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MITSUBISHI ELECTRIC

# CNC
# MELDAS C6/C64

# NETWORK MANUAL


BNP-B2373B(ENG)

# Introduction

This manual explains the interfaces and functions related to the MELDAS C6/C64 network connection.
Always read this manual before starting use. To ensure safe use of the MELDAS C6/C64, always read the "Precautions for Safety" given on the next page.

### Details described in this manual

## ⚠ CAUTION

- ⚠ For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine maker takes precedence over this manual.
- ⚠ Items not described in this manual must be interpreted as "not possible".
- ⚠ This manual is written on the assumption that all option functions are added. Confirm with the specifications issued by the machine maker before starting use.
- ⚠ The screens and functions may differ or be disabled depending on the NC system version.

### General precautions

Refer to the following documents.

| | | | |
|---|---|---|---|
| (1) | MELDAS C6/C64/C64T | Operation Manual | BNP-B2259 |
| (2) | MELDAS C6/C64/C64T | Parameter Manual | BNP-B2267 |
| (3) | MELDAS C6/C64/C64T | PLC I/F Manual | BNP-B2261 |
| (4) | MELDAS C6/C64 | PLC Programming Manual (Ladder Section with MELSEC Tool) | BNP-B2309 |
| (5) | MELDAS C6/C64 | Connection and Maintenance Manual | BNP-B2255 |

# Precautions for Safety

Always read the specifications issued by the machine maker, this manual, related manuals and attached documents before installation, operation, programming, maintenance or inspection to ensure correct use.
Understand this numerical controller, safety items and cautions before using the unit.
This manual ranks the safety precautions into "DANGER", "WARNING" and "CAUTION".

| | |
|---|---|
| ⚠ **DANGER** | When the user may be subject to imminent fatalities or major injuries if handling is mistaken. |
| ⚠ **WARNING** | When the user may be subject to fatalities or major injuries if handling is mistaken. |
| ⚠ **CAUTION** | When the user may be subject to bodily injury or when physical damage may occur if handling is mistaken. |

Note that even items ranked as "⚠ **CAUTION**", may lead to major results depending on the situation. In any case, important information that must always be observed is described.

## ⚠ DANGER

Not applicable in this manual.

## ⚠ WARNING

**1. Items related to prevention of electric shocks**

- ⚠ Do not operate the switches with wet hands. Failure to observe this could lead to electric shocks.
- ⚠ Do not damage, apply forcible stress, place heavy things on, or catch the cables. Failure to observe this could lead to electric shocks.

**2. Items related to program development**

- ⚠ Do not set any of the touch keys on the GOT as a start switch for the C6/C64. If a communication error (including cable disconnection) occurs between the GOT and C6/C64, the communication will be cut off and the GOT operation will be disabled. Even if the start switch is released, it will not be recognized that the start signal has been cut off, so the operation will continue. This could result in serious accidents.

## ⚠ CAUTION

**1. Items related to product and manual**

- ⚠ For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine maker takes precedence over this manual.
- ⚠ Items not described in this manual must be interpreted as "not possible".
- ⚠ This manual is written on the assumption that all option functions are added. Confirm with the specifications issued by the machine maker before starting use.
- ⚠ The screens and functions may differ or be disabled depending on the NC system version.
- ⚠ Do not turn "Use prohibited" signal ON. Failure to observe this could result in malfunction in units.

**2. Items related to installation and assembly**

- ⏚ Always ground the signal cable to ensure stable operation of the system. Use a one-point ground so that the control unit body, power distribution panel and machine are at the same potential.

**3. Items related to maintenance**

- ⊘ Do not connect or disconnect the cables connected between each unit while the power is ON.
- ⊘ Do not mount or remove each PCB while the power is ON.
- ⊘ Do not pull the cables when connecting/disconnecting them.

# Contents

## III. CC-Link Master/Local Unit



## IV. Setting the Ethernet IP Address

## V. Ethernet 2-channel Connection



## VI. Ethernet Interface Communication Function (MELSEC Communication Protocol Section)



## VII. Ethernet Interface Communication Function Using PLC (Client Function Section)

## VIII. I/O/Intelligent Function Unit Connection Function



## IX. Connection Function with GOT



## X. GOT Window Function

## XI. Remote Monitor Tool

# I. MELSECNET/10

# 1. Outline

As a control station or normal station of MELSECNET/10, MELDAS C6/C64 can be directly connected to the network.
To connect, insert the MELSECNET/10 communication unit into extension slots. The maximum number of communication units possible to insert is 2.

# 2. Performance Specifications

| Item | | Optical loop system (HR879) | Coaxial bus system (HR878) | |
|---|---|---|---|---|
| Max. link points per network | LX/LY | 8192 points | | |
| | LB | 8192 points | | |
| | LW | 8192 points | | |
| Max. link points per station | | $\left\{\frac{B+Y}{8}\right\}+(2\times W)\leq 2000$ bytes | | |
| Max. link device in NC | B | 8192 points | | |
| | W | 8192 points | | |
| Communication speed | | 10MBPS (equivalent to 20MBPS for multiple transmission) | 10MBPS | |
| Communication method | | Token ring | Token bus | |
| Synchronization method | | Frame synchronization | | |
| Encoding method | | NRZI (Non Return to Zero Inverted) | Manchester encoding | |
| Transmission route format | | Duplex loop | Simplex bus | |
| Transmission format | | Conform to HDLC (frame format) | | |
| Max. number of networks | | 255 | | |
| Max. number of groups | | 9 | | |
| Number of stations for connection per network | | 64 stations (Control station: 1, Normal station: 63) | 32 stations (Control station: 1, Normal station: 31) | |
| Total extension distance per network | | 30Km (Station to station 500m) | 3C-2V | 5C-2V |
| | | | 300m (Station to station 300m) | 500m (Station to station 500m) |
| Error control method | | Retry with CRC ($X^{16}+X^{12}+X^5+1$) and overtime | | |
| RAS function | | Loop back function with error detection and cable disconnection (only for optical loop systems)<br>Host link line check diagnosis function<br>System fault prevention due to control station migration<br>Error detection using special relay or register<br>Network monitor, various types of diagnosis functions | | |
| Transient transmission | | N: N communication (such as monitoring or program upload/download)<br>ZNRD/ZNWR (N: N) | | |
| Connection cable | | SI-200/250 | 3C-2V or 5C-2V equivalent product | |
| Connector | | 2-core optical connector plug CA7003 | BNC-P-3-Ni-CAU, BNC-P-5-Ni-CAU (DDK) equivalent products | |
| Cable transmission loss | | 12db/Km max. | Conform to JIS C 3501 standard | |

# 3. Available Functions

Among the functions of MELSECNET/10 network, available functions with MELDAS C6/C64 are as follows.

| Function | | | MELSEC | MELDAS C6/C64 |
|---|---|---|---|---|
| Network function | Control station function | | Available | Available |
| | Control station transfer function | | Available | Available |
| | Cyclic transmission | Communication by B/W (1: N) | Available | Available |
| | | Communication by X/Y (1: 1) | Available | Available |
| | | Constant link scan function | Available | Available |
| | | Stopping/Restarting data link | Available | Available |
| | | Inter data link transmission | Available | Available |
| | | Station specific parameter | Available | Not available |
| | Transient transmission | N: N communication | Available | Available |
| | | Routing function | Available | Available |
| | | Group function | Available | Not available |
| | RAS function | Automatic recovery function | Available | Available |
| | | Loop back function | Available | Available |
| | | Station detachment function | Available | Available |
| | | Data link status detection function | Available | Available |
| | Remote I/O net | | Available | Not available |
| | Multiplex transmission function | | Available (Optical loop only) | Available (Optical loop only) |
| | Reserve station function | | Available | Available |
| Setting and display | LED diagnosis function | | 22 point display | 4 point (coaxial) 7 point (optical loop) display |
| | Network No. setting | | Switch on the front of the unit | Setting switch on the card |
| | Group No. setting | | | |
| | Station No. setting | | | |
| | Condition setting | | | |
| | Mode setting switch | | | Switch on the front of the card |
| | Display changeover switch | | | Not available |
| Self diagnosis function | Hardware testing | | Available | Not available |
| | Internal self-loop back testing | | Available | Not available |
| | Self-loop back testing | | Available | Not available |
| | Station to station testing | | Available | Not available |
| | Forward loop / Reverse loop testing | | Available (Optical loop only) | Not available |
| | Loop testing | | Available | Not available |
| | Setting switch check | | Available | Not available |
| | Station order check testing | | Available | Not available |
| | Line monitoring | | Available | Not available |
| | Status monitoring | | Available | Not available |
| | Error history monitoring | | Available | Not available |
| | Network nesting | | Available | Not available |
| Dedicated command | READ/SREAD | | Available | Available |
| | WRITE/SWRITE | | Available | Available |

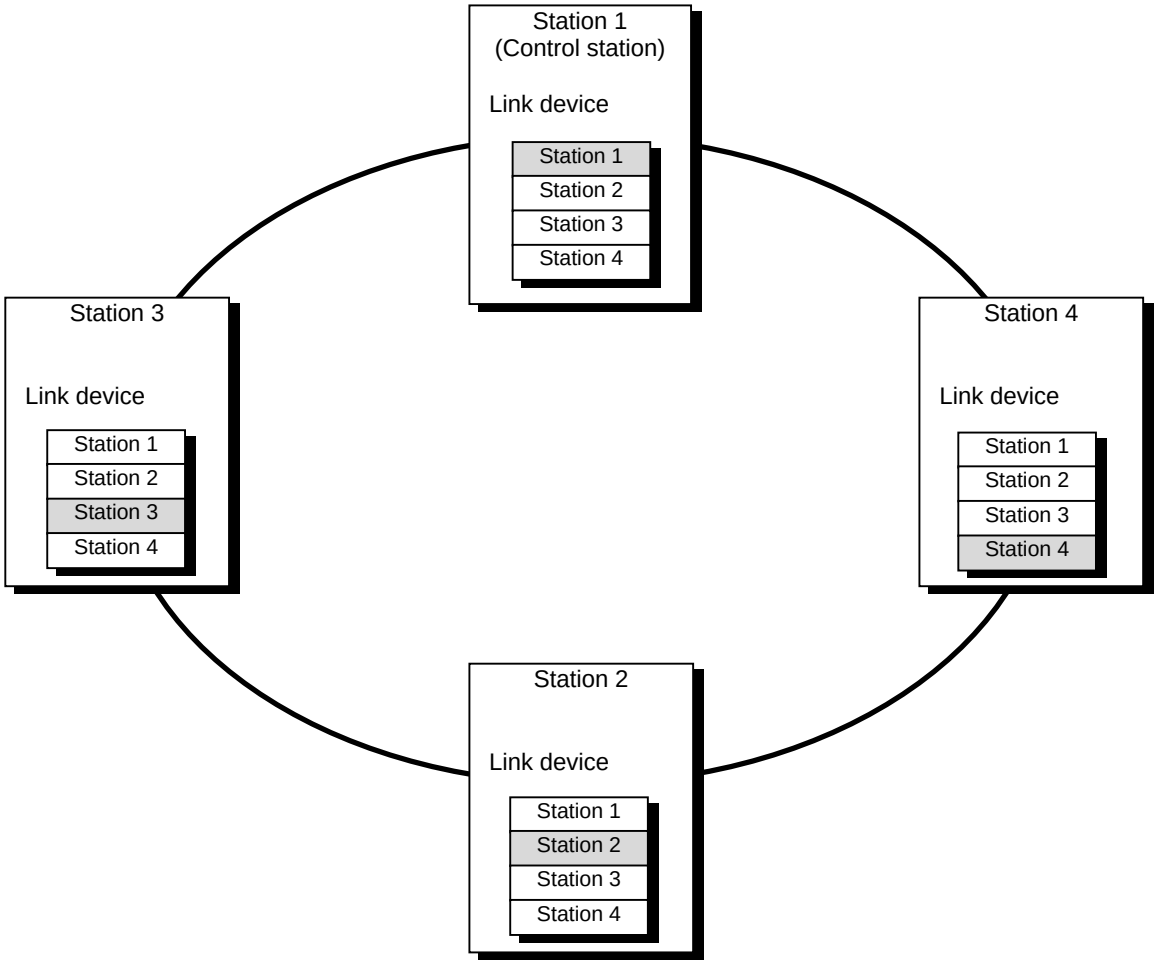
# 4. Cyclic Transmission

The cyclic transmission function is for periodical data transfer between the stations in the network. (The transfer period is in proportional to the size of the entire data in the network.)

## 4.1 Flow of Network Data

Data that can be transmitted within the MELSECNET/10 network is as follows.

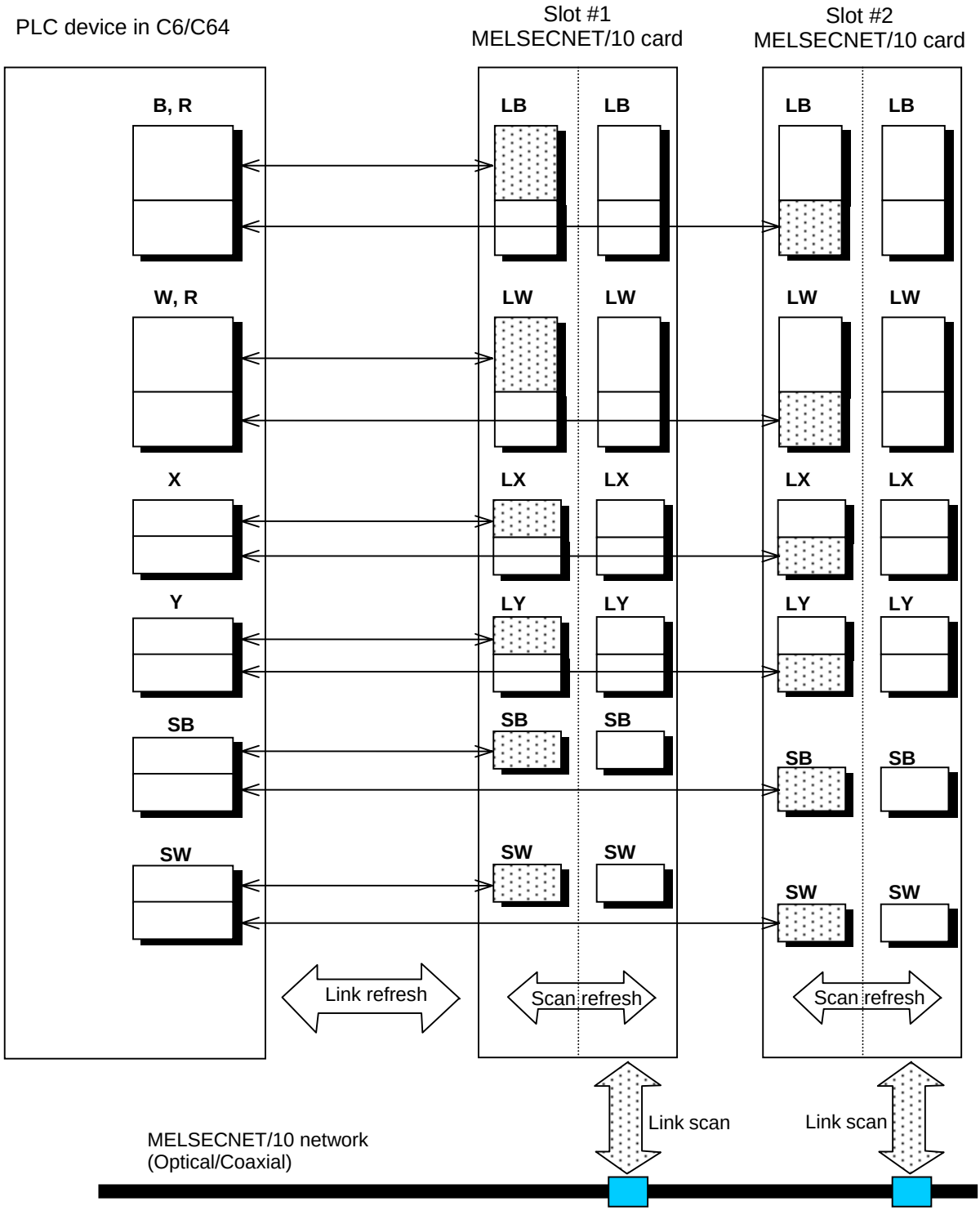
| Device | Unit | The max. number of points per 1 network |
|---|---|---|
| Link relay (B) | 1 bit | 8192 points |
| Link register (W) | 1 word | 8192 points |
| Link input (X) | 1 bit | 8192 points |
| Link output (Y) | 1 bit | 8192 points |




All stations' data is transmitted into the network. Each station outputs its data to the network, and takes the other stations' data in. So each station can refer to all the other stations' output information. However, it is not possible to output to the data allocated for the other stations.
Each station's size of data can be set by a parameter.

## 4.2 Flow of Data Transmitting/Receiving

Data transfer (link refresh) between the network card and PLC device in the NC is executed automatically. The size of data to transmit and the device to which the data is transmitted can be set by parameters.



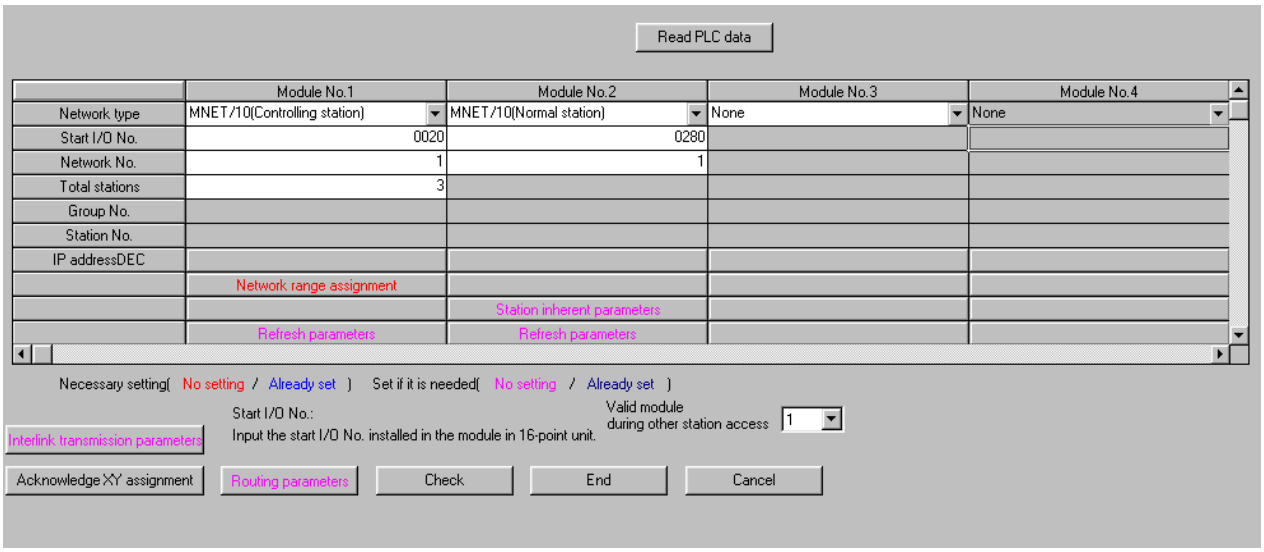
# 5. Parameter Setting

Set parameters related to MELSECNET/10 with MELSEC's peripheral devices in the same way as parameter setting of MELSEC CPU, and write them on C64 by PC. However, in the case of using the default parameters or not requiring separate settings due to normal stations, it is not necessary to set the network parameters.

## 5.1 Control Station Parameter

If you wish to place the control station in C64 and set the common parameters, set the network parameters by peripheral device and write them on C64. An example of parameter setting by GPPW is as follows.
Set the first I/O No. as follows according to the expansion slot to which the unit is inserted.

| Slot | First I/O No. |
|---|---|
| EXT1 (Bottom) | 0200 |
| EXT2 (Top) | 0280 |




Set essential settings. Set other parameters if necessary.

## 5.2 Normal Station Parameter

As for normal stations, it is not necessary to set parameters unless separate settings are required. The refresh parameters are set and written as required. In this case, the parameter setting of the first I/O No. is the same as in the case of the control station.

# 6. Other Functions

This section introduces functions whose specifications are different from MELSEC.

## 6.1 Refresh of SB and SW

SB and SW devices are automatically refreshed according to the allocation below depending on the slot.

| Slot | Refresh range of SB | Refresh range of SW |
|---|---|---|
| EXT1 | SB0000 to SB00FF | SW0000 to SW00FF |
| EXT2 | SB0100 to SB01FF | SW0100 to SW01FF |

## 6.2 Devices Possible to Refresh

The refresh parameters have extended setting. By the extended setting, various devices can be set as devices to be refreshed. In the case of C64, the range of devices is as follows.

| Devices possible to refresh | Unit | Range possible to use |
|---|---|---|
| B | 1 bit | B0 to B1FFF |
| X | 1 bit | X0 to X1FF (Avoid overlapping with the range for real I/O) |
| Y | 1 bit | Y0 to Y1FF (Avoid overlapping with the range for real I/O) |
| M | 1 bit | M0 to M8191 |
| L | 1 bit | L0 to L255 |
| W | 16 bit | W0 to W1FFF |
| R | 16 bit | R0 to R8191 (Avoid overlapping with the range for NC I/F) |
| D | 16 bit | D0 to D8191 (Note 1) |
| T | 16 bit | T0 to T255 |
| C | 16 bit | C0 to C127 |

**(Note 1)** D0 to D8191 can be used with software version D0 and above.

# 7. Transient Transmission

The transient transmission function is used to communicate only when a station requests communication to another.
In the transient transmission, it is possible to read and write devices of the other stations.

## 7.1 Dedicated Command

If C64 is set as either of the command execution station or the target station among the dedicated commands of transient transmission of MELSECNET/10, only the commands below can be used.

| Dedicated command possible to use | Outline of the command |
|---|---|
| READ | The host reads the word device data from the specified station. |
| SREAD | The host reads the word device data from the specified station (with the target station completion). |
| WRITE | The host writes data in the word device data of the specified station. |
| SWRITE | The host writes data in the word device data of the specified station (with the target station completion). |

## 7.2 Access to Other Stations

By setting the access to other stations valid for peripheral device connected to a station in the MELSECNET/10 network, operation of the peripheral device targeting the other stations in the network becomes possible. The PLC in C64 is also targeted. It is also possible to access the other stations via the peripheral device connected to C64.

# 8. Setting and Display

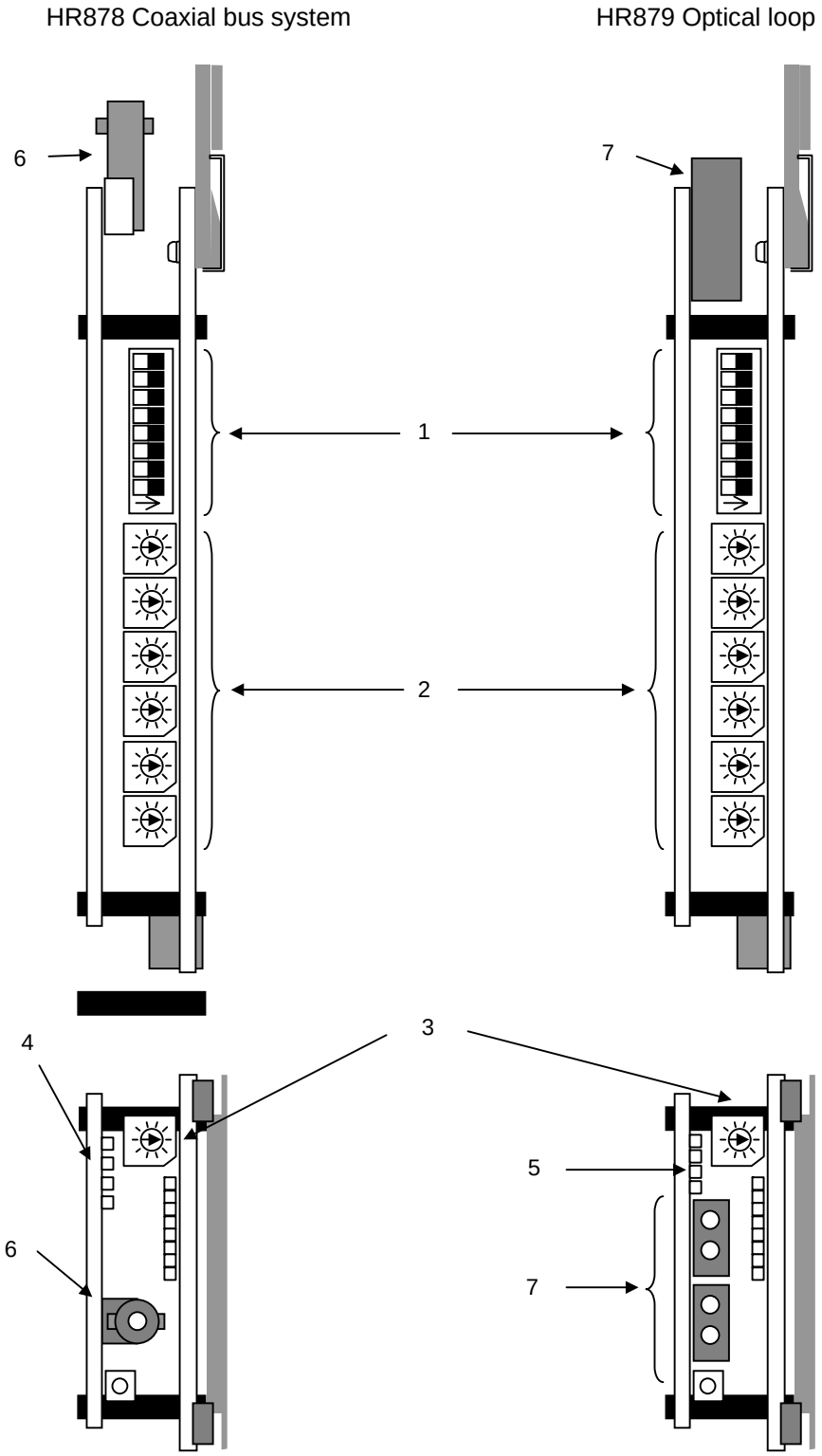
Set network settings by MELSEC's peripheral devices.
Available functions are shown in the table below.

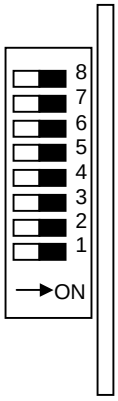
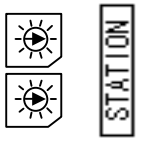
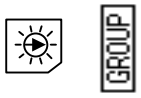
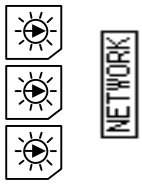
| Setting and display | | | Availability with C64 |
|---|---|---|---|
| Setting | Number of unit settings | | Available |
| | Common parameter | | Available |
| | Network refresh parameter | | Available |
| | Station specific parameter | | - |
| | Transfer parameters for data link | | Available |
| | Routing parameter | | Available |
| Monitor display | Line monitor | Line monitor | Not available |
| | | Detailed line monitor | Not available |
| | | Line monitor (other stations) | Not available |
| | Status monitor | Status monitor | Not available |
| | | Detailed status monitor | Not available |
| | | Test monitor | Not available |
| | Error history monitor | Error history monitor | Not available |
| | | Loop switching data display | Not available |
| | | Transient transmission error | Not available |

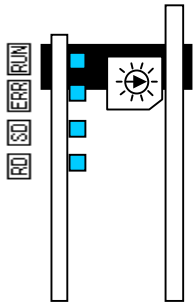
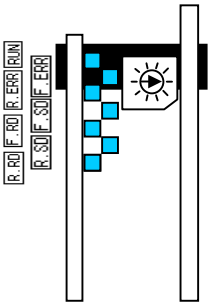
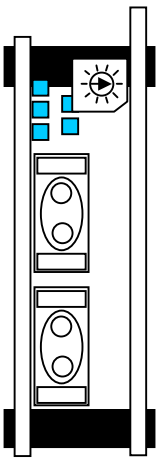
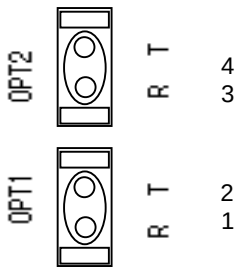
# 9. Name and Setting of Each Part of MELSECNET/10 Card

Name and setting of each part of HR879 for the optical loop system and HR878 for the coaxial bus system are as follows.

**<Figure of unit>**



<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>(1)</td><td>Condition setting switch<br> 
</td><td>Set the operation condition.
<table>
<tr><th>SW</th><th>Description</th><th colspan="4">OFF</th><th colspan="4">ON</th></tr>
<tr><td>1</td><td>Network type</td><td colspan="4">Inter-PC net (PC)</td><td colspan="4">Remote I/O net</td></tr>
<tr><td>2</td><td>Station type</td><td colspan="4">Normal station (N.ST)</td><td colspan="4">Control station (MNG)</td></tr>
<tr><td>3</td><td>Used parameter</td><td colspan="4">Common parameters (PRM)</td><td colspan="4">Default parameter (D.PRM)</td></tr>
<tr><td>4</td><td rowspan="2">Number of stations (Valid when SW3 is ON)</td><td>OFF</td><td rowspan="2">8 sta-tions</td><td>ON</td><td rowspan="2">16 sta-tions</td><td>OFF</td><td rowspan="2">32 sta-tions</td><td>ON</td><td rowspan="2">64 sta-tions</td></tr>
<tr><td>5</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>6</td><td rowspan="2">B/W total points (Valid when SW3 is ON)</td><td>OFF</td><td rowspan="2">2K points</td><td>ON</td><td rowspan="2">4K points</td><td>OFF</td><td rowspan="2">6K points</td><td>ON</td><td rowspan="2">8K points</td></tr>
<tr><td>7</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>8</td><td>Not used</td><td colspan="8">Always OFF</td></tr>
</table></td></tr>
<tr><td rowspan="3">(2)</td><td>Setting switch of station No., group No. and network No.<br> 
</td><td>Station number setting<br><Setting range><br>1 to 64: Station number<br>Other than 1 to 64: Setting error</td></tr>
<tr><td> 
</td><td>Group number setting<br>Not used, fixed to 0</td></tr>
<tr><td> 
</td><td>Network number setting<br><Setting range><br>1 to 255: Network number<br>Other than 1 to 255: Setting error</td></tr>
<tr><td>(3)</td><td>Mode setting switch</td><td>Sets the mode.
<table>
<tr><th>Mode</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Online (with auto recovery)</td><td>Data link with auto recovery</td></tr>
<tr><td>1</td><td colspan="2">Cannot be used</td></tr>
<tr><td>2</td><td>Offline</td><td></td></tr>
<tr><td>3</td><td>Test mode 1</td><td>Loop test (Forward loop)</td></tr>
<tr><td>4</td><td>Test mode 2</td><td>Loop test (Reverse loop)</td></tr>
<tr><td>5</td><td>Test mode 3</td><td>Station to station test (Master station)</td></tr>
<tr><td>6</td><td>Test mode 4</td><td>Station to station test (Slave station)</td></tr>
<tr><td>7</td><td>Test mode 5</td><td>Self loop back test</td></tr>
<tr><td>8</td><td>Test mode 6</td><td>Internal self loop back test</td></tr>
<tr><td>9</td><td>Test mode 7</td><td>H/W test</td></tr>
<tr><td>A</td><td>-</td><td>Cannot be used</td></tr>
<tr><td>B</td><td>-</td><td>Cannot be used</td></tr>
<tr><td>C</td><td>-</td><td>Cannot be used</td></tr>
<tr><td>D</td><td>Test mode 8</td><td>Network No. check</td></tr>
<tr><td>E</td><td>Test mode 9</td><td>Group No. check</td></tr>
<tr><td>F</td><td>Test mode 10</td><td>Station No. check</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>No.</th><th>Name</th><th colspan="3">Description</th></tr>
<tr><td rowspan="6">(4)</td><td rowspan="6">LED (Coaxial bus system)<br> 
</td><td>Name</td><td>Status</td><td>Description</td></tr>
<tr><td rowspan="2">RUN</td><td>ON</td><td>Unit normal</td></tr>
<tr><td>OFF</td><td>WDT error occurred</td></tr>
<tr><td>ERR</td><td>ON</td><td>Hardware error</td></tr>
<tr><td>SD</td><td rowspan="2">ON in dim light</td><td>Sending data</td></tr>
<tr><td>RD</td><td>Receiving data</td></tr>
<tr><td rowspan="8">(5)</td><td rowspan="8">LED (Optical loop system)<br> 
</td><td rowspan="2">RUN</td><td>ON</td><td>Unit normal</td></tr>
<tr><td>OFF</td><td>WDT error occurred</td></tr>
<tr><td>F.ERR</td><td>ON</td><td>Forward loop Hardware error</td></tr>
<tr><td>R.ERR</td><td>ON</td><td>Reverse loop Hardware error</td></tr>
<tr><td>F.SD</td><td rowspan="4">ON in dim light</td><td>Forward loop Sending data</td></tr>
<tr><td>F.RD</td><td>Forward loop Receiving data</td></tr>
<tr><td>R.SD</td><td>Reverse loop Sending data</td></tr>
<tr><td>R.RD</td><td>Reverse loop Receiving data</td></tr>
<tr><td>(6)</td><td>Connector<br>  </td><td colspan="3">Connect coaxial cable (F shape connector).</td></tr>
<tr><td>(7)</td><td>Connector<br>  </td><td colspan="3">Connect optical fiber cable.<br> 

1 Forward (F) loop RD<br>2 Reverse (R) loop SD<br>3 Reverse (R) loop RD<br>4 Forward (F) loop SD</td></tr>
</table>

# 10. Others

## 10.1 Backup of MELSECNET/10 Related Parameters

The parameters related to MELSECNET/10 are only the network parameters written from MELSEC's peripheral device. Their storage area is different from that of usual NC parameters, and the parameters are stored in the Ladder program area in the NC. In order to backup the network parameters out of the NC, it is necessary to output and save the data as follows.

| No. | Data output operation | Devices to use |
|---|---|---|
| 1 | Read the data by selecting the PC read parameter by MELSEC's peripheral device, and store it as a file in the PC. In writing, execute PC writing as above. | MELSEC peripheral devices GPPQ, GPPW, etc. |
| 2 | Output the PLC program area in the NC data output screen. Output by #(99) DATA ( ALL2). In inputting, use the data input screen. | External storage unit (PC, etc.) |

## 10.2 Replacement of MELSECNET/10 Card

Even if the MELSECNET/10 card inserted in the NC is faulty and the cards are replaced, data recovery is not necessary as no parameters are stored in the card.

# II. DeviceNet Interface

# 1. Outline

This function is used to connect MELDAS C6/C64 to DeviceNet as the master station.
The dedicated interface card HR871 is required to use this function.

## 1.1 Features

This function has the following features.
(1) Compliant with DeviceNet Standards Revision 2.0.
(2) Operates as a DeviceNet group 2 dedicated client, and communicates with a Group 2 dedicated server.
(3) Can input and output 256 bytes (2048 points) each using I/O communication.

## 1.2 Restrictions

(1) This MELDAS C6/C64 operates as a Group 2 dedicated client using the HR871, but cannot communicate with the other masters. In other words, neither communication to the configurator on the network nor dynamic establishment of the connection is supported.

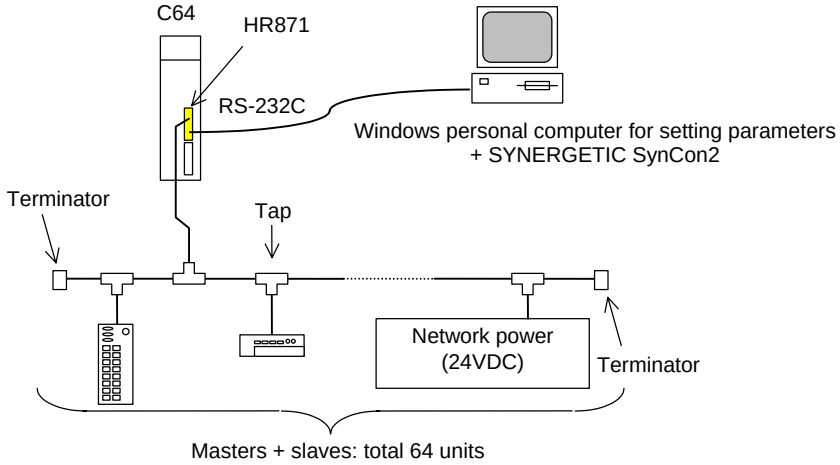
(2) A Hilsher (hereinafter, Company H) communication PCB is used, so when the network analyzer is installed, it will appear as a Company H product. (This is because the Company H vender ID is recognized.)

(3) The DeviceNet communication parameters must be set (configured) with the Windows based SYNERGETIC Configurator SyCon Ver. 2.0 or with the built-in PLC program.

# 2. Detailed Explanations

## 2.1 General Configuration

The general configuration when using the C64 as the master station is shown below.



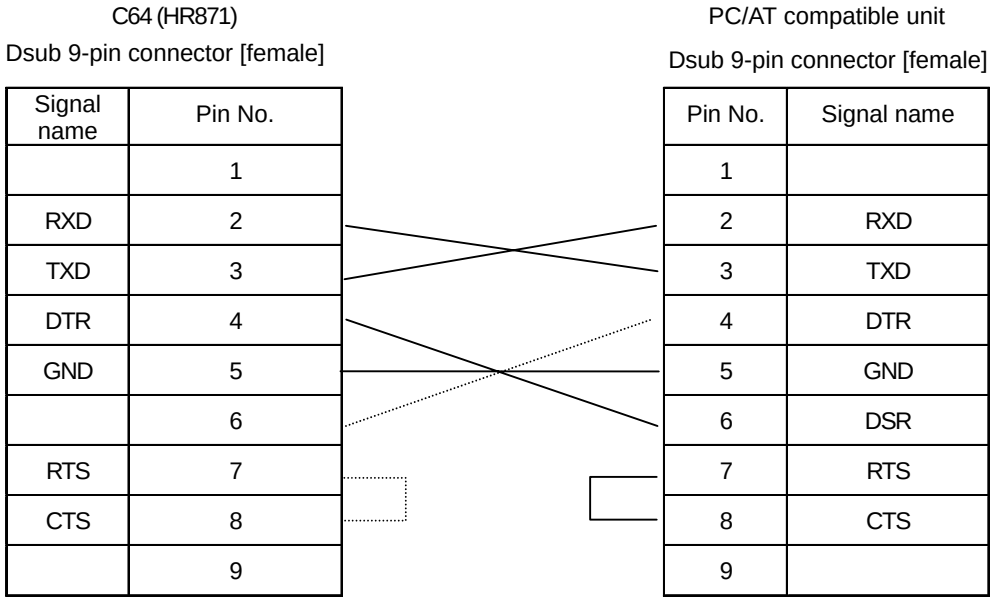

## 2.2 Setting the Configuration Parameters

### 2.2.1 Configurator

The parameters can be set in the HR871 using the SYNERGETIC (hereinafter Company S) Configurator SyCon Ver. 2.0 (hereinafter SynCon2). Connect HR871 and SyCon2 with a RS-232C cross cable.
The SyCon2 system requirements are as follows.

| Item | System Requirements |
|---|---|
| CPU | Intel 486 processor or more |
| OS | Windows95, WindowsNT3.51, WindowsNT4.0 |
| Open disk space | 10MB or more |
| RAM | 16MB or more |
| Display resolution | 800 × 600 dots or more |
| External memory | CD-ROM drive (for installation) |

Connect the cross cable as shown below.
The connections shown with dotted lines are not required, but may be connected without problem to eliminate the cable orientation.




**RS-232C cross cable connection diagram**

**(Note)** The details set with SyCon2 are written into the flash ROM on the communication PCB mounted on HR871.
This data cannot be read or written from the NC main system (it can only be erased).
Back up the setting data with the personal computer.

### 2.2.2 Parameter Setting Function

The configuration parameters can be set with the PLC program.

**(Note)** The details set with the PLC program are written into the EEPROM on the HR871's base PCB. When the parameters are written, the data in the flash ROM set with the SyCon2 will be erased. Always invalidate the EEPROM parameters when writing the parameters with SyCon2 again.

The relation of the flash ROM and EEPROM parameters is as follows.

| | | **Flash ROM** | |
|---|---|---|---|
| | | **Parameters not set** | **Parameters set** |
| EEPROM | Invalid<br>Local station MAC ID is FFFF | Communication does not start. | Communicates with the flash ROM parameters. |
| | Valid | Communicates with the EEPROM parameters. | <Use prohibited> |

**(Note)** The EEPROM can be invalidated by setting the local station's station No. (MAC ID) to FFFF. Refer to section "6.2 Setting the parameters with the PLC program" for details on setting the station No., etc.

# 3. Communication Data

The communication data is assigned to device B (or device W).
The device assignments are as shown below.

| Input/output data | HR871 mounting slot | |
|---|---|---|
| | Extension slot 1 | Extension slot 2 |
| Input data 2048 points | B0000 to B07FF | B1000 to B17FF |
| Output data 2048 points | B0800 to B0FFF | B1800 to B1FFF |

| Message communication | | HR871 mounting slot | |
|---|---|---|---|
| | | Extension slot 1 | Extension slot 2 |
| Message communication command | (16word, W) | W0000 to W000F | W1000 to W100F |
| Message communication results | (16word, R) | W0010 to W001F | W1010 to W101F |
| Message communication data | (120word, R/W) | W0020 to W0097 | W1020 to W1097 |

**(Note)** Programming and monitor of the device B (or device W) are currently not supported with onboard. These are possible only with GPP until supported.

## 3.1 Assigning the Input Data

The input data arrangement follows the parameter settings.

### 3.1.1 Setting with SyCon2

The assignment of the input data for each station is indicated with SyCon2's "Customized I/O data" "I. Addr". This value follows the address mode set with another SyCon2 screen (Master Settings screen).

**(1) Byte addressing mode**

If the address mode is byte address, the devices and I. Addr correspond as shown below.

| Device | I. Addr |
|---|---|
| B0007-B0000 | 0 |
| B000F-B0008 | 1 |
| B0017-B0010 | 2 |
| B001F-B0018 | 3 |
| B0027-B0020 | 4 |
| B002F-B0028 | 5 |
| | |

**(2) Word addressing mode**

If the address mode is word address, the devices and I. Addr correspond as shown below.

| Device | I. Addr |
|---|---|
| B0007-B0000 | 0 |
| B000F-B0008 | |
| B0017-B0010 | 1 |
| B001F-B0018 | |
| B0027-B0020 | 2 |
| B002F-B0028 | |
| | |

### 3.1.2 Setting with the PLC Program

When the data is set with the PLC program, the settings are the same as the word addressing mode.
Note that the byte modules, word modules and double-word modules must be grouped per each slave station in the order as previously indicated.

**(Layout example)**

| Device | Module | | |
|---|---|---|---|
| B000F to B0000 | Byte module 2 | Byte module 1 | Input data for 1st station |
| B001F to B0010 | (Open due to alignment) | Byte module 3 | |
| B002F to B0020 | Word module 1 | | |
| B003F to B0030 | Word module 2 | | |
| B004F to B0040 | Double-word module 1 (low-order) | | |
| B005F to B0050 | Double-word module 1 (high-order) | | |
| B006F to B0060 | Byte module 2 | Byte module 1 | Input data for 2nd station |
| B007F to B0070 | Byte module 4 | Byte module 3 | |
| | | | |

## 3.2 Assigning the Output Data

The output data arrangement follows the parameter settings.

### 3.2.1 Setting with SyCon2

The assignment of the output data for each station is indicated with SyCon2's "Customized I/O data" "0. Addr". This value follows the address mode set with another SyCon2 screen (Master Settings screen).

**(1) Byte addressing mode**

If the address mode is byte address, the devices and O. Addr correspond as shown below.

| Device | O. Addr |
|---|---|
| B0807-B0800 | 0 |
| B080F-B0808 | 1 |
| B0817-B0810 | 2 |
| B081F-B0818 | 3 |
| B0827-B0820 | 4 |
| B082F-B0828 | 5 |
| | |

**(2) Word addressing mode**

If the address mode is word address, the devices and O. Addr correspond as shown below.

| Device | O. Addr |
|---|---|
| B0007-B0000 | 0 |
| B000F-B0008 | |
| B0017-B0010 | 1 |
| B001F-B0018 | |
| B0027-B0020 | 2 |
| B002F-B0028 | |
| | |

### 3.2.2 Setting with the PLC Program

When the data is set with the PLC program, the settings are the same as the word addressing mode.
Note that the byte modules, word modules and double-word modules must be grouped per each slave station in the order as previously indicated.

**(Layout example)**

| Device | Module | | |
|---|---|---|---|
| B080F to B0800 | Byte module 2 | Byte module 1 | Output data for 1st station |
| B081F to B0810 | (Open due to alignment) | Byte module 3 | |
| B082F to B0820 | Word module 1 | | |
| B083F to B0830 | Word module 2 | | |
| B084F to B0840 | Double-word module 1 (low-order) | | |
| B085F to B0850 | Double-word module 1 (high-order) | | |
| B086F to B0860 | Byte module 2 | Byte module 1 | Output data for 2nd station |
| B087F to B0870 | Byte module 4 | Byte module 3 | |
| | | | |

## 3.3 Message Communication

### 3.3.1 Message Communication Commands

The following information can be handled with Message Communication.

- Reading of error information for the slave in which error occurred
- Getting/Setting of the slave attribute data
- Resetting of objects

**(1) Reading the communication error information**

| Device No. | | Item | Details | |
|---|---|---|---|---|
| W0000 | W1000 | Command No. | 0001H | Communication error information read |
| W0001 | W1001 | Slave station No. (Slave MAC ID) | High-order byte | Not used (always 0) |
| | | | Low-order byte | Number of the slave station from which error information is read |

**(2) Getting the attribute data (Get Attribute)**

| Device No. | | Item | Details | |
|---|---|---|---|---|
| W0000 | W1000 | Command No. | 0101H | Attribute get |
| W0001 | W1001 | Slave station No./ class ID | High-order byte | Class ID of the object from which attribute are gotten |
| | | | Low-order byte | No. of the slave station (MAC ID) from which attributes are gotten |
| W0002 | W1002 | Instance ID | | Instance ID of the object from which attributes are gotten |
| W0003 | W1003 | Attribute ID | High-order byte | Not used (always 0) |
| | | | Low-order byte | Attribute ID of the object from which attributes are gotten |

**(3) Setting the attribute data (Set Attribute)**

| Device No. | | Item | Details | |
|---|---|---|---|---|
| W0000 | W1000 | Command No. | 0102H | Attribute set |
| W0001 | W1001 | Slave station No./ class ID | High-order byte | Class ID of the object to which attributes are set |
| | | | Low-order byte | No. of the slave station (MAC ID) to which attributes are set |
| W0002 | W1002 | Instance ID | | Instance ID of the object to which attributes are set |
| W0003 | W1003 | Attribute ID / Data length | High-order byte | Byte length of the attribute data to be set (1 to 240) |
| | | | Low-order byte | Attribute ID of the object to which attributes are set |

**(4) Resetting**

| Device No. | | Item | Details | |
|---|---|---|---|---|
| W0000 | W1000 | Command No. | 0201H | Reset |
| W0001 | W1001 | Slave station No./ class ID | High-order byte | Class ID of the object to be reset |
| | | | Low-order byte | Slave Station No. containing target object |
| W0002 | W1002 | Instance ID | | Instance ID of the object to be reset |

### 3.3.2 Message Communication Results

When the "message communication command" process results are set, "Message completion" signal (Y202/Y282) turns ON. The PLC program must confirm that "Message completion" signal is ON before reading the data.
Refer to section "7.2 Message communication execution error codes" for details on the execution error codes.

**(1) Reading the communication error information**

| Device No. | | Item | Details | |
|---|---|---|---|---|
| W0010 | W1010 | Command No. | 0001H | Communication error information read |
| W0011 | W1011 | Execution error code | 0000H | Normal end |
| | | | Other than 0000H | Error end (execution error code) |

**(2) Getting the attribute data (Get Attribute)**

| Device No. | | Item | Details | |
|---|---|---|---|---|
| W0010 | W1010 | Command No. | 0101H | Attribute get |
| W0011 | W1011 | Execution error code | 0000H | Normal end |
| | | | Other than 0000H | Error end (execution error code) |
| W0012 | W1012 | Slave station No./ class ID | High-order byte | Class ID of the object from which attributes were gotten |
| | | | Low-order byte | No. of the slave station (MAC ID) from which attributes were gotten |
| W0013 | W1013 | Instance ID | | Instance ID of the object from which attributes were gotten |
| W0014 | W1014 | Attribute ID/data length | High-order byte | Byte length of the gotten attribute data (1 to 240) |
| | | | Low-order byte | Attribute ID of the object from which attributes were gotten |

**(3) Setting the attribute data (Set Attribute)**

| Device No. | | Item | Details | |
|---|---|---|---|---|
| W0010 | W1010 | Command No. | 0102H | Attribute set |
| W0011 | W1011 | Execution error code | 0000H | Normal end |
| | | | Other than 0000H | Error end (execution error code) |
| W0012 | W1012 | Slave station No./ class ID | High-order byte | Class ID of the object to which attributes were set |
| | | | Low-order byte | No. of the slave station (MAC ID) to which attributes were set |
| W0013 | W1013 | Instance ID | | Instance ID of the object to which attributes were set |
| W0014 | W1014 | Attribute ID / Data length | High-order byte | Byte length of the set attribute data (1 to 240) |
| | | | Low-order byte | Attribute ID of the object to which attributes were set |

**(4) Resetting**

| Device No. | | Item | Details | |
|---|---|---|---|---|
| W0010 | W1010 | Command No. | 0201H | Reset |
| W0011 | W1011 | Execution error code | 0000H | Normal end |
| | | | Other than 0000H | Error end (execution error code) |
| W0012 | W1012 | Slave station No./ class ID | High-order byte | Class ID of the reset object |
| | | | Low-order byte | Slave Station No. containing the target object |
| W0013 | W1013 | Instance ID | | Instance ID of the reset object |

### 3.3.3 Message Communication Data

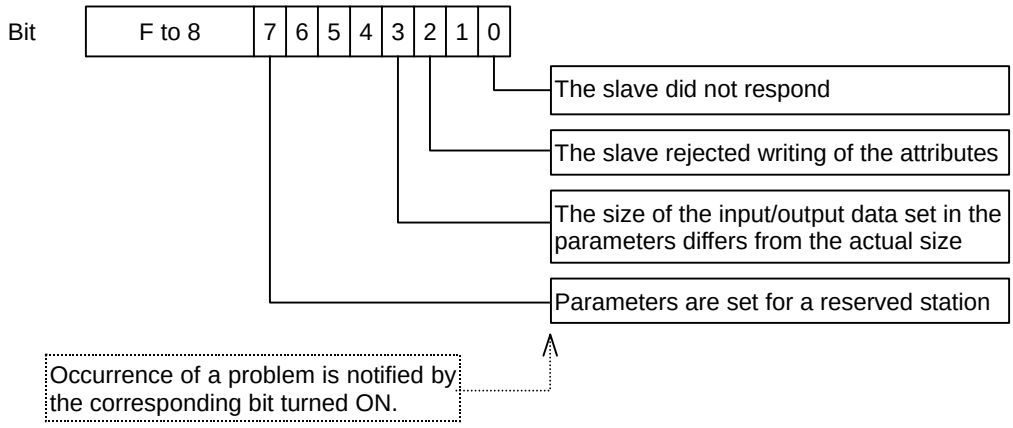
**(1) Reading the communication error information**

| Device No. | | Item | Details |
|---|---|---|---|
| W0020 | W1020 | Slave status | Indicates whether the slave is set in the parameters, and whether the slave responded or not. Refer to the explanation (a) below. |
| W0021 | W1021 | (Not used) | |
| W0022 | W1022 | Communication error | The error code is stored.<br>Refer to section "7.1 Communication error codes" for details on the error codes. |
| W0023 | W1023 | General error codes | General error codes sent from the slave station. This is valid only when the communication error code is 35 (0023H). The general meanings stipulated with DeviceNet are shown in (b) below. Refer to the manual for each slave for details on the actual trouble and countermeasures. |
| W0024 | W1024 | Additional error code | Additional error codes sent from the slave station. Refer to the manual for the slave for the meaning of each error code. |
| W0025 | W1025 | No. of heartbeat timeouts | No. of times the slave station was asked whether it was down. A higher value indicates that the network state is poor. |

**(Note)** Refer to each slave station manual for details on the general error codes and additional error codes.

(a) Slave status

Problems in the slave station are notified by the ON/OFF state of each bit.



(b) General DeviceNet error codes

| Error code | | Name | Meaning |
|---|---|---|---|
| Hexa-decimal | Decimal | | |
| 0000 | 0 | – | This is reserved by DeviceNet. |
| 0001 | 1 | – | This is reserved by DeviceNet. |
| 0002 | 2 | Resource unavailable | The requested service could not be executed because the required resources were not found. |
| 0003 to 0007 | 3 to 7 | – | This is reserved by DeviceNet. |
| 0008 | 8 | Service not supported | The requested service is not supported, or is not defined with this object class/instance. |
| 0009 | 9 | Invalid attribute value | The attribute data is incorrect. |
| 000A | 10 | – | This is reserved by DeviceNet. |
| 000B | 11 | Already in requested mode/state | The object is already in the mode/status requested by the server. |
| 000C | 12 | Object settable | The object cannot execute the requested service in the current mode/status. |
| 000D | 13 | – | This is reserved by DeviceNet. |
| 000E | 14 | Attribute not settable | Attributes that cannot be changed were changed. |
| 000F | 15 | Prevelege violation | Access rights are not available. |
| 0010 | 16 | Device state conflict | The requested service cannot be executed in the current device state. |
| 0011 | 17 | Reply data too large | The response data length is longer than the buffer. |
| 0012 | 18 | – | This is reserved by DeviceNet. |
| 0013 | 19 | Not enough data | Enough data to execute the designated operation has not been provided. |
| 0014 | 20 | Attribute not supported | The designated attribute is not supported. |
| 0015 | 21 | Too much data | Invalid data was found. |
| 0016 | 22 | Object does not exist | The designated object does not exist in the slave. |
| 0017 | 23 | – | This is reserved by DeviceNet. |
| 0018 | 24 | No stored attribute data | The designated object's attribute data was not saved before the service was requested. |
| 0019 | 25 | Store operation failure | The attribute data could not be saved because a problem occurred during the save process. |
| 001A to 001E | 26 to 30 | – | This is reserved by DeviceNet. |
| 001F | 31 | Vender specific error | A vender specific error occurred. The details are shown in the additional error code area (W0024/W1024). Refer to the slave station manual for details on the vender specific error. |
| 0020 | 32 | Invalid parameter | The parameters for the requested service are incorrect. |
| 0021 to 0027 | 33 to 39 | Future extensions | This is reserved by DeviceNet. |
| 0028 | 40 | Invalid Member ID | The requested member ID designated a class, instance or attribute that is not mounted. |
| 0029 | 41 | Member not settable | The requested setting service designated a write disabled member. |
| 002A to 00CF | 42 to 204 | – | This is reserved by DeviceNet. |
| 00D0 to 00FF | 207 to 225 | Reserved for Object Class and service errors | An object class specific error was indicated. The details may be displayed in the additional error code area (W0024/S1024). Refer to the slave station manual for details. |

**(2) Getting the attribute data (Get Attribute)**

The gotten attribute data is stored as a byte string.

**(3) Setting the attribute data (Set Attribute)**

Set the attribute data to be set as a byte string.

**(4) Reset**

There is no message communication data.

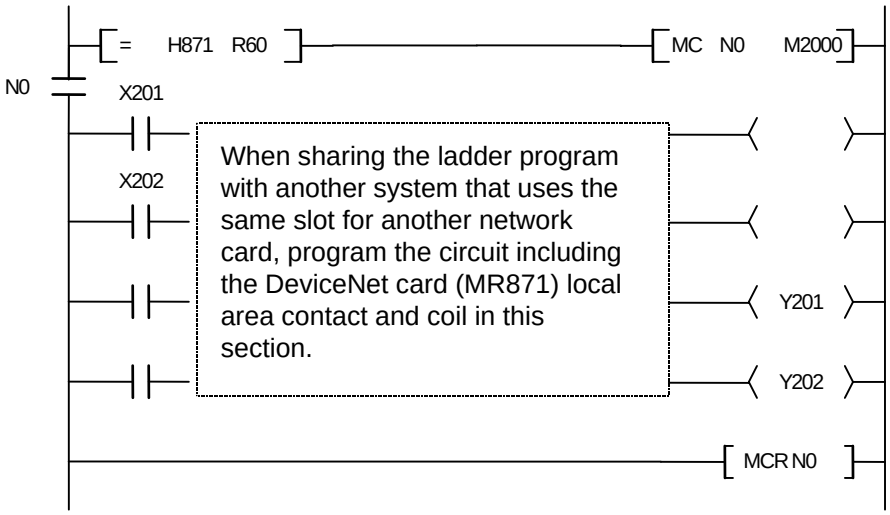
# 4. Interface with Communication Card (HR871)

The interface assignments for the communication card and main system are shown below. The assignment will change according to the interface card mounted in this area.

| Slot's local information | | | HR871 mounting slot | |
|---|---|---|---|---|
| | | | Extension slot 1 | Extension slot 2 |
| Bit data | HR871 → Main | (256 points) | X200 to X27F | X280 to X2FF |
| | Main → HR871 | (256 points) | Y200 to Y27F | Y280 to Y2FF |
| Word data | | (10 words) | R60 to R69 | R70 to R79 |

**(Note)** This interface assignment differs according to the communication card to be used. Thus, when using the PLC program with another interface card, each mounted communication card must be identified.

**(Example of circuit creation)**



## 4.1 Outline of Interface Signals

**Bit data (HR871 → Main)**

| Slot 1 | Slot 2 | Details | Slot 1 | Slot 2 | Details |
|---|---|---|---|---|---|
| X200 | X280 | (Not used) | X208 | X288 | (Not used) |
| X201 | X281 | Refreshing | X209 | X289 | (Not used) |
| X202 | X282 | Message communication completion | X20A | X28A | (Not used) |
| X203 | X283 | Error set | X20B | X28B | (Not used) |
| X204 | X284 | Slave down | X20C | X28C | (Not used) |
| X205 | X285 | Message communication error | X20D | X28D | (Not used) |
| X206 | X286 | Setting parameters | X20E | X28E | (Not used) |
| X207 | X287 | Parameter setting completion | X20F | X28F | System ready |

**Bit data (Main → HR871)**

| Slot 1 | Slot 2 | Details | Slot 1 | Slot 2 | Details |
|---|---|---|---|---|---|
| Y200 | Y280 | (Not used) | Y208 | Y288 | (Not used) |
| Y201 | Y281 | Refresh request | Y209 | Y289 | (Not used) |
| Y202 | Y282 | Message communication request | Y20A | Y28A | (Not used) |
| Y203 | Y283 | Error reset request | Y20B | Y28B | (Not used) |
| Y204 | Y284 | (Not used) | Y20C | Y28C | (Not used) |
| Y205 | Y285 | (Not used) | Y20D | Y28D | (Not used) |
| Y206 | Y286 | (Not used) | Y20E | Y28E | (Not used) |
| Y207 | Y287 | Parameter set request | Y20F | Y28F | (Not used) |

**Word data**

| Slot 1 | Slot 2 | Details | Slot 1 | Slot 2 | Details |
|---|---|---|---|---|---|
| R60 | R70 | Mounted card information (0871H) | R65 | R75 | No. of set parameters |
| R61 | R71 | Master communication status | R66 | R76 | Down station detection prohibit setting |
| R62 | R72 | Error information | R67 | R77 | |
| R63 | R73 | (Not used) | R68 | R78 | |
| R64 | R74 | Parameter set Head register No. | R69 | R79 | |

## 4.2 Details of Interface Signals

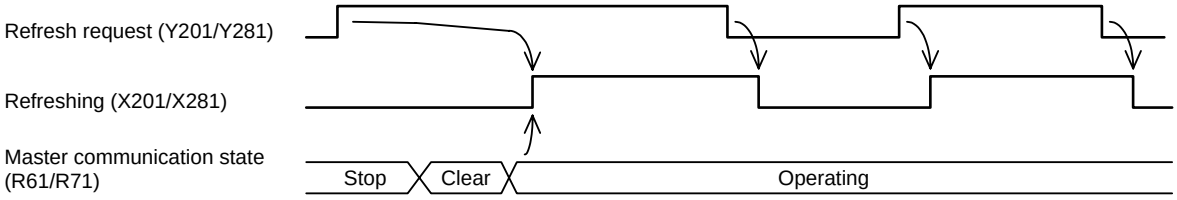
### 4.2.1 Refresh Request, Refreshing

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Refresh request | | | Y201 | Y281 | |

This signal turns ON when the details of device B are refreshed on the network.
Refreshing starts when the master communication state is "operating". Refreshing will not start if the communication status is "stop" or "clear".
Turn this signal OFF to stop refreshing. 0 (or OFF) will be sent forcibly to the network when refreshing stops.

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Refreshing | | | X201 | X281 | |

This signal turns ON when refreshing has started followed by "Refresh request" signal (Y201/Y281) turned ON, and the master communication status being "operating".
This signal turns OFF when refreshing stops.




### 4.2.2 Message Communication Request, Message Communication Completion, Message Communication Error

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Message communication request | | | Y202 | Y282 | |

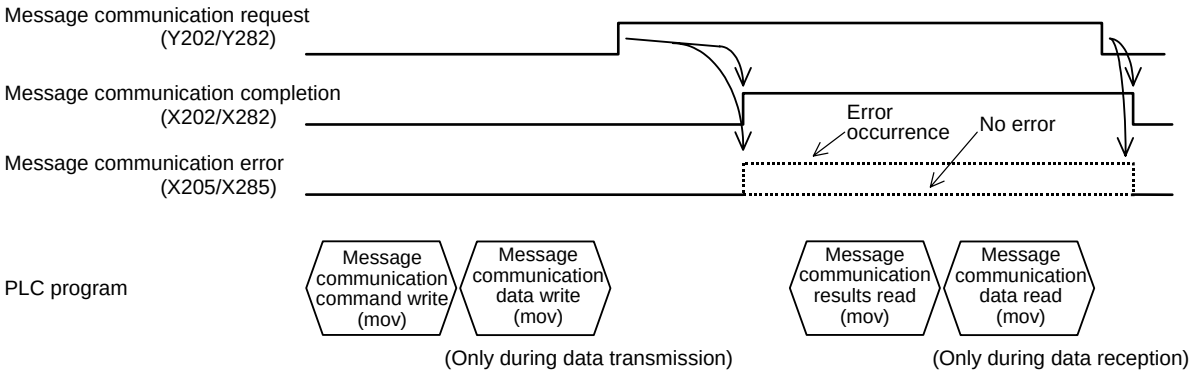
This signal turns ON during message communication.
The signal turns ON after the data (command) is set in the message communication area.
This signal turns OFF after the message communication results are received. "Message communication completion" signal (or "Message communication error" signal) turns OFF when this signal turns OFF.

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Message communication completion | | | X202 | X282 | |

This signal turns ON when the message communication for "Message communication request" signal (Y202/Y282) has ended, and the results have been written into the message communication area.
If an error occurs during the message communication, "Message communication error" signal will also turn ON.
When the message communication request signal turns OFF, this signal will also turn OFF.

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Message communication error | | | X205 | X285 | |

This signal turns ON if an error occurs during message communication.
When "Message communication request" signal turns OFF, this signal will also turn OFF.



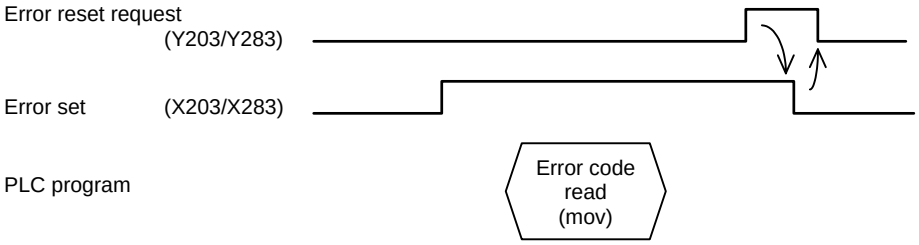

### 4.2.3 Error Reset Request, Error Set

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Error reset request | | | Y203 | Y283 | |

"Error set" signal and error code reset are executed when this signal is issued.

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Error set | | | X203 | X283 | |

This signal turns ON when an error occurs and the error code is set in the file register's error information area.
This signal automatically turns OFF when the cause of the error is eliminated.



### 4.2.4 Slave Down

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Slave down | | | X204 | X284 | |

This signal turns ON if there is a slave with inactive communication status.
The signal will turn OFF when the slave with inactive communication status is recovered.
The communication status of each slave station is indicated with "each station communication status (from SD56/from SD88)".
To disable the slave down detection for any slave, designate the slave with the "down station detection prohibit setting (from R66/from R76)".

### 4.2.5 Parameter Set Request, Setting Parameters, Parameter Setting Completion

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Parameter set request | | | Y207 | Y287 | |

Use this signal to set the parameters with the PLC program.
This signal turns ON after the data is prepared in the parameter send area.
The data is written into the EEPROM when this signal turns ON. The data (set with SyCon2) in the flash ROM is cleared at this time.
"Refreshing" signal (X201/X281) must be OFF to set the parameters.

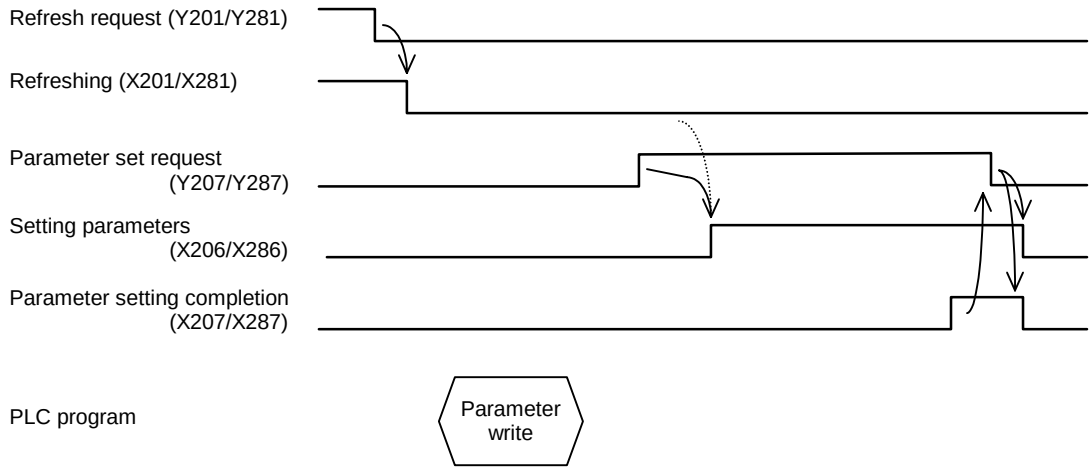
**(Note)** If this signal turns ON when "Refreshing" signal (X201/X281) is ON, it will be ignored. In this case, confirm that "Refreshing" signal (X201/X281) is OFF, and then turn this signal ON again.

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Setting parameters | | | X206 | X286 | |

When "Parameter set request" signal is received and the parameter analysis is completed, the parameter write process will start. This signal turns ON during the parameter write process.
Communication is stopped during the parameter write process.

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Parameter setting completion | | | X207 | X287 | |

This signal turns ON when the parameter write process is completed.




### 4.2.6 System Ready

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | System ready | | | X20F | X28F | |

This signal turns ON when initialization of the module for DeviceNet communication has been completed, and data can be received.
This signal must be ON as a condition for the program related to DeviceNet.

## 4.3 Details of Word Data

### 4.3.1 Mounted Card Information

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Mounted card information | | | R60 | R70 | |

Information on the card mounted in the expansion slot is set in this signal.
When using the DeviceNet master station card (HR871), 0871 (hexadecimal) is set.

This is used in the PLC program to determine that the DeviceNet master station card (HR871) is mounted.

**(Note)** The card information may not be set depending on the mounted card.

### 4.3.2 Master Communication Status

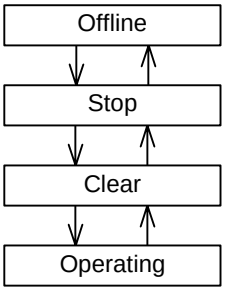
| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Master communication status | | | R61 | R71 | |

**[High-order byte]**

The I/O communication status is indicated. The status values are as follow.
Use this information to confirm that the communication status is "operating" before starting message communication.

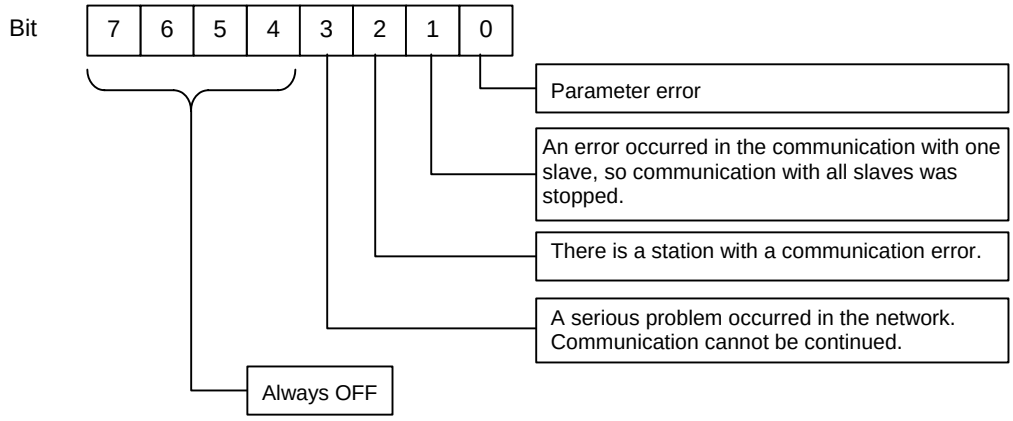
| Value | Name | Operation |
|---|---|---|
| 00H | Offline | Initializing |
| 40H | Stop | I/O communication stopped |
| 80H | Clear | Resetting each slave's output data by transmitting 0 data |
| C0H | Operating | In I/O communication |

Each communication status shifts in the following order.



**[Low-order byte]**

Problems in the master are notified with the ON/OFF state of each bit.




### 4.3.3 Error Information

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Error information | | | R62 | R72 | |

This signal indicates information on the problem, such as a parameter error, which occurred during unit initialization or communication.
When a valid error is set in the register, "Error set" signal (X203/X283) turns ON.
Even if the error information is eliminated, and "Error set" signal is automatically turned OFF, the error information is held. "Error reset request" signal (Y203/Y283) must be turned ON to clear the error information.

**[High-order byte]**

The error code is indicated. (Refer to section "7.1 Communication error code" for details.)

**[Low-order byte]**

Station No. (MAC ID) of the station in which problem was detected

| Data | Details | Related NC error |
|---|---|---|
| FF | Local station (type 1) | L10 |
| FE | Local station (type 2) | L11 |
| 0 to 3F (63) | Station No. (MAC ID) of the station in which problem was detected | L12 |

### 4.3.4 Parameter Set Head Register No.

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Parameter set head register No. | | | R64 | R74 | |

When setting the configuration parameters with the PLC program, set the head No. of the file register (random) in which the data is stored. For example, if the parameters are set from R4000, set "4000".
This data must be set before "Parameter set request" signal is turned ON.

### 4.3.5 No. of Set Parameters

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | No. of set parameters | | | R65 | R75 | |

When setting the configuration parameters with the PLC program, set the number of file registers (random) in which the data is stored. For example, if the parameters are set from R4000 to R4019, set "20".
This data must be set before "Parameter set request" signal is turned ON.

### 4.3.6 Down Station Detection Prohibit Setting

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Down station detection prohibit setting | | | R66 to R69 | R76 to R79 | |

Set whether to reflect the down information for each slave station onto "Slave down" signal (X204/X284).

- When corresponding bit is ON : "Slave down" signal does not turn ON even if the station is down.
- When corresponding bit is OFF : "Slave down" signal turns ON when the station is down.

If the slave station is set as a reserved station with the configuration, set the corresponding bit ON.
If the bit is not ON, the reserved station will be recognized as a down station, and "Slave down" signal (X204/X284) will turn ON.

| Slave station corresponding to each bit | | | | | |
|---|---|---|---|---|---|
| **Slot 1/Slot 2** | **Bit 15** | **Bit 14** | **•••** | **Bit 1** | **Bit 0** |
| R66/R76 | 15 | 14 | ••• | 1 | 0 |
| R67/R77 | 31 | 30 | ••• | 17 | 16 |
| R68/R78 | 47 | 46 | ••• | 33 | 32 |
| R69/R79 | 63 | 62 | ••• | 49 | 48 |

# 5. Diagnosis Information

The diagnosis information is indicated in the special register SD.
The details of the diagnosis information are held even when the power is turned OFF.

| Slot 1 | Slot 2 | Details | Slot 1 | Slot 2 | Details |
|---|---|---|---|---|---|
| SD48 | SD80 | Master communication status | SD56 | SD88 | Each station's communication status |
| SD49 | SD81 | Error information | SD57 | SD89 | |
| SD50 | SD82 | Bus error counter | SD58 | SD90 | |
| SD51 | SD83 | Bus OFF counter | SD59 | SD91 | |
| SD52 | SD84 | Each station's configuration status | SD60 | SD92 | Each station's trouble status |
| SD53 | SD85 | | SD61 | SD93 | |
| SD54 | SD86 | | SD62 | SD94 | |
| SD55 | SD87 | | SD63 | SD95 | |

| Slot 1 | Slot 2 | Details | Slot 1 | Slot 2 | Details |
|---|---|---|---|---|---|
| SD64 | SD96 | (Not used) | SD72 | SD104 | Communication PCB version information (ASCII) |
| SD65 | SD97 | (Not used) | SD73 | SD105 | |
| SD66 | SD98 | (Not used) | SD74 | SD106 | |
| SD67 | SD99 | (Not used) | SD75 | SD107 | |
| SD68 | SD100 | (Not used) | SD76 | SD108 | |
| SD69 | SD101 | (Not used) | SD77 | SD109 | |
| SD70 | SD102 | (Not used) | SD78 | SD110 | |
| SD71 | SD103 | (Not used) | SD79 | SD111 | |

## 5.1 Details of Diagnosis Information

### 5.1.1 Master Communication Status

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Master communication status | | | SD48 | SD80 | |

Refer to section "4.3.2 Master communication status".

### 5.1.2 Error Information

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Error information | | | SD49 | SD81 | |

Refer to section "4.3.3 Error information".
The R62/R72 error information is cleared with "Error reset request" signal (Y203/Y283), but the details of this register are held.

### 5.1.3 Bus Error Counter

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Bus error counter | | | SD50 | SD82 | |

The number of times the illegal frame counter for the communication chip (CAN chip) exceeded the limit value (96) is indicated.

### 5.1.4 Bus OFF Counter

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Bus OFF counter | | | SD51 | SD83 | |

The number of times that bus OFF (communication error) was detected is indicated.

### 5.1.5 Each Station's Configuration Status

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Each station's configuration status | | | SD52 to SD55 | SD84 to SD87 | |

The status of each slave station's configuration (communication parameter settings) is indicated.

- When corresponding bit is ON : Parameters for that station are set.
- When corresponding bit is OFF : Parameters for that station are not set.

| | Slave station corresponding to each bit | | | | |
|---|---|---|---|---|---|
| Slot 1/Slot 2 | Bit 15 | Bit 14 | ••• | Bit 1 | Bit 0 |
| SD52/SD84 | 15 | 14 | ••• | 1 | 0 |
| SD53/SD85 | 31 | 30 | ••• | 17 | 16 |
| SD54/SD86 | 47 | 46 | ••• | 33 | 32 |
| SD55/SD87 | 63 | 62 | ••• | 49 | 48 |

### 5.1.6 Each Station's Communication Status

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Each station's communication status | | | SD56 to SD59 | SD88 to SD91 | |

The I/O communication status of each slave station is indicated.

- When corresponding bit is ON : I/O communication with that station is taking place normally.
- When corresponding bit is OFF : I/O communication with that station is not taking place normally.

| Slave station corresponding to each bit | | | | | |
|---|---|---|---|---|---|
| **Slot 1/Slot 2** | **Bit 15** | **Bit 14** | **•••** | **Bit 1** | **Bit 0** |
| SD56/SD88 | 15 | 14 | ••• | 1 | 0 |
| SD57/SD89 | 31 | 30 | ••• | 17 | 16 |
| SD58/SD90 | 47 | 46 | ••• | 33 | 32 |
| SD59/SD91 | 63 | 62 | ••• | 49 | 48 |

### 5.1.7 Each Station's Trouble Status

| B contact | Signal name | Abbre-viation | PC | Slot 1 | Slot 2 | Applicable type |
|---|---|---|---|---|---|---|
| – | Each station's trouble status | | | SD60 to SD63 | SD92 to SD95 | |

The status of any communication trouble occurring during communication with each slave station are indicated.

- When corresponding bit is ON : Communication trouble information found.
- When corresponding bit is OFF : Communication trouble information not found.

The communication error information for the corresponding slave station must be read out with the message communication function in order to turn the corresponding bit OFF.

| Slave station corresponding to each bit | | | | | |
|---|---|---|---|---|---|
| **Slot 1/Slot 2** | **Bit 15** | **Bit 14** | **•••** | **Bit 1** | **Bit 0** |
| SD60/SD92 | 15 | 14 | ••• | 1 | 0 |
| SD61/SD93 | 31 | 30 | ••• | 17 | 16 |
| SD62/SD94 | 47 | 46 | ••• | 33 | 32 |
| SD63/SD95 | 63 | 62 | ••• | 49 | 48 |

# 6. Setting the Communication Parameters

## 6.1 Setting the Parameters with Configurator

Configuration using SyCon2 is carried out in the following manner.

(1) Setting the configuration
(2) Setting the master station parameters
(3) Setting the bus parameters
(4) Setting the slave station parameters

Refer to the SyCon2 manual for details on using SyCon2.

### 6.1.1 Setting the Configuration

Write the configuration of the network to be configured into the file.
Select the master station and slave station device name from the list. If the applicable device is not listed, the EDS file for that device must be read in. The EDS file can be downloaded from the ODVA website.
http://web.kyoto-inet.or.jp/org/odva-j/

### 6.1.2 Setting the Master Station Parameters

Set the following items on the Master Settings screen.

(1) Startup behavior after system initialization
Always select "Controlled release of the communication by the application program".
(2) User program monitoring
For Watchdog time, set the time (ms unit) to monitor whether the carrier PCB OS is running properly.
For C64, set a value of 56ms or higher.
(3) Addressing mode
Set whether to assign the I/O data with a byte unit or word unit.
(Refer to section "3. Communication data".)
(4) Storage format (word module)
Always select "Little Endian".
(5) Handshake of the process data
Always select "Buffered, device controlled".
(6) Hardware parameter
Always select "8 kB dual-port memory".

### 6.1.3 Setting the Bus Parameters

Set the following items on the Bus Parameter screen

(1) Baudrate
Set the baud rate.
(2) MAC ID Master
C64 station No. (MAC ID)
(3) Heartbeat timeout
Set the interval to recognize the slave existence. (ms)
(4) Auto Clear mode on
Select this to turn the output from all stations OFF when there is a communication error in any station.

### 6.1.4 Setting the Slave Station Parameters

Set the following items on the Device Configuration screen.

(1) MAC ID
Set the slave station No.
(2) Description
Set the slave name.
(3) Activate device in actual configuration
Set whether the station actually communicates, or if it is a reserved station.
Checking this item will activate the station.
(4) Actual chosen IO connection
Select the I/O data communication methods.
(5) UCMM Check
This system is a Group 2 only system, so this cannot be selected.
(6) Fragmented Timeout
Designate the time to wait for confirming the reception from the slave when carrying out split transmission/reception of messages.
(7) Expected packet rate
Set the expected packet rate. (Refer to section "8. Details on expected packet rate and production inhibit time".)
(8) Production inhibit time
Set the production inhibit time. (Refer to section "8. Details on expected packet rate and production inhibit time".)
(9) Watchdog timeout action
Set the action taken at watchdog timeout.

| | Details |
|---|---|
| Timeout | Timeout : The connection times out.<br>The communication is manually halted, and is not recovered until manually restarted. |
| Auto delete | Auto delete : The connection is automatically deleted.<br>The communication is halted, and automatically restarted. The output is cleared to 0 once. |
| Auto reset | Auto reset : Communication continues while holding the connection. |

(10) Configured I/O connection data and its offset address
Designate the I/O module configuration. Designate the method for assigning the input/output data for that I/O module with I.Addr and O.Addr.

## 6.2 Setting the Parameters with the PLC Program

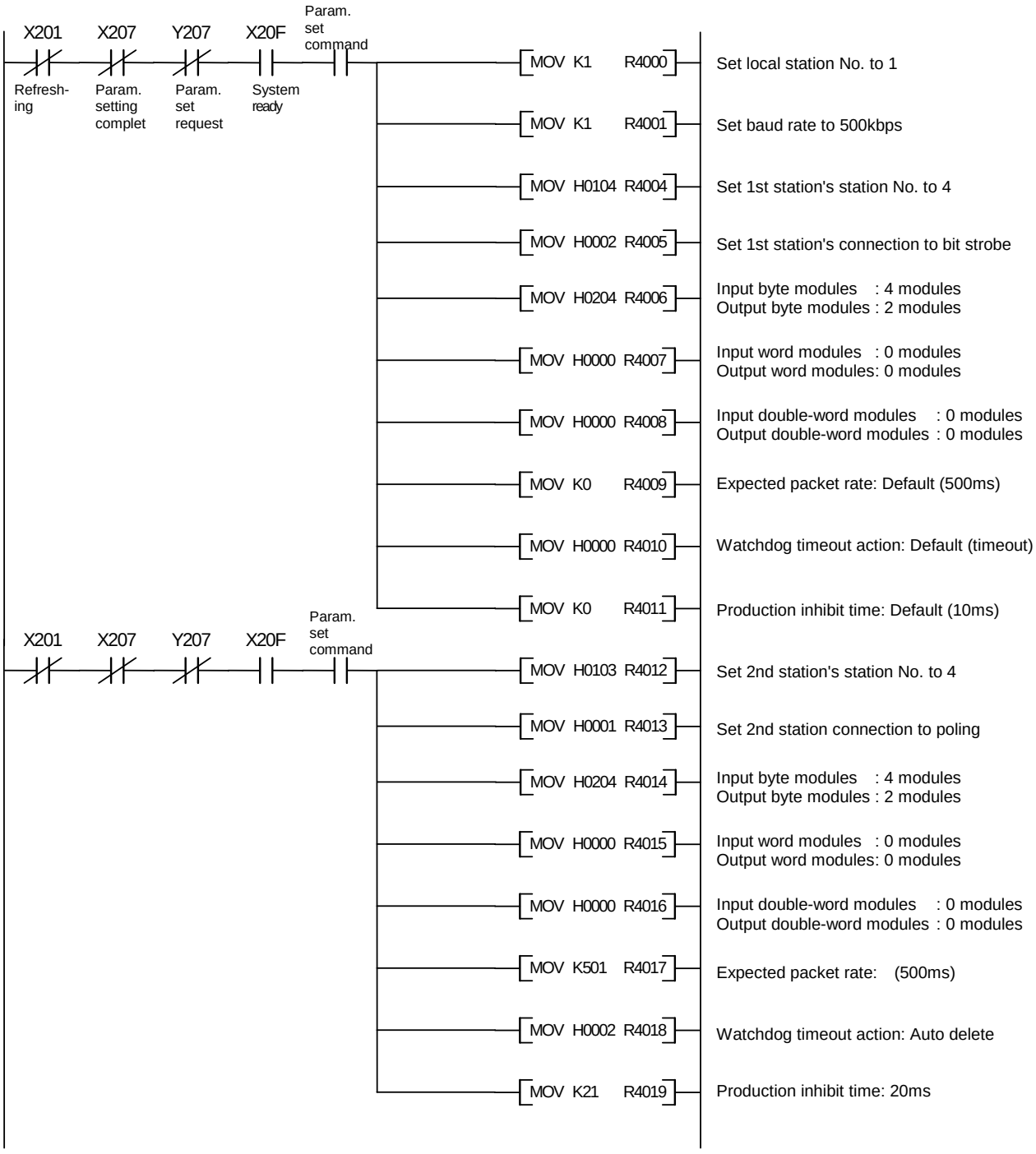
To set the communication parameters with the PLC program, set the data in a random file register (R register).
The set file register's head No. and number (offset) are set in R64 (R74) and R65 (R75) respectively.
The setting item "1st station" and "2nd station" are not the station No. (MAC ID). If three slave stations are connected, set the data in the parameter areas for the 1st station to the 3rd station.

| Offset | Item | Details |
|---|---|---|
| 0 | Local station No.<br>(Local station MAC ID) | C64 (master) station No. 0000H to 003FH (0 to 63) If FFFFH is set and the parameters are set, the EEPROM data will be invalidated. |
| 1 | Baud rate | Select the baud rate.<br>1 : 500Kbps, 2 : 250Kbps, 3 : 125Kbps |
| 2 | (Reserved for future use) | Fixed to 0 |
| 3 | (Reserved for future use) | Fixed to 0 |
| 4 | 1st station's slave station No. | Low-order byte : Station No. (MAC ID) for 1st station's slave 0 to 63<br>High-order byte: 1st station's slave type<br>01H : Actual communicating station<br>80H : Reserved station |
| 5 | 1st station's slave connection type | Select the I/O communication connection type.<br>0001H: Poling<br>0002H: Bit strobe<br>0004H: Change of state<br>0008H: Cyclic |
| 6 | No. of byte module points for 1st station's slave | Low-order byte : No. of input byte modules<br>High-order byte: No. of output byte modules<br>(The bit module is calculated as 8 points equaling to 1 byte module.) |
| 7 | No. of word module points for 1st station's slave | Low-order byte : No. of input word modules<br>High-order byte: No. of output word modules |
| 8 | No. of double-word module points for 1st station's slave | Low-order byte : No. of input double-word modules<br>High-order byte: No. of output double-word modules |
| 9 | Expected packet rate for 1st station (EXPECTED PACKETRATE) | Set the expected packet rate for the 1st station's slave. **(Note)**<br>0000H : 500ms (default value)<br>Other than 0000H : Watchdog timer value ... Setting value -1 (ms) |
| 10 | Watchdog timeout action for 1st station (WATCHDOG TIMEOUT ACTION) | Select the action taken when a watchdog timeout occurs in the slave.<br>0000H : (Default value) Same as following timeout.<br>0001H : Timeout... The connection times out. The communication is manually halted, and is not recovered until manually restarted.<br>0002H : Auto delete ... The connection is automatically deleted. The communication is halted, and automatically restarted. The output is cleared to 0 once.<br>0003H : Auto reset ... Communication continues while holding the connection. The output is not cleared to 0. |
| 11 | Production inhibit time for 1st station's slave (PRODUCTION INHIBIT TIME) | Set the production inhibit time for the 1st station's slave. **(Note)**<br>0000H : 10ms (default value)<br>Other than 0000H : Production inhibit time ... Setting value -1 (ms) |
| 12 to 19 | Settings for 2nd station's slave | |
| 20 to 27 | Settings for 3rd station's slave | |
| : | : | |
| 500 to 507 | Settings for 63rd station's slave | |

**(Note)** Refer to section "8. Details on expected packet rate and production inhibit time" for details on the expected packet rate and production inhibit time.

### 6.2.1 Example of Circuit Creation

An example of creating the circuit when connecting two slave stations is shown below.
Since the parameters are written into the EEPROM, they are saved even when the power is turned OFF.
Once the program is executed, it does not need to be executed again.

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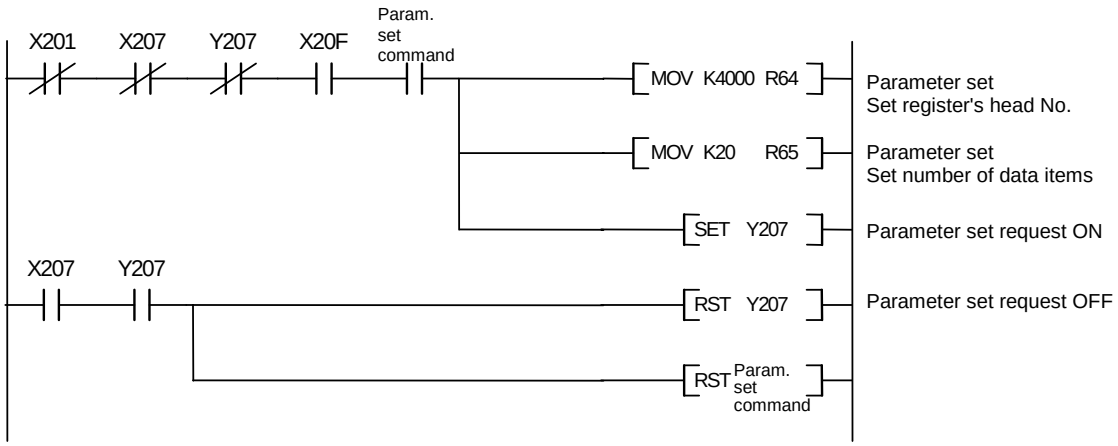
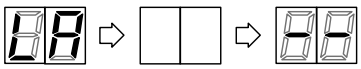
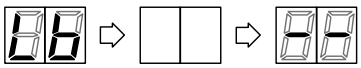


# 7. Error Displays

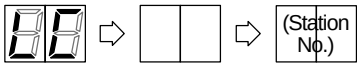
## 7.1 Communication Error Codes

| Display | | Error detected when initializing DeviceNet unit (Type 1: Configuring with SyCon2) |
|---|---|---|
| Screen | L10 DN initialization error 1 | |
| 7-segment |  | |

| Error No. | | Details | Countermeasures |
|---|---|---|---|
| 0035 |  | The baud rate setting is not within the valid range. | • Correctly set the baud rate. |
| 0036 |  | The local station No. (MAC ID) value is not within the valid range. | • Set the local station No. between 0 and 63. |
| 0039 |  | There are two or more stations with the same station No. (MAC ID) in the network. | • Set the station numbers so that they are not duplicated. |
| 00D2 |  | The parameters are not set in the communication PCB's flash ROM. | • This is not particularly a problem when using the EEPROM parameters. |

| Display | | Error detected when initializing DeviceNet unit (Type 2: Configuring with PLC program) |
|---|---|---|
| Screen | L11 DN initialization error 2 | |
| 7-segment |  | |

| Error No. | | Details | Countermeasures |
|---|---|---|---|
| 0001 |  | The local station No. (MAC ID) value is not within the range. | • Set the local station No. within 0000H to 003FH, or to FFFFH. |
| 0002 |  | The baud rate is not within the valid range. | • Set a value between 1 and 3. |
| 0003 |  | The slave station No.'s low-order byte is not within the valid range. | • Set a value between 0 and 63. |
| 0004 |  | The slave station No.'s high-order byte is not within the valid range. | • Set 01H or 80H. |
| 0005 |  | The connection type is not within the valid range. | • Set 0001H, 0002H, 0004H or 0008H. |
| 0006 |  | A slave station with the same station No. as the local station No. is already set. | • Set the slave station numbers so that they are not duplicated within all stations. |
| 0007 |  | No slave station is set. | • Set at least one slave station. |
| 0008 |  | The total input data length for all slave stations is too long. | • The total length must be 256 bytes or less for all slave stations. |
| 0009 |  | The total output data length for all slave stations is too long. | • The total length must be 256 bytes or less for all slave stations. |
| 000A |  | The parameter watchdog timeout action value is illegal. | • Set 0000H, 0001H, 0002H or 0003H. |
| 000B |  | The expected packet rate value is smaller than the production inhibit time value. | • Set so that the expected packet rate value is greater than or equal to the production inhibit time value. |
| 000C |  | EEPROM check sum error | • Write the parameters again.<br>• Do not turn the power OFF or reset the system while writing the parameters. |

| Display | | Error detected during DeviceNet communication process |
|---|---|---|
| Screen | L12 DN link error □□□□ □□<br>Error No.<br>Error detected station No. | |
| 7-segment |   | |

| Error No. | | Details | Countermeasures |
|---|---|---|---|
| 0001 |  | Network trouble was detected after communication started. | • Check that the cable is connected correctly. |
| 001E |  | The slave did not respond. | • Comprehensively check the state of the network and slave, and check that the MAC ID and baud rate are correct, that the slave is not down, and that the terminator is not disconnected, etc. |
| 0020 |  | The slave responded with an unspecified error. | • Read the communication error information, read the error information, and take appropriate measures for that error. |
| 0023 |  | The slave responded with an error when establishing the connection. | • Read the communication error information, read the error information, and take appropriate measures for that error. |
| 0024 |  | The parameter input data size and actual slave size do not match. | • Check the slave manual and set the correct input data size. |
| 0025 |  | The parameter output data size and actual slave size do not match. | • Check the slave manual and set the correct output data size. |
| 0026 |  | Response data for a function not supported by the HR871 card was received. | • Check the slave manual, and set so that functions not supported by HR871 are not sent.<br>• Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |
| 0027 |  | The connection is already in the designated mode. | • Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |
| 0028 |  | Unpredicted illegal data was received when establishing the connection. | • Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |
| 0029 |  | A connection is already established with that slave. | • Observe the state for a while, and if the connection cannot be established, reset the slave. |
| 002A |  | The poling response data length differs from the data length read from the slave when the connection was established. | • Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |
| 002B |  | When receiving a split poling response, the first split data was received twice. | • Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |
| 002C |  | When receiving a split poling response, the received split data No. differed from the one available. | • Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |
| 002D |  | When receiving a split poling response, the middle data or final data was received before receiving the first split data. | • Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |

| Error No. | | Details | Countermeasures |
|---|---|---|---|
| 003B |  | The same station No. (MAC ID) was detected two or more times in the parameters. | • There are two or more slaves with the same station No. in the parameters. Correct the station numbers.<br>• A slave with the same station No. as the local station No. was found in the parameters. |
| 0045 |  | O.Addr in the parameters exceeds 255. | • Set O.Addr to 255 or less. |
| 0046 |  | I.Addr in the parameters exceeds 255. | • Set I.Addr to 255 or less. |
| 0047 |  | An illegal connection type was designated. | • Confirm that the connection type value is correct. |
| 0049 |  | The expected packet rate value is smaller than the production inhibit time value. | • Set the expected packet rate value higher than the production inhibit time value. |

## 7.2 Message Communication Execution Error Codes

| Display | | | Error detected while executing message communication |
|---|---|---|---|
| Screen | L13 DN message communication error □□□□<br>Error No. | | |
| 7-segment |  | | |
| Error No. | | Details | Countermeasures |
| 0002 |  | The resources required for executing the required service could not be used. | • Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 0008 |  | The requested service is not mounted or is not defined for this object class or instance. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 0009 |  | Invalid attribute data was detected. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 000B |  | The object is already in the mode or state requested by the service. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Check the current status using attribute get.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 000C |  | The object cannot execute the requested service in the current mode or state. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Check the current status using attribute get.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 000E |  | A request to change a change prohibited attribute was received. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 000F |  | The enable/special rights check failed. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 0010 |  | The requested service cannot be executed in the current device state. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 0011 |  | The slave did not respond. | • Comprehensively check the state of the network and slave, and check that the slave is not down, and that the terminator is not disconnected, etc. |

| Error No. | | Details | Countermeasures |
|---|---|---|---|
| 0013 |  | Sufficient data to execute the designated operation has not been provided. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• When executing attribute set, check that the designated data is not insufficient, and that the data length is correct.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 0014 |  | The designated attributes are not supported. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 0015 |  | The service provided with an unexpected volume of data. | • The data returned by the slave must be 240 bytes or less. |
| 0016 |  | The designated object does not exist in the slave. | • Check that the designated MAC ID, class ID, instance ID and attribute ID are correct.<br>• Referring to the slave manual, check the conditions for the slave to notify this error, and remedy accordingly. |
| 0032 |  | The response data format is illegal. | • Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |
| 0037 |  | The designated slave station No. is not within 0 to 63. | • Designate a value between 0 and 63. |
| 0039 |  | The split response order is illegal. | • Comprehensively check the state of the network and slave, and confirm that the terminator is not disconnected, etc. |
| 00C8 |  | The parameters are not set for the designated slave. | • Designate a slave with which the parameters have been set. |
| 0101 |  | The set data length exceeds 241. | • The data length must be 240 or less. |
| 0102 |  | An illegal value was set for the command No. in the message communication command area. | • Set 0001H, 0101H, 0102H or 0201H for the command No. |

# 8. Details on Expected Packet Rate and Production Inhibit Time

| | Expected packet rate | Production inhibit time |
|---|---|---|
| Poling | (1) The communication watchdog timer value for the slave is set. If communication is cut off at the set time, the slave will carry out the action designated with the watchdog timeout action. | (1) Slave's minimum transmission cycle = Set the minimum time in which the slave can prepare the send data. The master sends the poling request to the slave at this time cycle. |
| | (2) If the expected packet rate setting value is ≠ 1, meaning if the expected packet rate ≠ 0ms, then the expected packet rate ≥ the production inhibit time must be observed. | |
| | (3) If 1 is set, meaning if the expected packet rate is 0ms, the watchdog timer monitor function is invalid. | (3) The production inhibit time ≥ 3ms, or in other words, the setting value ≥ 4 must be observed.. |
| Bit strobe | (1) The communication watchdog timer value for the slave is set. If the communication between the master and slave is cut off at the set time, the slave will carry out the action designated with the watchdog timeout action. | (1) Slave's minimum transmission cycle = Set the minimum time in which the slave can prepare the send data. The master sends the poling request to the slave at this time cycle. |
| | (2) If the expected packet rate setting value is ≠ 1, meaning if the expected packet rate ≠ 0ms, then the expected packet rate ≥ the production inhibit time must be observed. | |
| | (3) If 1 is set, meaning if the expected packet rate is 0ms, the watchdog timer monitor function is invalid. | (3) The production inhibit time ≥ 3ms, or in other words, the setting value ≥ 4 must be observed. |
| | | (4) This value must be the same for all bit strobe connections. |
| Change of state | (1) 1 must always be set. In other words, the expected packet rate must be set to 0ms. | (1) 1 must always be set. In other words, the production inhibit time must be set to 0ms. |
| Cyclic | (1) Designate the cycle to send the data from the slave to the master. | (1) Designate the cycle to send the data from the master to the slave. |
| | (2) If the expected packet rate setting value is ≠ 1, meaning if the expected packet rate ≠ 0ms, then the expected packet rate ≥ the production inhibit time must be observed. | |
| | (3) The expected packet rate ≥ 3ms, or in other words, the setting value ≥ 4 must be observed. | (3) The production inhibit time ≥ 3ms, or in other words, the setting value ≥ 4 must be observed. |

# III. CC-Link Master/Local Unit

# 1. Outline

The MELDAS C6/C64 can be directly connected to the network as a MELSEC CC-Link master/local station. The CC-Link master/local unit (HR865) must be mounted in the expansion slot to use this connection. Up to two communication units can be mounted.

# 2. Performance Specifications

| Item | CC-Link master/local unit (HR865) |
|---|---|
| Transmission speed | 156kbps; 625kbps; 2.5Mbps; 5Mbps; 10Mbps selective |
| Maximum transmission distance | 1200m; 600m; 200m; 150m/110m; 100m/80m/50m depending on the transmission speed selected above |
| Maximum number of connected units | 64 units<br>Note that the following conditions must be satisfied:<br>$\{(1 \times a) + (2 \times b) + (3 \times c) + (4 \times d)\} \leq 64$<br>a : Number of units that occupies 1 station<br>b : Number of units that occupies 2 stations<br>c : Number of units that occupies 3 stations<br>d : Number of units that occupies 4 stations<br><br>$\{(16 \times A) + (54 \times B) + (88 \times C)\} \leq 2304$<br>A : Number of remote I/O stations (not more than 64 units)<br>B : Number of remote device stations (not more than 42 units)<br>C : Number of local stations, standby master stations and intelligent device stations (not more than 26 units) |
| Number of occupied stations (Number of local stations) | 1 to 4 stations (change with DIP switch) |
| Maximum number of link points per system **(Note 1)** | Remote input/output (RX, RY): 2048 points each for input/output<br>Remote register (RWw): 256 points (master station → remote/local station)<br>Remote register (RWr) : 256 points (remote/local station → master station) |
| Number of link points per remote station/local station | Remote input/output (RX, RY): 32 points (30 points for local station)<br>Remote register (RWw): 4 points (master station → remote/local station)<br>Remote register (Rwr) : 4 points (remote/local station → master station) |
| Communication method | Poling method |
| Synchronization method | Frame synchronization method |
| Coding method | NRZI method |
| Transmission path format | Bus (RS-485) |
| Transmission format | HDLC complaint |
| Error control method | CRC ($X^{16} + X^{12} + X^5 + 1$) |
| Connection cable | Twisted pair cable with shield |
| RAS function | • Automatic online return function<br>• Slave station cutoff function<br>• Error detection with link special relay/register |
| Number of occupied input/ output points | 32 points |

**(Note 1)** When the CC-Link master station is mounted on the C64, the maximum number of remote input/output points may drop slightly depending on the number of device points that can be secured on the C64 side.

# 3. Usable Functions

The following CC-Link functions can be used with the MELDAS C6/C64.

| Function item | | | MELSEC | MELDAS C6/C64 |
|---|---|---|---|---|
| Method | Ver.1 | | ○ | ○ |
| | Ver.2 | | ○ | × |
| Master functions | Communication with remote I/O station | | ○ | ○ |
| | Communication with remote device station | | ○ | ○ |
| | Communication with local station | | ○ | ○ |
| | Communication with mixed system | | ○ | ○ |
| | Reserved station function | | ○ | ○ |
| | Error invalid station function | | ○ | ○ |
| | Data link status setting at master station CPU error | | ○ | ○ |
| | Parameter registration in EEPROM | | ○ | ○ |
| | Input data status setting from data link error station | | ○ | ○ |
| | Unit reset by sequence program | | ○ | ○ |
| | Data link stop/restart | | ○ | ○ |
| | Parameter registration function | | ○ | ○ |
| | Automatic refresh function | | ○ | ○ |
| | Scan synchronization function | Synchronous mode | ○ | ○ |
| | | Asynchronous mode | ○ | ○ |
| | Local station | | ○ | ○ |
| Setting and display functions | LED diagnosis function | | 16-point display (A1SJ61QBT11) | 16-point display |
| | Station No. setting | | Switches on the front of unit | Setting switch on card |
| | Baud rate setting | | | |
| | Mode setting switch | | | Switch on the front of card |
| | Condition setting | | | |
| RAS function | Automatic online return function | | ○ | ○ |
| | Slave station cutoff function | | ○ | ○ |
| | Data link status confirmation (SB/SW) | | ○ | ○ Automatic refresh-ing to SB/SW |
| | Offline test | | ○ | ○ |
| | Online test | | ○ | ○ |
| | Monitor diagnosis | | ○ | × |
| | Standby master function | | ○ | ○ |
| | Temporary error invalid station designation function | | ○ | ○ |
| Dedicated commands | READ command, SREAD command | | ○ | ○ |
| | WRITE command, SWRITE command | | ○ | ○ |
| | RIRD command, RIWT command **(Note 1)** | | ○ | ○ |

**(Note 1)** Transient execution using this command is applicable only to the software Version D and above.

# 4. Input/output Signals

The input/output signal device numbers used to control the CC-Link card mounted in the C64 expansion slot with the built-in PLC are determined according to the slot in which the card is inserted.

| Slot | Input device number | Output device number |
|---|---|---|
| EXT1 (bottom) | X200 to X21F | Y200 to Y21F |
| EXT2 (top) | X280 to X29F | Y280 to Y29F |

| Signal direction: Built-in PLC ← master/local card | | | | Signal direction: Built-in PLC → master/local card | | | |
|---|---|---|---|---|---|---|---|
| Input No. | Signal name | Usability | | Output No. | Signal name | Usability | |
| | | Master station | Local station | | | Master station | Local station |
| X2n0 | Unit error | ○ | ○ | Y2n0 | Refresh command | ○ | ○ |
| X2n1 | Data link status at host station | ○ | ○ | Y2n1 | (Prohibited to use) | – | – |
| X2n2 | Parameter setting status | ○ | × | Y2n2 | | | |
| X2n3 | Data link status at other stations | ○ | ○ | Y2n3 | | | |
| X2n4 | Unit reset acceptance complete | ○ | ○ | Y2n4 | Unit reset request | ○ | ○ |
| X2n5 | (Prohibited to use) | – | – | Y2n5 | (Prohibited to use) | – | – |
| X2n6 | Data link startup normal completion | ○ | × | Y2n6 | Data link startup request | ○ | × |
| X2n7 | Data link startup error completion | ○ | × | Y2n7 | (Prohibited to use) | – | – |
| X2n8 | Data link startup by EEPROM parameter normal completion | × | × | Y2n8 | Data link startup request from the EEPROM parameters | × | × |
| X2n9 | Data link startup by EEPROM parameter error completion | × | × | Y2n9 | (Prohibited to use) | – | – |
| X2nA | Parameter registration to EEPROM normal completion | × | × | Y2nA | Parameter registration request to EEPROM | × | × |
| X2nB | Parameter registration to EEPROM error completion | × | × | Y2nB | (Prohibited to use) | – | – |
| X2nC | (Prohibited to use) | – | – | Y2nC | | | |
| X2nD | | | | Y2nD | | | |
| X2nE | | | | Y2nE | | | |
| X2nF | Unit ready | ○ | ○ | Y2nF | | | |

| Signal direction: Built-in PLC ← master/local card | | | | Signal direction: Built-in PLC → master/local card | | | |
|---|---|---|---|---|---|---|---|
| Input No. | Signal name | Usability | | Output No. | Signal name | Usability | |
| | | Master station | Local station | | | Master station | Local station |
| X2 (n+1) 0 | (Prohibited to use) | – | – | Y2 (n+1) 0 | (Prohibited to use) | – | – |
| X2 (n+1) 1 | | | | Y2 (n+1) 1 | | | |
| X2 (n+1) 2 | | | | Y2 (n+1) 2 | | | |
| X2 (n+1) 3 | | | | Y2 (n+1) 3 | | | |
| X2 (n+1) 4 | | | | Y2 (n+1) 4 | | | |
| X2 (n+1) 5 | | | | Y2 (n+1) 5 | | | |
| X2 (n+1) 6 | | | | Y2 (n+1) 6 | | | |
| X2 (n+1) 7 | | | | Y2 (n+1) 7 | | | |
| X2 (n+1) 8 | | | | Y2 (n+1) 8 | | | |
| X2 (n+1) 9 | | | | Y2 (n+1) 9 | | | |
| X2 (n+1) A | | | | Y2 (n+1) A | | | |
| X2 (n+1) B | | | | Y2 (n+1) B | | | |
| X2 (n+1) C | | | | Y2 (n+1) C | | | |
| X2 (n+1) D | | | | Y2 (n+1) D | | | |
| X2 (n+1) E | | | | Y2 (n+1) E | | | |
| X2 (n+1) F | | | | Y2 (n+1) F | | | |

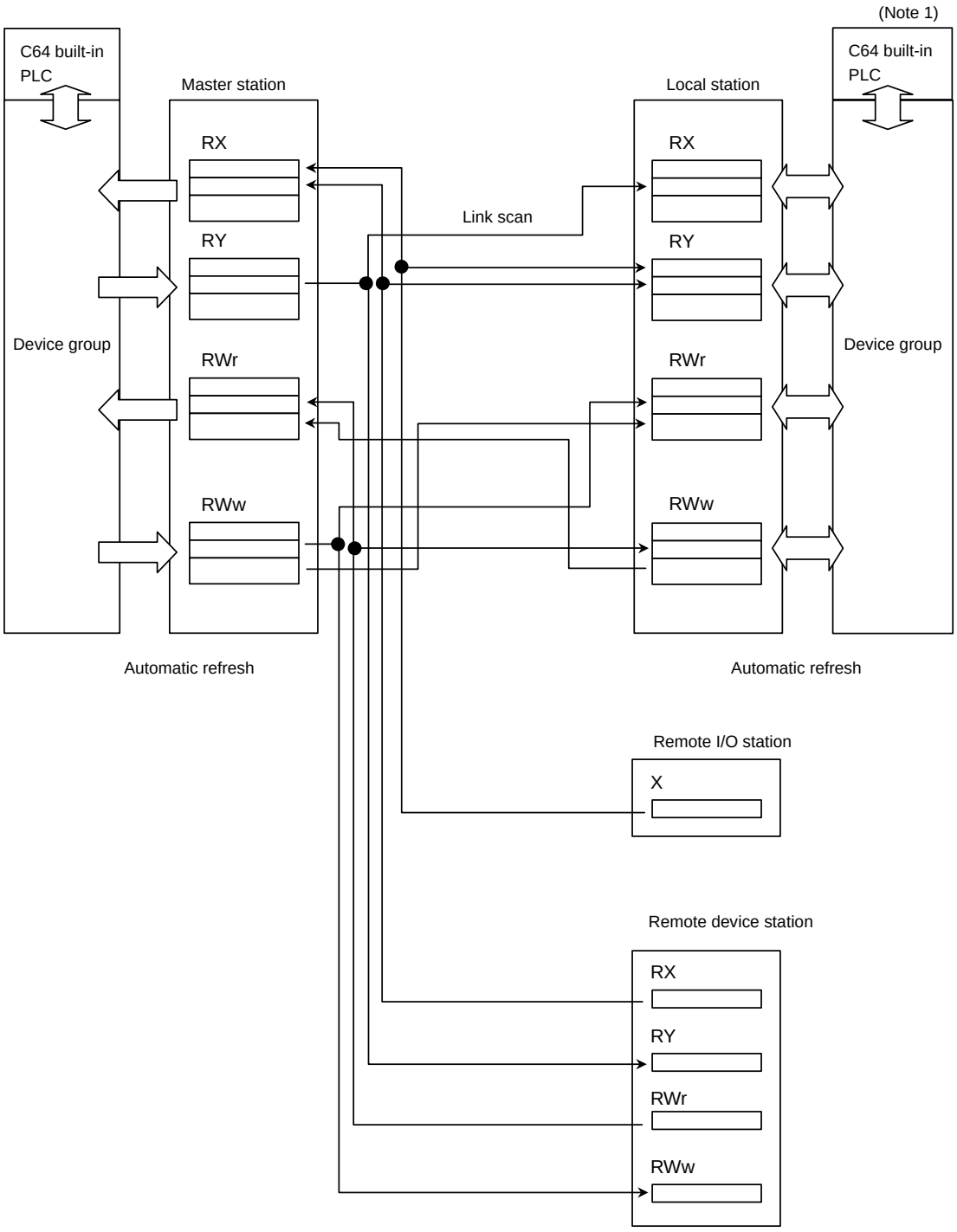
○: Usable ×: Not usable

**(Note 1)** n is either 0 or 8 according to the slot.

**(Note 2)** Refer to the MELSEC "CC-Link System Master/Local Unit User's Manual" for details on the input/output signals.
Normally only "Refresh command (Y2n0)" signal and "Data link start (Y2n6)" signal with the buffer memory parameters are turned ON.

# 5. Flow of Communication Data

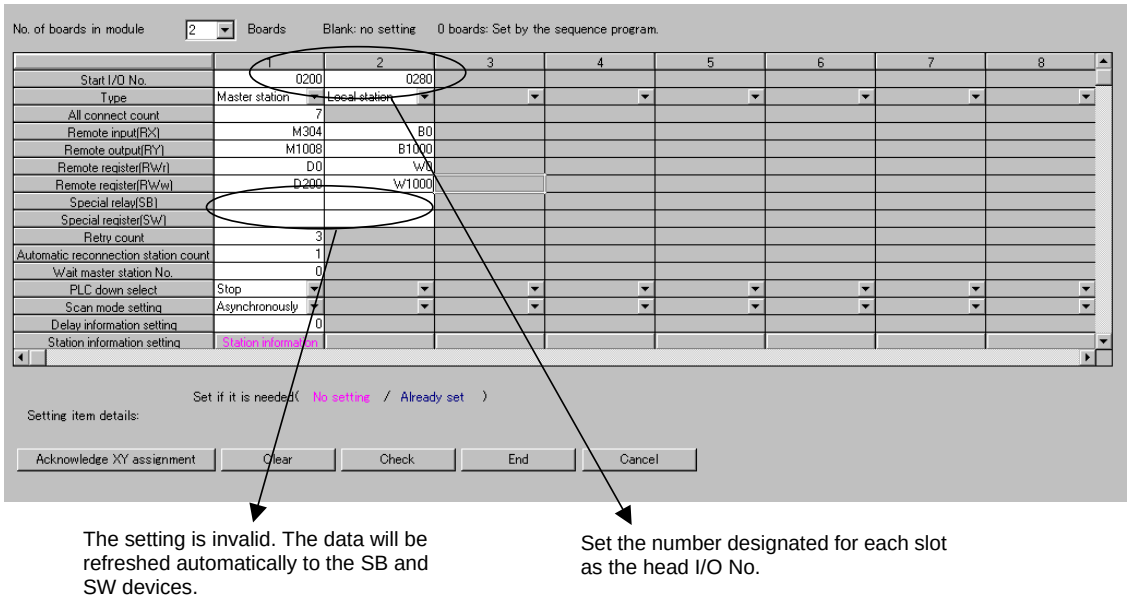
The flow of data communicated with the CC-Link scan is as shown below.




**(Note 1)** Both master stations and local stations can be used by using the MELSEC CPU.

## 5.1 Automatic Refresh

Data is automatically sent between the CC-Link card and the NC built-in PLC device. The transmission size and the transmission destination device are set with the parameters using the MELSEC peripheral device. An example for setting this with the GX Developer is given below.
The parameters cannot be set with the PLC program, and the system cannot be started with the EEPROM parameters.
When setting the parameters, the network parameters must also be set for the master station.




The setting is invalid. The data will be refreshed automatically to the SB and SW devices.

Set the number designated for each slot as the head I/O No.

The devices that can be set as the transmission destination for automatic refresh are as follow.

| Device name | Device range | RX, RY | RWr, RWw |
|---|---|---|---|
| X | X0 to X1FF (Must not be duplicated with actual I/O) | Only RX | × |
| Y | Y0 to Y1FF (Must not be duplicated with actual I/O) | Only RY | × |
| M | M0 to M8191 | ○ | ○ |
| L | L0 to L255 | ○ | ○ |
| B | B0 to B1FFF | ○ | ○ |
| D | D0 to D8191 **(Note 1)** | ○ | ○ |
| R | R4000 to R4499, R6400 to R7199 | ○ | ○ |
| W | W0 to W1FFF | ○ | ○ |

**(Note 1)** D0 to D8191 can be used in the software version D0 and above.

SB and SW are automatically refreshed to the internal devices SB and SW. The setting is invalid.

| Slot | SB refresh range | | SW refresh range | |
|---|---|---|---|---|
| | Output (C64 → CC-Link) | Input (CC-Link → C64) | Output (C64 → CC-Link) | Input (CC-Link → C64) |
| EXT1 | SB0000 to SB002F | SB0030 to SB00FF | SW0000 to SW003F | SW0040 to SW00FF |
| EXT2 | SB0100 to SB012F | SB0130 to SB01FF | SW0100 to SW013F | SW0140 to SW01FF |

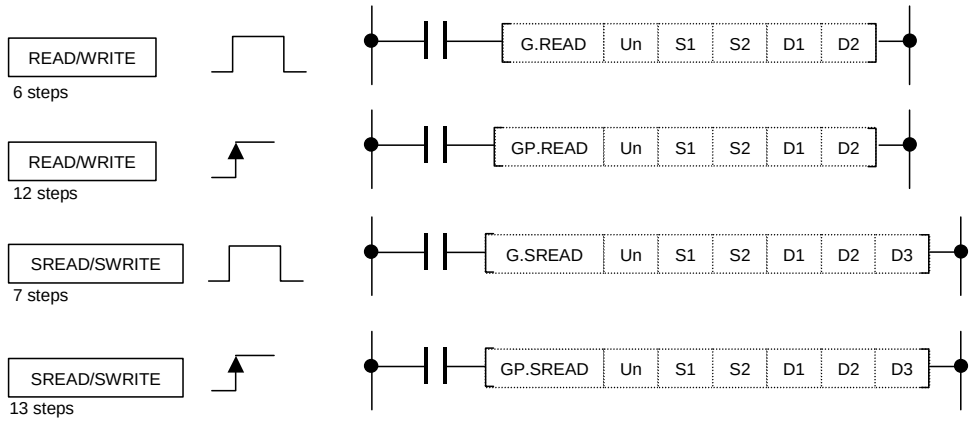
# 6. Transient Function

## 6.1 Outline

The transient function does not constantly send data. Instead, the data is written and read to and from arbitrary stations when necessary. The client station must be compatible with the transient function.
The C6/C64 is compatible with the READ(SREAD)/WRITE(SWRITE) and RIRD/RIWT commands.

## 6.2 Transient Command (READ/SREAD/WRITE/SWRITE) Format

| | Usable devices | | | | | | | | | | | | | | | | | | | | Index | Digit designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit device | | | | | | | | | Word device | | | | | | | | Constant | | Pointer | | |
| | X | Y | M | L | F | B | SB | T | SM | T | C | D | R | W | SW | Z | SD | K | H | P | | |
| S1 | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | |
| S2 | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | |
| D1 | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | |
| D2 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | | | | | | | | | |
| D3 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | | | | | | | | | |




**(Note)** The station targeted for this command is either QnCPU, QnACPU or MELDAS's master/local station.

**<Setting data>**

READ/SREAD

| Setting data | Details |
|---|---|
| Un | Local station head input/output No. |
| S1 | Head device of local station storing the control data |
| S2 | Head device of target station storing the data to be read |
| D1 | Head device of local station where the read data is to be stored |
| D2 | Local station device that turns 1 scan ON at completion of command |
| D3 | Target station device that turns 1 scan ON at completion of command |

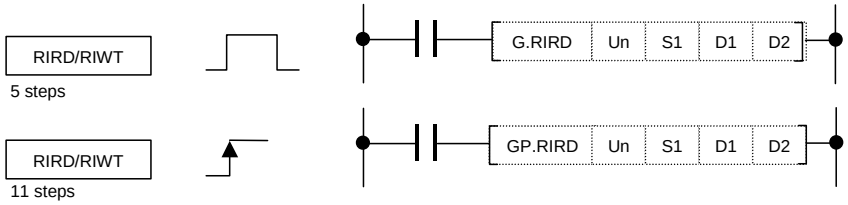
WRITE/SWRITE

| Setting data | Details |
|---|---|
| Un | Local station head input/output No. |
| S1 | Head device of local station storing the control data |
| S2 | Head device of local station storing the data to be written |
| D1 | Head device of target station where the written data is to be stored |
| D2 | Local station device that turns 1 scan ON at completion of command |
| D3 | Target station device that turns 1 scan ON at completion of command |

**(Note)** Designate the Un value as U20 for the EXT1 card, and as U28 for the EXT2 card.

## 6.3 Transient Command (RIRD/RIWT) Format

| | Usable devices | | | | | | | | | | | | | | | | | | | | Index | Digit designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit device | | | | | | | | | Word device | | | | | | | | Constant | | Pointer | | |
| | X | Y | M | L | F | B | SB | T | SM | T | C | D | R | W | SW | Z | SD | K | H | P | | |
| S | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | |
| D1 | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | |
| D2 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | | | | | | | | | |




**(Note)** The station targeted for this command is either the QnCPU, QnACPU, ACPU or MELDAS's master/local station.

**<Setting data>**

RIRD command

| Setting data | Details |
|---|---|
| Un | Local station head input/output No. |
| S1 | Head device of local station storing the control data |
| D1 | Head No. of device storing read data |
| D2 | Device that turns 1 scan ON at completion of read.<br>(D2)+1 device also turns ON at error completion. |

RIWT command

| Setting data | Details |
|---|---|
| Un | Local station head input/output No. |
| S1 | Head device of local station storing the control data |
| D1 | Head No. of device storing write data |
| D2 | Device that turns 1 scan ON at completion of write.<br>(D2)+1 device also turns ON at error completion. |

**(Note)** Designate the Un value as U20 for the EXT1 card, and as U28 for the EXT2 card.

## 6.4 Precautions

(1) If the target station is MELDAS, only the device memory can be designated in the access code. The buffer memory in the CC-Link unit cannot be designated.

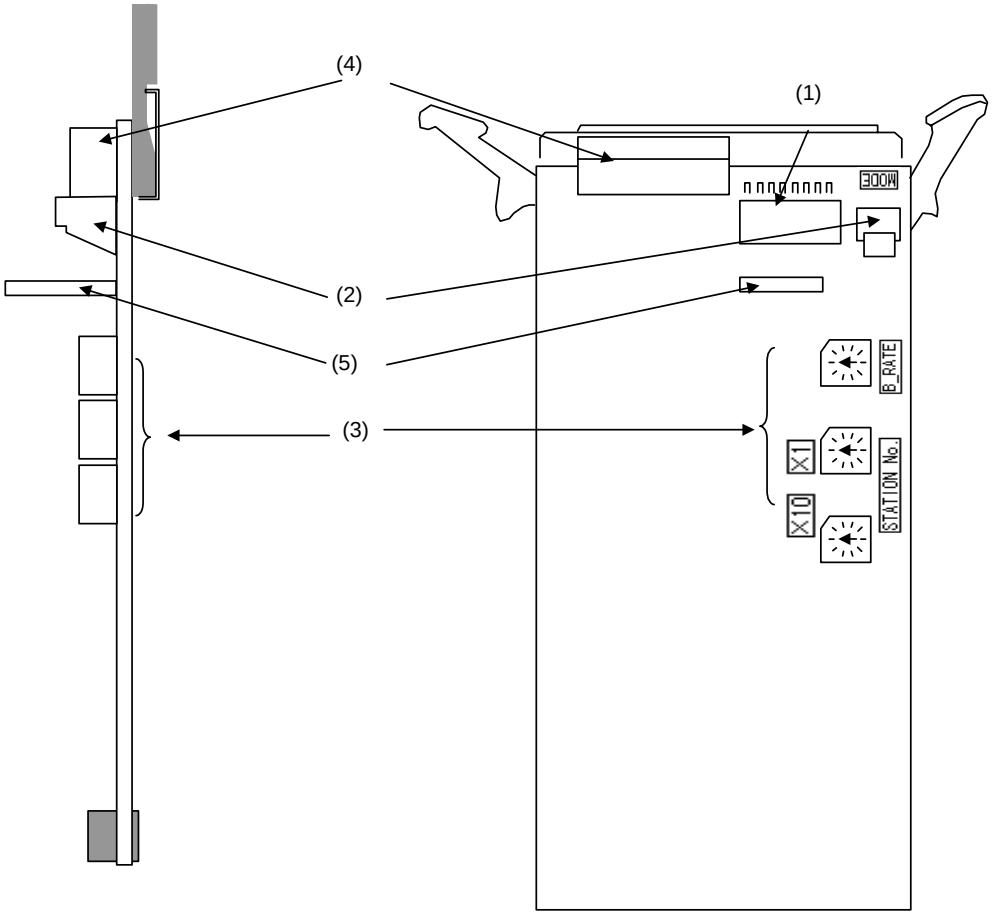
(2) This command is usable only with the FCU6-HR865 unit card version B and above. A timeout error will occur with earlier card versions.

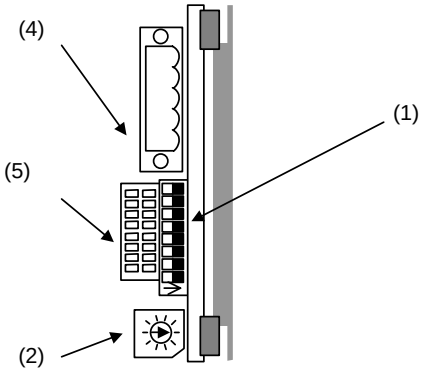
# 7. Names and Settings of Each CC-Link Card Section

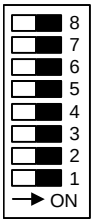
The names and settings of each section on the HR865 are explained in this section.

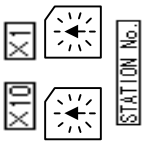
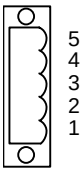
**<Unit drawing>**

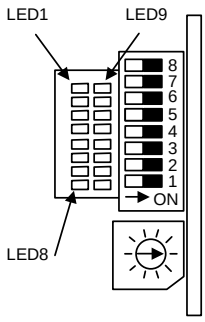
HR865 CC-Link system




<table>
<tr><th>No.</th><th>Name</th><th colspan="8">Description</th></tr>
<tr><td>(1)</td><td>Condition setting switch<br>  <br></td><td colspan="8">This switch sets the operation conditions.</td></tr>
<tr><td rowspan="12"></td><td rowspan="12"></td><td rowspan="2">No.</td><td rowspan="2">Setting details</td><td colspan="3">Switch status</td><td colspan="2">Setting validity</td></tr>
<tr><td colspan="2">OFF</td><td>ON</td><td>Master station (Standby master station)</td><td>Local station (Standby master station)</td></tr>
<tr><td>SW1</td><td>Station type</td><td colspan="2">Master station/local station</td><td>Standby master station</td><td>(Valid)</td><td>(Valid)</td></tr>
<tr><td>SW2</td><td>(Not used)</td><td colspan="3">Always OFF</td><td>–</td><td>–</td></tr>
<tr><td>SW3</td><td>(Not used)</td><td colspan="3">Always OFF</td><td>–</td><td>–</td></tr>
<tr><td>SW4</td><td>Data link error station input data status</td><td colspan="2">Clear</td><td>Hold</td><td>Valid</td><td>Valid</td></tr>
<tr><td rowspan="5">SW5<br>SW6</td><td rowspan="5">Number of occupied stations</td><td>No. of occupied stations</td><td>SW5</td><td>SW6</td><td rowspan="5">Invalid</td><td rowspan="5">Valid</td></tr>
<tr><td>1 station</td><td>OFF</td><td>OFF</td></tr>
<tr><td>2 stations</td><td>OFF</td><td>ON</td></tr>
<tr><td>3 stations</td><td>ON</td><td>ON</td></tr>
<tr><td>4 stations</td><td>ON</td><td>OFF</td></tr>
<tr><td>SW7</td><td>(Not used)</td><td colspan="3">Always OFF</td><td>–</td><td>–</td></tr>
<tr><td>SW8</td><td>(Not used)</td><td colspan="3">Always OFF</td><td>–</td><td>–</td></tr>
<tr><td>(2)</td><td>Mode switch<br>  <br></td><td colspan="8">This switch sets the unit operation status.</td></tr>
<tr><td rowspan="17"></td><td rowspan="17"></td><td rowspan="2">No.</td><td rowspan="2">Name</td><td rowspan="2">Details</td><td colspan="2">Settability</td></tr>
<tr><td>Master station</td><td>Local station</td></tr>
<tr><td>0</td><td rowspan="2">Online</td><td>Automatic online return provided when data link is enabled</td><td>Yes</td><td>Yes</td></tr>
<tr><td>1</td><td>Link with remote I/O net mode</td><td>Yes</td><td>No</td></tr>
<tr><td>2</td><td>Offline</td><td>Data link offline state</td><td>Yes</td><td>Yes</td></tr>
<tr><td>3</td><td>Line test 1</td><td>Line test 1 in offline state</td><td>Yes</td><td>No</td></tr>
<tr><td>4</td><td>Line test 2</td><td>Line test 2 in offline state</td><td>Yes</td><td>No</td></tr>
<tr><td>5</td><td>Parameter confirmation test</td><td>Checks the parameter details</td><td>Yes</td><td>No</td></tr>
<tr><td>6</td><td>Hardware test</td><td>Test of isolated HR865 card</td><td>Yes</td><td>Yes</td></tr>
<tr><td>7</td><td>(Not usable)</td><td>Used internally; cannot be set.</td><td>–</td><td>–</td></tr>
<tr><td>8</td><td>(Not usable)</td><td>Used internally; cannot be set.</td><td>–</td><td>–</td></tr>
<tr><td>9</td><td>(Not usable)</td><td>Used internally; cannot be set.</td><td>–</td><td>–</td></tr>
<tr><td>A</td><td>(Not usable)</td><td>Setting error ("SW" LED lights)</td><td>–</td><td>–</td></tr>
<tr><td>B</td><td>(Not usable)</td><td>Setting error ("SW" LED lights)</td><td>–</td><td>–</td></tr>
<tr><td>C</td><td>(Not usable)</td><td>Setting error ("SW" LED lights)</td><td>–</td><td>–</td></tr>
<tr><td>D</td><td>(Not usable)</td><td>Setting error ("SW" LED lights)</td><td>–</td><td>–</td></tr>
<tr><td>E</td><td>(Not usable)</td><td>Setting error ("SW" LED lights)</td><td>–</td><td>–</td></tr>
<tr><td>F</td><td>(Not usable)</td><td>Setting error ("SW" LED lights)</td><td>–</td><td>–</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>(3)</td><td>Transmission speed setting switch<br> 
</td><td>This switch sets the unit transmission speed.
<table>
<tr><th>No.</th><th>Details</th></tr>
<tr><td>0</td><td>156 kbps</td></tr>
<tr><td>1</td><td>625 kbps</td></tr>
<tr><td>2</td><td>2.5 Mbps</td></tr>
<tr><td>3</td><td>5 Mbps</td></tr>
<tr><td>4</td><td>10 Mbps</td></tr>
<tr><td>5</td><td>Setting error ("SW" "L.ERR" LED lights)</td></tr>
<tr><td>6</td><td>Setting error ("SW" "L.ERR" LED lights)</td></tr>
<tr><td>7</td><td>Setting error ("SW" "L.ERR" LED lights)</td></tr>
<tr><td>8</td><td>Setting error ("SW" "L.ERR" LED lights)</td></tr>
<tr><td>9</td><td>Setting error ("SW" "L.ERR" LED lights)</td></tr>
</table></td></tr>
<tr><td>(4)</td><td>Station No. setting switch<br> 
</td><td>This switch sets the unit station No.<br><Setting range><br>Master station : 0<br>Local station : 1 to 64<br>Standby master station : 1 to 64<br><br>If a value other than 0 to 64 is set, the "SW" and "L.ERR." LED will turn ON.</td></tr>
<tr><td>(5)</td><td>Connector<br> 
</td><td>A twisted pair cable is connected here to establish the data link.
<table>
<tr><th>Pin</th><th>Signal name</th></tr>
<tr><td>1</td><td>DA</td></tr>
<tr><td>2</td><td>DB</td></tr>
<tr><td>3</td><td>DG</td></tr>
<tr><td>4</td><td>SLD</td></tr>
<tr><td>5</td><td>FG</td></tr>
</table></td></tr>
</table>

| No. | Name | Description | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (6) | LED display   | No. | LED name | Details | | LED display status | | | |
| | | | | | | Master station (Standby master station) | | Local station (Standby master station) | |
| | | | | | | Normal | Error | Normal | Error |
| | | LED1 | RUN | ON | Unit is in normal state | ON | OFF | ON | OFF |
| | | | | OFF | Watchdog timer error | | | | |
| | | LED2 | ERR. | Indicates the status of communication with the station set in parameters | | OFF | ON or flicker | OFF | ON or flicker |
| | | | | ON | Communication with all stations error | | | | |
| | | | | Flicker | Station with error communication found | | | | |
| | | LED3 | MST | ON | Set to master station | ON | – | OFF | – |
| | | LED4 | S.MST | ON | set to standby master | ON | – | ON | – |
| | | LED5 | LOCAL | ON | Set to local station | OFF | – | ON | – |
| | | LED6 | CPU R/W | ON | Communicating with PLC CPU | ON | OFF | ON | OFF |
| | | LED7 | L RUN | ON | Executing data link | ON | OFF | ON | OFF |
| | | LED8 | L ERR. | ON | communication error (local station) | OFF | ON or flicker | OFF | ON or flicker |
| | | | | Flicker | Switches 1 to 3 changed during power ON | | | | |
| | | LED9 | SW | ON | Switch setting is incorrect | OFF | ON | OFF | ON |
| | | LED10 | M/S | ON | Master station already exists in same line | OFF | ON | – | – |
| | | LED11 | PRM | ON | Error in parameter details | OFF | ON | – | – |
| | | LED12 | TIME | ON | Data link monitor timer activated (All stations error) | OFF | ON | – | – |
| | | LED13 | LINE | ON | Cable is disconnected Transmission path is affected by noise, etc. | OFF | ON | OFF | ON |
| | | LED14 | | (Not used) | | – | – | – | – |
| | | LED15 | SD | ON | Sending data | ON | OFF | ON | OFF |
| | | LED16 | RD | ON | Receiving data | ON | OFF | ON | OFF |

# 8. Miscellaneous

## 8.1 Backing Up CC-Link Related Parameters

The CC-Link related parameters are only network parameters written into from the MELSEC peripheral devices. These parameters are usually stored in a different area than the NC parameters, and are stored in the ladder program area of the NC. To store these network parameters externally, the data must be output and saved with the following methods.

| No. | Data output operation | Usable devices |
|---|---|---|
| 1 | Select PC read, then parameters with the MELSEC peripheral device, read the parameters and store them as a file in the personal computer. To write the parameters, carry out PC write in the same manner. | MELSEC peripheral device GPPQ, GPPW, etc. |
| 2 | Output the PLC program area with the NC Data Out screen. Output by setting #(99 ) DATA ( ALL2). The data is input with the Data In screen. | External storage device (personal computer, etc.) |

## 8.2 Replacing the CC-Link Card

If any defect is found in the CC-Link card mounted in the NC, the card must be replaced. There are no such parameters on the card which must be saved, so the data does not need to be recovered.

# IV. Setting the Ethernet IP Address

# 1. Outline

With this function, the communication parameters can be confirmed and set using the 7-segment LED display and rotary switches mounted on the C6/C64. These parameters, such as the IP address, are required for establishing Ethernet communication with the personal computer to monitor the C6/C64 and carry out setting operations.

# 2. Explanation of function

## 2.1 Confirming the IP Address

The IP address, gateway address, subnet mask and port No. set in the parameter area can be confirmed with the 7-segment LED display mounted on the C6/C64.
Set communication parameters confirmed above in the application setting file in the personal computer used to monitor the C6/C64 and carry out settings. When the application is started up, Ethernet communication will start between the C6/C64 and personal computer.

## 2.2 Initializing the IP Address

The IP address, gateway address, subnet mask and port No. can be initialized using the rotary switches mounted on the C6/C64.
The default values are shown below.

| | | |
|---|---|---|
| IP address | : | 192. 168. 1. 2 |
| Gateway address | : | 0. 0. 0. 0 |
| Subnet mask | : | 255. 255. 255. 0 |
| Port No. | : | 64758 |

After initializing the parameters with this function, reboot C6/C64. Ethernet communication will be enabled with the default values.
Set the above default values in the application setting file in the personal computer used to monitor the C6/C64 and carry out settings. When the application is started up, Ethernet communication will start between the C6/C64 and personal computer.

## 2.3 Setting the IP Address

Once Ethernet communication is established between the C6/C64 and personal computer with the above method, the communication parameters, such as the IP address, can be set on the Parameter Setting screen of the application used for C6/C64 monitoring and setting operations.
After setting the communication parameters, such as the IP address, on the Parameter Setting screen, turn the C6/C64 power OFF once. When the power is turned ON again, Ethernet communication with the new parameter setting values will be possible.
Set the parameters set above in the application setting file in the personal computer used to monitor the C6/C64 and carry out settings. When the application is started up, Ethernet communication will start between the C6/C64 and personal computer using the new parameter setting values.

The IP address, gateway address, subnet mask and port No. can be set using the 7-segment LED display and rotary switches mounted on the C6/C64.

# 3. Operation Procedure

## 3.1 Confirming the Address

**(Example)** Display when parameters are set as follows

| | | |
|---|---|---|
| IP address | : | 192. 255. 11. 3 |
| Gateway address | : | 192. 255. 11. 254 |
| Subnet mask | : | 255. 255. 255. 0 |
| Port No. | : | 64758 |

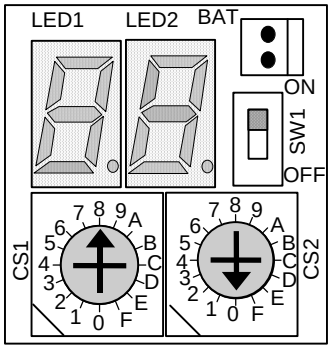
Turn the C6/C64 power OFF.

↓

Select the IP address confirmation mode by setting the slide switch SW1 on the C6/C64 (shown on the right) to "ON" and the rotary switch CS1 to "8".

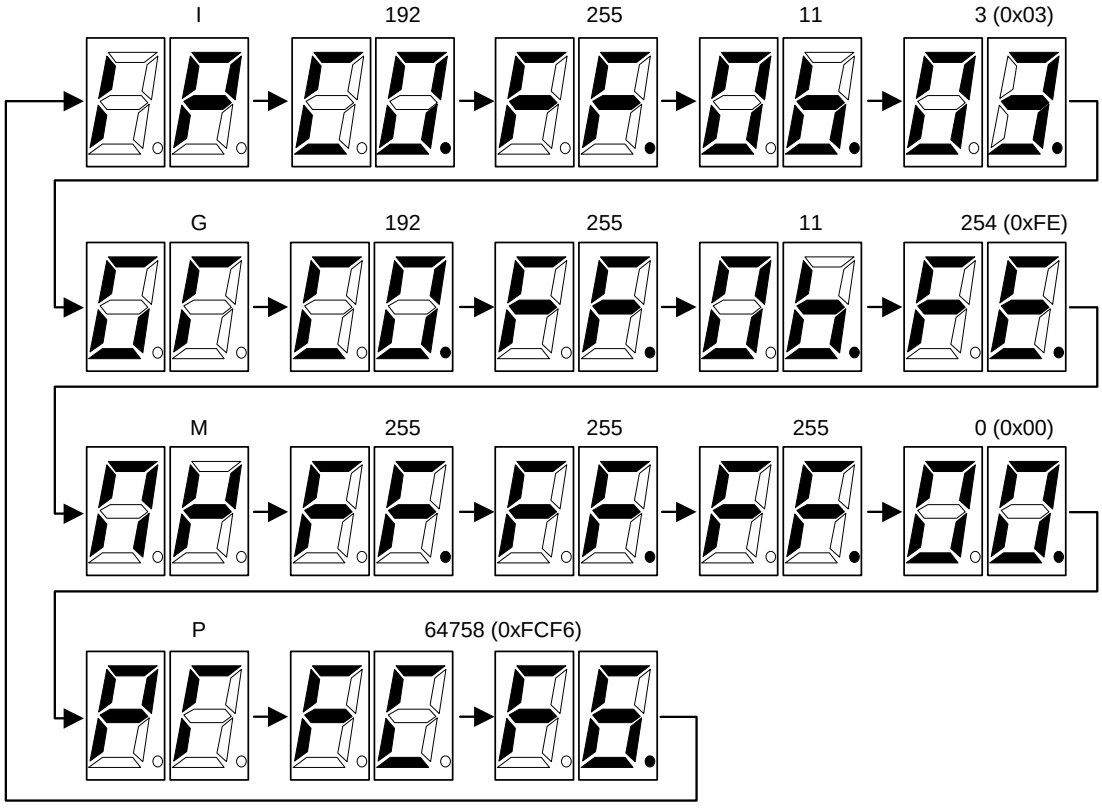
↓

Turn the C6/C64 power ON.

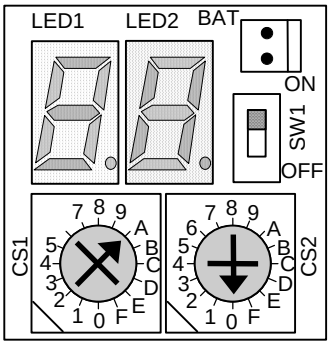



→ The IP address, gateway address, subnet mask and port No. will appear on the 7-segment LED display as shown below.

**(Note)** The IP address is normally indicated as a decimal, but is displayed as a hexadecimal on the 7-segment LED.



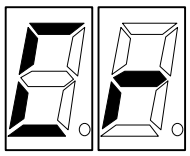
## 3.2 Initializing the IP Address



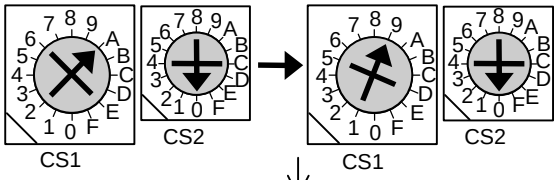

Turn the C6/C64 power OFF.

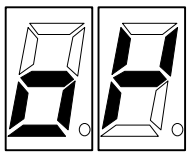
Select the IP address initialization mode by setting the slide switch SW1 on the C6/C64 (shown on the right) to "ON" and the rotary switch CS1 to "A".

Turn the C6/C64 power ON. → The IP address initialization mode is ready, and the following will appear on the 7-segment LED display.

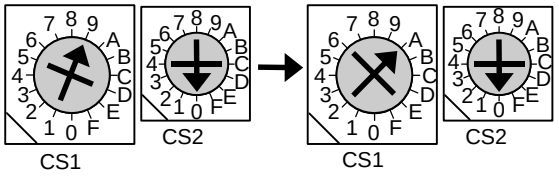


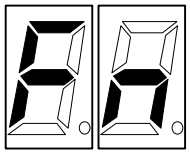
With the power ON, change the rotary switch CS1 from "A" to "9". → The 7-segment LED display will change as follows.



Turn the rotary switch CS1 back to "A" from "9". → The following will appear on the 7-segment LED display. The communication parameters, such as the IP address and subnet mask, will be initialized.



(Note)
The settings are not initialized until the above display appears. If the power is turned OFF, etc., during the operation, start again from the beginning.

Turn the C6/C64 power OFF, set the slide switch SW1 to "OFF", and turn the rotary switch CS1 back to "0".

Turn the C6/C64 power ON. → Ethernet communication is possible with the default communication parameters.

## 3.3 Setting the IP Address

The methods for setting the IP address, gateway address, subnet mask and port No. using the 7-segment LED display and rotary switches mounted on the C6/C64 are explained in this section.

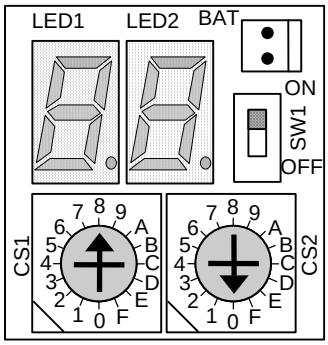
Turn the C6/C64 power OFF.

↓

Select the IP address initialization mode by setting the slide switch SW1 on the C6/C64 (shown on the right) to "ON" and the rotary switch CS1 to "8".

↓

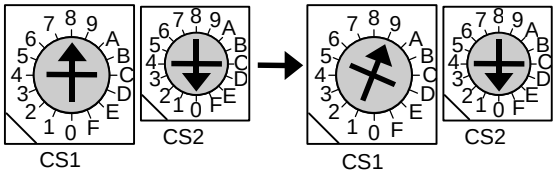
Turn the C6/C64 power ON.

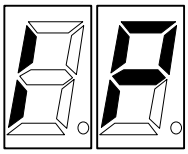



→ The IP address, gateway address, subnet mask and port No. will appear on the 7-segment LED display.

↓

With the power ON, change the rotary switch CS1 from "8" to "9". → The IP address setting mode is ready, and the setting parameter name will appear on the 7-segment LED display as shown below.



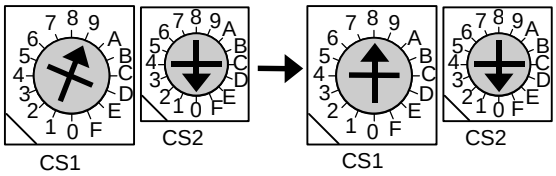



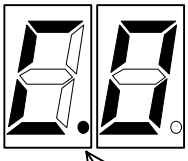
This indicates that the IP address will be set.

↓

Change the rotary switch CS1 from "9" to "8". → The first IP address will appear on the 7-segment LED display.

(Example)
If the IP address is "C0. FF. 0B. 03", the first "C0" will appear.



The lit dot LED indicates the settable digit.
In this example, the "C" section can be set.

↓

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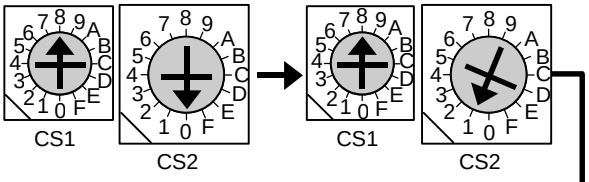
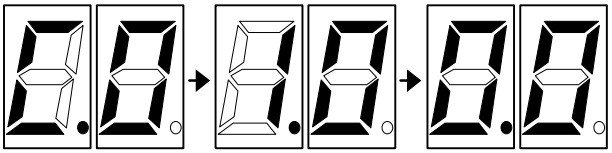
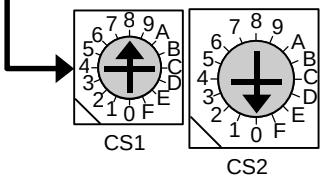
Change the setting with rotary switch CS2.
(Example: To change "C" to "0")

As CS2 is changed, the settable section will flicker and change.



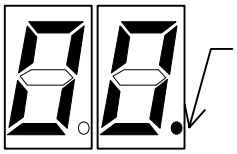



If the rotary switch CS2 is already set to the required value (example: "0") as shown above, change the switch to another value once, and then reset it to the required value.

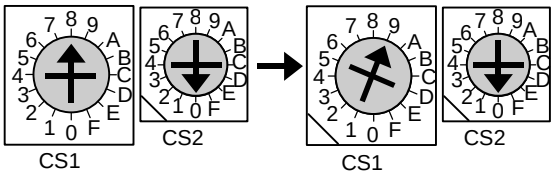
In the above case, the rotary switch CS2 was already set to "0", so the setting was changed to "1" once, and then changed to "0" again.

Change the rotary switch from "8" to "9", and change the settable section.

The settable section will change, and the dot LED will move.

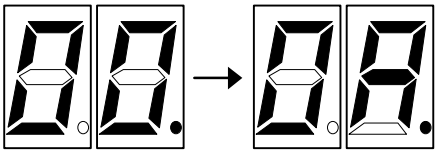


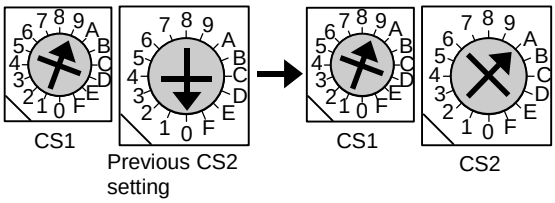
Indicates that the right section can be set.




Change the setting with rotary switch CS2.
(Example: To change "0" to "A")

As CS2 is changed, the settable section will flicker and change.



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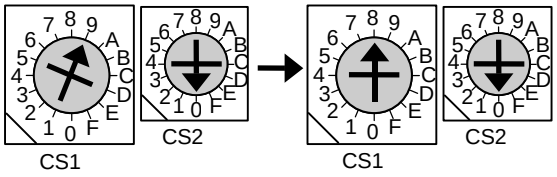
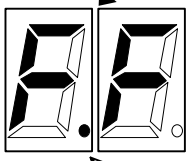
Change the rotary switch CS1 from "9" to "8", and change the settable section.



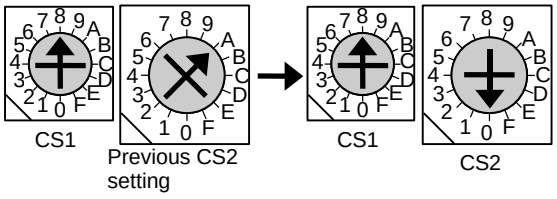

The settable section will change, and the second IP address delimited with "." will appear.

IP address C0. FF. 0B. 03

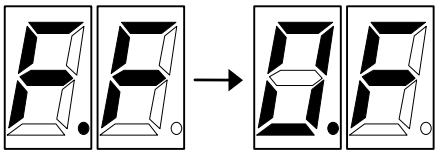


Indicates that the left section can be set.

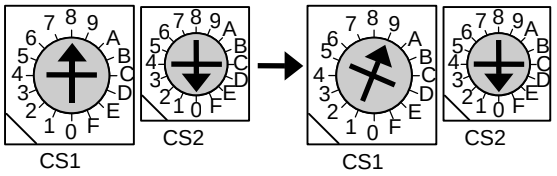
Change the setting with rotary switch CS2.
(Example: To change "F" to "0")



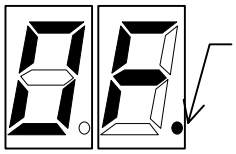

As CS2 is changed, the settable section will flicker and change.



Change the rotary switch CS1 from "8" to "9", and change the settable section.

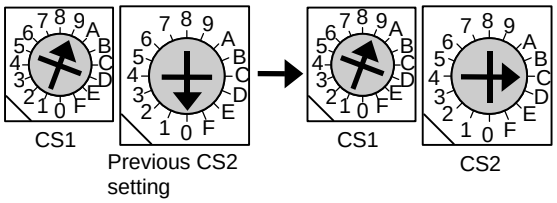



The settable section will change, and the dot LED will move.

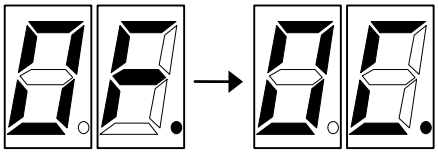


Indicates that the right section can be set.

Change the setting with rotary switch CS2.
(Example: To change "F" to "C")




As CS2 is changed, the settable section will flicker and change.



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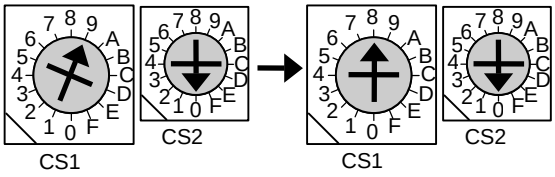
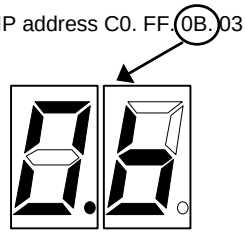
Change the rotary switch CS1 from "9" to "8", and change the settable section.

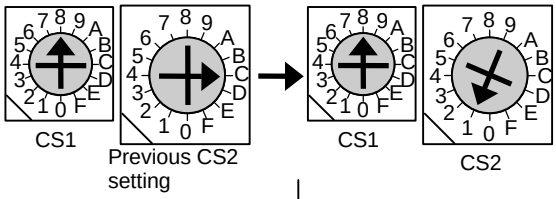
→ The settable section will change, and the third IP address delimited with "." will appear

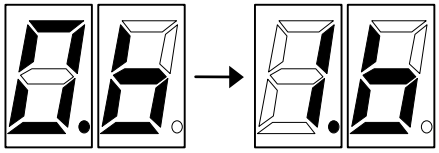



Change the setting with rotary switch CS2.
(Example: To change "0" to "1")

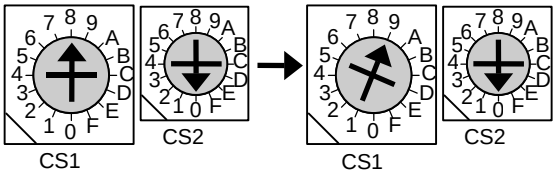
→ As CS2 is changed, the settable section will flicker and change.

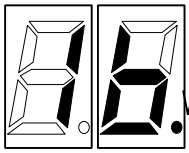


Change the rotary switch CS1 from "8" to "9", and change the settable section.

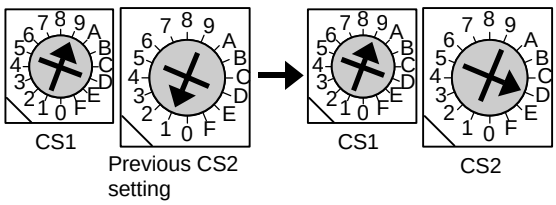
→ The settable section will change, and the dot LED will move.

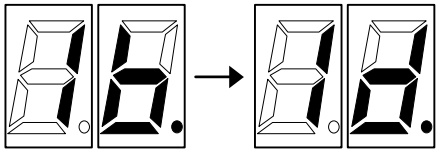



Change the setting with rotary switch CS2.
(Example: To change "B" to "D")

→ As CS2 is changed, the settable section will flicker and change.



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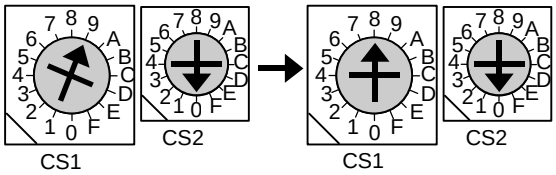
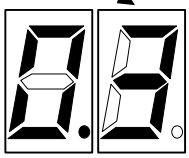
Change the rotary switch CS1 from "9" to "8", and change the settable section.

→ The settable section will change, and the fourth IP address delimited with "." will appear.



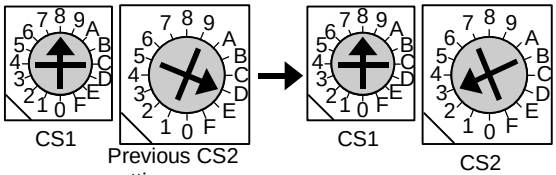

IP address C0. FF. 0B. 03

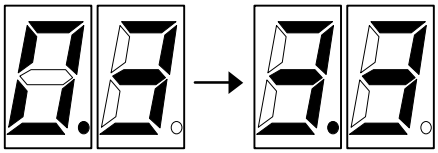


Indicates that the left section can be set.

Change the setting with rotary switch CS2.
(Example: To change "0" to "3")

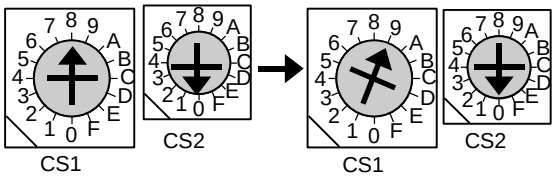
→ As CS2 is changed, the settable section will flicker and change.

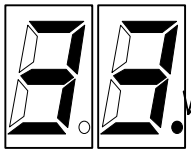


Change the rotary switch CS1 from "8" to "9", and change the settable section.

→ The settable section will change, and the dot LED will move.

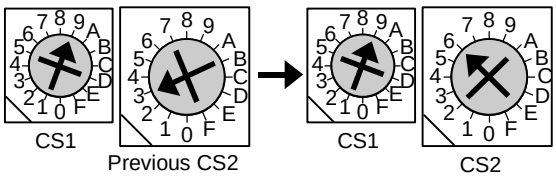


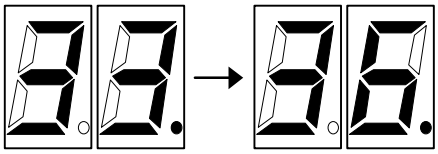



Indicates that the right section can be set.

Change the setting with rotary switch CS2.
(Example: To change "3" to "6")

→ As CS2 is changed, the settable section will flicker and change.



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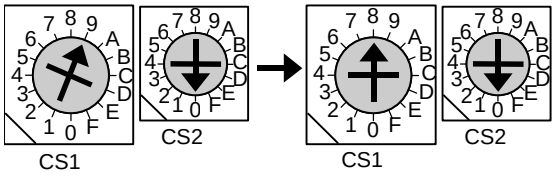
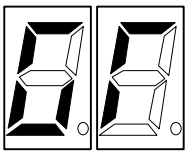
Change the rotary switch CS1 from "9" to "8", and change the settable section.

The 7-segment LED display will change as shown below, and all of the IP address settings set above will be validated.



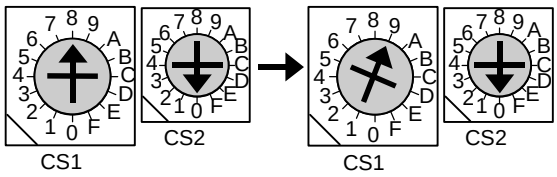



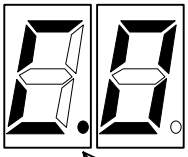
The display above indicates the gateway address setting.

Change the rotary switch CS1 from "8" to "9".

The first gateway address will appear on the 7-segment LED display.

Gateway address C0. FF. 0B. FE



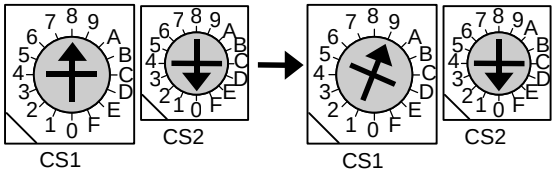
The lit dot LED indicates the settable digit.
In this example, the "C" section can be set.

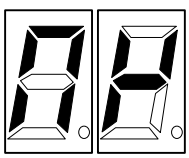
Using the same methods as setting the IP address, select the digit to be set with rotary switch CS1, and change the setting with rotary switch CS2.

The settable section will change as rotary switch CS1 is operated, and the settable section on the 7-segment LED display will flicker and change as the rotary switch CS2 is operated.

Change the rotary switch CS1 from "8" to "9", and change the settable section.

The 7-segment LED display will appear as shown below. All of the gateway addresses set above will be validated.



The display above indicates the subnet mask setting.

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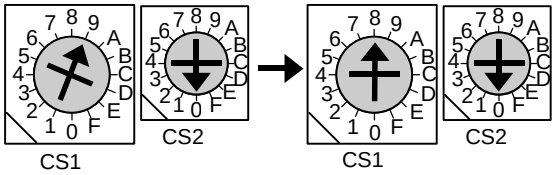
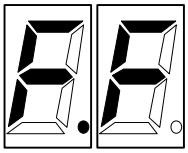
Change the rotary switch CS1 from "9" to "8".

→ The first subnet mask setting value will appear on the 7-segment LED display.

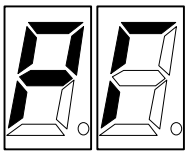



Subnet mask FF. FF. FF. 00



Using the same methods as setting the IP address, select the digit to be set with rotary switch CS1, and change the setting with rotary switch CS2.

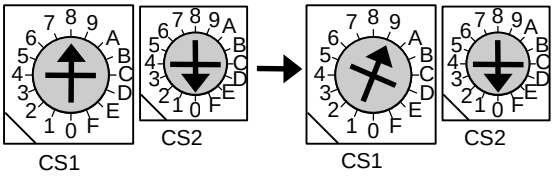
→ The settable section will change as rotary switch CS1 is operated, and the settable section on the 7-segment LED display will flicker and change as the rotary switch CS2 is operated.
When the subnet mask has been set to the last digit, the 7-segment LED display will appear as shown below. All of the subnet mask settings set above will be validated.



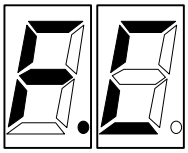
The display above indicates the port No. setting.

Change the rotary switch CS1 from "8" to "9".

→ The two high-order digits of the port No. will appear on the 7-segment LED display.



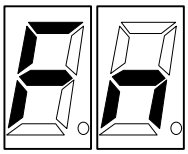

Port No. F C F 6.



Using the same methods as setting the IP address, select the digit to be set with rotary switch CS1, and change the setting with rotary switch CS2.

→ The settable section will change as rotary switch CS1 is operated, and the settable section on the 7-segment LED display will flicker and change as the rotary switch CS2 is operated.
When the port No. has been set to the last digit, the 7-segment LED display will appear as shown below. All of the port No. settings made above will be validated.

Turn the C6/C64 power OFF, set the slide switch SW1 to "OFF", and turn the rotary switch CS1 back to "0".



Turn the C6/C64 power ON.

→ Ethernet communication using the IP address, gateway address, subnet mask and port No. set with the above operations will be possible.

# V. Ethernet 2-channel Connection

# 1. Outline

When two Ethernet I/F cards HR876 are mounted in the C6/C64 (hereinafter, C64), two network channels can be connected with Ethernet.

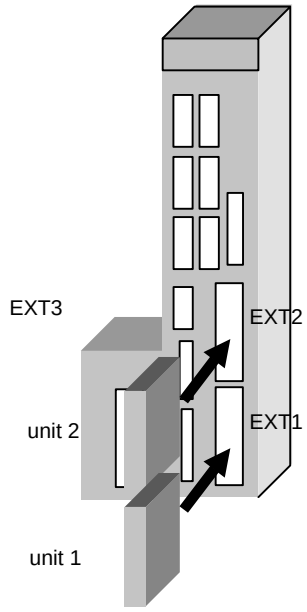
# 2. Hardware Configuration

The Ethernet I/F card HR876 can be mounted in the C64's internal expansion slot (EXT1, EXT2) and the external expansion slot (EXT3).

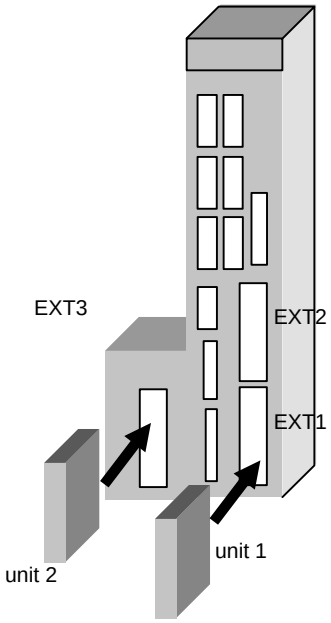
## 2.1 Unit No.

When two Ethernet I/F cards are mounted, unit numbers are assigned to each card to identify the I/F card. The I/F card's mounting state and the unit numbers correspond as shown below.

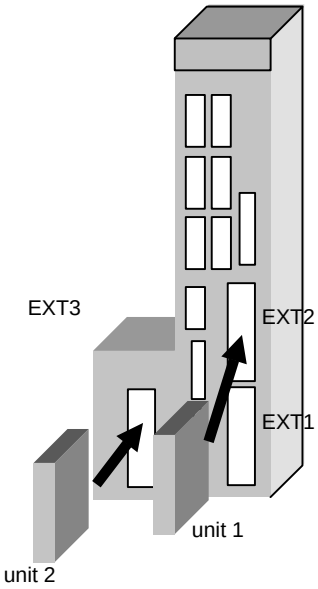
**When mounted in EXT1 and EXT2**



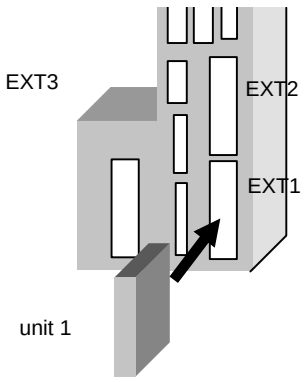

**When mounted in EXT1 and EXT3**



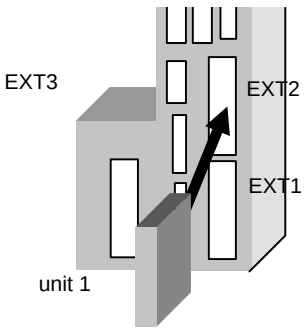

**When mounted in EXT2 and EXT3**



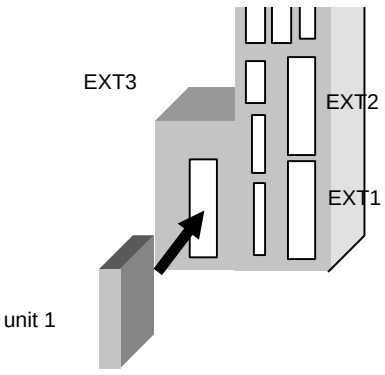

**When mounted in EXT1 only**




**When mounted in EXT2 only**




**When mounted in EXT3 only**



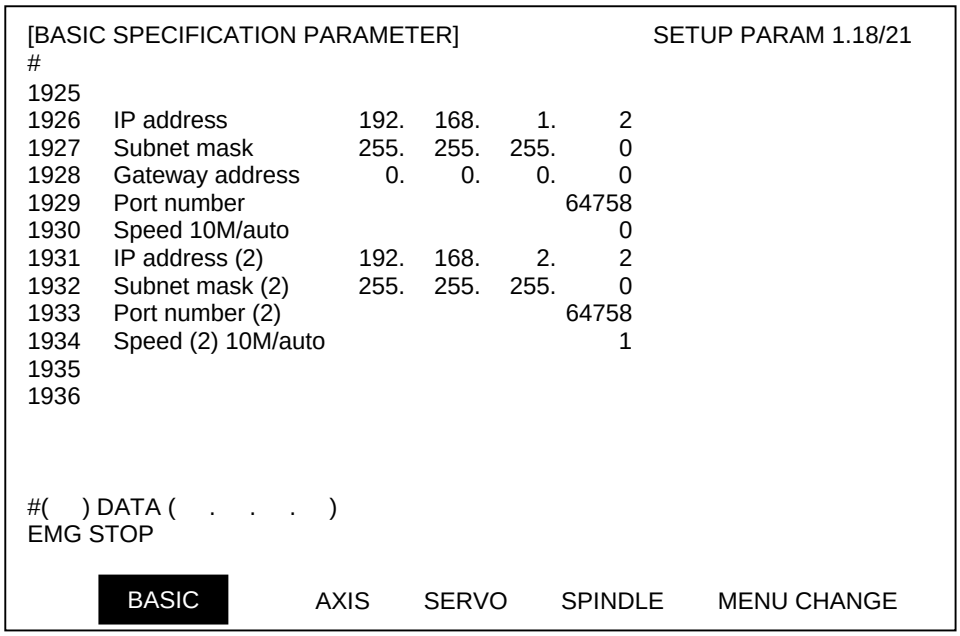
## 2.2 Correspondence with Unit Numbers

The operation of the Ethernet I/F card corresponds to each unit No. as indicated below.

| Operation | Unit 1 | Unit 2 |
|---|---|---|
| Recommended connection | HMI (Human Machine Interface) | Information network |
| Corresponding IP address setting | #1926 IP address | #1931 IP address (2) |
| Corresponding Subnet mask setting | #1927 Subnet mask | #1932 Subnet mask (2) |
| Corresponding port number setting | #1929 Port number | #1933 Port number (2) |
| Processing priority | High | Low |
| Others | IP address setting available off-line | |

# 3. Setting the Parameters

Set the parameters for each Ethernet I/F card on the BASIC SPECIFICATION PARAMETER screen.
You can set the parameters from #1926 to #1929 in the off-line mode.
(Refer to "Chapter IV. Setting the IP Address" in this manual.)




**(Note 1)** If "#1926 IP address" is not set, "192.168.1.2" will be set as the initial setting.
**(Note 2)** If you set or change the Ethernet parameters, reboot C64.

# 4. Precautions

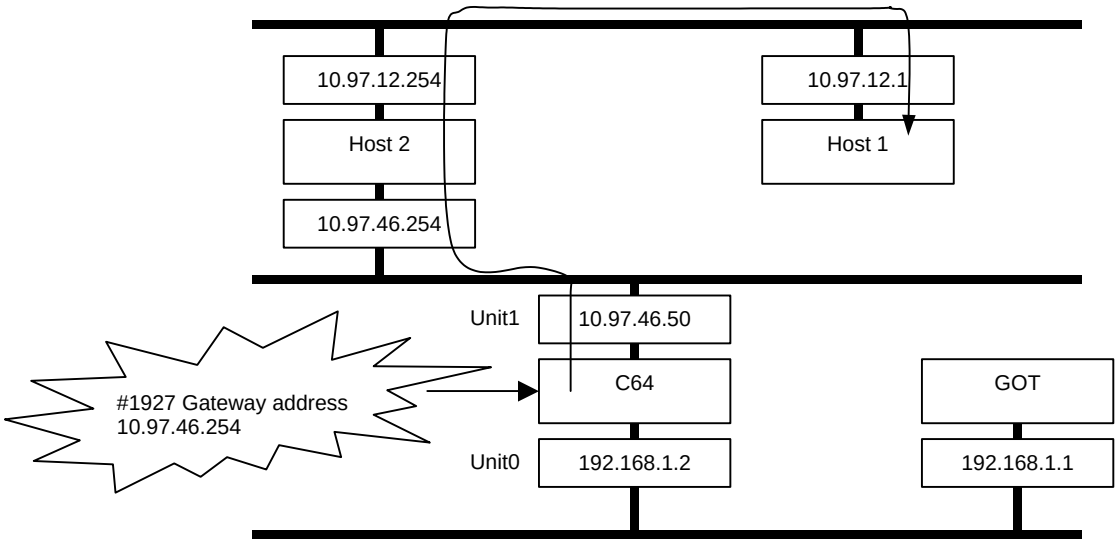
(1) When two Ethernet cards are mounted, do not use the IP address in the same net ID as correct transmission may be inhibited.
The same net ID refers to when the masked (valid) section is duplicated by the subnet mask.

# 5. Supplement

## 5.1 Setting the Gateway Address

Routing is not used with the WEP compatible specifications, so the gateway address does not need to be set. To use routing, set "#1927 Gateway address". Routing will be validated for unit 1.

**Setting example**




## 5.2 EXT3 Compatible Version

The HR876 Ethernet I/F card can be mounted in the EXT3 with the software version D and above.

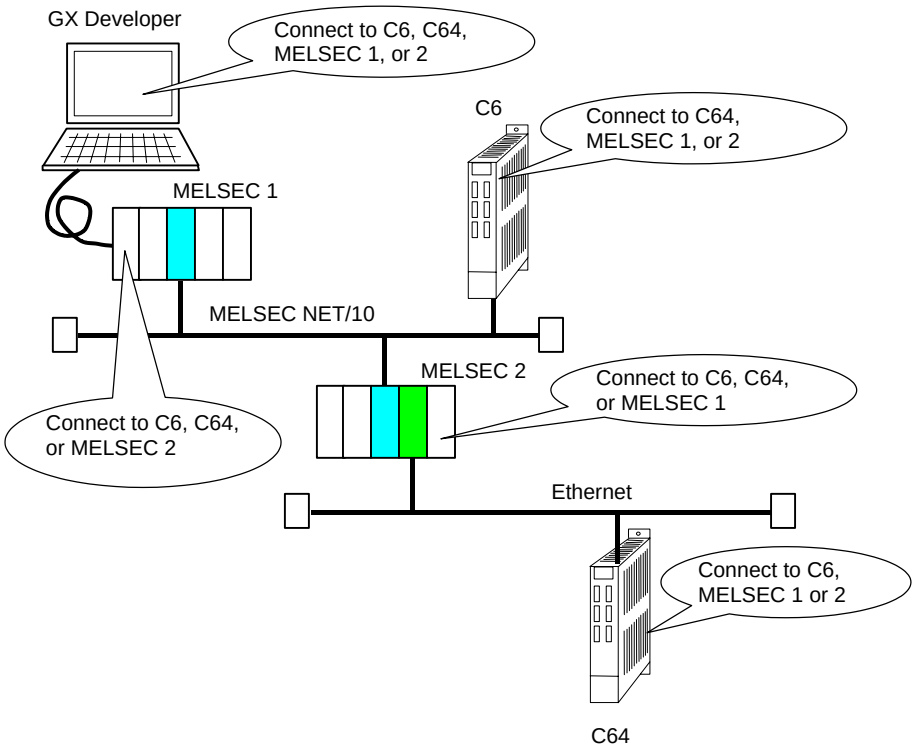
# VI. Ethernet Interface Communication Function (MELSEC Communication Protocol Section)

# 1. Outline

This section explains the methods of communication using MELSEC communication protocol (hereinafter, MC protocol) which is one of the Ethernet interface card communication functions.
MC protocol is a MELSEC communication method used to read and write, etc., the data in the MELSEC CPU.
The sequence programs and data in the C6/C64 can be accessed from a MELSEC peripheral device connected by Ethernet using this protocol.
This section generically labels the C6/C64 and MELSEC CPU as the "PLC CPU".

# 2. Functions for Accessing the PLC CPU with MC Protocol

The main functions for accessing the PLC CPU with MC protocol are explained here.
On the PLC side, the Ethernet unit sends and receives data based on the commands from the client device.
Thus, a sequence program for data communication is not required on the PLC CPU side.



### (1) Reading and writing data

This function reads and writes data to and from the device memory of the PLC CPU in the local station or other station on MELSECNET/10, and to and from the intelligent function unit's buffer memory.
By reading and writing the data, the PLC CPU's operation can be monitored, data can be analyzed, and production can be controlled with the client device.
In addition, production commands, etc., can be issued from the client device.

### (2) Reading and writing files

This function reads and writes the files, such as the sequence programs and parameters, stored in the PLC CPU.
By reading and writing the files, the PLC CPU files can be controlled with the client device.
The execution programs, etc., can be changed (interchanged) from the client device.

### (3) PLC CPU remote control

This function executes remote RUN/STOP.
Remote operation of the PLC CPU from the client device is possible using the PLC CPU remote control function.

### (4) Accessing other stations' PLC using data link command

The PLC CPU can exchange data with PLC CPUs in the following stations using the data link commands. Note that the only data link commands supported by C6/C64 are READ, SREAD/WRITE and SWRITE.

- Other station's PLC CPU on same Ethernet
- Other Ethernet via MELSECNET/H or MELSECNET/10, or PLC CPU on MELSECNET/H or MELSECNET/10
  (Use MELSECNET/H or MELSECNET/10 relay communication function)

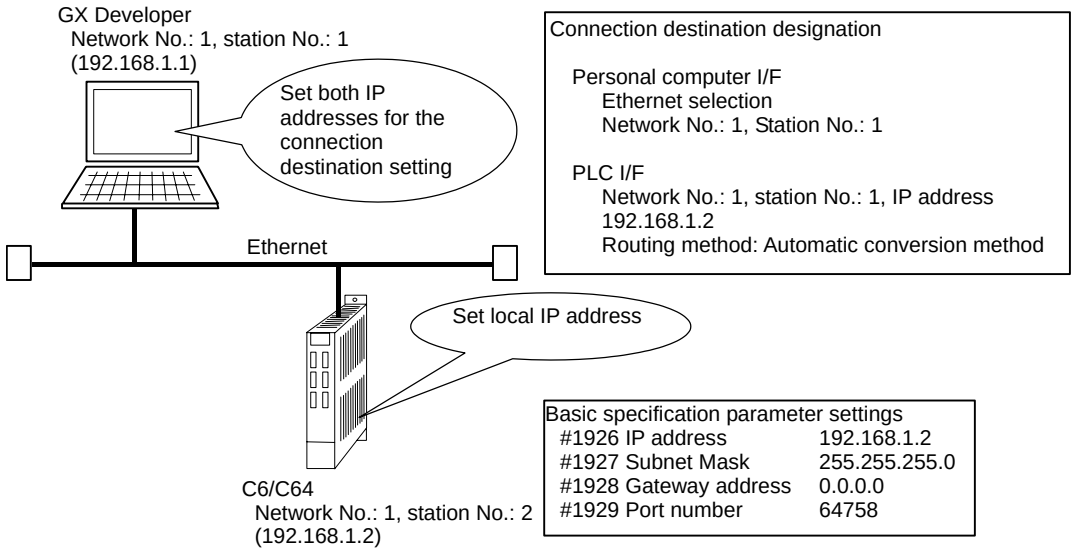
**(Note)** The MELSECNET/H cannot be connected directly to C6/C64.

# 3. Example of Connection Configuration

An example of the actual connection configuration is shown below.

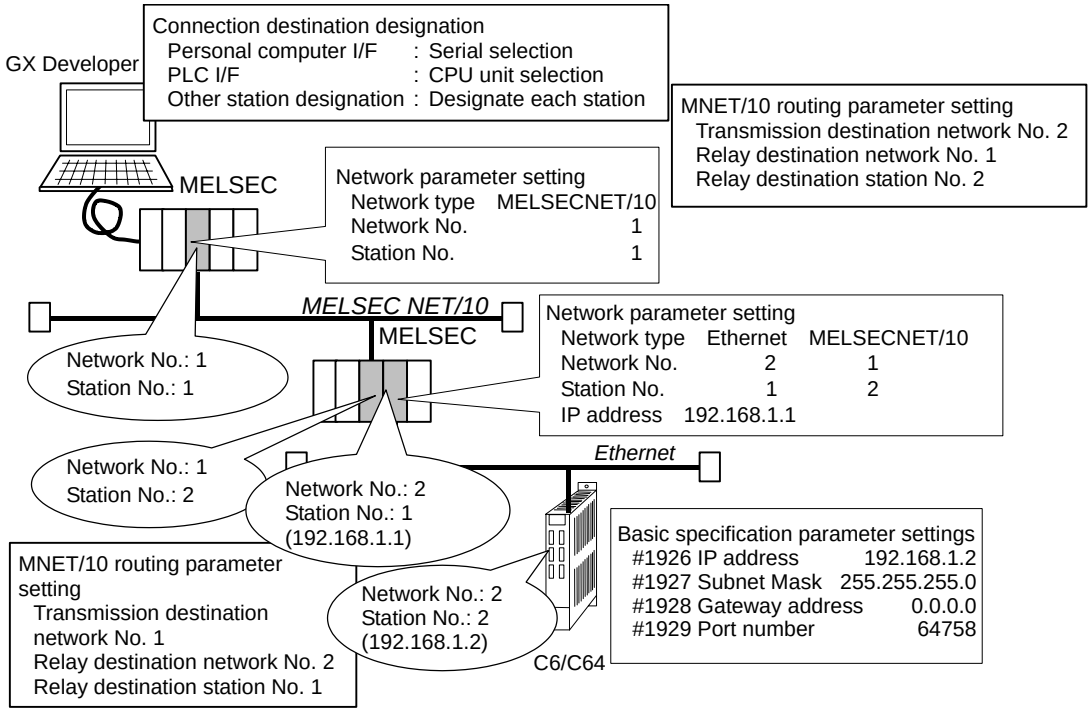
## 3.1 Example of Connecting Peripheral Devices on Single Network

This is the most simple configuration for connecting peripheral devices with Ethernet.



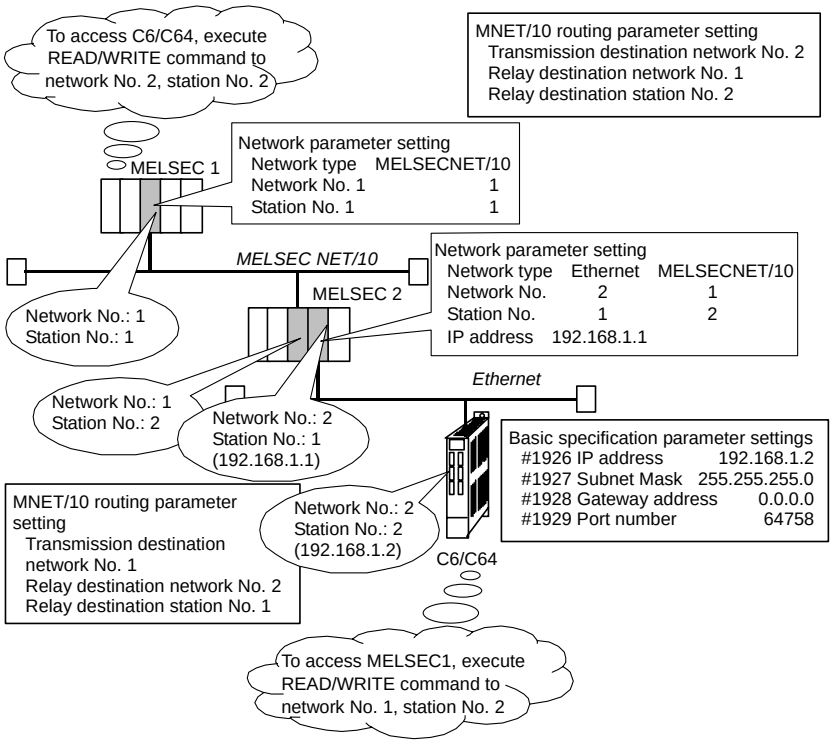

## 3.2 Example of Connecting Peripheral Devices to a Multilevel Network

This configuration connects peripheral devices to a multilevel network consisting of Ethernet and MELSECNET /10.
The communication settings for other stations are set on the peripheral device side in this case.



## 3.3 Example of Connecting MELSEC CPU and C6/C64 to a Multilevel Network

This configuration connects the MELSEC CPU and C6/C64 to a multilevel network consisting of Ethernet and MELSECNET /10.
Each can access (read/write) each other's devices.



# 4. Setting the Parameters

## 4.1 Setting the NC Side

The local station's IP address is set with the NC.
The IP address set here is shared with the other Ethernet communication functions (GOT connection, etc.).

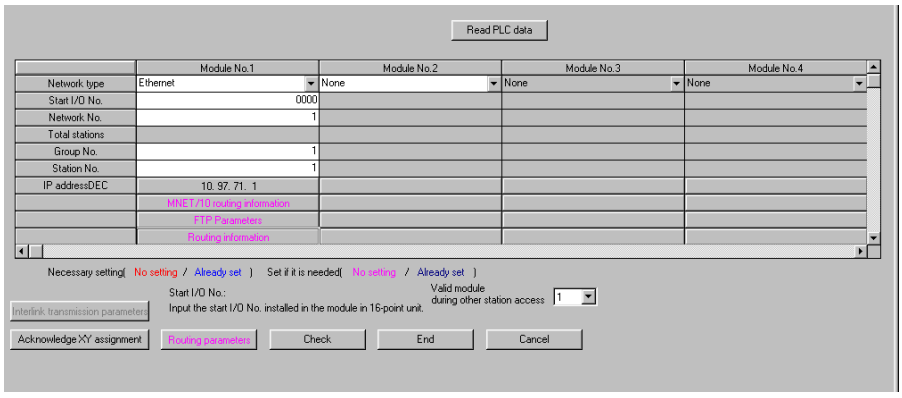
| Parameter No. | Parameter name | Setting example |
|---|---|---|
| #1926 | IP address | 192. 182. 1. 2 |
| #1927 | Subnet mask | 255. 255. 255. 0 |
| #1928 | Gateway address | 192. 182. 1. 254 |
| #1929 | Port number | 64758 |

## 4.2 Setting the GX Developer Side

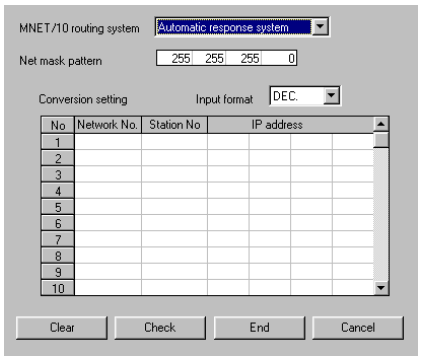
### 4.2.1 Setting the Network Parameters

The network parameters set with the GX Developer are included in the parameter files.
The parameter files set here are written into the target C6/C64.
These settings include the MELSECNET/10 routing parameters.
Set the following value for the head I/O No. according to the slot in which the Ethernet unit is inserted.

| Inserted slot | Head I/O No. |
|---|---|
| EXT1 (bottom) | 200 |
| EXT2 (top) | 280 |

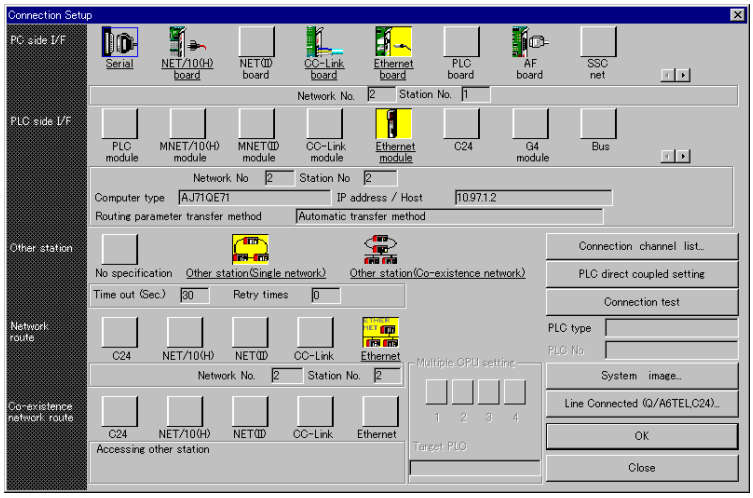



**(Note)** When C6/C64 is set, the NC parameter setting is validated for the IP address, and the IP address set with this network parameter is invalidated.



### 4.2.2 Setting the GX Developer Connection Destination

These parameters set the GX Developer connection method. These parameters are included in the GX Developer project data.




# 5. Comparison of Functions

A comparison of the functions with the Ethernet unit mounted in the MELSEC CPU is given below.

| Function | | C6/C64 | MELSEC (Note 2) |
|---|---|---|---|
| Communication with MC protocol | | ○ | ○ |
| Communication with fixed buffers | | × | ○ |
| Communication with random access buffer | | × | ○ |
| Sending/receiving by e-mail | | × | ○ |
| Communication with data link buffer (data link command) | | ○ (Note 1) | ○ |
| File transmission (FTP server function) | | × | ○ |
| Communication with Web function | | × | ○ |
| MELSECNET/H, MELSECNET/10 relay communication | | ○ | ○ |
| | Automatic response method | ○ | ○ |
| | IP address calculation method | ○ | ○ |
| | Table conversion method | ○ | ○ |
| | Combined method | ○ | ○ |
| Router relay communication (router relay function) (Note 3) | | × | ○ |
| Client device existence check | | × | ○ |
| Communication with pairing open | | × | ○ |
| Communication with automatic open UDP port | | ○ | ○ |
| Simultaneous broadcast communication | | × | ○ |
| Compliance with QCPU remote password function | | × | ○ |
| Multi-CPU system compliance | | × | ○ |
| Ethernet parameter setting using GX Developer | | ○ | ○ |
| Access to QCPU using GX Developer (TCP/IP or UDP/IP) | | ○ | ○ |

**(Note 1)** Only the READ, SREAD, WRITE, and SWRITE commands are supported.
**(Note 2)** Compliance with each MELSEC function depends on the CPU model.
**(Note 3)** If the network is configured with only one router installed for each network, the units can communicate with each other across routers even without the router relay function.

# 6. Performance Specifications

The Ethernet unit (FCU6-EX875) performance specifications are as shown below.

| Item | | Specifications |
|---|---|---|
| Transmission specifications | Interface | 10BASE-T (RJ-45) |
| | Transmission method | Base band |
| | Maximum segment length | 100 m |
| | Maximum number of nodes/connection | Up to four levels with cascade connection |
| Transmission/reception data storage memory | Number of simultaneously opened connections | 8 connections |
| | Fixed buffer | – |
| | Random access buffer | – |
| | e-mail | – |

# VII. Ethernet Interface Communication Function Using PLC (Client Function Section)

# 1. Outline

Using the built-in PLC dedicated commands, this function sends and receives the PLC device data to and from the devices (host computer, etc.) connected with Ethernet.
The communication method (protocol) can be selected from TCP/IP or UDP/IP for each connection.

The following four dedicated commands are used with this function.

| Dedicated command | Function |
|---|---|
| OPEN | Establishes (opens) a connection with the client device with which data is to be communicated. |
| BUFSND | Sends data to the client device. |
| BUFRCV | Reads data received from the client device. |
| CLOSE | Ends (closes) the connection with the client device with which data is being communicated. |

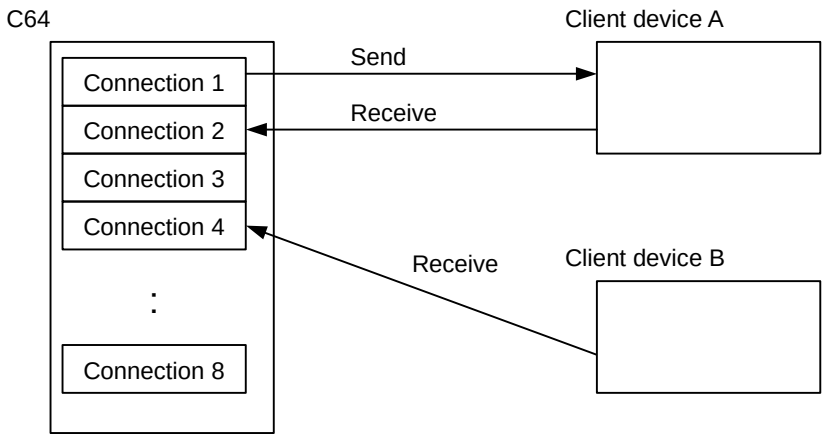
The following two communication procedures (protocol) are available for communicating with the client device. These can be selected for each connection.

| Protocol type | Communication procedure |
|---|---|
| Procedural | Data is communicated while establishing a handshake with the client device.<br>A response must be made to the communication request.<br>The maximum send data size is 1017 words. |
| Non-procedural | No response is made in respect to the data reception.<br>The maximum send data size is 2046 bytes. |

# 2. Detailed Explanation

## 2.1 Connection No. in Connecting with Client Device

The client device with which data is communicated is connected with a connection port identified with a connection No.
Up to eight connections, with connection No. 1 to 8, can be opened simultaneously.
One connection only allows to be connected for either sending or receiving data. Thus, two connection numbers are required when sending and receiving data to and from the client device.
Once the connection is closed, it can be switched to another client device.



## 2.2 Control Signals

Control signals are assigned to control the Ethernet I/F card from the built-in PLC. These control signal devices' are automatically assigned as shown below according to the slot in which the Ethernet I/F card is mounted. When two Ethernet I/F cards are mounted, the control signals are assigned to the devices with the smaller number.

| Ethernet I/F card mounting position | Devices to which control signals are assigned |
|---|---|
| EXT1 (bottom built-in slot) | From X200/From Y200 |
| EXT2 (top built-in slot) | From X280/From Y280 |
| EXT3 (left external slot) | From X300/From Y300 |

| Device No. | Details | Device No. | Details |
|---|---|---|---|
| X200<br>/X280<br>/X300 | Initialization normal completion | Y200 to Y20F<br>/Y280 to Y28F<br>/Y300 to Y30F | Blank |
| X210 to X217<br>/X290 to X297<br>/X310 to X317 | Connections 1 to 8 Open completion | Y210 to Y21F<br>/Y290 to Y29F<br>/Y310 to Y31F | Blank |
| X220 to X227<br>/X2A0 to X2A7<br>/X320 to X327 | Connections 1 to 8 Data reception status | Y220 to Y22F<br>/Y2A0 to Y2AF<br>/Y320 to Y32F | Blank |

## 2.3 Response Monitor Timer

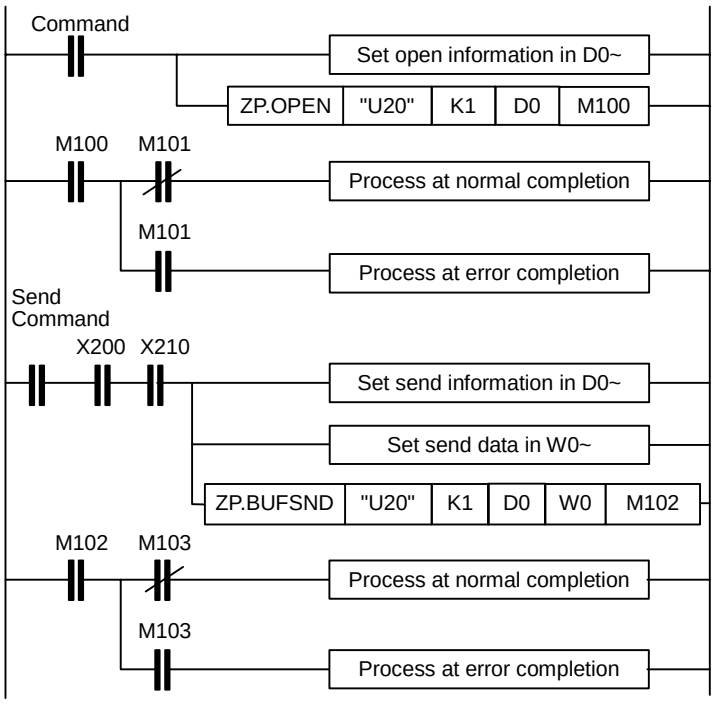
When the send connection is opened with "procedural", once the data is sent, the Ethernet I/F card will wait for a response from the client device to which the data was sent. The maximum value for this wait time is set as the response monitor timer value. If a response is not received within the set timer value time, the BUFSND command will end as an error. (The control data completion status will become $C022_H$.)

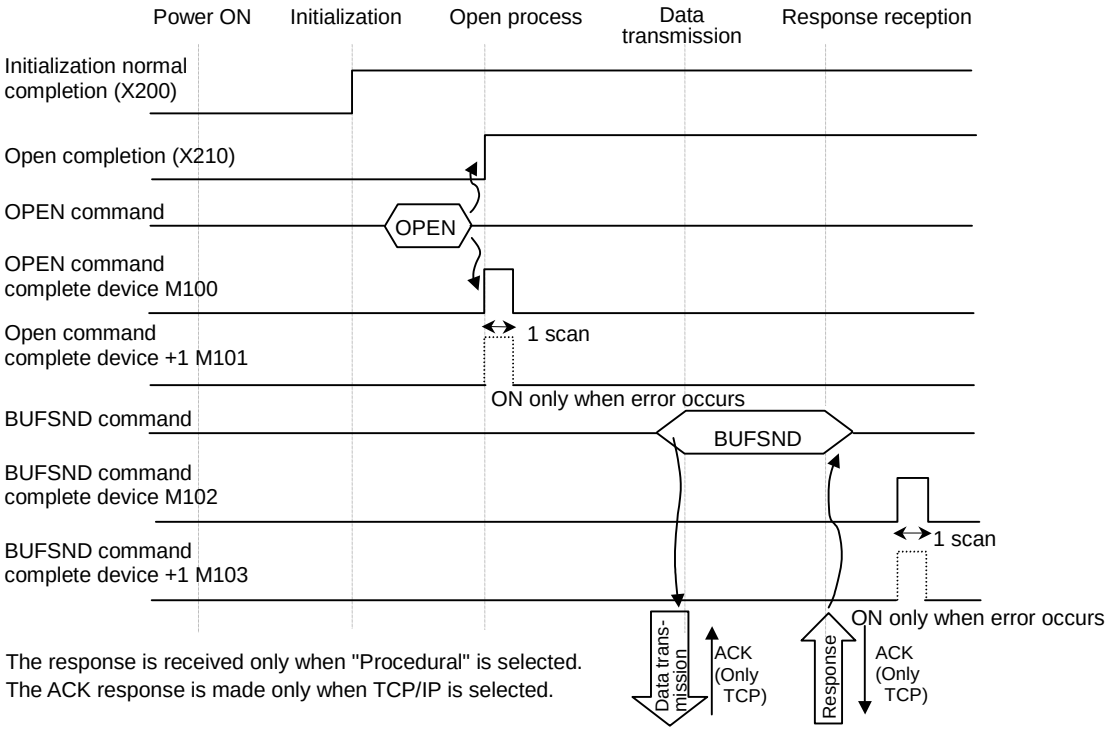
The response monitor timer is set in the following file register.

| File register No. | Details | Setting range | Default value | Setting unit |
|---|---|---|---|---|
| R123 | Response monitor timer | 2 to 32767 | 60 | 500 ms |

## 2.4 Transmission Control Method

The method of control when sending data from the Ethernet I/F card to the client device is explained below using connection 1 as an example.

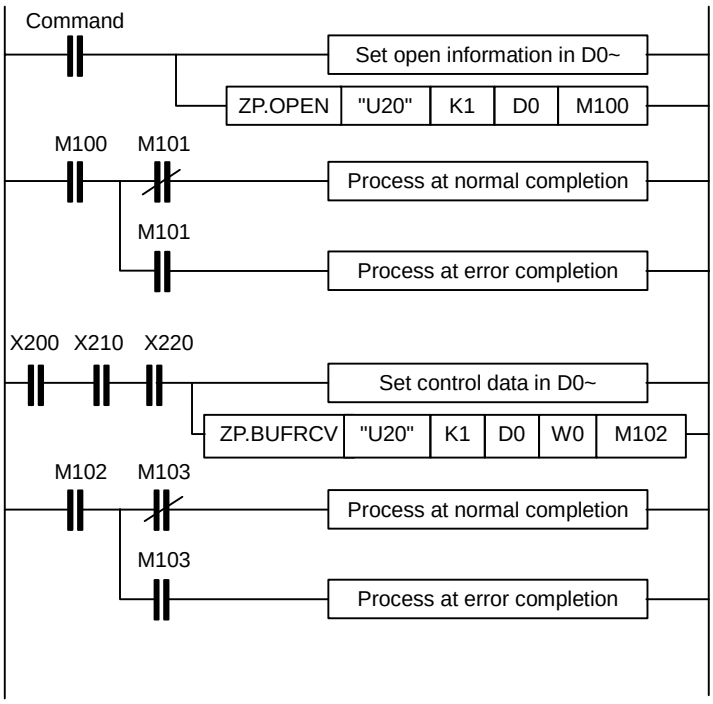


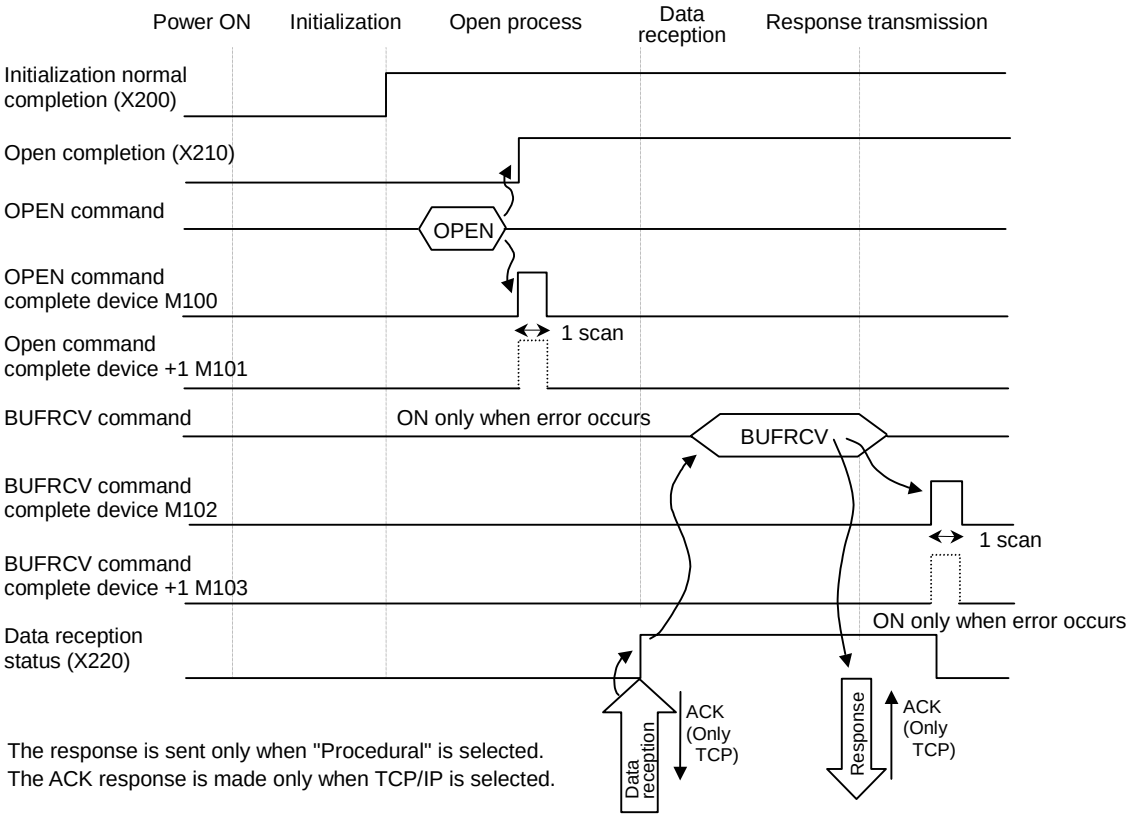




The response is received only when "Procedural" is selected.
The ACK response is made only when TCP/IP is selected.

## 2.5 Reception Control Method

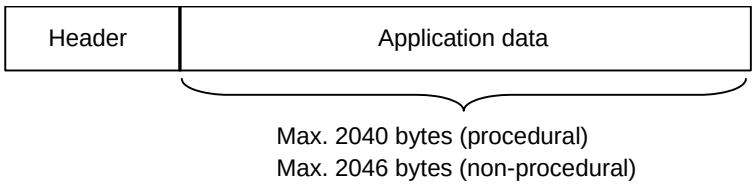
The method of control when receiving data from the client device is explained below using connection 1 as an example.



# 3. Data Format

The data format used when communicating data between the Ethernet I/F card and client device is explained in this section.
The communication data consists of the "header" and "application data" as shown below.




## 3.1 Header

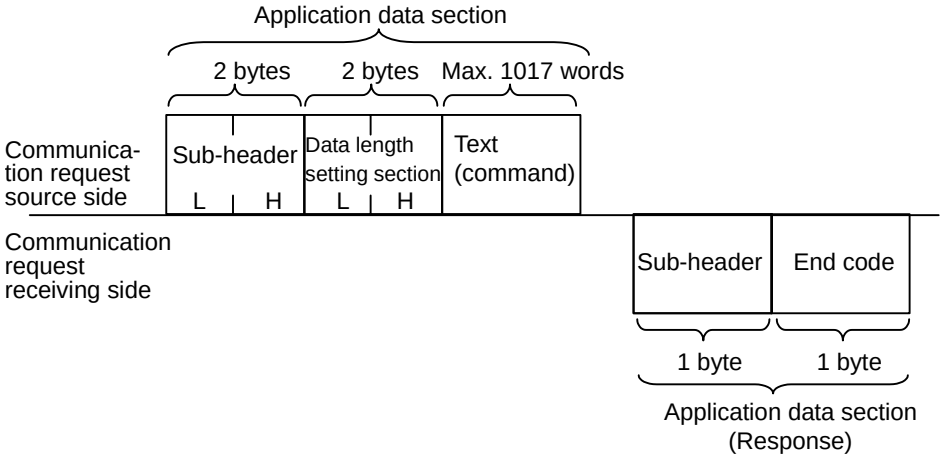
The header is for TCP/IP and UDP/IP. The header is automatically added and deleted within the Ethernet I/F card, and does not need to be set in the program.

## 3.2 Application Data

The application data format differs according to the procedure setting.

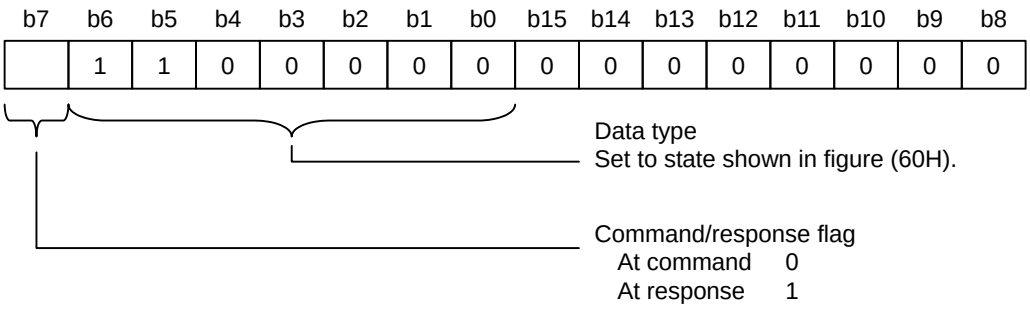
**(1) For procedural**

When procedural is selected, the format is as shown below.




(a) Sub-header

The sub-header format is shown below.
The sub-header is automatically added and deleted within the Ethernet I/F card, and does not need to be set in the program.



(b) Data length setting section
The data capacity of the text (command) section is indicated. (Indicate in number of words.)

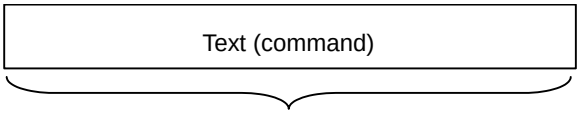
(c) Text
This is the text section actually to be sent.

(d) End code
When the client device normally receives the data, the end code indicates 00H. If an error occurs, a corresponding error code is entered. The following end codes are used.

| End code | Details |
|---|---|
| $00_H$ | Normal completion |
| $50_H$ | Command/response type in sub-header is not specified code. |

**(2) For non-procedural**

When non-procedural is selected, all of the data is handled as valid text.

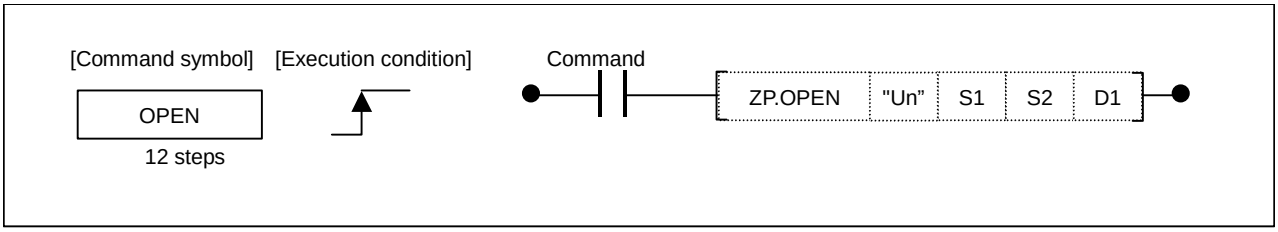



Application data section Max. 2046 bytes

# 4. Details of Dedicated Commands

## 4.1 OPEN Command

| | Usable devices | | | | | | | | | | | | | | | | | | | Index | Digit designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit device | | | | | | | | | Word device | | | | | | | | Constant | Pointer | | |
| | X | Y | M | L | F | B | SB | T | SM | T | C | D | R | W | SW | Z | SD | K | H | P | |
| S1 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | | |
| S2 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | |
| D1 | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | | | | | | | | | |




**Setting data**

| Setting data | Details | Data type |
|---|---|---|
| "Un" | Head input/output No. for Ethernet I/F card | BIN16 bit |
| S1 | Connection No. (1 to 8) | BIN16 bit |
| S2 | Head device of local station storing control data | BIN16 bit |
| D1 | Local device that turns 1 scan ON at completion of command.<br>(D1)+1 device also turns ON at error completion. | Bit |

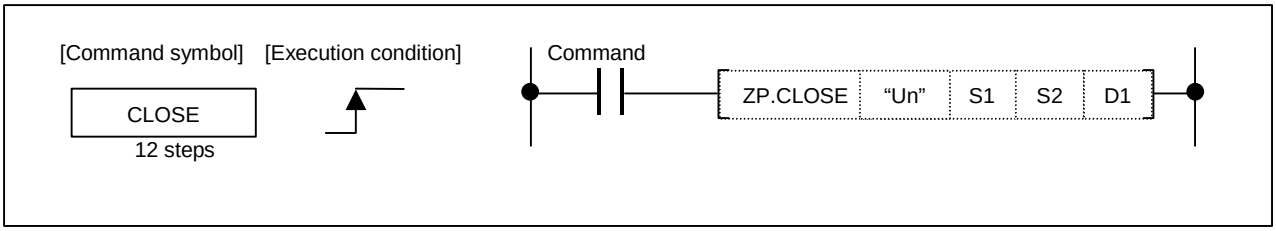
**Control data**

| Device | Item | Setting data | Setting range | Setting side |
|---|---|---|---|---|
| (S2) + 0 | Execution type/ completion type | Fix to a setting not used by GX Developer. | $8000_H$ | User |
| (S2) + 1 | Completion status | The status at completion is stored.<br>$0000_H$ : Normal completion<br>Other than $0000_H$ : Error completion (error code) | – | System |
| (S2) + 2 | Application setting area | Designate the connection application.<br>b15 … b9 b8 … b1 b0<br>(5) (4) (1)<br>(1) Buffer application (bit 0)<br>0 : Transmission<br>1 : Reception<br>(4) Communication method (bit 8)<br>0 : TCP/IP<br>1 : UDP/IP<br>(5) Communication procedure (bit 9)<br>0 : Procedural<br>1 : Non-procedural | (Indicated on the left) | User |

| Device | Item | Setting data | Setting range | Setting side |
|---|---|---|---|---|
| (S2) + 3 | Blank | | 0 | |
| (S2) + 4 to (S2) + 5 | Client device IP address | Designate the client device's IP address. (Set 0×A8C00101 for IP = 168.192.1.1) | $1_H$ to $FFFFFFFF_H$ | User |
| (S2) + 6 | Client device port No. | Designate the port No. for the client device. | 1025 to 65535 | User |
| (S2) + 7 to (S2) + 9 | Blank | | 0 | |

## 4.2 CLOSE Command

| | Usable devices | | | | | | | | | | | | | | | | | | | Index | Digit designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit device | | | | | | | | | Word device | | | | | | | | Constant | Pointer | | |
| | X | Y | M | L | F | B | SB | T | SM | T | C | D | R | W | SW | Z | SD | K | H | P | | |
| S1 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | | |
| S2 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | |
| D1 | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | | | | | | | | | |




**Setting data**

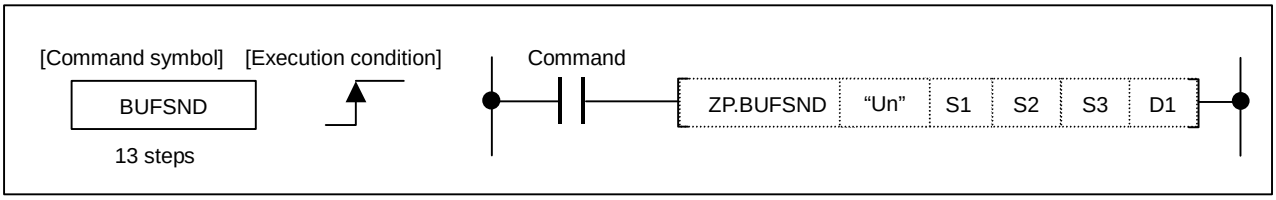
| Setting data | Details | Data type |
|---|---|---|
| "Un" | Head input/output No. for Ethernet I/F card | BIN16 bit |
| S1 | Connection No. (1 to 8) | BIN16 bit |
| S2 | Head device of local station storing control data | BIN16 bit |
| D1 | Local device that turns 1 scan ON at completion of command. (D1)+1 device also turns ON at error completion. | Bit |

**Control data**

| Device | Item | Setting data | Setting range | Setting side |
|---|---|---|---|---|
| (S2) + 0 | System area | – | – | – |
| (S2) + 1 | Completion status | The status at completion is stored.<br>$0000_H$ : Normal completion<br>Other than $0000_H$ : Error completion (error code) | – | System |

## 4.3 BUFSND Command

| | Usable devices | | | | | | | | | | | | | | | | | | | Index | Digit designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit device | | | | | | | | | Word device | | | | | | | Constant | | Pointer | | |
| | X | Y | M | L | F | B | SB | T | SM | T | C | D | R | W | SW | Z | SD | K | H | P | |
| S1 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | |
| S2 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | | | | |
| S3 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | | | | |
| D1 | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | | | | | | | | |




**Setting data**

| Setting data | Details | Data type |
|---|---|---|
| "Un" | Head input/output No. for Ethernet I/F card | BIN16 bit |
| S1 | Connection No. (1 to 8) | BIN16 bit |
| S2 | Head device of local station storing control data | BIN16 bit |
| S3 | Head No. of device to store the data to be sent | BIN16 bit |
| D1 | Local device that turns 1 scan ON at completion of command.<br>(D1)+1 device also turns ON at error completion. | Bit |

**Control data**

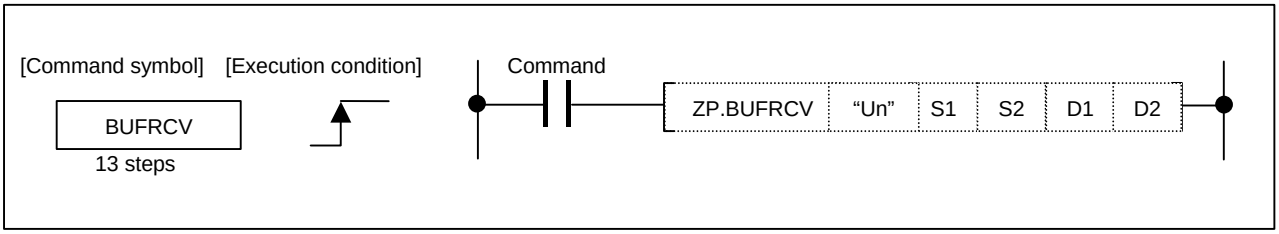
| Device | Item | Setting data | Setting range | Setting side |
|---|---|---|---|---|
| (S2) + 0 | System area | – | – | – |
| (S2) + 1 | Completion status | The status at completion is stored.<br>$0000_H$ : Normal completion<br>Other than $0000_H$ : Error completion (error code) | – | System |

**Send data**

| Device | Item | Setting data | | Setting range | Setting side |
|---|---|---|---|---|---|
| (S3) + 0 | Send data length | Designate the send data length.<br>Designate the data length according to the communication procedure. | | | User |
| | | | Procedural : No. of words | 1 to 1017 | |
| | | | Non-procedural : No. of bytes | 1 to 2046 | |
| (S3) + 1 to (S3) + n | Send data | Designate the send data. | | – | User |

## 4.4 BUFRCV Command

| | Usable devices | | | | | | | | | | | | | | | | | | | Index | Digit designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit device | | | | | | | | | Word device | | | | | | | Constant | | Pointer | | |
| | X | Y | M | L | F | B | SB | T | SM | T | C | D | R | W | SW | Z | SD | K | H | P | |
| S1 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | |
| S2 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | | | | |
| D1 | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | | | | |
| D2 | | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | | | | | | | | |




**Setting data**

| Setting data | Details | Data type |
|---|---|---|
| "Un" | Head input/output No. for Ethernet I/F card | BIN16 bit |
| S1 | Connection No. (1 to 8) | BIN16 bit |
| S2 | Head device of local station storing control data | BIN16 bit |
| D1 | Head No. of device to store the received data | BIN16 bit |
| D2 | Local device that turns 1 scan ON at completion of command (D1)+1 device also turns ON at error completion. | Bit |

**Control data**

| Device | Item | Setting data | Setting range | Setting side |
|---|---|---|---|---|
| (S2) + 0 | System area | – | – | – |
| (S2) + 1 | Completion status | The status at completion is stored.<br>$0000_H$ : Normal completion<br>Other than $0000_H$ : Error completion (error code) | – | System |

**Received data**

| Device | Item | Setting data | | Setting range | Setting side |
|---|---|---|---|---|---|
| (D1) + 0 | Received data length | Designate the received data length.<br>Designate the data length according to the communication procedure. | | | System |
| | | | Procedural : No. of words | 1 to 1017 | |
| | | | Non-procedural : No. of bytes | 1 to 2046 | |
| (D1) + 1 to (D1) + n | Received data | Designate the received data. | | – | System |

## 4.5 Details of Error Codes

The errors that occur when each dedicated command is executed, along with the error codes, are as shown below.

| Error code | Details | OPEN | BUFSND | BUFRCV | CLOSE |
|---|---|---|---|---|---|
| $2111_H$ | The input/output No. is not 20, 28, or 30.<br>The head character of the input/output No. is not "U".<br>The Ethernet I/F card is not mounted in the designated slot. | ○ | ○ | ○ | ○ |
| $4100_H$ | The device designation in the command is illegal. | ○ | ○ | ○ | ○ |
| $C014_H$ | The initialization process or open process is not completed. | | ○ | ○ | |
| $C017_H$ | An error occurred when opening the TCP connection. | ○ | | | |
| $C020_H$ | The data length exceeds the tolerable range. | | ○ | ○ | |
| $C021_H$ | An error completion response was received. | | ○ | | |
| $C022_H$ | The response was not received within the response monitor timer value. | | ○ | | |
| $C030_H$ | A transmission error occurred. | | ○ | | |
| $C033_H$ | A client device with the set IP address does not exist. | ○ | | | |
| $C1A6_H$ | BUFSND was executed in a connection opened for reception.<br>BUFRCV was executed in a connection opened for transmission.<br>An opened connection was tried to be opened again.<br>The connection No. is not within the specified range. | ○ | ○ | ○ | ○ |

## 4.6 Precautions for Programming

(1) Even if the dedicated commands (OPEN, CLOSE, BUFSND, BUFRCV) are executed with the high-speed PLC, the actual operation will take place at the same timing as the medium-speed PLC. Thus, the dedicated command should be executed with the medium-speed PLC.

(2) Do not update the BUFSND command transmission buffer until the command is completed. Failure to observe this could result in malfunctions.

(3) Refer to the BUFRCV command reception buffer after the command is completed. Failure to observe this could result in malfunctions.

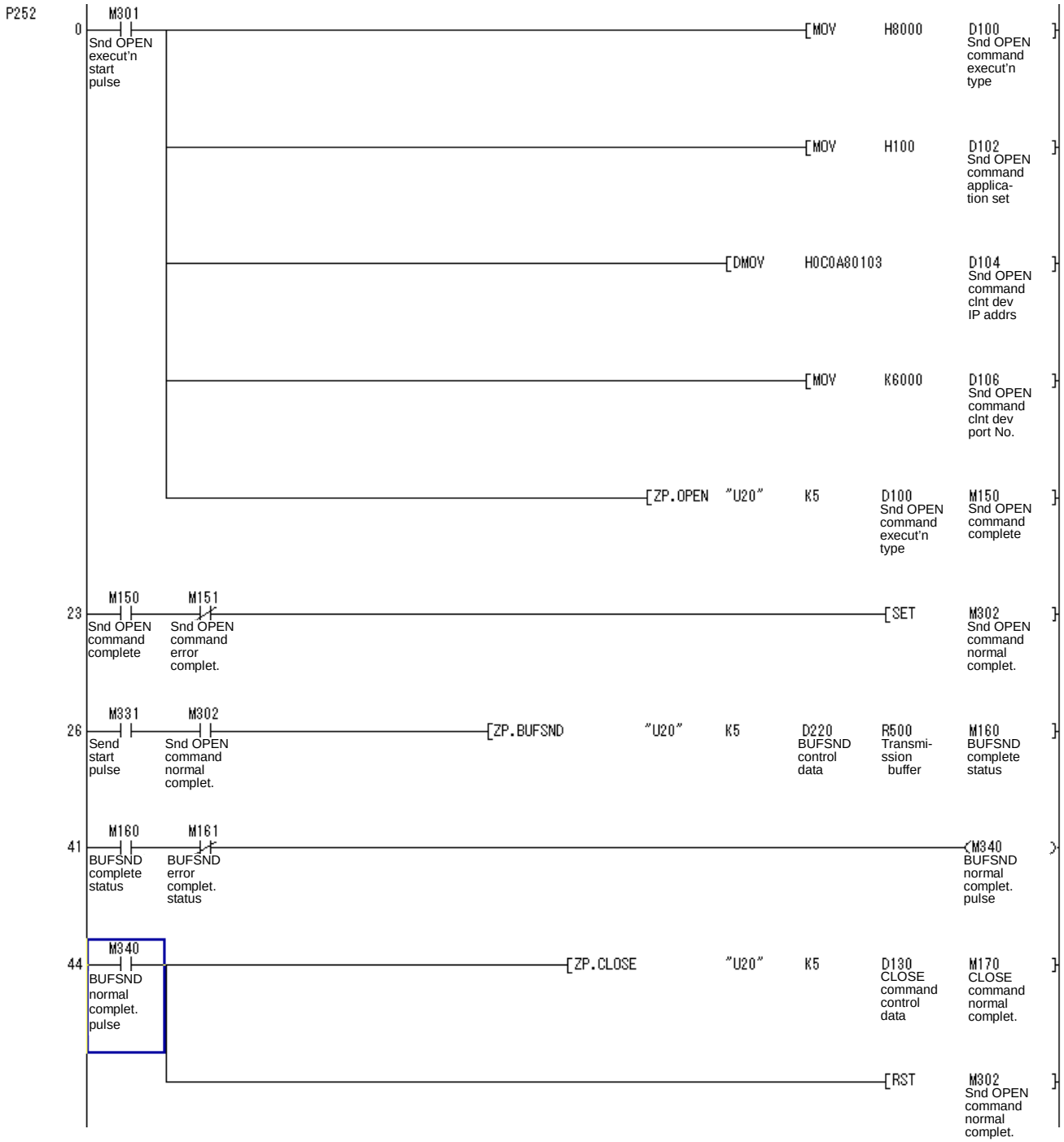
(4) Open transmission using TCP after the client device's reception has been opened. If transmission is opened before reception is opened, an error completion (completion status C033) will occur.
If transmission is opened for a client device with a nonexistent IP address, an error completion (completion status C033) will occur after one minute.

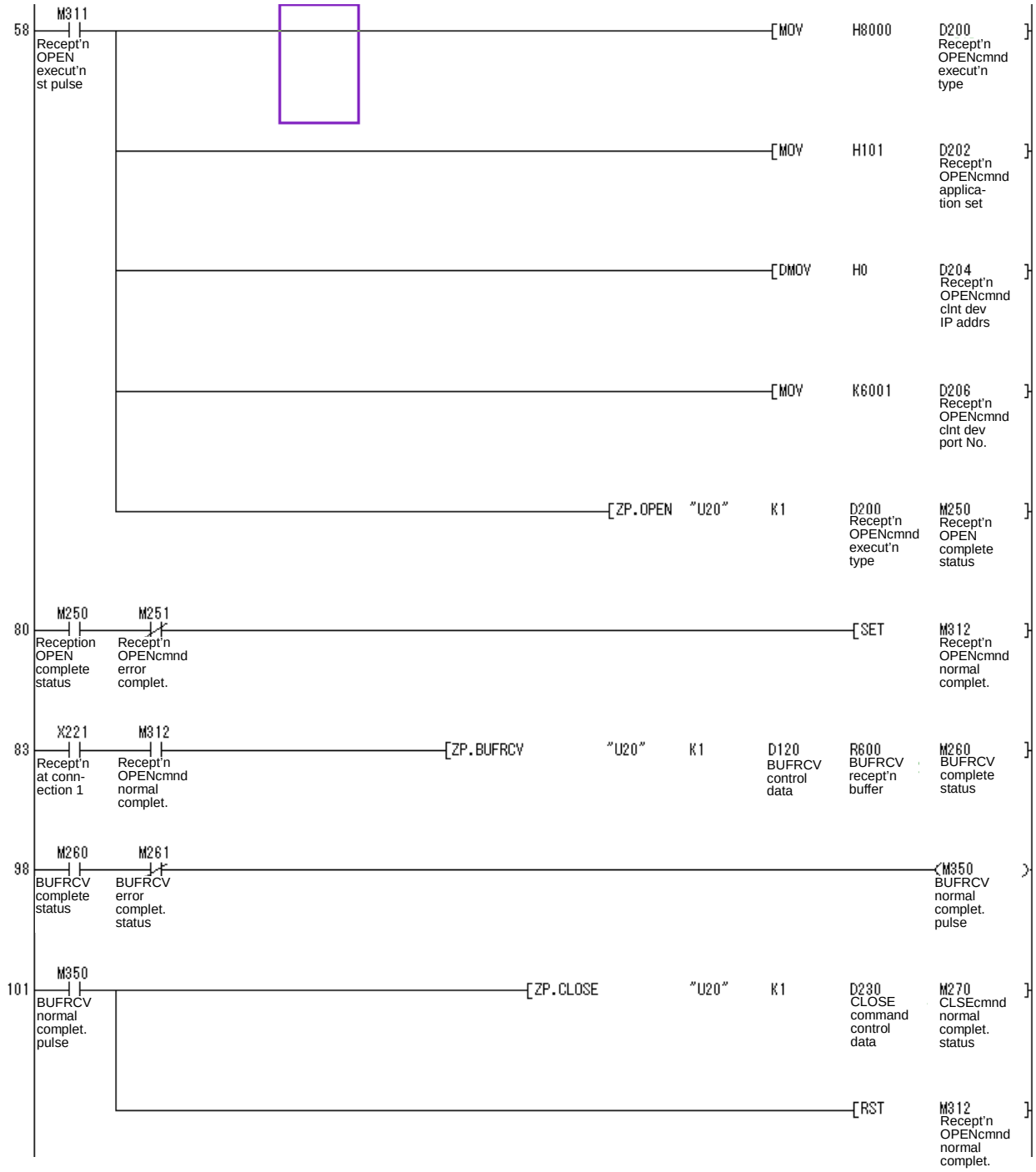
(5) If a connection opened with TCP is closed, and is tried to be opened again within a minute, an error completion (completion status C017) will occur. Wait a while before opening the connection again.

(6) If the connection No. is not within the specified range, an error completion (completion status C1A6) will occur, but the completion device and completion device +1 will not turn ON.

# 5. Example of Data Communication Program

The following is an example of the program that executes sending (BUFSND) and receiving (BUFRCV). UDP/IP, non-procedural type are used for both commands.
The send destination IP address is 192.168.1.3, and the applicable port No. is 6000. Connection 5 is used. In the actual program, the send data is set in R500 and above.
For the reception, the port No. is 6001, and connection 1 is used.




58
M311
Recept'n OPEN execut'n st pulse
MOV H8000 D200 Recept'n OPENcmnd execut'n type
MOV H101 D202 Recept'n OPENcmnd applica-tion set
DMOV H0 D204 Recept'n OPENcmnd clnt dev IP addrs
MOV K6001 D206 Recept'n OPENcmnd clnt dev port No.
ZP.OPEN "U20" K1 D200 Recept'n OPENcmnd execut'n type M250 Recept'n OPEN complete status
80
M250
Reception OPEN complete status
M251
Recept'n OPENcmnd error complet.
SET M312 Recept'n OPENcmnd normal complet.
83
X221
Recept'n at conn-ection 1
M312
Recept'n OPENcmnd normal complet.
ZP.BUFRCV "U20" K1 D120 BUFRCV control data R600 BUFRCV recept'n buffer M260 BUFRCV complete status
98
M260
BUFRCV complete status
M261
BUFRCV error complet. status
M350 BUFRCV normal complet. pulse
101
M350
BUFRCV normal complet. pulse
ZP.CLOSE "U20" K1 D230 CLOSE command control data M270 CLSEcmnd normal complet. status
RST M312 Recept'n OPENcmnd normal complet.

# VIII. MELSEC Q Series I/O/Intelligent Function Unit Connection Function

# 1. Outline

This function is for connecting an I/O unit / intelligent function unit of MELSEC-Q series to the NC (MELDAS C6/C64).

# 2. Basic Specification

By adding a Q bus bridge card HR863, connection with the following specifications becomes possible. Only one Q bus bridge card can be mounted, but the maximum 4 extension base units can be mounted on the Q bus bridge card. The maximum number of slots (No. of units) is 24.

MELSEC I/O connection basic specification

| Item | Basic specification |
|---|---|
| The numbers of I/O points | The maximum number of input points: 512 points<br>The maximum number of output points: 512 points |
| Access to buffer memory of intelligent unit | The accessible size of MELSEC intelligent unit's buffer memory per scan is up to 12k words with FROM/TO command from the built-in PLC of C6/C64. |

Connectable MELSEC units

| Product | | Model | Description |
|---|---|---|---|
| Input unit | AC | QX10 | 100-120VAC/7-8mA, 16 points, response time: 20ms, terminal block |
| | | QX28 | 240VAC, 8 points, terminal block |
| | DC | QX40 | 24VDC/4mA, positive common, 16 points, response time: 1/5/10/20/70ms, terminal block |
| | | QX40-S1 | 24VDC, 16 positive common input points, terminal block for high-speed input (Possible to set the response time to 0.1ms.) |
| | | QX41 | 24VDC/4mA, positive common, 32 points, response time: 1/5/10/20/70ms, connector |
| | | QX42 | 24VDC/4mA, positive common, 64 points, response time: 1/5/10/20/70ms, connector |
| | | QX80 | 24VDC/4mA, negative common, 16 points, response time: 1/5/10/20/70ms, terminal block |
| | | QX81 | 24VDC/4mA, negative common, 32 points, response time: 1/5/10/20/70ms, connector |
| Output unit | Contact | QY10 | 240VAC/24VDC, 2A/point, 8A/common, 16 points (16 points/common), output delay:12ms, without fuse, terminal block |
| | | QY18A | 240VAC/24VDC 2A, 8 independent output points, terminal block, without fuse |
| | AC triac | QY22 | 240VAC, 0.6A, 16 points, terminal block, without fuse |
| | Transistor (Sink) | QY40P | 12/24VDC, 0.1A/point, 1.6A/common, 16 points (16 points/common), output delay:1ms, terminal block, with short protection function |
| | | QY41P | 12/24VDC, 0.1A/point, 2A/common, 32 points (32 points/common), output delay:1ms, connector, with short protection function |
| | | QY42P | 12/24VDC, 0.1A/point, 2A/common, 64 points (32 points/common), output delay:1ms, connector, with short protection function |
| | | QY50 | 12/24VDC, 0.5A/point, 4A/common, 16 points (16 points/common), output delay:1ms, with fuse, terminal block |
| | Transistor | QY68A | 5-24VDC, 2A/point, 8A/unit, 8 points, all points independent, sink/source, terminal block, without fuse |
| | TTL CMOS (Sink) | QY70 | 5/12VDC, 16mA/point, 16 points (16 points/common), output delay:0.3ms, with fuse, terminal block |
| | | QY71 | 5/12VDC, 16mA/point, 32 points (32 points/common), output delay:0.3ms, with fuse, connector |
| | Transistor (Source) | QY80 | 12/24VDC, 0.5A/point, 4A/common, 16 points (16 points/common), output delay:1ms, with fuse, terminal block |
| | | QY81P | 12/24VDC, 0.1A/point, 2A/common, 32 points (32 points/common), output delay:1ms, connector, with short protection function |

Intelligent unit

| Product | Model | Description |
|---|---|---|
| FL-net (OPCN-2) unit | QJ71FL71-T-F01 | |
| | QJ71FL71-B5-F01 | |
| | QJ71FL71-B2-F01 | |
| AS-i master unit | QJ71AS92 | Supports AS-i Standard Ver.2.11 |

Others

| Product | Model | Description |
|---|---|---|
| Extension base unit | Q63B | Power supply + 3 I/O slots, for mounting on Q series unit |
| | Q65B | Power supply + 5 I/O slots, for mounting on Q series unit |
| | Q68B | Power supply + 8 I/O slots, for mounting on Q series unit |
| | Q612B | Power supply + 12 I/O slots, for mounting on Q series unit |
| Power supply unit | Q61P-A1 | 100-120VAC input/5VDC 6A output |
| | Q61P-A2 | 200-240VAC input/5VDC 6A output |
| | Q62P | 100-240VAC input/5VDC 3A, 24VDC/0.6A output |
| | Q63P | 24VDC input/5VDC 6A output |
| | Q64P | 100-120/200-240VAC input, 5VDC 8.5A output |

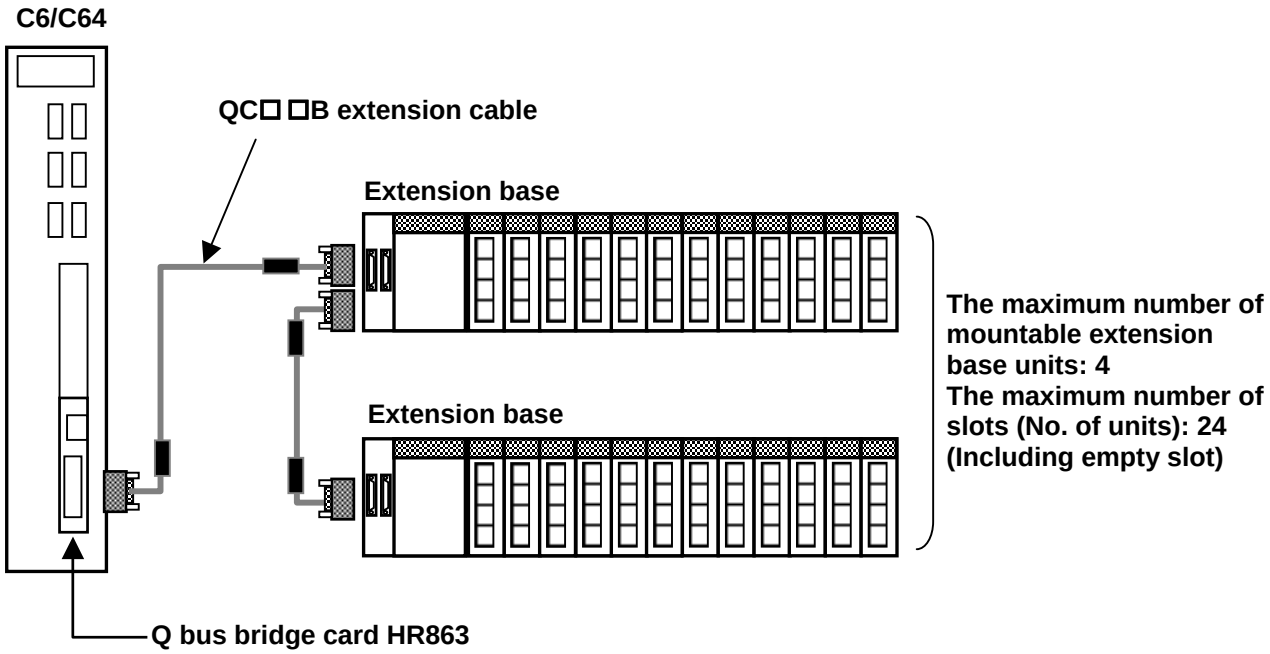
**(Note 1)** Maximum 4 extension base units can be mounted.
**(Note 2)** Extension base unit without power supply cannot be used.

# 3. Detailed Explanation

## 3.1 Connection

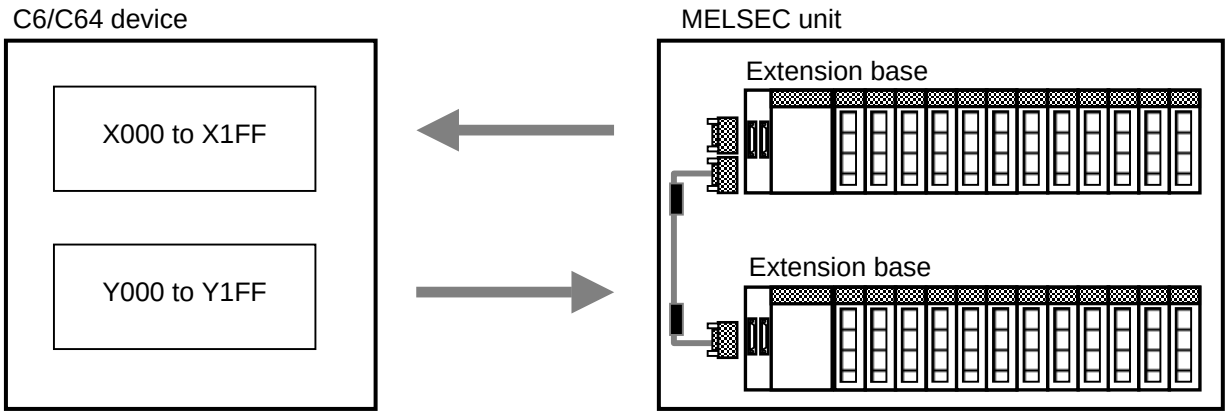
Connect the NC and the MELSEC units as shown below.

MELSEC unit connection

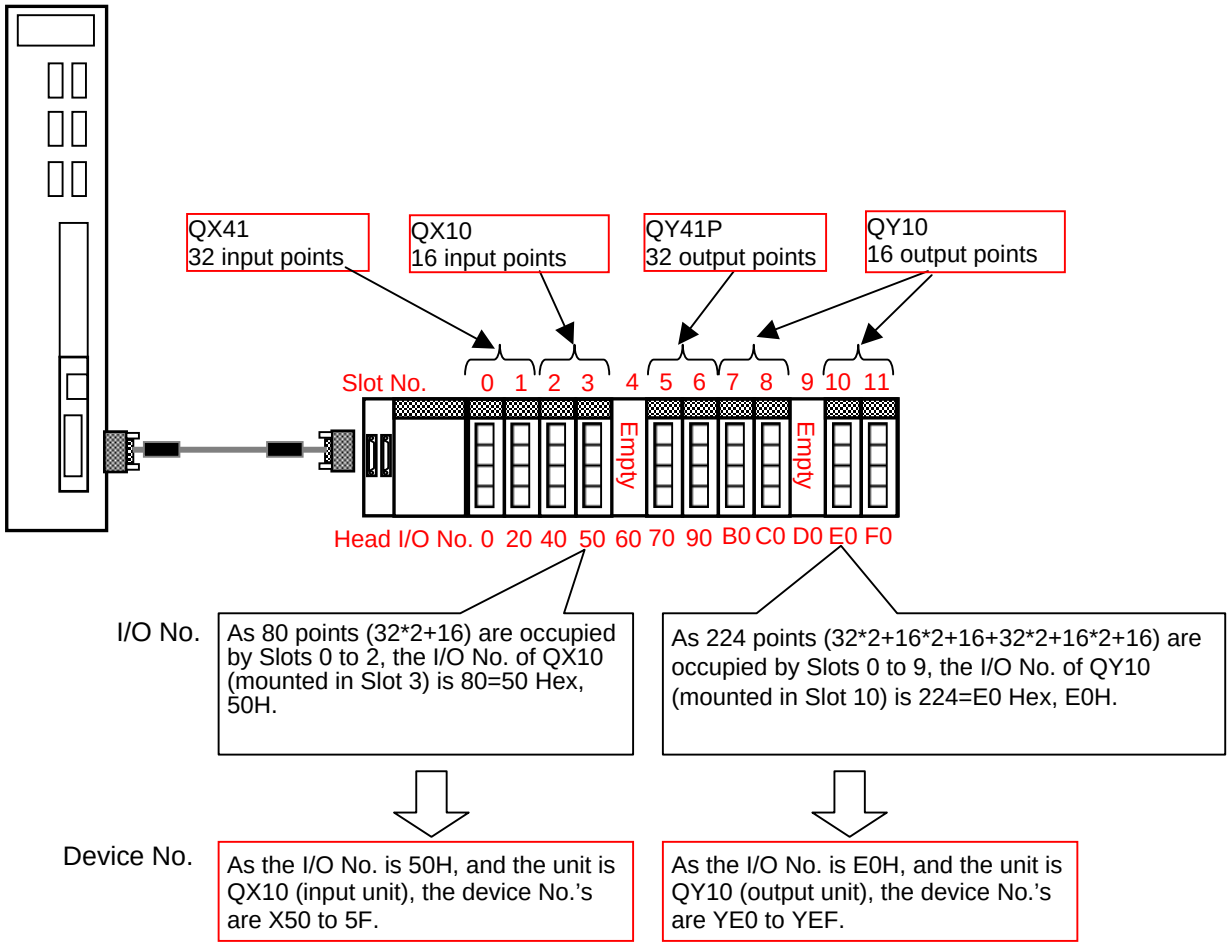



## 3.2 Allocation of I/O I/F (Interface)

The I/O I/F between C6/C64 and MELSEC unit is 512 points (X000 to X1FF) for input and 512 points (Y000 to Y1FF) for output.
By using the following devices in the built-in PLC of C6/C64, you can access to the I/O of the MELSEC units. The device number to each unit is determined by the I/O number of each unit. The I/O No. of each unit is expressed in HEX. The left end slot, which is the closest to the power supply unit, of the first extension base unit is 0H. To find the I/O No. of the next unit (the one on the right hand of the first unit), add the number of I/O points of the first unit (the one on the left hand) and express it in HEX. (A slot without a unit also occupies 16 points.) Refer to the next page for calculation examples.



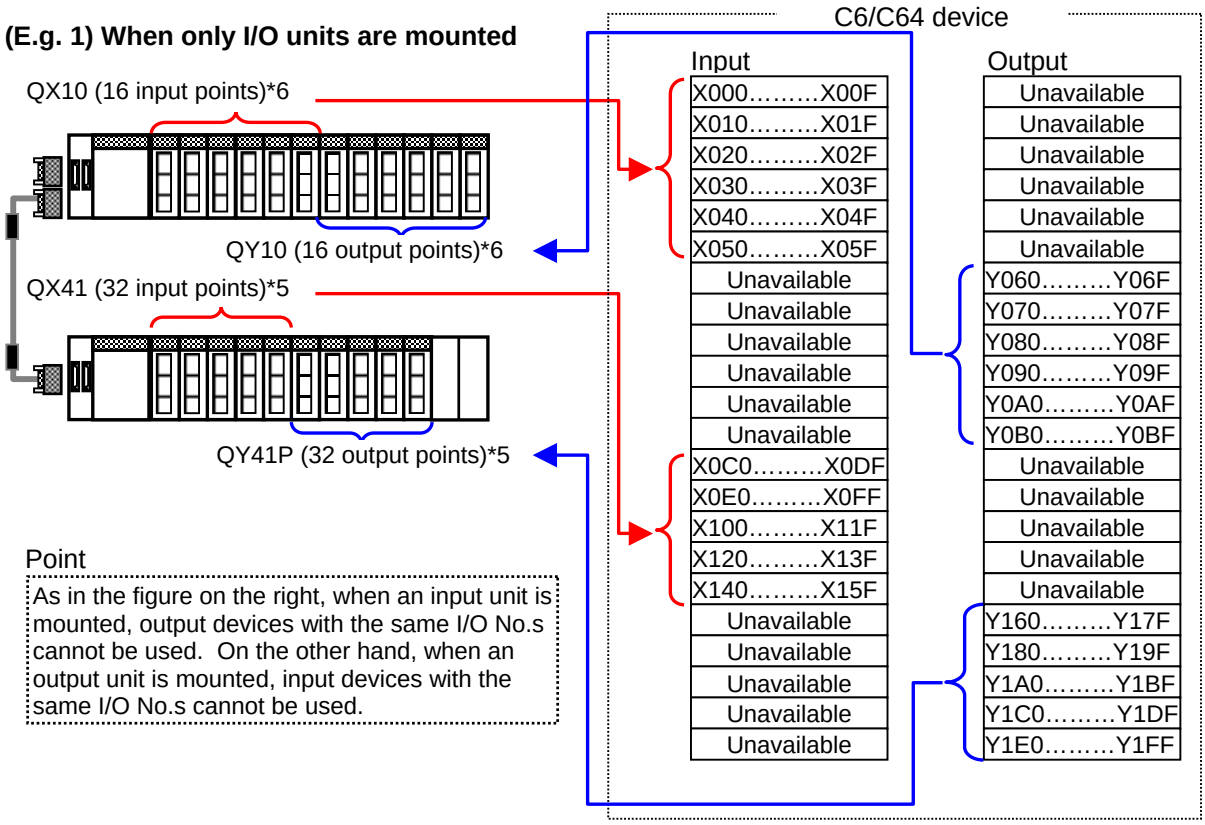
### (1) Example of calculation of I/O numbers and device numbers



### (2) MELSEC I/O unit connection and access devices from C6/C64

The followings are examples of device correspondence of C6/C64.

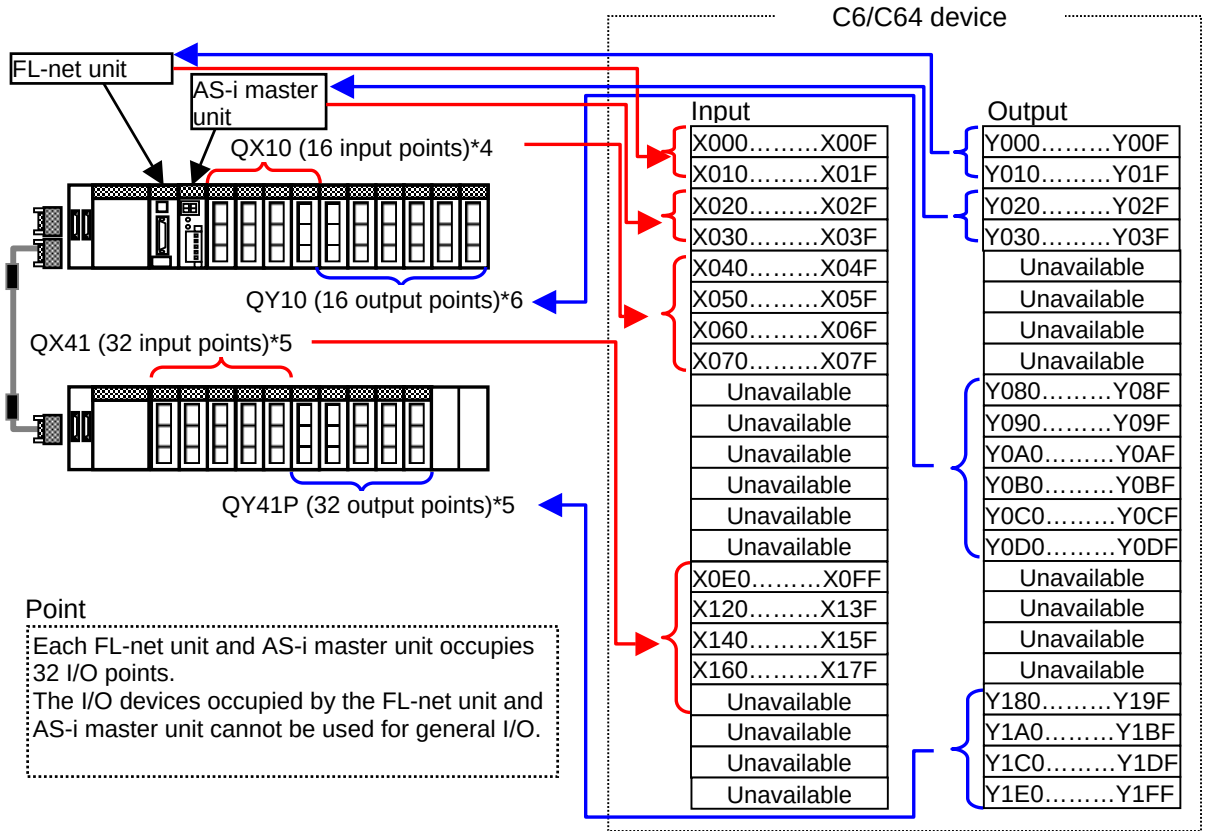
**(E.g. 1) When only I/O units are mounted**




**Point**

As in the figure on the right, when an input unit is mounted, output devices with the same I/O No.s cannot be used. On the other hand, when an output unit is mounted, input devices with the same I/O No.s cannot be used.

**(E.g. 2) When intelligent function units and I/O units are mounted**

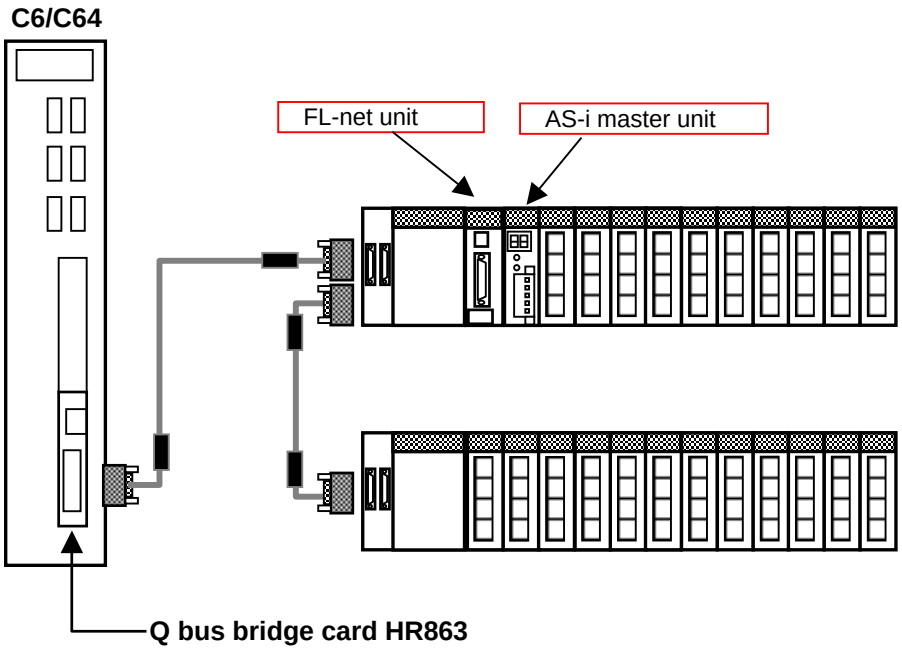



**Point**

Each FL-net unit and AS-i master unit occupies 32 I/O points.
The I/O devices occupied by the FL-net unit and AS-i master unit cannot be used for general I/O.

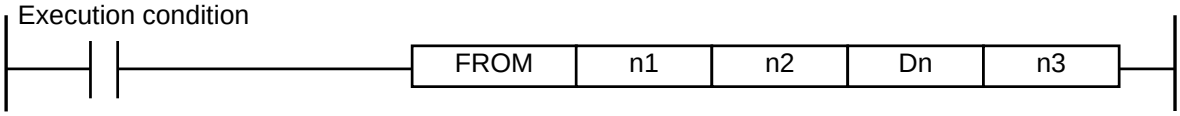
## 3.3 Access to Intelligent Function Units

This section explains how to access to a MELSEC intelligent function unit from the built-in PLC of C6/C64.




### 3.3.1 Reading Buffer Memory (by FROM command)

To read the buffer memory of the MELSEC intelligent function unit by the built-in PLC in C6/C64, use an FROM command.

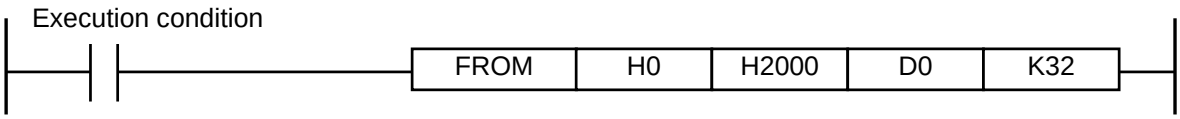



n1: Head I/O No. (Designate the first two digits of the 3-digit I/O No. allocated to the intelligent function unit.)
n2: Head address of the buffer memory in which the data to read is stored.
Dn: Head No. of the PLC register of C6/C64 which will store the read data.
n3: The number of words of the data to read.

| | Usable device | | | | | | | | | | | | | | | | | | | | Digit specification | Index | The number of steps |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit device | | | | | | | | | | Word device | | | | | | | | Constant | Pointer | | | |
| | X | Y | M | L | F | B | SB | T | SM | V | T | C | D | R | W | SW | Z | SD | K | H | P | | | |
| n1 | | | | | | | | | | | | | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | | | 5 |
| n2 | | | | | | | | | | | | | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | | | |
| Dn | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | ○ | ○ | ○ | ○ | | ○ | | | | | | |
| n3 | | | | | | | | | | | | | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | | | |

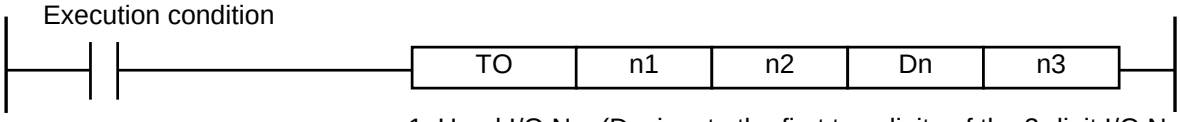
**(Note)** As for bit device, the only available unit for designation is 16 bits.

**(E.g.)** To read 32 words of data in Area 2 of the FL-net unit (buffer memory address 2000H) and write them into D0 to D31 of data register in the configuration above. (The I/O number of FL-net unit in the configuration above is 000.)



### 3.3.2 Writing in Buffer Memory (by TO command)

To write data into the buffer memory of the MELSEC intelligent function unit from the built-in PLC in C6/C64, use a TO command.

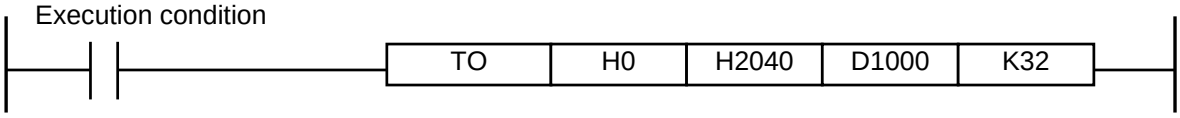



n1: Head I/O No. (Designate the first two digits of the 3-digit I/O No. allocated to the intelligent function unit.)
n2: Head address of the buffer memory in which the data to write is stored.
Dn: Head No. of the PLC register of C6/C64 which will store the written data.
n3: The number of words of the data to write.

| | Usable device | | | | | | | | | | | | | | | | | | | | Digit designation | Index | The number of steps |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit device | | | | | | | | | | Word device | | | | | | | | Constant | Pointer | | | |
| | X | Y | M | L | F | B | SB | T | SM | V | T | C | D | R | W | SW | Z | SD | K | H | P | | | |
| n1 | | | | | | | | | | | | | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | | | 5 |
| n2 | | | | | | | | | | | | | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | | | |
| Dn | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | ○ | ○ | ○ | ○ | | ○ | | | | | | |
| n3 | | | | | | | | | | | | | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | | | |

**(Note)** As for bit device, the only available unit for designation is 16 bits.

**(E.g.)** To write 32 words of data in data register D1000 to D1031 into the buffer memory addresses 2040H to 205FH of FL-net unit's Area 2. (The I/O number of FL-net unit in the configuration above is 000.)



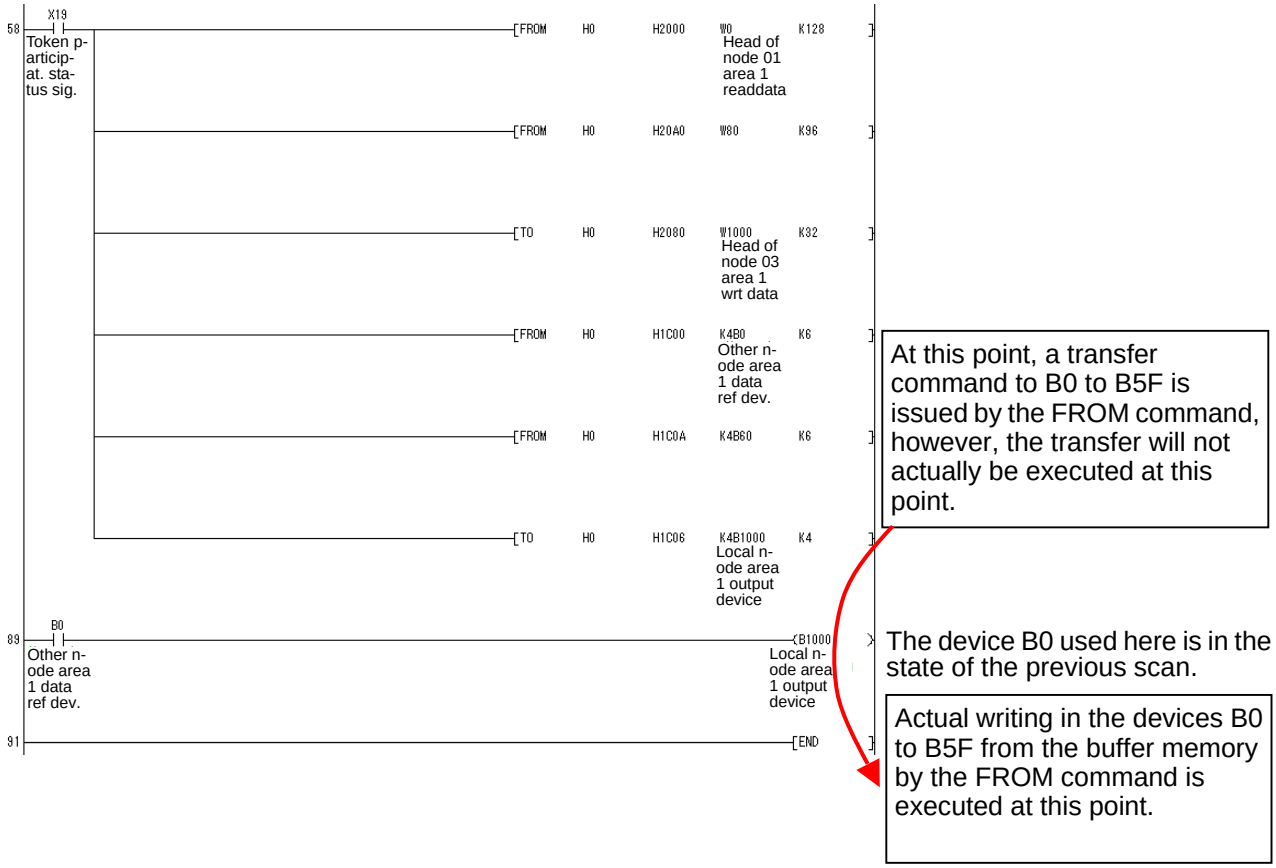
### 3.3.3 Restrictions in Using FROM/TO Commands

Using FROM/TO command by the built-in PLC in C6/C64 has the restrictions below.

(1) The number of FROM and TO commands that can be used in one scan (including multiple program) is 50 each. Using more than 50 will cause the alarm "Q01 EMERGENCY STOP LAD 0005", and will stop the built-in PLC.

(2) The accessible size of buffer memory in one scan (including multiple program) by FROM/TO command is up to 12k words. Exceeding 12k words will cause the alarm "Q01 EMERGENCY STOP LAD 0006", and will stop the built-in PLC.

(3) Actual transfer from the buffer memory to read devices by FROM command, and transfer from write devices to the buffer memory by TO command are done at the execution of END command. (In multiple programs, at the execution of END command at the end of all the programs.) Thus, device data renewal will be delayed by 1 scan.



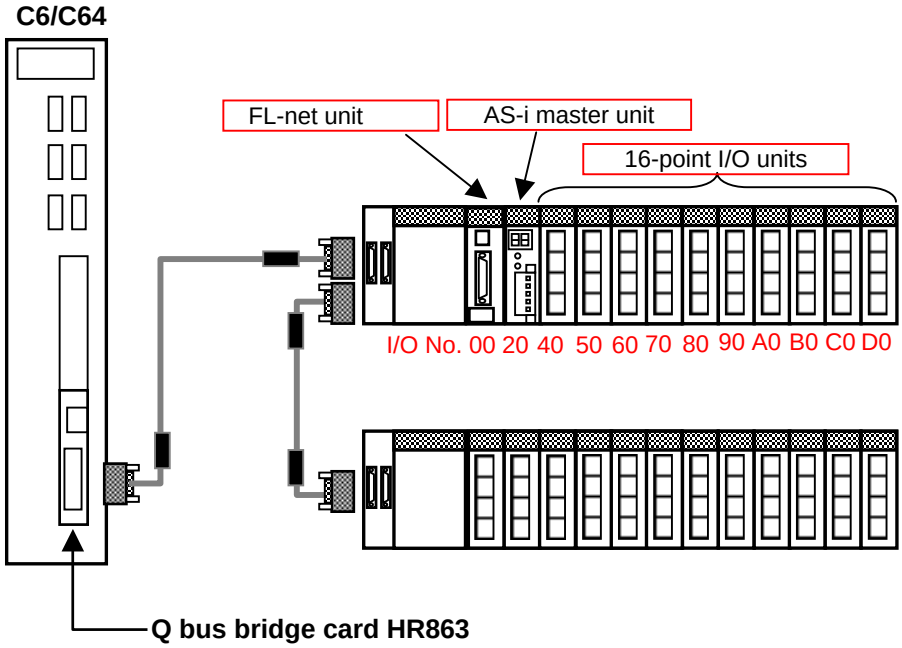

(4) FROM/TO commands cannot be used in high-speed program processing.
If FROM/TO command is executed in high-speed program processing, the alarm "Q01 EMERGENCY STOP LAD 0007" will occur and the built-in PLC will stop.

(5) If bit device is used for FROM/TO command, the only available unit for designation is 16 bits.
If bit device is not designated in the unit of 16 bits, the alarm "Q01 EMERGENCY STOP LAD 0008" will occur and the built-in PLC will stop.

Correct example : FROM H0 H1C00 K4B20 K32
TO H0 H1C80 K4M64 K32
Incorrect example : FROM H0 H1C00 K4B28 K32 → "Q01 EMERGENCY STOP LAD 0008"
TO H0 H1C80 K4M100 K32 → "Q01 EMERGENCY STOP LAD 0008"

### 3.3.4 Access to I/O of Intelligent Function Units

MELSEC intelligent function unit occupies I/O as I/O units do, and the I/O controls the unit itself or judges the status.
In an access from C6/C64's built-in PLC to I/O of an intelligent function unit, use X000 to X1FF and Y000 to Y1FF (the I/O I/F).
Device numbers are determined by I/O numbers allocated to the intelligent function unit.
Each device number will be "I/O number + 00 to 1F".



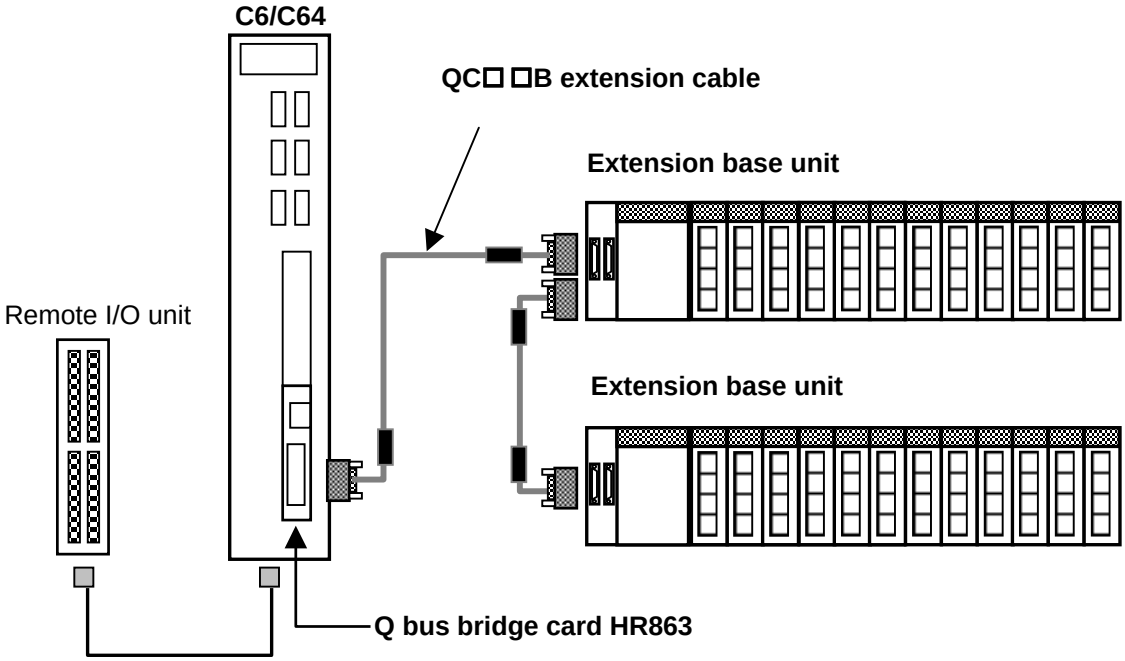

The I/O devices of each intelligent unit in the case that the units are mounted as shown in the figure above are as follows.

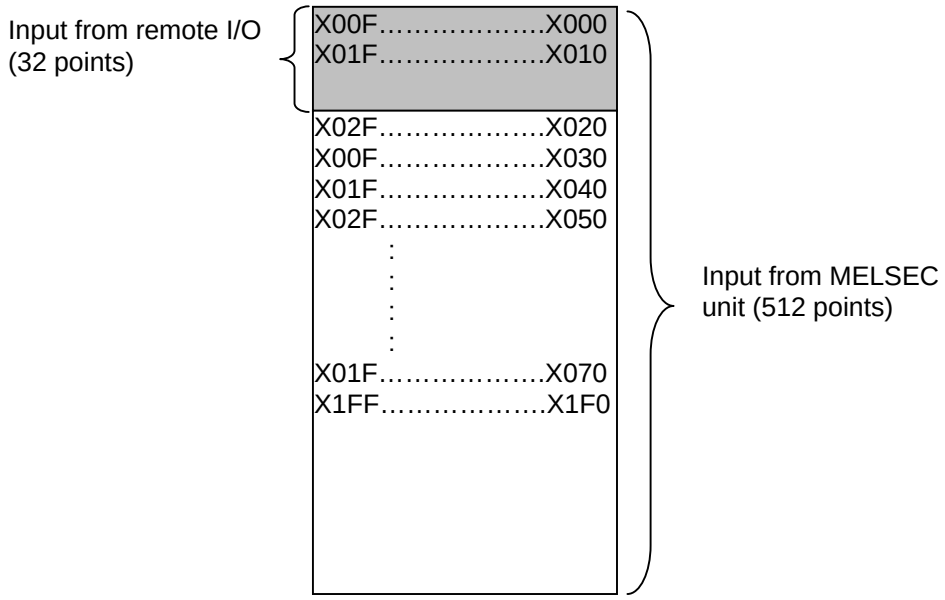
| Intelligent unit | Input devices | Output devices |
|---|---|---|
| FL-net unit 1 | X000 to X01F | Y000 to Y01F |
| AS-i master unit | X020 to X03F | Y020 to Y03F |

# 4. Other Notices

## 4.1 Notices in Connecting Remote I/O Unit

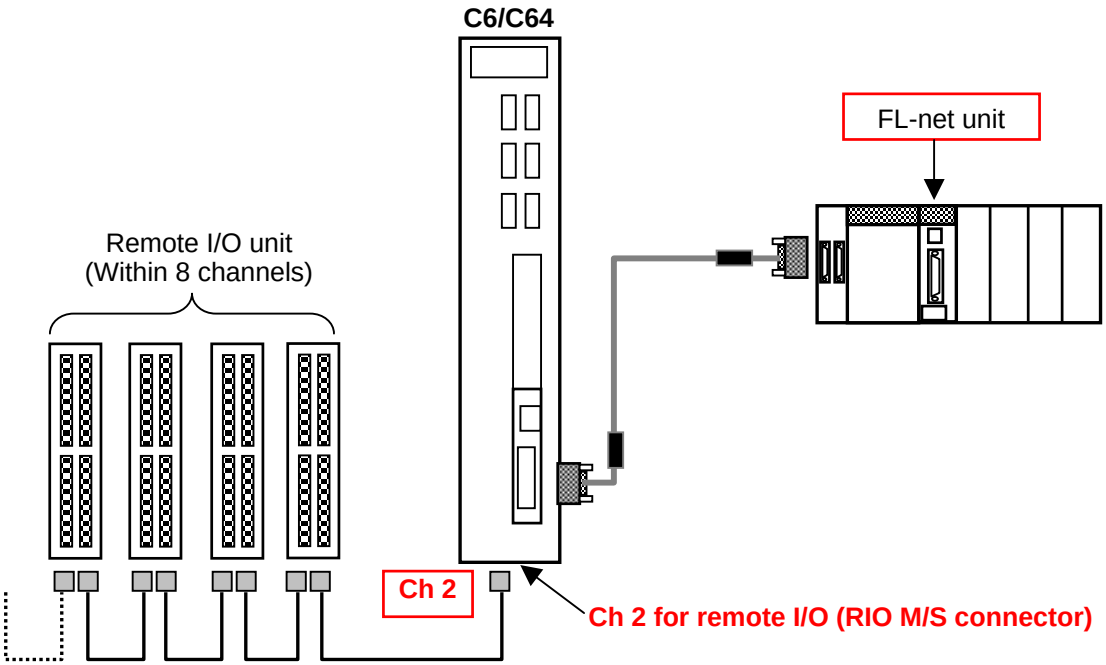
(1) When a remote I/O unit is connected, the priority is on the input signals from the remote I/O unit.
If a remote I/O unit that occupies 32 points is connected to Channel 1 for remote I/O as shown in the figure below, the I/O signals from MELSEC (X000 to X01F) will be ignored, and the I/O signals from the remote I/O unit will be validated.
As for output signals, the same signals are output to the remote I/O unit and MELSEC.

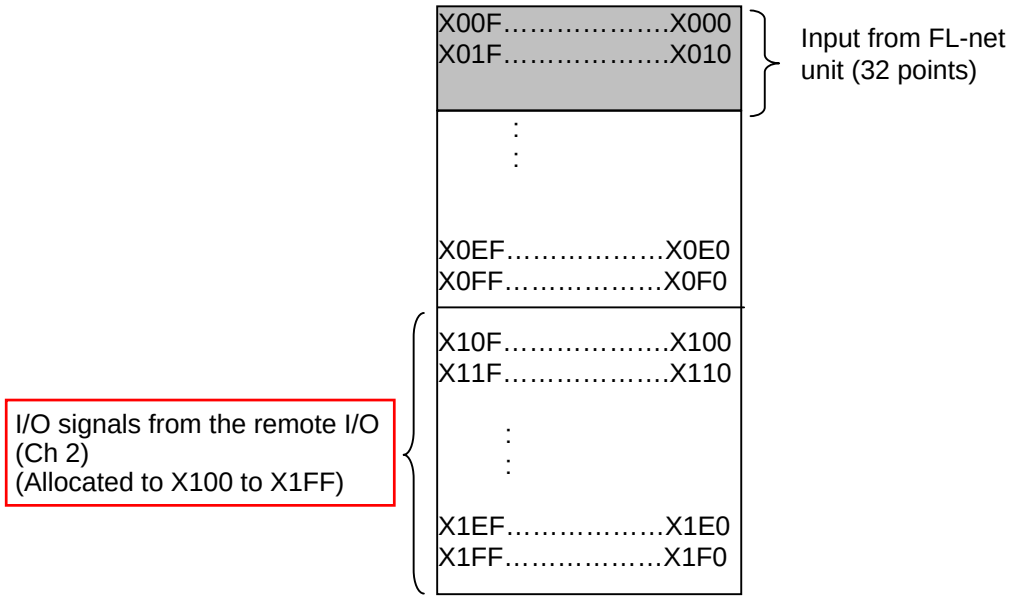


(2) When intelligent function unit and remote I/O unit are connected

When an intelligent function unit is used, access to the unit's buffer memory needs to be controlled by I/O signals from the unit, so access to the unit may not be done properly if I/O signals from the remote I/O unit lap over.
To use an intelligent function unit and remote I/O unit together, connect the remote I/O unit to Channel 2, so that their I/O signals will not lap over.



## 4.2 Built-in PLC's Scan Time

As mentioned in the section of restrictions, up to 50 FROM/TO commands are available in one scan, and the maximum size of access to the buffer memory by FROM/TO command is 12k words. However, as FROM/TO command takes longer for processing compared with other commands, it greatly affects on the scan time of the built-in PLC. Keep the number of FROM/TO commands as low as possible.

Reference: FROM/TO command processing time

| Command | Command base processing time | Data transfer time |
|---|---|---|
| FROM command | 115μs | 1.29μs/word |
| TO command | 110μs | 1.29μs/word |

Example of processing time calculation: FROM H0 H2000 D1000 K64

(Read 64 words of the address 2000H of the buffer memory and write them in D1000)

Command processing time=Command base processing time + Data transfer time

=115 +1.29*64

=197.56μs

## 4.3 Buffer Memory Address

Trying to access to an illegal address (that doesn't exist in terms of MELSEC intelligent unit's spec) with the intelligent unit's buffer memory access by FROM/TO command will cause the alarm "Q01 EMERGENCY STOP LAD 0009", and will stop the built-in PLC.

# 5. Alarm List

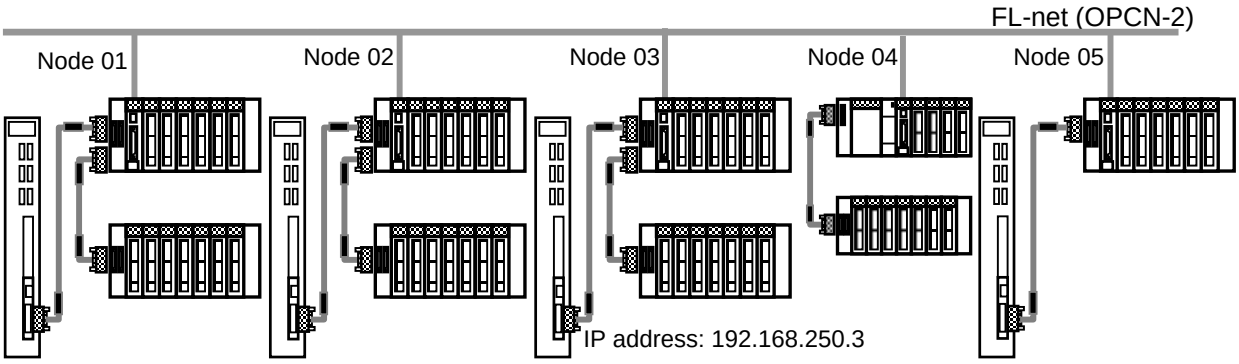
Descriptions and remedies for the alarms that may occur during using this function.

| Message | Description | Remedy |
|---|---|---|
| Q01 EMERGENCY STOP LAD 0002 | FROM/TO command was issued without mounting a Q bus bridge card HR863. | Mount a Q bus bridge card HR863. |
| Q01 EMERGENCY STOP LAD 0003 | In FROM/TO command, a minus value was set as the head I/O number. | Correct the head I/O number. |
| Q01 EMERGENCY STOP LAD 0004 | In FROM/TO command, a minus value was set as the transfer size. | Correct the transfer size. |
| Q01 EMERGENCY STOP LAD 0005 | There are more than 50 FROM/TO commands in one scan. | Review the built-in PLC's program so that the number of each FROM command and TO command does not exceed 50. |
| Q01 EMERGENCY STOP LAD 0006 | The size of access to the buffer memory by FROM/TO command in one scan exceeded 12k words. | Review the built-in PLC's program. |
| Q01 EMERGENCY STOP LAD 0007 | FROM/TO command was used in high-speed program processing. | As FROM/TO command is not available in high-speed program processing, delete the command. |
| Q01 EMERGENCY STOP LAD 0008 | The unit when designating bit device in FROM/TO command is not 16 bits. | Change the unit of bit device number to 16 bits. |
| Q01 EMERGENCY STOP LAD 0009 | In access to MELSEC intelligent unit's buffer memory by FROM/TO command, an illegal address (that doesn't exist in terms of the unit's spec) was accessed. | Of the built-in PLC's FROM/TO command, review the part that designates the buffer memory address. |
| Q01 EMERGENCY STOP LAD 000A | An alarm occurred in the MELSEC unit mounted on an extension base unit. | Check the MELSEC unit that is mounted on an extension base unit. |
| Q01 EMERGENCY STOP LAD 000B | The head I/O No. designated by FROM/TO command and the actual position of the mounted intelligent function unit (the unit's I/O No.) don't match. | Check if the head I/O No. and the unit's mounted position are correct. If wrong, correct the head I/O No. of the FROM/TO command. |
| | The head address designated by FROM/TO command is out of the range of the intelligent function unit's buffer memory address. | Check the head address of the FROM/TO command. If it's wrong, correct the head address. |

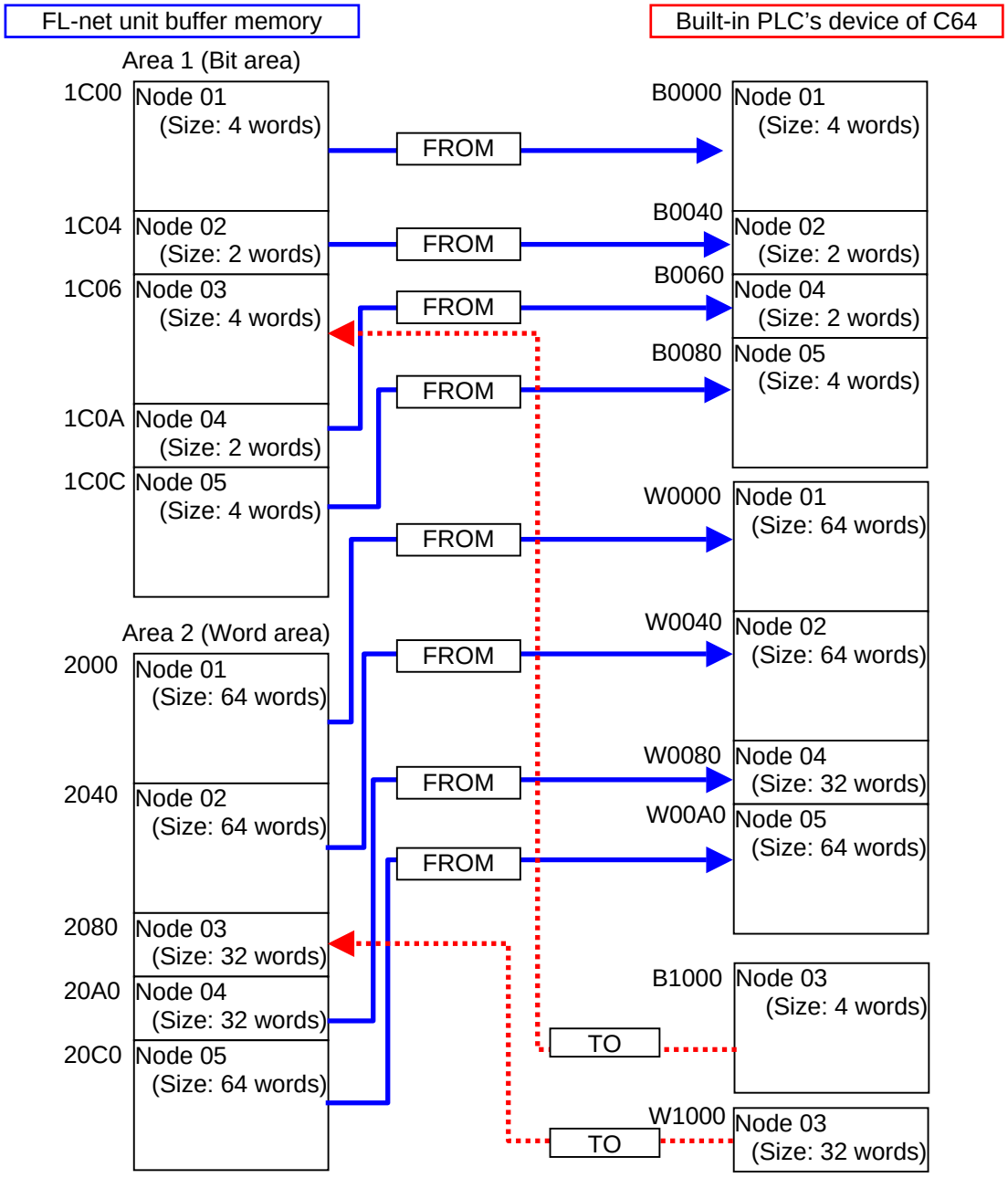
**(Note)** To release the alarm, reboot the NC after completing the remedy.

# 6. Supplement (Example of built-in PLC when FL-net unit is used)

The following is an example of built-in PLC when MELSEC FL-net unit is connected as below.




This example is on the assumption that FL-net is used when its common memory Area 1 and 2 are allocated to each node as shown in the left of the figure below, and the C64's built-in PLC (node 3) allocates devices as shown in the right of the figure below.



## 6.1 Input/Output Signal List

FL-net unit's input/output signals are explained in this section. The input/output signal assignment is performed on the assumption that the FL-net unit is mounted in the slot on an extended base unit. Note that device X indicates the input signal from FL-net unit to NC, and device Y indicates the output signal from NC to FL-net unit.

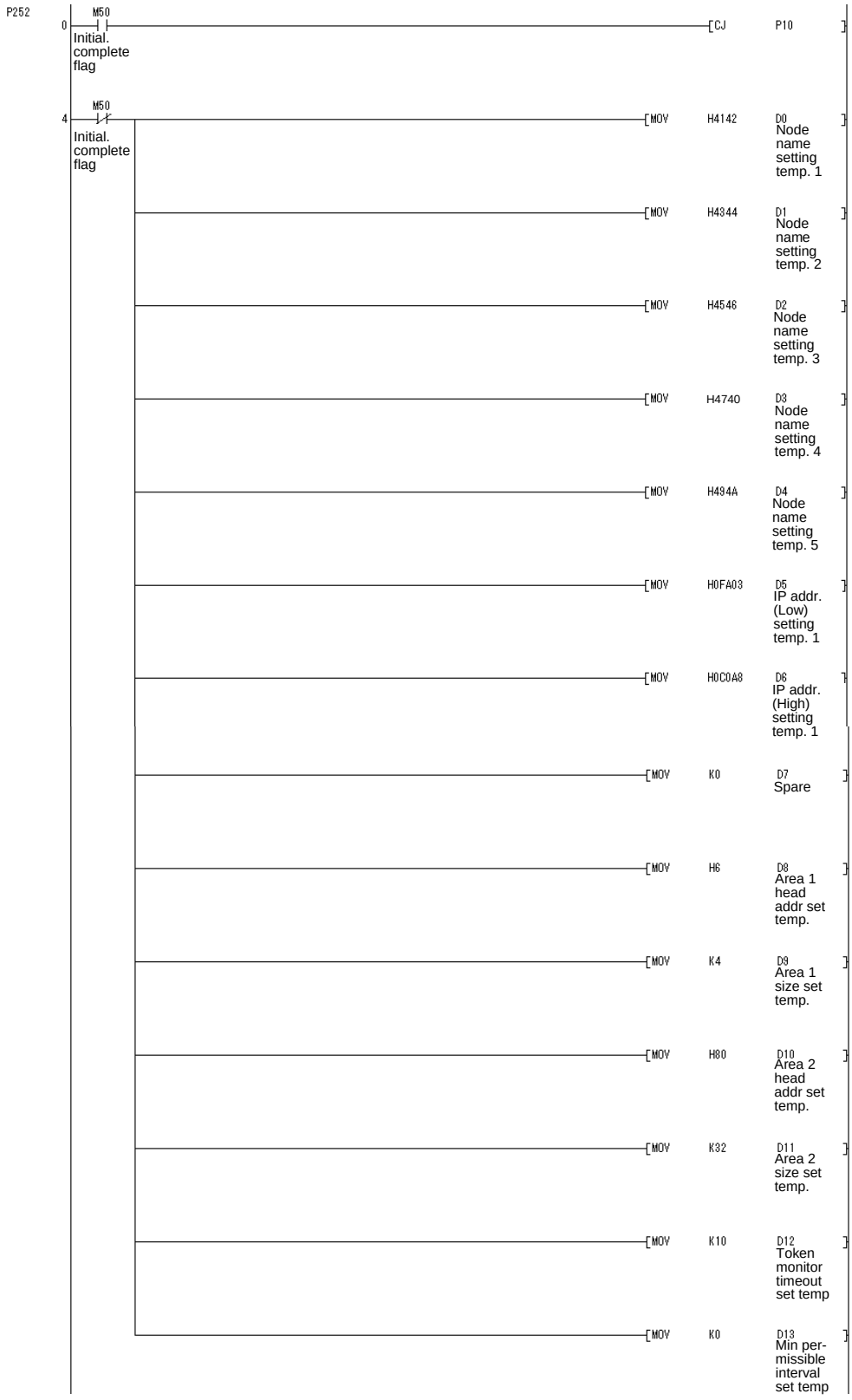
| Signal direction: NC ← FL-net unit | | Signal direction: NC → FL-net unit | |
|---|---|---|---|
| **Input No.** | **Signal name** | **Output No.** | **Signal name** |
| X00 | Message send normal completion<br>ON: Normal completion OFF: - | Y00 | Message send request<br>ON: Request OFF: - |
| X01 | Message send error completion<br>ON: Error completion ending OFF: - | Y01 | Use prohibited |
| X02 | Message being received<br>ON: Being received OFF: Not received | Y02 | Message reception completion<br>ON: Request OFF: - |
| X03<br>to<br>X0F | Use prohibited | Y03<br>to<br>Y0F | Use prohibited |
| X10 | Network parameter write completion<br>ON: Completed OFF: - | Y10 | Network parameter write request<br>ON: Request OFF: - |
| X11 | Network parameter read completion<br>ON: Completed OFF: - | Y11 | Network parameter read request<br>ON: Request OFF: - |
| X12 | Use prohibited | Y12 | Use prohibited |
| X13 | Device profile read completion<br>ON: Completed OFF: - | Y13 | Device profile read request<br>ON: Request OFF: - |
| X14 | Log data clear completion<br>ON: Completed OFF: - | Y14 | Log data clear request<br>ON: Request OFF: - |
| X15 | Log data read completion<br>ON: Completed OFF: - | Y15 | Log data read request<br>ON: Request OFF: - |
| X16 | Use prohibited | Y16<br>to<br>Y1F | Use prohibited |
| X17 | Use prohibited | | |
| X18 | Parameter setting status<br>ON: Error OFF: Normal | | |
| X19 | Token participation status<br>ON: Participation OFF: Released | | |
| X1A | Use prohibited | | |
| X1B | Use prohibited | | |
| X1C | Unit ready<br>ON: Preparation completed<br>OFF: In initialization | | |
| X1D | Use prohibited | | |
| X1E | Use prohibited | | |
| X1F | Watchdog timer error detection<br>ON: Detected OFF: Not detected | | |

**⚠ CAUTION**

⚠ Do not turn "Use prohibited" signal ON among the signals output to FL-net unit (Y00 to Y1F). Failure to observe this could result in malfunction the device mounted on the extension base unit.

## 6.2 Initial Setting

The following is an example of initial processing of FL-net unit. (The local node number is Node 03.)




At completion of initial setting, go to P10.

Set the node name (equipment name) in initial setting temporary (optional).

Set the lower part (250.3) of IP address (192.168.250.3) in initial setting temporary.

Set the higher part (192.168) of IP address (192.168.250.3) in initial setting temporary.

Set the head address of Area 1 in initial setting temporary.

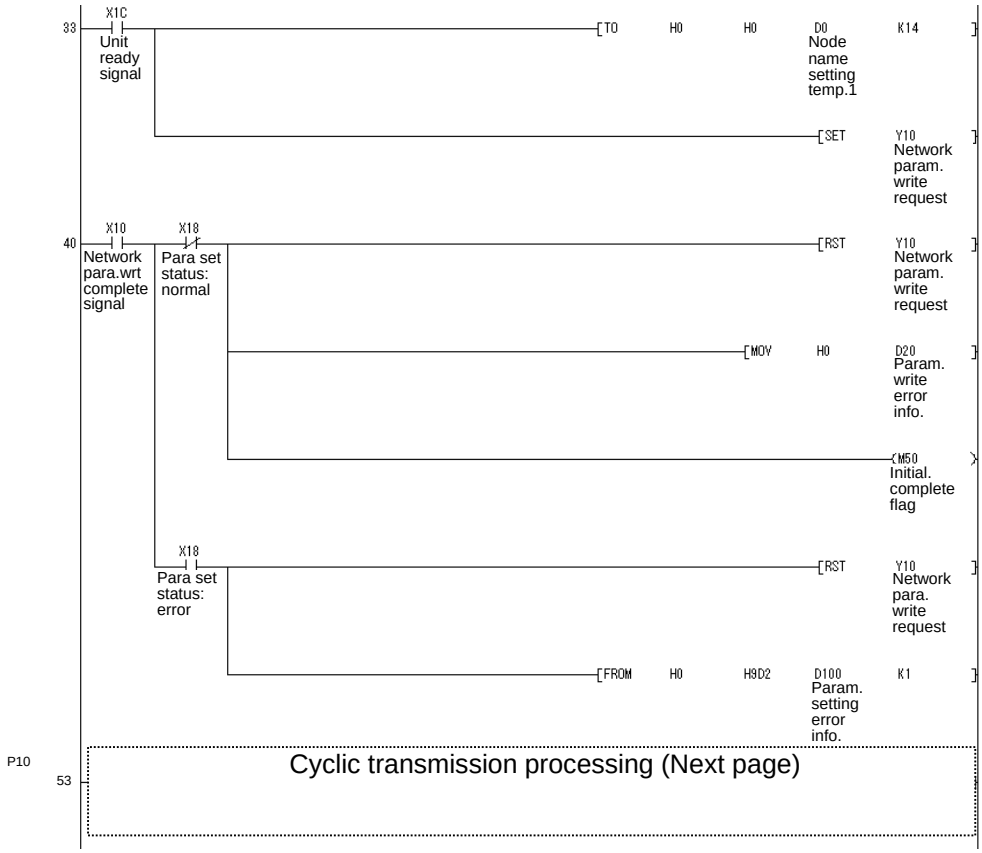
Set the size of Area 1 in initial setting temporary.

Set the head address of Area 2 in initial setting temporary.

Set the size of Area 2 in initial setting temporary.

Set the token monitoring timeout time in initial setting temporary.

Set the minimum permissible frame interval in initial setting temporary.




Write the initial setting temporary in the local node parameter area on the buffer memory of FL-net.

Parameter writing request ON.

Parameter writing request OFF.

Set parameter writing status.

Initialization completion flag ON.

Parameter writing request OFF.

Read parameter setting error information.

Initialization completed.

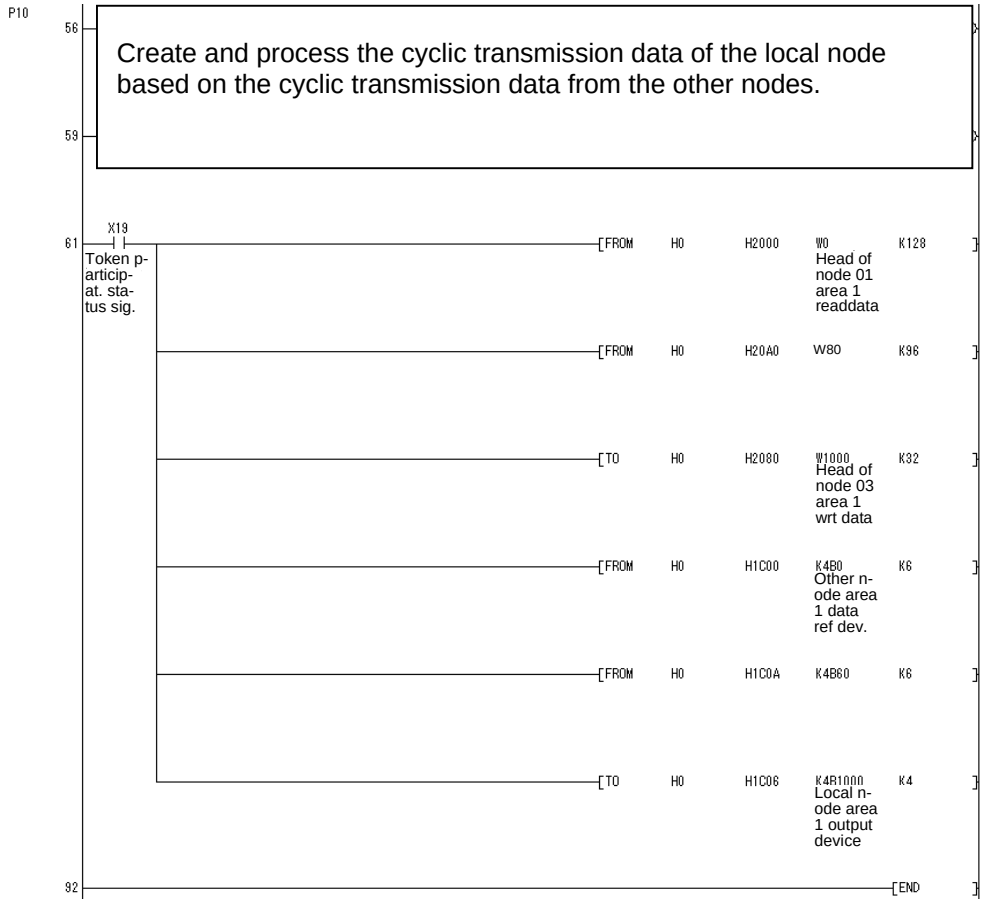
**(Note)** Automatic refresh cannot be set. Execute refresh by programming with FROM/TO commands.

Data and description of parameter setting errors (List of error data in D100 and its description)

| D100's data | Description of error | Remedy |
|---|---|---|
| C021H | Wrong IP address (network address) setting | Correct the IP address and perform initial process again. |
| C022H | Wrong IP address (host address) setting | Correct the IP address and perform initial process again. |
| C023H | Wrong setting value for common memory area 1 head address | Correct setting value for common memory area 1 head address and perform initial process again. |
| C024H | Wrong setting value for common memory area 1 size | Correct setting value for common memory area 1 size and perform initial process again. |
| C025H | Setting value for common memory area 1 head address or size is outside permissible range. | Correct setting value for common memory area 1 head address and size and perform initial process again. |
| C026H | Wrong setting value for common memory area 2 head address | Correct setting value for common memory area 2 head address and perform initial process again. |
| C027H | Wrong setting value for common memory area 2 size | Correct setting value for common memory area 2 size and perform initial process again. |
| C028H | Setting value for common memory area 2 head address or size is outside permissible range. | Correct setting value for common memory area 2 head address and size and perform initial process again. |
| C029H | Wrong setting value for token monitoring timeout time | Correct setting value for token monitoring timeout time and perform initial process again. |
| C02AH | Wrong setting value for minimum permissible frame interval | Correct setting value for minimum permissible frame interval and perform initial process again. |
| C02CH | Setting for common memory area overlaps other node setting range | Correct setting value for common memory and perform initial processing. |

## 6.3 Cyclic Transmission

The following is an example of communication processing by cyclic transmission of FL-net unit.




Express transmission data in Area 1 of the other nodes as Bit device of C64.

Read the data in Area 2 of Node 01 and 02 and write it in W100 to W17F.

Read the data in Area 2 of Node 04 and 05 and write it in W180 to W1DF.

Write output word data in Area 2 of the local node.

Read the data in Area 1 of Node 01 and 02 and write it in W000 to W005.

Read the data in Area 1 of Node 04 and 05 and write it in W006 to W00B.

Write output bit data in Area 1 of the local node.

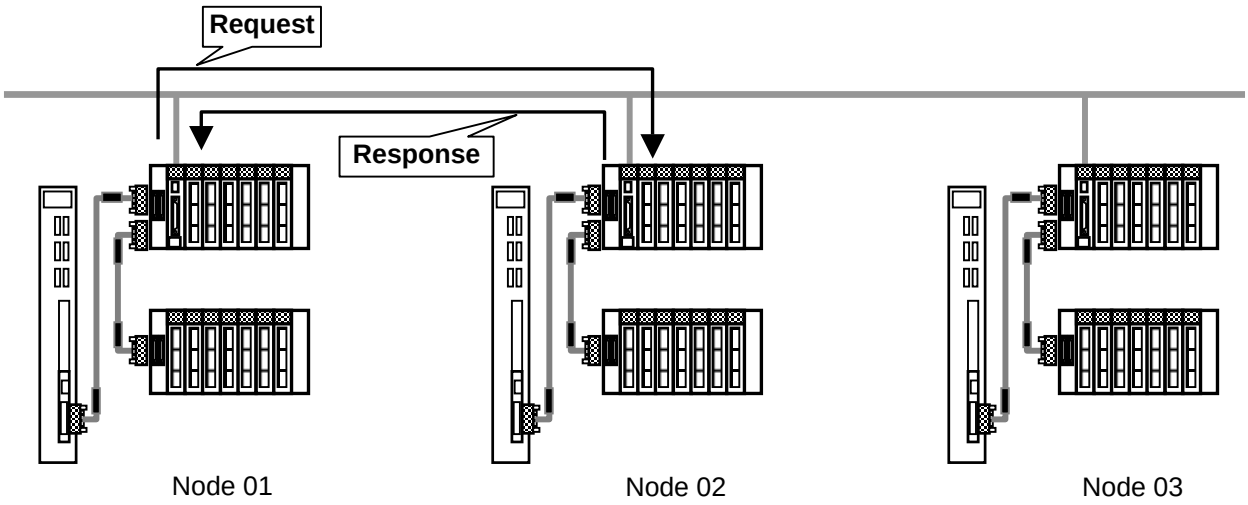
## 6.4 Message Transmission

### 6.4.1 Outline of Message Transmission

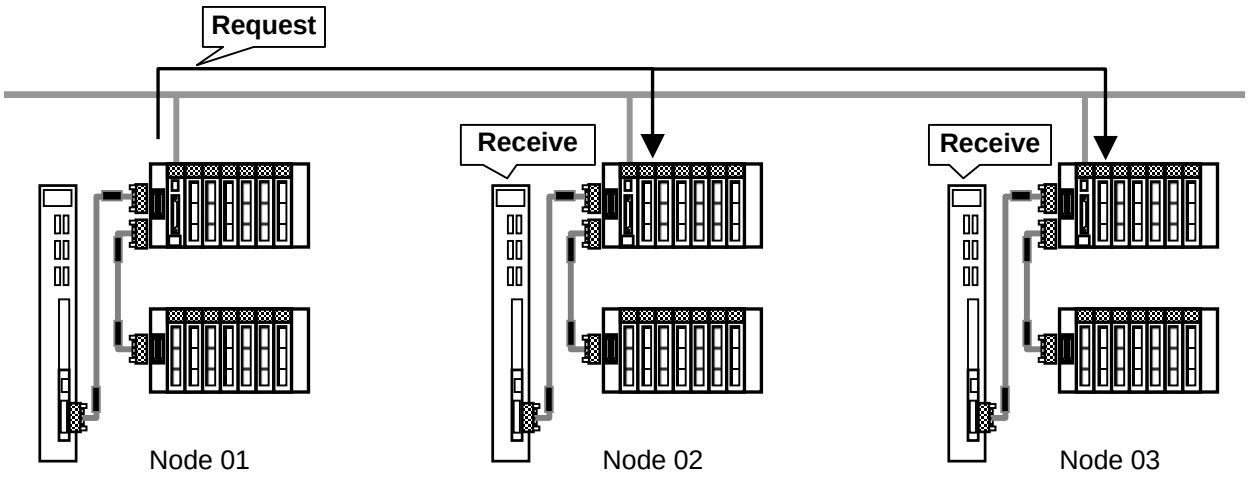
Message transmission is the function supporting the asynchronous data exchange generated among nodes.

(1) When a node receives a token, it sends up to one (message) frame before transmitting cyclic frames.
(2) Data volume that can be transmitted in a frame is equal to or less than 1024 bytes (512 words).
(3) Algorithm is provided so as not to exceed allowable refresh cycle time for cyclic transmission.
(4) Both "1:1 transmission" transmitting to a specific destination node and "1:n broadcast transmission" transmitting to all nodes are provided.
(5) Delivery acknowledgement function is provided to confirm successful delivery of data to the destination node on the "1:1 transmission".

**1:1 Transmission**




**1:n Broadcast transmission**



### 6.4.2 Transaction Code

Each message has a header with a transaction code for requesting or responding, which is used for identifying the message frame.

| Transaction code | | Application |
|---|---|---|
| Decimal | Hex | |
| 0 to 59999 | 0000H to EA5FH | Transparent type message |
| 60000 to 64999 | EA60H to FDE7H | Reserved |
| 65000 | FDE8H | Cyclic header (with token) |
| 65001 | FDE9H | Cyclic header (without token) |
| 65002 | FDEAH | Participation request frame header |
| 65003 | FDEBH | Byte block data read (request) |
| 65004 | FDECH | Byte block data write (request) |
| 65005 | FDEDH | Word block data read (request) |
| 65006 | FDEEH | Word block data write (request) |
| 65007 | FDEFH | Network parameter read (request) |
| 65008 | FDF0H | Network parameter write (request) |
| 65009 | FDF1H | Stop command (request) |
| 65010 | FDF2H | Operate command (request) |
| 65011 | FDF3H | Profile read (request) |
| 65012 | FDF4H | Trigger header |
| 65013 | FDF5H | Log read (request) |
| 65014 | FDF6H | Log clear (request) |
| 65015 | FDF7H | For message return test (request) |
| 65016 to 65202 | FDF8H to FEB2H | Reserved |
| 65203 | FEB3H | Byte block data read (response) |
| 65204 | FEB4H | Byte block data write (response) |
| 65205 | FEB5H | Word block data read (response) |
| 65206 | FEB6H | Word block data write (response) |
| 65207 | FEB7H | Network parameter read (response) |
| 65208 | FEB8H | Network parameter write (response) |
| 65209 | FEB9H | Stop command (response) |
| 65210 | FEBAH | Operate command (response) |
| 65211 | FEBBH | Profile read (response) |
| 65212 | FEBCH | Reserved |
| 65213 | FEBDH | Log read (response) |
| 65214 | FEBEH | Log clear (response) |
| 65215 | FEBFH | For message return test (response) |
| 65216 to 65399 | FEC0H to FF77H | Reserved |
| 65400 to 65535 | FF78H to FFFFH | Reserved |

### 6.4.3 Support Message List

This section explains available message transmissions from C64's user PLC.

(1) Transparent type message transmission
Message data (up to 512 words) can be sent and received to and from the message area of a specified node.
Possible to use arbitrary transaction codes (0 to 59999).

(2) Return data response
It is possible to return the received data as-is whenever a return command is received.

(3) Reading of the parameters
It is possible to read the network parameters (such as vendor name, token monitoring time, etc.) for each node.

(4) Reading and clearing of log data
It is possible to read and clear the communication log data held by each node.

(5) Reading of device profile
It is possible to read the device profile data held by each node.

**Support message list**

| No. | Message | 1:1 | 1:n | Server function (*1) | Client function (*2) | |
|---|---|---|---|---|---|---|
| | | | | | | Transparent type message transmission (*3) |
| 1 | Byte block read (*4) | × | × | × | × | ○ |
| 2 | Byte block write (*4) | × | × | × | × | ○ |
| 3 | Word block read (*4) | × | × | × | × | ○ |
| 4 | Word block write (*4) | × | × | × | × | ○ |
| 5 | Network parameter read | ○ | × | ○ | ○ | × |
| 6 | Network parameter write | × | × | × | × | × |
| 7 | Operate/stop command | × | × | × | × | ○ |
| 8 | Profile read | ○ | × | ○ | ○ | × |
| 9 | Log data read | ○ | × | ○ | ○ | × |
| 10 | Log data clear | ○ | ○ | ○ | ○ | × |
| 11 | Message return | ○ | × | ○ | × | × |
| 12 | PING | ○ | × | ○ | × | × |
| 13 | Transparent type message transmission | ○ | ○ | ○ | ○ | ○ |

*1: Server function ..... Functions that create a response frame for the request message that has been received and send it.
*2: Client function..... Functions that send the request message and receive the response frame.
*3: Realized by the transparent type message transmission. Refer to the next page for the transparent type message transmission procedures.
*4: If this message is received not in the transparent type message, the device data which can be read/written is not of C6/C64.

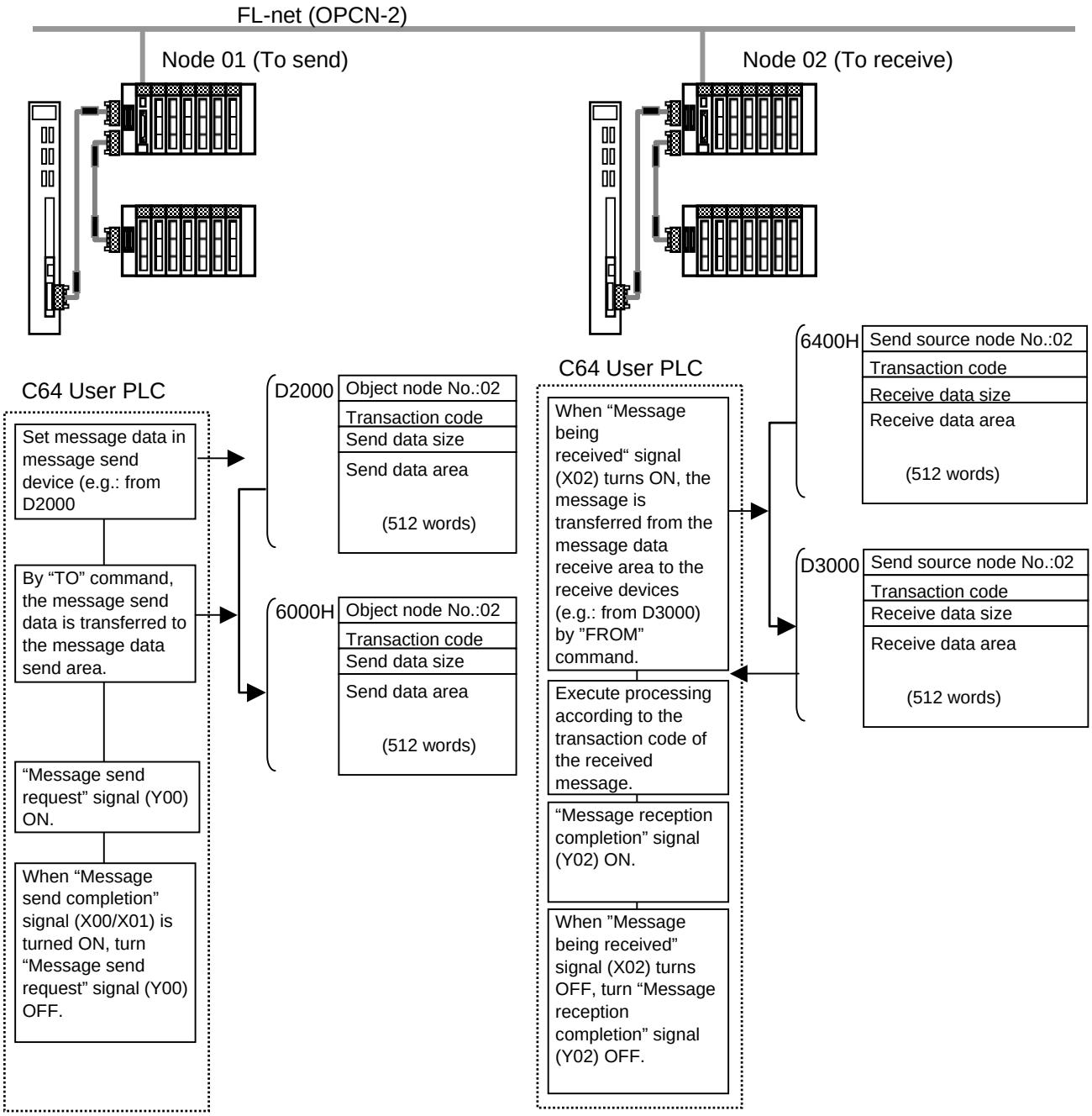
### 6.4.4 Support Message Details

This section explains details of message transmission available from C64's user PLC.

#### (1) Transparent type message transmission

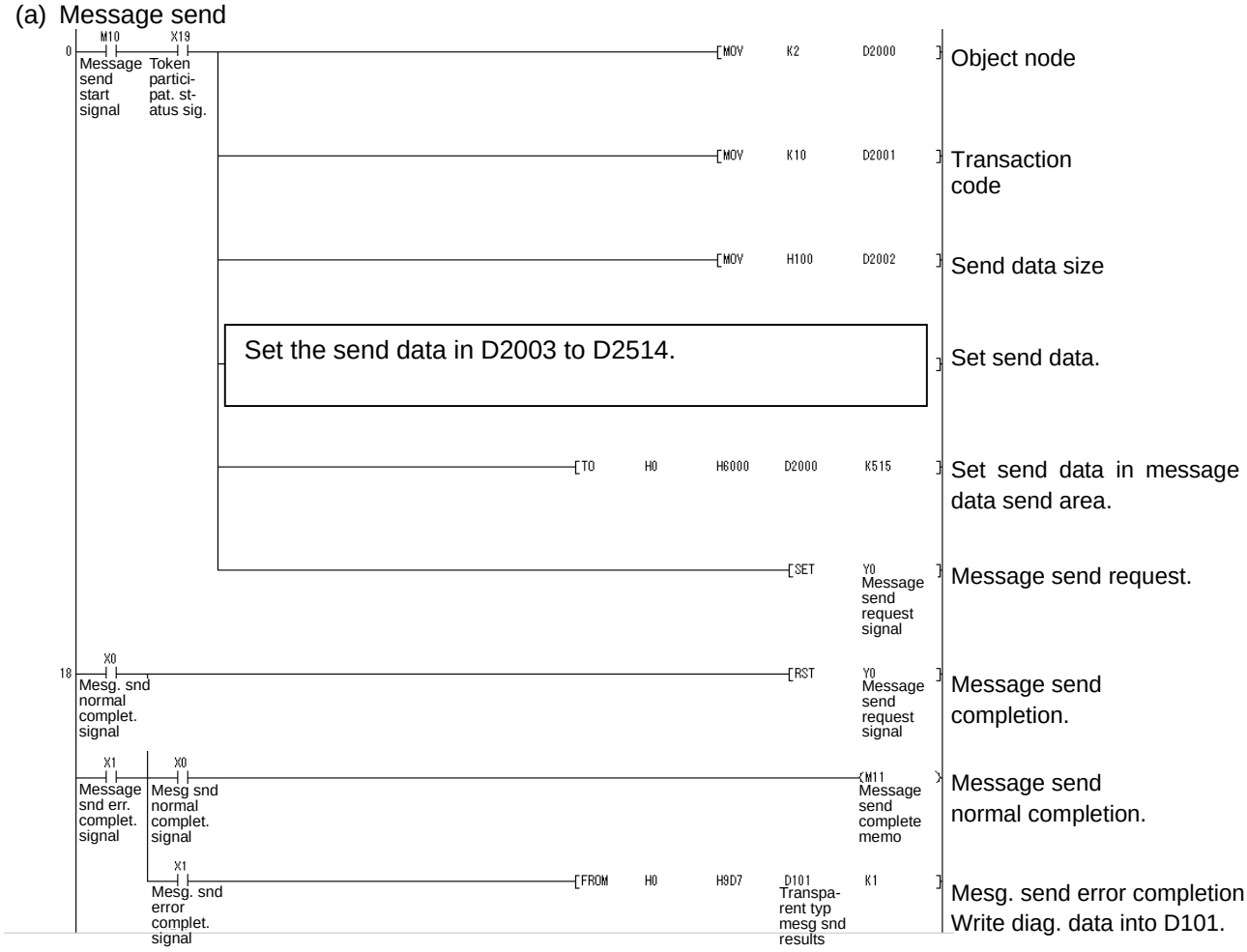
This function writes messages to the corresponding node's received message area from the network.
Arbitrary transaction codes (0 to 59999) are available.
By arranging transaction codes with the destination node, various messages can be transmitted.
As FL-net unit itself doesn't return response messages, if response messages are necessary, response message creation process has to be carried out with the user PLC program.

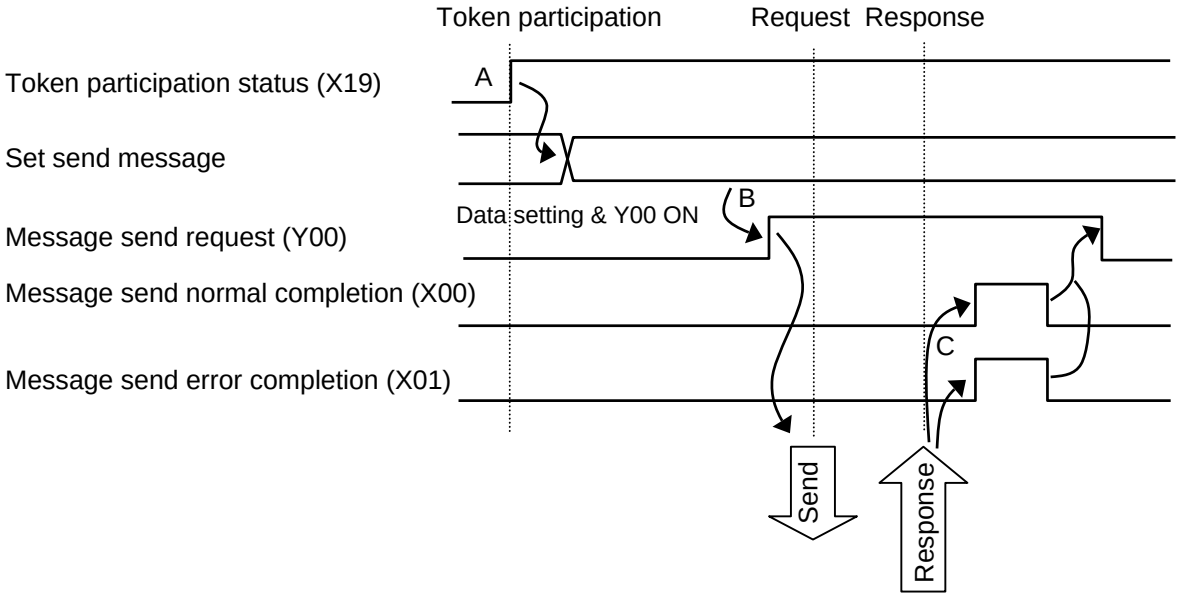
| Item | Request | Response |
|---|---|---|
| Transaction code | 0 to 59999 | - |
| Parameter | • Object node number<br>• Data size (Word unit) | - |
| User data | Data (512 word space) | - |



**[Example of user PLC program]**

(a) Message send



A : Check if FL-net unit's "Token participation status" signal (X19) is ON.

B : After setting data below in message send devices, transfer the message to the message data send area, then turn "Message send request" signal (Y00) ON.
- Object node number
- Transaction code
- Send data size
- Send data

C : Check the completion of the message send.

<At normal completion>
- "Message send normal completion" signal (X00): ON
- "Message send error completion" signal (X01): OFF

<At error completion>
- "Message send normal completion" signal (X00): OFF
- "Message send error completion" signal (X01): ON

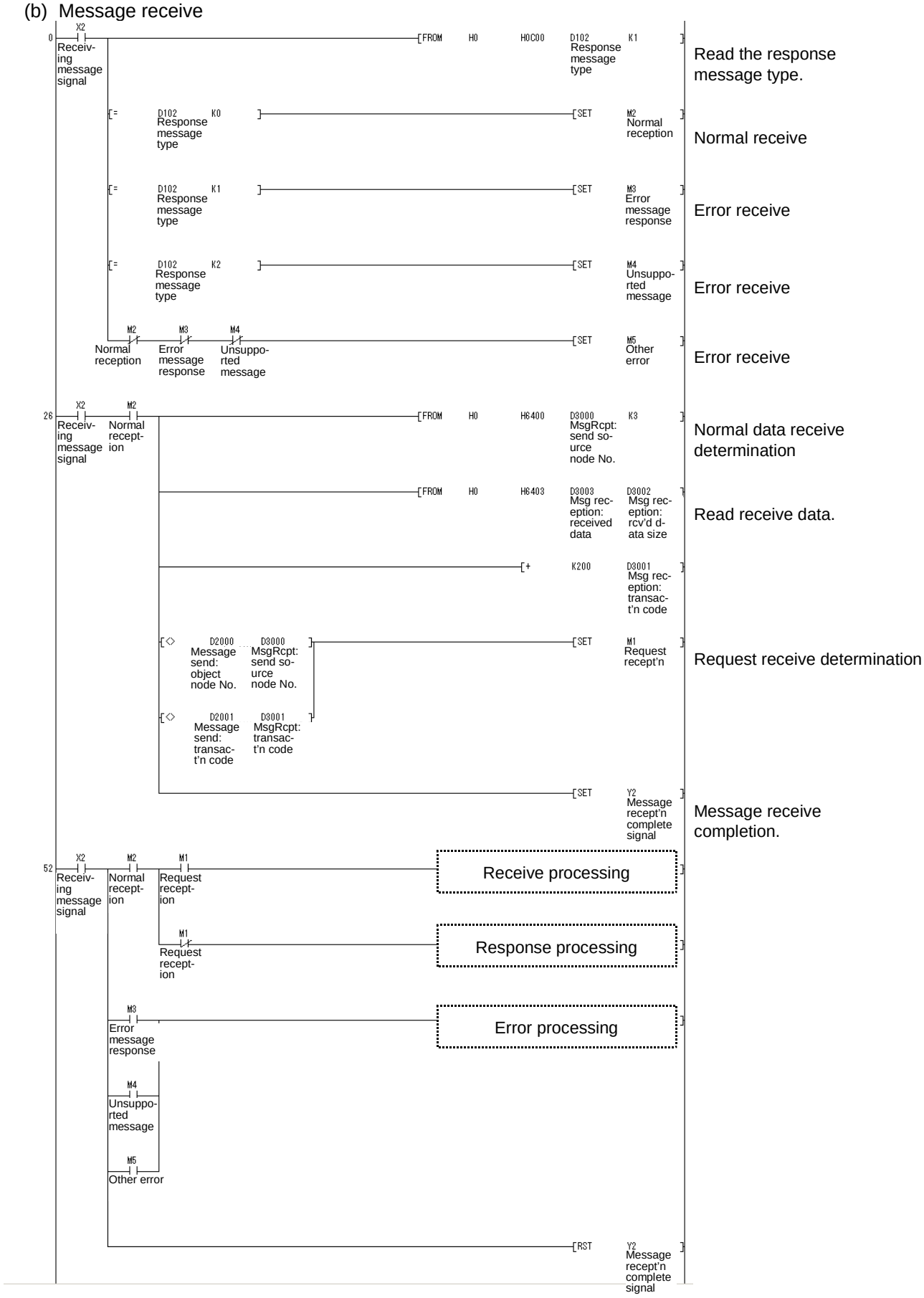
At an error completion, refer to the diagnosis data in D101 (see the table below) and correct the FL-net parameters or user PLC, then reboot C6/C64.

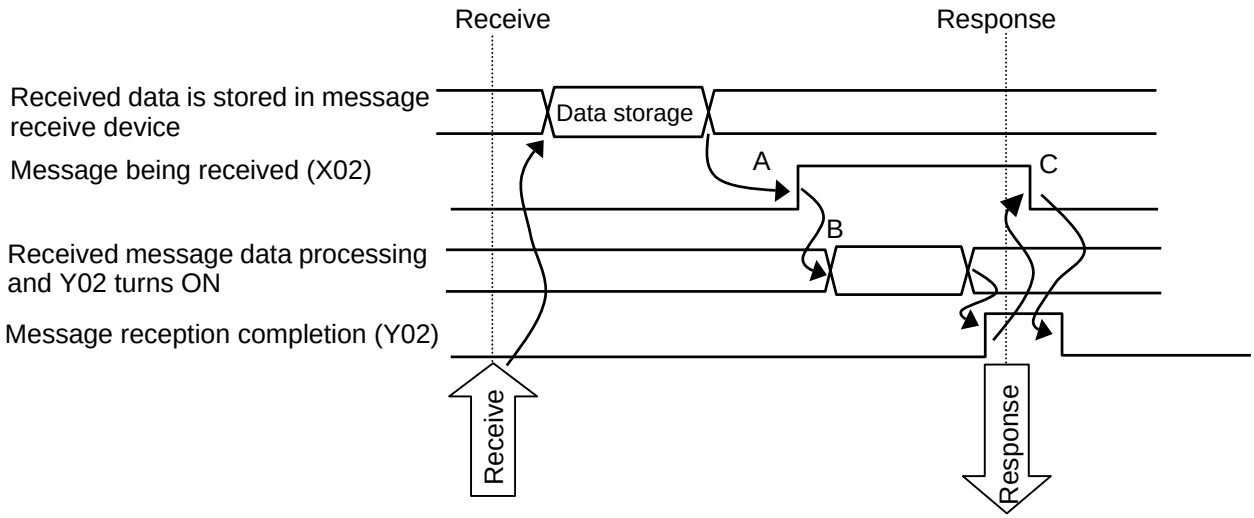
After confirming that "Message send normal completion" signal (X00) or "Message send error completion" signal (X01) is ON, turn "Message send request" signal (Y00) OFF.

Data and description of message transmission errors (List of error data in D101 and its description)

| D101's data | Description of error | Remedy |
|---|---|---|
| C321H | Setting value for object node number is outside permissible range. | Correct setting value for object node number. |
| C322H | Object node does not exist. | Correct setting value for object node number.<br>Check operation of corresponding equipment. |
| C323H | No response from object node for 10 seconds or more. | Correct setting value for object node number.<br>Check operation of corresponding equipment. |
| C324H | Error in send data. | Correct send data. |
| C325H | The transaction code includes the process that is not supported by FL-net unit. | Correct transaction code. |
| C326H | No empty capacity in object node buffer. | Re-execute after waiting for a while. |
| C328H | Not participating in token. | Check the status of the PLC and wires.<br>Review the settings for the initial process. |

(b) Message receive






A : After the received message data is set in message receive device, turn "Message being received" signal (X02) ON.

B : After transferring (writing) the message data to device, turn "Message reception completion" signal (Y02) ON.

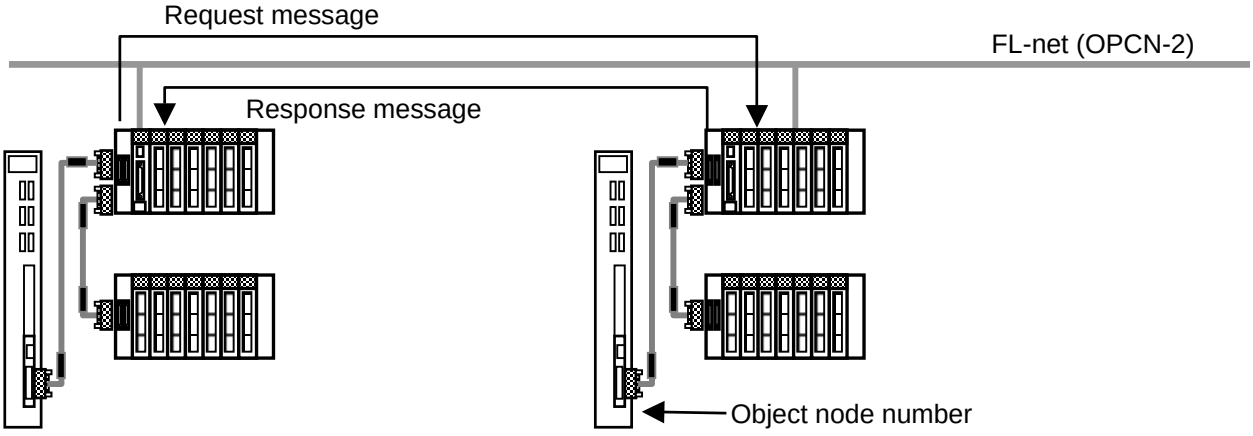
C : After confirming that "Message being received" signal (X02) is OFF, turn "Message reception completion" signal (Y02) OFF.

**(Note)** If response is necessary at receiving message data, create a sequence program for responding.

### (2) Message return

This function returns the received message.
The message return is performed automatically within the FL-net unit. Thus, there is no necessity for C6/C64's user PLC to perform processing.

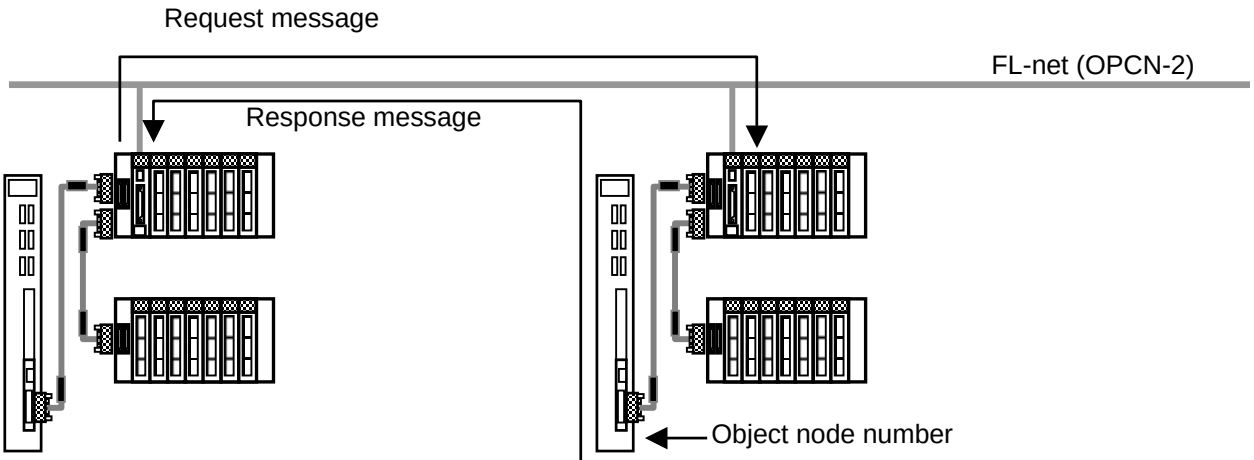
| Item | Request | Response |
|---|---|---|
| Transaction code | 65015 | 65215 |
| Parameter | Object node number | - |
| User data | Test data (512 words space) | Test data (512 words space) |



### (3) Read network parameters

This function reads network parameters (such as vendor name, token monitoring time, etc.) for each node.

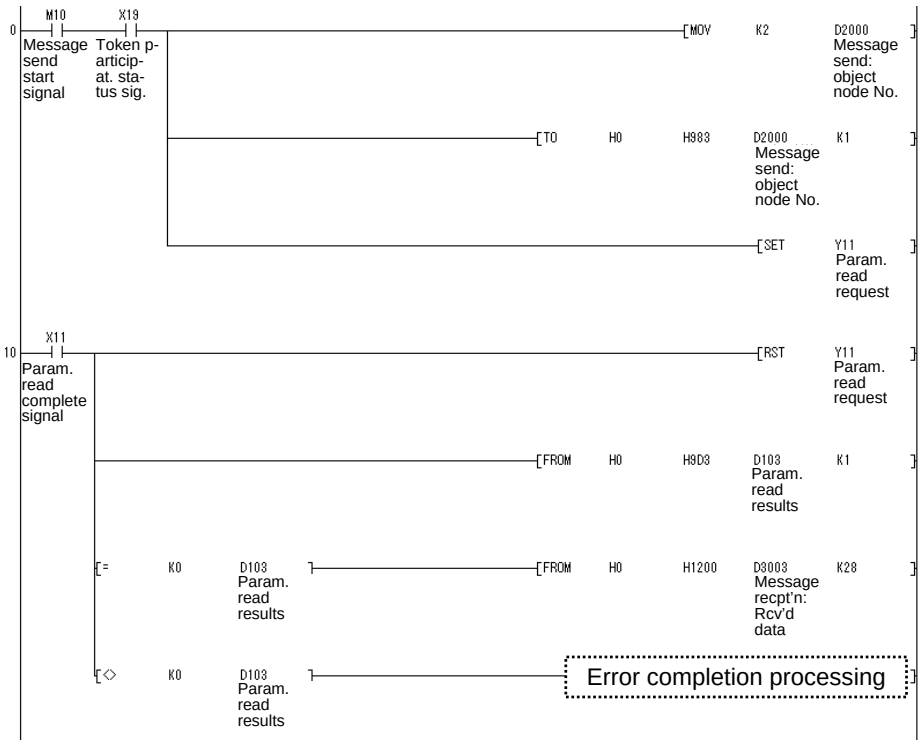
| Item | Request | Response |
|---|---|---|
| Transaction code | 65007 | 65207 |
| Parameter | Object node number | - |
| User data | - | • Node number<br>• Vendor name<br>• Manufacturer's model<br>• Node name (equipment name)<br>• Address and size of common memory<br>• Token monitoring timeout time<br>• Refresh cycle time<br>• Refresh cycle time (Actual value)<br>• Permissible minimum frame interval<br>• Upper layer status<br>• FL-net (OPCN-2) status<br>• Protocol version |

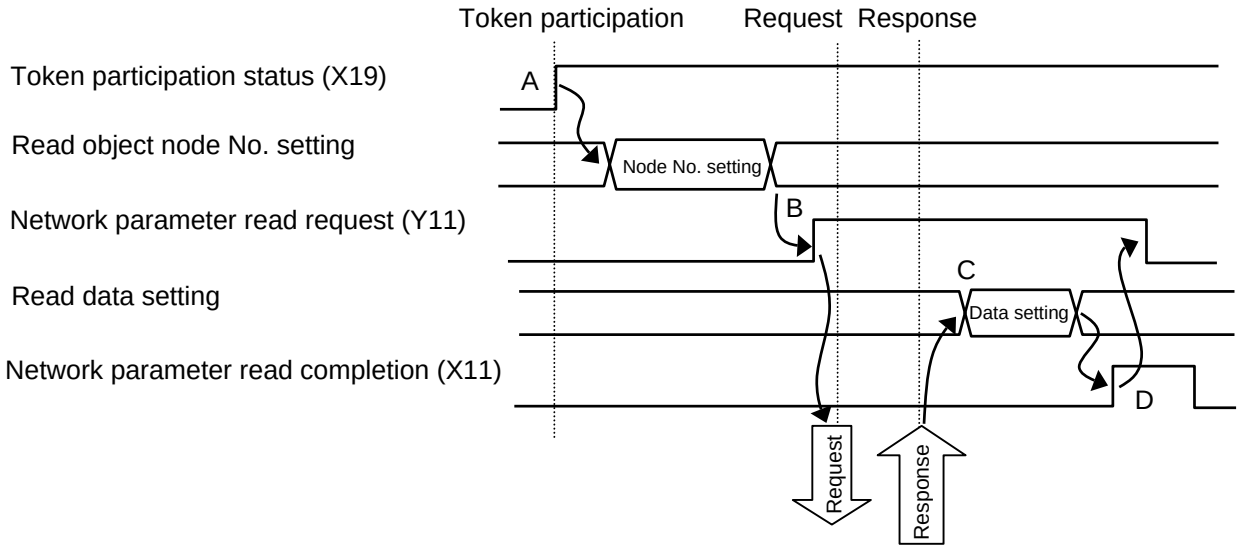



**Network parameter**

| |
|---|
| Node number |
| Vendor name |
| Manufacturer's model |
| Node name (equipment name) |
| Area 1 head address |
| Area 1 size |
| Area 2 head address |
| Area 2 size |
| Token monitoring timeout time |
| Permissible minimum frame interval |
| FL-net (OPCN-2) status |
| Protocol version |
| Upper layer status |
| Refresh cycle permissible time RCT setting value |
| Refresh cycle measurement value (Current) |
| Refresh cycle measurement value (Maximum) |
| Refresh cycle measurement value (Minimum) |

**Example of user PLC program**




A : Check if "Token participation status" signal (X19) of FL-net unit is ON.

B : After setting the parameter reading object node number in the message send device D2000 (node number setting device), set the number in the buffer memory by "TO" command, then turn "Network parameter read request" signal (Y11) ON.

C : FL-net unit stores the object node's parameter data in the buffer memory (address: 1200H to 121bH). After stored, the parameter data is transferred to the message reception device D3003 and later.

D : Check the completion of the parameter reading.
<At normal completion>
- "Network parameter read completion" signal (X11): ON
- Parameter reading result (D103): 0

<At error completion>
- "Network parameter read completion" signal (X11): ON
- Parameter reading result (D103): Other than 0

At an error completion, refer to the diagnosis data in D103 (see the table below) and correct the FL-net parameters or user PLC, then reboot C6/C64.

After confirming "Network parameter read completion" signal (X11) is ON, turn "Network parameter read request" signal (Y11) OFF.

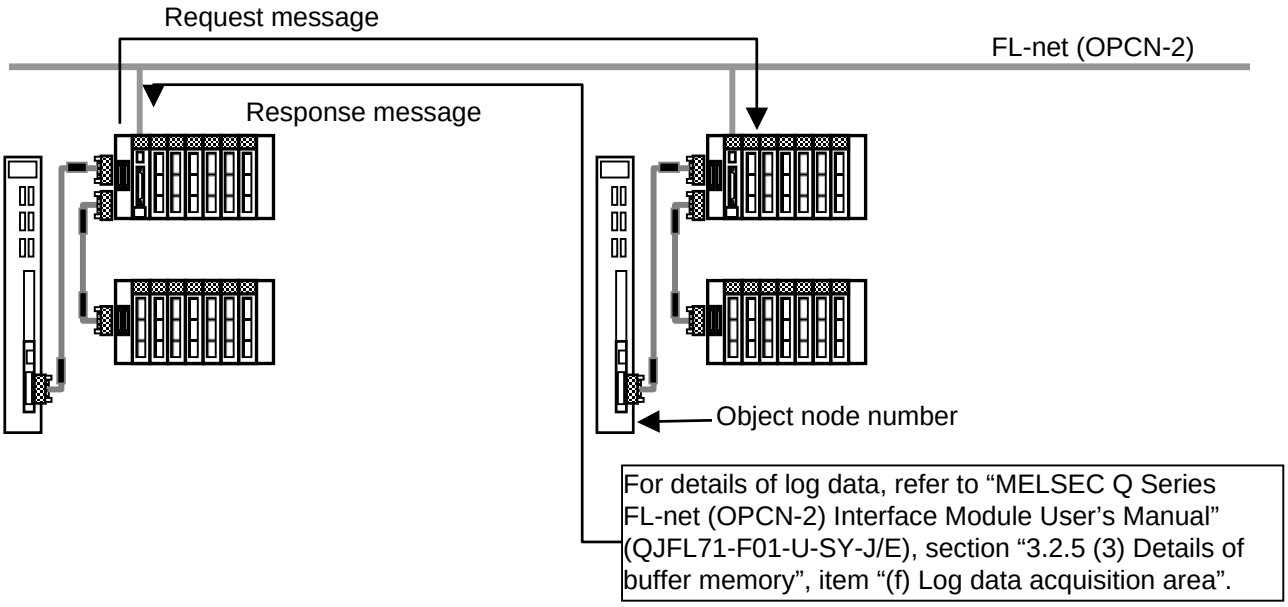
Data and description of parameter reading result errors (List of error data in D103 and its description)

| D103's data | Description of error | Remedy |
|---|---|---|
| C321H | Setting value for object node number outside permissible range. | Correct setting value for object node number. |
| C322H | Object node does not exist. | Correct setting value for object node number. Check operation of corresponding equipment. |
| C323H | No response from object node for 10 seconds or more. | Correct setting value for object node number. Check operation of corresponding equipment. |
| C324H | Error in send data. | Correct send data. |
| C326H | No empty capacity in object node buffer. | Re-execute after waiting for a while. |
| C328H | Not participating in token | Check the status of the PLC and wires. Review the settings for the initial process. |

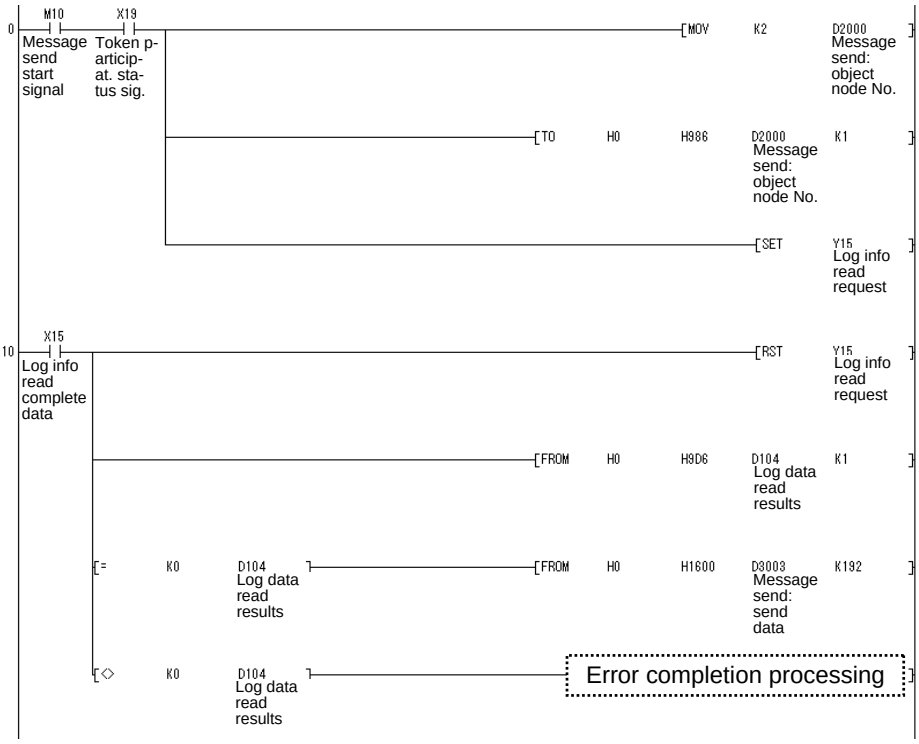
**(4) Log data read**

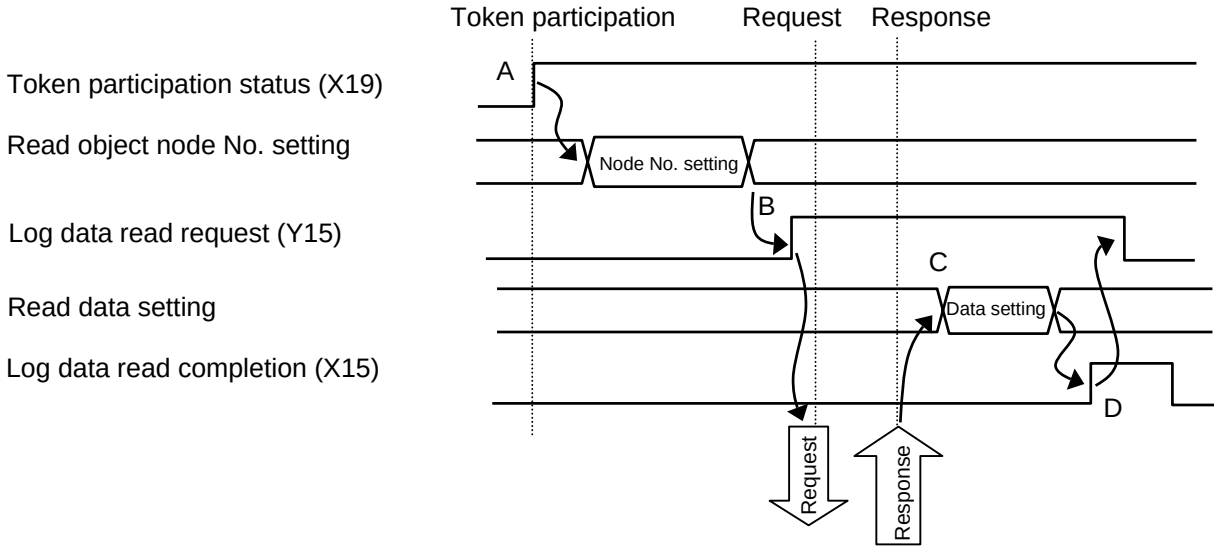
Message function for reading corresponding node log data from the network.

| Item | Request | Response |
|---|---|---|
| Transaction code | 65013 | 65213 |
| Parameter | Object node number | - |
| User data | - | • Send and receive log<br>• Frame log<br>• Cyclic transmission error log<br>• Message transmission error log<br>• ACK error log<br>• Token error log<br>• Status data<br>• Participation node list |



**Example of user PLC program**




A : Check if FL-net unit's "Token participation status" signal (X19) is ON.

B : After setting the log data read object node No. in message send device D2000 (node No. setting device), set the data in the buffer memory by "TO" command, and turn "Log data read request" (Y15) ON.

C : FL-net unit stores the log data of the object node in the buffer memory (address: from 1600H). After stored, the log data is transferred to the message reception device D3003 and later.

D : Check the log data read completion.

<At normal completion>

- "Log data read completion" signal (X15): ON
- Log data reading result (D104): 0

<At error completion>

- "Log data read completion" signal (X15): ON
- Log data reading result (D104): Other than 0

At an error completion, refer to the diagnosis data of D104 (see the table below) and correct the FL-net parameters or user PLC, then reboot C6/C64.

After confirming that "Log data read completion" signal (X15) is ON, turn "Log data read request" signal (Y15) OFF.

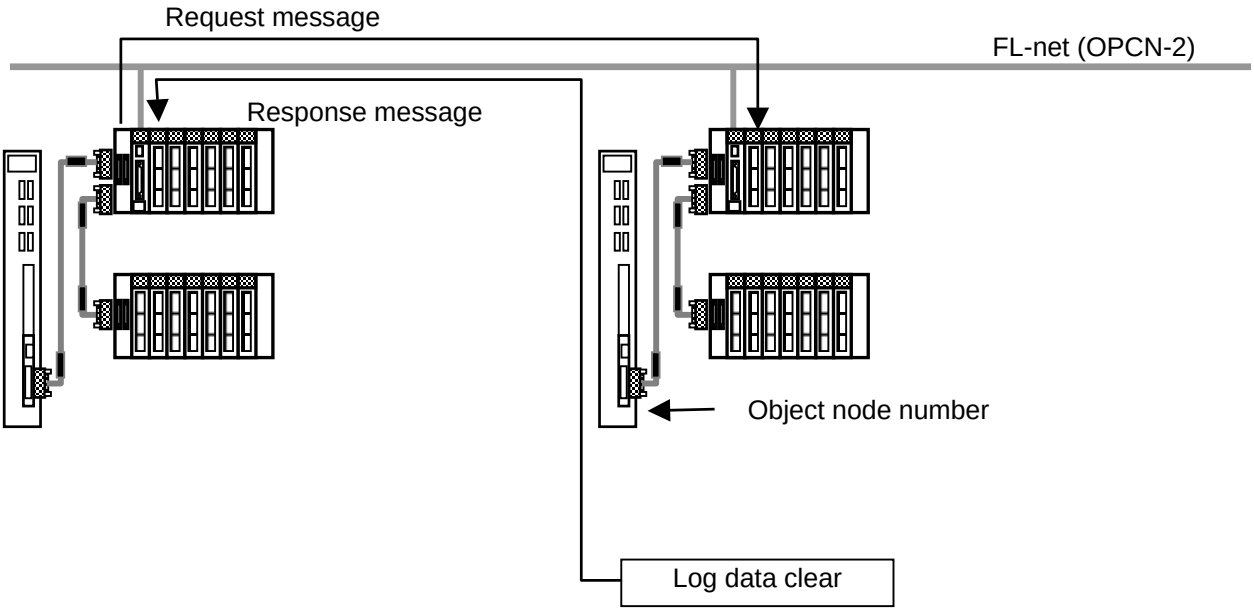
Data and description of log data reading result errors (List of error data in D104 and its description)

| D104's data | Description of error | Remedy |
|---|---|---|
| C321H | Setting value for object node number is outside permissible range. | Correct setting value for object node number. |
| C322H | Object node does not exist. | Correct setting value for object node number.<br>Check operation of corresponding equipment. |
| C323H | No response from object node for 10 seconds or more. | Correct setting value for object node number.<br>Check operation of corresponding equipment. |
| C324H | Error in send data. | Correct send data. |
| C326H | No empty capacity in object node buffer. | Re-execute after waiting for a while. |
| C328H | Not participating in token. | Check the status of the PLC and wires.<br>Review the settings for the initial process. |

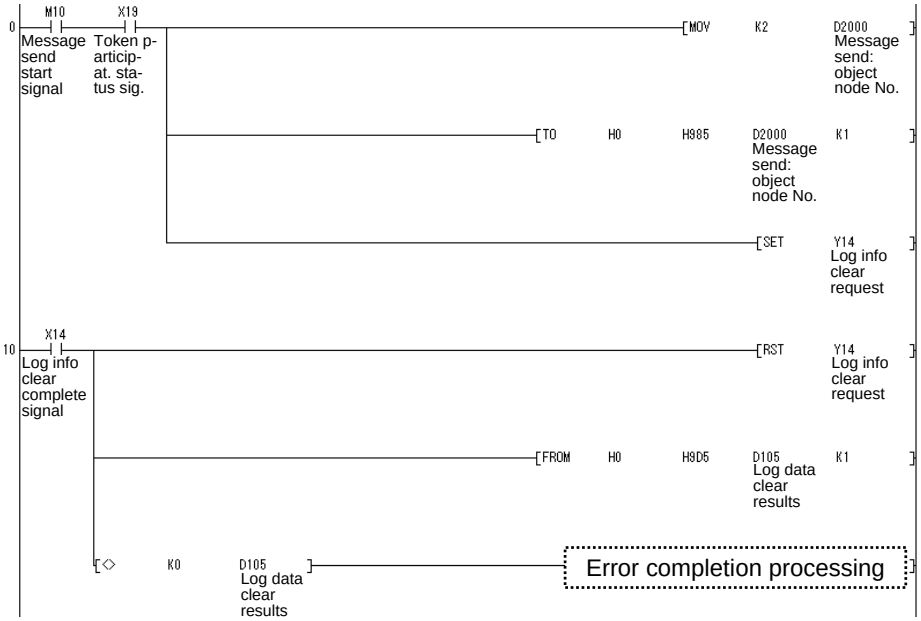
**(5) Log data clear**

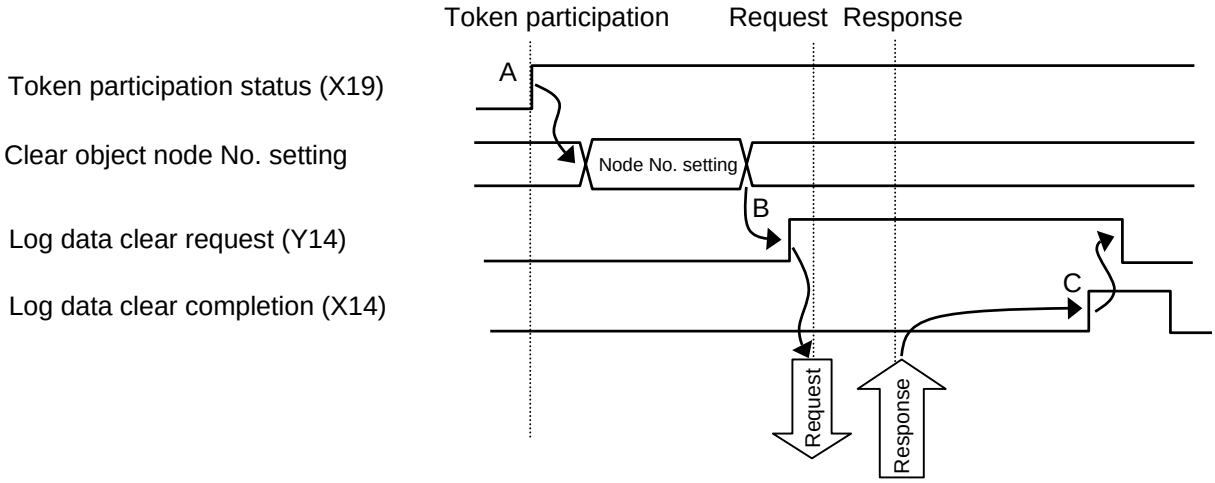
Message function for clearing corresponding node log data from the network.

| Item | Request | Response |
|---|---|---|
| Transaction code | 65014 | 65214 |
| Parameter | Object node number | - |
| User data | - | - |



**Example of user PLC program**




A : Check if FL-net unit's "Token participation status" signal (X19) is ON.

B : After setting the log data clear object node number is set in message send device D2000 (node number setting device), set the data in the buffer memory by "TO" command, and turn "Log data clear request" signal (Y14) ON.

C : Check the log data clear completion.
<At normal completion>
- "Log data clear completion" signal (X14): ON
- Log data clear result (D105): 0

<At error completion>
- "Log data clear completion" signal (X14): ON
- Log data clear result (D105): Other than 0

At an error completion, refer to the diagnosis data in D105 (see the table below) and correct the FL-net parameters or user PLC, then reboot C6/C64.

After confirming that "Log data clear completion" signal (X14) is ON, turn "Log data clear request" signal (Y14) OFF.

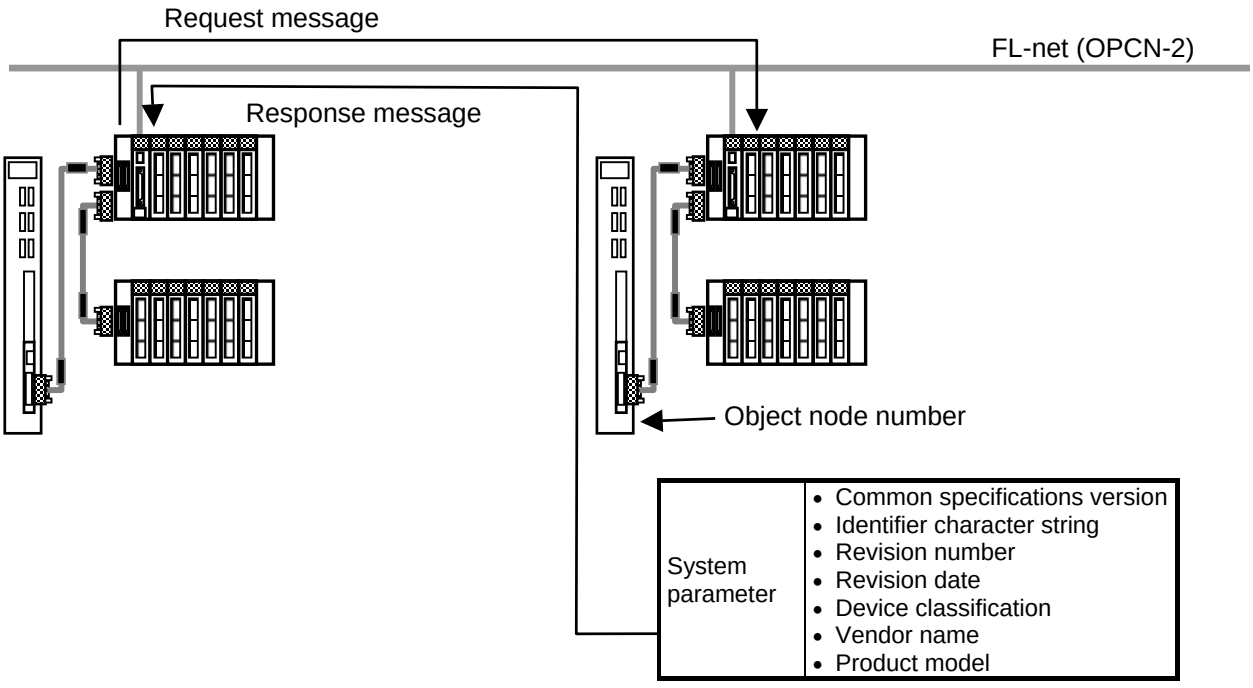
Data and description of log data clear result errors (List of error data in D105 and its description)

| D105's data | Description of error | Remedy |
|---|---|---|
| C321H | Setting value for object node number outside permissible range. | Correct setting value for object node number. |
| C322H | Object node does not exist. | Correct setting value for object node number. Check operation of corresponding equipment. |
| C323H | No response from object node for 10 seconds or more. | Correct setting value for object node number. Check operation of corresponding equipment. |
| C324H | Error in send data. | Correct send data. |
| C326H | No empty capacity in object node buffer. | Re-execute after waiting for a while. |
| C328H | Not participating in token. | Check the status of the PLC and wires. Review the settings for the initial process. |

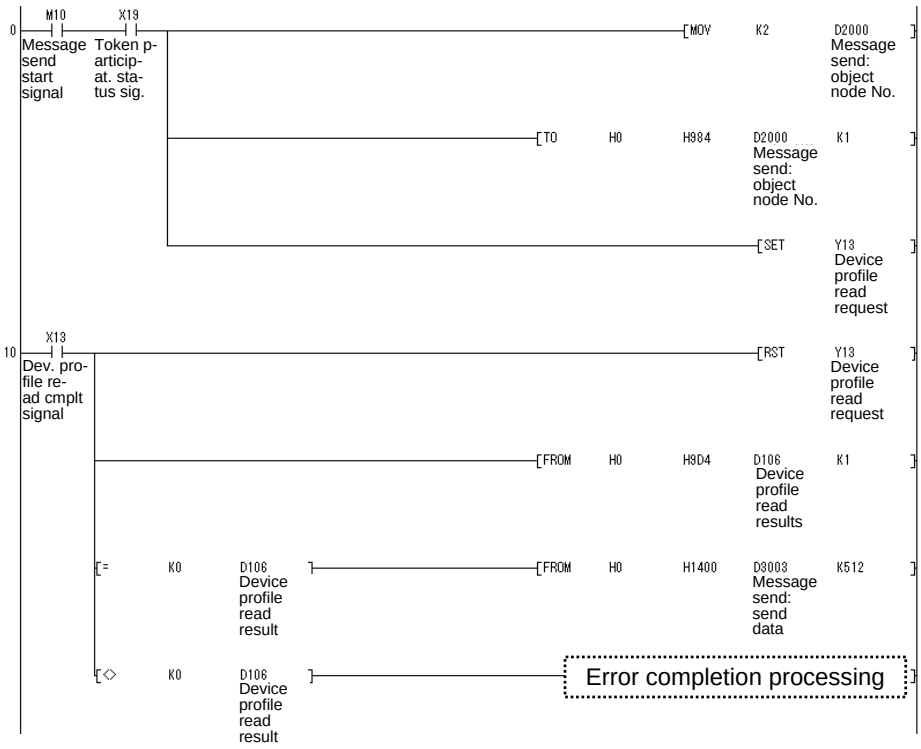
**(6) Device profile read**

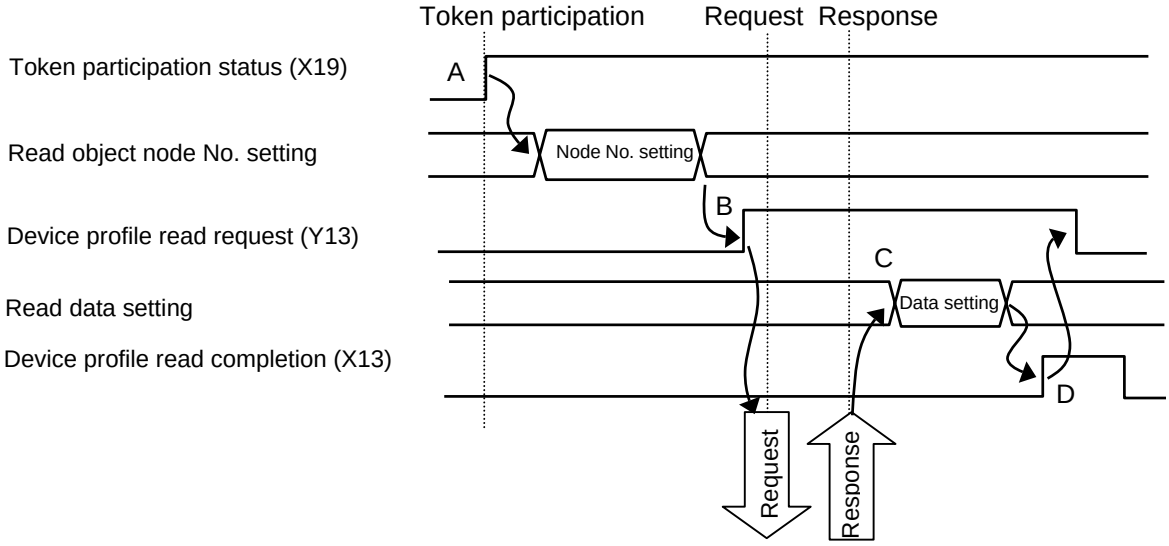
This function reads the device profile data that is the data for the corresponding node from the network. The data format for the device profile data is based on ASN1.1 (Abstract Syntax Notation One) conversion rules for transmission encoding as stipulated in ASN1.1 Basic Encoding Rule (ISO/IEC 8825).

| Item | Request | Response |
|---|---|---|
| Transaction code | 65011 | 65211 |
| Parameter | Object node number | - |
| User data | - | System parameter |



**Example of user PLC program**




A : Check if FL-net unit's "Token participation status" signal (X19) is ON.

B : After setting the device profile reading object node number in message send device D2000 (node number setting device), set the data in the buffer memory by "TO" command, and turn "Device profile read request" signal (Y13) ON.

C : FL-net unit stores the device profile data of the object node in the buffer memory (address: from 1400H). After stored, the parameter data is transferred to the message reception device D3003 and later.

D : Check device profile reading completion.

<At normal completion>

- "Device profile read completion" signal (X13): ON
- Device profile read result (D106): 0

<At error completion>

- "Device profile read completion" signal (X13): ON
- Device profile read result (D106): Other than 0

At an error completion, refer to the diagnosis data of D106 (see the table below) and correct the FL-net parameters or user PLC, then reboot C6/C64.

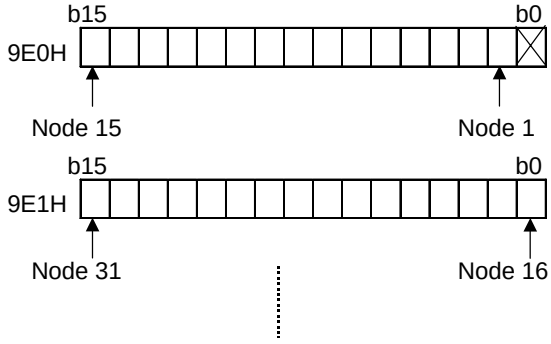
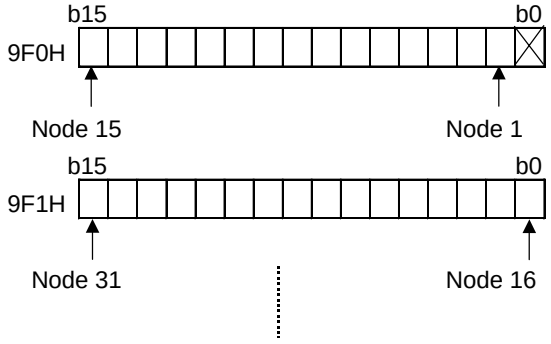
After confirming that "Device profile read completion" signal (X13) is ON, turn "Device profile read request" signal (Y13) OFF.

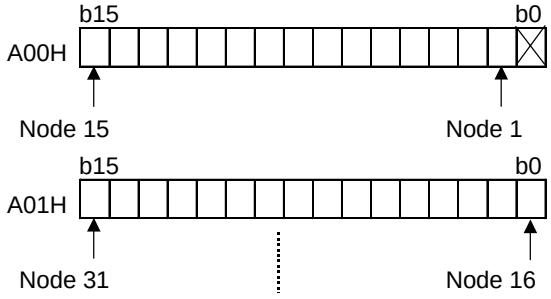
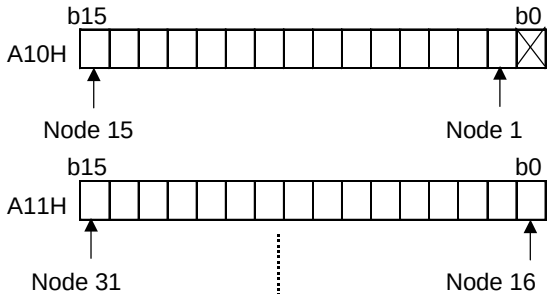
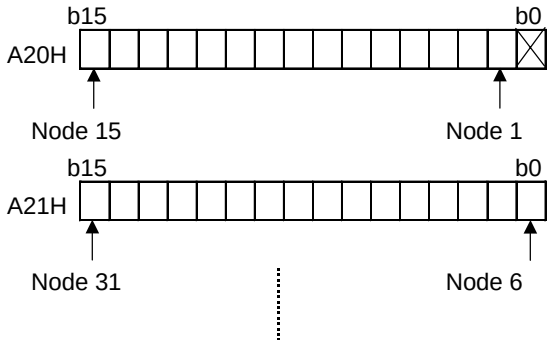
Data and description of device profile read result errors (List of error data in D106 and its description)

| D106 data | Description of error | Remedy |
|---|---|---|
| C321H | Setting value for object node number outside permissible range. | Correct setting value for object node number. |
| C322H | Object node does not exist. | Correct setting value for object node number. Check operation of corresponding equipment. |
| C323H | No response from object node for 10 seconds or more. | Correct setting value for object node number. Check operation of corresponding equipment. |
| C324H | Error in send data. | Correct send data. |
| C326H | No empty capacity in object node buffer. | Re-execute after waiting for a while. |
| C328H | Not participating in token. | Check the status of the PLC and wires. Review the settings for the initial process. |

## 6.5 Checking various status of other nodes

The information on the other nodes can be obtained by referring to the information area of the other nodes as shown in the table below.

| Buffer memory address | Name | Description | Reference to other nodes from C64 user PLC | Reference to C64 side from other nodes |
|---|---|---|---|---|
| 9E0H to 9EFH | Participation node list | Indicates the token participation status at the other node in bits.<br>  <br>0: Participation<br>1: Release | Possible | Possible |
| 9F0H to 9FFH | Other node parameter setting status | Indicates the parameter setting status at the other nodes in bits. *1<br>  <br>0: Setting<br>1: No setting | Possible | Possible |

| Buffer memory address | Name | Description | Reference to other nodes from C64 user PLC | Reference to C64 side from other nodes |
|---|---|---|---|---|
| A00H to A0FH | Other node CPU execution status | Indicates the execution status of QnCPU, etc. at the other node in bits. *1<br>  <br><br>0: RUN status (RUN,STEP_RUN)<br>1: STOP status (STOP,PAUSE) | Possible | Not possible (Note) |
| A10H to A1FH | Other node CPU operation status (Low level error) *2 | Indicates the results of self-diagnosis of QnCPU, etc. at the other node in bits. *1<br>  <br><br>0: Normal<br>1: Warning | Possible | Not possible (Note) |
| A20H to A2FH | Other node CPU operation status (Medium, high level errors) *3 | Indicates the results of self-diagnosis of QnCPU, etc. at the other node in bits. *1<br>  <br><br>0: Normal<br>1: Alarm | Possible | Not possible (Note) |

*1: For the participation nodes only.
*2: CPU unit's operation continues when the low level error occurs.
*3: CPU unit's operation stops when the medium to high level error occurs.

**[Note]**
Because C64 is not provided with QnCPU, CPU status, such as CPU execution status or operation status of C64, cannot be referred to from the other nodes.
When C64 PLC execution status or PLC operation status needs to be checked from the other nodes, alternatively check the heart beat signal in the common area that has been written by the C64 side user PLC with TO commands.

## 6.6 Reference

For the specifications or other programming methods of FL-net, refer to the document of MELSEC Q series below.

FL-net (OPCN-2) Interface Module User's Manual (QJ71FL71-F01-U-SY-J/E)

# IX. Connection Function with GOT

# 1. Outline

This function is to connect Mitsubishi Graphic Operation Terminal (GOT) with MELDAS C6/C64 and use the GOT as a machine operation panel or a NC operation panel.
You can display not only overall PLC devices but various monitored information of CNC C6/C64 on the GOT.
Setting display dedicated for CNC C6/C64 (CNC monitor), and ladder monitor display are also available.
The contents of this manual are supporting C6/C64 software Ver. D0.

**⚠ CAUTION**

⚠ Do not set any of the touch keys on the GOT as a start switch for the C6/C64. If a communication error (including cable disconnection) occurs between the GOT and C6/C64, the communication will be cut off and the GOT operation will be disabled. Even if the start switch is released, it will not be recognized that the start signal has been cut off, so the operation will continue. This could result in serious accidents.

# 2. Available Function

The table below shows the available functions of GOT when the GOT is connected with CNC C6/C64. This table is extracted from GOT-A900 Series Operating Manual (GT Works2 Version1/GT Designer2 Version1 compatible Extended/Option Functions Manual). ○ : Available △ : Partly restricted × : Unavailable

| Function | | | Ref. Section | C6/C64 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Bus connection | CPU direct connection | Computer link connection | MELSEC NET connection | CC-Link connection | | | Ethernet connection |
| | | | | | | | | BT13 | BT15 | G4 | |
| Utility function | | | Sec. 4 | × | ○ | × | × | ○ | △*1 | × | ○ |
| Ladder monitor function | Ladder monitor | Monitoring of sequence programs with ladder signals | Sec. 6.3.1 | × | ○ | × | × | ○ | × | × | ○ |
| | Display switching | Displaying of word device values in decimal and hexadecimal numbers | Sec. 6.3.3 | × | ○ | × | × | ○ | × | × | ○ |
| | | Displaying of device comments | | × | | | | | | | |
| | Device changing | Changing of device values | Sec. 6.3.4 | × | ○ | × | × | ○ | × | × | ○ |
| | Print-out | Printing of ladder | Sec. 6.3.5 | × | ○ | × | × | ○ | × | × | ○ |
| System monitor function | Entry monitor | Monitoring of current values by pre-registering monitor devices | Sec. 9.2 | × | ○ | × | × | ○ | △ *2 | × | ○ |
| | Batch monitor | Monitoring of 'n' points of current values subsequent to the designated device | Sec. 9.3 | × | ○ | × | × | ○ | △ *2 | × | ○ |
| | T/C monitor | Monitoring of 'm' points of current values, setting values, contacts and coils subsequent to the designated device | Sec. 9.4 | × | | | | | | | |
| | BM monitor | Monitoring of 'x' points of current values subsequent to the designated buffer memory of the designated special unit | Sec. 9.5 | × | ○ | × | × | ○ | × | × | ○ |
| | Data editing by using test operation | Setting/resetting of bit devices | Sec. 9.6 | × | ○ | × | × | ○ | × | × | ○ |
| | | Changing of current values for the buffer memory of word device | | × | ○ | × | × | ○ | × | × | ○ |
| | | Changing of current value for T/C (can be used while monitoring T/C) | | × | ○ | × | × | ○ | × | × | ○ |
| | | Changing of setting value for T/ C (can be used while monitoring T/C) | | × | | | | | | | |
| | Quick test | Changing of device value by using quick test | Sec. 9.6.2 | × | ○ | × | × | ○ | ○ | × | ○ |
| | Display switching | Displaying of device comment | Sec. 9.1.2 | × | ○ | × | × | ○ | × | × | ○ |
| | | Displaying of word device value and buffer memory value in decimal and hexadecimal numbers | | × | ○ | × | × | ○ | ○ | × | ○ |
| Special unit monitor function | | Monitoring of special unit's buffer memory on the dedicated screen | Ch. 11 | × | | | | | | | |
| Network monitor function | | Monitoring of the network status of MELSECNET/B, (II), and /10 | Ch. 15 | × | | | | | | | |
| List editing function | | List editing of sequence programs | Ch. 19 | × | | | | | | | |
| Motion monitor function | Servo monitor | Monitoring of servo-related items, such as current values and positioning errors on various monitor screens | Ch. 22 | × | | | | | | | |
| | Parame-ter setting | Changing of servo parameter setting values | | | | | | | | | |
| Servo drive unit monitor function | | Monitoring of servo drive unit, changing of servo parameter settings and test operation | Ch. 25 | This function is available regardless of the connection mode, as RS-232C interface of the GOT is used. (Refer to Sec. 3.7.3 for the precautions for servo drive unit monitor function.) | | | | | | | |
| CNC monitor function | | Monitoring of C6/C64 and changing of the parameters | Ch. 28 | × | | | | | | | ○ |

BT13 : A8GT-J61BT13 is used (intelligent device station).
BT15 : A8GT-J61BT15 is used (remote device station).
G4 : A9GT-RS4 or A9GT-50WRS4 is used (via G4).

*1 Clock setting is not available. *2 Link devices can be monitored only when they are allocated to the GOT.

CNC monitor function is available only with A985GOT (-V), which also requires the memory board. For more details, refer to GOT-A900 Series Operating Manual (GT Works2 Version1/GT Designer2 Version1 compatible Extended/Option Functions Manual).

# 3. Connection Mode

The table below shows the connectability of GOT by connection mode.

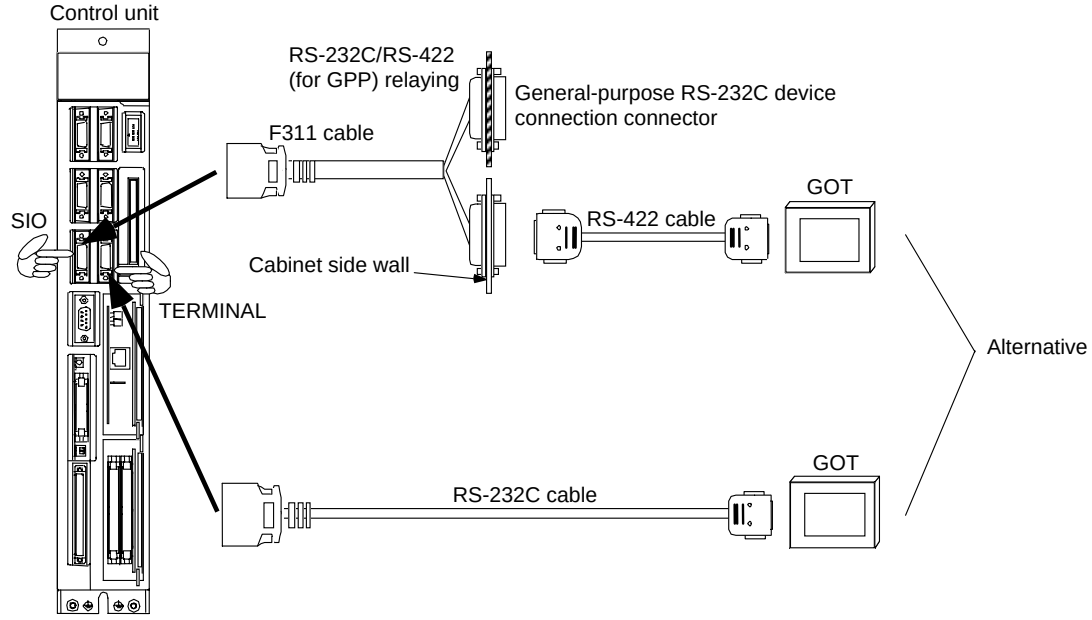
| Connection mode | Bus con-nection | CPU direct connec-tion | Computer link connec-tion | MELSEC NET connection | | | CC-Link connection | | | Ethernet connection |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Network system | | Data link system | | | | |
| | | | | H | 10 | B, (II) | Intelligent device station | Remote device station | Via G4 | |
| Connectable | X | ○ | X | X | X | X | ○*1 | ○ | X | ○ |

*1 Compatible with the software version of CC-Link communication unit A8GT-J61BT13 is X or later.

Each unit requires the communication units in every communication mode. But the additional unit on C6/C64 side is not necessary when in CPU direct connection mode.

## 3.1 CPU Direct Connection

GOT can be connected with CNC C6/C64 via RS-422 and RS-232C cables, and this connection is the most economical way.
When you use RS-422 cable, you connect this cable with the GPP connector of the F311 cable which is connected to the SIO connector on CNC C64 control unit.
When you use RS-232C cable, you connect this cable with TERMINAL connector on CNC C64 control unit.




**< Cable specification >**

(1) RS-422 cable
Cable for GOT (MELSEC) AC30R4-25P (3.0m), AC100R4-25P (10.0m), AC300R4-25P (30.0m)

(2) RS-232C cable

| CNC C6/C64 side (20-pin half-pitch) | | Cable connection and direction of signal | GOT side (9-pin D-SUB) | |
|---|---|---|---|---|
| Signal name | Pin No. | | Pin No. | Signal name |
| GND | 1 | | 1 | CD |
| | | | 2 | RD (RXD) |
| SD | 6 | | 3 | SD (TXD) |
| RD | 16 | | 4 | DTR (ER) |
| ER (DTR) | 18 | | 5 | SG (GND) |
| | | | 6 | DSR (DR) |
| | | | 7 | RS (RTS) |
| | | | 8 | CS (CTS) |
| GND | 11 | | 9 | - |

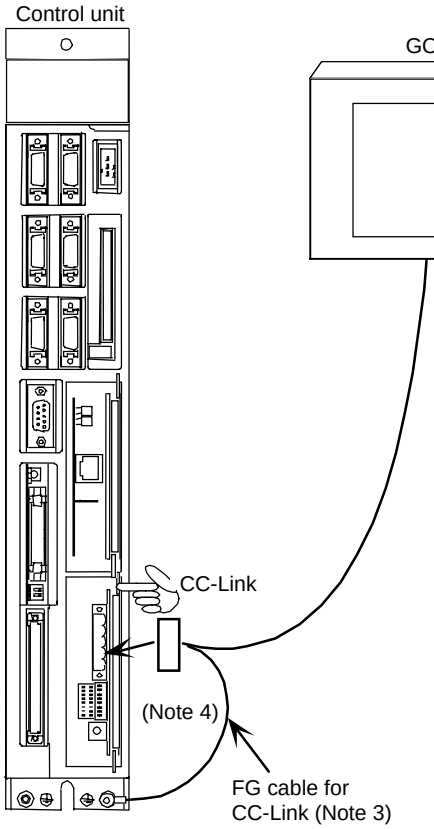
[CNC connector (recommended)]
Connector : 10120-3000VE (manufactured by Sumitomo 3M Ltd.)
Connector cover : 10320-52F0-008 (manufactured by Sumitomo 3M Ltd.)

[GOT connector]
The following type of connector is used as GOT connector. You should use the matching connector.
D-sub 9-pin (male) inch thread type
17LE-23090-27 (D3CC) (manufactured by DDK Ltd.)

**(Note)** For more details of GOT, refer to GOT-A900 Series User's Manual (GT Works2 Version1/GT Designer2 Version1 compatible Connection System Manual) and other relevant documents.

## 3.2 CC-Link Connection

Remote control can be realized via network since CNC C6/C64 functions as an intelligent device station or remote device station in CC-Link system.
In order to be connected via CC-Link, a CC-Link unit (FCU6-HR865) needs to be mounted on the expansion slot on the control unit.
You need to use CC-Link dedicated cable. Connect the cable to CC-Link system unit (FCU6-HR865) terminal.
And make sure to attach the terminating resistor (attachment) to the end station unit.




**(Note 1)** We cannot assure the performance when you use any cables other than CC-Link dedicated cable in CC-Link system. For specifications of CC-Link dedicated cables and inquiries, please access the Web page of CC-Link Partner Association (http://www.cc-link.org/). (Provided in "Contact List of CPLA Members")

**(Note 2)** You need to use the attached terminating resistor. The values of the resistors vary depending on the cables to be used. The value is 110 Ω for CC-Link dedicated cable, 130 Ω for CC-Link dedicated high-performance cable.

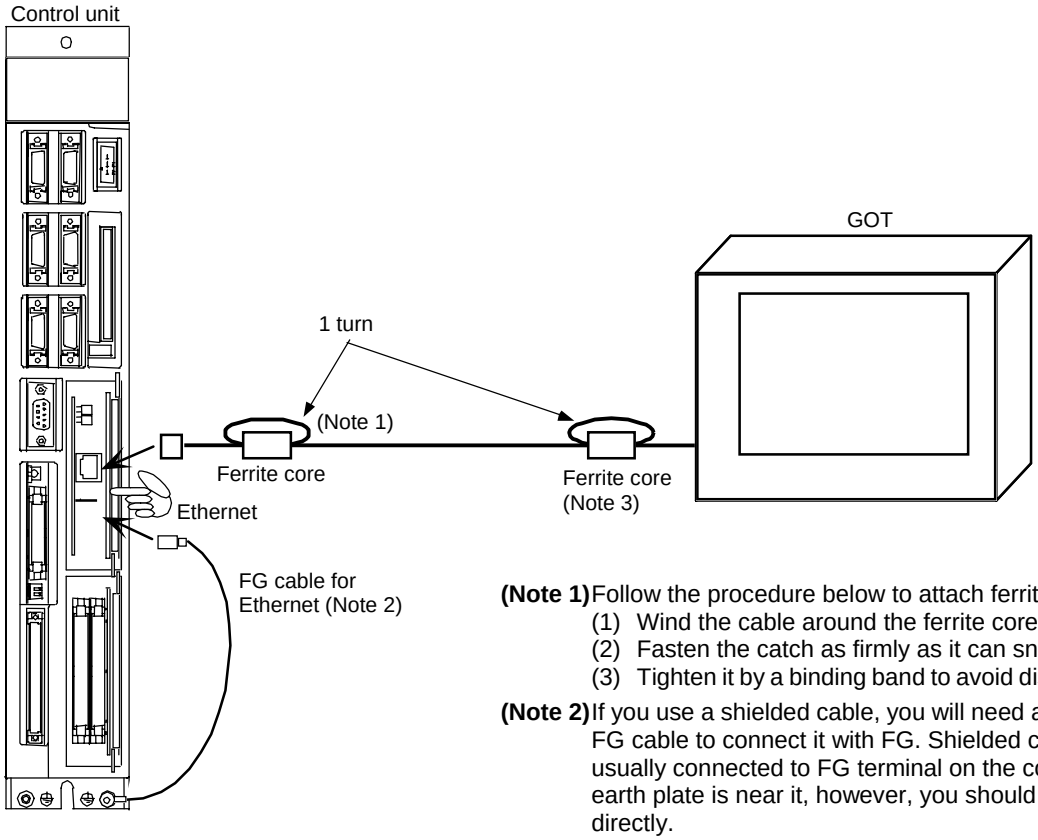
**(Note 3)** Connect FG cable from the FG terminal of CC-Link terminal block to the FG terminal at the lower part on C64 control unit.

**(Note 4)** In order to adjust the rotary switches for station number setting and for baud rate setting on C64 control unit, pull the CC-Link unit out from the control unit.

- With regard to CC-Link specification with CNC C6/C64, refer to "III. CC-LINK Master/Local Unit" in this MANUAL.
- For details of connection instruction, refer to "MELDAS C6/C64 CONNECTION AND MAINTENANCE MANUAL" (BNP-B2255).
- For more details of GOT, refer to "GOT-A900 Series User's Manual (GT Works2 Version1/GT Designer2 Version1 compatible Connection System Manual)" and other relevant documents.

## 3.3 Ethernet Connection

After installed in Ethernet system, GOT can operate CNC C6/C64 remotely via network.
In order to be connected via Ethernet, an Ethernet unit (FCU6-EX875) needs to be mounted on the expansion slot of the control unit.
Connect an Ethernet cable (10BASE-T cable) to the modular jack on the Ethernet unit.
Ethernet cable is so susceptible to noise that you should wire power cables and electric supply cables separately. And you need to attach a ferrite core (attachment) on the control unit side.
If you use this function under particularly adverse conditions, or need EMC compatibility, we recommend you to use the shielded cables.



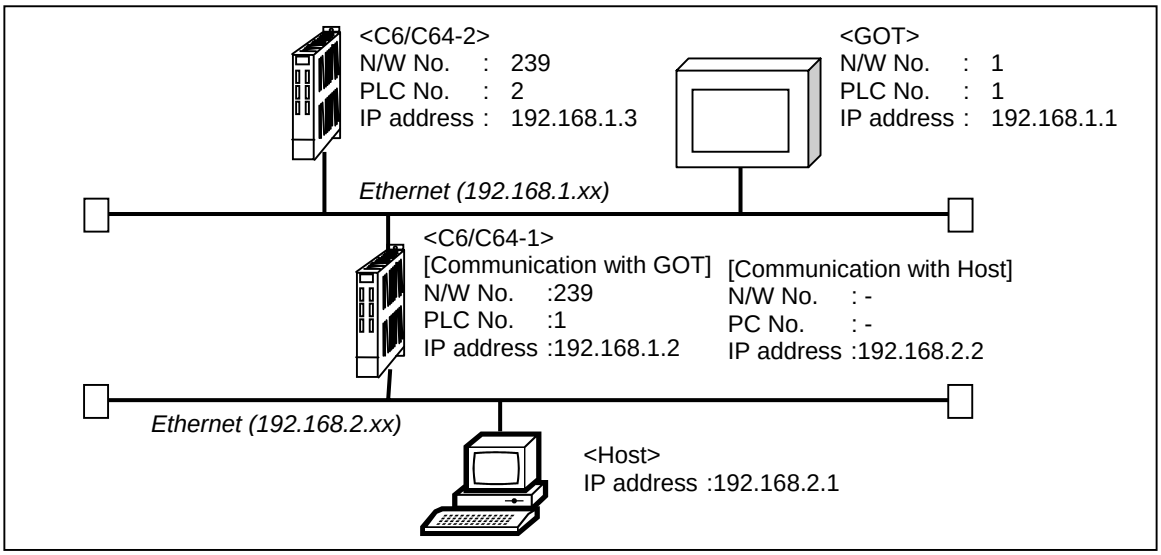

**(Note 1)** Follow the procedure below to attach ferrite cores.
(1) Wind the cable around the ferrite core once.
(2) Fasten the catch as firmly as it can snap.
(3) Tighten it by a binding band to avoid displacement.

**(Note 2)** If you use a shielded cable, you will need an additional FG cable to connect it with FG. Shielded cable is usually connected to FG terminal on the control unit. If earth plate is near it, however, you should connect it directly.

**(Note 3)** IF you need EMC compatibility, a ferrite core may need to be attached on GOT side, too.

### 3.3.1 Initial setting of Ethernet Connection

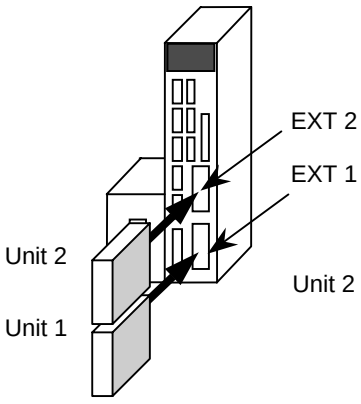
The initial setting in the case of the following system configuration is described below.



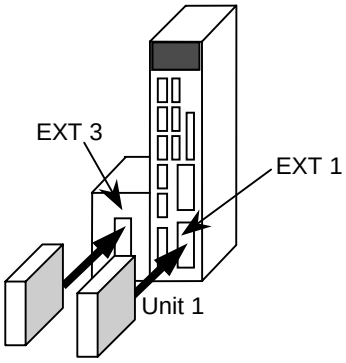

**(1) Setting on NC**

Perform the settings of Host IP address on NC side.
The IP address to be set here will be shared with the other Ethernet communication function (including GX Developer connection).
Up to 2 Ethernet units (FCU6-EX875) can be mounted on C6/C64, so it has 2 channels of Ethernet connection.
There are three expansion slots in total: two internal expansion slots (EXT1, EXT2) and one external expansion slot (EXT3).
When you mount 2 Ethernet units, each unit will be controlled by being numbered for identification (as "Unit 1" and "Unit 2"). The mounted status and unit numbers of Ethernet units are as follows.

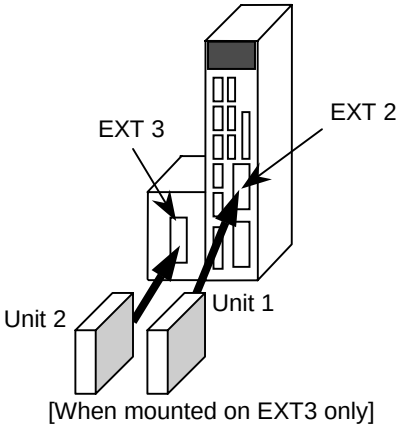
[When mounted on EXT1 and EXT2]



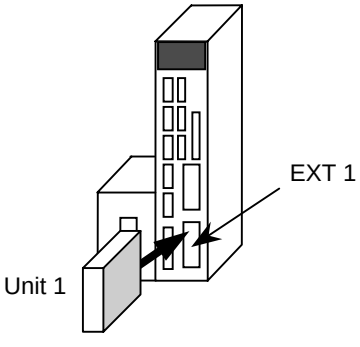

[When mounted on EXT1 and EXT3]



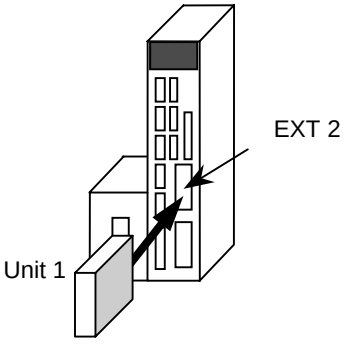

[When mounted on EXT2 and EXT3]



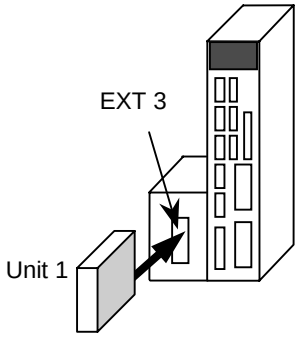

[When mounted on EXT1 only]




[When mounted on EXT2 only]




[When mounted on EXT3 only]

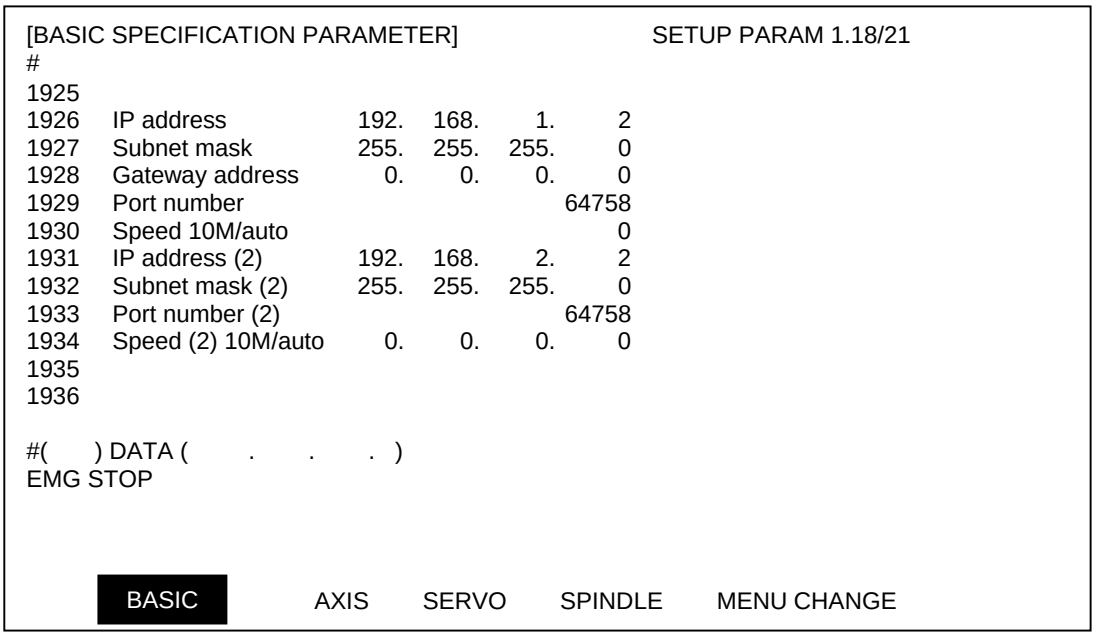


The following table shows the settings relating to Ethernet in accordance with each unit number.

| Item | Unit 1 | Unit 2 |
|---|---|---|
| Recommended connection | GOT | Information network |
| Assigned IP address setting | #1926 IP address | #1931 IP address (2) |
| Assigned Subnet mask setting | #1927 Subnet mask | #1932 Subnet mask (2) |
| Assigned port number setting | #1929 Port number | #1933 Port number (2) |
| Assigned communication speed setting | #1930 Speed 10M/auto | #1934 Speed (2) 10M/auto |
| Processing priority | High | Low |
| Others | IP address setting available at off-line | |

<Parameter setting>

You will set Ethernet parameters on Basic specification parameter screen.
You can set the parameters from #1926 to #1929 in off-line mode.
(Refer to "IV. Setting the IP Address" in this manual.)




| Parameter number | Parameter name | Setting example |
|---|---|---|
| #1926 | IP address | 192.168.1.2 |
| #1927 | Subnet mask | 255.255.255.0 |
| #1929 | Port number | 64758 |
| #1930 | Speed 10M/auto | 0 |

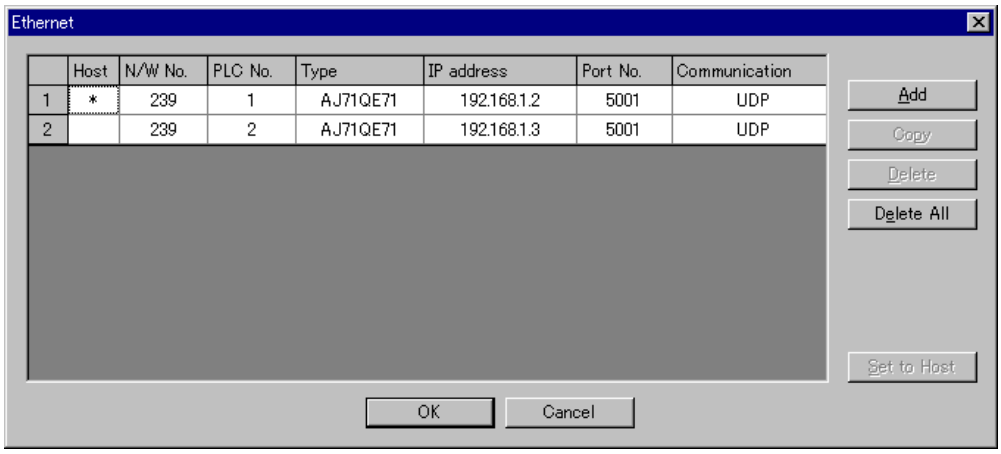
**(Note 1)** If #1926 IP address is not set, the initial setting will be "192.168.1.2".
**(Note 2)** If you set or change the Ethernet parameters, you need to reboot C64.
**(Note 3)** Always set Port number to "64758".
**(Note 4)** Always set #1930 Speed 10M/auto to 0 (10Mbps) during GOT connection.

The following table shows meaning of #1930 Speed 10M/auto and #1934 Speed (2) 10M/auto.

| Setting value | 0 | 1 |
|---|---|---|
| Communication speed Speed 10M/auto | The communication speed is fixed to 10Mbps. | The communication speed is set after 10Mbps or 100Mbps is automatically recognized |

### (2) Setting on GT Designer2

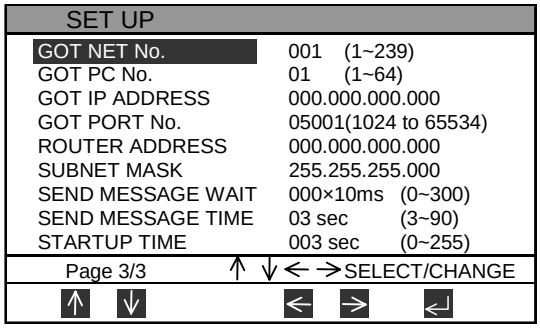
Perform the settings of C6/C64 to be monitored in "Ethernet setting" of GT Designer2.




| Item | Detail |
|---|---|
| Host | "*" mark will be shown when you click "Set to Host" button. |
| N/W No. | Set the network number of the MELDAS C6/C64.<br>If you use the CNC monitor function, set it to "239". |
| PLC No. | Set the PLC number (station number) of the CNC C6/C64. |
| Model | Select "AJ71QE71". |
| IP address | Set the IP address of the MELDAS C6/C64.<br>Set the IP address that is assigned to the connected C6/C64. |
| Port No. | Set it to "5001". |
| Communication type | Fixed to UDP/IP.<br>However, communication is made via TCP/IP during the CNC monitoring, and via UDP/IP during the normal monitoring. |

**(3) Setting on GOT**

Perform the Ethernet settings on GOT unit.
Use Setup of the GOT unit's utility function to perform Ethernet settings.

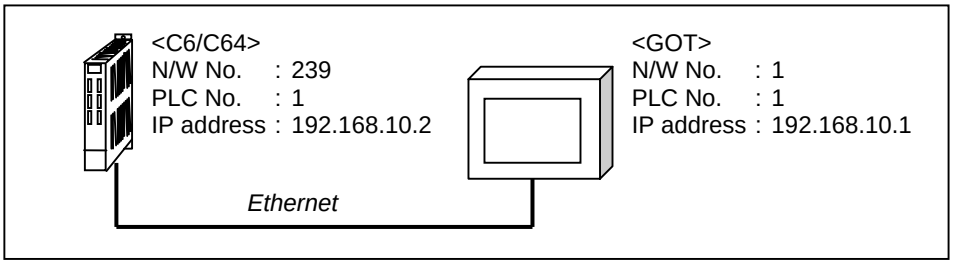



| Item | Detail | Factory setting |
|---|---|---|
| GOT NET No. | Set the network number of the GOT. | 1 |
| GOT PC No. | Set the station number of the GOT. Do not set the same number as the PC numbers of the Ethernet unit and C6/C64 to be monitored. | 1 |
| GOT IP ADDRESS | Set the IP address of the GOT. | 000.000.000.000 |
| GOT PORT No. | Set the port number of the GOT.<br>When connected with C6/C64, set it to "5001". | 5001 |
| ROUTER ADDRESS | If the system is connected with the other network by a router, set the router address of the network where the GOT is connected. | 000.000.000.000 |
| SUBNET MASK | When the GOT is connected to the Ethernet network controlled by the subnet, set the subnet mask that is commonly set in the network. Without subnet, operation will be conducted with the default value. | 255.255.255.000 |
| SEND MESSAGE WAIT | Set the send message wait time in order to reduce loads on the network and the subjected PLC. | 0 |
| SEND MESSAGE TIME | Set the timeout interval. | 3 |
| START UP TIME | Set how many seconds after GOT's power-on the communication with C6/C64 will be started.<br>Set it to "10". | 3 |

**(Note)** For more details about settings on GT Designer2 and GOT, refer to "GOT-A900 Series User's Manual (GT Works2 Version1/GT Designer2 Version1 compatible Connection System Manual)" and other relevant documents.

### (4) Initial setting procedure example

The followings show the setting procedure to conduct CNC monitoring with the GOT.
The setup procedure of the configuration below is used as an example.
The procedure of connecting with the default value before changing the IP address in order to set the IP address of C6/C64 is explained here.



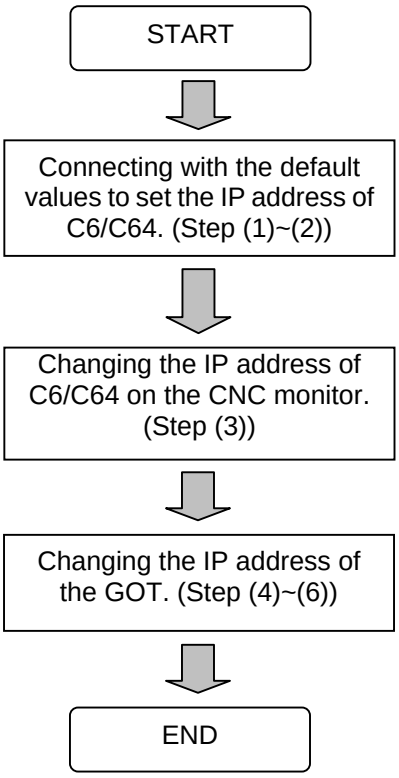

[C6/C64 parameter setting (factory setting)]

| Parameter No. | Parameter name | Factory setting |
|---|---|---|
| #1926 | IP address | 192.168.1.2 |
| #1927 | Subnet mask | 0.0.0.0 |
| #1929 | Port number | 64758 |
| #1930 | Speed 10M/auto | 0 |

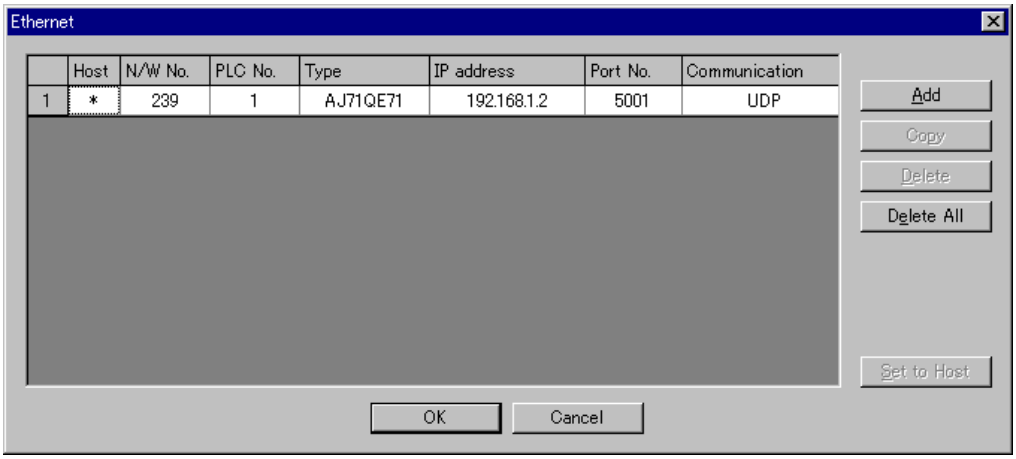
[GOT parameter setting (factory setting)]

| Parameter name | Factory setting |
|---|---|
| GOT NET No. | 1 |
| GOT PC No. | 1 |
| GOT IP ADDRFESS | 000.000.000.000 |
| GOT PORT No. | 5001 |
| ROUTER ADDRESS | 000.000.000.000 |
| SUBNET MASK | 255.255.255.000 |
| TRANSMISSION WAIT TIME | 0 |
| TRANSMISSION TIMEOUT | 3 |
| START UP TIME | 3 |

[Setting procedure]

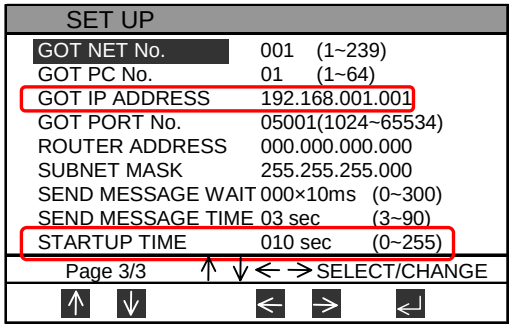


Step (1): Set the following settings in "Ethernet setting" of GT Designer2, and transmit them to the GOT.

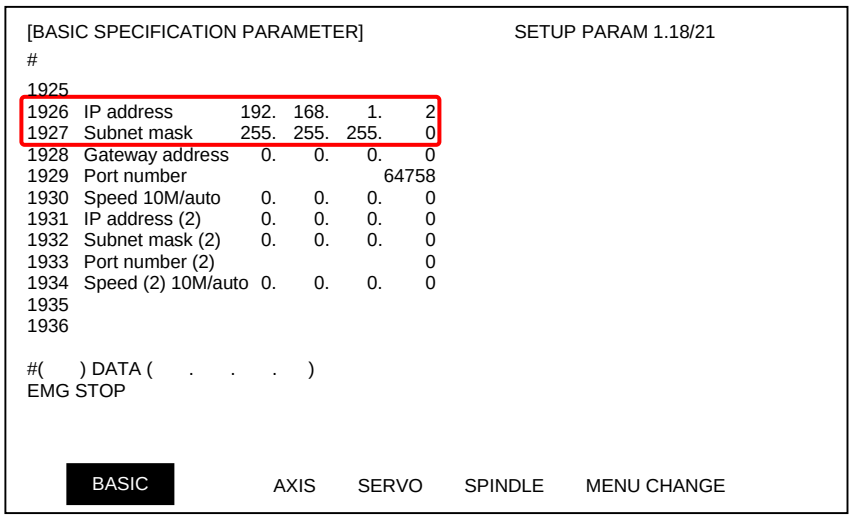



| Item | Setting value | Remarks |
|---|---|---|
| Host | * | |
| N/W No. | 239 | When conducting CNC monitoring, set it to "239". |
| PLC No. | 1 | |
| Model | AJ71QE71 | |
| IP address | 192.168.1.2 | Set the default IP address of C6/C64. |
| Port No. | 5001 | |
| Communication type | UDP | |

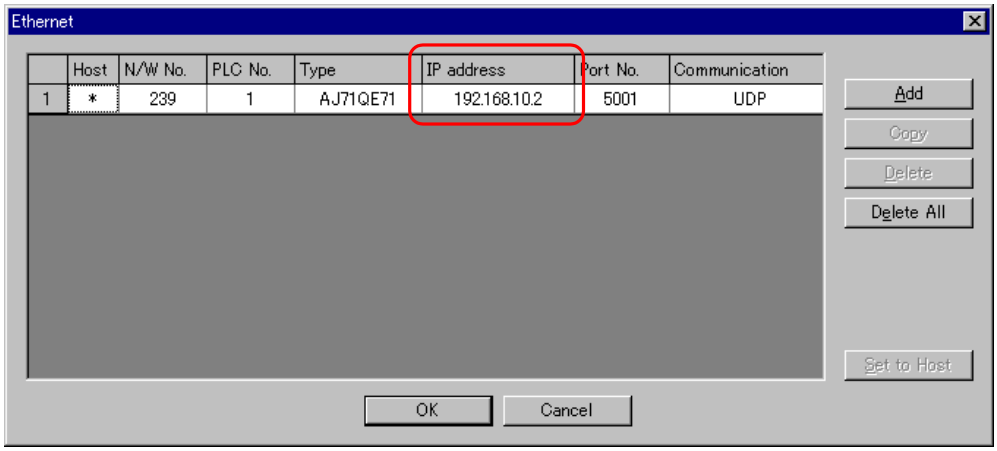
Step (2): Set the following settings on the GOT unit.



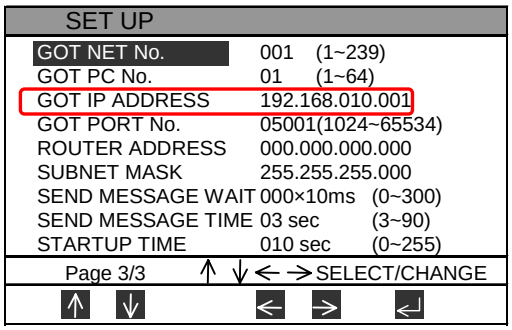

Step (3): With the CNC monitor displayed, change the IP address of C6/C64.
The changed IP address will be validated after rebooting.



Step (4): Set the formal settings in "Ethernet setting" of GT Designer2, and then transmit them to the GOT.




Step (5): Set the formal settings on the GOT unit.




Step (6): Reboot C6/C64 and GOT.

Now, the initial setting is completed.

# 4. Device Range Referenced on the GOT

The following table shows the types and ranges of the devices in the C6/C64 that can be referenced on the GOT.

| Application | | Device Range | | | Point |
|---|---|---|---|---|---|
| Input | | X0 | to | XAFF | 2816 points |
| Output | | Y0 | to | YE7F | 3712 points |
| Internal relay | | M0 | to | M8191 | 8192 points |
| Internal relay (Annunciator) | | F0 | to | F127 | 128 points |
| Latch relay | | L0 | to | L255 | 256 points |
| Special relay | | SM0 | to | SM127 | 128 points |
| Link relay | | B0 | to | B1FFF | 8192 points |
| Special link relay | | SB0 | to | SB1FF | 512 points |
| Special register | | SD0 | to | SD127 | 128 points |
| Link register | | W0 | to | W1FFF | 8192 points |
| Special link register | | SW0 | to | SW1FF | 512 points |
| Timer | 10ms | T0 | to | T15 | 16 points |
| | 100ms | T16 | to | T95 | 80 points |
| | 100ms integration | T96 | to | T103 | 8 points |
| | 10ms (Fixed timer) | T104 | to | T143 | 40 points |
| | 100ms (Fixed timer) | T144 | to | T239 | 96 points |
| | 100ms integration (Fixed timer) | T240 | to | T255 | 16 points |
| Counter | | C0 | to | C127 | 128 points |
| Data register | | D0 | to | D8191 (Note 1) | 8192 points |
| File register | | R0 | to | R8191 | 8192 points |

**(Note 1)** D1024 to D8191 can be used with the software version D0 and above.

# 5. Related Documents

**[Documents relating to MELDAS C6/C64]**

MELDAS C6/C64 CONNECTION AND MAINTENANCE MANUAL ..... BNP-B2255

MELDAS C6/C64 PLC PROGRAMMING MANUAL ..... BNP-B2309
(Ladder Section with MELSEC Tool)

**[Documents relating to GOT]**

GOT-A900 Series User's Manual (GT Works2 Version1/GT Designer2 Version1 Compatible Connection System Manual)..... SH (NA)-080255

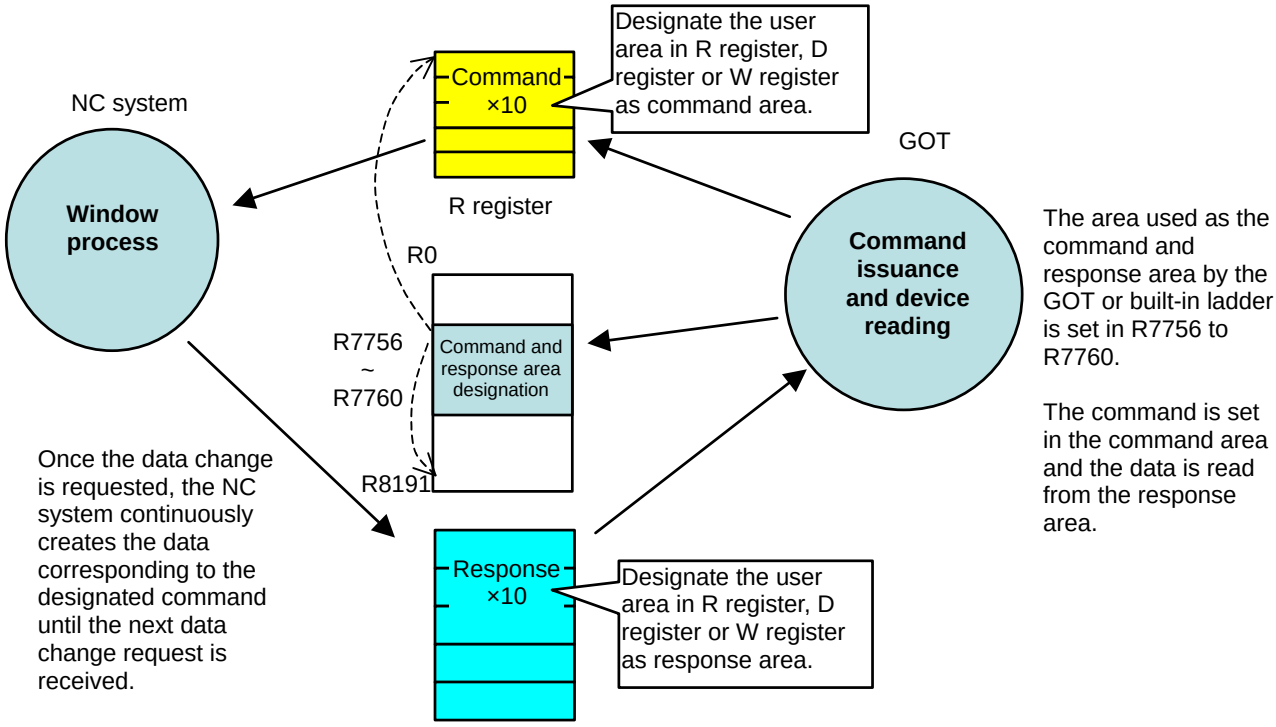
GOT-A900 Series Operating Manual (GT Works2 Version1/GT Designer2 Version1 Compatible Extended/Option Functions Manual) ..... SH (NA)-080253

# X. GOT Window Function

# 1. Outline

This function is an interface used to display various data on the GOT (A900 Series) connected to the MELDAS C6/C64.
The currently running machining program No., the currently running machining program and the coordinates, etc., are read from the GOT with the device read commands.
Commands for the NC are set from the GOT, and the data corresponding to the commands is created on the NC side.

The command area and response area are designated in R7756 to R7760. When the GOT designates the NC data to be gotten in the command area, the NC stores the designated data in the response area. That data can be sequentially read and displayed with the GOT.
Up to ten areas can be set as window areas, and up to ten types of commands can be set simultaneously.



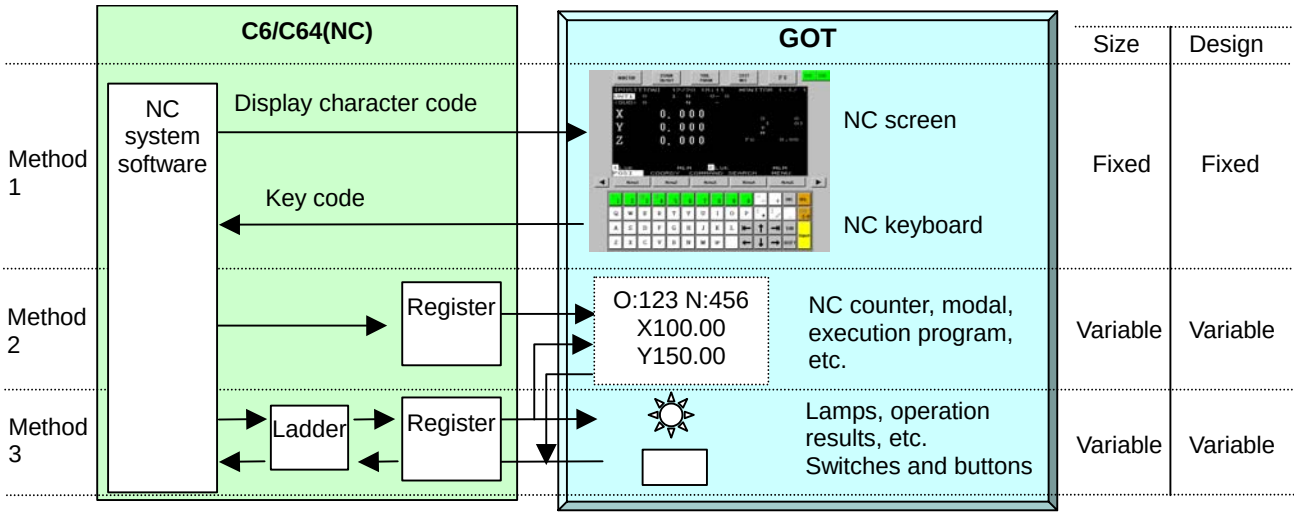
# 2. Displaying the NC data

The NC internal data can be displayed and set with three methods.
Method 2 is explained in this manual.

<Method 1>
The NC screen conventionally displayed on the communication terminal, etc., is displayed on the GOT using the GOT's NC monitor function.
This is a fixed screen which cannot be customized by the user. Only the A985GOT(-V) NC monitor function can be used.

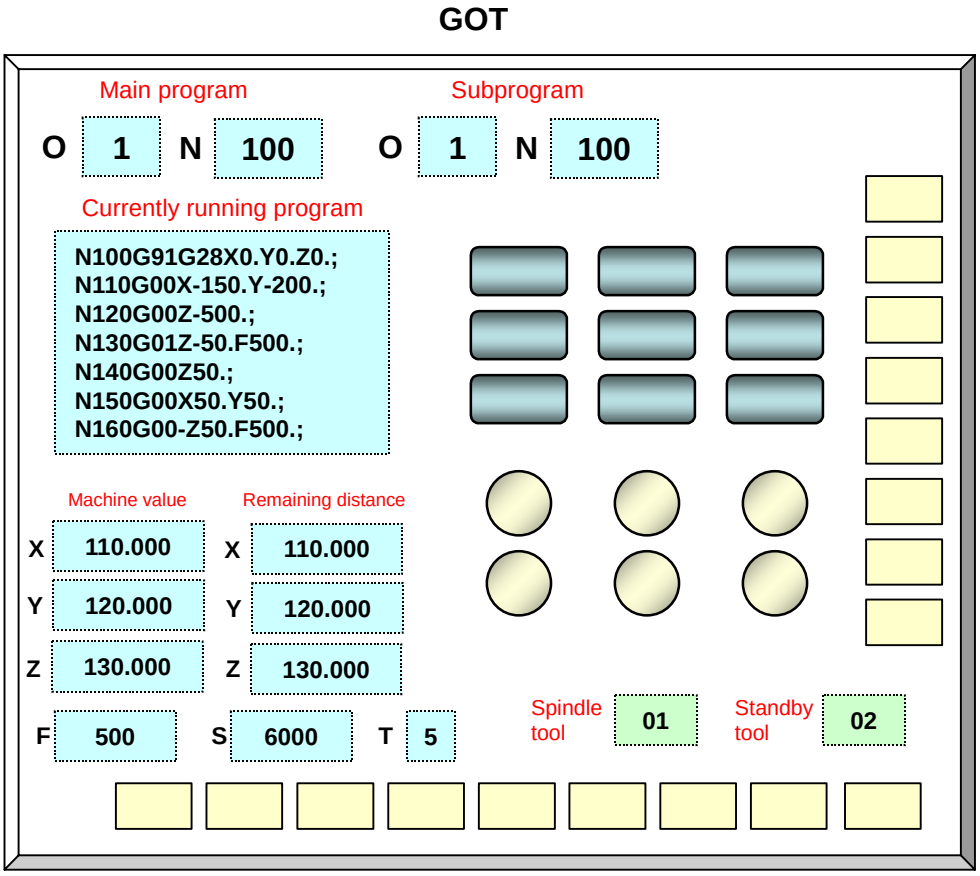
<Method 2>
The data periodically output to the NC's built-in PLC register by the NC system software is displayed on the GOT.
The types and amount of data periodically output by the NC system software are limited.

<Method 3>
Data is prepared (DDB commands) in the register by the NC's built-in PLC, and the GOT reads and writes the NC register.
The degree of freedom is high, but the NC internal data must always be gotten with a ladder.



# 3. Displaying the NC data (Method 2): GOT window function

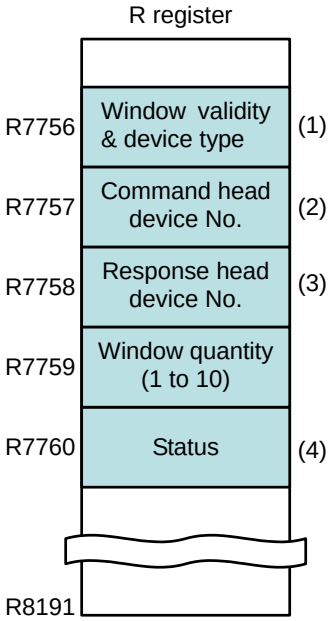
This function displays the NC internal data prepared in a special register by the NC system.




| Display data | Getting method |
|---|---|
| Main/sub O, N No. | Get with melGetGmodalPack (Command code: 0x0F02) |
| Currently running program | Get with melGetCurrentPrgPack (Command code: 0x0F01) |
| Machine value | Get with melGetAxisPosition (Command code: 0x0F03) |
| Remaining distance | Get with melGetAxisPosition (Command code: 0x0F03) |
| F command (modal) | Get with melGetGmodalPack (Command code: 0x0F02) |
| S command (modal) | Get with melGetGmodalPack (Command code: 0x0F02) |
| T command (modal) | Get with melGetGmodalPack (Command code: 0x0F02) |

# 4. Designating the window area

Set the window area in R7756 to R7760 with the GOT (or built-in PLC).
Set commands in the set window command area.



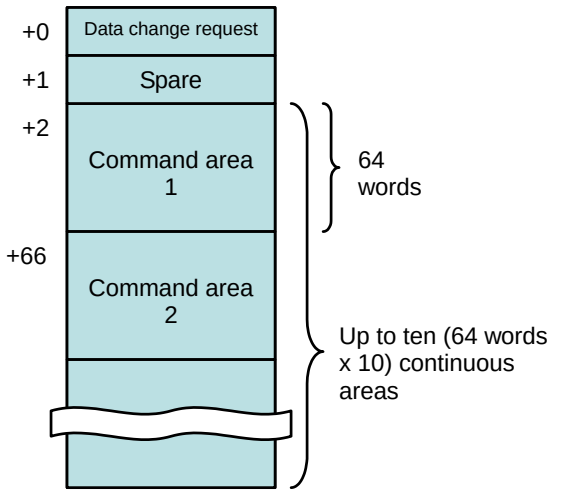

The user area is used as the command and response areas.
[User area]
R4000~R4499
R6400~R7199
D0~D8191
W0~W1FFF

**(Example)** To designate R6400 as the response head device No.
: Set 6400 as a decimal.

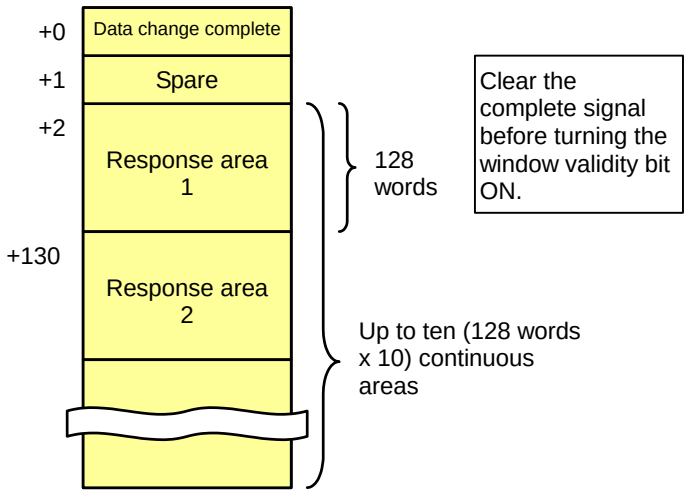
(1) Window validity and device type designation (Designate with R7756)

| bit | Details | Explanation |
|---|---|---|
| 0 | Window validity | Turn bit0 ON to use the window function. |
| 1 | | The data in the response area will not be updated when this bit is OFF. |
| 2 | | |
| 3 | | Turn the validity bit ON after setting all of the other data. |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | R register usage | For command: Designate the device type used with the window function. Turn 1 bit ON. If multiple bits are ON or if they are all OFF, the R register will be used. |
| 9 | D register usage | |
| A | W register usage | |
| B | | |
| C | R register usage | For response: Designate the device type used with the window function. Turn 1 bit ON. If multiple bits are ON or if they are all OFF, the R register will be used. |
| D | D register usage | |
| E | W register usage | |
| F | | |

(2) Window command area (Designate with R7757)




(3) Window response area (Designate with R7758)




(4) Status (Designate with R7760)

| bit | Details |
|---|---|
| 0 | Window quantity error |
| 1 | Command area Device range error |
| 2 | Response area Device range error |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| A | |
| B | |
| C | |
| D | |
| E | |
| F | |

The error status from the NC is stored in the status area.

An error will occur if the designated device is not within the user area range, or if the window quantity is not between 1 and 10.

The "response area device range error" will occur if the command area and response area overlap.

**Precautions for designating the window area**

(1) Turn the window validity bit ON after setting the window quantity, command head device No. and response head device No.
The window validity bit can be turned ON simultaneously with the device type without problem.

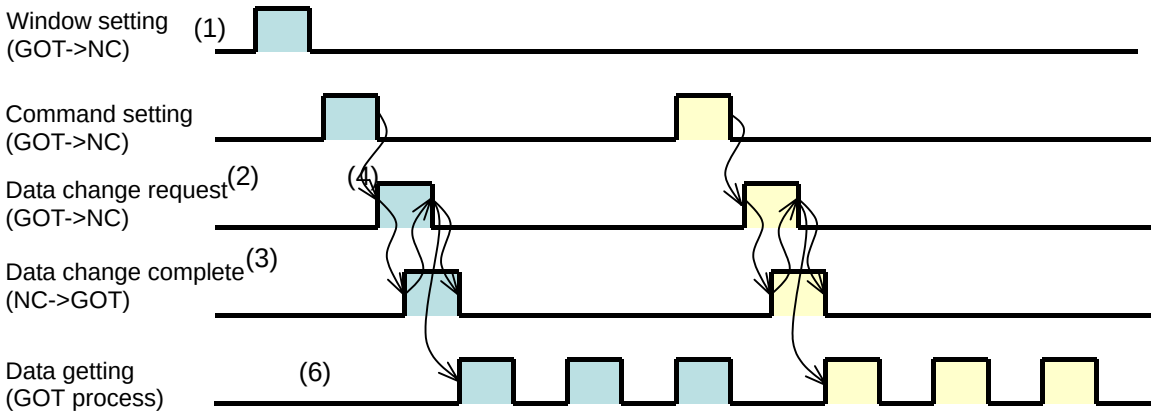
(2) After changing the window area, turn the window validity bit OFF once and then set the device No., etc.

(3) After an error such as a window quantity error or device range error occurs, turn the window validity bit OFF once, and make a correct setting.

(4) The command head device No. and response head device No. must always be an even number (so that 4 bytes is the boundary).

# 5. Getting window data

The window area must be designated before the GOT can get the NC data.
Next, set the required commands, and turn the data change request ON.
The NC side receives the data change request, and when the data has been changed, the data change complete signal turns ON.
Once the data change request turns ON, the NC will continue to create data until the next data change request turns ON.
There are ten data change request signals corresponding to windows 1 to 10.




(1) Designate the window area.
(Window quantity, command/response device area, device type designation, window validity bit)

↓

(2) After writing the command (API designation) and argument into the command area from the GOT or built-in ladder, the data change request signal turns ON.

↓

(3) After the NC receives the data change request and the response area update is completed, the data change complete signal turns ON.

↓

(4) The GOT receives the data change complete signal and turns the data change request signal OFF.

↓

(5) The NC continually creates data in respect to the designated command, and stores it in the response area.

↓

(6) The GOT reads the response area device.

**Precautions for getting the window data**

(1) The script function is used to write the commands from the GOT.
(2) To prevent transient data from being displayed, do not get the data while the data change request is ON.
(3) If data is to be constantly gotten without changing the command, turn the data change request ON only once. The response area will be constantly updated after that.

# 6. Data change request and complete signals

## 6.1 Data change request signal (GOT → NC)

| Offset | Details | Remarks |
|---|---|---|
| Command head device +0 | Data change request signal | Turns ON when the command data is changed. |

Details of bits

| bit | Details |
|---|---|
| 0 | Window 1 data change request |
| 1 | Window 2 data change request |
| 2 | Window 3 data change request |
| 3 | Window 4 data change request |
| 4 | Window 5 data change request |
| 5 | Window 6 data change request |
| 6 | Window 7 data change request |
| 7 | Window 8 data change request |
| 8 | Window 9 data change request |
| 9 | Window 10 data change request |
| A | |
| B | |
| C | |
| D | |
| E | |
| F | |

## 6.2 Data change complete signal (NC → GOT)

| Offset | Details | Remarks |
|---|---|---|
| Response head device +0 | Data change complete signal | Turns ON when the data change is completed, and turns OFF when the data change request signal turns OFF. |

Details of bits

| bit | Details |
|---|---|
| 0 | Window 1 data change complete |
| 1 | Window 2 data change complete |
| 2 | Window 3 data change complete |
| 3 | Window 4 data change complete |
| 4 | Window 5 data change complete |
| 5 | Window 6 data change complete |
| 6 | Window 7 data change complete |
| 7 | Window 8 data change complete |
| 8 | Window 9 data change complete |
| 9 | Window 10 data change complete |
| A | |
| B | |
| C | |
| D | |
| E | |
| F | |

# 7. Window commands/responses

## 7.1 List of command codes

| Command name | Details | Command code |
|---|---|---|
| melGetCurrentPrgPack | Designate and get type of currently running program | 0xF01 |
| melGetGmodalPack | Get modal information in batch | 0xF02 |
| melGetAxisPosition | Get coordinate values for all axes in batch | 0xF03 |
| melGetCurrentAlarmMsg2 | Get currently occurring alarm message | 0xF04 |
| melGetAlarmHistory | Get alarm history information | 0xF05 |

## 7.2 Command area

Up to ten window command areas can be used.

| Window | Offset | Details | Remarks |
|---|---|---|---|
| - | +0 | Data change request signal | |
| - | +1 | Spare | |
| Window 1 | +2 | Data size | Number of bytes from command code to end of argument |
| | +3 | Spare | |
| | +4 | Command code | Command code used |
| | +5 | Spare | |
| | +6 ~ +65 | Argument 1 to argument 30 | The argument configuration differs according to the command |
| Window 2 | +66 | Data size | Number of bytes from command code to end of argument |
| | +67 | Spare | |
| | +68 | Command code | Command code used |
| | +69 | Spare | |
| | +70 ~ +129 | Argument 1 to argument 30 | The argument configuration differs according to the command |
| : | : | : | : |
| Window 10 | +578 | Data size | Number of bytes from command code to end of argument |
| | +579 | Spare | |
| | +580 | Command code | Command code used |
| | +581 | Spare | |
| | +582 ~ +641 | Argument 1 to argument 30 | The argument configuration differs according to the command |

The offset is indicated in word units.

## 7.3 Response area

Up to ten window response areas can be used.

| Window | Offset | Details | Remarks |
|---|---|---|---|
| - | +0 | Data change complete signal | |
| - | +1 | Spare | |
| Window 1 | +2 | Data size | Number of bytes from command code to end of response |
| | +3 | Spare | |
| | +4 | Command code | Command code issued |
| | +5 | Spare | |
| | +6<br>+7 | Error code | 0 : No error<br>Other than 0 : Error occurring |
| | +8<br>~<br>+129 | Response (122 words) | The response configuration differs according to the command |
| Window 2 | +130 | Data size | Number of bytes from command code to end of response |
| | +131 | Spare | |
| | +132 | Command code | Command code issued |
| | +133 | Spare | |
| | +134<br>+135 | Error code | 0 : No error<br>Other than 0 : Error occurring |
| | +136<br>~<br>+257 | Response (122 words) | The response configuration differs according to the command |
| : | : | : | : |
| Window 10 | +1154 | Data size | Number of bytes from command code to end of response |
| | +1155 | Spare | |
| | +1156 | Command code | Command code issued |
| | +1157 | Spare | |
| | +1158<br>+1159 | Error code | 0 : No error<br>Other than 0 : Error occurring |
| | +1160<br>~<br>+1281 | Response (122 words) | The response configuration differs according to the command |

The offset is indicated in word units.

# 8. Details of commands

## 8.1 melGetCurrentPrgPack

| | |
|---|---|
| melGetCurrentPrgPack | Designates and gets the type of currently running program. |

Usage example

■ Command

| Offset | Details | Setting example | Remarks |
|---|---|---|---|
| 0 | Data size | 16 | |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F01 | Designate melGetCurrentPrgPack |
| 3 | Spare | 0 | |
| 4 | Argument 1: Designate part system No. | 1 | 1: 1st part system<br>2: 2nd part system |
| 5 | | | |
| 6 | Argument 2: Designate number of blocks to get | 3 | Setting range: 1 to 10 |
| 7 | | | |
| 8 | Argument 3: Designate number of characters in one block | 16 | Setting range: 1 to 240 |
| 9 | | | |

The offset is indicated in word units.
Designate so that the number of blocks x number of characters in one block is within 240 characters.

■ Response

| Offset | Details | Response example | Remarks |
|---|---|---|---|
| 0 | Data size | 60 | |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F01 | Designate melGetCurrentPrgPack |
| 3 | Spare | 0 | |
| 4 | Error code | 0 | 0 : No error<br>Other than 0 : Error occurring |
| 5 | | | |
| 6 | Status | 1 | 0: Not running<br>1: Running |
| 7 | | | |
| 8~15 | Currently running program | "NO1G90G28X0.Y0.;" | |
| 16~23 | | "NO2G00X-123.456;" | |
| 24~31 | | "NO003;" | |

The offset is indicated in word units.
The currently running block is always output to the 2nd block. NULL is output for empty blocks.
Thus, if the program is not running, the NULL code is output to the above two blocks.

## 8.2 melGetGmodalPack

| | |
|---|---|
| melGetGmodalPack | Gets various modal information in a batch. |

Usage example

■ Command

| Offset | Details | Setting example | Remarks |
|---|---|---|---|
| 0 | Data size | 16 | |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F02 | Designate melGetGmodalPack |
| 3 | Spare | 0 | |
| 4 | Argument 1: Designate part system No. | 1 | 1: 1st part system<br>2: 2nd part system |
| 5 | | | |

The offset is indicated in word units.

■ Response

| Offset | Details | Response example | Remarks |
|---|---|---|---|
| 0 | Data size | 190 | Number of bytes |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F02 | Command code issued |
| 3 | Spare | 0 | |
| 4 | Error code | 0 | 0 : No error<br>Other than 0 : Error occurring |
| 5 | | | |
| 6~9 | S1 modal | "1200" | 8-digit S1 modal (ASCII)<br>S1 is output regardless of the part system |
| 10~13 | T modal | "13" | 8-digit T modal (ASCII) |
| 14~18 (Note1) | F modal | "1200.00" | 10-digit FA modal (ASCII) |
| 19~48 | G modal | "01 17 91 94"<br>"21 40 49 80"<br>"98 54 64 67"<br>"97 50.143.1" | G modal for each group (ASCII)<br>One group is output with four characters |
| 49 | NC status 1 | 0 | 0: No alarm message<br>1: Alarm message found |
| 50~68 | NC status 2 | "LSK mm INC G40 G54" | When there is no alarm message:<br>ST1 to ST8 are output with ASCII<br>When there is an alarm message:<br>The message is output with up to 33 characters |
| 69~72 | Main program No. | "100" | 8-digit main program No. (ASCII) |
| 73~76 | Main sequence No. | "110" | 8-digit main program sequence No. (ASCII) |
| 77~80 | Subprogram No. | "9990" | 8-digit subprogram No. (ASCII) |
| 81~84 | Subprogram sequence No. | "200" | 8-digit subprogram sequence No. (ASCII) |
| 85~88 | S2 modal | "2000" | 8-digit S2 modal (ASCII)<br>S2 is output regardless of the part system |
| 89~92 | Current program No. | "9990" | 8-digit current program No. (ASCII) |
| 93~96 | Currently running program's sequence No. | "200" | 8-digit sequence No. of currently running program (ASCII) |

The offset is indicated in word units.

**(Note 1)** The F modal value is a value on which override is not applied.

## 8.3 melGetAxisPosition

| | |
|---|---|
| melGetAxisPosition | Gets the coordinate values for all axes in a batch. |

Example of use when getting the machine value (When getting as a character string)

■ Command

| Offset | Details | Setting example | Remarks |
|---|---|---|---|
| 0 | Data size | 20 | |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F03 | Designate melGetAxisPosition |
| 3 | Spare | 0 | |
| 4<br>5 | Argument 1: Designate part system No. | 1 | 1: 1st part system<br>2: 2nd part system |
| 6<br>7 | Argument 2: Designate the axis to get | 3 | bit0: 1st axis<br>bit1: 2nd axis<br>...<br>If the axis is not designated, the values for all axes will be gotten. |
| 8<br>9 | Argument 3: Designate the type of coordinate value | 0 | 0: Machine value<br>1: Current value<br>2: Workpiece coordinate value<br>3: Remaining command<br>4: Next command |
| 10<br>11 | Argument 4: Data type | 1 | 0: Interpolation unit (Note 1)<br>1: Character string type (ASCII) |

The offset is indicated in word units.

**(Note 1)** When the command unit is 1µm, the interpolation unit is 0.5µm.
When the command unit is 0.1µm, the interpolation unit is 0.05µm.

**(Note 2)** Only the NC axes are the target axes. The coordinate values for the PLC axes cannot be gotten.

**(Note 3)** When using the character string type, the diameter designated axis will be displayed as a diameter.

**(Note 4)** When using the character string type, if the coordinate value exceeds 8 digits, * will be displayed.
(ex.) ******.***

**(Note 5)** If the number of axes to be gotten exceeds the number of axes actually mounted on the NC, an error will be returned, and the coordinate values, including those for the mounted axes, will not be stored.

■ Response

| Offset | Details | Response example | Remarks |
|---|---|---|---|
| 0 | Data size | 44 | Number of bytes |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F03 | Command code issued |
| 3 | Spare | 0 | |
| 4 | Error code | 0 | 0 : No error<br>Other than 0 : Error occurring |
| 5 | | | |
| 6~11 | 1st axis coordinate value | "-12345.678" | 8-digit S1 modal (ASCII)<br>S1 is output regardless of the part system |
| 12~17 | 2nd axis coordinate value | "12345.678" | 8-digit T modal (ASCII) |
| 18~23 | 3rd axis coordinate value | " " | 10-digit FA modal (ASCII) |

The offset is indicated in word units.

Example of storing "-123.456" in register

| | bit15 bit8 | bit7 bit0 |
|---|---|---|
| +0 | " " | " " |
| +1 | "-" | " " |
| +2 | "2" | "1" |
| +3 | "." | "3" |
| +4 | "5" | "4" |
| +5 | " " | "6" |

Example of use when getting the machine value (When getting as a binary)

■ Command

| Offset | Details | Setting example | Remarks |
|---|---|---|---|
| 0 | Data size | 20 | |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F03 | Designate melGetAxisPosition |
| 3 | Spare | 0 | |
| 4<br>5 | Argument 1: Designate part system No. | 1 | 1: 1st part system<br>2: 2nd part system |
| 6<br>7 | Argument 2: Designate the axis to get | 7 | bit0: 1st axis<br>bit1: 2nd axis<br>...<br>If the axis is not designated, the values for all axes will be gotten. |
| 8<br>9 | Argument 3: Designate the type of coordinate value | 0 | 0: Machine value<br>1: Current value<br>2: Workpiece coordinate value<br>3: Remaining command<br>4: Next command |
| 10<br>11 | Argument 4: Data type | 0 | 0: Interpolation unit (Note 1)<br>1: Character string type (ASCII) |

The offset is indicated in word units.

**(Note 1)** When the command unit is 1µm, the interpolation unit is 0.5µm.
When the command unit is 0.1µm, the interpolation unit is 0.05µm.

**(Note 2)** Only the NC axes are the target axes. The coordinate values for the PLC axes cannot be gotten.

**(Note 3)** If the number of axes to be gotten exceeds the number of axes actually mounted on the NC, an error will be returned, and the coordinate values, including those for the mounted axes, will not be stored.

■ Response

| Offset | Details | Response example | Remarks |
|---|---|---|---|
| 0 | Data size | 20 | Number of bytes |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F03 | Command code issued |
| 3 | Spare | 0 | |
| 4 | Error code | 0 | 0 : No error<br>Other than 0 : Error occurring |
| 5 | | | |
| 6 | 1st axis coordinate value | 20000<br>(0x4E20) | 20000-2000=10.000mm |
| 7 | | | |
| 8 | 2nd axis coordinate value | -24690<br>(0xFFFF9F8E) | -24690/2000=-12.345mm |
| 9 | | | |
| 10 | 3rd axis coordinate value | 1000<br>(0x3E8) | 1000/2000=0.500mm |
| 11 | | | |

The offset is indicated in word units.

Example of storing 0xFFFF9F8E (-24690) in register

| | |
|---|---|
| +0 | 9F8E |
| +1 | FFFF |

## 8.4 melGetCurrentAlarmMsg2

| | |
|---|---|
| melGetCurrentAlarmMsg2 | Gets the currently occurring alarm message. |

The designated number of up to five currently occurring messages can be gotten in order of priority.
The NC alarm/stop code language follows NC parameter "#1043 lang".

Example of use

■ Command

| Offset | Details | Setting example | Remarks |
|---|---|---|---|
| 0 | Data size | 16 | |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F04 | Designate melGetCurrentAlarmMsg2 |
| 3 | Spare | 0 | |
| 4<br>5 | Argument 1: Designate part system No. | 0 | 0: All part systems<br>1: 1st part system<br>2: 2nd part system<br>... |
| 6<br>7 | Argument 2: Number of messages to get | 5 | 1~5 |
| 8<br>9 | Argument 3: Type of alarm to get | 0x7 | bit0: NC alarm<br>bit1: Stop code<br>bit2: PLC alarm message<br>The alarm messages for which the corresponding bit is ON are gotten. |

The offset is indicated in word units.

■ Response

| Offset | Details | Response example | Remarks |
|---|---|---|---|
| 0 | Data size | 252 | Number of bytes |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F04 | Command code issued |
| 3 | Spare | 0 | |
| 4 | Error code | 0 | 0 : No error<br>Other than 0 : Error occurring |
| 5 | | | |
| 6~7 | Number of gotten messages | 2 | The number of gotten messages (number of occurring alarms) is set. |
| 8~10 | Alarm code (1) | 0x003300520700 | Refer to the Alarm code table |
| 11~31 | Alarm message (1) | "S03 Servo error 0052 XYZ $1" | The message is returned with left justified. A space (0x20) is set in empty areas. |
| 32~34 | Alarm code (2) | 0x000100000000 | |
| 35~55 | Alarm message (2) | "EMG Emergency stop EXIN $1" | |
| 56~58 | Alarm code (3) | 0x000000000000 | 0 is set if there is no alarm. |
| 59~79 | Alarm message (3) | NULL | NULL(0) is set if there is no alarm. |
| 80~82 | Alarm code (4) | 0x000000000000 | |
| 83~103 | Alarm message (4) | NULL | |
| 104~106 | Alarm code (5) | 0x000000000000 | |
| 107~127 | Alarm message (5) | NULL | |

■ Message format

The NC alarms, stop codes and PLC alarm messages use the following format.
Each message has a fixed length of 21 words (42 characters).

(1) NC alarm/stop code
Message (20 characters) + sp + error No. 1 (4 characters) + sp + error No. 2 (8 characters) + sp + $1 (2 characters) (Note 2) + sp (5 characters)

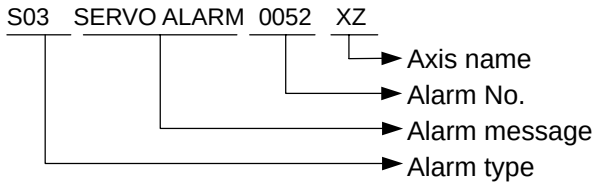
(2) PLC alarm message
Message (32 characters) + sp + sp + class No. (5 characters) + sp (3 characters)

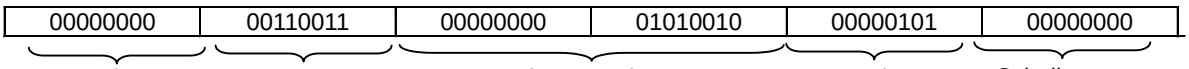
**(Note 1)** sp: Space (0x20)
**(Note 2)** Only when all part systems are designated. When 1st part system or 2nd part system, etc., is designated, this will be sp + sp.

■ Alarm code

The NC alarms, stop code and PLC alarm messages displayed on the NC screen are coded with three words.

**(Example)** When servo alarm S03 occurs




| | bit 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| 1st axis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 2nd axis | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 3rd axis | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 4th axis | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 5th axis | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 6th axis | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 7th axis | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8th axis | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The bit corresponding to the axis No. at which the alarm occurs turned ON for the servo axis name, spindle axis name and PLC axis name. If several alarms occur simultaneously, several bits will turn ON.

■ Alarm code table

The alarm types and alarm Nos. follow the next table.

The alarm with priority 1 has the highest priority.

| Alarm | | Details | Alarm type | Presence of axis name | Priority |
|---|---|---|---|---|---|
| NC alarm | | | | | |
| Operation error | M01 | OPERATION ERROR | 0x11 | Some are added. | 8 |
| Servo/spindle alarm | S01 | SERVO ALARM:PR | 0x31 | Added. | 2 |
| | S02 | INIT PARAM ERR | 0x32 | | |
| | S03 | SERVO ALARM:NR | 0x33 | | |
| | S04 | SERVO ALARM:AR | 0x36 | | |
| | S51 | PARAMETER ERROR | 0x34 | Added. | 6 |
| | S52 | SERVO WARNING | 0x35 | | |
| MCP alarm | Y02 | SYSTEM ALARM | 0x41 | Not added. | 3 |
| | Y03 | AMP. UNEQUIPPED | 0x42 | | |
| | Y51 | PARAMETER ERROR | 0x45 | | |
| | Y90 | SP. NON SIGNAL | 0x47 | | |
| System alarm | Z52 | BATTERY FAULT | 0x52 | Not added. | 7 |
| | Z53 | TEMP. OVER | 0x53 | | |
| | Z55 | RIO NOT CONNECT | 0x54 | | |
| | Z59 | TIME CONSTANT | 0x59 | | |
| | Z70 | ABS. ILLEGAL | 0x55 | Added. | 1 |
| | Z71 | DETECTOR ERROR | 0x56 | | |
| | Z72 | COMPARE ERROR | 0x57 | | |
| | Z73 | ABS. WARNING | 0x58 | | |
| | P990 | PREPRO S/W ERR | 0x61 | Not added. | 5 |

| Alarm | | Details | Alarm type | Presence of axis name | Priority |
|---|---|---|---|---|---|
| NC alarm (continued) | | | | | |
| Program error | P*** | Program error | 0x71 | Not added. | 5 |
| Auxiliary axis (MR-J2-CT) alarm (Note 1) | M00 | AUX OPER.ALM | 0x81 | Added. | 8 |
| | M01 | AUX OPER.ALM | 0x82 | | |
| | S01 | AUX SERVO ALM | 0x83 | Added. | 2 |
| | S02 | AUX SERVO ALM | 0x84 | | |
| | S03 | AUX SERVO ALM | 0x85 | | |
| | S52 | AUX SERVO WRN | 0x86 | | |
| | Y02 | AUX SYSTEM ALM | 0x87 | Some are added. | 3 |
| | Y03 | AUX AMP UNEQU. | 0x88 | | |
| | EMG | AUX EMERGENCY | 0x89 | | |
| | Z70 | AUX POS. ERR | 0x8A | Added. | 1 |
| | Z71 | AUX DETEC. ERR | 0x8B | | |
| | Z73 | AUX SYSTEM WRN | 0x8C | | |
| Emergency stop | EMG | EMERGENC | 0x01 | Not added. | 4 |
| Stop code | | | | | |
| Stop code | T01 | CAN'T CYCLE ST | 0x21 | Not added. | 9 |
| | T02 | FEED HOLD | 0x22 | | |
| | T03 | BLOCK STOP | 0x23 | | |
| | T04 | COLLATION STOP | 0x24 | | |
| | T10 | FIN WAIT | 0x26 | | |
| PLC alarm message | (Arbitrary character string) | | 0x91 | Not added. | 10 |

**(Note 1)** If multiple alarms occur simultaneously, only the alarm with the highest order of priority in the code table will be output. Note that the auxiliary axis name is output to the servo axis name area.

The messages for emergency stop are coded as shown below.

| Alarm | | Details | Alarm number |
|---|---|---|---|
| EMG emergency stop | EXIN | External emergency stop | 0x0000 |
| | PLC | User PLC emergency stop | 0x0001 |
| | SRV | Servo drive unit not ready | 0x0002 |
| | STOP | User PLC not running | 0x0003 |
| | SPIN | Spindle drive unit not ready | 0x0004 |
| | PC_H | PLC high-speed process error | 0x0005 |
| | PARA | Door open II fixed device setting illegal | 0x0006 |
| | LINK | No communication with external PLC | 0x0007 |
| | WAIT | Waiting for external PLC communication | 0x0008 |
| | XTEN | External PLC emergency stop | 0x0009 |
| | LAD | User PLC illegal code | 0x0010 |

The PLC alarm messages are coded as shown below.

| Alarm | Details | Alarm number |
|---|---|---|
| PLC alarm message | (Arbitrary character string) + contents of registered D register | For corresponding F device (ex) F64: 64, or<br>When contents of corresponding R register (ex) R118 are the target, and contents of R118 are 64: 64 |

There are two interfaces for displaying the PLC alarm messages on the NC screen, the "F method" that makes a display request with the temporary memory F, and the "R method" that makes a display request with the file register (R). The method can be selected with the parameters.
Up to four PLC alarm messages can be displayed at once on the Alarm Diagnosis screen.

(1) F method interface
The 128 points from F0 to F127 in the temporary memory are the target.
The priority of the F0 to F127 signals starts with F0. Starting from F0, the messages corresponding to the Fn which is set to 1 are gotten from the message table and displayed.

(2) R method interface
The file registers R118, R119, R120 and R121 are the target.
The values (binary) set in these R registers are the values that indicate which number message in the message table to display.
The messages are cleared by setting the R register contents to 0.
The messages are displayed in order from the message corresponding to R118.
Since the display is cleared when the contents of the R register are set to 0, No. 0 in the message table cannot be used when using the R method.

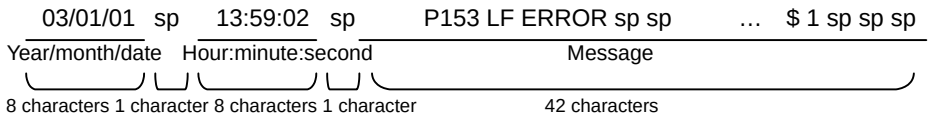
(3) Parameter for switching between F method and R method
Switch between the methods with the PLC parameter #6450/bit1.
bit1=0: F method bit1=1: R method

## 8.5 mmelGetAlarmHistory

| | |
|---|---|
| melGetAlarmHistory | Gets the alarm history information. |

■ Details of alarm history
- The alarm history information saved in the NC is gotten.
- The NC alarm history information is gotten from the history data displayed on the NC "Operation History" screen.
- The history is sorted in order of latest data and is gotten.
- The history for up to 168 alarms can be stored in the NC.
  When 168 alarms are exceeded, the history will be deleted in order from the oldest alarms.
- The stop codes and PLC alarm messages are not stored in the operation history.
- The following NC alarms are not stored in the operation history.
  M01 Operation error 0004 (External interlock axis found)
  M01 Operation error 0005 (Internal interlock axis found)
  M01 Operation error 0109 (Block start interlock)
  M01 Operation error 0110 (Cutting block start interlock)

■ Alarm history message format
The length of one message is fixed to a total of 60 characters as shown below.
The blank spaces of the message are filled in with space codes.




**(Note 1)** The part system No. ($1, $2, etc.) is indicated at the 38th and 39th characters of the message. For the 1st part system, the part system No. is indicated as sp+sp.

Due to limitations to the response area size, M alarms are gotten from the history for the latest Nth alarms.
Up to four alarm histories can be gotten at once.
Thus, to get the entire alarm history in the NC, up to 42 retrievals must be used.

Example of use

■ Command

| Offset | Details | Setting example | Remarks |
|---|---|---|---|
| 0 | Data size | 12 | |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F05 | Designate melGetAlarmHistory |
| 3 | Spare | 0 | |
| 4 | Argument 1: Head history number of history data to be retrieved | 10 | 0: Retrieve from latest history data<br>1: Retrieve from previous history data<br>2: Retrieve from second to previous history data |
| 5 | | | |
| 6 | Argument 2: Number of histories to retrieve | 4 | 1~4 |
| 7 | | | |

The offset is indicated in word units.

■ Response

| Offset | Details | Response example | Remarks |
|---|---|---|---|
| 0 | Data size | 252 | Number of bytes |
| 1 | Spare | 0 | |
| 2 | Command code | 0x0F05 | Command code issued |
| 3 | Spare | 0 | |
| 4 | Error code | 0 | 0 : No error<br>Other than 0 : Error occurring |
| 5 | | | |
| 6~7 | Number of retrieved histories | 3 | The number of retrieved histories is set. |
| 8~37 | Alarm history (1) | "03/01/01 15:20:26<br>EMG EMERGENCY EXIN $3 " | -24690/2000=-12.345mm |
| 38~67 | Alarm history (2) | "03/01/01 15:20:26<br>EMG EMERGENCY EXIN $2 " | 1000/2000=0.500mm |
| 68~97 | Alarm history (3) | "03/01/01 15:20:26<br>EMG EMERGENCY EXIN $1 " | |
| 98~127 | Alarm history (4) | " " | A space is set if there is no alarm history. |

# XI. Remote Monitor Tool

# 1. Outline

The C64 series remote monitor tool is the software capable of the following functions.

- Remotely monitoring NC screens by using intranet
- Inputting and outputting parameters / machining programs

# 2. System Configuration

## 2.1 System Requirements

Remote monitor tool works on the following system requirements.

| Items | Details |
|---|---|
| Processor | Pentium 100MHz or faster |
| RAM | 64MB or more |
| Hard disk space | 50MB or more (apart from the capacity required for OS) |
| OS | Microsoft Windows95/98 or Microsoft WindowsNT4.0 |
| Interface | 10/100M Ethernet |
| Monitor | Resolution 800 x 600 or more, 256 colors or more |
| Restriction on the number of Remote Monitor Tools connected | Maximum 8 NC screens per 1 NC can be connected.<br>(Including setup/maintenance tool) |
| Connectable NC | MELDAS C6/C64/C64T Ver. C or later versions.<br>(Ethernet option card must be mounted in this case.) |

## 2.2 Contents of Software Package

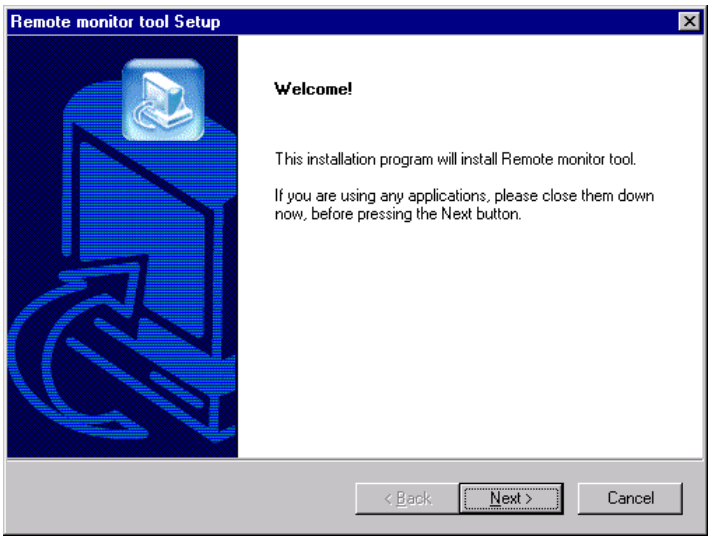
The software package consists of the following items.

- C64 series Remote monitor tool installation disk
- Software license agreement

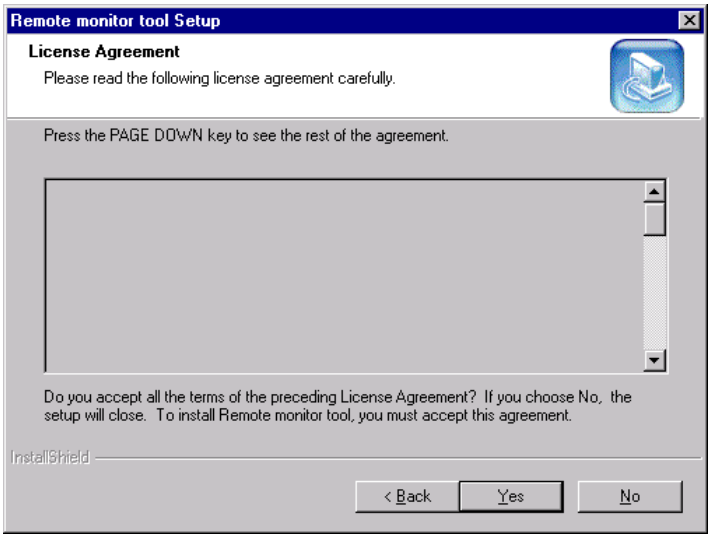
# 3. Installation of Remote Monitor Tool

(1) Insert an installation disk into a CD-ROM drive. After a while, the setup program of Remote monitor tool starts. (In the case of the personal computer with which reading of CD-ROM is not automatically performed, double-click Setup.exe in a setup disk.) Choose the language used by installation and click "OK" button.

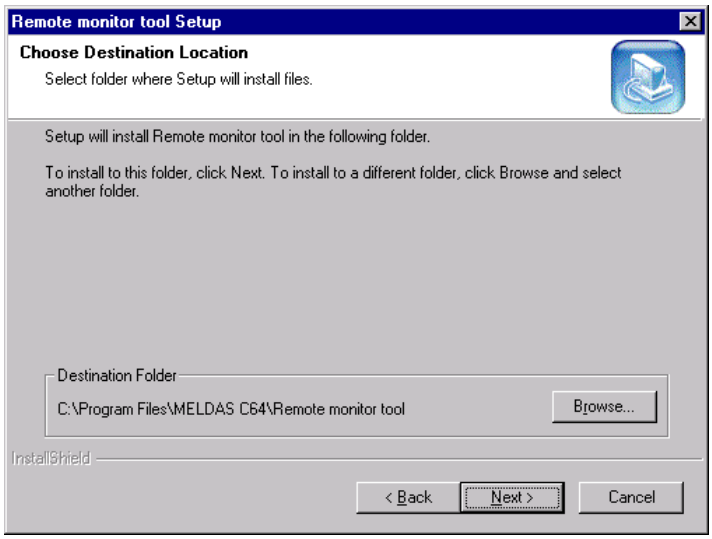

(2) The screen of "Welcome!" is displayed. Click a "Next" button according to the dialogue in a screen.



(3) Next, the "License Agreement" screen is displayed. When you read the contents well and agree with the license agreement, click "Yes". Click "NO" to cancel installation. If clicked "Back", it will return to the screen of "Welcome".




(4) Next, the "Choose Destination Location" screen is displayed. Here, the directory which installs Remote monitor tool can be chosen. When you install in other directories, click "Browse" and choose a directory. Click "Next", if selection is made, then installation of Remote monitor tool is started.



# 4. Uninstalling the Remote Monitor Tool

Uninstall the remote monitor tool with following steps.

(1) Quit the remote monitor tool.

(2) Click [Start] → [Setting] → [Control panel].

(3) Double-click on [Add/Remove Program].

(4) Click on "Remote monitor tool".

(5) Click on "Add/Remove".

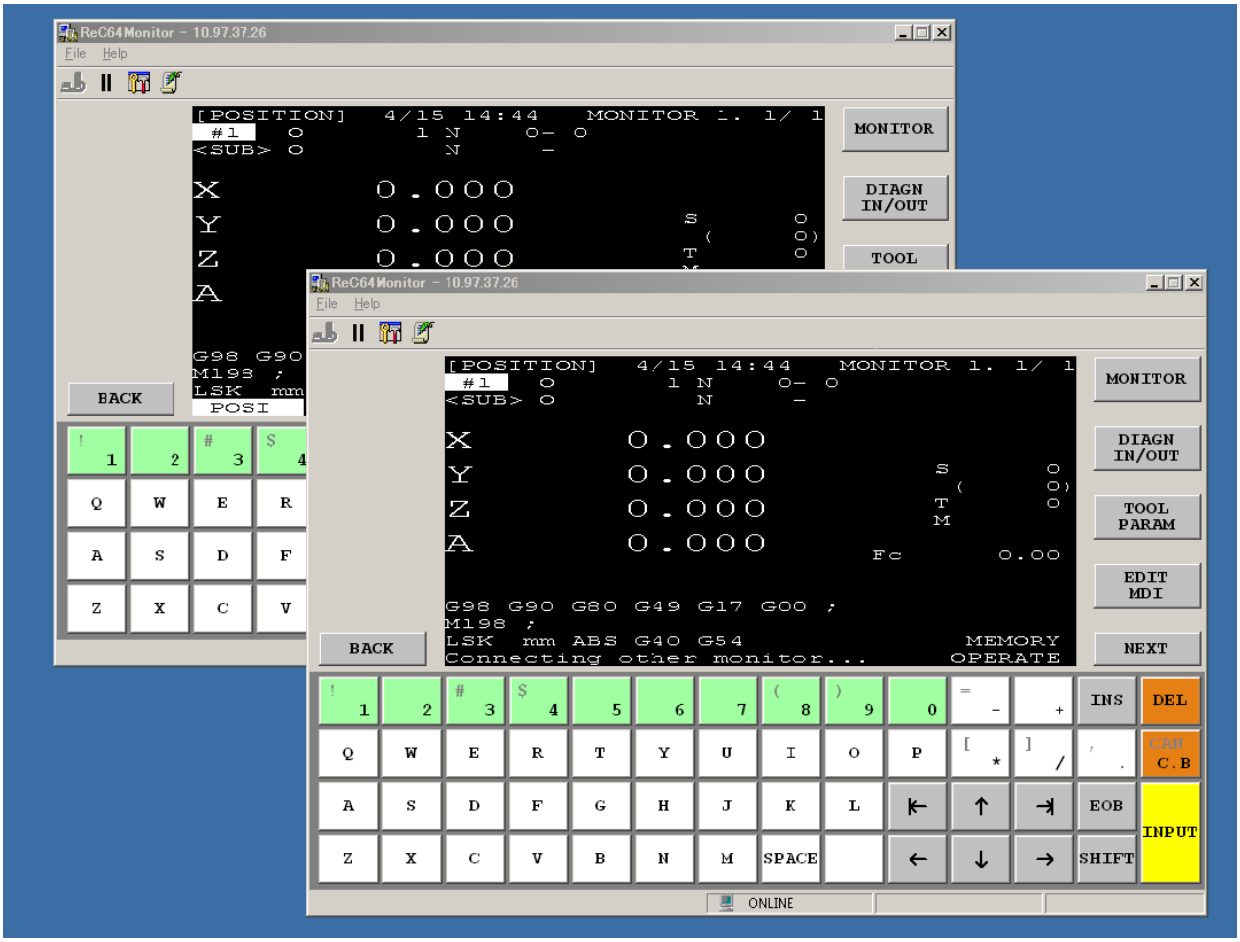
(6) Follow the onscreen instructions.

# 5. How to Start and Operate

How to start and operate the remote monitor tool software is explained in this section.

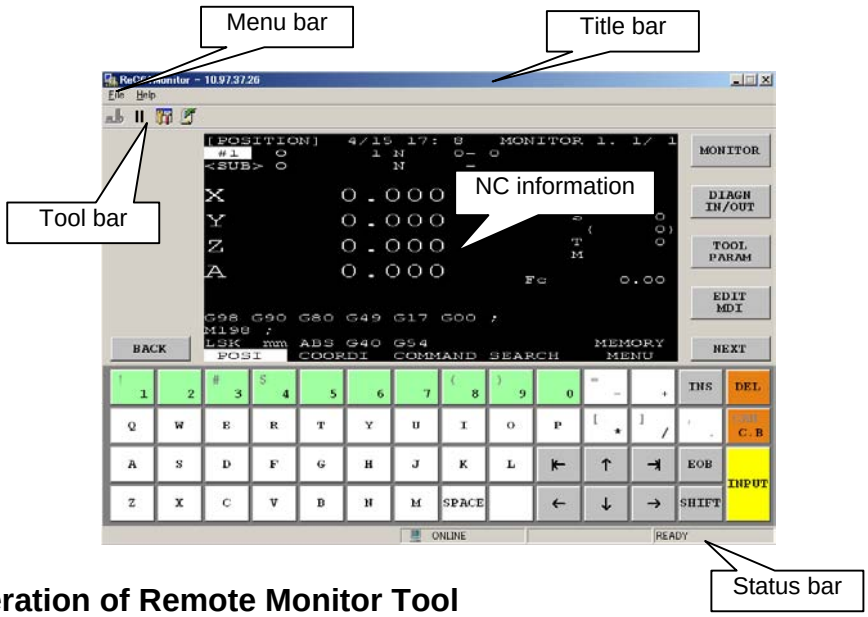
## 5.1 Starting Remote Monitor Tool

Click on [Start] → [Program] → [MELDAS C64] → [Remote monitor tool]. Multiple windows of the remote monitor tool can be opened, so the 1st and 2nd NC can be monitored simultaneously.



## 5.2 Screen Makeup of Remote Monitor Tool

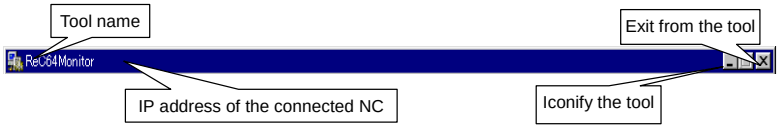
The window of Remote monitor tool consists of a title bar, menu bar, status bar and NC information display etc.




## 5.3 Basic Operation of Remote Monitor Tool

### 5.3.1 Title Bar

Title bar shows the tool name "ReC64Monitor"




| Item | Details |
|---|---|
| Tool name | The tool name is displayed.<br>The tool name is used for being identified in Windows. |
| IP address of the connected NC | When the tool is in online mode, the IP address of connected NC is displayed. |
| Iconification of tool | Click this button to minimize the window of Remote monitor tool to the size of an icon and to be contained in the task bar. |
| Exit | Click this button to exit from Remote monitor tool. |

### 5.3.2 Menu Bar

Each function including connection destination designation is able to be selected from the menu bar.

**(1) File menu**

The commands for the basic operation of the tool are allocated on the [File (F)] menu.

| Sub menu | Details |
|---|---|
| Connect | This connects with the designated NC. When selecting this menu, the dialogue box to designate connection destination shows up. |
| Translate | This is used when sending and receiving the parameters, machining programs and maintenance data to and from NC. By selecting each menu item, file transferring tool will be activated. |
| Online | This is used for selecting online (connecting) mode or offline (disconnecting) mode. |
| Exit | This exits from Remote monitor tool. |

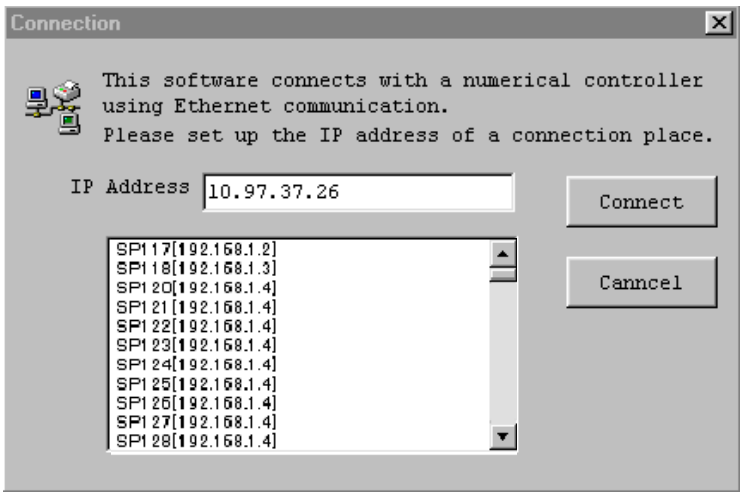
**(2) Help menu**

An explanation about the operation etc. is allocated on the [Help] menu.

| Sub menu | Details |
|---|---|
| Help topics | This displays the explanation of how to treat Remote monitor tool. |
| About Remote monitoring tool | This shows the software version of Remote monitor tool. |

### 5.3.3 Connect with Machine Tools (NC)

Select [File] → [Connect] from the menu bar and display the [Connection] dialogue box.
Input the IP address of the NC to connect with and press the button [Connect].
If the communication is started normally, a screen of the connected NC will be displayed.
(The screen of the connected NC is displayed only when "Base specification parameters #21034" is set to "0").
If any communication error occurs, [Communication Error] will be displayed on the status bar. By describing NC list in the Hosts File in advance, the NC to connect with can be selected from the list.
Refer to "8. Supplement" of this chapter for creating the host files.



### 5.3.4 Send and Receive a Parameter File

Select [File] → [Translate] → [Parameter] → [Text] from the menu bar.
Or, select [Binary] and display the [Parameter–Text] dialogue box or the [Parameter–Binary] dialogue box.

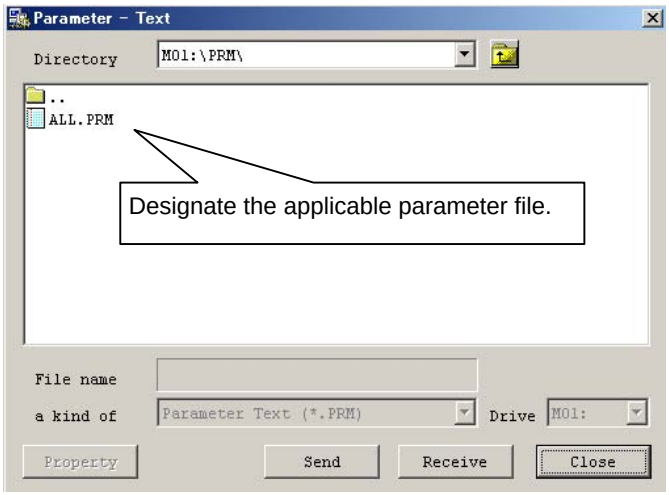
Receiving a parameter file

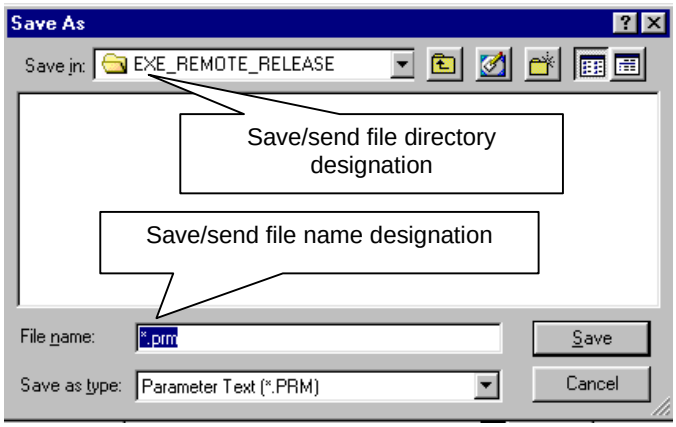
When receiving a parameter file from NC, select "ALL.PRM" (text format) or "PARAMET.BIN" (binary format) and press the [Receive] button.

Sending a parameter file

When sending a parameter file to NC, press [Send] button, designate the directory to store the file and a file name of the sending file and then press the [Open] button.

**(Note)** The parameters can be sent when sending is validated with "ReC64Monitor.ini". Refer to "8. Supplement" of this chapter for details on setting this parameter.



### 5.3.5 Send and Receive the Program

Select [File] → [Translate] → [Program] → [Text] from the menu bar.
Or, select [Binary] and display the [Program–Text] dialogue box or the [Program–Binary] dialogue box.

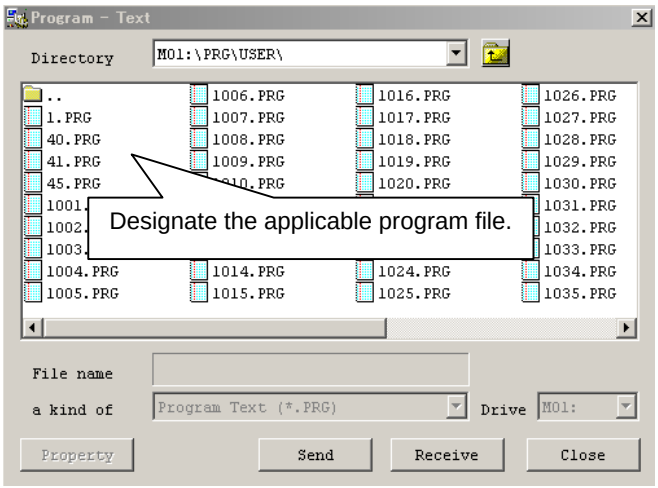
Receiving a machining program file

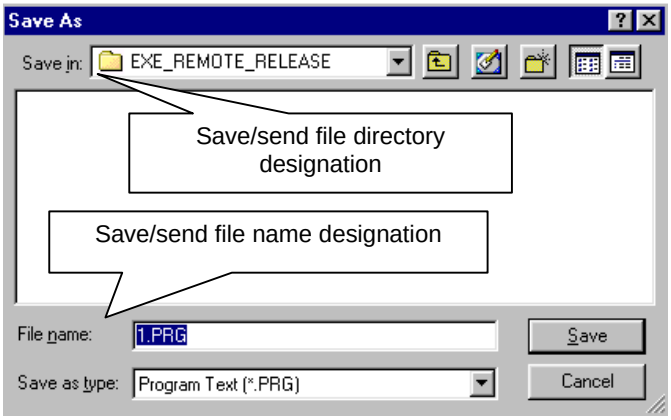
When receiving a machining program file from NC, select the program from the list, designate directory to store the file and the file name and then press the [Receive] button.
When selecting a machining program file, plural files can be selected by clicking the file names displayed in the list while pressing Ctrl key.

Sending a machining program file

When sending a machining program file to NC, press the [Send] button, select the sending program from the list and press the [Open] button.

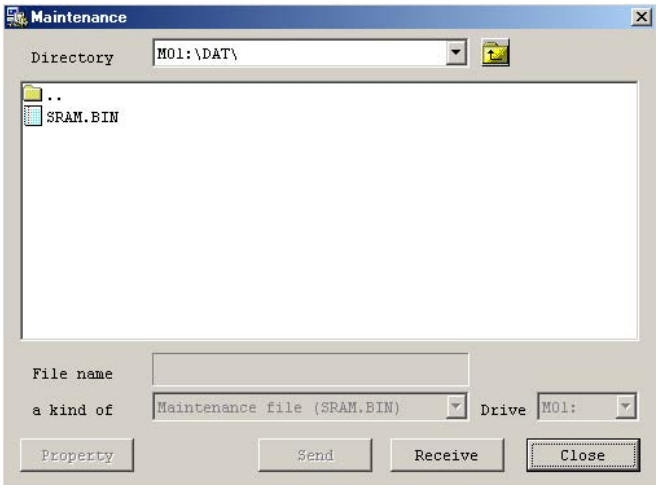
**(Note)** The parameters can be sent when sending is validated with "ReC64Monitor.ini".
Refer to "8. Supplement" of this chapter for details on setting this parameter.



### 5.3.6 Receiving a Maintenance Data

Select [File] → [Translate] → [Maintenance] from the menu bar, and display [Maintenance] dialogue box.




The maintenance data is used for protecting the user's data or for investigating the cause of the problem. When receiving a maintenance file from NC, select "SRAM.BIN" in the displayed list, designate the directory to store the data and the file name and then press the [Receive] button.

### 5.3.7 Refer to NC Information

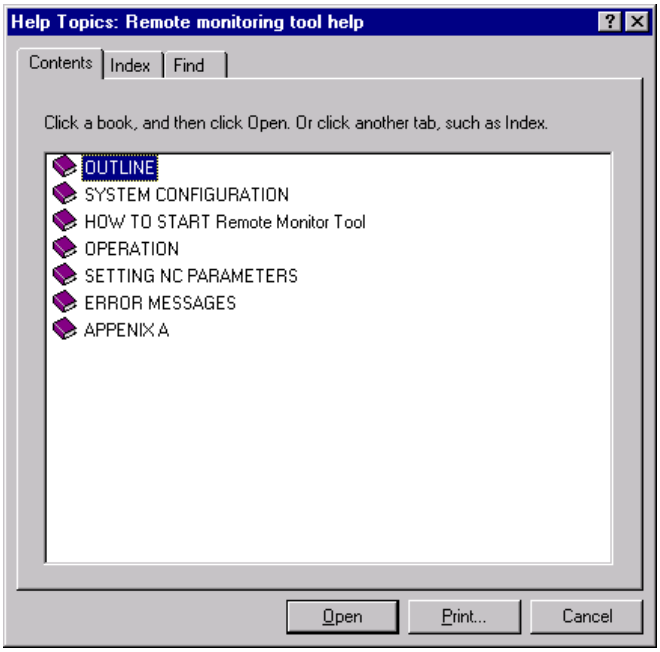
Press the keyboard or click the buttons on the screen with a mouse to work on the NC information

The keyboard keys used for NC information reference are as shown below.

| Keyboard keys | Buttons to be clicked |
|---|---|
| F1 | Menu 1 |
| F2 | Menu 2 |
| F3 | Menu 3 |
| F4 | Menu 4 |
| F5 | Menu / Operation |
| F6 | Position display |
| F7 | Alarm diagnosis |
| F8 | Tool offset / Param. |
| F9 | Program |
| →, ←, ↑, ↓ | Cursor |
| Page up, Page Dn | Back / Next |
| Home | C+B/CAN |
| Insert | Add |
| Delete | Delete |
| Back space | Delete |
| Tab, Shift + Tab | Tab / Shift + Tab |
| ; | EOB |
| Enter | INPUT |
| 0 ~ 9 | 0 ~ 9 |
| !, #, $, (, ), =, –, +, [, ], *, / | !, #, $, (, ), =, –, +, [, ], *, / |
| ,. | ,. |
| SPACE | Space |

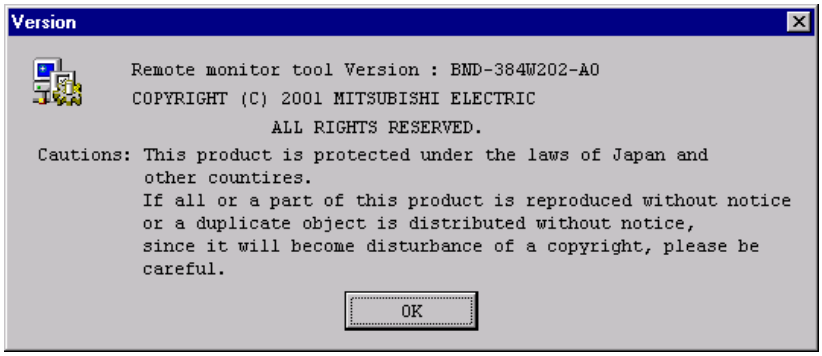
### 5.3.8 Search the Topics

Select [Help] → [Help Topics] from the menu bar, and display the help screen. On the "table-of-contents" page, the help system consists of a format of a volume and a page.



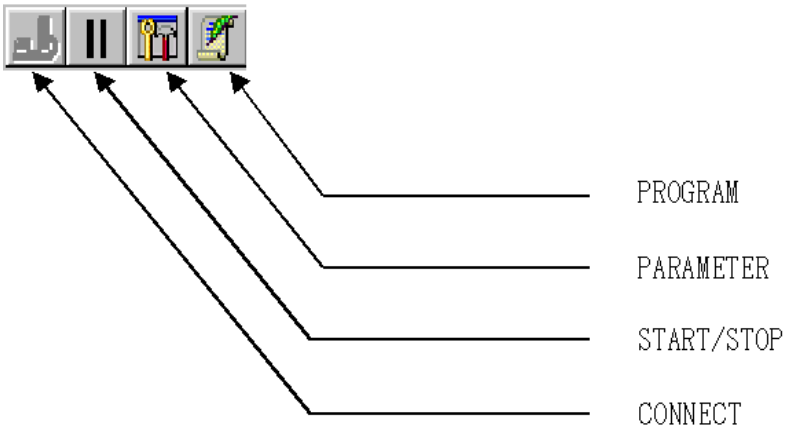

### 5.3.9 Confirm the Remote Monitor Tool Version

Select [Help] → [About Remote monitoring tool] from the menu bar, and display the [Version] dialogue box for version information.



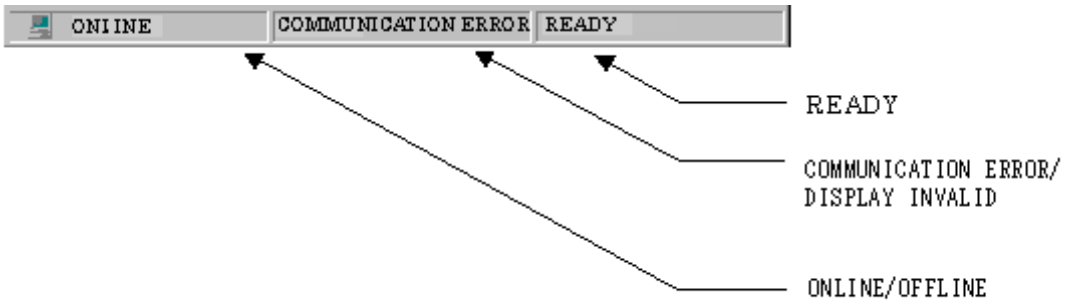
### 5.3.10 Using a Tool Bar

Designation of the NC to connect with or other functions can be used without selecting from the menu. Besides, the outline of the function is displayed by placing the cursor on the tool bar.




### 5.3.11 Using a Status Bar

The status of Remote monitor tool including communication status is displayed on the status bar.




| No. | Display | Details |
|---|---|---|
| 1 | ONLINE | This means the status in which Remote monitor tool is communicating with the designated NC. Select the [START / STOP] button on the tool bar or select [Offline] in the menu to change the status to the offline mode. |
| 2 | OFFLINE | This means the status in which Remote Monitor Tool is not communicating with the designated NC. Select the [START / STOP] button on the tool bar or select [Online] in the menu to change the status to the online mode. |
| 3 | COMMUNICATION ERROR | This means that the communication error between Remote monitor tool and the connected NC has occurred. |
| 4 | DISPLAY INVALID | This means the status in which the NC screen cannot be displayed by Remote monitor tool due to the incorrect NC parameter settings. NC screen can be displayed by setting "Base specification parameters #21034"to "0". |
| 5 | READY | This status is displayed when the connected NC is ready to start operating. |

# 6. Setting NC Parameters

By setting Base specification parameters in NC, the key operation and the display can be restricted.

| # | Item | | Detail | Setting range | Standard setting value |
|---|---|---|---|---|---|
| 21033 | KeyCtrlLmt | Restriction on the right to operate the keys | Restrict the right to operate the keys.<br>0: The keys on other display units can operate all the screens.<br>1: The keys on other display units are disabled while a program screen is displayed.<br>2: The keys on other display units cannot operate any screen. | 0 to 2 | 0 |
| 21034 | ReMonDisp | Display restriction | Restrict to display with Remote monitor tool.<br>0: No restriction on the display with Remote monitor tool.<br>1: No information about display is sent to Remote monitor tool.<br>**(Note)** Do not set the parameter with Remote monitor tool, or nothing will be displayed immediately after the setting has been done. | 0 to 1 | 0 |

# 7. Error Message and Its Remedy

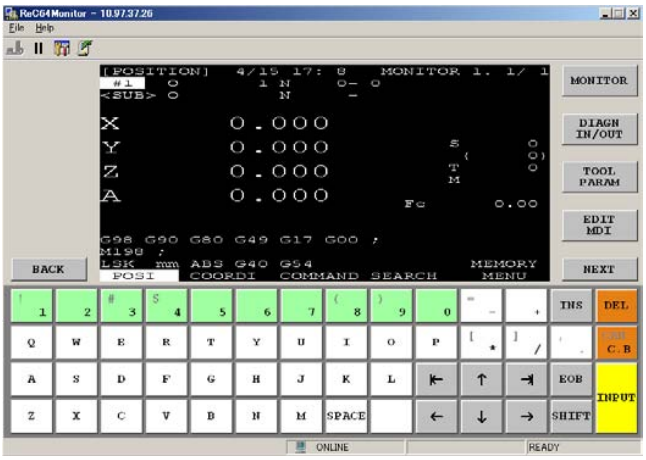
The details of the errors that would occur while Remote monitor tool is running and the remedies are listed below.

| No. | Message | Details | Remedy |
|---|---|---|---|
| 1 | Communication error | Communication error is occurring between Remote monitor tool and the designated NC. | Confirm the following items and retry.<br>Confirm:<br>• that the designated IP address is correct.<br>• that there is no problem with a connecting cable.<br>• that the ping command in the designated IP address is normal.<br>• that the communication traffic is not crowded. |
| 2 | Duplication error | More than 1 dialogue boxes for transferring files are opened. | If more than 1 dialogue boxes for transferring files are opened, close them leaving only 1 dialogue box. |
| 3 | Directory open error | The directory information was not acquired successfully in the file transferring dialogue. | Confirm the following items and retry.<br>Confirm:<br>• that there is no problem in the file system of the connected NC.<br>• that no communication error is occurring. |
| 4 | Directory search error | The directory information was not searched successfully in the file transferring dialogue. | Confirm the following items and retry.<br>Confirm:<br>• that there is no problem in the file system of the connected NC.<br>• that no communication error is occurring. |
| 5 | Reserved word | "COM1 to COM9, LPT1 to LPT9, AUXCON, PRN, NUL, CLOCK" has already reserved in the system. | Use words other than "COM1 to COM9, LPT1 to LPT9, AUXCON, PRN, NUL, CLOCK" |
| 6 | Incorrect file name | "/,;,:,*?"<>\|\" or Tab is used for the file name. | Do not use "/,;,:,*?"<>\|\" nor Tab when naming the title of the file. |
| 7 | Select file name | The file to send or receive is not selected. | Retry after selecting the file to send or receive. |
| 8 | File reception error | Error has occurred while receiving a parameter file, machining program file or maintenance data. | Confirm the following items and retry.<br>Confirm:<br>• that there is no problem in the file system of the connected NC.<br>• that no communication error is occurring. |
| 9 | File sending error | Error has occurred while sending a parameter file or machining program file. | Confirm the following items and retry.<br>Confirm:<br>• that there is no problem in the file system of the connected NC.<br>• that no communication error is occurring.<br>• that the connected NC is not in the data protect mode.<br>• that the connected NC is running. |
| 10 | File designation error | The designated file does not exist. | Confirm that the designated file exists and retry. |
| 11 | File deletion error | When overwriting a sending or receiving a file, the file was not deleted successfully. | When overwriting a file on PC side, confirm that the property of the file is not set to "read only". When overwriting a file on NC side, confirm the following items and retry.<br>Confirm:<br>• that there is no problem in the file system of the connected NC.<br>• that no communication error is occurring.<br>• that the connected NC is not in the data protect mode.<br>• that the connected NC is running. |

# 8. Supplement

### (1) Key operation rights

To operate a screen when another display (NC dedicated display or adjustment and maintenance tool) is connected, press the F5 key or "Key operation rights" button to retrieve the screen operation rights.




### (2) Number of simultaneous connections

Up to eight "remote monitor tool + operation panel (adjustment and maintenance tool)" sets can be connected at once. A communication error message will appear if more are connected.

### (3) Creating the hosts file

By saving the Hosts file with the following format under the name "C64Hosts" in the C:\Program files\MELDAS C64\Remote monitor tool (default installation directory), a list of the connection destinations can be displayed. Set the name of the connection destination with up to 20 characters, excluding spaces and tabs.

# = Comment
IP address [space] connection destination name

Description example

```
#C64 connection destination list
#
192.168.1.2          SP117
192.168.1.3          SP118
192.168.1.4          SP119
192.168.1.5          SP120

192.168.1.6          SP121
```

### (4) Setting the parameter/machining program file transmission validity

To validate transmission of parameter files or machining program files, add the line "DOWNLOAD=1" to the "ReC64Monitor.ini" file located in the "C:\Program files\MELDAS C64\Remote monitor tool (default installation directory)".

[Setting example]

[COMMUNICATION]

DOWNLOAD=1

# Revision History

| Date of revision | Manual No. | Revision details |
|---|---|---|
| Sep. 2003 | BNP-B2373* | First edition created. |
| Apr. 2004 | BNP-B2373A | The following changes were made to comply with the software version D.<br>(1) The following chapters were added.<br>• "V Ethernet 2-channel Connection"<br>• "VII Ethernet Interface Communication Function Using PLC (Client Function Section)"<br>• "VIII I/O/Intelligent Function Unit Connection Function"<br>(2) The following chapter was deleted.<br>• "VIII FL-net interface"<br>• "IX Appendix" → (Moved to Chapter II and Chapter X.)<br>(3) The number of steps was changed in "III CC-Link Master/local Unit".<br>(4) The contents of "IX GOT Connection Function" (previous Chapter VII) were totally reviewed.<br>(5) Mistakes, etc., were corrected. |
| Dec. 2004 | BNP-B2373B | (1) "X. GOT Window Function" was added.<br>(2) The following chapters' explanations were added.<br>• "VIII MELSEC Q Series I/O/Intelligent Function Unit Connection Function"<br>• "IX. Connection Function with GOT" |
| | | |

## Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.
Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

## Duplication Prohibited

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| | |
|---|---|
| MODEL | MC6/C64 |
| MODEL CODE | 008-270 |
| Manual No. | BNP-B2373B(ENG) |



(0412) MEE