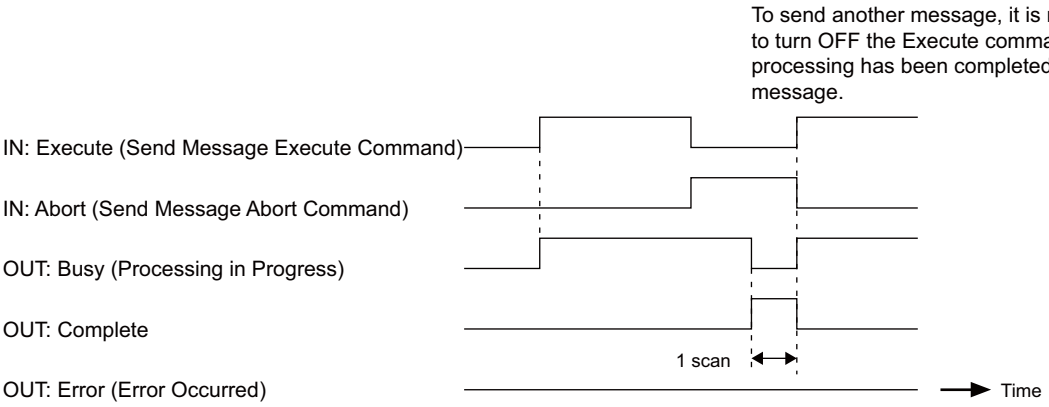
(3) I/O Timing Chart

The following timing charts show the bit inputs and outputs used with the MSG-RCV function.

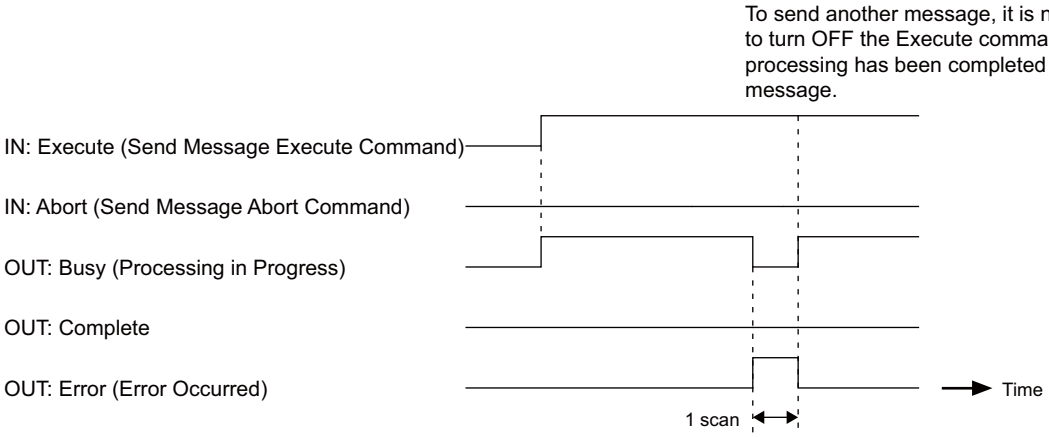
<Normal Processing>



<Abort Processing>



<Error Processing>



6.2.4 Parameter List for MSG-RCV Function

The Param input to the MSG-RCV function is a parameter list structure consisting of 17 words. The value of the Param input is the leading address (MA or DA) of the parameter list.
Use the parameter list to input the holding register offset value and write range LO/HI. The processing results and connection number are also output to the parameter list.
The parameter lists for the MEMOBUS and non-procedure communication protocols in FL-net are given below.

PARAM No.	IN/OUT	Contents	Description	
			Pro-Typ=1 (MEMOBUS)	Pro-Typ=2 (Non-procedure)
00	OUT	Processing result	The processing results are output here.	
01	OUT	Status	The status of the current MSG-RCV function is output here.	
02	OUT	Remote node number	The source node number (1 to 254) is output here.	
03	SYS	Reserved by the system (1).		
04	OUT	Function code	Not used.	
05	OUT	Data address	The data address is output here.	Not used.
06	OUT	Data size	The data size is output here.	The data size is output here. The first one word of the data is a transaction code.
07	OUT	Remote CPU number (address upper word)	0 is output here.	
08	IN	Coil offset	Not used.	
09	IN	Input relay offset	Not used.	
10	IN	Input register offset	Not used.	
11	IN	Holding register offset	Register offset	Not used.
12	IN	Write range LO/ holding register offset	The lower value of write range	The register offset
13	IN	Write range HI	The upper value of write range	
14	SYS	Reserved by the system (2).		
15 and 16	SYS	Reserved by the system (3).		

- IN: Input, OUT: Output, SYS: Used by the system.
- Refer to *6.2.5 Parameter Details for MSG-RCV Function* on page 6-24 for details on the parameters.

6.2.5 Parameter Details for MSG-RCV Function

This section describes the parameter list in detail for MSG-RCV function.

(1) PARAM00: Processing Result

The processing result is output to the upper-place byte of PARM00. The lower-place byte is for system analysis.

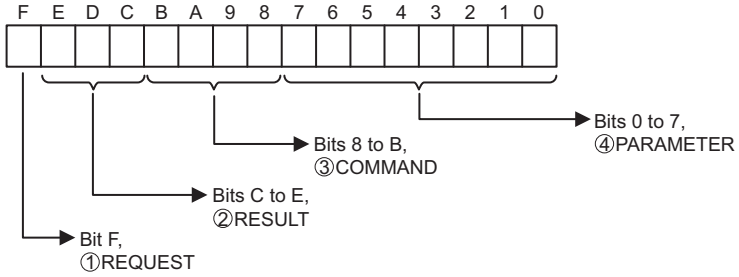
Value of Processing Result	Meaning
00□□H	Processing in progress (busy)
10□□H	Processing completed (Complete)
8y□□H	Error occurred (Error)

If an error occurs, troubleshoot the problem according to the value of the processing result as listed below.

Error	Error Contents	Description
80□□H	–	Reserved by the system.
81□□H	Function code error	An undefined function code was received. Check the function code that was received.
82□□H	Address setting error	One of the following settings in not within the valid range. Check the settings. Data address (in request from sender) PARAM11 (holding register offset)
83□□H	Data size error	The size of the sent or received data is not within the allowable range. Check PARAM06 (data size).
84□□H	Circuit number setting error	The circuit number is not within the allowable range. Check the circuit number in the MSG-RCV function.
85□□H	Channel number setting error	The transmission buffer channel number is not within the allowable range. Check the transmission buffer channel number in the MSG-RCV function.
86□□H	–	–
87□□H	–	–
88□□H	Transmission device error	An error response was returned from the transmission device. Check the connection to the equipment. Also, be sure that the remote device can communicate.
89□□H	Device selection error	An unavailable device was set. Check the transmission device type in the MSG-RCV function.

(2) PARAM01: Status

The status of the transmission device is output to PARAM01.
Bit allocations are shown in the following figure and described after the figure.



① REQUEST

The status of the processing request for the MSG-RCV function is output to this bit.

Bit Status	Meaning
1	Processing is being requested.
0	Processing request has been accepted.

② RESULT

The result of executing MSG-RCV function is output to these bits.

Code	Abbreviation	Meaning
0	CONN_NG	Sending or connection has ended abnormally for FL-net communication.
1	SEND_OK	Sending has been completed normally.
2	REC_OK	Receiving has been completed normally.
3	ABORT_OK	Abort completed.
4	FMT_NG	Parameter format error
5	SEQ_NG	Command sequence error
6	RESET_NG	Reset status
7	REC_NG	Data receive error (Error detected by a lower-layer program.)

③ COMMAND

The processing command for the MSG-RCV function is output to these bits. The processing that is executed depends on the setting of the COMMAND bits.

Code (Hex)	Abbreviation	Meaning
1	U_SEND	Send General-purpose Message with Non-procedure Protocol
2	U_REC	Receive General-purpose Message with Non-procedure Protocol
3	ABORT	Abort
8	M_SEND	Send MEMOBUS command; executing the command is completed upon receiving a response.
9	M_REC	Receive MEMOBUS command; executing the command is followed by sending a response.
C	MR_SEND	Send MEMOBUS response

④ PARAMETER

The following error code is output if RESULT is set to 4 (FMT_NG: parameter format error). In other cases, the remote node number is output.

RESULT	Code	Meaning
RESULT = 4 (FMT_NG: parameter format error)	00	No errors
	01	Connection number out of range
	02	MEMOBUS response receive monitor time error
	03	Retry count setting error
	04	Cyclic area setting error
	05	CPU No. error
	06	Data address error
	07	Data size error
	08	Function code error
Other values of RESULT	□□	Remote node number

(3) PARAM02: Remote Node Number

The source node number is output to PARAM02.

(4) PARAM05: Data Address

The requested data address is output to PARAM05.

(5) PARAM06: Data Size

The data size requested by the sending station to be read or written as the number of bits or words is output to PARAM06. When Pro-Typ = 1 (Non-procedure protocol), a one-word transaction code is included in the data size in the leading address of the data.

(6) PARAM07: Remote CPU Number

The destination CPU number specified in the source station is output.

(7) PARAM11: Holding Register Offset (Only for MEMOBUS)

PARAM11 sets the data address offsets from the receiving station when Pro-Typ=1 (MEMOBUS) (PARAM11 is not used when Pro-Typ=2 (non-procedure)).
The position of the data is shifted backward by the number of words set for the offset at the device receiving the message.

- For details, refer to *6.2.6 Relationship among the Data Address, Data Size, and Offset in the MSG-RCV Function* on page 6-28.
- Negative offsets cannot be set.

(8) PARAM12 and PARAM13: Write Range

■ When Pro-Typ=1 (MEMOBUS)

This parameter sets the range of addresses that can be written for a write requested from the sending station. Any write request that exceeds this address range will result in an error.
The write ranges in PARAM12 and PARAM13 are set as word addresses.

- The MP900/MP2000 Series Machine Controllers store all data for write requested from the sending station to M registers.

The write range parameter can be used to set a range of M registers that can be written using messages.
The write range parameters are listed in the following table.

Parameter	Contents	Description
PARAM12	Write range LO	Leading address of the write range
PARAM13	Write range HI	Final address of the write range

Set the write ranges so that the following conditions are satisfied.

$0 \leq$ Write range LO $\leq$ Write range HI $\leq$ Maximum value of M addresses

Example: The following settings would be used to permit writing to the M registers with addresses 1000 to 1999.
PARAM12=1000
PARAM13=1999
With these settings, the receiving station will output an error and not perform the write if a write request is received for any registers not between MW01000 and MW01999.

■ When Pro-Typ=2 (Non-procedure Protocol)

This parameter sets the offset value and the upper limit of addresses that can be written for a write request from the sending station. Any write request that exceeds this address range will result in an error.

Parameter	Contents	Description
PARAM12	Holding register offset	Leading address of the write range
PARAM13	Write range HI	Final address of the write range

(9) PARAM14: Reserved by the System (2)

PARAM14 is used by the system. (The current transmission buffer channel number is held here.)

- Make sure that the user program sets this parameter to 0 in the first scan after the power is turned ON. Thereafter, do not change the value set for this parameter because the system will use it.

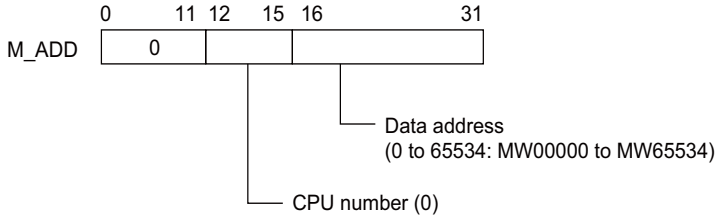
(10) PARAM15 and PARAM16: Reserved by the System (3)

These parameters are used by the system. Do not change the values set for these parameters.

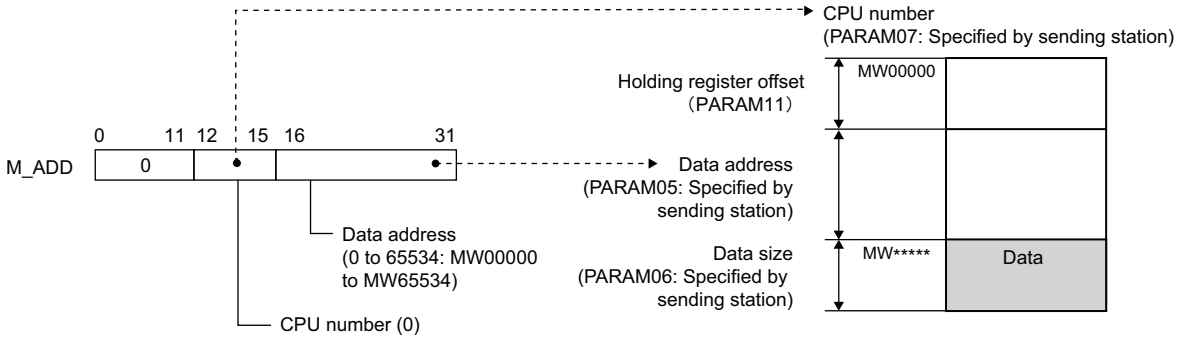
6.2.6 Relationship among the Data Address, Data Size, and Offset in the MSG-RCV Function

■ When the Message Is Received under Pro-Typ=1 (MEMOBUS)

The following shows an offset address (M_ADD) for a virtual address space sent from other FL-net equipment to the 262IF-01.

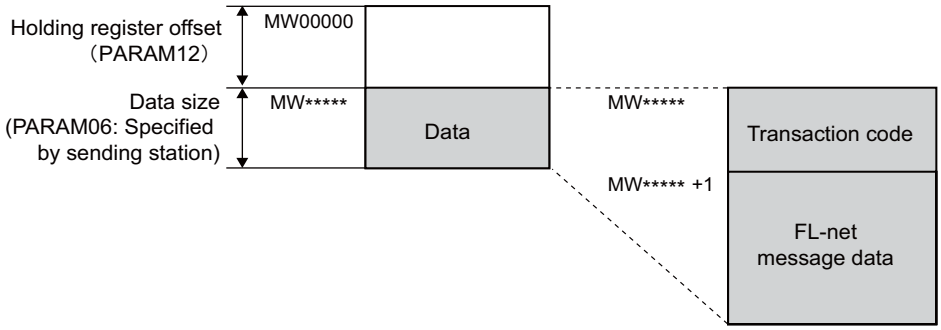


When the 262IF-01 receives the above virtual address, the 262IF-01 stores a CPU number and a data address in PARAM07 and PARAM05 respectively, and then writes to or reads from the data area shown in the following figure.



■ When the Message Is Received under Pro-Typ=2 (Non-procedure Protocol)

Because a message using a non-procedure protocol does not use a virtual address, the 2602IF-01 stores the received data in an area specified by the holding register offset (PARAM12) if it receives an FL-net message while the MSG-RCV is activated by Pro-Typ=2 (non-procedure protocol 1). At this time, the transaction code is stored in the leading register and FL-net message data (received data) in the subsequent register. The data size including one word for the transaction code is stored in the data size (PARAM06).

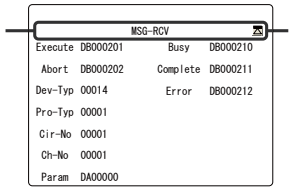
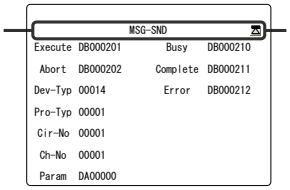
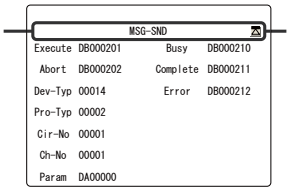
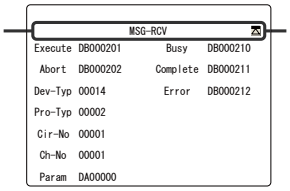
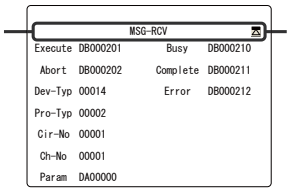
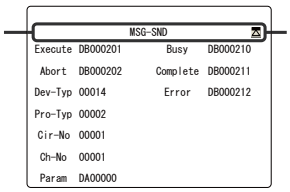
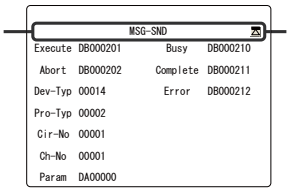
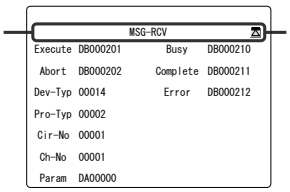
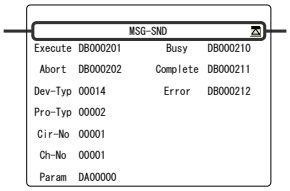
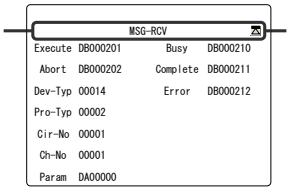


- When the 262IF-01 has sent a message “remote device not supported” as a client and has received its response message, the processing result of the MSG-RCV function is “normal”. However, two words consisting of a transaction code (response) and an unsupported error code “0□FFFF” are stored in the data part.

MW□□□□□	Transaction code
MW□□□□□ + 1	0□FFFF

6.3 Combination of FL-net Messages and Message Functions

For FL-net message transmission when the 262IF-01 acts as a client or a server, the following combinations of messages and message functions are used for each message transmission.
When the client or server is another manufacturer's FL-net equipment, refer to the pertinent manual of the other manufacturer for message confirmation.

Message Type	Server (Send response)	Client (Send request)
Word block read Work block write		
Network parameter read Profile read Log data read Log data clear Message loopback	Loopback within 262IF-01	 
Transparent message	 	 
Network parameter write Stop command Start command	Not supported by 262IF-01. "Unsupported-message type" response is returned. * "Unsupported-message type" response is also returned at byte block read/write or at vendor-specific message reception.	 

6.4 Displaying a Register List and Notes at Register Input

When a message send or receive function is used in a ladder program, access to DW or MW register and input are required.
The following describes how to display the register list and notes at register input.

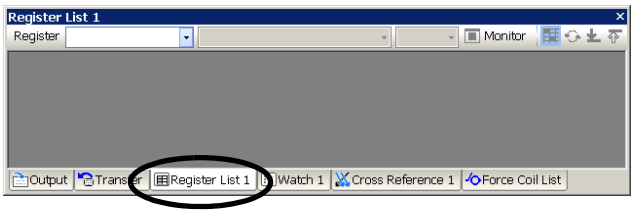
6.4.1 Displaying a Register List

(1) MPE720 Ver. 6 and Ver. 7

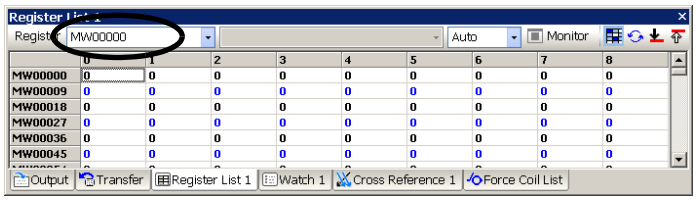
Use the following procedure to display the MPE720 Ver. 6 or Ver. 7 register list.

1. Open the **Register List** Sub-window from the **MPE720 Ver. 6** or **Ver. 7** Main Window.

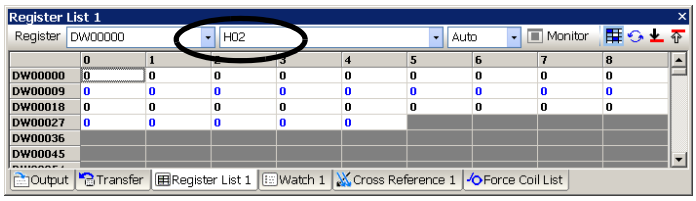
The **Register List 1** Tab is provided by default in the sub-window displayed on the bottom of the screen.



2. Enter the leading register number of the system register “MW□□□□□” (or ”DW□□□□□”)to be accessed in the **Register** input field and press the **ENTER** Key. The contents of the system register will be displayed starting from the leading register number.



- Enter the drawing number for the D register as follows.

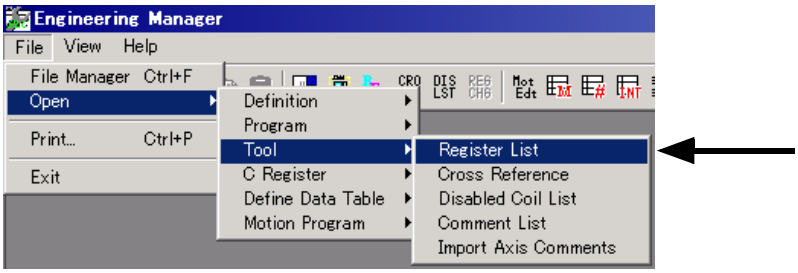


- The data type is set by default to decimal. Place the cursor anywhere on the list, and then right-click. Select ***Hex*** (hexadecimal) from the pop-up menu that will appear. The data will then be displayed in hexadecimal.

(2) MPE720 Ver. 5

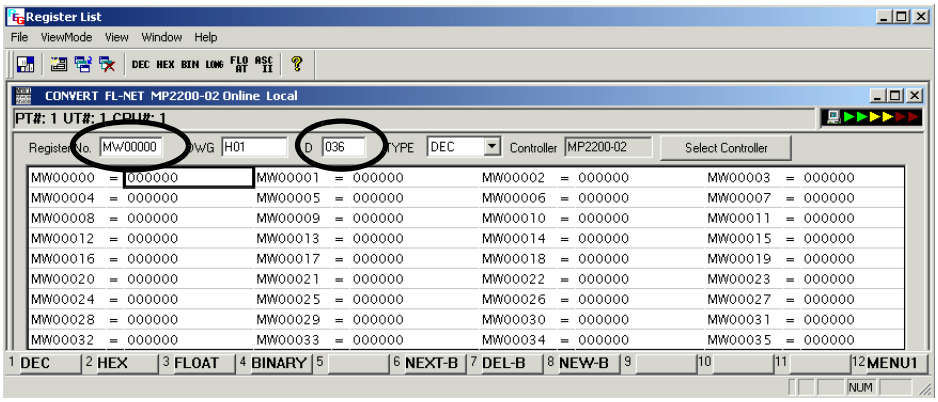
Use the following procedure to display the MPE720 Ver. 5 register list.

1. Select ***File*** – ***Open*** – ***Tool*** – ***Register List*** from the MPE720 Ver. 5 Main Menu of **Engineering Manager** Window to open the **Register List** Window.



- Refer to *4.1.1 Displaying the Module Configuration Window* on page 4-2 for details on how to display the **Engineering Manager** Window.

2. Enter the first register number "MW□□□□□" (or "DW□□□□□") to be accessed for **Register No.**, enter the final register number to be accessed for **D**, and click anywhere in the list. The contents of the specified range of register numbers will be displayed.

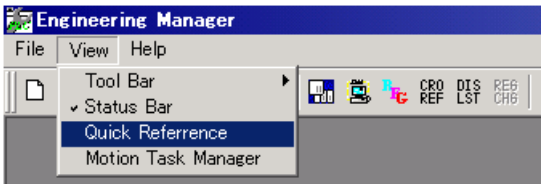


- Clicking the **DEC** Button will display the list in decimal values. Clicking the **HEX** Button will display the list in hexadecimal values.

(3) Displaying a Register List with the Quick Reference (MPE720 Ver. 5)

Register lists can also be accessed with the Quick Reference.

1. Select ***View*** – ***Quick Reference*** from the Main Menu of MPE720 **Engineering Manager** Window.

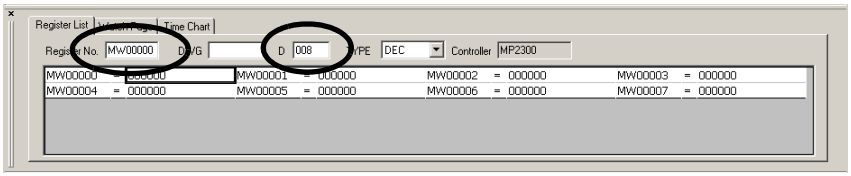


The Quick Reference will be displayed at the bottom of the **Engineering Manager** Window.

- Refer to *4.1.1 Displaying the Module Configuration Window* on page 4-2 for details on how to display the **Engineering Manager** Window.

2. Click the **Register List** Tab to switch to the register list.

3. Enter the first register number "MW□□□□□" to be accessed for **Register No.**, enter the number of registers to be accessed for **D**, and click anywhere in the list. The contents of the specified range of register numbers will be displayed.



6.4.2 Notes at Register Input

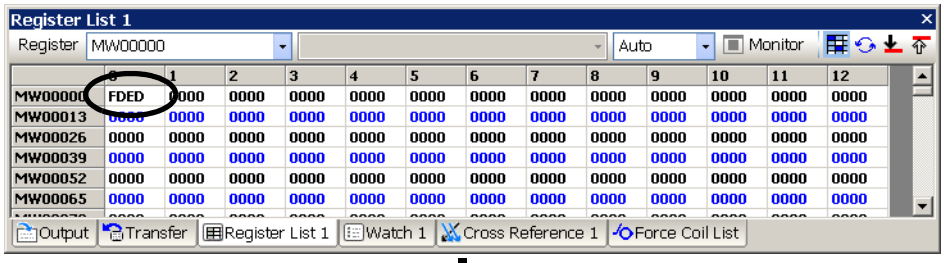
(1) Decimal/Hexadecimal Number

DW and MW registers are signed integer registers and their input ranges are decimal numbers from -32768 to +32767. (Hexadecimal: 0 to FFFFH)
Because integers greater than or equal to +32768 cannot be input to these registers in decimal numbers, set the display mode to "HEX" (hexadecimal) and input them in hexadecimal numbers for entry of a remote destination address or transaction code.

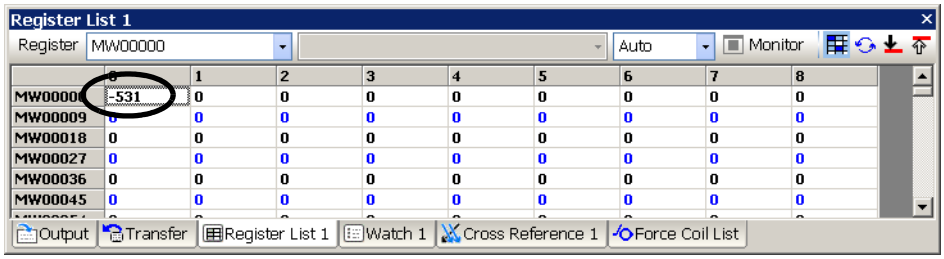
(2) Negative Value Representation in Decimal Numbers

When a hexadecimal input register is displayed in decimal numbers, its value may be represented as a negative value as shown below.

Hexadecimal



Decimal



This is because a hexadecimal input value is greater than +32768 (decimal number) and it is represented as a negative value through bit inversion. In spite of negative value representation, processing is performed as a positive value.
To convert a negative decimal number into a positive decimal number, the following expression is used.

| -32768 | + 32767 + 1 + (displayed negative value)

In the above screen example (-531), the following is used.

| -32768 | + 32767 + 1 + (-531)= 65005

6.5 Example of Programming Message Communications

Cyclic transmission is performed automatically if cyclic transmission setting (FL-net transmission definition) is made. For message transmission, it is necessary to create a user program using the message send and receive functions (MSG-SND function and MSG-RCV function).
The following shows a programming example using the message send/receive function.

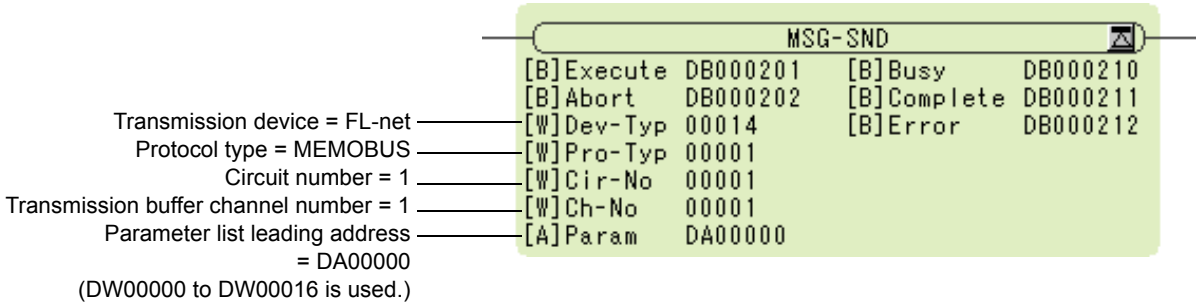
- When a server receives either of the following message requests from a client, it is not necessary to create the user program.
  Network parameter read, profile read, log data read and clear, message loopback

6.5.1 Word Block Data Read (Client)

The following shows an example where the 262IF-01 acts as an FL-net message client to request a word block data read with a data size of 512 words from a virtual address 0 to the remote device (node number 1).

(1) MSG-SND Function Setting

The MSG-SND function is set as follows:



(2) Parameter Setting

The parameter list from DA00000 is set as follows.

Parameter list F · · · · · · · 0	Register	Contents	Setting Value	Remarks
PARAM00	DW00000	Processing result	–	
PARAM01	DW00001	Status	–	
PARAM02	DW00002	Remote node number	1	
PARAM03	DW00003	Option	0	Not used
PARAM04	DW00004	Function code	09H	Word block data read
PARAM05	DW00005	Data address	0	FL-net virtual address
PARAM06	DW00006	Data size	512	
PARAM07	DW00007	Remote CPU number (Address upper word)	0	When the destination node is the 262IF-01, 0 must be set.
PARAM08	DW00008	Coil offset	0	Not used
PARAM09	DW00009	Input relay offset	0	Not used
PARAM10	DW00010	Input register offset	0	Not used
PARAM11	DW00011	Holding register offset	0	
PARAM12 to 16	DW00012 to DW00016	Reserved by the system	0	

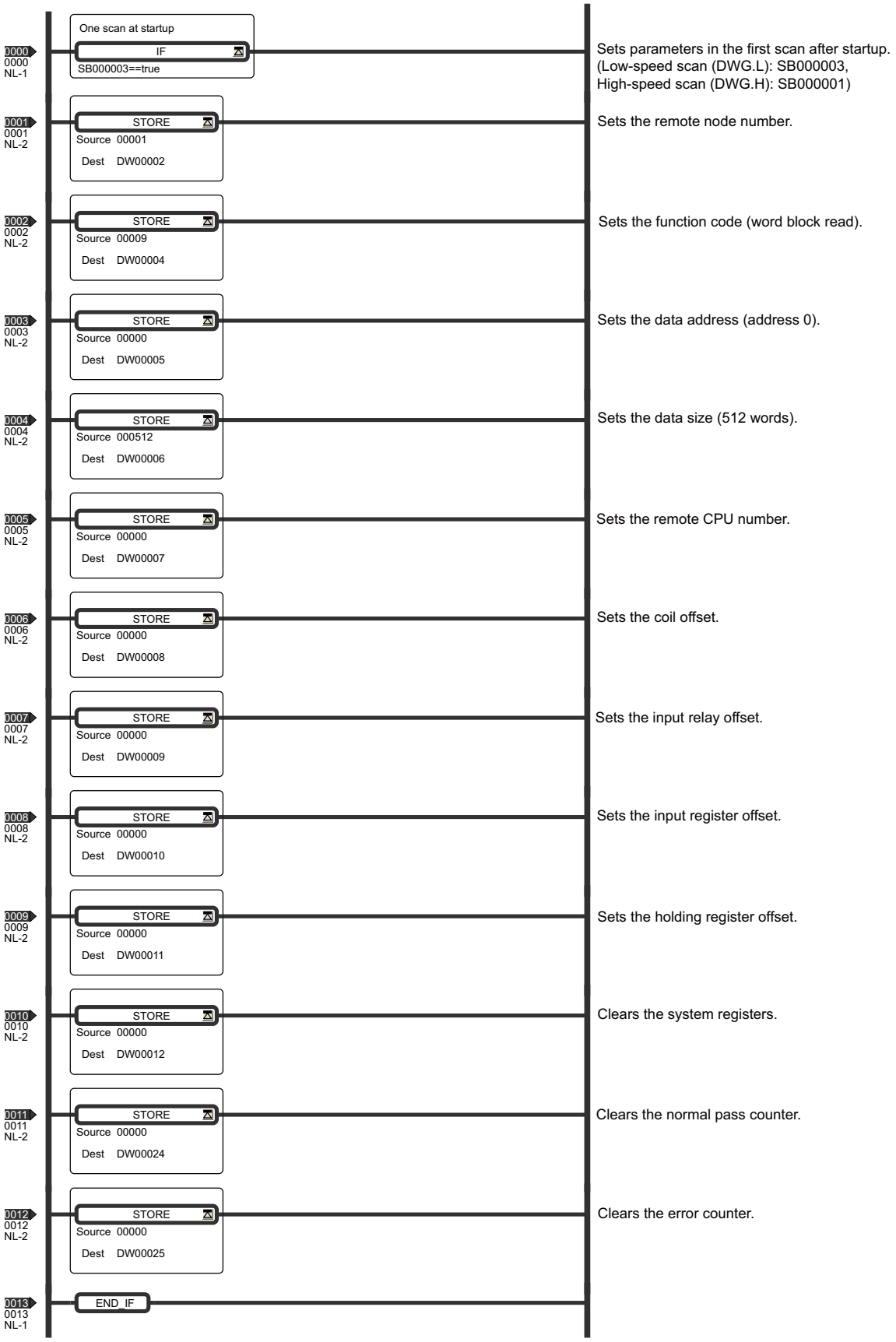
- For register reference method and notes at register input, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

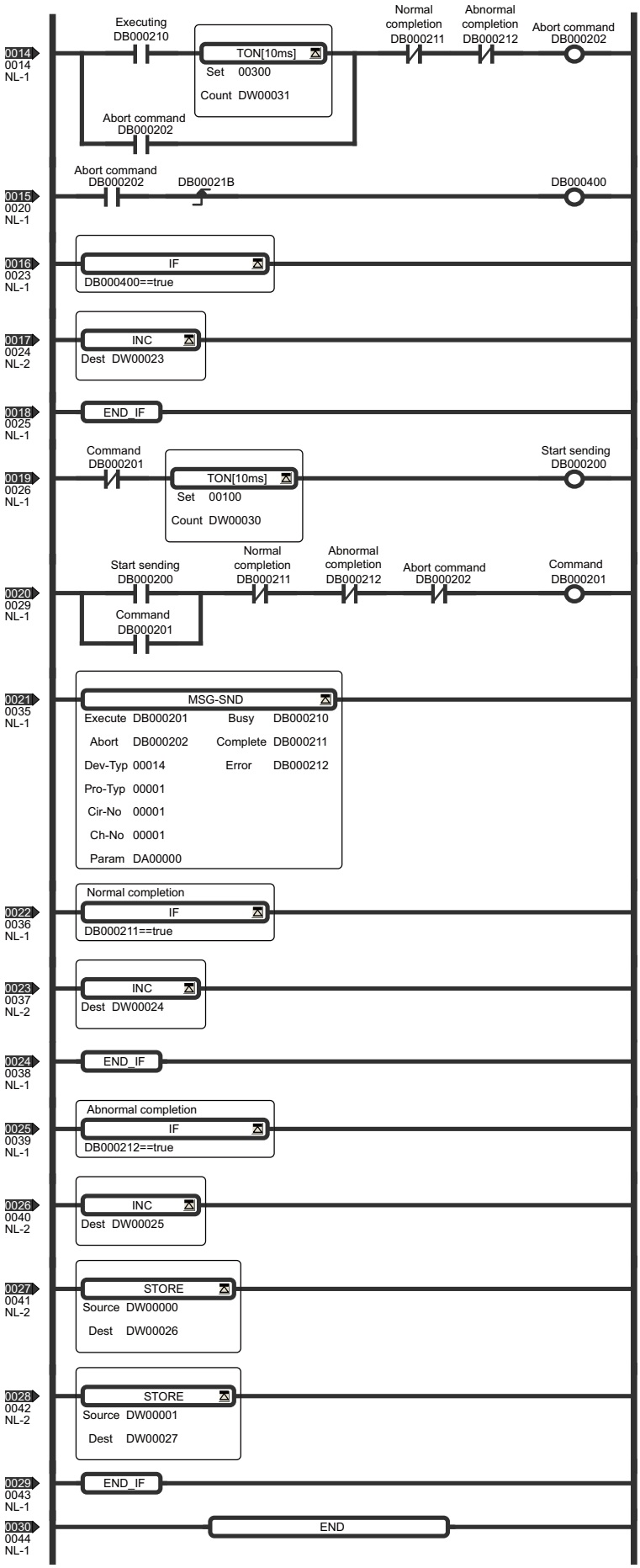
When the Execute (DB000201) is set to ON (=1) from the above settings, the 262IF-01 sends a word block data read request (transaction code: 65005).
When a word block data read response (transaction code: 65205) is received from a remote node, the 262IF-01 writes read data to MW00000 to MW000511 (512 words).

- For transaction codes, refer to *6.1.5 (5) PARAM05: Data Address* on page 6-13.

(3) Programming Example

The following shows an example of ladder programming executed by the settings in the previous page.





Forced stop if processing is not completed within 3 seconds after sending the Send command.

Increments the stop counter when the Abort command is sent.

Starts sending every 1 second.

Function Send command

Sends a message to the remote node.
The executing coil turns ON when the CPU receives the command.
The normal completion or abnormal completion coil turns ON at the completion of processing.
Pro-Type: Always 1 (MEMOBUS communication)
Cir-No. (circuit number): 1 (Depends on the connection port.)
Ch-No. (channel number): 1 (Use 1 to 10 for the 262IF-01.)

Turns ON after the query message is sent and the response message is received.

Increments the normal pass counter.

Ended with transmission errors.

Increments the abnormal pass counter.

Stores the processing results.

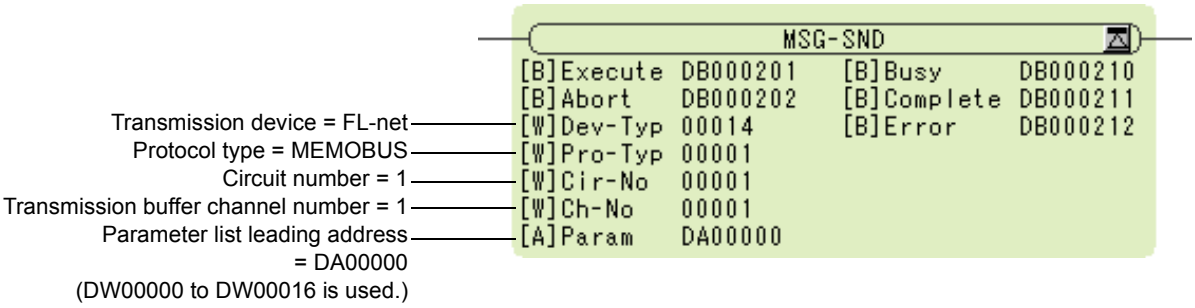
Stores the status.

6.5.2 Word Block Data Write (Client)

The following shows an example where the 262IF-01 acts as an FL-net message client to request a word block data write with a data size of 100 words from a virtual address offset 0 to the remote device (node number 254).

(1) MSG-SND Function Setting

The MSG-SND function is set as follows:



(2) Parameter Setting

The parameter list from DA00000 is set as follows:

Parameter list F · · · · · · · 0	Register	Contents	Setting Value	Remarks
PARAM00	DW00000	Processing result	–	
PARAM01	DW00001	Status	–	
PARAM02	DW00002	Remote node number	1	
PARAM03	DW00003	Option	0	Not used
PARAM04	DW00004	Function code	0Bh	Word block data write
PARAM05	DW00005	Data address	0	FL-net virtual address
PARAM06	DW00006	Data size	512	
PARAM07	DW00007	Remote CPU number (Address upper word)	0	
PARAM08	DW00008	Coil offset	0	Not used
PARAM09	DW00009	Input relay offset	0	Not used
PARAM10	DW00010	Input register offset	0	Not used
PARAM11	DW00011	Holding register offset	0	
PARAM12	DW00012	Reserved by the system	0	
PARAM13	DW00013	Reserved by the system	0	
PARAM14	DW00014	Reserved by the system	0	
PARAM15	DW00015	Reserved by the system	0	
PARAM16	DW00016	Reserved by the system	0	

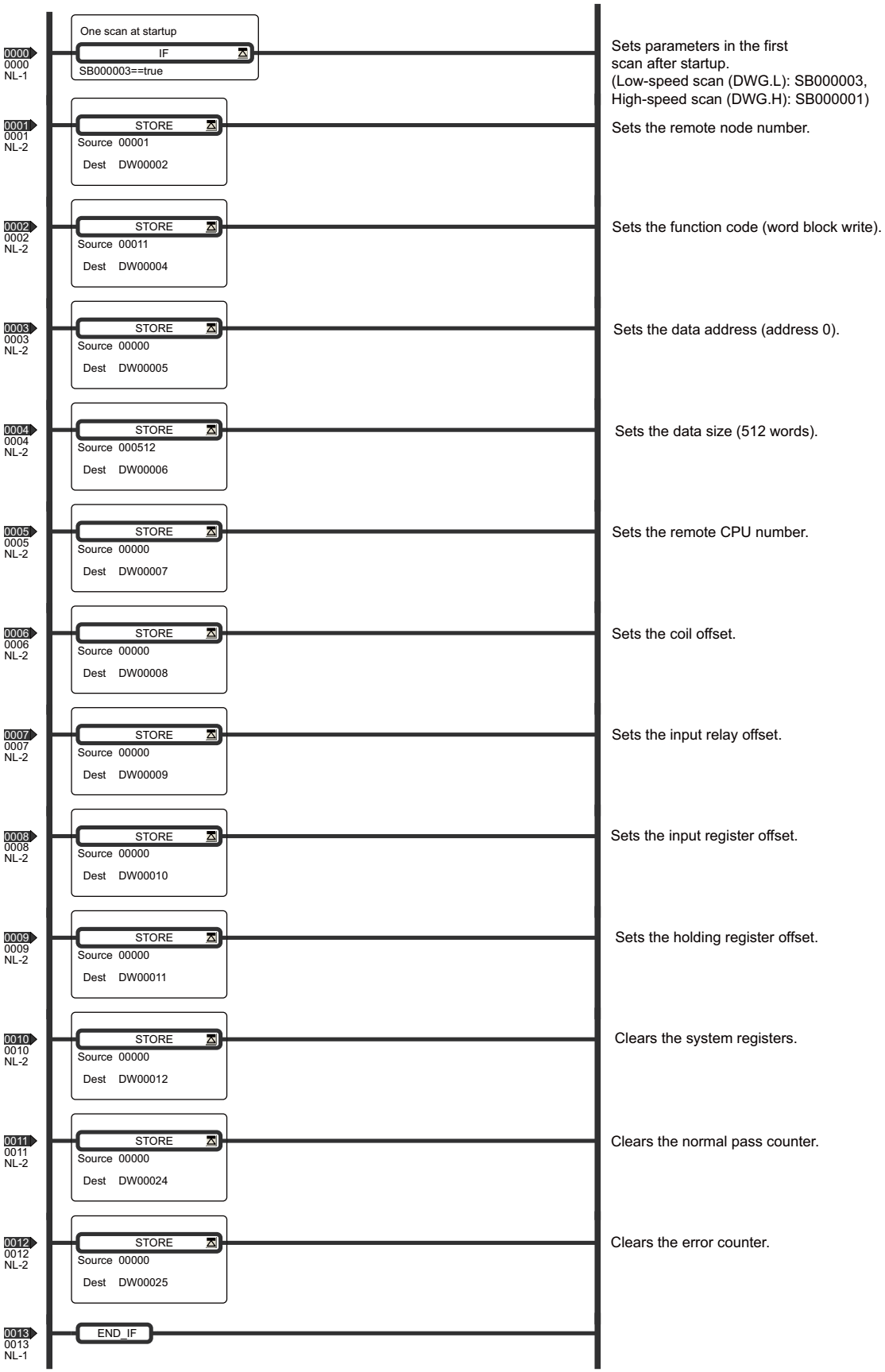
- For register access method and notes at register input, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

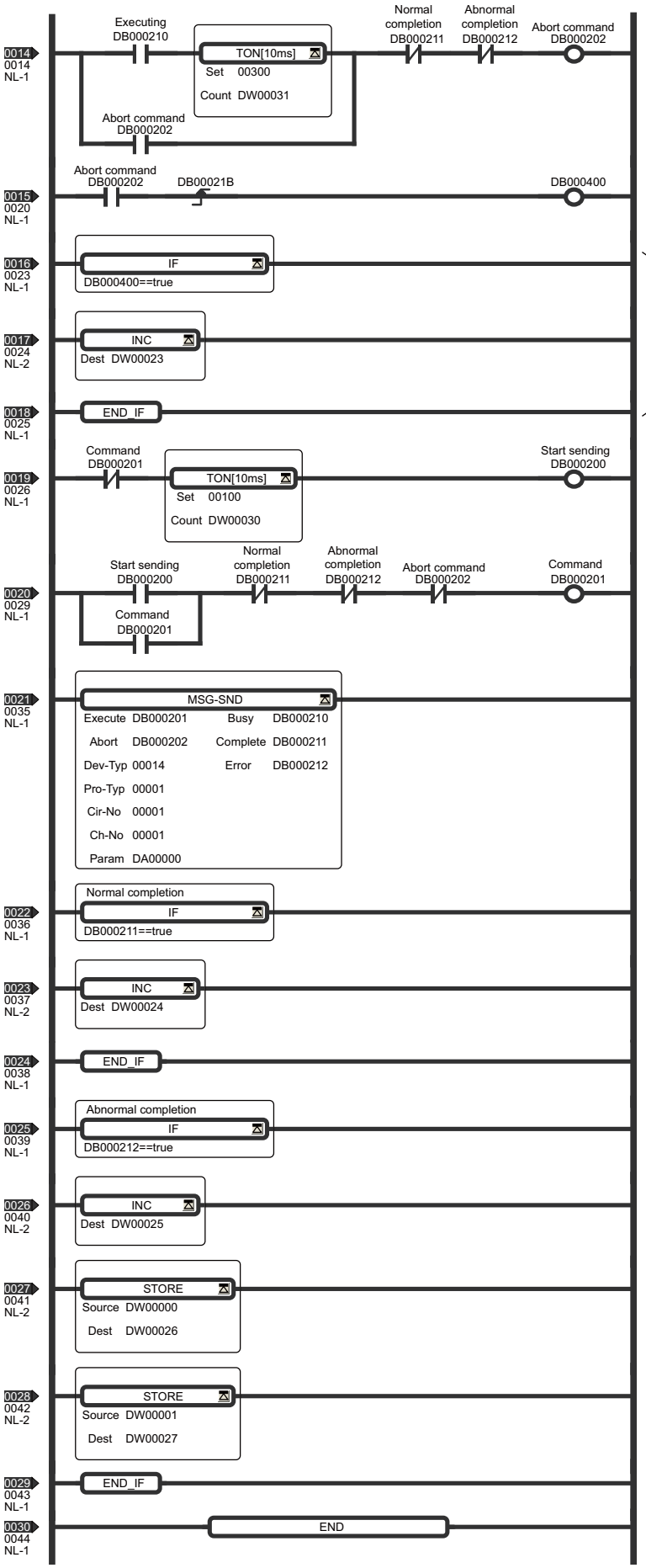
When the Execute (DB000201) is set to ON (=1) from the above settings, the 262IF-01 sends a word block data write request (transaction code: 65006).
Data of MW00000 to MW000511 (512 words) is read and written in the virtual address of a remote device for data size of 512 words from offset 0.
When a word block data response (transaction code: 65206) is received from a remote device, COMPLETE in the MSG-SND function goes ON for one scan.

- For transaction codes, refer to *6.1.5 (5) PARAM05: Data Address* on page 6-13.

(3) Programming Example

The following shows an example of ladder programming executed by the settings in the previous page.





Forced stop if processing is not completed within 3 seconds after sending the Send command.

Increments the stop counter when the Abort command is sent.

Starts sending every 1 second.

Function Send command

Sends a message to the remote node.
The executing coil turns ON when the CPU receives the command.
The normal completion or abnormal completion coil turns ON at the completion of processing.
Pro-Type: Always 1 (MEMOBUS communication)
Cir-No. (circuit number): 1 (Depends on the connection port.)
Ch-No. (channel number): 1 (Use 1 to 10 for the 262IF-01.)

Turns ON after the query message is sent and the response message is received.

Increments the normal pass counter.

Ended with transmission errors.

Increments the abnormal pass counter.

Stores the processing results.

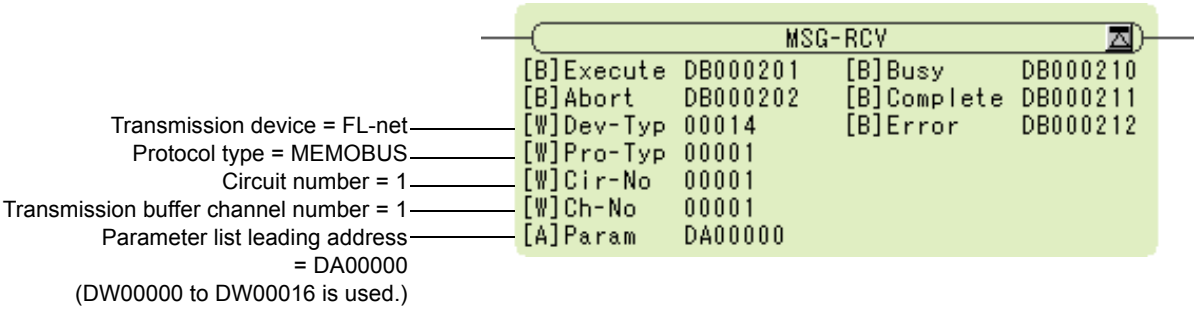
Stores the status.

6.5.3 Word Block Data Read/Write (Server)

The following shows an example where the 262IF-01 acts as an FL-net message server to handle a word block data read or write request with a data size of 10 words from a virtual address offset of 100 from remote device.

(1) MSG-SND Function Setting

The MSG-RCV function is set as follows:



(2) Parameter Setting

The parameter list from DA00000 is set as follows:

Parameter list F · · · · · · · 0	Register	Contents	Setting Value	Remarks
PARAM00	DW00000	Processing result	–	
PARAM01	DW00001	Status	–	
PARAM02	DW00002	Remote node number	–	
PARAM03	DW00003	Option	0	Not used
PARAM04	DW00004	Function code	–	Not used
PARAM05	DW00005	Data address	–	FL-net virtual address
PARAM06	DW00006	Data size	–	
PARAM07	DW00007	Remote CPU number (Address upper word)	–	
PARAM08	DW00008	Coil offset	0	Not used
PARAM09	DW00009	Input relay offset	0	Not used
PARAM10	DW00010	Input register offset	0	Not used
PARAM11	DW00011	Holding register offset	100	
PARAM12	DW00012	Write range LO	0	Lower limit of write range
PARAM13	DW00013	Write range HI	32767	Upper limit of write range
PARAM14 to 16	DW00014 to DW00016	Reserved by the system	0	

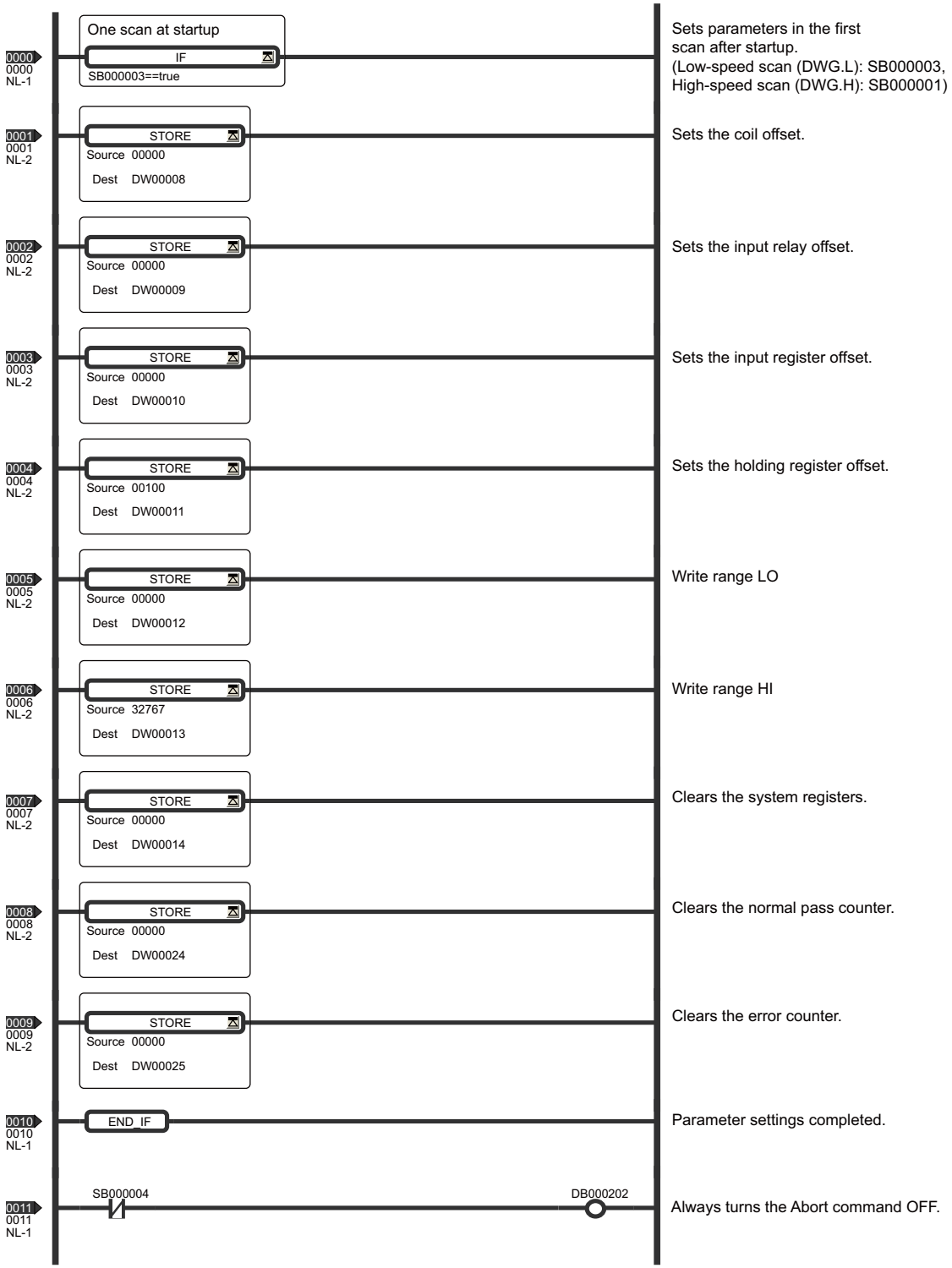
- For register access method and notes at register input, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

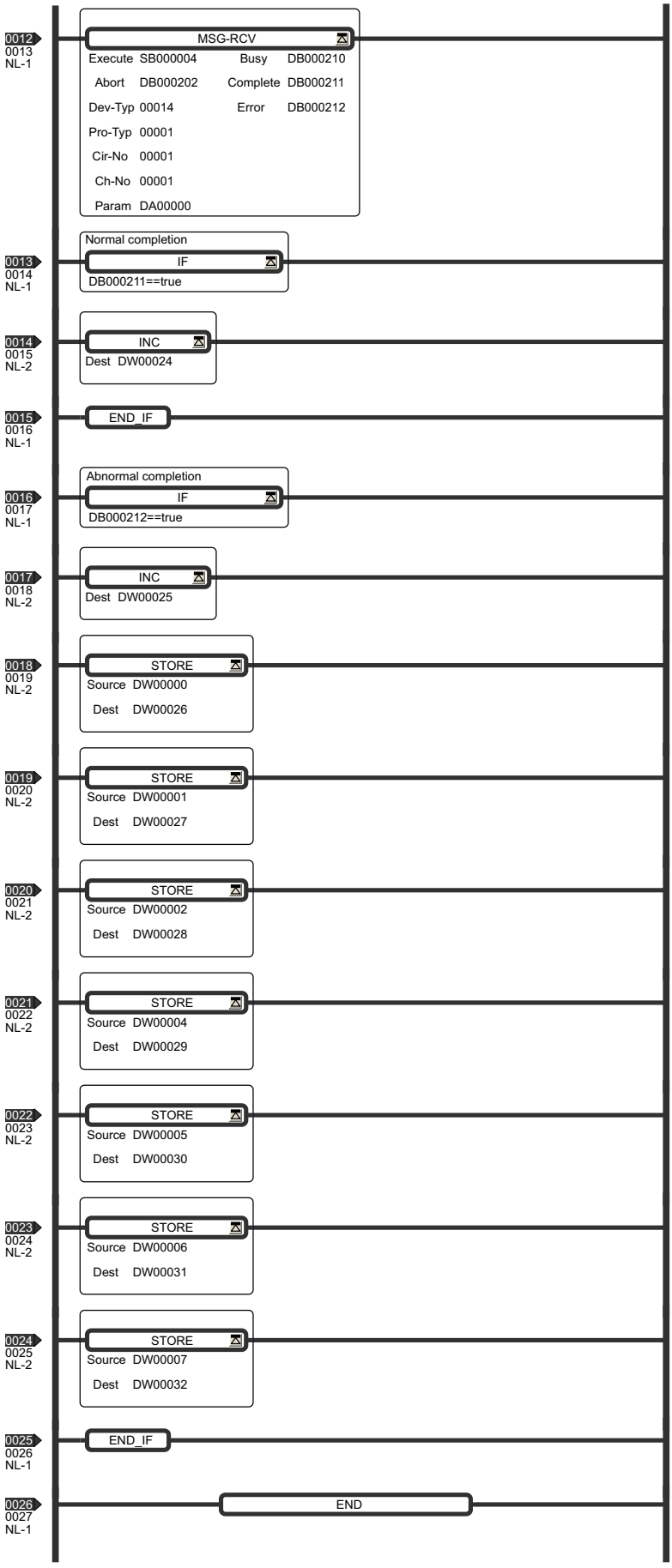
In the above setting, setting Execute (DB000201) to ON (=1) causes a waiting state for reception.
When a word block data read request (transaction code: 65005) is received from a remote device, the 262IF-01 sends a word block data read response (transaction code: 65205). At this time, data in MW00100 to MW000109 (10 words) is read.
When a word block data write request (transaction code: 65006) is received from a remote device, the 262IF-01 sends word block data write response (transaction code: 65206). At this time, data with a data size of 10 words is read from virtual address offset 0 of the remote device and written to MW00100 to MW000109 (10 words) of the 262IF-01.
The virtual space address data size specified in the request message is stored in the data address (DW00005 and DW00006).

- For transaction codes, refer to *6.1.5 (5) PARAM05: Data Address* on page 6-13.

(3) Programming Example

The following shows an example of ladder programming executed by the settings in the previous page.



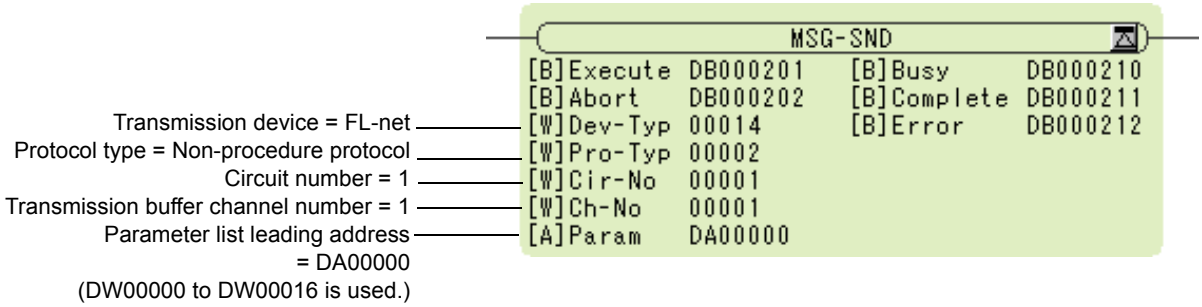

0012
0013
NL-1
MSG-RCV
Execute SB000004
Busy DB000210
Abort DB000202
Complete DB000211
Dev-Typ 00014
Error DB000212
Pro-Typ 00001
Cir-No 00001
Ch-No 00001
Param DA00000
The executing coil turns ON when the CPU receives the command.
The normal completion or abnormal completion coil turns ON at the completion of processing.
Pro-Type: Always 1 (MEMOBUS communication)
Cir-No. (circuit number): 1 (Depends on the connection port.)
Ch-No. (channel number): 1 (Use 1 to 10 for the 262IF-01.)
Normal completion
0013
0014
NL-1
IF
DB000211==true
The normal completion coil turns ON at normal completion.
0014
0015
NL-2
INC
Dest DW00024
Increments the normal pass counter.
0015
0016
NL-1
END_IF
Abnormal completion
0016
0017
NL-1
IF
DB000212==true
The abnormal completion coil turns ON at abnormal completion.
0017
0018
NL-2
INC
Dest DW00025
Increments the abnormal pass counter.
0018
0019
NL-2
STORE
Source DW00000
Dest DW00026
Stores the processing results.
0019
0020
NL-2
STORE
Source DW00001
Dest DW00027
Stores the status.
0020
0021
NL-2
STORE
Source DW00002
Dest DW00028
Stores the number of node to which the command is sent.
0021
0022
NL-2
STORE
Source DW00004
Dest DW00029
Stores the FC.
0022
0023
NL-2
STORE
Source DW00005
Dest DW00030
Stores the data address.
0023
0024
NL-2
STORE
Source DW00006
Dest DW00031
Stores the data size.
0024
0025
NL-2
STORE
Source DW00007
Dest DW00032
Stores the remote CPU number.
0025
0026
NL-1
END_IF
0026
0027
NL-1
END

6.5.4 Sending Request (Client)/Response (Server) according to Non-procedure Protocol

As for transparent messages, only the MSG-SND function is started because no response reception processing is required after request was sent.
Though the server usually sends no response at transparent message request reception, it starts only the MSG-SND function independently to send a response if necessary.
The following shows an example for sending transparent message with the data size of 512 words in MW00100 and the subsequent to a destination with node number 1.

(1) MSG-SND Function Setting

The MSG-SND function is set as follows:



(2) MSG-SND Parameter Setting

The parameter list from DA00000 is set as follows:

Parameter list F · · · · · · · 0	Register	Contents	Setting Value	Remarks
PARAM00	DW00000	Processing result	–	
PARAM01	DW00001	Status	–	
PARAM02	DW00002	Remote node number	1	
PARAM03	DW00003	Option	0	Not used
PARAM04	DW00004	Function code	0	Not used
PARAM05	DW00005	Data address	100	FL-net virtual address
PARAM06	DW00006	Data size	513	One-word transaction code included
PARAM07	DW00007	Remote CPU number (Address upper word)	0	
PARAM08	DW00008	Coil offset	0	Not used
PARAM09	DW00009	Input relay offset	0	Not used
PARAM10	DW00010	Input register offset	0	Not used
PARAM11	DW00011	Holding register offset	0	
PARAM12	DW00012	Reserved by the system	0	
PARAM13	DW00013	Reserved by the system	0	
PARAM14	DW00014	Reserved by the system	0	
PARAM15	DW00015	Reserved by the system	0	
PARAM16	DW00016	Reserved by the system	0	

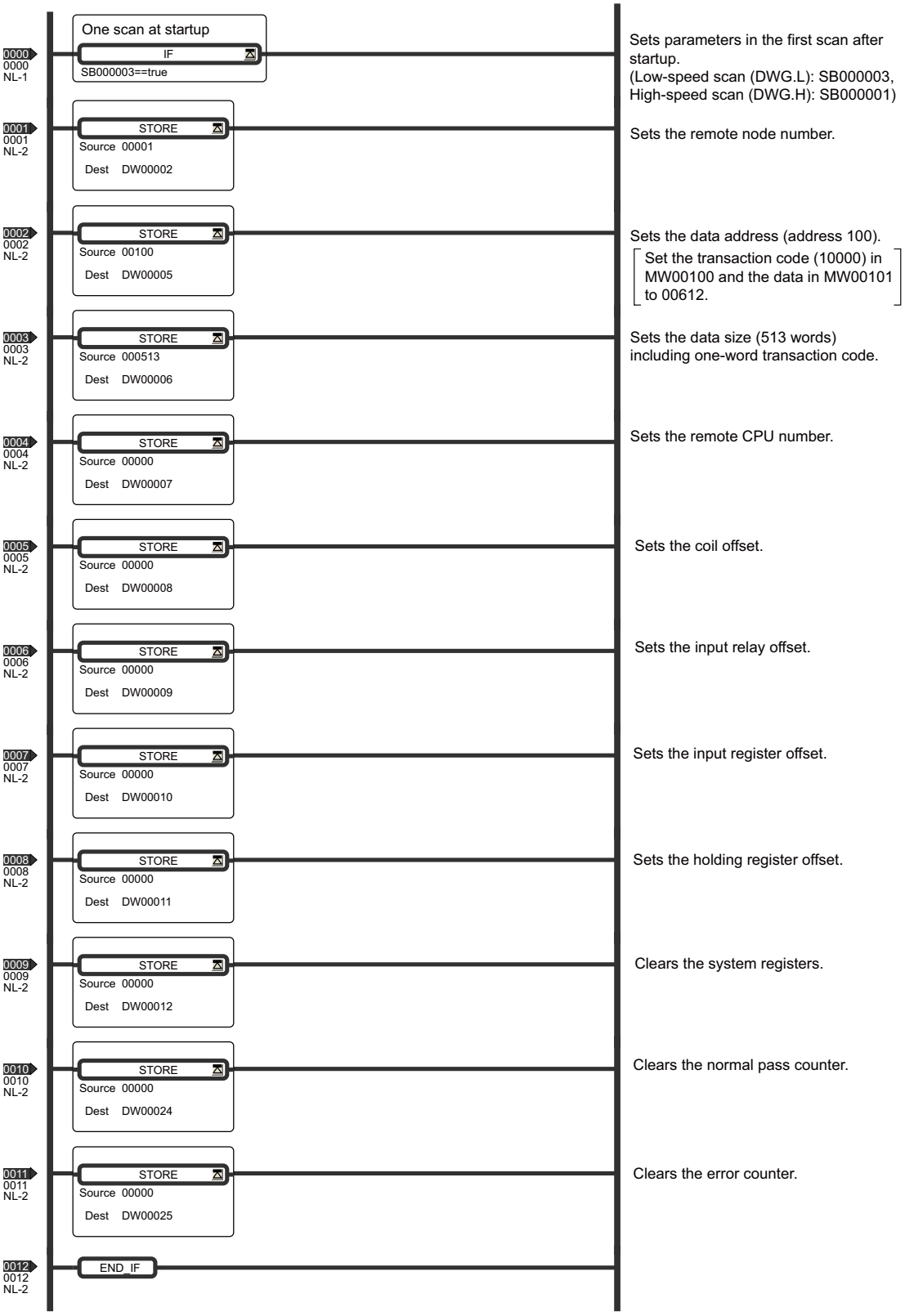
- For register access method and notes at register input, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

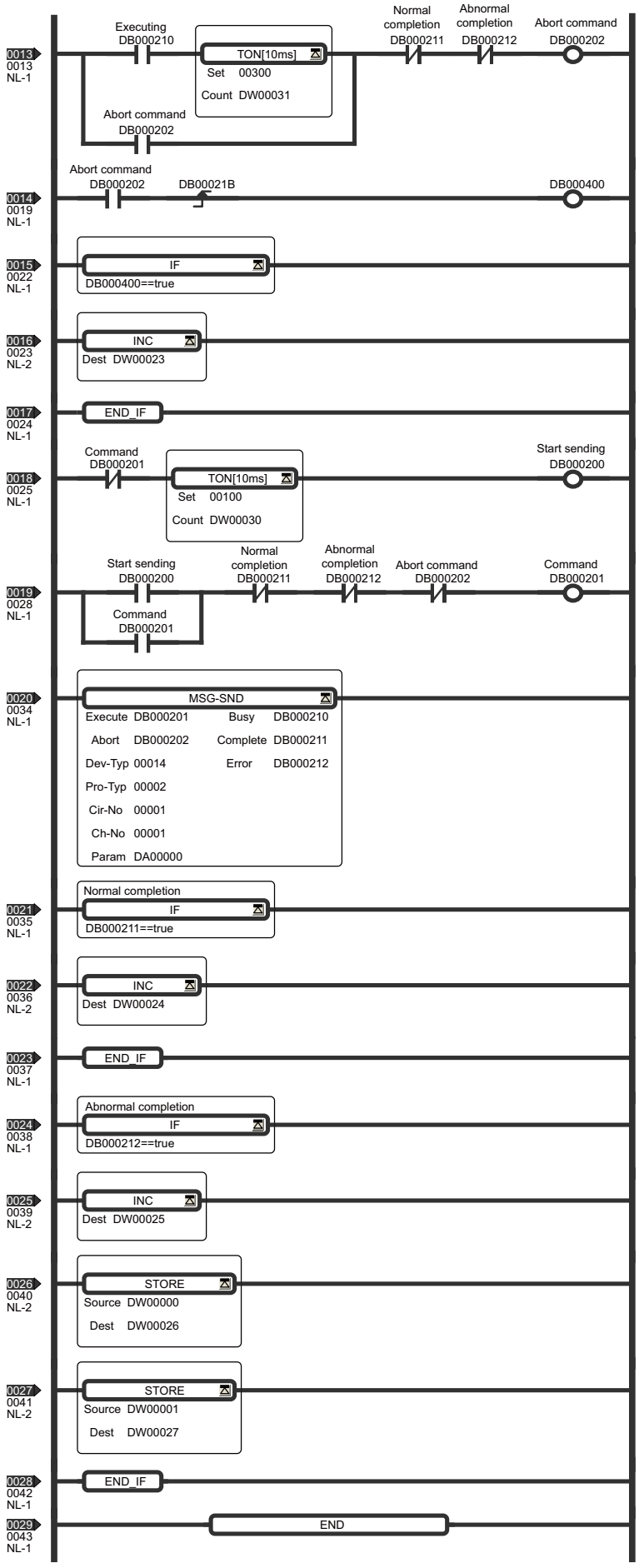
In the above setting, setting a request transaction code of the transparent message (10000) in MW00100 and message data in the subsequent register (MW00001 and subsequent), and then setting Execute (DB000201) to ON (=1) starts the MSG-SND function so that the 262IF-01 can send the transaction code and message data from MW00100.

- For transaction codes, refer to *6.1.5 (5) PARAM05: Data Address* on page 6-13.

(3) Programming Example

The following shows an example of ladder programming executed by the settings in the previous page.





Forced stop if processing is not completed within 3 seconds after sending the Send command.

Increments the stop counter when the Abort command is sent.

Starts sending every 1 second.
Sends the command at intervals where the receiving side can receive the command properly. Because the command is sent in one direction, adjustment is required so that the sent command does not remain at the receiving side.

Function Send command

Sends a message to the remote station.
The executing coil turns ON when the CPU receives the command.
The normal completion or abnormal completion coil turns ON at the completion of processing.
Pro-Type: Always 2 (Non-procedure communication)
Cir-No. (circuit number): 1 (Depends on the connection port.)
Ch-No. (channel number): 1 (Use 1 to 10 for the 262IF-01.)

Turns ON after the query message is sent and the response message is received.

Increments the normal pass counter.

Ended with transmission errors.

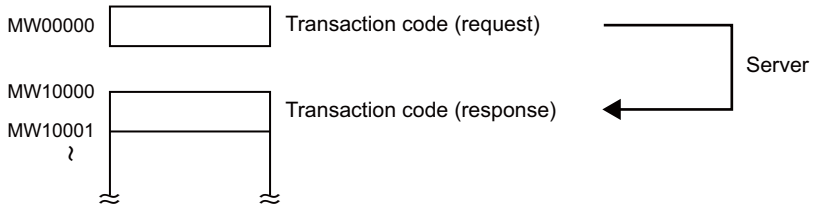
Increments the abnormal pass counter.

Stores the processing results.

Stores the status.

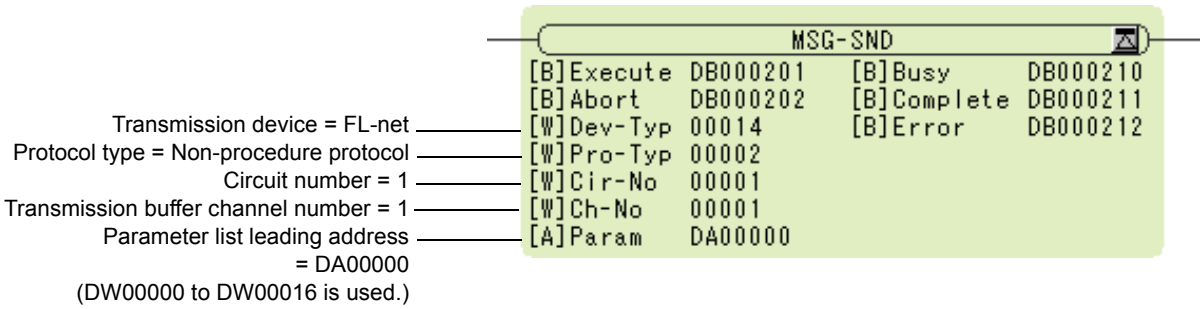
6.5.5 Sending Request/Receiving Response (Client) according to Non-procedure Protocol

As for FL-net messages other than transparent messages, the MSG-RCV function must be started to receive a response message after message request was sent by the MSG-SND function.
The following shows an example of a profile read for response reception after request was sent. In this example, a profile read transaction code (65011) is set in MW00000 and sent, a response code (65211) for the received profile is stored in MW10000 and profile data is stored in MW10001 and subsequent.



(1) MSG-SND Function Setting

The MSG-SND function is set as follows:



(2) MSG-SND Parameter Setting

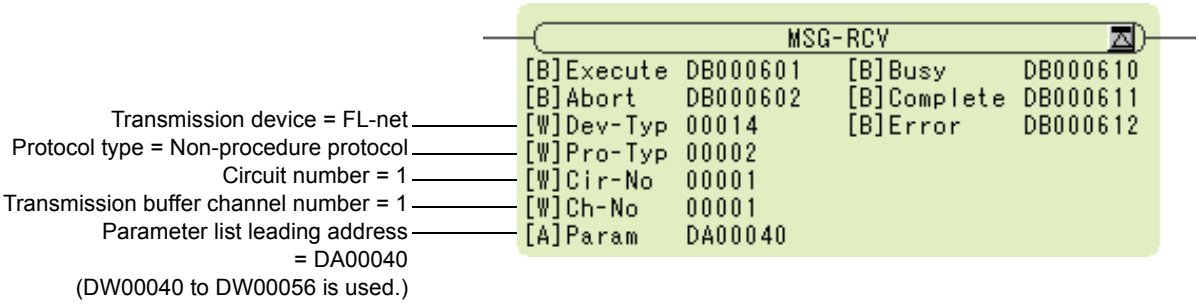
The parameter list from DA00000 is set as follows:

Parameter list F · · · · · · · 0	Register	Contents	Setting Value	Remarks
PARAM00	DW00000	Processing result	–	
PARAM01	DW00001	Status	–	
PARAM02	DW00002	Remote node number	1	
PARAM03	DW00003	Option	0	Not used
PARAM04	DW00004	Function code	0	Not used
PARAM05	DW00005	Data address	0	FL-net virtual address
PARAM06	DW00006	Data size	1	One-word transaction code included
PARAM07	DW00007	Remote CPU number (Address upper word)	0	
PARAM08	DW00008	Coil offset	0	Not used
PARAM09	DW00009	Input relay offset	0	Not used
PARAM10	DW00010	Input register offset	0	Not used
PARAM11	DW00011	Holding register offset	0	
PARAM12	DW00012	Reserved by the system	0	
PARAM13	DW00013	Reserved by the system	0	
PARAM14	DW00014	Reserved by the system	0	
PARAM15	DW00015	Reserved by the system	0	
PARAM16	DW00016	Reserved by the system	0	

- For register access method and notes at register input, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

(3) MSG-SND Function Setting

The MSG-RCV function is set as follows:



(4) MSG-RCV Parameter Setting

The parameter list from DA00040 is set as follows.

Parameter list F · · · · · · · · 0	Register	Contents	Setting Value	Remarks
PARAM00	DW00040	Processing result	–	
PARAM01	DW00041	Status	–	
PARAM02	DW00042	Remote node number	–	
PARAM03	DW00043	Reserved by the system	0	Not used
PARAM04	DW00044	Function code	–	Not used
PARAM05	DW00045	Data address	–	FL-net virtual address
PARAM06	DW00046	Data size	–	One-word transaction code included
PARAM07	DW00047	Remote CPU number (Address upper word)	–	
PARAM08	DW00048	Coil offset	0	Not used
PARAM09	DW00049	Input relay offset	0	Not used
PARAM10	DW00050	Input register offset	0	Not used
PARAM11	DW00051	–	0	Not used
PARAM12	DW00052	Holding register offset	10000	
PARAM13	DW00053	Write range HI	32767	
PARAM14	DW00054	Reserved by the system	0	
PARAM15	DW00055	Reserved by the system	0	
PARAM16	DW00056	Reserved by the system	0	Clear to 0 only once, when the power is turned ON.

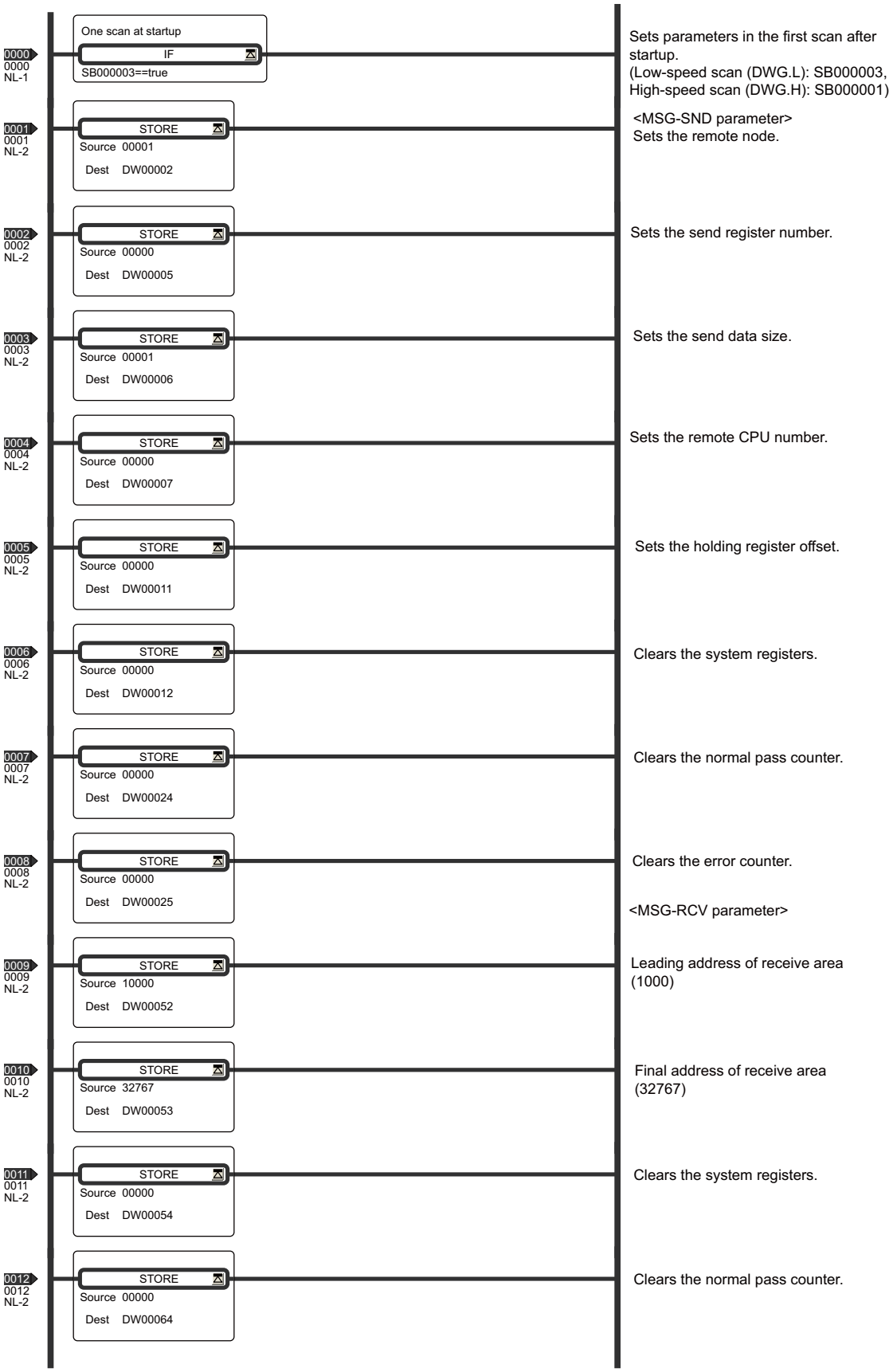
- For register access method and notes at register input, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

In the above setting, setting a transaction code (request) in MW00000 and message data in the subsequent register (MW00001 and the subsequent), and then setting Execute (DB000201) to ON (=1) starts the MSG-SND function so that the 262IF-01 can send the transaction code and message data from MW00000.
After completion of sending, setting Execute (DB000601) to ON (=1) starts the MSG-RCV function and waits for message reception, and then the MSG-RCV function stores a transaction code (response) in MW10000 and message data in the subsequent register (MW10001 and the subsequent) upon response message reception.

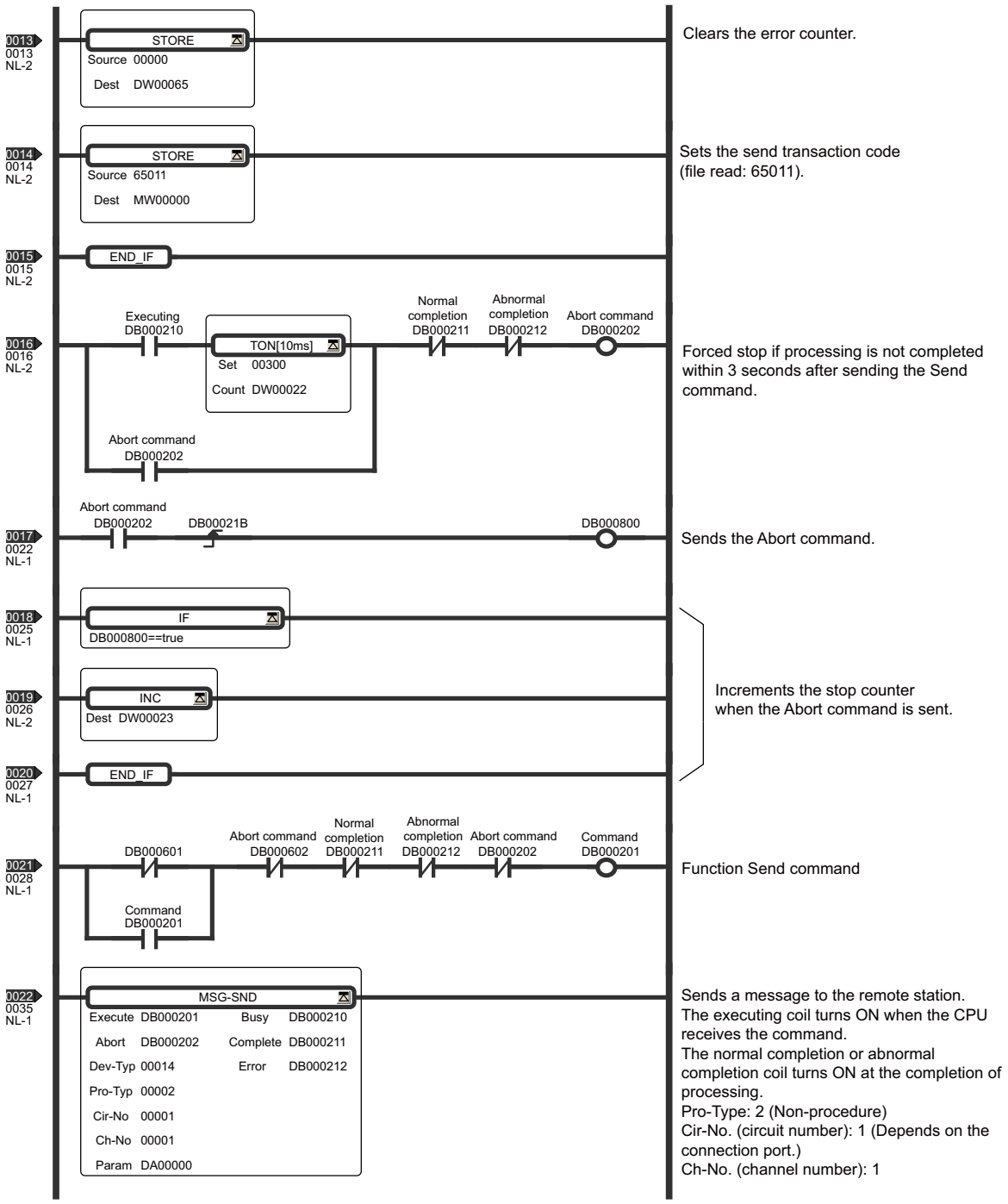
- For transaction codes, refer to *6.1.5 (5) PARAM05: Data Address* on page 6-13.

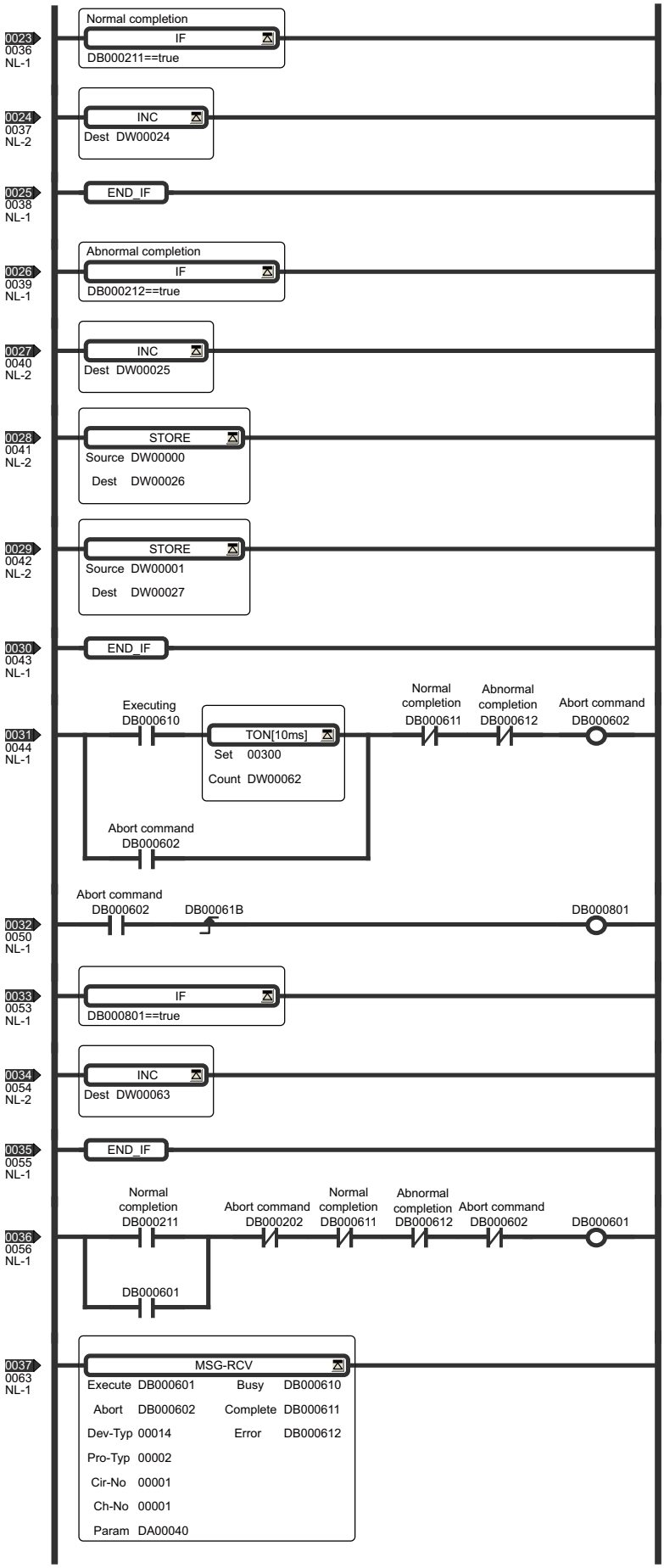
(5) Programming Example

The following shows an example of ladder programming executed by the settings in the previous page.

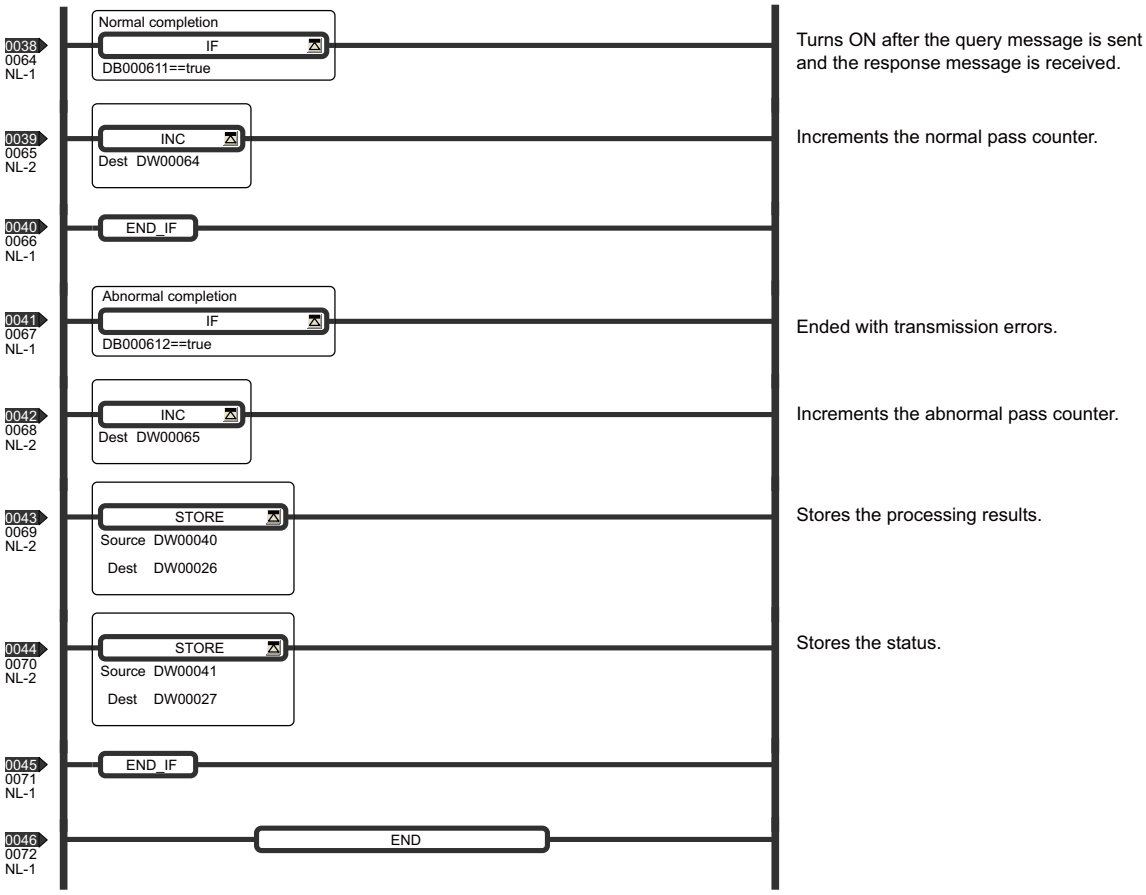


6.5.5 Sending Request/Receiving Response (Client) according to Non-procedure Protocol




0023
0036
NL-1
Normal completion
IF
DB000211==true
Turns ON after the query message is sent and the response message is received.
0024
0037
NL-2
INC
Dest DW00024
Increments the normal pass counter.
0025
0038
NL-1
END_IF
0026
0039
NL-1
Abnormal completion
IF
DB000212==true
Ended with transmission errors.
0027
0040
NL-2
INC
Dest DW00025
Increments the abnormal pass counter.
0028
0041
NL-2
STORE
Source DW00000
Dest DW00026
Stores the processing results.
0029
0042
NL-2
STORE
Source DW00001
Dest DW00027
Stores the status.
0030
0043
NL-1
END_IF
0031
0044
NL-1
Executing
DB000610
TON[10ms]
Set 00300
Count DW00062
Normal completion
DB000611
Abnormal completion
DB000612
Abort command
DB000602
Abort command
DB000602
Forced stop if processing is not completed within 3 seconds after sending the Send command.
0032
0050
NL-1
Abort command
DB000602
DB00061B
DB000801
Sends the Abort command.
0033
0053
NL-1
IF
DB000801==true
0034
0054
NL-2
INC
Dest DW00063
Increments the stop counter when the Abort command is sent.
0035
0055
NL-1
END_IF
0036
0056
NL-1
Normal completion
DB000211
Abort command
DB000202
Normal completion
DB000611
Abnormal completion
DB000612
Abort command
DB000602
DB000601
DB000601
Function Send command
0037
0063
NL-1
MSG-RCV
Execute DB000601
Abort DB000602
Dev-Typ 00014
Pro-Typ 00002
Cir-No 00001
Ch-No 00001
Param DA00040
Busy DB000610
Complete DB000611
Error DB000612
The executing coil turns ON when the CPU receives the command.
The normal completion or abnormal completion coil turns ON at the completion of processing.
Pro-Type: 2 (Non-procedure)
Cir-No. (circuit number): 1
Ch-No. (channel number): 1

6.5.5 Sending Request/Receiving Response (Client) according to Non-procedure Protocol



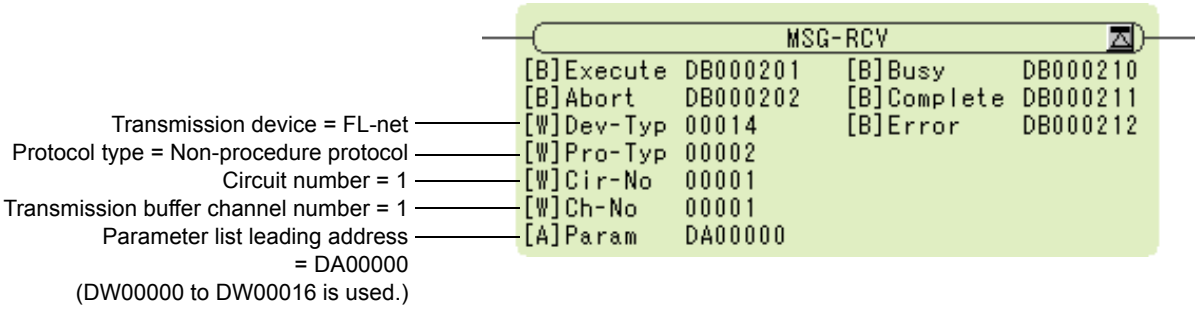
6.5.6 Receiving Transparent Message Request (Server)

Because sending the response is not required when a transparent message is received by a server, only the MSG-RCV function is started.
The following shows an example of transparent message reception according to non-procedure protocol.

- When it is necessary to send a response for a transparent message request, the MSG-SND function must be started. For details, refer to *6.5.4 Sending Request (Client)/Response (Server) according to Non-procedure Protocol* on page 6-42.

(1) MSG-RCV Function Setting

The MSG-RCV function is set as follows:



(2) Parameter Setting

The parameter list from DA00000 is set as follows:

Parameter list F · · · · · · · 0	Register	Contents	Setting Value	Remarks
PARAM00	DW00000	Processing result	–	
PARAM01	DW00001	Status	–	
PARAM02	DW00002	Remote node number	–	
PARAM03	DW00003	Reserved by the system	0	
PARAM04	DW00004	Function code	–	Not used
PARAM05	DW00005	Data address	–	
PARAM06	DW00006	Data size	–	
PARAM07	DW00007	Remote CPU number (Address upper word)	–	
PARAM08	DW00008	Coil offset	0	Not used
PARAM09	DW00009	Input relay offset	0	Not used
PARAM10	DW00010	Input register offset	0	Not used
PARAM11	DW00011	–	0	Not used
PARAM12	DW00012	Holding register offset	0	
PARAM13	DW00013	Write range HI	65534	Upper limit of write range
PARAM14	DW00014	Reserved by the system	0	
PARAM15	DW00015	Reserved by the system	0	
PARAM16	DW00016	Reserved by the system	0	Clear to 0 only once, when the power is turned ON.

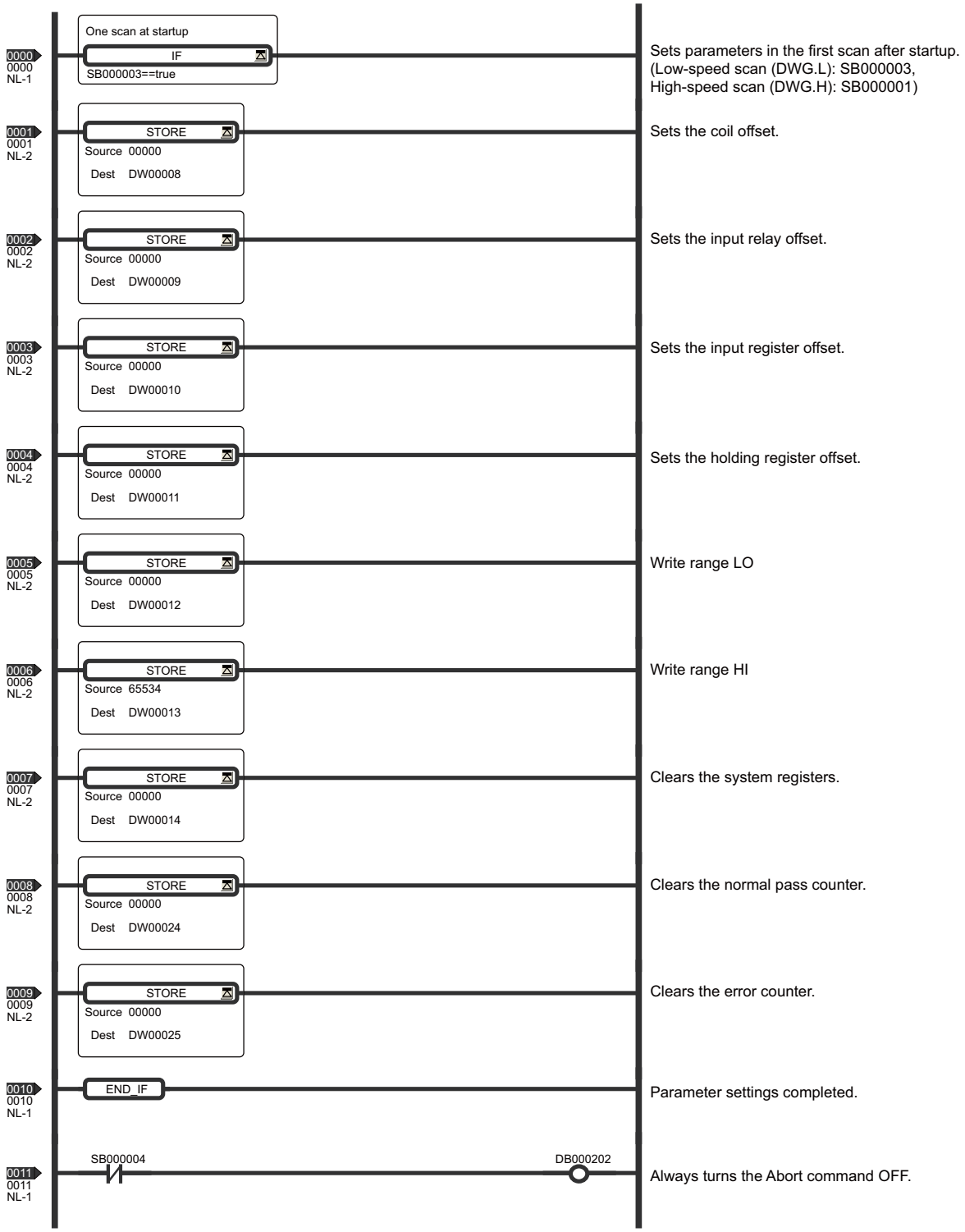
- For register access method and notes at register input, refer to *6.4 Displaying a Register List and Notes at Register Input* on page 6-30.

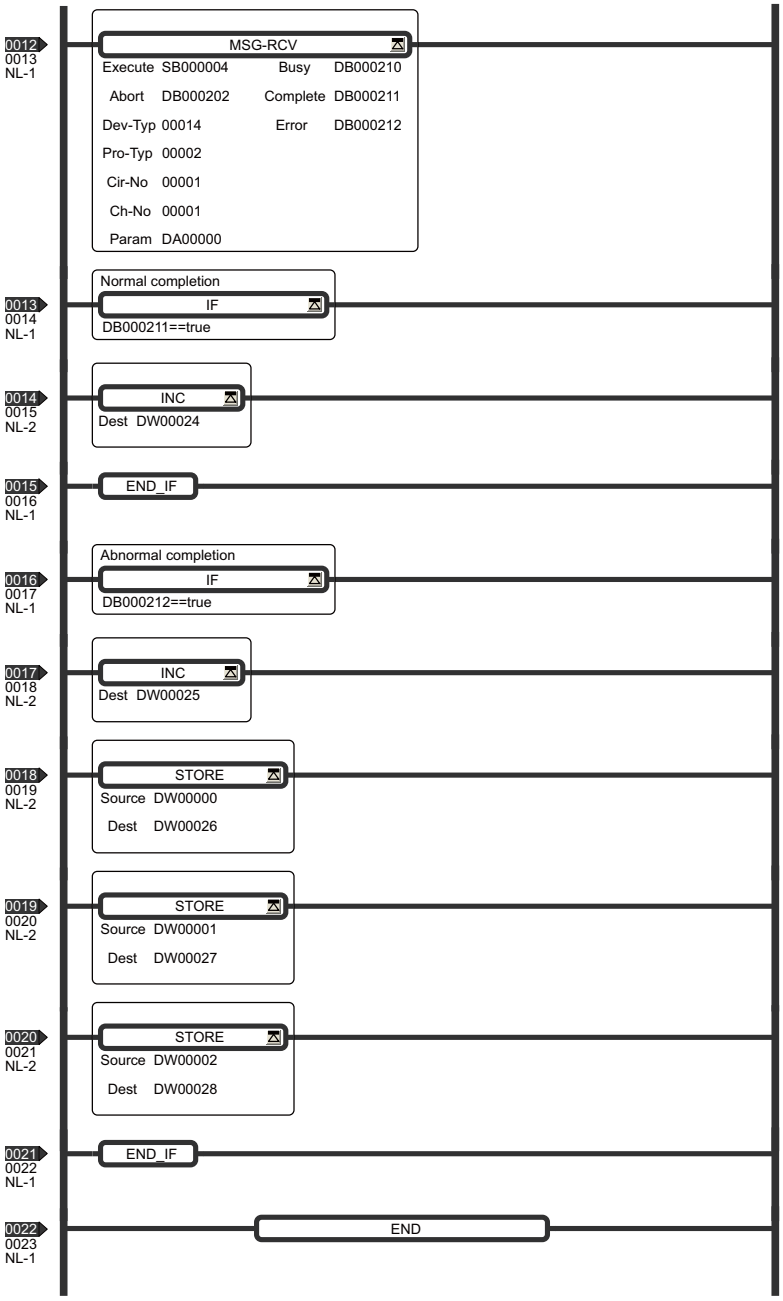
In the above setting, setting Execute (DB000201) to ON (=1) causes a waiting state for message reception and then a transaction code (10000) is stored in MW00000 and message data in the subsequent register (MW00001 and the subsequent) upon message reception.

- For transaction codes, refer to *6.1.5 (5) PARAM05: Data Address* on page 6-13.

(3) Programming Example

The following shows an example of ladder programming executed by the settings in the previous page.




0012
0013
NL-1
MSG-RCV
Execute SB000004
Busy DB000210
Abort DB000202
Complete DB000211
Dev-Typ 00014
Error DB000212
Pro-Typ 00002
Cir-No 00001
Ch-No 00001
Param DA00000
The executing coil turns ON when the CPU receives the command.
The normal completion or abnormal completion coil turns ON at the completion of processing.
Pro-Type: Always 2 (Non-procedure communication)
Cir-No. (circuit number): 1 (Depends on the connection port.)
Ch-No. (channel number): 1 (Use 1 to 10 for the 262IF-01.)
Normal completion
0013
0014
NL-1
IF
DB000211==true
The normal completion coil turns ON at the normal completion.
0014
0015
NL-2
INC
Dest DW00024
Increments the normal pass counter.
0015
0016
NL-1
END_IF
Abnormal completion
0016
0017
NL-1
IF
DB000212==true
The abnormal completion coil turns ON at the abnormal completion.
0017
0018
NL-2
INC
Dest DW00025
Increments the abnormal pass counter.
0018
0019
NL-2
STORE
Source DW00000
Dest DW00026
Stores the processing results.
0019
0020
NL-2
STORE
Source DW00001
Dest DW00027
Stores the status.
0020
0021
NL-2
STORE
Source DW00002
Dest DW00028
Stores the number of node to which the command is sent.
0021
0022
NL-1
END_IF
0022
0023
NL-1
END

7

Troubleshooting

This chapter describes how to troubleshoot problems and take countermeasures against them.

7.1 Before Starting to Locate Faults

When the 262IF-01 does not work normally, check to see the following points.

	Contents
1	Have you attached the units correctly?
2	Have you set the switches correctly?
3	Have you set the network IP address correctly?
4	Have you set the common memory area correctly?
5	Have you tightened the unit connectors firmly?
6	Have you connected the communication cables correctly?
7	Have you connected the terminator to the 10BASE5 cable connector?
8	Have you grounded the 10BASE5 cable?
9	Is the 10BASE-T/100BASE-TX cable meeting the requirements of category 5 or higher?
10	Have you turned ON an Ethernet hub or repeater?

7.2 Common Network Problems and Countermeasures

7.2.1 When Communication Is not Possible or It Is Unstable

Check the following points.

Location to Be Checked	Item to Be Checked	Countermeasures
Power supply	Is the power module POWER LED lamp ON?	Check that the power supply or power cable is connected and that supply voltage is correct.
	Is the hub power lamp ON?	
Check the transmission path.	Have you run the cable correctly?	Check the cable.
	Has a repeater been connected in up to four cascades?	Check the segment configuration.
	Is the length of each segment within the predefined length?	
	Is the number of devices connected to each segment within the predefined number?	
	Is the repeater turned ON?	Check that the power supply or power cable is connected and that supply voltage is correct.
Check equipment settings for stations attached for communication.	Have you set the network IP address correctly?	Check the equipment settings again by means of the MPE720 and network analyzer.
	Have you set the station number correctly?	
	Have you set the station parameters correctly?	
	Is the TX LED (send) steadily or intermittently lit?	
	Is the LNK LED (link) steadily lit?	

7.2.2 Confirming 262IF-01 Setting

The connection status can be checked based on the LED ON/OFF status and status information.

(1) Normal Status

In the following status, link transmission takes place normally.

LED			Link Status *1		Status *2
RUN	ERR	LNK	Upper Layer	FA Link	
Lit	Not lit	Intermittently lit	8000 (local node)	0061 (local node)	0080
			8000 (other node)	0061 (other node)	

∗ 1. This status can be checked on the **Status Detail** Window (refer to page 4-12) for FL-net transmission definition.
∗ 2. This status can be checked from **State of local node** on the **Status** Tab Page (refer to page 4-14) for FL-net transmission definition.

(2) When Cyclic Transmission Is not Performed Normally

When cyclic transmission is not performed normally, check the following.

LED			Link Status		Status	Causes	Countermeasures
RUN	ERR	LNK	Upper Layer	FA Link			
Lit	Flash	Lit	8000 (local node) 8000 (other node)	0061 or 0001 (local node or other node)	0080	The common memory settings do not match those of the other node.	Collect network configuration information on the **Network Configuration** Window for FL-net transmission definition, check the common memory settings of the other nodes, and then change the link assignment.
Lit	Flash	Not Lit	8000 (local node) 0000 (other node)	0000 (local node) 0000 (other node)	0040	The node number is not unique.	Change the node number.
						Problems occurred while receiving transmission. (The transmission interval for all data, including tokens, sent from each node is 500 µs or less.)	Set the minimum permissible frame interval to a value greater than 500 µs on the **Transmission Parameters** Tab Page in the FL-net transmission definition.
Lit	Not Lit	Not Lit	8000 (local node) 0000 (other node)	0040 (local node) 0060 (other node)	0020	No network connection has been made (status has changed from “Join” to “Leave”).	Check cable and hub connection.
Lit	Not Lit	Not Lit	8000 (local node) 0000 (other node)	0000 (local node) 0000 (other node)	0020	No network connection has been made.	
Lit	Lit	Not Lit	0000 (local node) 8000 (other node)	0000 (local node) 0001 (other node)	0008	The setting value of the token monitoring time is smaller than the actual refresh cycle.	Increase the token monitoring time. (Check the actual time from the **Refresh cycle time (max)** on the **Status** Tab Page in FL-net transmission definition and then change the token monitoring time to an adequate value on the **Transmission Parmeters** Tab Page.)

(cont'd)

LED			Link Status		Status	Causes	Countermeasures
RUN	ERR	LNK	Upper Layer	FA Link			
Lit	Lit	Lit	8000 (local node) 8000 (other node)	0061 (local node) 0061 (other node)	0080	The common memory settings do not match those of the other node.	Collect network configuration information on the **Network Configuration** window for FL-net transmission definition, check the common memory settings of the other nodes and then change the link assignment.
Lit	Lit	Lit	8000 (local node) 0000 (other node)	0061 (local node) 0061 (other node)	0080	The upper layer of a remote node has been stopped.	Activate the upper layer of the remote node.

7.2.3 System I/O Error Status

The following shows the system I/O error status of the MP2000 Series Machine Controller.
Refer to *6.4.1 Displaying a Register List* on page 6-30 and specify a system register number "SW□□□□□" to access.

(1) MP2100M Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IW□□□□ register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OW□□□□ register number)
Reserved by the system	SW00205	Not used.
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	MP2100M Machine Controller error status
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00228	SVB-01 Module error status
	SW00229 to SW00239	Reserved by the system
	SW00240 to SW00247	Error status of slot 1 of rack 2 * (Depends on the mounted module and error code.)
	SW00248 to SW00255	Error status of slot 2 of rack 2 * (Depends on the mounted module and error code.)
	SW00256 to SW00263	Error status of slot 3 of rack 2 * (Depends on the mounted module and error code.)
	SW00264 to SW00271	Error status of slot 4 of rack 2 * (Depends on the mounted module and error code.)
	⋮	⋮
	SW00448 to SW00455	Error status of slot 9 of rack 4 * (Depends on the mounted module and error code.)

* Racks 2 to 4 can be used only when using MP2100MEX.

(2) MP2200 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IW□□□□ register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OW□□□□ register number)
Reserved by the system	SW00205	Not used.
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Not used.
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00228	Error status of slot 1 of rack 1 (Depends on the mounted module and error code.)
	SW00229 to SW00239	Error status of slot 2 of rack 1 (Depends on the mounted module and error code.)
	SW00240 to SW00247	Error status of slot 3 of rack 1 (Depends on the mounted module and error code.)
	SW00248 to SW00255	Error status of slot 4 of rack 1 (Depends on the mounted module and error code.)
	⋮	⋮
	SW00496 to SW00503	Error status of slot 9 of rack 4 * (Depends on the mounted module and error code.)

* Racks 2 to 4 can be used only when using EXIOIF.

(3) MP2300 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IW□□□□ register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OW□□□□ register number)
Reserved by the system	SW00205	Not used.
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Slot 0 error status (Depends on the mounted module and error code)
	SW00216 to SW00223	Reserved for the system
	SW00224 to SW00231	Slot 1 error status (Depends on the mounted module and error code.)
	SW00232 to SW00239	Slot 2 error status (Depends on the mounted module and error code.)
	SW00240 to SW00247	Slot 3 error status (Depends on the mounted module and error code.)

(4) MP2310 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O errors
Input Error Count	SW00201	Number of input errors
Input Error Address	SW00202	Latest input error address (IW□□□□ register number)
Output Error Count	SW00203	Number of output errors
Output Error Address	SW00204	Latest output error address (OW□□□□ register number)
Reserved by the system	SW00205	(Not used.)
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Slot 0 error status
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00231	Slot 1 error status
	SW00232 to SW00239	Reserved by the system (Slot 2 error status)
	SW00240 to SW00247	Reserved by the system (Slot 3 error status)
	SW00248 to SW00255	Reserved by the system (Slot 4 error status)
	...	
	SW00456 to SW00463	Reserved by the system (Slot 30 error status)

(5) MP2300S Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O errors
Input Error Count	SW00201	Number of input errors
Input Error Address	SW00202	Latest input error address (IW□□□□ register number)
Output Error Count	SW00203	Number of output errors
Output Error Address	SW00204	Latest output error address (OW□□□□ register number)
Reserved by the system	SW00205	(Not used.)
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Slot 0 error status
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00231	Slot 1 error status
	SW00232 to SW00239	Reserved by the system (Slot 2 error status)
	SW00240 to SW00247	Reserved by the system (Slot 3 error status)
	SW00248 to SW00255	Reserved by the system (Slot 4 error status)
	...	
	SW00456 to SW00463	Reserved by the system (Slot 30 error status)

7.2.4 Details on I/O Error Status

When a system I/O error occurs, the error status will be written in the system register.
The registers allocated for each error status when an I/O Module (LIO-01/02), FL-net Communication Module (262IF-01), and DeviceNet Communication Module (260IF-01) are mounted in slots 1, 2, and 3 of the MP2300 Machine Controller respectively are described below.

[a] MP2300 Machine Controller Basic Module Error Status

Name	Register No.	Remarks
Slot 0 Error Status	SW00208 to SW00215	(Depends on the mounted module and error code.)
Reserved by the system	SW00216 to SW00223	(Depends on the mounted module and error code.)
Slot 1 Error Status	SW00224 to SW00231	(Depends on the mounted module and error code.)
Slot 2 Error Status	SW00232 to SW00239	(Depends on the mounted module and error code.)
Slot 3 Error Status	SW00240 to SW00247	(Depends on the mounted module and error code.)

■ Register Allocation: Slot 0 (Reserved for Basic Module)

(Bit No.)	F ····· 8	7 ····· 0
SW00208	Error code (I/O error = 2)	Subslot No. (= 2)
SW00209	Error code (Station error = 1)	Subslot No. (= 3)

SW00210	ST#15	·····	ST#2	ST#1	Not used
SW00211	Not used	ST#30 ·····	ST#17	ST#16	
SW00212	Not used	·····	Not used		
SW00213	Not used	·····	Not used		
SW00214	Not used	·····	Not used		
SW00215	Not used	·····	Not used		

[b] LIO-01/LIO-02 Module Error Status (Slot 1)

(Bit No.)	F ····· 8	7 ····· 0
SW00224	Error code (I/O error = 2)	Subslot No. (= 1)
SW00225	Error code (I/O error = 2)	Subslot No. (= 2)

SW00226	ST#15	·····	ST#2	ST#1	Not used
SW00227	Not used	·····			Not used
SW00228	Not used	·····			Not used
SW00229	Not used	·····			Not used
SW00230	Not used	·····			Not used
SW00231	Not used	·····			Not used

[c] 262IF-01 Module Error Status (Slot 2)

(Bit No.)	F ····· 8	7 ····· 0
SW00232	Error code (Station error = 1)	Subslot No. (= 2)

SW00233	Logic#16	·····	Logic#1
SW00234	Logic#32	·····	Logic#17
SW00235	Logic#48	·····	Logic#33
SW00236	Logic#64	·····	Logic#49

<Error Status Details>

Item	Code	Description
ST#n	0	Normal communication
	1	Communication error at the station n

- The logical number indicates the number displayed in **No**. on the **Link Assignment** Tab Page of the 260IF-01 Module configuration definition.

[d] 260IF-01 Module Error Status (Slot 3)

(Bit No.)	F ····· 8	7 ····· 0
SW00240	Error code (Station error = 1)	Subslot No. (= 2)
SW00241	ST#15 ·····	ST#0
SW00242	ST#31 ·····	ST#16
SW00243	ST#47 ·····	ST#32
SW00244	ST#63 ·····	ST#48

<Error Status Details>

Item	Code	Description
ST#n	0	Normal communication
	1	Communication error at the station n (n = local station number in slave mode)

7.3 Notes on Regular Usage of FL-net

For FL-net transmission path standard, refer to the preceding item or IEEE802.3. In addition, consider the following FL-net specific restrictions and notes.

1	Do not flow communication data of other Ethernet via an FL-net communication cable.
2	Do not connect FL-net to a router.
3	Even if a switching hub is employed for FL-net, effects specific to the switching hub cannot be obtained.
4	When infrared radiation or wireless media is used, real-time processing performance during communication may deteriorate greatly.
5	When a PC is used, real-time processing performance during communication may change greatly depending on PC capability, OS, and applications.
6	Use a predefined IP address. Use the common network address. (The standard network address is 192.168.250) It is recommended to use IP address node numbers (station numbers) in the following range. Network address: 192.168.250. Node number: 1 to 249 Duplicate node numbers cannot be checked during initial setting. However, if duplicate numbers are set, a node number duplication error will occur when communication starts. Be sure to set them carefully.
7	Be sure to connect the ground wire firmly. Use a ground wire with enough thickness.
8	Install FL-net far from noise sources. Avoid placing power supply cables near FL-net.
9	When cyclic data communication or message data communication is performed, real-time processing performance may deteriorate depending on an amount of data and other factors.
10	An area (common memory area) for cyclic data communication does not need to be allocated continuously.
11	When a transceiver has been equipped with an SQE switch, set it properly according to the included instructions manual.
12	Regular communication in the entire system is affected by the processing capability of connected equipment. All equipment connected to the network intercommunicates by adjusting the baud rate to the equipment with the slowest communication processing capability (at a minimum allowable frame interval). For this reason, real-time processing performance of the entire system may deteriorate greatly due to connection or addition of one piece of equipment.
13	Though the header part for message data communication is a big-endian, the data part is a little-endian. However, note that the system parameter, which is the data part for profile read, is a big-endian.
14	Do not use equipment with different protocol versions or modes in the same network. When the same network comprises multiple pieces of equipment having different protocol versions or modes, all the network equipment cannot be connected to the network.

Appendices

Appendix A Network System Definition

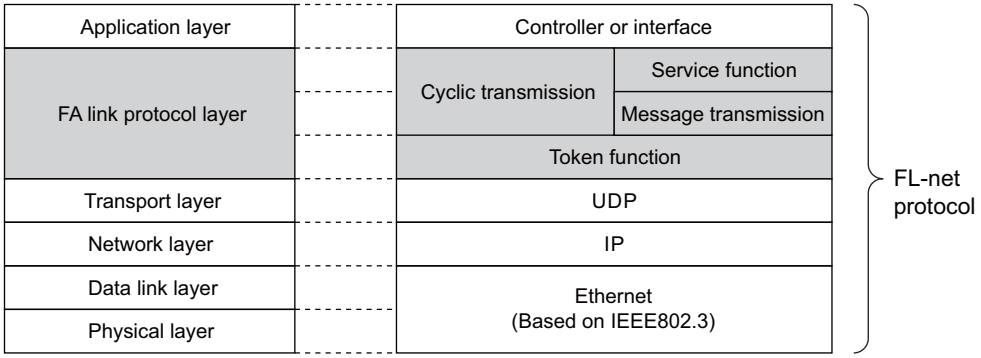
A.1 Communication Protocol Standard

A communication protocol means a set of rules (communication rules) for information transfer from one system to another via communication lines and vice-versa. The FL-net communication protocol complies with the following standards.

FL-net Communication Protocol	Compliance Specifications
FL-net	FA Link Protocol Specifications JIS B 3521, FA Control Network FL-net (OPCN2) – Protocol Specifications
UDP	RFC768
IP, IPMC, etc.	RFC791, 792, 919, 922, 950
ARP, etc.	RFC826, 894
Ethernet	IEEE802.3

A.2 Hierarchical Structure of Communication Protocol

The communication protocol has been modeled in a hierarchical structure and its communication processes are divided into levels and arranged for representation and standardization. FL-net consists of six protocol layers as shown below.



A.3 FL-net Physical Layer

When the baud rate is 10 Mbps, the Ethernet physical layer supports five transmission systems: 10BASE5, 10BASE2, 10BASE-T, 10BASE-F, and 10BROAD36. In addition, when the baud rate is 100 Mbps, it supports four transmission system: 100ASE-T2, 100BASE-T4, 100BASE-TX, and 100BASE-FX.
FL-net recommends 10BASE5, 10BASE2, 10BASE-T, 100BASE-TX, and 100BASE-FX among them.

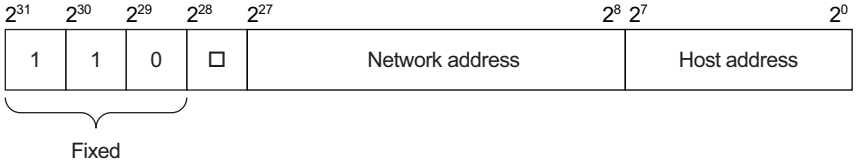
A.4 FL-net IP Address

To identify each communication device selected from among multiple devices connected to Ethernet, an IP address (INET address) is used. Each device connected to Ethernet must be assigned a unique IP address.
The IP address is composed of the address of the network where the communication device is connected and the host address of the communication device, and is classified into three network classes, A, B, and C (in addition to these classes, network classes D and E are available for special purposes).

	Leading One Octet Value	Network Address Part	Host Address Part
Class A	0 to 127	□□□.□□□.□□□.□□□	□□□.□□□.□□□.□□□
Class B	128 to 191	□□□.□□□.□□□.□□□	□□□.□□□.□□□.□□□
Class C	192 to 223	□□□.□□□.□□□.□□□	□□□.□□□.□□□.□□□

- □□□ corresponds to the address parts, respectively.

In one network, the IP address of a communication device connected to the network is composed of the same network address and a host address with a unique value.
The default value of an FL-net IP address is 192.168.250.N (N: 1 to 254).
It is recommended that the IP address is class C and its lower host address is identical to a node number in the FL-net protocol.



A.5 FL-net Subnet Mask

The FL-net subnet mask is fixed at 255.255.255.0. The FL-net user need not set this subnet mask.
The classification of this value is the same as that of the original network address and host address parts of class C.

A.6 TCP/IP, UDP/IP Communication Protocol

TCP, UDP, and IP are the main protocols used by Ethernet.
IP belongs to the communication protocol network layer and controls communication data flow.
Though both of TCP and UDP belong to the transport layer employing IP as the network layer, their service content differs greatly.
TCP provides the upper layer with reliable services that need not be conscious of data segmentation. In contrast, UDP sends a group of data (data diagram) to the upper layer as is and does not guarantee whether it has reached a destination normally. Acknowledgment and resending at data reception are left to the topmost layers. Though UDP is less reliable than TCP, it provides communication services with less overhead.
FL-net uses UDP. This is because the TCP's complicated data acknowledgment/resending procedure is redundant for FL-net. By avoiding this procedure, UDP uses tokens to manage sending rights and segments and integrates multiple frames at the upper FL-net protocol layer for high-speed data exchange.

A.7 FL-net Port Number

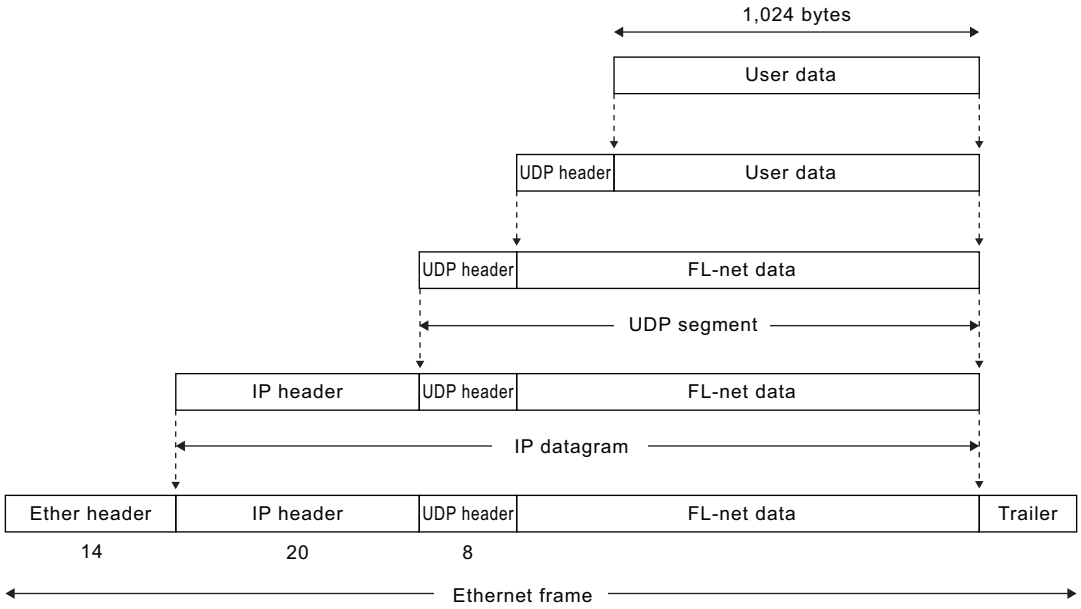
To implement services on the FL-net protocol layer, which lies above the transport layer, port numbers have been predefined in FL-net as shown below. However, the FL-net users do not have to define these port numbers in the parameters.

	Name	Port Number
1	Port number for token frame and cyclic frame	55000 (fixed)
2	Port number for message frame	55001 (fixed)
3	Port number for trigger frame or join request frame	55002 (fixed)
4	Pot number for sending port	55003 (fixed)

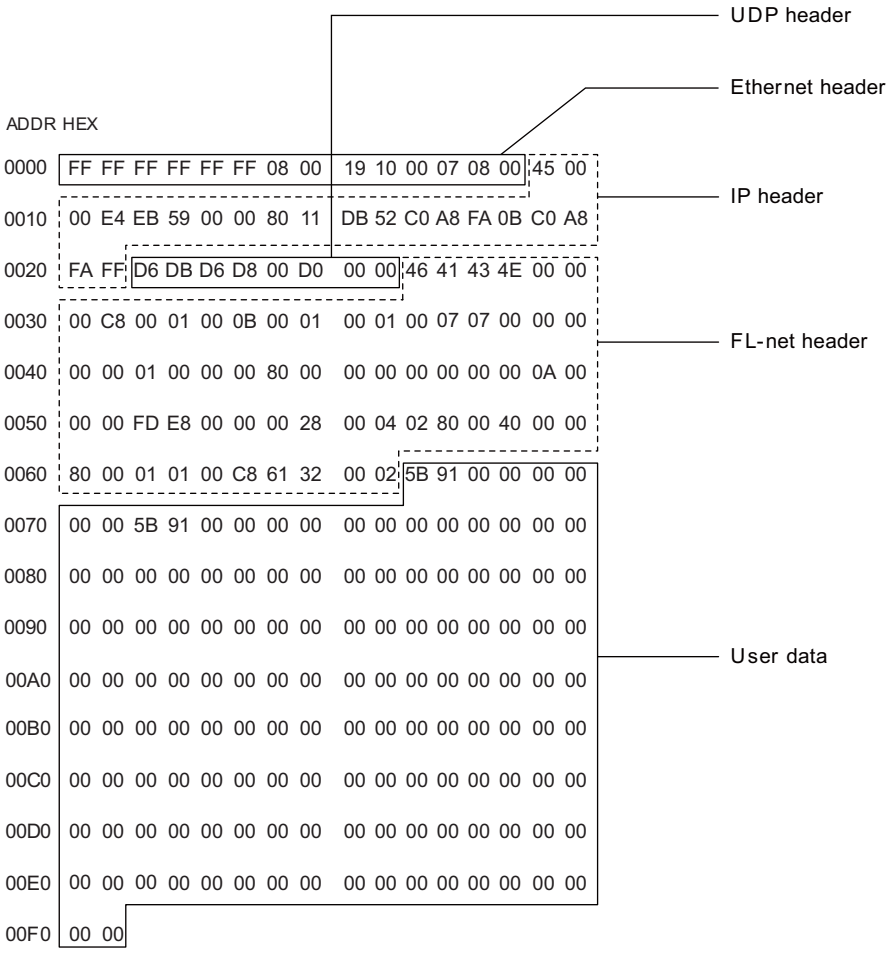
A.8 FL-net Data Format

(1) Overview of FL-net Data Format

Data to be transferred via FL-net is encapsulated in each layer of the communication protocol as shown in the following figure.

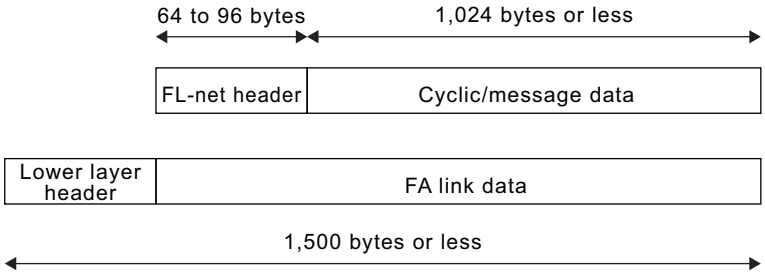


Next, the following shows FL-net data (of one frame) that can be observed on communication lines. In this example, 128-byte cyclic data is transferred.



(2) FL-net Header Format

The FL-net header size ranges from 64 to 96 bytes.



The FL-net header is put at the beginning of each frame of the FL-net protocol.

(3) FL-net Transaction Code

For details, refer to *5.3.2 (3) List of Transaction Codes* on page 5-13.

Appendix B FL-net Network Management

B.1 FL-net Token Management

(1) Token

Basically, the node is not allowed to send data unless it has a token.
However, it is allowed to send data in the following cases even if it does not hold the token.

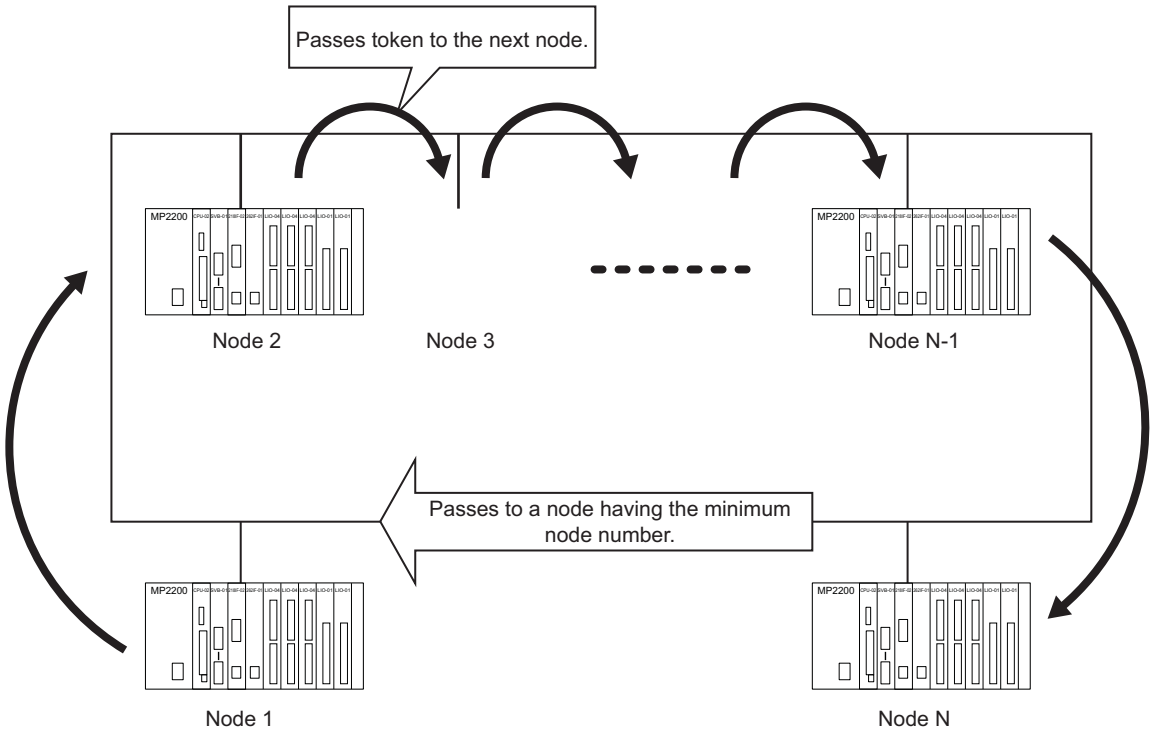
- When a token is issued again because it has disappeared
- When a join request frame is sent for a node to join the network

The following gives a brief description of token function.

- In FL-net, one token is passed among nodes joined to the network.
- Each node holds rights to send data to the network from when it receives a token until it passes the token to the next node.
- The token is monitored by the timer of each node. If a token is not circulated in a specified period of time, it is reissued automatically.
- When two tokens are circulating on a network, one is deleted to allow only one token to be circulated on the network.

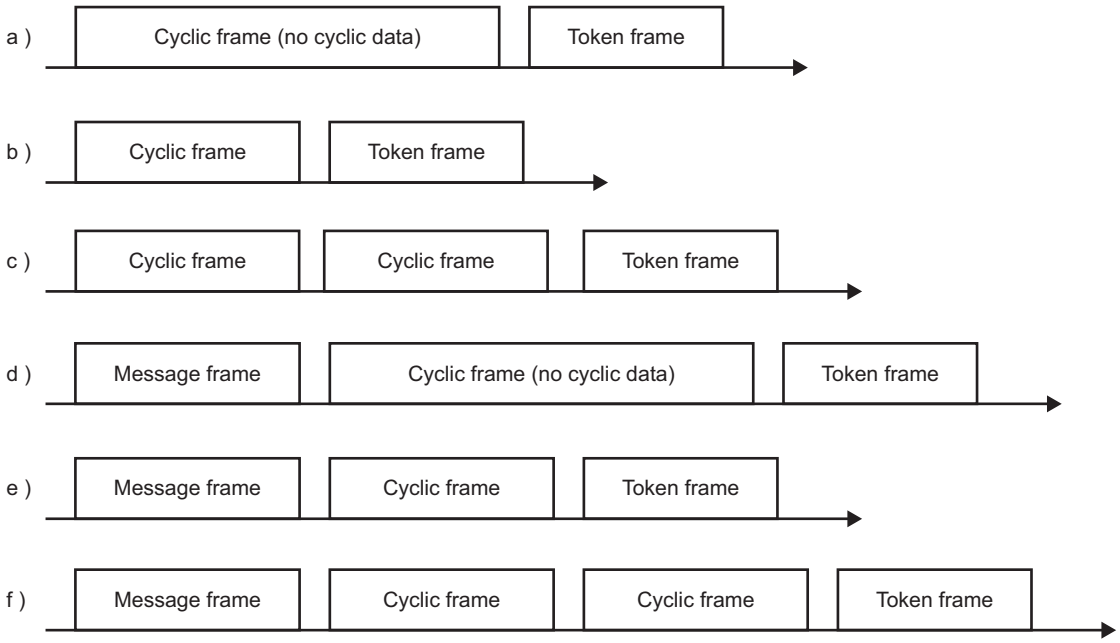
(2) Token Flow

Basically, only one token is present in the network.
When two or more tokens are present in the network, the node selects the token with a smaller node number and discards the other.
A frame holding a token (called a token frame) has a token destination node number and a token passing node number.
Each node serves as a token holding node only when it has a token number identical to the token destination node number of a received token frame.
The token rotation sequence depends on node numbers.
Each node passes the token in the ascending order of node numbers registered in the joined node management tables of each node.
A node having the maximum node number passes the token to a node having the minimum node number.



(3) Token and Data

When the token is passed, data is classified into six patterns as follows.



(4) Frame Interval (Minimum Allowable Frame Interval)

The time from when a local node receives a token until it sends a frame is called a frame interval.
During this time, the minimum time required for each node to send the frame is called the minimum allowable frame interval.
FL-net shares this minimum allowable frame interval in the network.
For each node, the maximum value of the minimum allowable frame intervals set by nodes joined to the network is calculated and updated each time a node joins/leaves a network.

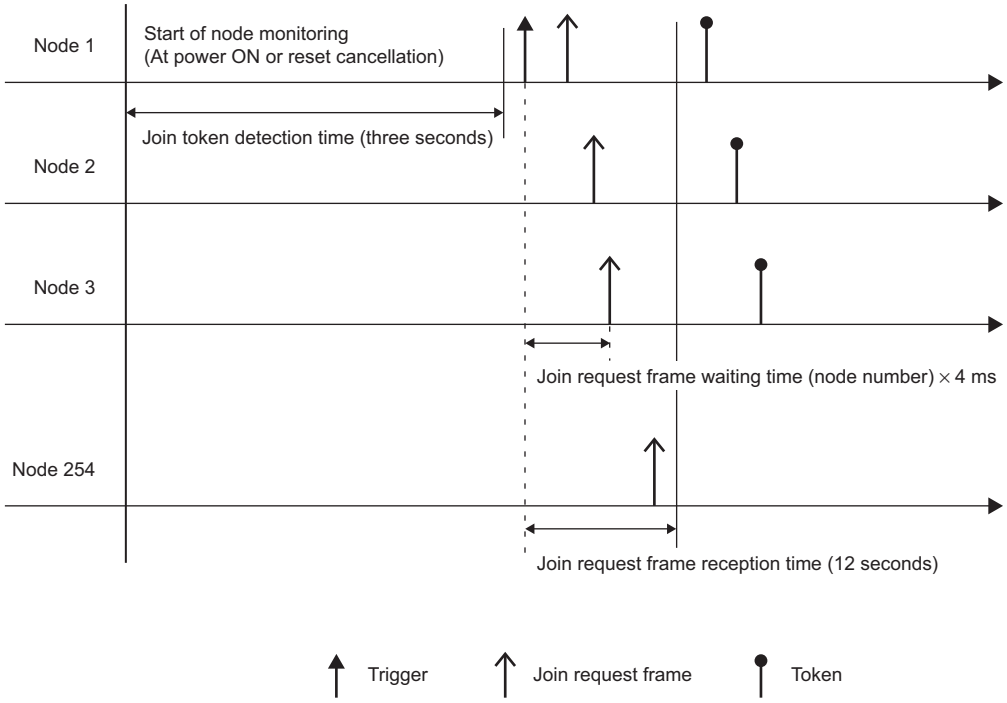
B.2 Joining/Leaving FL-net

(1) Joining FL-net

Each node monitors the line at start up until the join token detection time has elapsed. When no token has been received during this time, the node will newly join a network, determining that the network has just been activated. In contrast, when a token has been received, the node will join the network at a halfway point.

[a] Newly Joining FL-net

When no token is received even after the join token detection time has elapsed, each node prepares to send a trigger, and then sends the trigger after an elapse of the remainder of the node number/8 × 4 ms. When a trigger is received prior to trigger sending, the node does not send the trigger. While checking for the presence of duplicate node numbers and addresses, and updating the join node management table, each node waits for a join request frame sent by all nodes during the join request frame reception time (1,200 ms) from the point of time when a trigger is received. A join request frame is sent after the elapse of the join request frame send waiting time (node number × 4 ms) from the point of time when the trigger is received. At this time, if a node recognizes the presence of a duplicate address in a join request frame sent from other nodes, it sets the common memory leading addresses of areas 1 and 2 and the common memory size to 0, and does not send cyclic data. In addition, the node sets the duplicate address detection flag and resets the common memory data valid notification flag. When the join request frame reception time has expired, the node with the smallest node number passes the token according to the join node management table. When a duplicate node number is found, the node disables sending and receiving entirely.

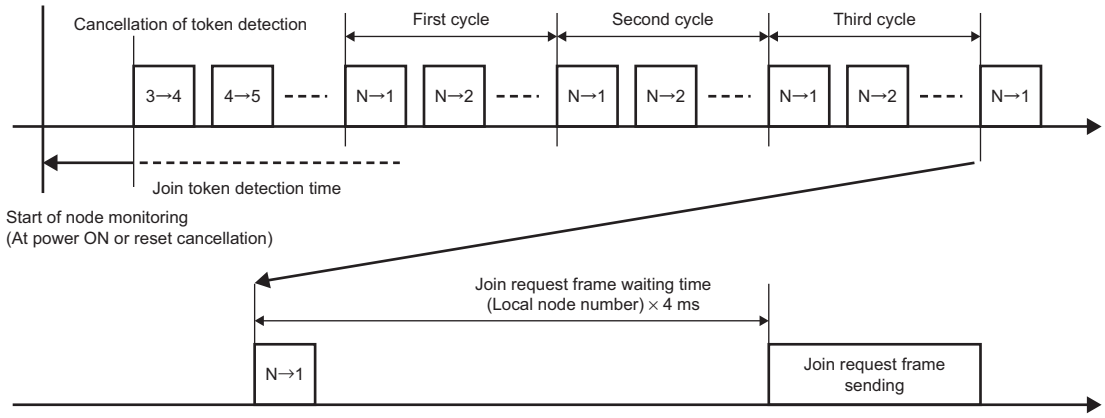


[b] Joining FL-net at a Halfway Point

When the token has been received within the join token detection time, each node waits for join request frame sending until the token has circulated three times, assuming that the link has already been established. Meanwhile, each node checks for the presence of duplicate node numbers and addresses using the received frame, and updates the join node management table. At this time, if a node recognizes the presence of a duplicate address, it sets the common memory leading addresses of areas 1 and 2 and the common memory size to 0 and does not sends cyclic data. In addition, the node sets the duplicate address detection flag and resets the common memory data valid notification flag. When there is no error with the node number (no duplicate address is found), the node sends a join request frame after the join request frame send waiting time elapses. The join request frame is sent regardless of whether the token is being held by the node.

When a duplicate node number is found, the node will neither send the join request frame nor join the network.

- Join token detection time: Time required to check whether the network is active or not.
- Circulation: Circulation is started when the token sent to the smallest node number has been received.
- Join request frame send waiting time: A join request frame is sent after an elapse of local node number × 4 ms to avoid the duplication of other newly joined nodes (refer to the following figure).



(2) Leaving from FL-net

Each node checks a node number each time it receives a token frame, and determines that the node has left the network if no token frame is received three consecutive times from that node.

(This is also true when the token holding node does not pass the token even after the token monitoring time has elapsed.)

As shown above, when it is determined that a node has left the network, each node deletes its information from the management table.

B.3 Node Status Management

Node status management is accomplished via the local node management table, join node management table, and network management table. The following gives a brief description.

Name	Contents
Local node management table	Manages local node settings.
Join node management table	Manages information about nodes that join the network.
Network management table	Manages information common to networks.

B.4 FL-net Local Node Management Table

(1) Basic Function

The FL-net local node management table manages data for local node settings. The following gives a brief description.

- Used for a join request frame or network parameter reading.
- Management data is set from the FL-net upper layer at the startup of the node.
- The node name and the leading address and size of a send area in the common memory can be set from the network.

(2) Management Data

Item	Byte Length	Contents
Node number	1 byte	1 to 254
Area 1 data leading address in common memory	2 bytes	Word address (0 to 1FFH)
Area 1 data size in common memory	2 bytes	Size (0 to 1FFH)
Area 2 data leading address in common memory	2 bytes	Word address (0 to 1FFFH)
Area 2 data size in common memory	2 bytes	Size (0 to 1FFFH)
Status of upper layer	2 bytes	RUN/STOP/ALARM/WARNING/NORMAL
Token monitoring time	1 byte	Unit: 1 ms (1 to 255)
Minimum allowable frame interval	1 byte	Unit: 100 μs (0 to 50)
Vendor name	10 bytes	Vendor name “YASKAWA”
Manufacturer model	10 bytes	Manufacturer model, device name For 10 bytes of “JAPMC-CM2303-E,” “JAPMC-CM23”
Node name (facility name)	10 bytes	User-defined node name
Protocol type	1 byte	80H fixed
FA link status	1 byte	Join/leave information, etc.
Local node status	1 byte	Duplicated node number detection, etc.

B.5 FL-net Join Node Management Table

(1) Basic Function

The status of each node joining the network is monitored via the management table of the node. The management table handles data managed in units of nodes for the nodes that join the network. The following gives a brief description.

- Each node receives a token frame at startup and updates the join node management table and network management table.
- Each node updates the join node management table each time it receives a token frame.
- Each node also updates the join node management table each time it receives a new join request frame to newly join the network.
- When no token frame has been received from a node or a time-out has occurred three times consecutively, each node deletes the node from the join node management table.

(2) Management Data

The token of each node is always monitored and the join node management table is created and managed.

Item	Byte Length	Contents
Node number	1 byte	1 to 254
Status of upper layer	2 bytes	RUN/STOP/ALARM/WARNING/NORMAL
Area 1 data leading address in common memory	2 bytes	Word address (0 to 1FFH)
Area 1 data size in common memory	2 bytes	Size (0 to 1FFH)
Area 2 data leading address in common memory	2 bytes	Word address (0 to 1FFFH)
Area 2 data size in common memory	2 bytes	Size (0 to 1FFFH)
Refresh cycle allowable time	2 bytes	Unit: 1 ms (1 to 65535)
Token monitoring time	1 byte	Unit: 1 ms (1 to 255)
Minimum allowable frame interval	1 byte	Unit: 100 μs (0 to 50)
FA link status	1 byte	Join/leave information, etc.

B.6 FL-net Status Management

(1) Basic Function

Manages network status parameters.

(2) Management Data

Item	Byte Length	Contents
Token holding node number	1 byte	Node holding token at present (1 to 254)
Minimum allowable frame interval	1 byte	Unit: 100 µs (0 to 50)
Refresh cycle allowable time	2 bytes	Unit: 1 ms (1 to 65535)
Refresh cycle measurement time (Current value)	2 bytes	Unit: 1 ms (1 to 65535)
Refresh cycle measurement time (Maximum value)	2 bytes	Unit: 1 ms (1 to 65535)
Refresh cycle measurement time (Minimum value)	2 bytes	Unit: 1 ms (1 to 65535)

B.7 FL-net Message Serial Number Management

(1) Basic Function

Manages serial numbers and their version numbers in message transmission.

(2) Management Data for Sending

Item	Byte Length	Contents
Serial version number	4 bytes	Serial numbers for send messages
Serial number (1:1 sending)	4 bytes	1 to FFFFFFFFH
Serial number (1:n sending)	4 bytes	1 to FFFFFFFFH

(3) Management Data for Receiving

Item	Byte Length	Contents
Serial version number	4 bytes	1 to FFFFFFFFH
Serial number (1:1 receiving)	4 bytes	1 to FFFFFFFFH
Serial number (1:n receiving)	4 bytes	1 to FFFFFFFFH

Appendix C FL-net System Grounding

C.1 Overview

The following gives an example of grounding a control panel to the iron frame of a building to describe a method for grounding the FL-net system controller control panel in Fig. C.1 and Fig. C.2.
When the control panel needs to be grounded to the iron frame of a building, the following requirements must be met. When these requirements are not met, it must be subject to controller-dedicated grounding (ground resistance: 100Ω or less).

- The iron frames must be welded to each other.
- The ground and iron frame must be grounded with a ground resistance of 100Ω.
- There can be no current flows into a ground point of the control panel from the power circuit.
- The distance between the ground point of the control panel and that of the magnetics panel must be at least 15 m.

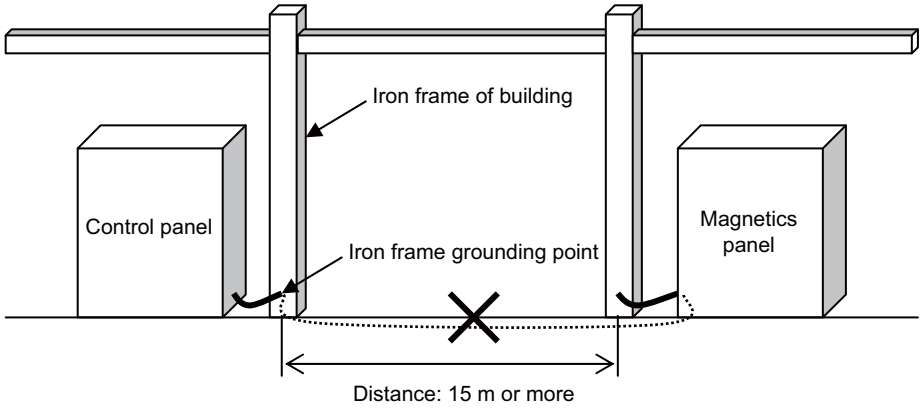


Fig. C.1 Example 1 of Grounding a Controller Control Panel (Grounding on Iron Frames)

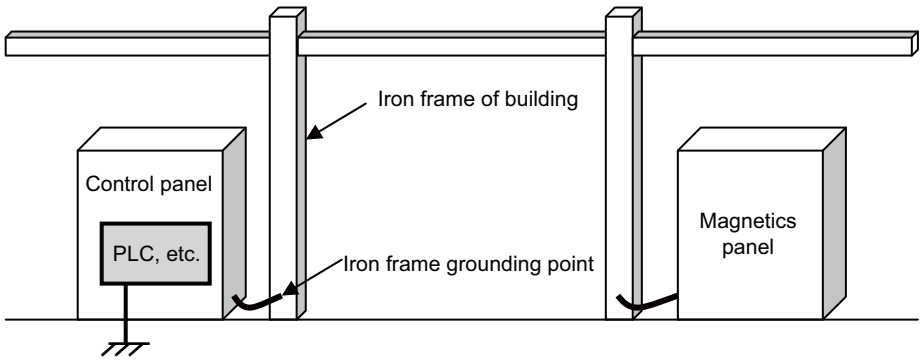


Fig. C.2 Example 2 of Grounding a Controller Control Panel
(Grounding Controller Alone with Ground Resistance of 100Ω or less)

C.2 Power Supply Wiring and Grounding

The following describes how to wire and ground an FL-net system power supply, and gives an example of power supply wiring and grounding in the distribution panel and controller panel as shown in Fig. C.3.
The power supply must be wired and grounded as follows:

- An insulating transformer with an electrostatic shield must be placed between the control power supply and the controller power supply for insulation.
- The frames of the distribution and controller control panels must be grounded with a ground resistance of 100Ω or less.
- The controller FG (frame ground) terminal must not be connected to the frame of the control panel but subject to controller-dedicated grounding (ground resistance: 100Ω or less).
- Wiring for a controller input power supply must be shortened as much as possible and a twisted cable must be used for this purpose.
- The controller LG (line ground) terminal must be connected to a shielded terminal of the insulating transformer and grounded to the frame of the panel.

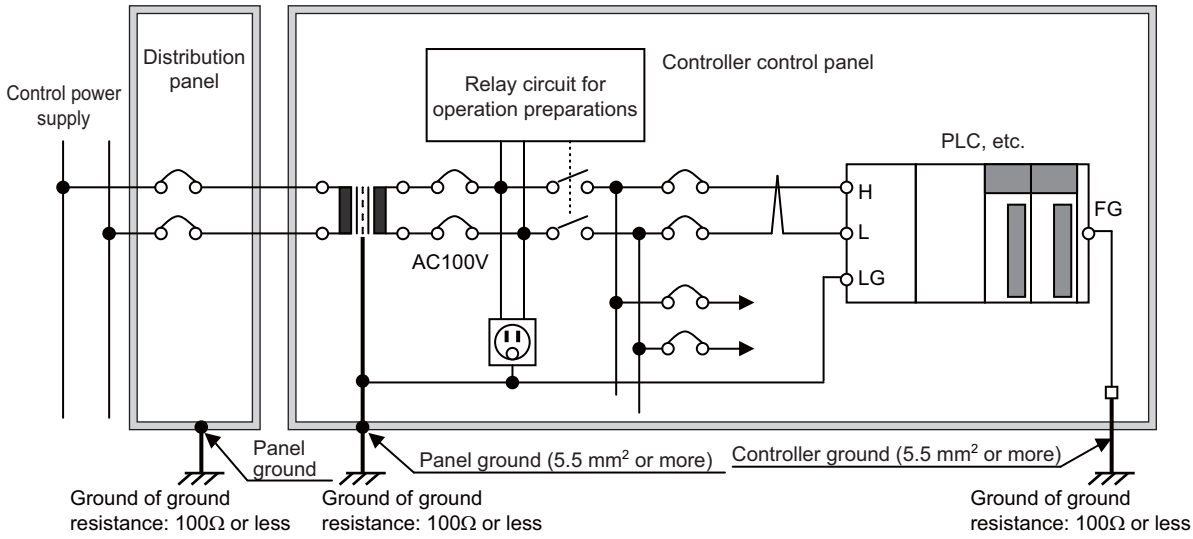


Fig. C.3 Example of Power Supply Wiring and Grounding in FL-net System

C.3 Installing and Wiring Network Equipment in the FL-net System

The following shows an example of installing network equipment (transceivers, hubs, etc.) in the FL-net system as shown in Fig. C.4.

- Note that the transceiver should be installed in a metal installation box with a wooden insulation cover. The installation box must be grounded with a ground resistance of 100Ω or less.
- A transceiver cable must be wired to the control panel of the controller by means of a conduit. The conduit must also be grounded with a ground resistance of 100Ω or less.
- The hub must be installed within the control panel of the controller with a U-shaped fitting. The hub must be electrically insulated from the fitting by rubber feet. The fitting must be grounded to the control panel of the controller, and the control panel must be grounded with a ground resistance of 100Ω or less.

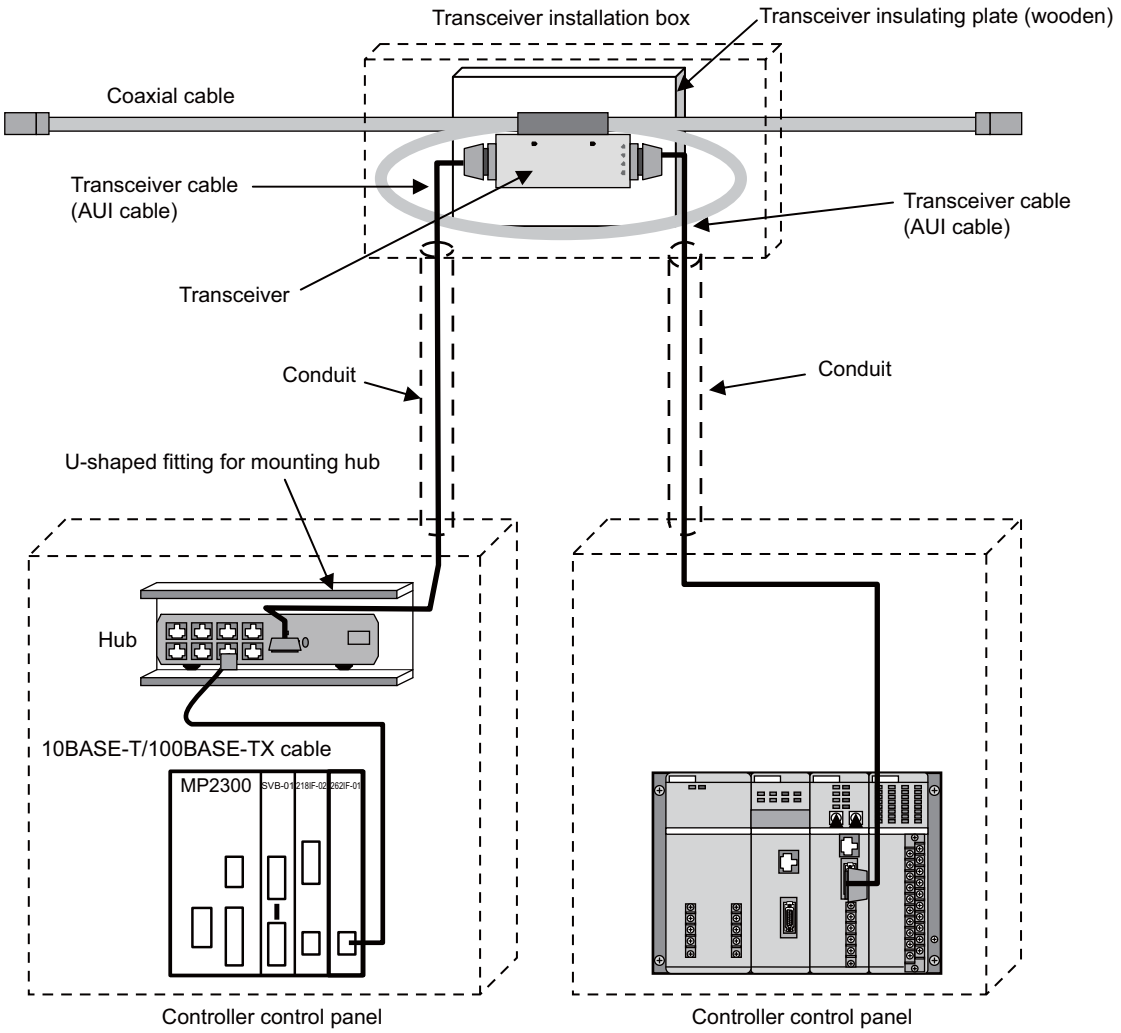


Fig. C.4 Example of Network Equipment Connection in the FL-net System

C.4 Laying and Grounding a Wiring Duct and a Conduit

The following gives an example of laying and grounding a wiring duct and a conduit in FL-net as shown in Fig. C.5 and Fig. C.6.

Wiring must be performed as follows:

- When a wiring duct is used, the power lines and signal lines must be separated with separators according to their levels. In addition, the wiring duct (including a cover and a separator) must be grounded with a ground resistance of 100Ω or less.
- When conduits are used, the conduits should be prepared individually for the power lines and signal lines according to their levels. In addition, the conduit must be the one defined in JIS-C-8305 and must be grounded with a ground resistance of 100Ω or less.

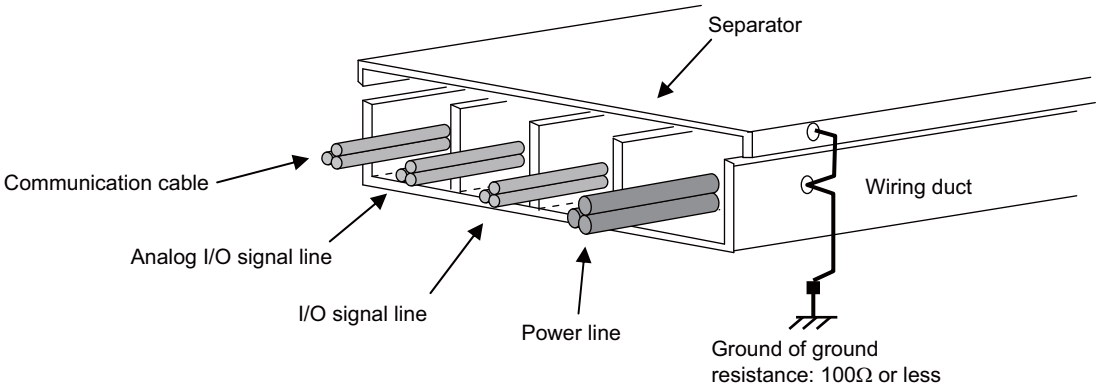


Fig. C.5 Wiring Example via a Wiring Duct

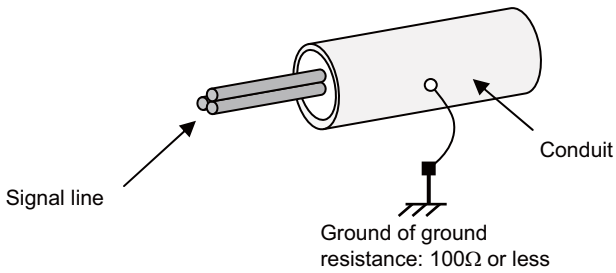


Fig. C.6 Wiring Example via a Conduit

C.5 FL-net Construction Work Check Sheet

The following shows an example of the FL-net construction work check sheet.

FL-net Construction Work Check Sheet

Communication line name: Station number:

		Check date	
Check Item		Company name Inspector name	
Cable	Have you locked all connectors firmly?		
	Is the bending radius of a cable within the specified value?		
	Have you protected the connector with a jacket?		
	Have you affixed a wiring identification number (line number) label? Is the wiring number correct?		
	Have you not placed heavy objects on a communication cable?		
	Have you not bundled a communication cable and a power line together in the same duct?		
	Is an AUI cable for repeater within 2 m? Is a transceiver cable within 50 m?		
	Is a coaxial cable (10BAE5) within 500 m?		
	Have you connected the coaxial cable to a ground terminal correctly?		
	Have you insulated the coaxial cable shield and transceiver?		
	Have you provided the coaxial cable with a terminator correctly?		
	Is the number of hierarchical repeaters or hub connections correct?		
	Is the twisted pair cable a straight cable?		
	Have you employed a twisted pair cable of category 5 and is its length within 100 m?		
Unit	Have you grounded the equipment GND terminal correctly?		
	Have you tightened each unit to the base firmly?		
	Have you mounted the base unit at the control panel firmly?		
	Have you locked the AUI cable firmly?		
	Have you not exerted excessive force on the mounting part of the AUI cable from the door?		
Hubs, etc.	Have you connected the RJ45 connector firmly?		
	Have you locked the AUI cable connector?		
	Have you affixed a line number label?		
	Have you located the transceiver at the marked position correctly?		
	Have you set the transceiver SQE switch properly according to equipment specifications?		
	Have you connected the hub firmly?		
	Have you set the HUB/MAU selector switch of the hub correctly?		
	Is the hub supply voltage the rated value?		

- For equipment alteration, modification, or inspection, be sure to check and make entry.
- Note that the entry field must be given "✓" for passed, "×" for failed, or "-" for N/A (coaxial cable, twisted pair cable), and the switch setting field must be given a rotary switch number and a dip switch setting (ON or OFF) if any.

- Because the above sheet shows a general-purpose check sheet, it contains some items not applicable to the 262IF-01.

Appendix D Supplement on FL-net Profile

D.1 262IF-01 Profile

(1) Device-common Parameters

The following describes device-common parameters in detail.

Parameter Name	Name Character [PrintableString type] (Length), (Character)	Data Type [Type]	Example of Parameter Descriptions (For 262IF-01) (Length), (Contents)
Device profile common specification version	6, “COMVER”	INTEGER	1, 1
System parameter identification character	2, “ID”	PrintableString	7, “SYSPARA”
System parameter change number	3, “REV”	INTEGER	2, 0□0100
System parameter change date	7, “REVDATE”	[INTEGER],2,(0001 to 9999) [INTEGER],1,(01 to 12) [INTEGER],1,(01 to 31)	2, 2007 1, 9 1, 27
Device type	10, “DVCATEGORY”	PrintableString	2, “PC”*
Vendor name	6, “VENDER”	PrintableString	7, “YASKAWA”
Product model	7, “DVMODEL”	PrintableString	16, “JAPMC-CM2303␣␣␣”

* The following describes the parameters for device type.
  PC or PLC: Programmable Logic Controller
  NC or CNC: Numeric control equipment
  RC or ROBOT: Robot controller
  COMPUTER: Personal computer, panel computer, workstation, intelligent display computer
  SP.*..*: To be specified as a vendor-specific SP by vendor (.*..* is an alphanumeric character.)
  OTHER: Others

The transfer syntax requires that system parameters, common parameters, system parameter change dates and device-specific parameters (options) are all given in SEQUENCE structures. (Perform structuring within device-specific parameters arbitrarily.)

(2) Device-specific Parameter

The following describes device-specific parameters in detail.

Parameter Name	Name Character	Data Type	Example of Parameter Descriptions (Length), (Contents)
Device-specific parameter identification character	2, “ID”	PrintableString	7, “DEVPARA”
The contents can be freely defined by the vendor.			

The above device-specific parameters are not used in 262IF-01.

D.2 ANS.1 Transfer Syntax Summary

The following gives a brief description of the ISO/IEC 8825 ASN.1 (Abstract Syntax Notation One) basic coding rules that relate only to this manual.

(1) Simple ASN.1 Type

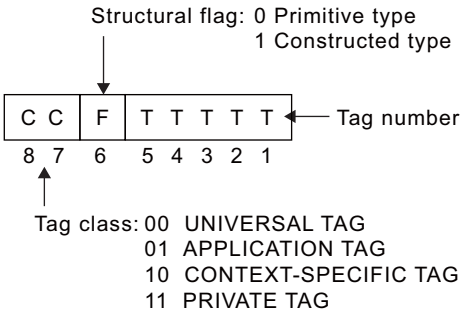
Type	Length	Value

(2) Example of Structured ASN.1 Type Coding

Type	Length	Value					
		Type	Length	Value	Type	Length	Value

(3) Type Field

[a] Structure (one octet)



[b] Tag Number (UNIVERSAL TAG)

Tag Number (Hexadecimal)	Type	Tag Number (Hexadecimal)	Type
00	(Reserved)	11	SET and SET OF
01	BOOLEAN	12	NumericString
02	INTEGER	13	PrintableString
03	BIT STRING	14	TeletexString
04	OCTET STRING	15	VideotexString
05	NULL	16	IA5String
06	OBJECT IDENTIFIER	17	UTCTime
07	ObjectDescriptor	18	GeneralizedTime
08	EXTERNAL	19	GraphicString
09	REAL	1A	VisibleString
0A	ENUMERATED	1B	GeneralString
0B-0F	(Reserved)	1C	CharacterString
10	SEQUENCE and SEQUENCE OF	1D to 1E	(Reserved)

[c] Data Types and Structure Flags

ANS.1 Type	Structure Flags	
	Primitive Type	Constructed Type
BOOLEAN, INTEGER, OBJECT IDENTIFIER, REAL, ENUMERATED	○	–
BIT STRING	○	○
Character string type such as OCTET STRING and NumericString	○	○
NULL (no value field)	○	–
SEQUENCE, SEQUENCE OF, SET, SET OF	–	○
EXTERNAL	–	○
CHOICE	○	○
ANY	○	○
Tagged type	○	○

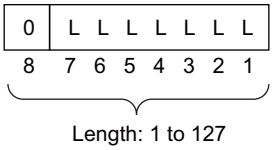
- ○: Can be supported.

[d] Details of Printable String Type

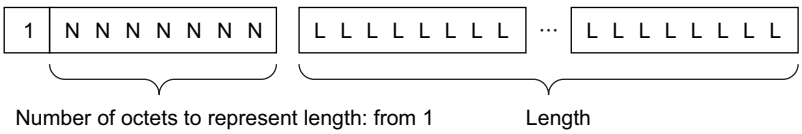
Name	Character	Code (Hexadecimal)
Capital letters	A, B, ···, Z	41, 42, ···, 5A
Small letters	a, b, ···, z6	61, 62, ···, 7A
Digits	0, 1, ···, 7A	30, 31, ···, 7A
Space	Space	20
Apostrophe	‘	27
Left Parenthesis	(	28
Right Parenthesis	)	29
Plus sign	+	2B
Comma	,	2C
Hyphen	–	2D
Full stop	.	2E
Solidus	/	2F
Colon	:	3A
Equal sign	=	3D
Question mark	?	3F

(4) Length Field

[a] Fixed Length Short Format



[b] Fixed Length Long Format



[c] Data Sending Sequence

The data sending sequence is big-endian where the highest octet of data is sent.

[d] Reference Materials for Profiles

i) Hisao Ogane, TCP/IP and OSI Network Management, 1993, Soft Research Center Inc.
ii) ISO/IEC 8824 Information Technology – Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1), 1990 Second Edition, (ISO/IEC 8824-1 1995, ISO/IEC 8824-2 1995, ISO/IEC 8824-3 1995, ISO/IEC 8824-4 1995)
iii) ISO/IEC 8825 Information Technology – Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1), 1990 Second edition, (ISO/IEC 8825-1 1995, ISO/IEC 8825-2 1996)

Appendix E Differences from CP Series/262IF

The following lists functional differences between our CP Series Controller FL-net Module (CP317/262IF) and MP Series Machine Controller FL-net Module (262IF-01).

Item		262IF-01	CP317/262IF
Transmission specifications	Interface	100BASE-TX, 10BASE-T	10BASE-T
	Baud rate	100 Mbps/10 Mbps	10 Mbps
Link transmission specifications	Area 1 assignment size	0 to 512 words (total: 512 words)	0 to 512 words (total: 512 words)
	Area 2 assignment size	0 to 8,192 words (total: 8192 words)	0 to 8,192 words (total: 8192 words)
Message transmission specifications	Number of message channels	10	15
	Message size	Up to 512 words	Up to 512 words
	Engineering communication	Not supported	Not supported
	Byte block read	×	×
	Byte block write	×	×
	Word block read	○	○
	Word block write	○	○
	Network parameter read	○	○
	Network parameter write	Allowed only for clients	Allowed only for clients
	Stop command	Allowed only for clients	Allowed only for clients
	Start command	Allowed only for clients	Allowed only for clients
	Profile read	○	○
	Transparent message	○	○
	Log data read	○	○
	Log data clear	○	○
	Message loopback	○	○
	Vendor-specific message	×	×
Screen specifications	Parameter setting	Node number, subnet mask, token monitoring time, minimum allowable frame interval, common memory size setting, and node name	Node number, subnet mask, token monitoring time, minimum allowable frame interval, and node name
	Link assignment	Assignment by common memory area image (An I/O register range is determined automatically when the common memory area address and size are specified.)	Assignment by I/O register image (I/O registers must be assigned in units of nodes, and common memory areas 1 and 2 within each node must be assigned.)
	I/O map	Not supported	Supported
	Link status	The detailed contents of the upper layer and FA link status can be displayed on the **Status Detail** Window in units of bits.	The upper layer and FA link status both support HEX display only. Detailed contents are not provided.
	Status	No device version is displayed. The manufacturer name and model are displayed.	A device version is displayed. The manufacturer name and model are not displayed.
	Network calibration information read	The address and size of each of the common memory areas 1, 2 and the detailed contents of the upper layer and FA link status are displayed.	Only the address and size of each of the common memory areas 1, 2 are displayed.
Others	Number of network nodes	254 (number of assignable nodes: 64)	254 (number of assignable nodes: 64)
	Number of module lines	8	8

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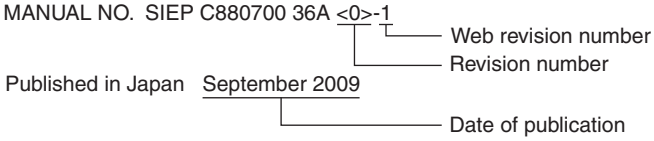
Revision History

The revision dates and numbers of the revised manuals are given on the bottom of the back cover.



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			3.1.1	Revision: Applicable Machine Controllers
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Machine Controller MP2000 Series

262IF-01
FL-net Communication Module
USER'S MANUAL

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