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PROGRAMMABLE CONTROLLERS
MELSEC-F

ADVANCED AND EVER ADVANCING **MITSUBISHI ELECTRIC**

USER'S MANUAL

FX_{2N}-64DP-M Profibus-DP Master Block



FX_{2N}

Foreword

- This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX_{2N}-64DP-M Profibus-DP Master Block. It should be read and understood before attempting to install or use the unit.
- Further information can be found in the FX_{2N} Series Hardware Manual, FX Series Programming Manual, MELSEC ProfiMap Configuration System for Open Networks Software Manual and manual of Profibus-DP slave units.
- If in doubt at any stage of the installation of FX_{2N}-64DP-M Profibus-DP Master Block always consult a professional electrical engineer who is qualified and trained to the local and national standards which apply to the installation site.
- If in doubt about the operation or use of FX_{2N}-64DP-M Profibus-DP Master Block please consult the nearest Mitsubishi Electric distributor.
- This manual is subject to change without notice.



FX₂N-64DP-M PROFIBUS-DP Master Block

USER'S MANUAL

Manual number : JY992D88001

Manual revision : B

Date : March 2001

Guidelines for the Safety of the User and Protection of the FX2N-64DP-M Profibus-DP Master Block

This manual provides information for the use of the FX2N-64DP-M Profibus-DP Master Block. The manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows;

- a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual should be of a competent nature, trained and qualified to the local and national standards required to fulfill that role. These engineers should be fully aware of all aspects of safety with regards to automated equipment.
- b) Any commissioning or service engineer must be of a competent nature, trained and qualified to the local and national standards required to fulfill that job. These engineers should also be trained in the use and maintenance of the completed product. This includes being completely familiar with all associated documentation for the said product. All maintenance should be carried out in accordance with established safety practices.
- c) All operators of the completed equipment should be trained to use that product in a safe and co-ordinated manner in compliance to established safety practices. The operators should also be familiar with documentation which is connected with the actual operation of the completed equipment.

Note : Note: the term ‘completed equipment’ refers to a third party constructed device which contains or uses the product associated with this manual.

Notes on the Symbols Used in this Manual

At various times through out this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of equipment. Whenever any of the following symbols are encountered its associated note must be read and understood. Each of the symbols used will now be listed with a brief description of its meaning.

Hardware Warnings



1) Indicates that the identified danger **WILL** cause physical and property damage.



2) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.



3) Indicates a point of further interest or further explanation.

Software Warnings



4) Indicates special care must be taken when using this element of software.



5) Indicates a special point which the user of the associate software element should be aware of.



6) Indicates a point of interest or further explanation.

- Under no circumstances will Mitsubishi Electric be liable responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

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1. Introduction

1.1 Features of the 64DP-M

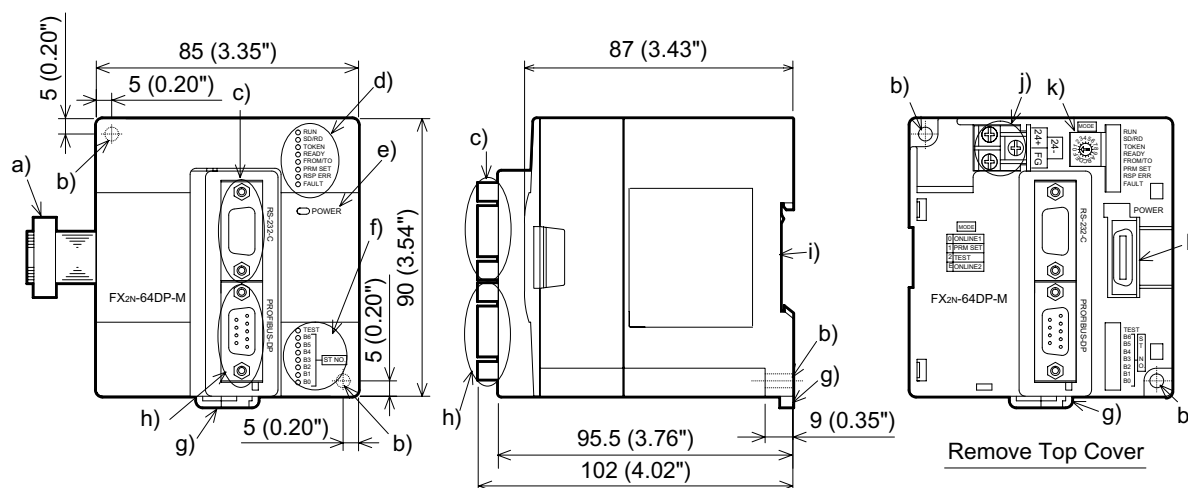
The FX_{2N}-64DP-M Profibus-DP Master Block (hereafter called “64DP-M”) is a “Class 1” master for the Profibus-DP network (hereafter called “DP-network”). The FX_{2N} series programmable controller by connecting 64DP-M can read input data from the Profibus-DP slave (hereafter called “DP-slave”), and write output data to the DP-slave.

- **Controlled maximum slaves:**
A 64DP-M can control a maximum of 60 slaves using repeaters on the DP-network.
For system configuration of the DP-network, refer to section 1.3.
- **Configuration setting:**
Configuration of the 64DP-M can be set easily by MELSEC ProfiMap configuration software (V3.00 or more). For MELSEC ProfiMap configuration software (hereafter called “ProfiMap”), refer to MELSEC ProfiMap Configuration System for Open Networks Software Manual. For choosing module type, refer to Appendix B.
- **Communication:**
The 64DP-M supports 9.6k, 19.2k, 93.75k, 187.5k, 500k, 1,500k, 3M, 6M and 12Mbps.
The 64DP-M can be connected to a Profibus-DP network by a standard 9-pin D-SUB connector and shielded twisted pair cable complying with EN50170. See chapter 2.
- **Global control:**
The 64DP-M supports Sync global control, Unsync global control, Freeze global control and Unfreeze global control.

1.2 External Dimensions and Each part Name

Dimensions: mm (inches) MASS (Weight): Approx. 0.4kg (0.88 lbs)
 Accessory: Special block No. label

Figure 1.1: External Dimensions



- a) Extension cable
- b) Direct mounting hole (2- \varnothing 4.5 (0.18"))
- c) RS-232C port (9-pin D-SUB Connector: #4-40unc inch screw thread)
 The cable connecting between 64DP-M and personal computer is Blue ProfiCab cable. For Blue ProfiCab, refer to MELSEC ProfiMap Configuration System for Open Networks Software Manual.
- d) Status LEDs

Table 1.1: Status LEDs

| LED Name | Description |
|-------------|---|
| RUN LED | ON: During normal operation OFF: Error |
| SD/RD LED | Flashes during communication with slave on the Profibus network. The flashing interval is the time interval of the bus parameter's Data Control Time. |
| TOKEN LED | ON when token is maintained. |
| READY LED | ON when the Profibus-DP network subscription preparation is completed and during subscription. |
| FROM/TO LED | ON when a FROM/TO instruction from the programmable controller is operating. |
| PRM.SET LED | ON (PARAMETER SET) when in the parameter setting mode. When flashing during normal operation, the parameter is not written. |
| RSP ERR LED | ON when a communication error occurs. |
| FAULT LED | ON when an error occurs. |

- e) POWER LED: ON when 24V DC power is supplied form the external power supply or FX2N series PLC.

f) TEST LED and STATION LED

Table 1.2: TEST LED and STATION LED

| LED Name | Description |
|-------------|--|
| TEST LED | ON when self-diagnosis is executing. |
| STATION LED | Displays the station address during normal operation. (Binary) Displays the test type during self-diagnosis. (B0 ~ B6) |

- g) Hook for mounting DIN rail
- h) PROFIBUS-DP port (9-pin D-SUB Connector: #4-40unc inch screw thread)
- i) Groove for mounting DIN rail (DIN 46277<DIN rail width: 35mm (1.38")>)
- j) DC power supply terminals (screws terminal: M3)
- k) Mode setting switch (Default setting: "0") For mode, refer to Chapter 4.

Table 1.3: Mode Switch

| Switch No. | Mode |
|------------|----------------------------------|
| 0 | ONLINE1 (Normal service mode) |
| 1 | PRM SET (Parameter setting mode) |
| 2 | TEST (Self diagnostic mode) |
| 3 ~ D | Cannot use |
| E | ONLINE2 (Extended service mode) |
| F | Cannot use |

l) port for extension cable

1.2.1 Pin configuration of Profibus-DP Connector

The connector is a 9-pin D-SUB (#4-40unc inch screw thread) type, the pin configuration is shown below.

Figure 1.2: Pin Layout of Profibus-DP Connector

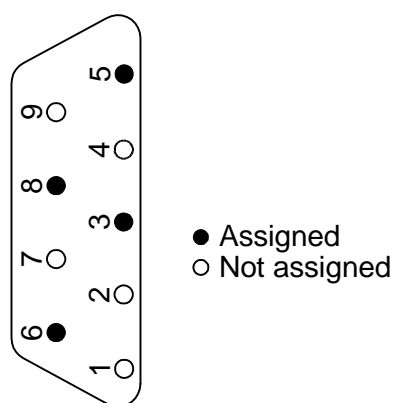


Table 1.4: Profibus-DP Connector Pin Configuration

| Pin No. | Signal Name | Meaning |
|---------------|-------------|-------------------------|
| 3 | RXD/TXD-P | Receive/transmit-Data-P |
| 5 | DGND | Data Ground |
| 6 | VP | Voltage-Plus |
| 8 | RXD/TXD-N | Receive/transmit-Data-N |
| 1, 2, 4, 7, 9 | NC | Pin not assigned |

1.3 System Configuration

1.3.1 Applicable Profibus-DP Network

- The maximum number of slaves that can be connected to a 64DP-M is 60.
- Number that can be connected for 1 segment
Masters + slaves + repeaters \leq 32 units
- Number of units that can be connected to the entire network using repeaters.
Masters + slaves \leq 126 units
- Communications can be conducted via a maximum of 3 repeaters from an arbitrary master or arbitrary slave to an arbitrary master or arbitrary slave. However, the whole network can contain more than 3 repeaters. (See note above.)



Note;

When using a slave with expansion diagnostic information of more than 32 bytes, the network will be limited. Maximum expansion diagnostic information data length is the smaller of the value obtained from a slave address by the following equation or 244 bytes.

$$\begin{aligned} \text{Maximum expansion diagnostic information data length (bytes)} \\ = [12600 \div N^{*1} - 10] \text{ or } [244] \end{aligned}$$

*1 The value of N is the smaller of the value obtained by the following equation or 300.

$$N = [(\text{Max. slave address value} - \text{Min. slave address value} + 1) \times 5] \text{ or } [300]$$



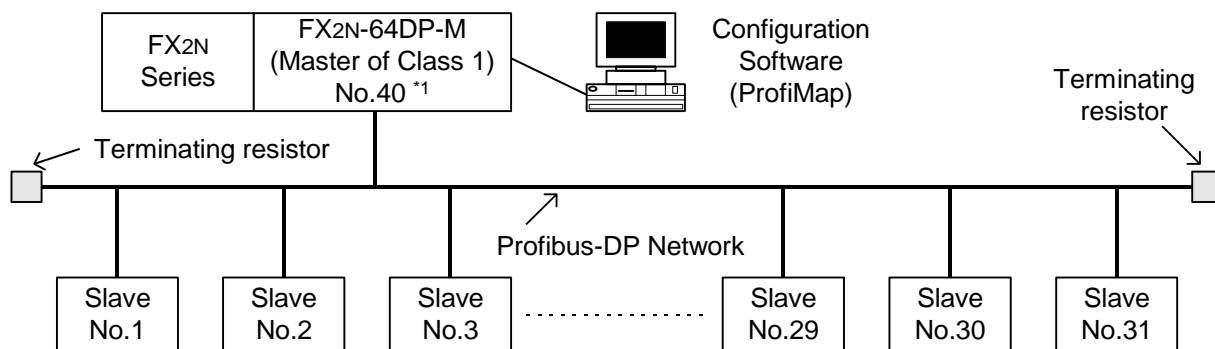
Note:

It is not possible to communicate normally with the slave when the maximum diagnosis information data length (Max_Diag_Data_Len) has been decided by the slave's GSD file is larger than the value obtained by the above expression. In this case, please try the following things.

- 1) Make the slave address consecutive number if possible.
- 2) Change setting so that this value may become small if the maximum diagnosis information data length on the slave side can be set.
- 3) Reduce connected number of the slave.

1) Connecting 1 master (class 1) on the Profibus-DP network.

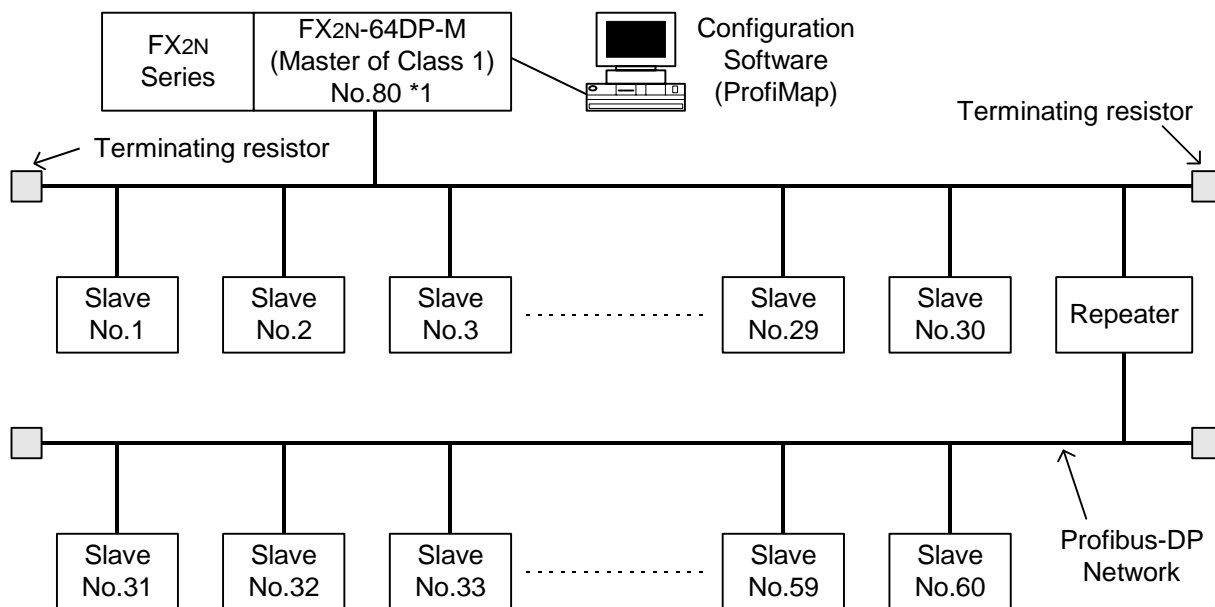
Figure 1.3: Connecting 1 Master (class 1) on the Profibus-DP Network



*1 In this system configuration, this 64DP-M can connect maximum 31 slaves. As the total units (masters + slaves + repeaters) is 32 units when DP-network is 1 segment.

2) Connecting 1 master (class 1) and 1 repeater on the Profibus -DP network.

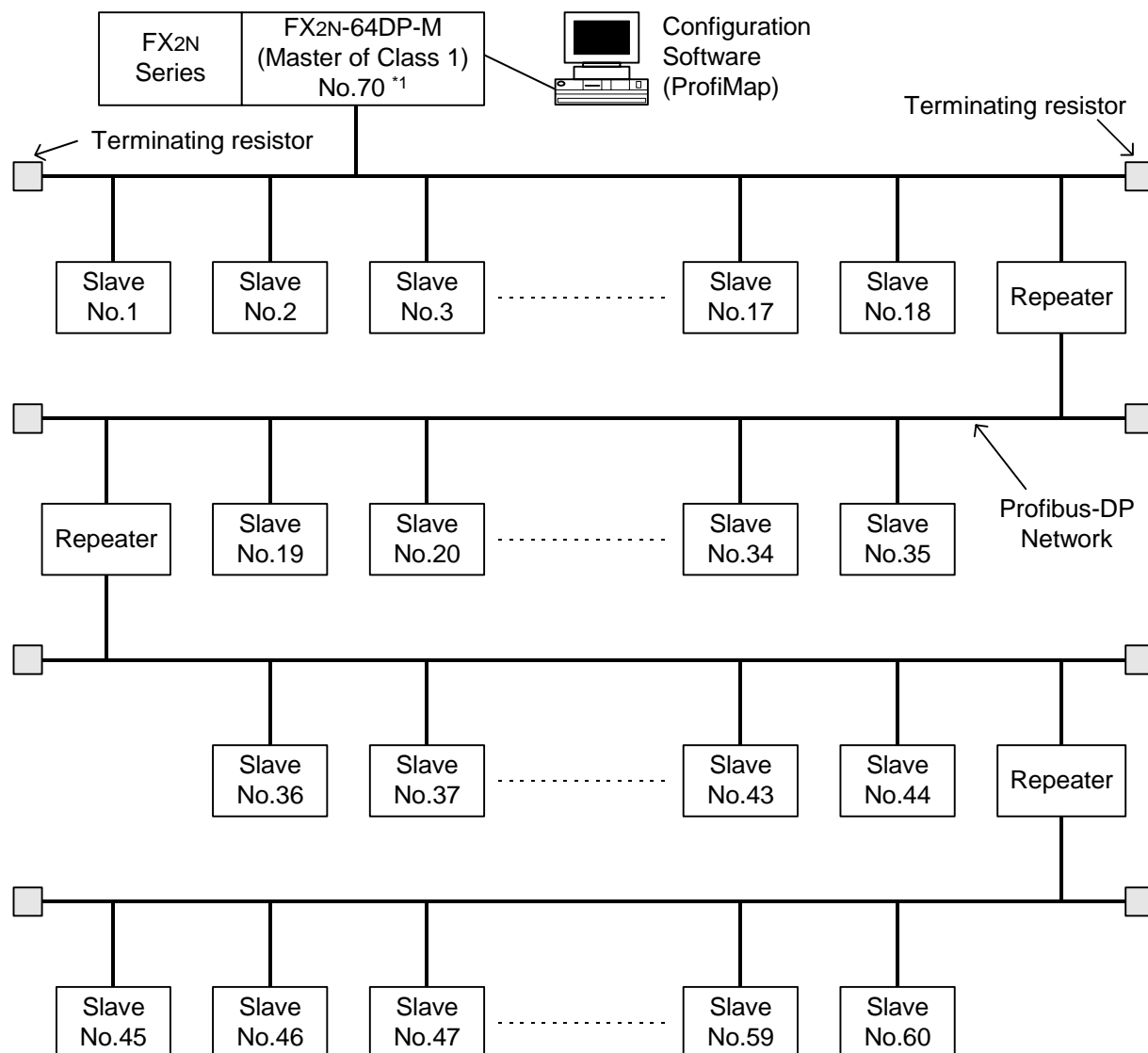
Figure 1.4: Connecting 1 Master (class 1) and 1 Repeater on the Profibus -DP Network



*1 In this system configuration, this 64DP-M can connect maximum 60 slaves, as a repeater is used.

3) Connecting 1 master (class 1) and 3 repeaters on the Profibus -DP network.

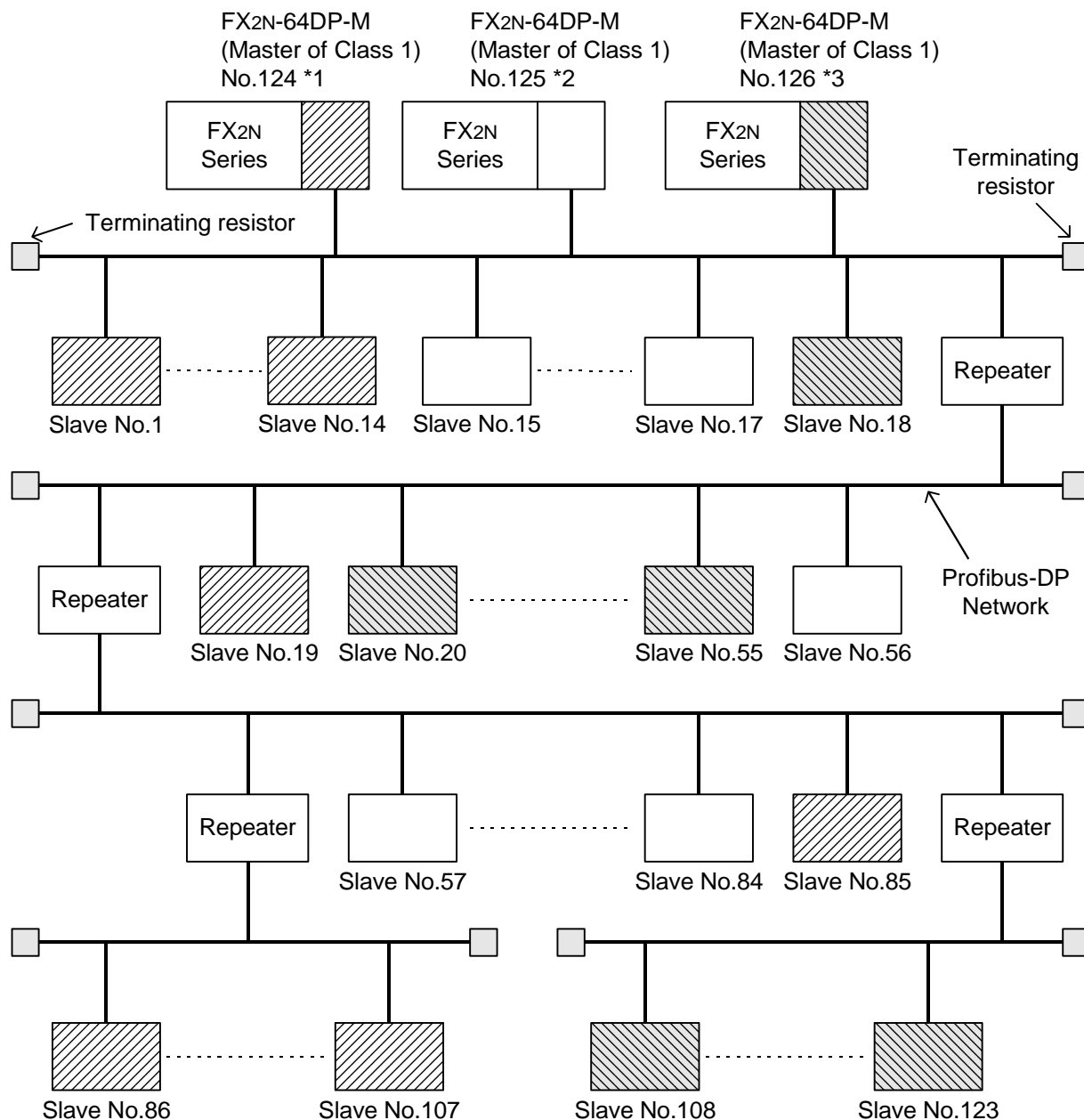
Figure 1.5: Connecting 1 master (class 1) and 3 Repeaters on the Profibus -DP Network



*1 Communications can be conducted via a maximum of 3 repeaters from an arbitrary master or arbitrary slave to an arbitrary master or arbitrary slave. However, the whole network can contain more than 3 repeaters.

- 4) Connecting 126 stations (3 masters + 60 slaves or more) on the Profibus-DP network.
Please see “Note” on the next page.

Figure 1.6: Connecting 126 Stations (3 Masters + 60 Slaves or More) on the Profibus-DP Network



*1 This 64DP -M has total 38 slaves (No.1 ~ 14, 19, 85 ~ 107).

*2 This 64DP-M has total 32 slaves (No.15 ~ 17, 56 ~ 84)

*3 This 64DP-M has total 53 slaves (No.18, 20 ~ 55, 108 ~ 123)

**Note**

In Configuration that use multiple master stations (multimaster configuration), when reconnecting a cable after disconnecting a PROFIBUS cable for 1 master that is exchanging data at allow baud rate, the communications of the master for which the cable is not disconnected could stop and the slave output could be turned OFF. To prevent this, the master PROFIBUS cable must be secured.

In addition, there is a high possibility that the above phenomena can be avoided if care is taken with the following points when configuring a system.

1) Set the slave watchdog timer setting value to larger than $(T_{Tr} \times G)/BR$. However,

T_{Tr}: Target token rotation time (Unit: Bit Time)

G: Gap update factor

BR: Baud rate (Unit: bps)

2) Use a high baud rate.

3) The HSA (Highest Station Address) value is made to match the maximum station No. that is actually connected.

1.3.2 Applicable Programmable Controller

For setting up a system, the 64DP-M can be connected directly to the FX2N series programmable controller's extension port, or to any other extension unit / block's right side extension port.

The 64 DP-M occupies 8 points of I/O on the FX2N's expansion bus. The 8 points can be allocated from either inputs or outputs. The maximum I/O for a FX2N system is 256 I/O.

Table 1.5: Applicable Programmable Controller

| Programmable Controller Type | Version |
|------------------------------|--------------------------------------|
| FX2N series | From first product (All versions) |

1.4 Communication Time

The communication time is the data exchange time between FX2N series programmable controller and slave on the Profibus-DP. This communication time can be requested by the expression below.

Communication time = Total of polling cycle time^{*1} for each slave + (2 × Scan time^{*2})

*1 The polling cycle time is a data update cycle time between 64DP-M and slave on the DP-network. For how to obtain the polling cycle time, refer to subsection 1.4.1.

*2 The scan time can be checked with D8010 ~ D8012 of the programmable controller.



Note;

The polling cycle time and FROM/TO instruction are operated asynchronously. If data is written to the 64DP-M in the polling cycle, this data will move to the system area on the next polling cycle.

1.4.1 Polling Cycle Time

An explanation of the polling cycle time for one master is given in figure 1.6. In this example there are 3 slaves. The polling cycle time is the larger of:

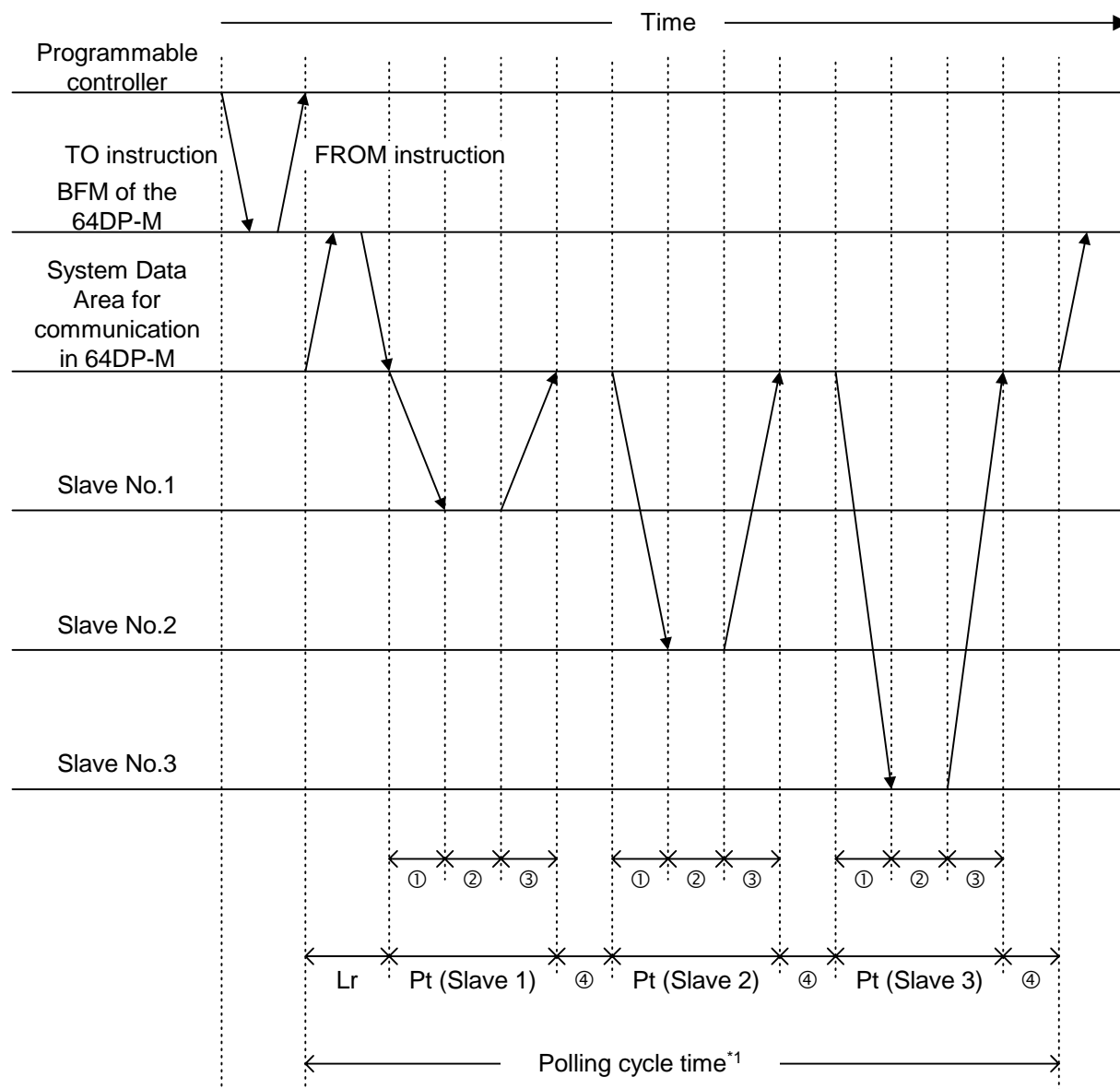
$$\text{Polling cycle time} = \text{the higher value of [MSI] or } \left[\sum_{i=1}^{\text{Number of slaves}} \{Pt (\text{Slave } (i)) + Tsdi (M)\} + Lr \right]$$

Explanation of MSI, Pt (Slave (i)), Treq (i), Max Tsdr (i), Tres (i), Tsdi (M), Lr see following table.

Table 1.6: Wording for Polling Cycle Time

| Wording | Description |
|----------------|--|
| Pt (Slave (i)) | The polling time of the slave = Treq (i) + Max Tsdr (i) + Tres (i) |
| Treq (i) | The request transmission time of the slave = (number of output bytes to this slave + 9) × 11 / baud rate |
| Max tsdr (i) | Response time of the slave = (This value is recorded in this slave GSD file.) / baud rate |
| Tres (i) | Response transmission time of the slave - (Number of input bytes from this slave + 9) × 11 / baud rate |
| Tsdi (M) | Processing time of master request/response = (This value is recorded in this slave GSD file.) / baud rate |
| Lr | Data refresh time = Max. 260 ms + 5 ms × number of slaves |
| MSI | Minimum slave interval is set in the configuration software (ProfiMap). |

Figure 1.7: Polling Cycle Time



- ① This time is "Treq" for each slave.
- ② This time is "Maximum Tsdr" for each slave.
- ③ This time is "Tres" for each slave.
- ④ This time is Tsd(M)

*1 The polling cycle time is the larger of the value obtained from the equation on the prior page or the MSI. MSI (Minimum slave interval) is set in the configuration software (ProfiMap).



Note;

FROM/TO instruction and the polling cycle are asynchronous.

MEMO

2. Wiring and Mounting

2.1 Mounting

2.1.1 Arrangements

The 64DP-M connects on the right side of an FX2N series main unit or extension unit/block (include special function block). For further information of mounting arrangements, refer to FX2N Series Hardware Manual.

2.1.2 Mounting

Mounting method of the 64DP-M is DIN rail mounting or direct wall mounting.

1) DIN rail mounting

- Align the upper side of the DIN rail mounting groove of the 64DP-M with a DIN rail*1 (①), and push it on the DIN rail (②). See Figure 2.1.
- When removing the 64DP-M from the DIN rail, the hook for DIN rail is pulled (③), and the 64DP-M is removed (④). See Figure 2.2.

Figure 2.1: Attach to DIN Rail

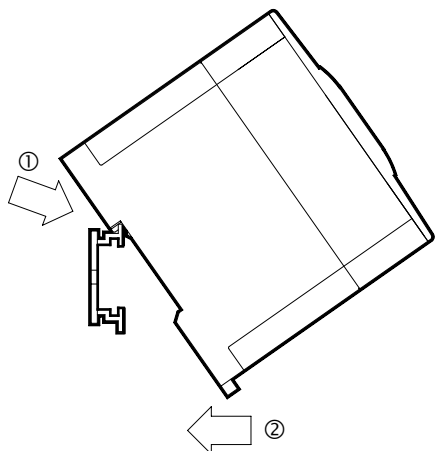
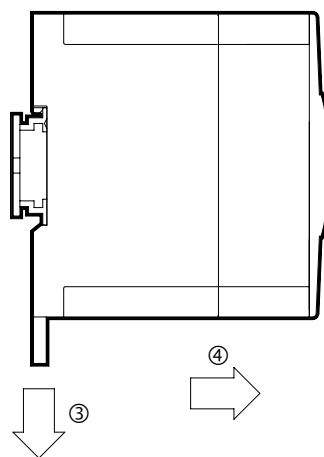


Figure 2.2: Remove from DIN Rail



*1 Uses DIN 46277 <35mm (1.38")>

2) Direct mounting to back walls

The 64DP-M can be mounted with M4 screws by using the direct mounting holes. An interval space between each unit of 1 ~ 2 mm is necessary.

2.2 Wiring

2.2.1 Caution



- 1) Do not lay signal cable near to high voltage power cable or house them in the same trunking duct. Effects of noise or surge induction may occur. Keep signal cables a safe distance of more than 100 mm (3.94") from these power cables.
- 2) Ground the shield wire or the shield of a shielded cable at one point on the programmable controller. Do not, however, ground at the same point as high voltage lines.
- 3) Terminal screws of the 64DP-M are M3 (0.12"), therefore crimp style terminals (see drawing) suitable for use with these screws should be fitted to the cable for wiring.

Figure 2.3: Crimp Terminals



- 4) The terminal tightening torque is 0.5 ~ 0.8 N·m. Tighten securely to avoid malfunction.
- 5) Cut off all phases of power source before installation or performing wiring work in order to avoid electric shock or damage of product.
- 6) Replace the provided terminal cover before supplying power and operating the unit after installation or wiring work, in order to avoid electric shock.

2.2.2 Wiring

2.2.3 Wiring of Power Supply

The 64DP-M needs power to be supplied from an FX2N series PLC or external power supply.



Caution

When the 64DP-M is supplied with 24V DC from external power supply, this external power supply needs to be started up at same time as the FX2N series PLC. If this external power supply is late to start up, FX2N series PLC could be down.

Figure 2.4: Power Supply From PLC

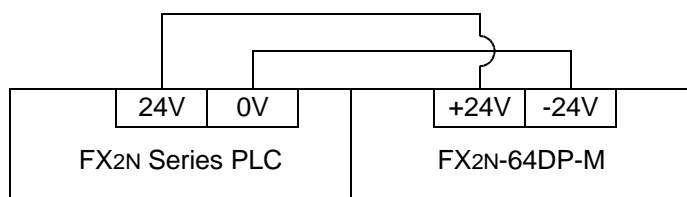
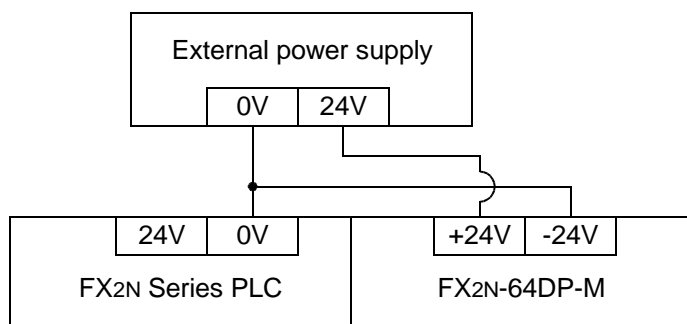


Figure 2.5: Power Supply From External Power Supply



2.2.4 Wiring of Profibus-DP

To connect the 64DP-M to a Profibus-DP network use only the Profibus connectors and shielded twisted-pair cable complying with EN50170. For Profibus connectors see the Profibus connector manual.

Figure 2.6: Wiring

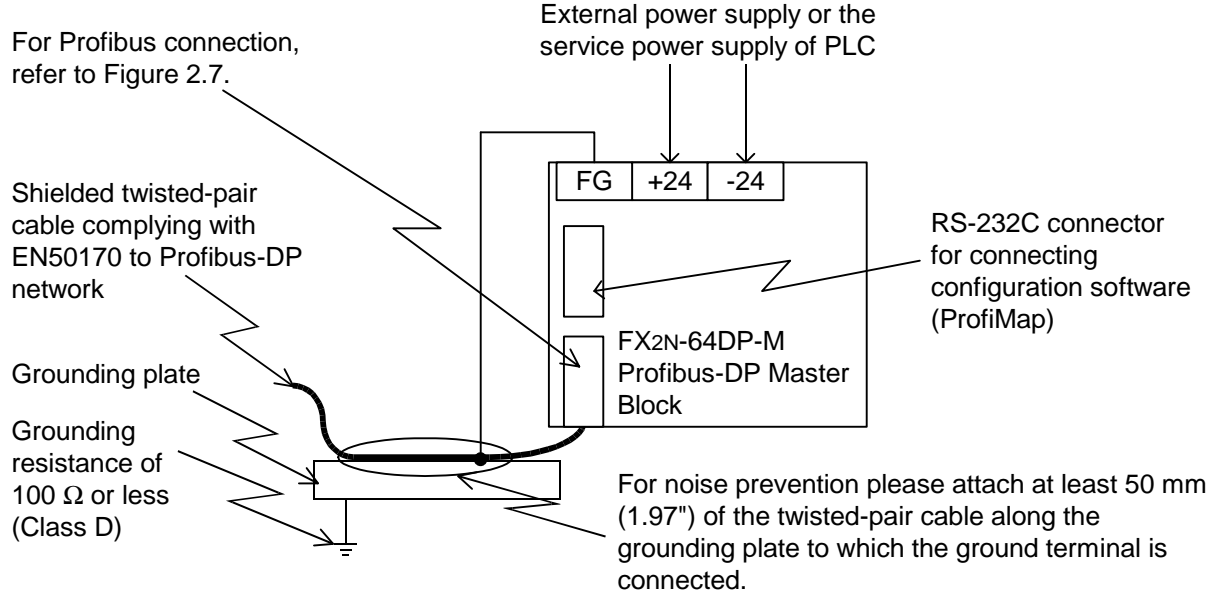
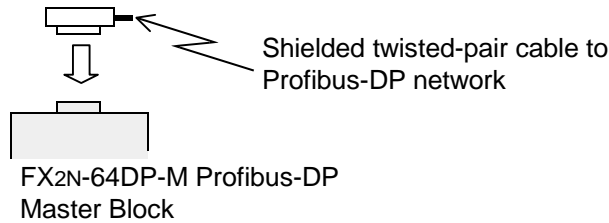


Figure 2.7: Profibus Connection



2.2.5 Terminating resistor

The units at each end of the Profibus-DP network must have a terminating resistor. This will either be in the master or slave unit or in the Profibus connector.

However, the 64DP-M does not have a terminating resistance built-in.

3. Specifications

3.1 General Specifications

Table 3.1: General Specifications

| Items | Description |
|---|---|
| General specifications excluding Dielectric Withstand Voltage | Same as those of the main unit |
| Dielectric Withstand Voltage | 500 V AC > 1 min. tested between DC power supply terminals and earth |
| Complies With | UL508 |

3.2 Power Supply Specifications

Table 3.2: Power Supply Specifications

| Items | Description |
|-----------------------|--|
| External Power Supply | 250 mA at 24 V DC |
| Internal Power Supply | 30 mA at 5 V DC supplied via extension cable |

3.3 Performance Specifications

Table 3.3: Performance Specifications

| Item | | Specifications |
|--|---------------------|---|
| Transmission Type | | Bus network |
| Unit type | | Profibus-DP master Class 1 |
| Transmission Data (Maximum Exchanged Data Length) | | ONLINE1(Normal service mode): 32 bytes / slave ONLINE2(Extended service mode): 244 byte/slave |
| Maximum Number of Repeaters / Network | | 3 units |
| Maximum Number of Stations / Segment | | 32 stations (See Note 1) |
| Maximum Number of Slaves / Master | | 60 slaves (See Note 1) |
| Number Connection of Nodes (Number of Repeaters) | | 32, 62 (1), 92 (2), 126 (3) (See Note 1) |
| Supported Baud Rates (bps) and Bus Length | 9.6k, 19.2k, 93.75k | 1,200 m (3,937') / segment |
| | 187.5k | 1,000 m (3,281') / segment |
| | 500k | 400 m (1,312') / segment |
| | 1.5 M | 200 m (656') / segment |
| | 3M, 6M, 12M | 100 m (328') / segment |
| PNO ID | | F264 H |
| Connector | RS-232C | Port for download configuration (9 pin D-SUB Connector: #4-40unc inch screw thread) |
| | Profibus-DP Network | Port for Profibus-DP network (9 pin D-SUB Connector: #4-40unc inch screw thread) |
| Synchronization | | Synchronization, unsynchronization, freeze and unfreeze modes shall be supported. |
| Terminal Resistor | | Not built in. |
| Number of occupied I/O points | | 8 points taken from the programmable controller extension bus (can be either input or output) |
| Applicable Programmable Controller | | FX2N Series |
| LED indicators | POWER LED | ON when 24V DC power is supplied form the PLC or external power supply. |
| | RUN LED | ON: During normal operation OFF: Error |
| | SD / RD LED | Flashes during communication with slave on the Profibus network. The flashing interval is the time interval of the bus parameter's Data Control Time. |
| | TOKEN LED | ON when token is maintained. |
| | READY LED | ON when the Profibus-DP network subscription preparation is completed and during subscription. |
| | FROM/TO LED | ON when a FROM/TO instruction from the programmable controller is operating. |

Table 3.3: Performance Specifications

| Item | | Specifications |
|----------------|-------------|---|
| LED indicators | PRM.SET LED | ON (PARAMETER SET) when in the parameter setting mode. When flashing during normal operation, the parameter is not written. |
| | RSP ERR LED | ON when a communication error occurs. |
| | FAULT LED | ON when an error occurs. |
| | TEST LED | ON when self-diagnosis is executing. |
| | STATION LED | Displays the station address during normal operation.(Binary) Displays the test type during a self-diagnosis. (B0 to B6) |



Note 1;

When using a slave with expansion diagnostic information of more than 32 bytes, the network will be limited. Maximum expansion diagnostic information data length is the smaller of the value obtained from a slave address by the following equation or 244 bytes.

$$\begin{aligned} &\text{Maximum expansion diagnostic information data length (bytes)} \\ &= [12600 \div N^{*1} - 10] \text{ or } [244] \end{aligned}$$

*1 The value of N is the smaller of the value obtained by the following equation or 300.

$$N = [(\text{Max. slave address value} - \text{Min. slave address value} + 1) \times 5] \text{ or } [300]$$



It is not possible to communicate normally with the slave when the maximum diagnosis information data length (Max_Diag_Data_Len) has been decided by the slave's GSD file is larger than the value obtained by the above expression. In this case, please try the following things.

- 1) Make the slave address consecutive number if possible.
- 2) Change setting so that this value may become small if the maximum diagnosis information data length on the slave side can be set.
- 3) Reduce connected number of the slave.

Note 2;

Length that the bus can be expanded by using repeaters.

$$\text{Maximum Bus Length} = (\text{"Number of repeaters"} + 1) \times \text{"Bus Length / segment"}$$

Table 3.4: Maximum Bus Length and Baud Rate

| Baud Rate (bps) | Maximum Bus Length | | | |
|---------------------|--------------------|------------------|-------------------|-------------------|
| | No repeater | 1 repeater | 2 repeaters | 3 repeaters |
| 9.6k, 19.2k, 93.75k | 1,200 m (3,937') | 2,400 m (7,874') | 3,600 m (11,811') | 4,800 m (15,748') |
| 187.5k | 1,000 m (3,281') | 2,000 m (6,562') | 3,000 (9,843') | 4,000 m (13,123') |
| 500k | 400 m (1,312') | 800 m (2,625') | 1,200 m (3,937') | 1,600 m (5,249') |
| 1.5 M | 200 m (656') | 400 m (1,312') | 600 m (1,969') | 800 m (2,625') |
| 3M, 6M, 12M | 100 m (328') | 200 m (656') | 300 m (984') | 400 m (1,312') |

MEMO

4. Allocation of Buffer Memories (BFMs)

4.1 Buffer Memories (BFM) Lists

Table 4.1: Buffer Memory (BFM) List

| BFM No. (Hex code) | Name | Description |
|----------------------------------|----------------------------------|--|
| BFM #0 (000 H) | Communication Status | Read only |
| BFM #1 (001 H) | Flags | Read only |
| BFM #2 (002 H) | Communication Control flags | Read / Write |
| BFM #3 (003 H) ~ #8 (008 H) | Not used | |
| BFM #9 (009 H) | Communication Stop Timer Setting | Read / Write |
| BFM #10 (00A H) | Slave Data Consistency Mode | |
| BFM #11 (00B H) ~ #14 (00E H) | Output Data Send Request Flags | |
| BFM #15 (00F H) ~ #18 (012 H) | Output Data Sending End Flags | Read only |
| BFM #19 (013 H) ~ #22 (016 H) | Output Data Send Error Flags | Read / Write |
| BFM #23 ~ #26 (01A H) | Not used | |
| BFM #27 (01B H) | Master Reset | Read / Write |
| BFM #28 (01C H) | Initial Data Set | The initial data writing / reading instruction signal |
| BFM #29 (01D H) | Master Status | Read only |
| BFM #30 (01E H) | Module ID Code | K7060 (Read only) |
| BFM #31 (01F H) ~ #36 (024 H) | Not used | |
| BFM #37 (025 H) | Number of Used Input Byte | Read only |
| BFM #38 (026 H) | Number of Allocated Slave | |
| BFM #39 (027 H) | Operation mode | |
| BFM #40 (028 H) ~ #43 (02B H) | Input Slave State | |
| BFM #44 (02C H) ~ #47 (02F H) | Output Slave State | |
| BFM #48 (030 H) ~ #99 (063 H) | Not used | |
| BFM #100 (064 H) ~ #1059 (423 H) | Input Data Area | This is the area that stores the input data from the slave. (Read only) |
| BFM #1060 (424 H) ~ #2019 (7E3H) | Output Data Area | This is the area that stores the output data to the slave. (Read / Write) |
| BFM #2020 (7E4 H) ~ #2139 (85BH) | Address Information Area | This is the area that shows the slave address and I/O data length. (4 bytes/slave) <Read only> |

Table 4.1: Buffer Memory (BFM) List

| BFM No. (Hex code) | Name | Description |
|---------------------------------------|---|--|
| BFM #2140 (85C H) ~ #2179 (883 H) | Communication Trouble Area | This is the area that shows the diagnostic information that occurred during communication. (Read only) |
| BFM #2180 (884 H) | Slave Diagnostic Status Cancel | This is buffer memory that sets the data that masks the slave the Diagnostic Status. (Read / Write) |
| BFM #2181 (885 H) | Global Control Area | This is the global control function hold/cancel selection area. (Read / Write) |
| BFM #2182 (886 H), #2183 (887 H) | Not used | |
| BFM #2184 (888 H) | Information Dwell Time Setting | This is used to set the wait time before informing the communication diagnostic after the exchange start. (Read / Write) |
| BFM #2185 (889 H) ~ #2195 (893 H) | Not used | |
| BFM #2196 (894 H) ~ #2210 (8A2 H) | Expansion Communication Trouble Area | This area shows the extension information of the diagnostic information which is occurred during the communication. (Read only) |
| BFM #2211 (8A3 H) | Not used | |
| BFM #2212 (8A4 H) ~ #2216 (8A8 H) | Slave Status Area | This is the area that shows the status information of each slave. (Read only) |
| BFM #2217 (8A9 H) ~ #2227 (8B3 H) | Not used | |
| BFM #2228 (8B4 H) ~ #2347 (92B H) | Input/Output Start Address Area | This is the area that shows the addresses to start the input area and output area of each slave. (Extended service mode only) <Read only> |
| BFM #2348 (92C H) ~ #9999 (270F H) | Not used | |

**Caution:**

- 1) Do not access the buffer memory of "Not used" (BFM #3 ~ #8, #10 ~ #26, #31 ~ #99, #2182, #2183, #2185 ~ #2195, #2211, #2217 ~ #2227, #2348 ~ #9999) by FROM/TO instruction. There is a possibility to cause abnormality to the operation of the 64DP-M if accessing these buffer memories.
- 2) Do not write to (access by TO instruction) the buffer memory of "Read only" (BFM #0, #1, #29, #30, #100 ~ #1059, #2020 ~ #2179, #2196 ~ #2210, #2212 ~ #2216, #2228 ~ #2347) in the programmable controller. It is possible to operate the 64DP-M by writing to (accessing by TO instruction) these buffer memories.
- 3) When large input/output data is read from or written to 64DP-M by many FROM/TO instructions in a scan, the scan time is very slow.
Therefore, it is necessary to execute the FROM/TO instruction to read and to write the input/output data little by little during the numerical scan cycle.
- 4) When writing data to BFMs, do not changed the value for 500 ms or more. If changing value in BFMs, last data will not use by 64DP-M system

4.2 Communication Status Flags <BFM #0, BFM #1> (Read Only)

The Communication Status flags are allocated as follows.

Table 4.2: Communication Status Flags (Read Only)

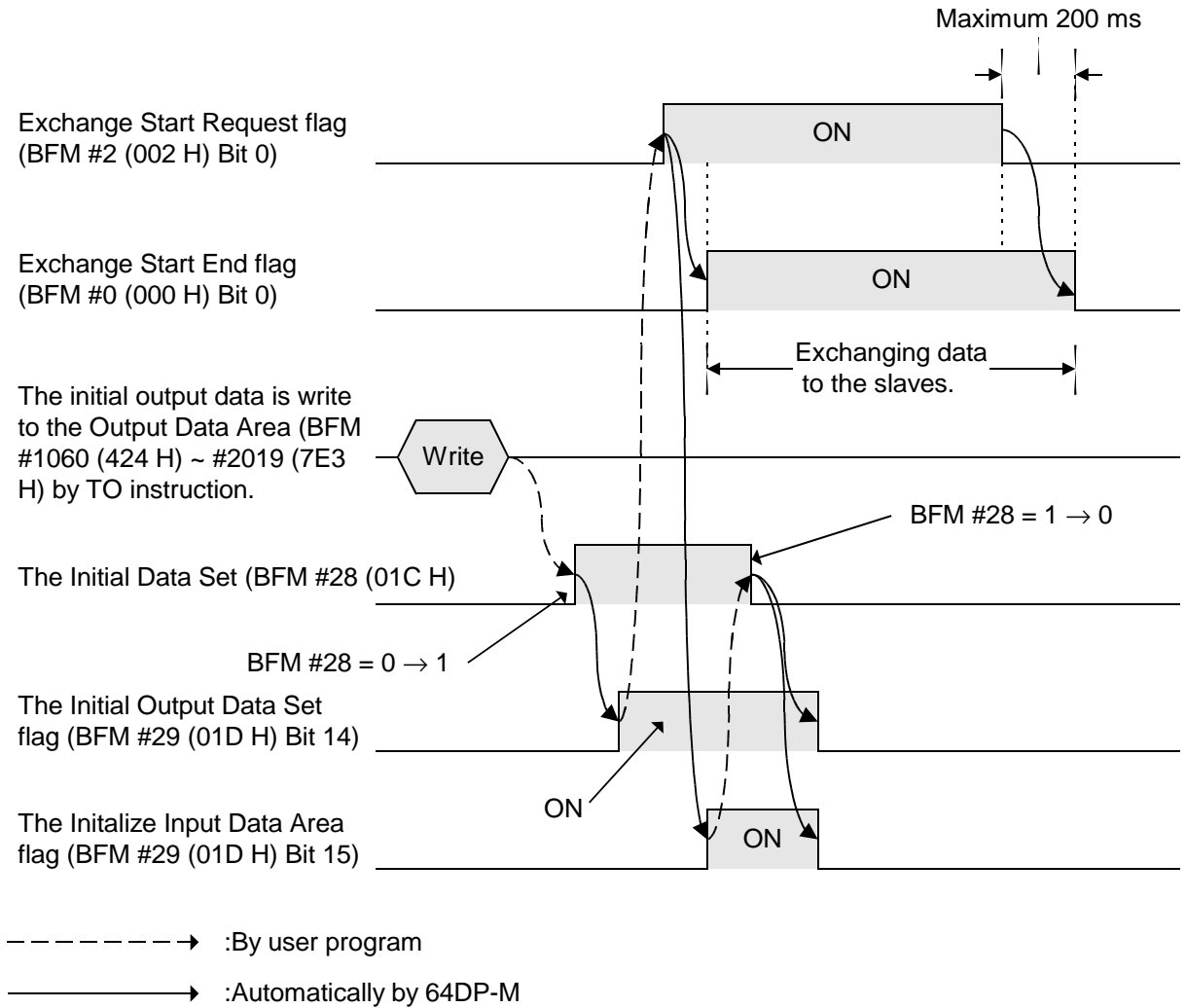
| BFM No. | Bit No. | Name | Description |
|-------------------|-------------|---|-------------|
| BFM #0 (000 H) | Bit 0 | Exchange Start End flag | Refer to 1) |
| | Bit 1 | Communication Trouble Detection flag | Refer to 2) |
| | Bit 2 | Communication Trouble Area Clear End flag | Refer to 3) |
| | Bit 3 | Not used | |
| | Bit 4 | Global Control End flag | Refer to 4) |
| | Bit 5 | Global Control Error End flag | Refer to 5) |
| | Bit 6 ~ 12 | Not used | |
| | Bit 13 | Watchdog Timer Error flag | Refer to 6) |
| | Bit 14 ~ 15 | Not used | |
| BFM #1 (001 H) | Bit 0 ~ 10 | Not used | |
| | Bit 11 | Communication READY flag | Refer to 7) |
| | Bit 12 | Not used | |
| | Bit 13 | Module READY flag | Refer to 8) |
| | Bit 14, 15 | Not used | |

1) Exchange Start End flag <BFM #0 Bit 0>

This Exchange Start End flag can be used as an interlock for programmable controller write/read output data and Input data to/from 64DP-M.

This flag is ON when the 64DP-M exchanges data with slave on the DP-network. This flag is turned ON when the Exchange Start Request flag (BFM #2 Bit 0) is turned ON by a TO instruction. This flag is turned OFF when Exchange Start Request flag is turned OFF by a TO instruction, or when an error occurs that stops the exchange of data with the slave on the DP-network.

Figure 4.1: Exchange Start End



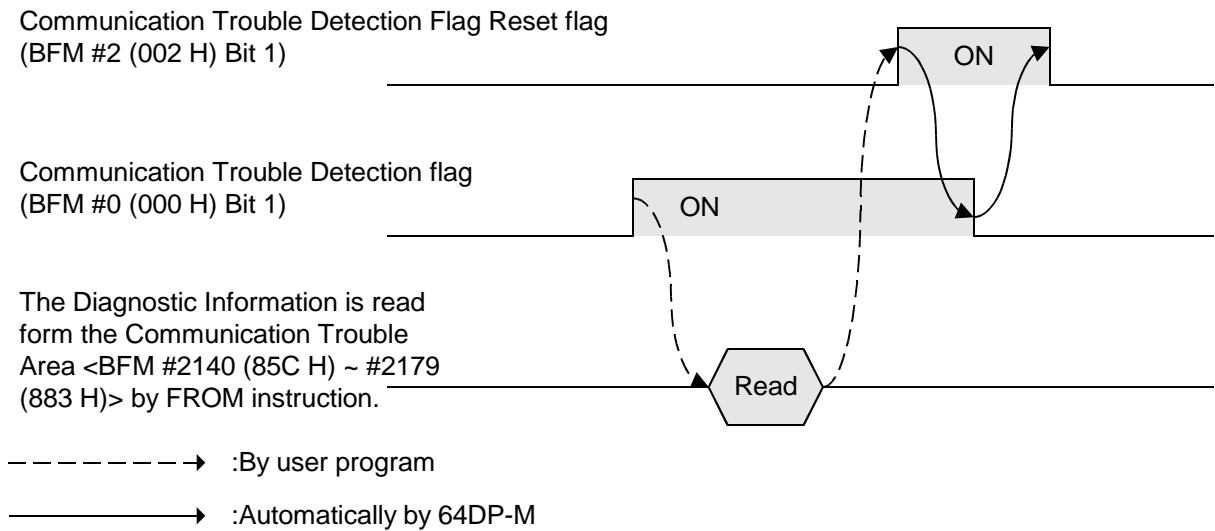


Note;

- Before the Exchange Start Request flag is turned ON the output data initial value must be written to BFM #1060 (424 H) ~ #2019 (7E3 H).
For the Initial Data Set buffer memory, refer to section 4.7. For the Initial Output Data Set flag and the Initialize Input Data Area flag, refer to section 4.8.
- There is a possibility that it is not possible to communicate with the slave, even if the Exchange Start Request flag (BFM #2 Bit 0) is turned ON, when the slave power supply is turned ON simultaneously with 64DP-M.
Therefore, please turn ON the Exchange Start Request flag after Communication READY flag (BFM #1 Bit 11) is turned ON.
- It is not possible to stop the communication with slaves, even if the FX2N plc is in STOP.
Therefore, please turn OFF the Exchange Start Request flag, or each power supply of the 64DP-M and FX2N plc, before the FX2N plc is in STOP.

2) Communication Trouble Detection flag <BFM #0 Bit 1>
The Communication Trouble Detection flag can check that the communication diagnostic error occurred.
This flag is turned ON when the communication diagnostic error occurs. At the same time the RSP ERR LED turns ON, and Diagnostic Information is stored in BFM #2140 ~ #2179 <Communication Trouble Area>. This flag is turned OFF when the Communication Trouble Detection Flag Reset flag (BFM #2 Bit 1) turns ON by a TO instruction. At the same time, the RSP ERR LED is turned OFF.

Figure 4.2: Communication Trouble Detection Flag

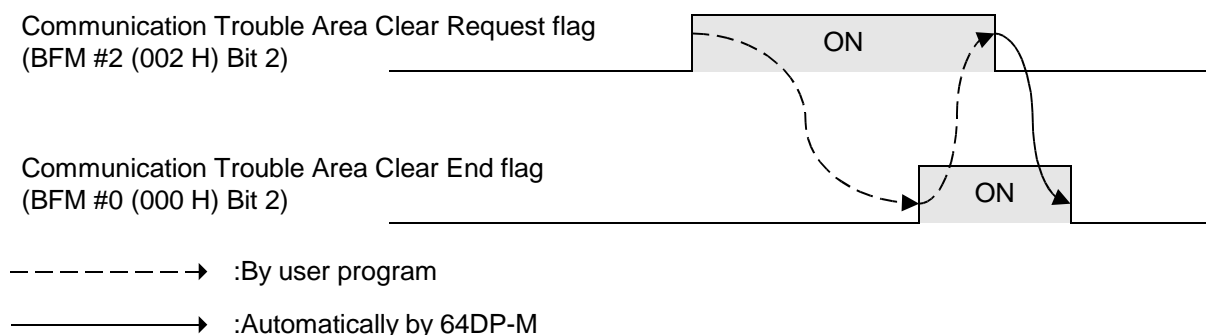


Note;

- If this flag is turned ON, Diagnostic Information needs to be read from the Communication Trouble Area area (BFM #2140 ~ #2179) by a FROM instruction.
- The Communication Trouble Detection Reset flag (BFM #2 Bit 1) is turned OFF by a TO instruction after it has been confirmed that the Communication Trouble Detection flag (BFM #0 Bit 1) has been turned OFF.

- 3) Communication Trouble Area Clear End flag <BFM #0 Bit 2>
 The Communication Trouble Area Clear End flag can check that all of the Communication Trouble Area (BFM #2140 ~ #2179) and the Expansion Communication Trouble Area (BFM #2196 ~ #2210) are cleared.
 This flag is turned ON when all of the Communication Trouble Area and Expansion Communication Trouble Area are cleared by turning ON the Communication Trouble Area Clear Request flag (BFM #2 Bit 2). This flag is turned OFF when the Communication Trouble Area Clear Request is turned OFF.

Figure 4.3: Communication Trouble Area Clear End Flag



Note;

The Communication Trouble Area Clear Request flag (BFM #2 Bit 2) is turned OFF by a TO instruction after it has been confirmed that the Communication Trouble Area Clear End flag (BFM #0 Bit 2) has been turned ON.

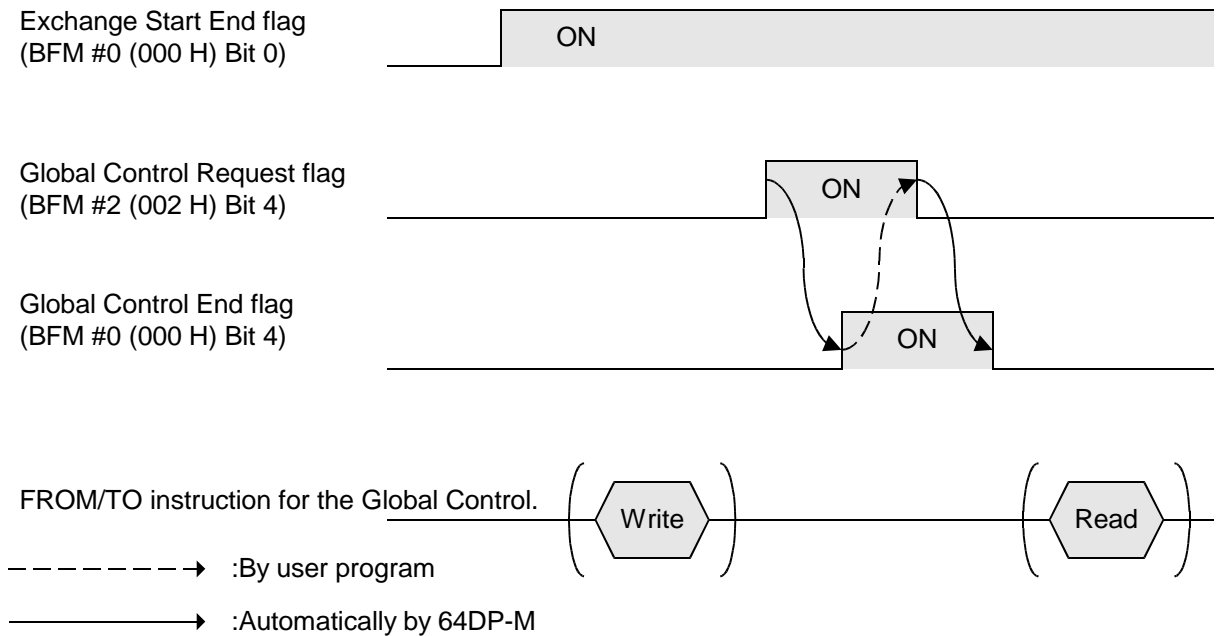
4) Global Control End flag <BFM #0 Bit 4>

The Global Control End flag can check the finishing action of the global control service.

This flag is turned ON when the global control has finished, after the Global Control Request flag (BFM #2 Bit 4) is turned ON by a TO instruction. This flag is turned OFF when the Global Control Request flag is turned OFF.

For the Global Control, refer to chapter 5.

Figure 4.4: Global Control End



Note;

- The Global Control Request flag (BFM #2 Bit 4) is turned OFF by a TO instruction after it has been confirmed that the Global Control End flag (BFM #0 Bit 4) has turned ON.
- The Global Control Request flag (BFM #2 Bit 4) cannot operate if the Exchange start End flag (BFM #0 Bit 0) is OFF. In this case, the Global Control End flag (BFM #0 Bit 4) and the Global Control Error End flag (BFM #0 Bit 5) will turn ON.

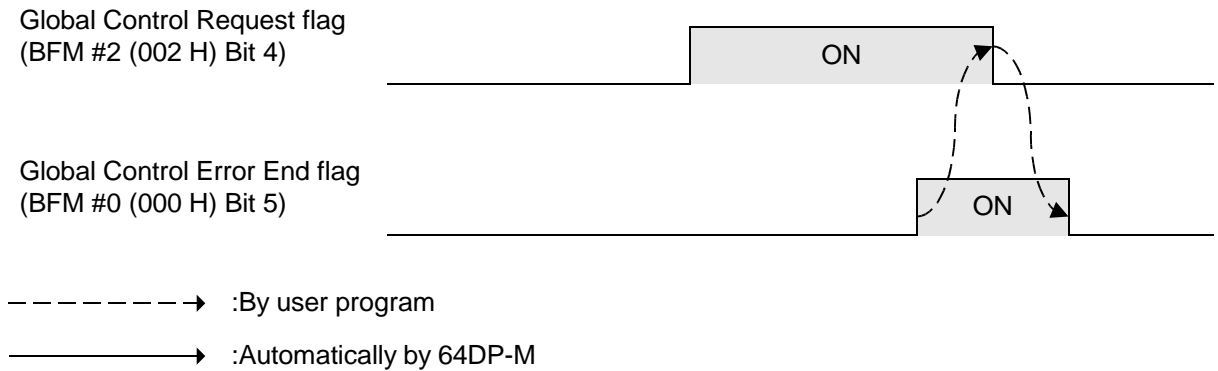
5) Global Control Error End flag <BFM #0 Bit 5>

The Global Control Error End flag can check that the global control service does not operate.

This flag is turned ON when the global control service does not operate. This flag is turned OFF when the Global Control Request (BFM #2 Bit 4) turned ON → OFF.

For global control, refer to chapter 5.

Figure 4.5: Global Control Error End Flag



Note;

- The Global Control Request flag (BFM #2 Bit 4) cannot operate if the Exchange start End flag (BFM #0 Bit 0) is OFF. In this case, the Global Control End flag (BFM #0 Bit 4) and the Global Control Error End flag (BFM #0 Bit 5) will turn ON.
- When the Global Control Error End flag is ON, the Input/Output data of the slave is not held/deleted on the DP-network.

6) Watchdog Timer Error flag <BFM #0 Bit 13>

The Watchdog Timer Error flag can check that the Watchdog Timer Error occurs.

Table 4.3: Watchdog Timer Error Flag Status

| Bit Status | Description |
|------------|---|
| ON | Watchdog timer error occurs in the 64DP-M. In this case, 64DP-M cannot exchange input data and output data to the slaves on the DP-network. |
| OFF | The 64DP-M is operating normally. |



Caution;

If this flag is turned ON, the 64DP-M can restart by the following method. When it is not possible to restart by these methods, please contact a service representative.

- Adjust the Master Reset (BFM #27) from “1” →”0”. However, interval of 1 second or more is necessary when the Master Reset is changed from “1” →”0”. For explanation of the Master Reset (BFM #27), refer to section 4.5.
- Turn the Restart Request flag (BFM #2 Bit 13) ON → OFF. For the Restart Request flag, refer to subsection 4.3 6).
- Turn power supply of the 64DP-M and programmable controller OFF → ON.

7) Communication READY flag <BFM #1 Bit 11>

The Communication READY flag can be used as an interlock when the Exchange Start Request flag (BFM #2 Bit 0) turn ON by a TO instruction.

This flag is turned ON when the status of the 64DP-M can communicate to slaves on the DP-network, after the 64DP-M has started up and the Module READY flag (BFM #1 Bit 13) has turned ON. This flag is turned OFF when an error^{*1} occurs in the 64DP-M, and it is impossible to communicate with slaves on the DP-network.

*1 When this error occurs, the FAULT LED will be ON. For checking point of the FAULT LED, refer to chapter 10.

8) Module READY flag <BFM #1 Bit 13>

The Module READY flag can check that the 64DP-M has started up. If this flag is OFF, the 64DP-M cannot receive FORM/TO instructions form the programmable controller or communicate to slaves on the DP-network.

This flag is turned ON when the 64DP-M is started up. Therefore, it is turned ON regardless of the operation mode. This flag is OFF when the 64DP-M is powered down.

4.3 Communication Control Flags <BFM #2> (Read / Write)

The Communication Control flags are allocated as follows.

Table 4.4: Communication Control Flags (Read / Write)

| Bit No. | Name | Description |
|------------|---|---|
| Bit 0 | Exchange Start Request flag | Refer to 1) and section 4.2 1) |
| Bit 1 | Communication Trouble Detection Flag Reset flag | Refer to 2) and section 4.2 2) |
| Bit 2 | Communication Trouble Area Clear Request flag | Refer to 3) and section 4.2 3) |
| Bit 3 | Communication Trouble Area Type Selection flag | Refer to 4) |
| Bit 4 | Global Control Request flag | Refer to 5), section 4.2 4) and chapter 6 |
| Bit 5 ~ 12 | Not used | |
| Bit 13 | Restart Request flag | Refer to 6) |
| Bit 14, 15 | Not used | |



Caution;

Do not write "1 (ON)" to any bit that is "Not used" (Bit 5 ~ 12, 14, 15) from the programmable controller. There is the possibility of corrupting the operation of the 64DP-M if writing "1" to these bits.

- 1) Exchange Start Request flag <BFM #2 Bit 0>
The Exchange Start Request flag is used for exchanging data between the 64DP-M and the slaves on the DP-network.
For further explanation, refer to section 4.2 1).
- 2) Communication Trouble Detection Flag Reset flag <BFM #2 Bit 1>
The Communication Trouble Detection Flag Reset flag is used to reset the Communication Trouble Detection flag (BFM #0 Bit 1) and turn PSR ERR LED to OFF.
For further explanation, refer to section 4.2 2).

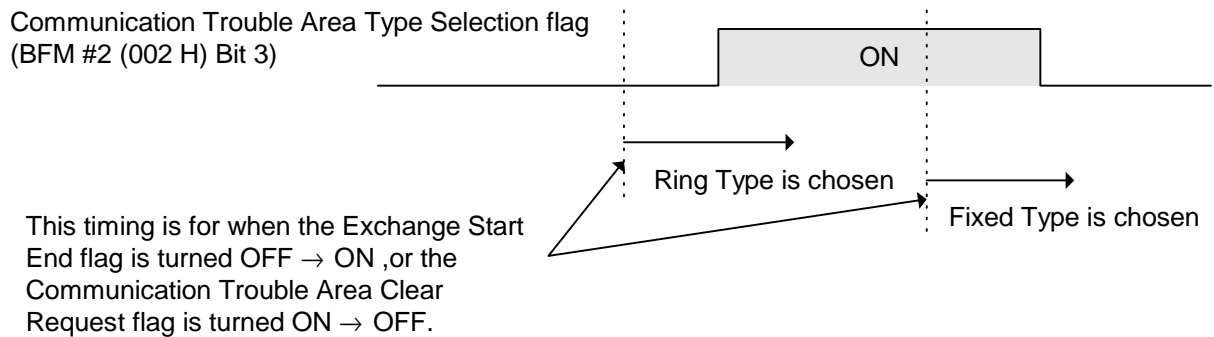


Note;

- Before the Exchange Start Request flag is turned ON the output data initial value must be written to BFM #1060 (424 H) ~ #2019 (7E3 H).
For the Initial Data Set buffer memory, refer to section 4.7. For the Initial Output Data Set flag and the Initialize Input Data Area flag, refer to section 4.8.
- There is a possibility that it is not possible to communicate with the slave, even if the Exchange Start Request flag (BFM #2 Bit 0) is turned ON, when the slave power supply is turned ON simultaneously with 64DP-M.
Therefore, please turn ON the Exchange Start Request flag after Communication READY flag (BFM #1 Bit 11) is turned ON.
- It is not possible to stop the communication with slaves, even if the FX2N plc is in STOP.
Therefore, please turn OFF the Exchange Start Request flag, or each power supply of the 64DP-M and FX2N plc, before the FX2N plc is in STOP.

- 3) Communication Trouble Area Clear Request flag <BFM #2 Bit 2>
 The Communication Trouble Area Clear Request flag is used to clear all of the Communication Trouble Area (BFM #2140 ~ #2179) and the Expansion Communication Trouble Area (BFM #2196 ~ #2210).
 For further explanation, refer to section 4.2 3).
- 4) Communication Trouble Area Type Selection flag <BFM #2 Bit 3>
 The Communication Trouble Area Type Selection flag is used to select Ring type or Fixed type.
 This flag is turned ON when selecting Fix type, or turned OFF when selecting Ring type.
 This flag becomes valid when the Exchange Start End flag (BFM #0 Bit 0) change OFF → ON, or the Communication Information Area Clear (Communication Trouble Area Clear) flag (BFM #0 (000 H) Bit 2) changes from OFF → ON.
 For Ring type and Fix type, refer to section 4.17.1

Figure 4.6: Communication Trouble Area Type Selection Flag



Note;

The content of the selection does not change even if this flag is switched to the other type, Fixed or Ring, after the selection has become valid.

Therefore, if changing the content of the selection, it is necessary that the Exchange Start Request flag (BFM #2 Bit 0) is turned OFF → ON or the Communication Trouble Area Clear Request flag (BFM #2 Bit 2) is turned ON → OFF.

- 5) Global Control Request flag <BFM #2 Bit 4>
 The Global Control Request flag is used for operating global control.
 For further explanation, refer to the subsection 4.2 4) and chapter 5.
- 6) Restart Request flag <BFM #2 Bit 13>
 The Restart Request flag is used for restarting the 64DP-M when the main power fails, either the FAULT LED is ON or Module READY flag is OFF.
 When this flag is turned ON → OFF, the 64DP-M is restarted. This action is same as the 64DP-M turn power supply OFF → ON.



Caution;

The 64DP-M restarts when this flag is operated. Therefore, please make sure this bit is turned OFF (default status) when it is not necessary to restart.

4.4 Communication Stop Timer Setting <BFM #9> (Read / Write)

The communication stop timer is adjusted in 10 ms steps. Default value is 50 ($50 \times 10 \text{ ms} = 500 \text{ ms}$). When this value is 0, the setting of the communication stop timer assumes it is default value. The setting range is 0 and 10 ~ 6,000.

When FROM / TO instructions do not access any buffer memories, the communication timer begins operating.

**Note;**

When restarting the communication between the 64DP-M and slaves on the DP-network, do in the following process.

- 1) Write new values of communication stop timer to the Communication Stop Timer Setting (BFM #9). The FROM / TO Error flag (BFM #29 Bit 9) is turned OFF.
- 2) Write initial or new output data to the Output Data Area (BFM #1060 ~ #2019), as the contents of the Output Data Area is held when the FROM / TO Error occurs.
- 3) Turn OFF to ON the Exchange Start Request flag (BFM #2 Bit 0). The 64DP-M will start to communicate to the slaves on the DP-network.

**Caution;**

If the communication timer reaches it is set time ($\text{BFM \#9} \times 10 \text{ ms}$), the 64DP-M experiences a communication time out. At this time, The FROM / TO Error flag (BFM #29 Bit 9) is turned ON, and data will not be exchanged with slaves on the DP-network. The Exchange Start Request flag (BFM #2 Bit 0) will turn OFF.

4.5 Slave Data Consistency Mode <BFM #10 ~ #22>

BFM #10 is used for the selection of Slave Data Consistency Mode. This mode is used to control the storage of data written in the output data area (BFM #1060 ~ #2019) in the send buffer.

This mode is used to control output data is controlled. Output Data Send Request flags and Sending End flags are used in each slave. For details on the Slave Data Consistency Mode refer to subsection 4.5.1. For allocation of Output Data Send Request flags refer to subsection 4.5.2. For allocation of Output Data Sending End flags refer to subsection 4.5.3.

Table 4.5: Slave Data Consistency Mode <BFM #10> (Read / Write)

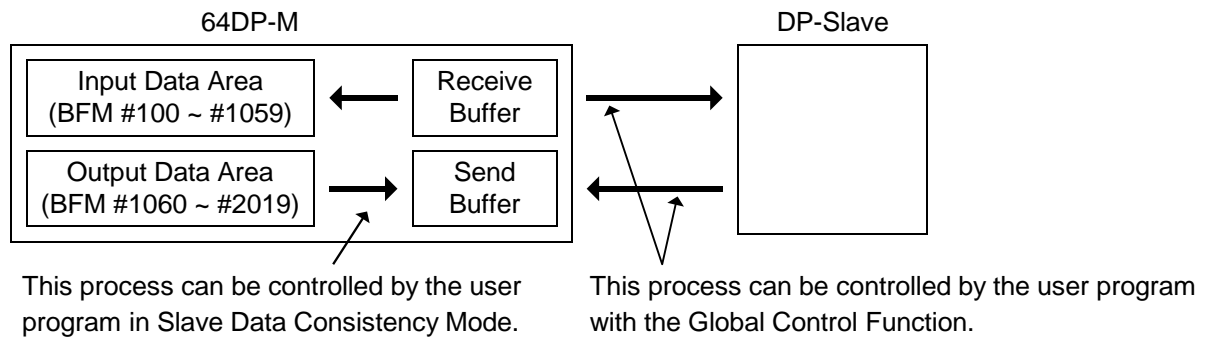
| Value | Description |
|--------------|---------------------------------------|
| K0 | Slave Data Consistency Mode disabled. |
| Other (≠ K0) | Slave Data Consistency Mode enabled. |



Note:

When 64DP-M is exchanging data to the slaves, an error will result if the mode is changed. When changing this mode, the Exchange Start End flag (BFM #0 bit 0) has to be OFF and the Exchange Start Request flag (BFM #2 bit 0) is turned OFF.

Figure 4.7: Input/Output Data Areas and Receive/Send Buffers



Note:

In the update of the data between 64DP-M and the slave, the data consistency can usually be kept to only the units of a single word. Therefore, 64DP-M has Slave Data Consistency Mode and Global Control Function. Refer to the table below for consistency of sending/receiving data and the relation of each function.

Table 4.6: Consistency of Exchanged Data

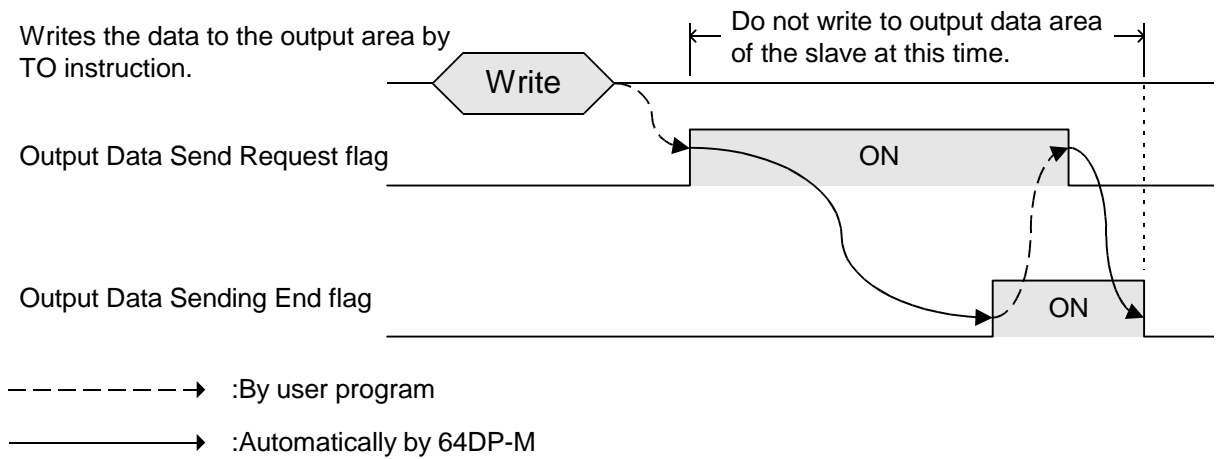
| Using Function | | Sending Data (To Slave) | Receiving Data (From Slave) |
|-----------------------------------|-------------------------------|-------------------------|-----------------------------|
| Using Slave Data Consistency Mode | Using Global Control Function | | |
| | | Single word data | |
| ✓ | | Multiple word data | Single word data |
| ✓ | ✓ | Slave data consistency | Slave data consistency |
| | ✓ | Single word data | Slave data consistency |

4.5.1 Slave Data Consistency Mode Process

The Slave Data Consistency Mode process is shown in Figure 4.8. When sending output data to the slave, the Output Data Send Request flag is turned ON. When output data has been stored in the send buffer, the Output Data Sending End flag is turned ON by 64DP-M. In this case, the output data of the 64DP-M will be sent to the slave. If an error occurs, the Output Data Send Error flag is turned ON.

For allocation of the Output Data Send Request flags, refer to Table 4.7. For allocation of the Output Data Sending End flags, refer to Table 4.8. For allocation of the Output Data Send Error flags, refer to Table 4.9.

Figure 4.8: Slave Data Consistency Mode Process



Note

Output data is not stored in the send buffer unless the Output Data Request flag is ON. The data is written only to the Output Data area (BFM #1060 ~ #2019). See Figure 4.7.

4.5.2 Output Data Send Request Flags <BFM #11 ~ #14> (Read / Write)

These buffer memories are allocated to the Output Data Send Request flags. When sending output data to the station, the bit which corresponds to the Output Data Send Request flag is turned ON. Allocation of the Output Data Send Request flags is shown in the following table. For further information on this flag, refer to subsection 4.5.1

Table 4.7: Allocated Output Data Send Request Flags <BFM #11 ~ #14>

| BFM No. | Bit No. | Station No. | BFM No. | Bit No. | Station No. |
|---------|---------|-------------|----------|---------|-------------|
| BFM #11 | Bit 0 | 1 | BFM #13 | Bit 0 | 33 |
| | Bit 1 | 2 | | Bit 1 | 34 |
| | Bit 2 | 3 | | Bit 2 | 35 |
| | ⋮ | | | ⋮ | |
| | Bit 15 | 16 | | Bit 15 | 48 |
| BFM #12 | Bit 0 | 17 | BFM #14 | Bit 0 | 49 |
| | Bit 1 | 20 | | Bit 1 | 50 |
| | Bit 2 | 21 | | Bit 2 | 51 |
| | ⋮ | ⋮ | | ⋮ | ⋮ |
| | ⋮ | ⋮ | | ⋮ | ⋮ |
| | Bit 15 | 32 | | Bit 11 | 60 |
| | | Bit 12 ~ 15 | Not used | | |

4.5.3 Output Data Sending End Flags <BFM #15 ~ #18> (Read Only)

These buffer memories are allocated to the Output Data Sending End flags. When output data has been stored in the send buffer, the bit which corresponds to the Output Data Sending End flag is turned ON by 64DP-M. Allocation of the Output Data Sending End flags is shown in the following table. For further information on this flag, refer to subsection 4.5.1.

Table 4.8: Allocated Output Data Sending End Flags <BFM #15 ~ #18>

| BFM No. | Bit No. | Station No. | BFM No. | Bit No. | Station No. |
|---------|---------|-------------|----------|---------|-------------|
| BFM #15 | Bit 0 | 1 | BFM #17 | Bit 0 | 33 |
| | Bit 1 | 2 | | Bit 1 | 34 |
| | Bit 2 | 3 | | Bit 2 | 35 |
| | ⋮ | | | ⋮ | |
| | Bit 15 | 16 | | Bit 15 | 48 |
| BFM #16 | Bit 0 | 17 | BFM #18 | Bit 0 | 49 |
| | Bit 1 | 20 | | Bit 1 | 50 |
| | Bit 2 | 21 | | Bit 2 | 51 |
| | ⋮ | ⋮ | | ⋮ | ⋮ |
| | ⋮ | ⋮ | | ⋮ | ⋮ |
| | Bit 15 | 32 | | Bit 11 | 60 |
| | | Bit 12 ~ 15 | Not used | | |

4.5.4 Output Data Send Error Flags <BFM #19 ~ #22> (Read / Write)

These buffer memories are allocated to the Output Data Send Error flags. In operation, the bit which corresponds to the Output Data Send Error flag is turned ON. Allocation of the Output Data Send Error flags is shown in the following table. For further information on this flag, refer to Figure 4.9 ~ 4.11

Table 4.9: Allocated Output Data Send Error Flags <BFM #19 ~ #22>

| BFM No. | Bit No. | Station No. |
|---------|---------|-------------|
| BFM #11 | Bit 0 | 1 |
| | Bit 1 | 2 |
| | Bit 2 | 3 |
| | ⋮ | |
| | Bit 15 | 16 |
| BFM #12 | Bit 0 | 17 |
| | Bit 1 | 20 |
| | Bit 2 | 21 |
| | ⋮ | ⋮ |
| | ⋮ | ⋮ |
| | Bit 15 | 32 |

| BFM No. | Bit No. | Station No. |
|---------|-------------|-------------|
| BFM #13 | Bit 0 | 33 |
| | Bit 1 | 34 |
| | Bit 2 | 35 |
| | ⋮ | |
| | Bit 15 | 48 |
| BFM #14 | Bit 0 | 49 |
| | Bit 1 | 50 |
| | Bit 2 | 51 |
| | ⋮ | ⋮ |
| | ⋮ | ⋮ |
| | Bit 11 | 60 |
| | Bit 12 ~ 15 | Not used |

Situations when the Output Data Send Error flag is turned ON

- 1) When the Output Data Send Request flag is turned ON by a station which does not exist, Output Data Send Error flag for that station is turned ON.
- 2) When the Output Data Send Request flag is turned ON by a station which does not have output, Output Data Send Error flag for that station is turned ON.
- 3) When making mistake as like Figure 4.9 ~ 4.11 in Slave Data Consistency Mode process, Output Data Send Error flag for that station is turned ON.



- In Figure 4.9 and 4.11 case, output data will not be stored to send buffer incorrectly. Check user program about this process, before this operation should be done to the error station again.
- In Figure 4.10 case, output data will be stored to send buffer correctly. But check user program about this process, before this operation should be done to the error station next time.

Figure 4.9: Example 1

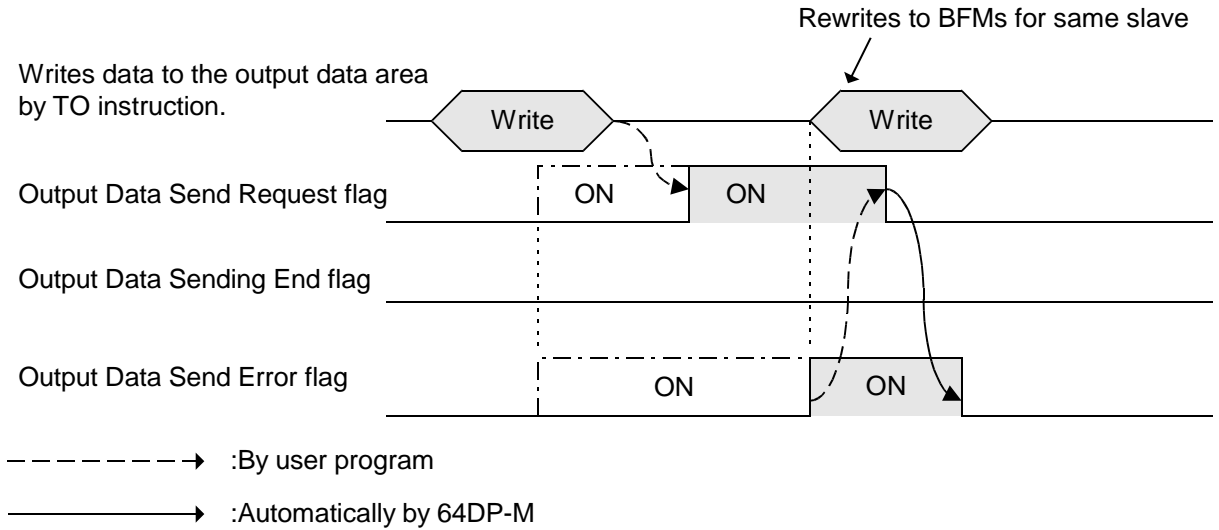


Figure 4.10: Example 2

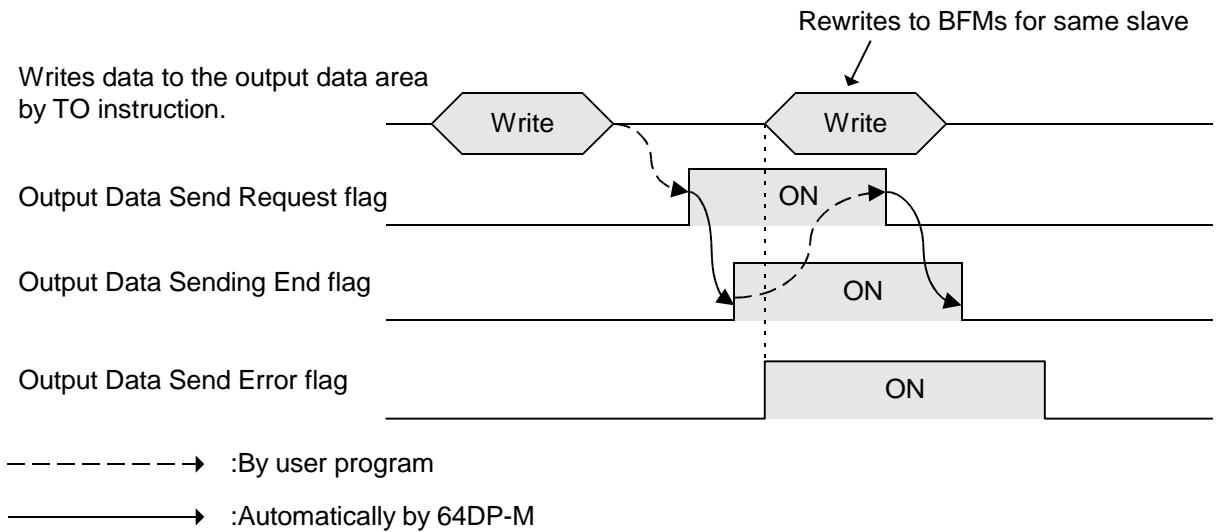
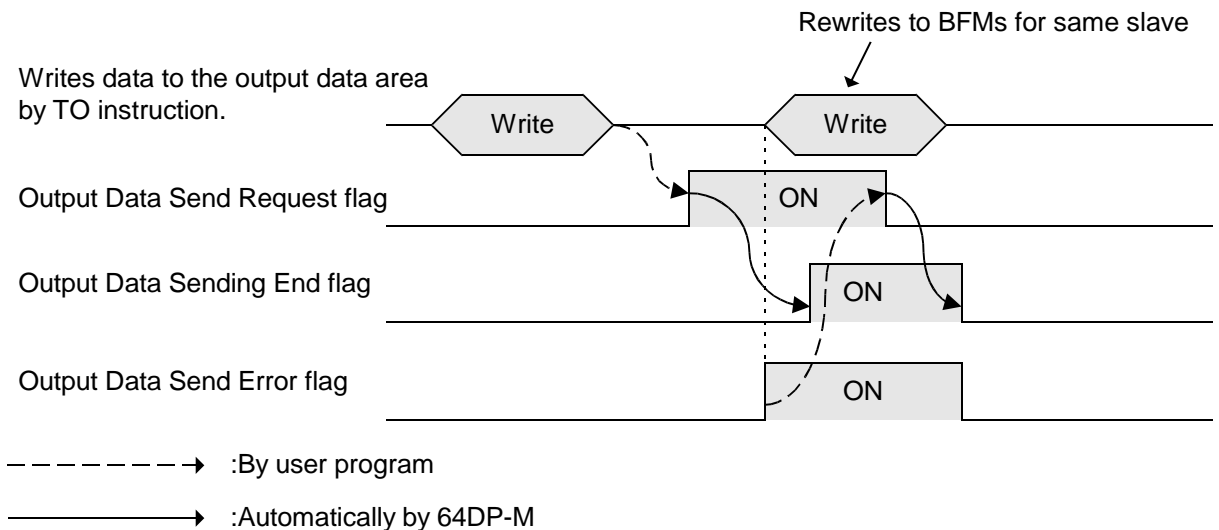


Figure 4.11: Example 3



4.6 Master Reset <BFM #27> (Read / Write)

The Master Reset buffer memory is used when changing to the test mode or the parameter set mode. When the value of this buffer memory is “K1”, the 64DP-M can be changed to the test mode or parameter set mode. When the value of this buffer memory is changed to “K0”, the 64DP-M will restart.

However, interval of 1 second or more is necessary when the Master Reset is changed to “K0”.

When finished in the test mode or parameter mode, reset the power supply for PLC and 64DP-M.

Table 4.10: Master Reset

| Value | Description |
|---------|---|
| K1 → K0 | 64DP-M will restart. Do not access 64DP-M for 1 second by FROM/TO instruction at when 64DP-M is restarting. |
| K0 → K1 | 64DP-M stop to access Profibus-DP system. An interval of 1 second or more is necessary when the Master Reset is changed to “K0”. |



Caution;

- The 64DP-M restarts when the value of this buffer memory changes to “K0”. Therefore, please do not access this buffer memory when it is not necessary to restart or change the test mode and the parameter set mode.

4.7 Initial Data Set <BFM #28> (Read / Write)

The Initial Data Set buffer memory is used to check that the initial data for output to slaves on the DP-network has finished to write to the Output Data Area buffer memory (BFM #1060 ~ BFM #2019).

A value of “1” is written to this BFM when the initial contents of the Output Data Area is for all slaves, after these status flags (BFM #29 Bit 14, 15) are turned ON. When these flags are ON, a value of “0” is written to this BFM and the Exchange Start Request flag (BFM #2 Bit 0) is turned ON. At this time, the Exchange Status Request flags are turned OFF.

For status flags (BFM #29 Bit 14, 15), refer to section 4.8.



Caution;

This process is necessary for the 64DP-M to communicate correctly with the slaves on the DP-network.

If the Exchange Start Request flag is turned ON before the initial data is prepared in the 64DP-M, it will communicate incorrectly with slaves on the DP-network.

4.8 Master Status <BFM #29> (Read Only)

The Master Status buffer memory is allocated as shown on the following table.

Table 4.11: Master Status <BFM #29 (01D H)>

| Bit No. | Name | Description |
|-------------|---|--|
| Bit 0 | Master Reset Status flag | ON when the value of the Master Reset buffer memory (BFM #27) is "1". |
| Bit 1 ~ 7 | Not used | |
| Bit 8 | BFM Access Error flag | ON when accessing the buffer memory of "Not used". |
| Bit 9 | Communication Stop Timer Timed Up flag | ON when the Communication Stop Timer is timed up. |
| Bit 10 ~ 11 | Not used | |
| Bit 12 | Writing Communication Control Status flag | ON when writing to the Communication Control flags buffer memory (BFM #2) by TO instruction. This flag uses an interlock for exclusive accessing to the Communication Control flags buffer memory. |
| Bit 13 | Not used | |
| Bit 14 | Initial Output Data Set flag | ON when the 64DP-M finishes to set initial data for output of the slaves. OFF when writing "0" to the Initial Data Set buffer memory (BFM #28). |
| Bit 15 | Initialize Input Data Area flag | ON when the 64DP-M finishes to initialize data for input of the slaves. OFF when writing "0" to the Initial Data Set buffer memory (BFM #28). |

4.9 Module ID code <BFM #30> (Read Only)

The identification code for a 64DP-M is available using a FROM instruction. The identification code for the 64DP-M is K7060. By reading this identification code, the user may create built-in checking routines to check whether the physical position of 64DP-M matches the software.

4.10 Number of Used Input Byte <BFM #37> (Read Only)

This buffer memory is used to check the 64DP-M for the number of bytes used in the input data area. This value may be more than the value of the configuration software. As the occupied number of bytes is included in this value.

4.11 Number of Allocated Slave <BFM #38> (Read Only)

This buffer memory is used to check the number of slaves connected to the 64DP-M. This value is same as the number of slaves in the configuration software.

4.12 Operation Service Mode <BFM #39> (Read Only)

This buffer memory is used to check the operation service mode of the 64DO-M.

Table 4.12: Operation Service Mode

| Value (Hex) | Description |
|-------------|---|
| 0 | 64DP-M is in normal service mode. |
| E | 64DP-M is in extended service mode. |
| Other value | Configuration error will be occurred in 64DP-M. |

4.13 Input Slave State <BFM #40 ~ #43> (Read Only)

These buffer memories are allocated to the input slave state. When the 64DP-M already has an input slave, the bit which corresponds to the input slave state is turned ON. Allocation of the input slave is shown in the following table.

Table 4.13: Allocated Input Slave

| BFM No. | Bit No. | Slave No. |
|---------|---------|-----------|
| BFM #40 | Bit 0 | 1 |
| | Bit 1 | 2 |
| | Bit 2 | 3 |
| | ⋮ | |
| | Bit 15 | 16 |
| BFM #41 | Bit 0 | 17 |
| | Bit 1 | 18 |
| | Bit 2 | 19 |
| | ⋮ | ⋮ |
| | ⋮ | ⋮ |
| | Bit 15 | 32 |

| BFM No. | Bit No. | Slave No. |
|-------------|----------|-----------|
| BFM #42 | Bit 0 | 33 |
| | Bit 1 | 34 |
| | Bit 2 | 35 |
| | ⋮ | |
| | Bit 15 | 48 |
| BFM #43 | Bit 0 | 49 |
| | Bit 1 | 50 |
| | Bit 2 | 51 |
| | ⋮ | ⋮ |
| | ⋮ | ⋮ |
| | Bit 11 | 60 |
| Bit 12 ~ 15 | Not used | |

4.14 Output Slave State <BFM #44 ~ #47> (Read Only)

These buffer memories are allocated to the output slave state. When the 64DP-M already has an output slave, the bit which corresponds to the output slave state is turned ON. Allocation of the output slave is shown in the following table.

Table 4.14: Allocated Output Slave

| BFM No. | Bit No. | Slave No. |
|---------|---------|-----------|
| BFM #44 | Bit 0 | 1 |
| | Bit 1 | 2 |
| | Bit 2 | 3 |
| | ⋮ | |
| | Bit 15 | 16 |
| BFM #45 | Bit 0 | 17 |
| | Bit 1 | 18 |
| | Bit 2 | 19 |
| | ⋮ | ⋮ |
| | ⋮ | ⋮ |
| | Bit 15 | 32 |

| BFM No. | Bit No. | Slave No. |
|-------------|----------|-----------|
| BFM #46 | Bit 0 | 33 |
| | Bit 1 | 34 |
| | Bit 2 | 35 |
| | ⋮ | |
| | Bit 15 | 48 |
| BFM #47 | Bit 0 | 49 |
| | Bit 1 | 50 |
| | Bit 2 | 51 |
| | ⋮ | ⋮ |
| | ⋮ | ⋮ |
| | Bit 11 | 60 |
| Bit 12 ~ 15 | Not used | |

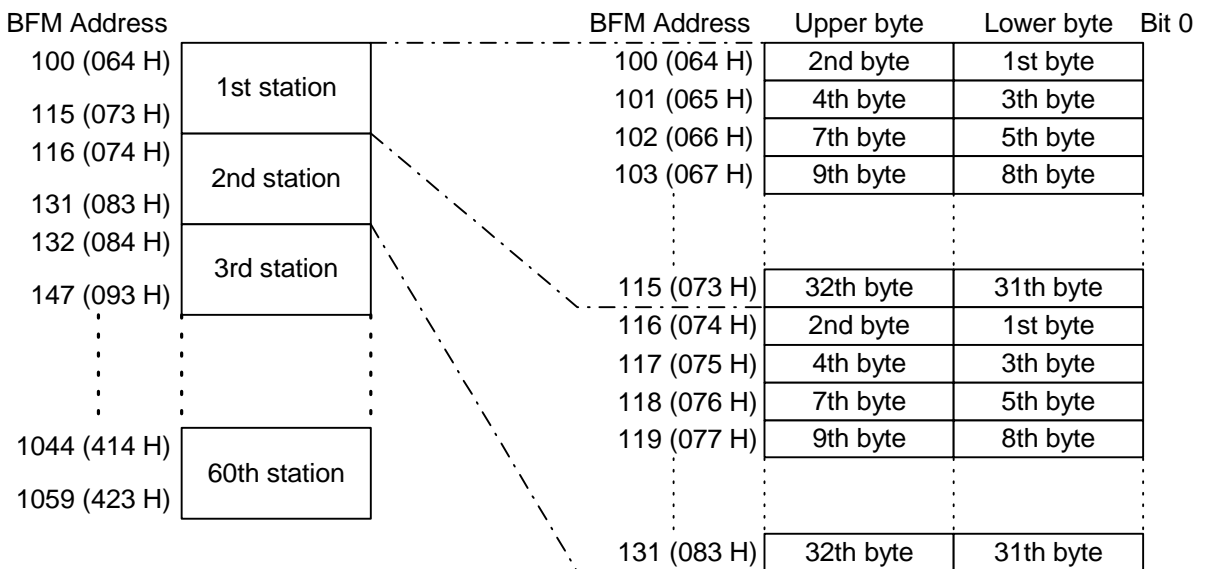
4.15 Input Data Area <BFM #100 ~ #1059> (Read Only)

This Input Data Area buffer memory is used to store input data for the slaves on the DP-network. The input data format is 2 type, Normal Service Mode type and Extended Service Mode type. These modes can be selected by using the mode switch.

4.15.1 Normal Service Mode <Mode Switch: 0>

This area is fixed to an allocation of 32 bytes (16 words) per station for input data of 60 stations. The configuration of the input data area is as follows.

Figure 4.12: Input Data Area Using Normal Service Mode



Note;

If the input data of a slave is less than 32 byte, the input data area of this slave will be a free area. If the input data of the slave is more than 32byte, the Extended Service Mode is needed.



Note:

In the update of the data between 64DP-M and the slave, the consistency can usually be kept to only the units of 1 word. Therefore, 64DP-M has Slave Data Consistency Mode and Global Control Function. Refer to the table below for consistency of sending/receiving data and the relation of each function.

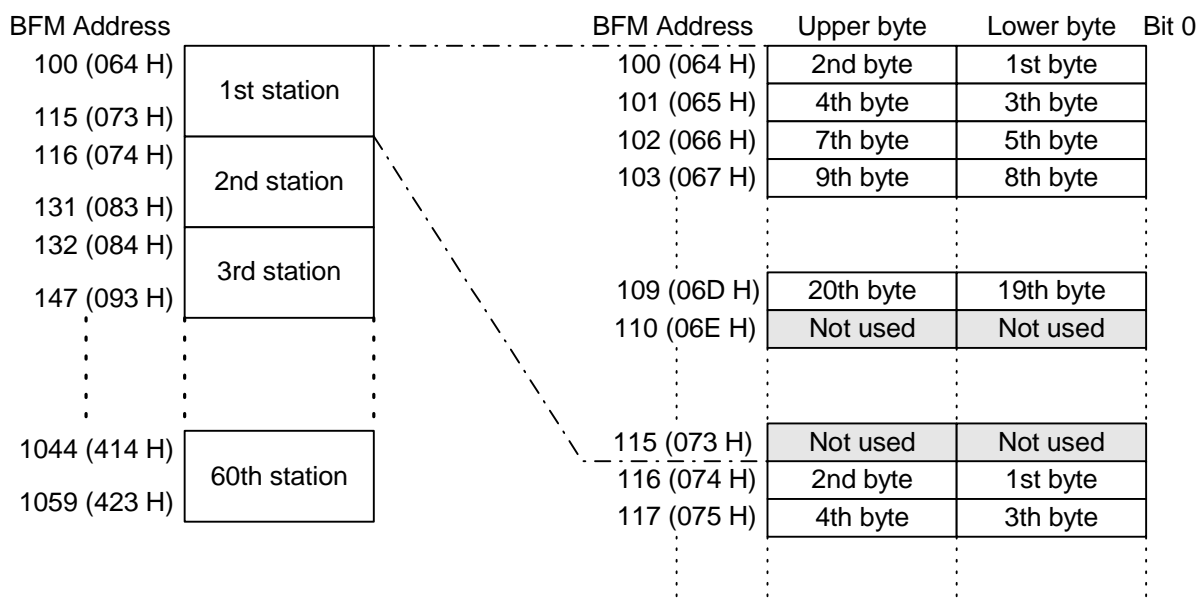
Table 4.15: Consistency of Exchanged Data

| Using Function | | Sending Data (To Slave) | Receiving Data (From Slave) |
|-----------------------------------|-------------------------------|-------------------------|-----------------------------|
| Using Slave Data Consistency Mode | Using Global Control Function | | |
| | | Single word data | |
| ✓ | | Multiple word data | Single word data |
| ✓ | ✓ | Slave data consistency | Slave data consistency |
| | ✓ | Single word data | Slave data consistency |

Example;

When the 1st station has 20 bytes of input data, the corresponding input data area has free sectors from 21th to 32th byte. The value of these free sectors is "00" hex code.

Figure 4.13: Example of Input Data Area Using Normal Service Mode



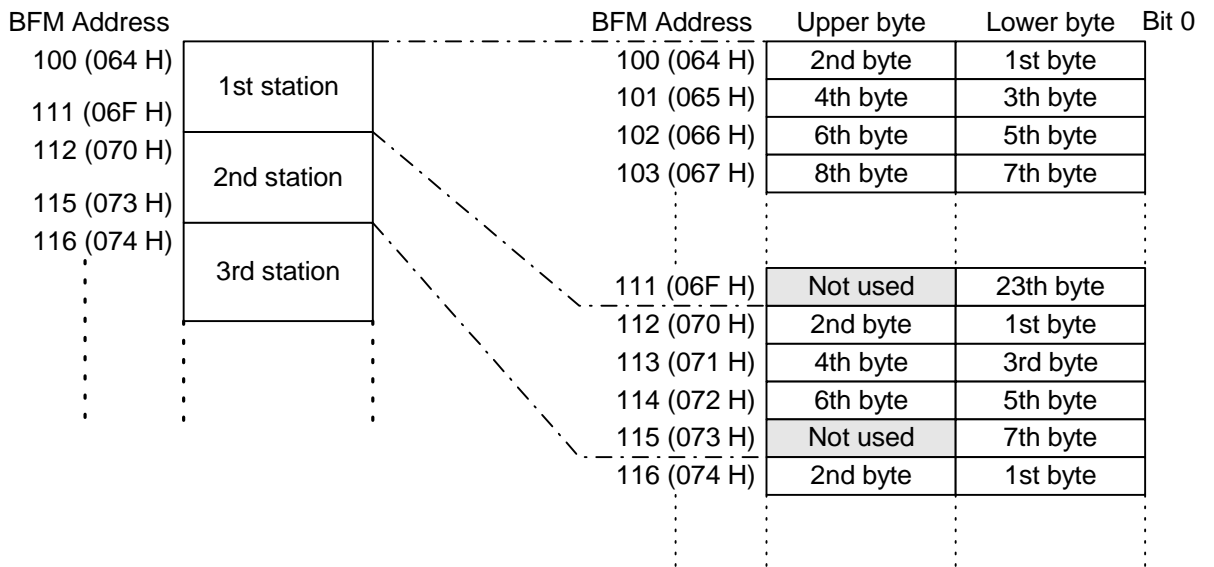
4.15.2 Extended Service Mode <Mode Switch: E>

This area is assigned in variable length according to the parameter file set in the configuration software (ProfiMap). The data length can be set in the range of 0 ~ 244 bytes. The number of stations that can be set will vary in the range of 1 ~ 60. However, this Input Data Area is 1920 bytes (32 bytes × 60 stations = 1920 bytes) for all slaves.

Example;

An example is shown below where the input data length of the 1st station is 23 bytes and the input data length of the 2nd station is 7 bytes. The value of this free area is “00” hex code.

Figure 4.14: Example of Input Data Area Using Extended Service Mode



Note;

- When the data length is an odd number of bytes, the last upper byte becomes a free area as the 1st byte of station data needs to be assigned as a lower byte, and data for the next station is assigned from the next address.
- When the data length is 0 byte, the input data area for this station will be not be in the Input Data Area buffer memory.

4.16 Output Data Area <BFM #1060 ~ #2019> (Read / Write)

This Output Data Area buffer memory is used to stored output data for the slaves on the DP-network. The output data format is 2 type, Normal Service Mode type and Extended Service Mode type. These mode can be chosen by mode switch.



Caution;

- Even if the programmable controller is in “STOP”, output data is maintained. Therefore,
 - 1) Appropriate output data must be sent, before the programmable controller is “STOP”.
 - 2) The entire system must stop before the programmable controller enters in “STOP”.



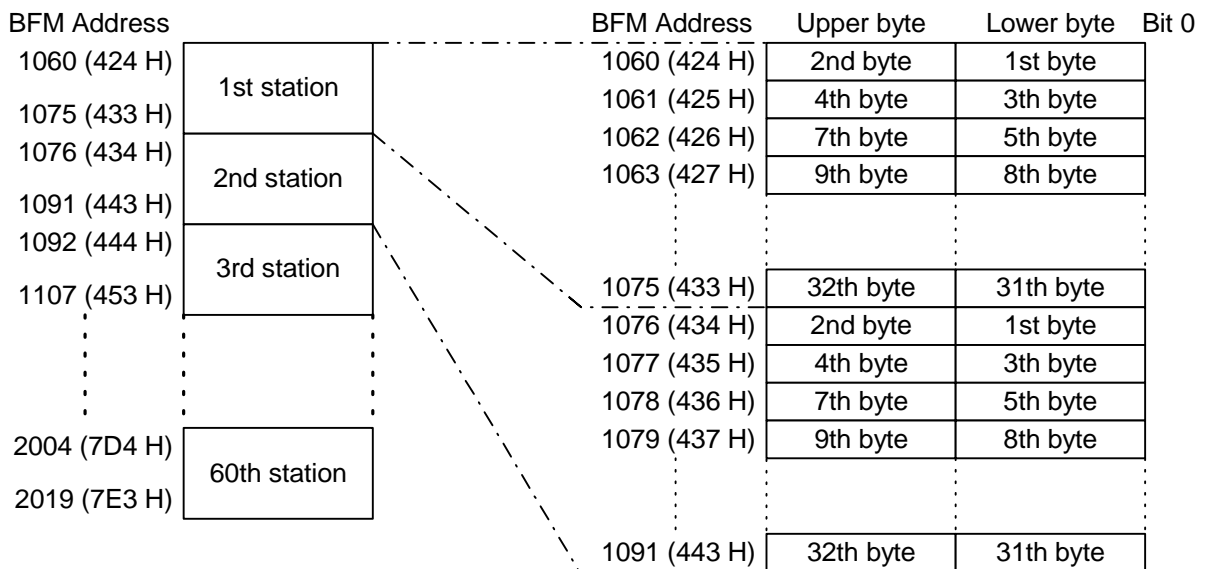
Note;

Appropriate initial data should be stored in the send buffer (Output Data Area <BFM #1060 ~ #2019>) before it begins to communicate.

4.16.1 Normal Service Mode <Mode Switch: 0>

This area is fixed to an allocation of 32 bytes (16 words) per station for input data of 60 stations. The configuration of output data area is as follows.

Figure 4.15:Output Data Area Using Normal Service Mode



Note;

If the output data of the slave is less than 32 byte, the output data area of this slave will have a free area. If output data of the slave is more than 32byte, the Extended Service Mode, will need to be used.



Note:

In the update of the data between 64DP-M and the slave, the consistency can usually be kept to only the units of 1 word. Therefore, 64DP-M has Slave Data Consistency Mode and Global Control Function. Refer to the table below for consistency of sending/receiving data and the relation of each function.

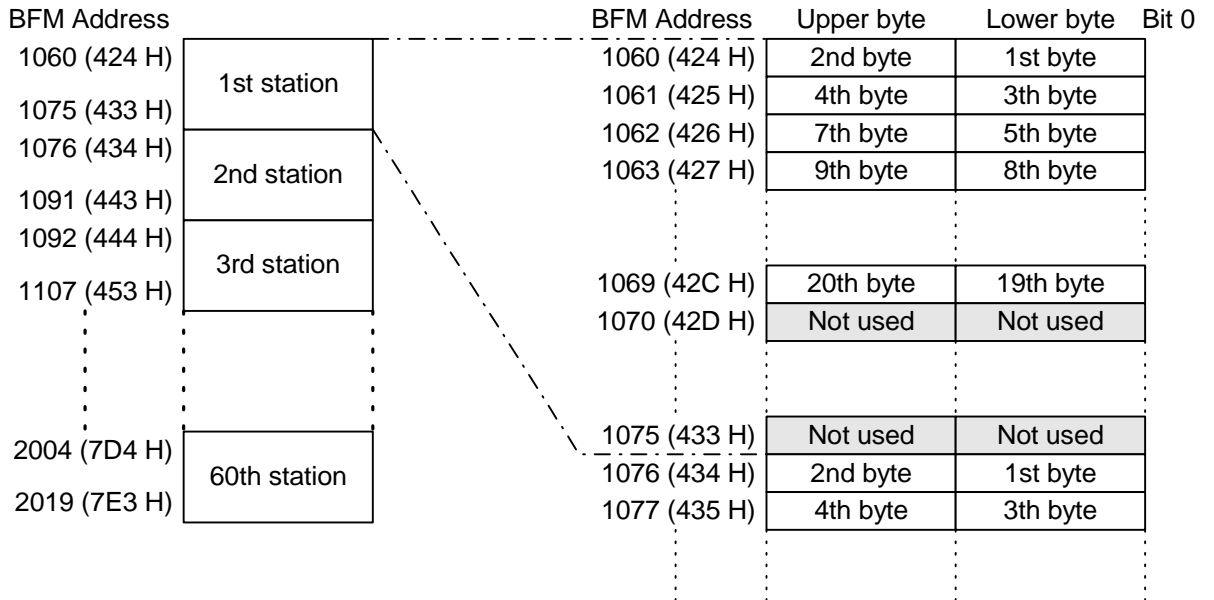
Table 4.16: Consistency of Exchanged Data

| Using Function | | Sending Data (To Slave) | Receiving Data (From Slave) |
|-----------------------------------|-------------------------------|-------------------------|-----------------------------|
| Using Slave Data Consistency Mode | Using Global Control Function | | |
| | | Single word data | |
| ✓ | | Multiple word data | Single word data |
| ✓ | ✓ | Slave data consistency | Slave data consistency |
| | ✓ | Single word data | Slave data consistency |

Example;

When the 1st station has 20 bytes for output data, the output data area of 1st station has free area of 21th ~ 32th byte. The value of this free area is "00" hex code.

Figure 4.16: Example of Output Data Area Using Normal Service Mode



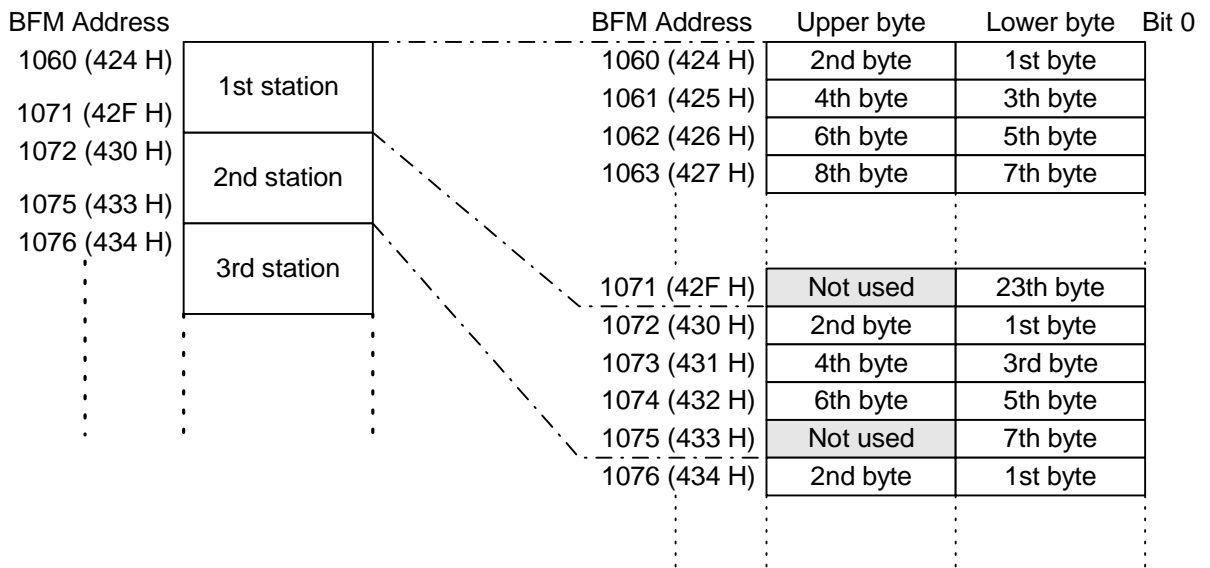
4.16.2 Extended Service Mode <Mode Switch: E>

This area is assigned in variable length according to the parameter file set in the configuration software (ProfiMap). The data length can be set in the range of 0 ~ 244 bytes. The number of stations that can be set will vary in the range of 1 ~ 60. However, this Output Data Area is 1920 bytes (32 bytes × 60 stations = 1920 bytes) for all slaves. The value of this free area is “00” hex code.

Example;

An example is shown below where the output data length of the 1st station is 23 bytes and the output data length of the 2nd station is 7 bytes.

Figure 4.17: Example of Output Data Area Using Extended Service Mode



Note;

- When the data length is an odd number of bytes, the last upper byte becomes a free area as the 1st byte of the station data needs to be assigned as a lower byte, and data for the next station is assigned from the next address.
- When the data length is 0 byte, the output data area for this station will not be in the Output Data Area buffer memory.

4.17 Address Information Area <BFM #2020 ~ #2139> (Read Only)

This Address Information Area buffer memory can check that the slave address number, the input data bytes length and the output data length of all slaves is assigned by the configuration software (ProfiMap). The Address Information Area assign as follows.

The station number is not the slave address number. Therefore, the setting range of slave address number is 1 ~ 126. Slave addresses do not need to be sequential numbers.

Figure 4.18:Address Information Area

| BFM Address | Bit 15 | Upper byte | Lower byte | Bit 0 |
|--------------|---------------------------------|------------|--------------------------------|-------|
| 2020 (7E4 H) | Slave address of 1st station | | | |
| 2021 (7E5 H) | 1st station output byte length | | 1st station input byte length | |
| 2022 (7E6 H) | Slave address of 2nd station | | | |
| 2023 (7E7 H) | 2nd station output byte length | | 2nd station input byte length | |
| ⋮ | ⋮ | | | |
| 2138 (85A H) | Slave address of 60th station | | | |
| 2139 (85B H) | 60th station output byte length | | 60th station input byte length | |



Note;

Any station address that is not assigned by the configuration software (ProfiMap) is assigned “FFFF” hex code, the input or output byte length is “FF” hex code.

Example;

When using the Extended Service Mode, the relation among the Address Information Area (BFM #2020 ~ #2139), Input Data Area (BFM #100 ~ #1059) and Output Data Area (BFM #1060 ~ #2019) is as follows.

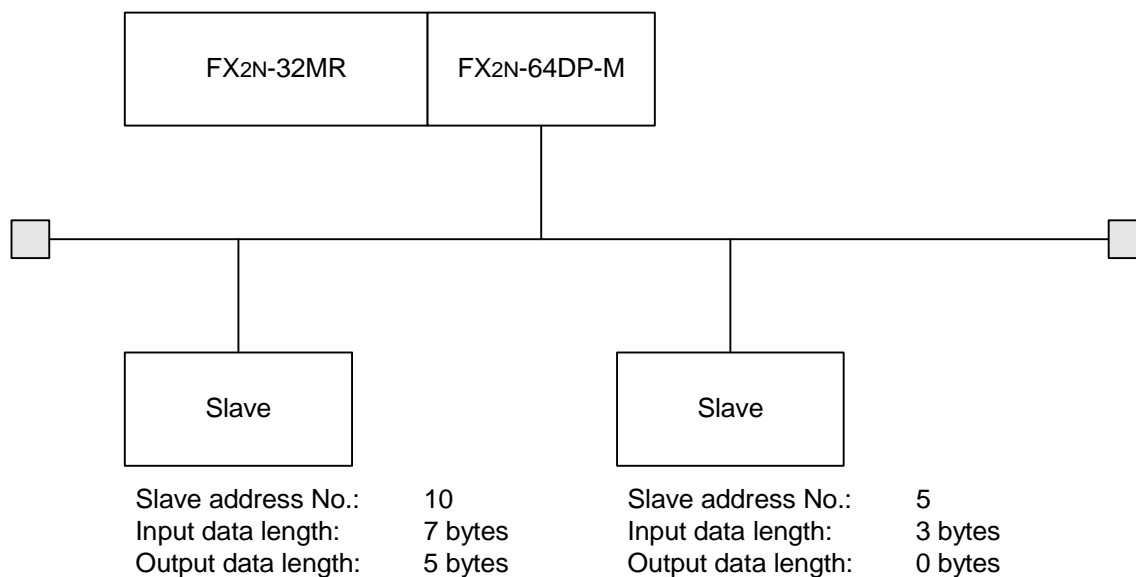
Figure 4.19:Example of Address Information Area

| BFM Address | Bit 15 | Upper byte | Lower byte | Bit 0 |
|--------------|--|------------|---------------------------------------|-------|
| 2020 (7E4 H) | Slave address of 1st station = 5 H | | | |
| 2021 (7E5 H) | 1st station output byte length = 0 | | 1st station input byte length =3 | |
| 2022 (7E6 H) | Slave address of 2nd station = 10 H | | | |
| 2023 (7E7 H) | 2nd station output byte length = 5 H | | 2nd station input byte length = 7 H | |
| 2024 (7E8 H) | Slave address of 3rd station = FFFF H | | | |
| 2025 (7E9 H) | 3rd station output byte length = FF H | | 3rd station input byte length =FF H | |
| ⋮ | ⋮ | | | |
| 2138 (85A H) | Slave address of 60th station = FFFF H | | | |
| 2139 (85B H) | 60th station output byte length = FF H | | 60th station input byte length = FF H | |

Figure 4.20: Input Data Area and Output Data Area

| BFM Address | | BFM Address | | Upper byte | Lower byte | Bit 0 |
|----------------------------------|--|--------------|--|------------|------------|-------|
| 100 (064 H) | 1st station | 100 (064 H) | | 2nd byte | 1st byte | |
| 101 (065 H) | | 101 (065 H) | | Not used | 3th byte | |
| 102 (066 H) | 2nd station | 102 (066 H) | | 2nd byte | 1st byte | |
| 105 (069 H) | | 103 (067 H) | | 4th byte | 3rd byte | |
| 106 (06A H) | This area is not used in this system configuration | 104 (068 H) | | 6th byte | 5th byte | |
| | | 105 (069 H) | | Not used | 7th byte | |
| | | 106 (06A H) | | Not used | Not used | |
| | | 107 (06B H) | | Not used | Not used | |
| 1059 (423 H) | 1st station | 1059 (423 H) | | Not used | Not used | |
| This slave does not have output. | | 1060 (424 H) | | 2nd byte | 1st byte | |
| 1060 (424 H) | 2nd station | 1061 (425 H) | | 4th byte | 3th byte | |
| 1062 (426 H) | | 1062 (426 H) | | Not used | 5th byte | |
| 1063 (427 H) | This area is not used in this system configuration | 1063 (427 H) | | Not used | Not used | |
| | | 1064 (428 H) | | Not used | Not used | |
| 2019 (7E3 H) | | 2019 (7E3 H) | | Not used | Not used | |

Figure 4.21: System configuration of Example



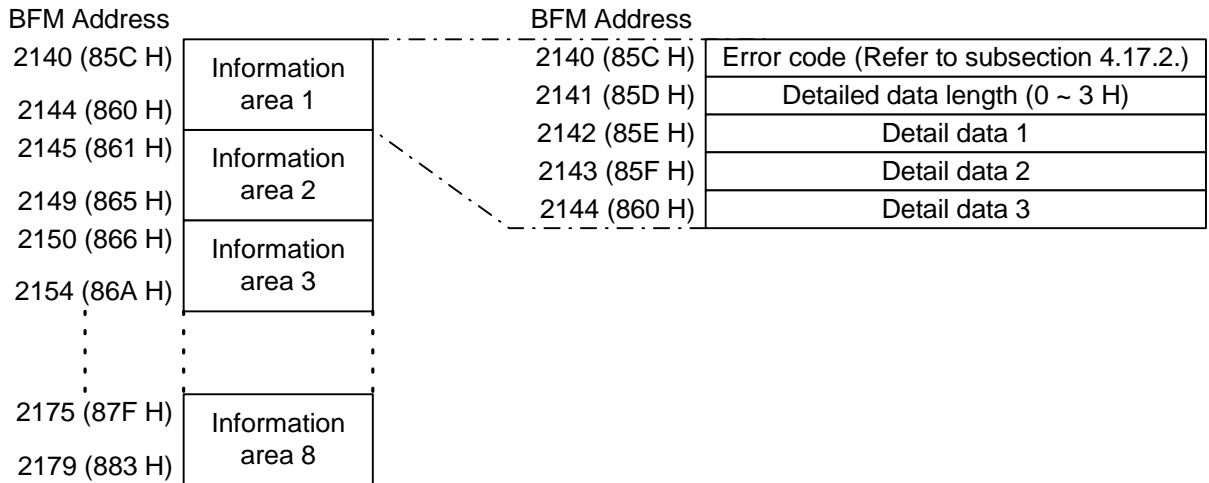
4.18 Communication Trouble Area <BFM #2140 ~ #2179> (Read Only)

This Communication trouble area can check the Diagnostic Information of a slave when a communication error occurs on the DP-network (in this case, the Communication Trouble Detection flag (BFM #0 Bit 1) will be ON.). When some kind of error occurs on the DP-network, Diagnostic Information is stored in this area. It contains the Error Code, Detailed Data Length and Detailed Data. The method storing is 2 type, Ring Type and Fixed Type. These 2 types can be chosen by the Communication trouble Area Type Selection flag (BFM #2 Bit 3) turned ON or OFF. When this flag is turned ON, Fixed Type is chosen. When this flag is turned OFF, Ring Type is chosen.

Regardless of the storage method (Fixed Type or Ring Type), up to 8 sets of Diagnostic Information can be stored in this area. The area can be cleared by turning ON the Communication Trouble Area Clear Request flag (BFM #2 Bit 2). This area is assigned as follows.

For the Communication Trouble Detection flag, refer to section 4.2. For the Communication Trouble Area Clear Request flag, refer to section 4.3.

Figure 4.22: Communication Trouble Area configuration

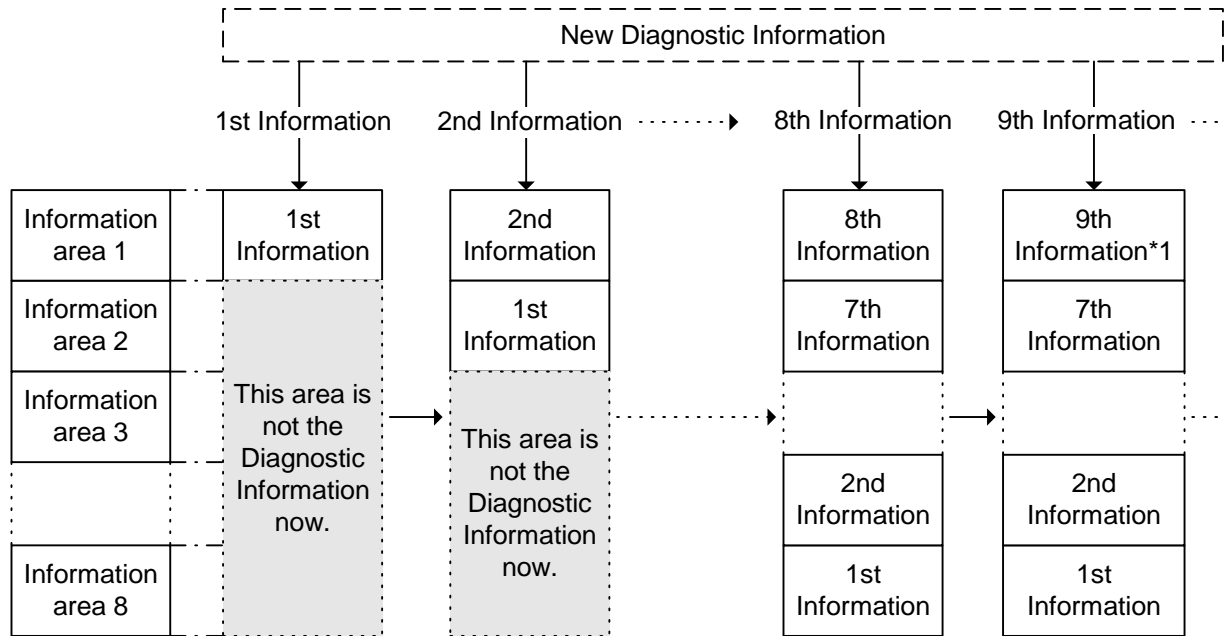


4.18.1 Fixed Type and Ring Type methods

With Fixed type, when 8 pieces of Diagnostic Information are stored, areas 2 to 8 are fixed, so when the next new diagnostic communication occurs only header area 1 is updated. Refer to Figure 4.23.

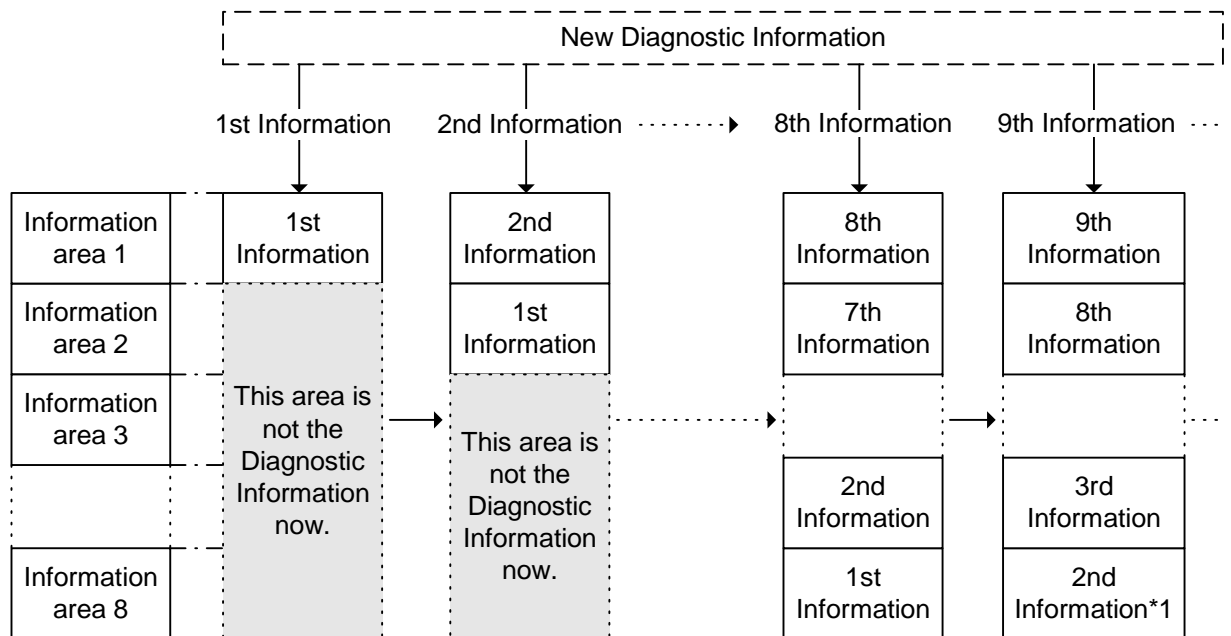
Ring type is stored in order from the header, with the header always being the last Diagnostic Information. Refer to Figure 4.24

Figure 4.23: The Fixed Type



*1 This Diagnostic Information is discarded.

Figure 4.24: The Ring Type



*1 This Diagnostic Information is discarded.

4.18.2 Error codes

Error codes are shown in the following table.

Table 4.17: Error Codes in the Diagnostic Information

| Error code | Data length | Detailed Data | | | Communication Status | Further Information |
|------------|-------------|---------------|--------|--------|---|---------------------|
| | | Data 1 | Data 2 | Data 3 | | |
| 0200 H | 3 | Refer to 1) | | | Continues communication | Refer to 1) |
| 1121 H | 1 | 03 H | - | - | Stops communication after the error occurs. | Refer to 2) |
| 1300 H | 2 | Refer to 3) | | - | | Refer to 3) |
| 3000 H | 1 | Ignored | - | - | | Refer to 4) |

1) Error code: 0200 H

When this error occurs, configuration of the Diagnostic Information assigns following figure 4.25.

In addition, the Expansion Diagnostic Information is stored in the Expansion communication Trouble Area <BFM #2196 ~ #2210> for only the latest the Diagnostic Information of the error code = 0200 H.

Figure 4.25: Configuration of the Diagnostic Information Occurring 0200 H Error Code

| | |
|----------------------------|--|
| Error Code = 0200 H | |
| Detailed data length = 3 H | |
| Detail Data 1 | Master Address *1 (hex code) Slave Address *2 (hex code) |
| Detail Data 2 | Diagnostic Status (Refer to Table 4.14.) *3 (hex code) |
| Detail Data 3 | Slave ID *4 (hex code) |

*1 The address of the master that controls the slave in which this Diagnostic Information occurred is stored.

However, FF H is stored when the Diagnostic Information shows that communication to the slave is failed.

*2 The address of the slave in which this Diagnostic Information occurred is stored.

*3 This diagnostic status is assigned as follows table 4.16.

*4 The NPO ID code of the slave is stored.

However, FF H is stored when the Diagnostic Information shows that communication to the slave is failed.

Table 4.18: Diagnostic Bit Status

| Bit No. | Name | Description and Check points | Setting Station |
|---------|---|---|-----------------|
| Bit 0 | Parameter allocation request | Master parameter allocation request from slave. This diagnostic information will always occur at exchange start, so it can be ignored. If this diagnostic information occurs during exchange, check the slave status and communication line. | slave |
| Bit 1 | Slave status error | Master diagnostic data read request from slave. If this bit is ON, check the slave status. | slave |
| Bit 2 | Not used (This bit is OFF.) | | |
| Bit 3 | WDT monitoring | Watchdog monitoring is being conducted in the slave. (normal operation) | slave |
| Bit 4 | FREEZE mode | This slave in FREEZE mode. (normal operation) | slave |
| Bit 5 | SYNC mode | This slave in SYNC mode. (normal operation) | slave |
| Bit 6 | Not used (This bit is OFF.) | | |
| Bit 7 | The cyclic communication stop | The cyclic communication for this module was separated by the parameter setting. This diagnostic information will always occur at exchange start, so it can be ignored. If this bit is ON, check the parameter on the DP-network was changed by class 2 master. | Master |
| Bit 8 | No comms with slave | Master can not communicate with slave. Check the slave status and communication circuit. And check the parameter. | Master |
| Bit 9 | Slave not ready | The slave is not ready to exchange. This diagnostic status will always occur at exchange start, check the slave status and communication circuit. | slave |
| Bit 10 | Parameter mis-match | The parameter received for byte length of Input/Output from the master does not match that of the slave. Check the slave parameter. | slave |
| Bit 11 | Expansion Diagnostic Information received | Expansion Diagnostic Information received. | Master |
| Bit 12 | Not support function | The function requested by the master is not supported in the slave. | slave |
| Bit 13 | Incorrect slave data | Data from the slave is incorrect. | Master |
| Bit 14 | Incorrect parameter | The parameter transmitted to this slave by the master is incorrect. | slave |
| Bit 15 | Multiple master comms | This slave is controlled by another master. | Master |

2) Error code: 1121 H

This error means that the slave address specified in the parameter is the same as that of the master.

This error occurs immediately after the power supply is turned ON or the 64DP-M is reset. Even though this error is occurring, if the Exchange Start Request (BFM #2 Bit 0) is ON then error code 3000h will occur, the FAULT LED will turn ON and operation will stop.

**Check Point**

Check the slave address and master address. If these are same address, set these address correctly.

3) Error code: 1300 H

This error means that no active slaves are set in the parameter. When this error occurs the detailed data is set number of slaves set in the parameter to the detailed data 1.

This error occurs immediately after the power supply is turned ON or the 64DP-M is reset. Even though this error is occurring, if the Exchange Start Request(BFM2:b0) is on then error 3000h will occur, the FAULT LED will turn ON, and operation will stop.

**Check Points**

a) Set 1 or more active slave in the parameter.

b) When the FAULT LED is turned on, reset by turning OFF → ON → OFF the BFM #0 Bit 13 for (a) above.

4) Error code: 1302 H

This error means that the capacity of the parameter area is insufficient.

This error occurs immediately after the power supply is turned ON or the 64DP-M is reset. When this error has occurred, the FAULT LED will turn ON, and operation will stop.

**Check Points**

Check capacity of the parameter area and expansion diagnostic information data length. Please, decrease the number of slaves or change slave's type.

For expansion diagnostic information data length, refer to the either Note on subsection 4.18.1 or Note on subsection 1.3.1.

5) Error code: 3000 H

This error means that 64DP-M had an error code of 1300H or 1121H, or has an unexpected error.

When this error has occurred, the FAULT LED will turn ON, and operation will stop.

**Check Points**

a) When the above error 1300 H or 1121 H had occurred, refer to the individual error codes (subsection 4.17.3. 2), 3)).

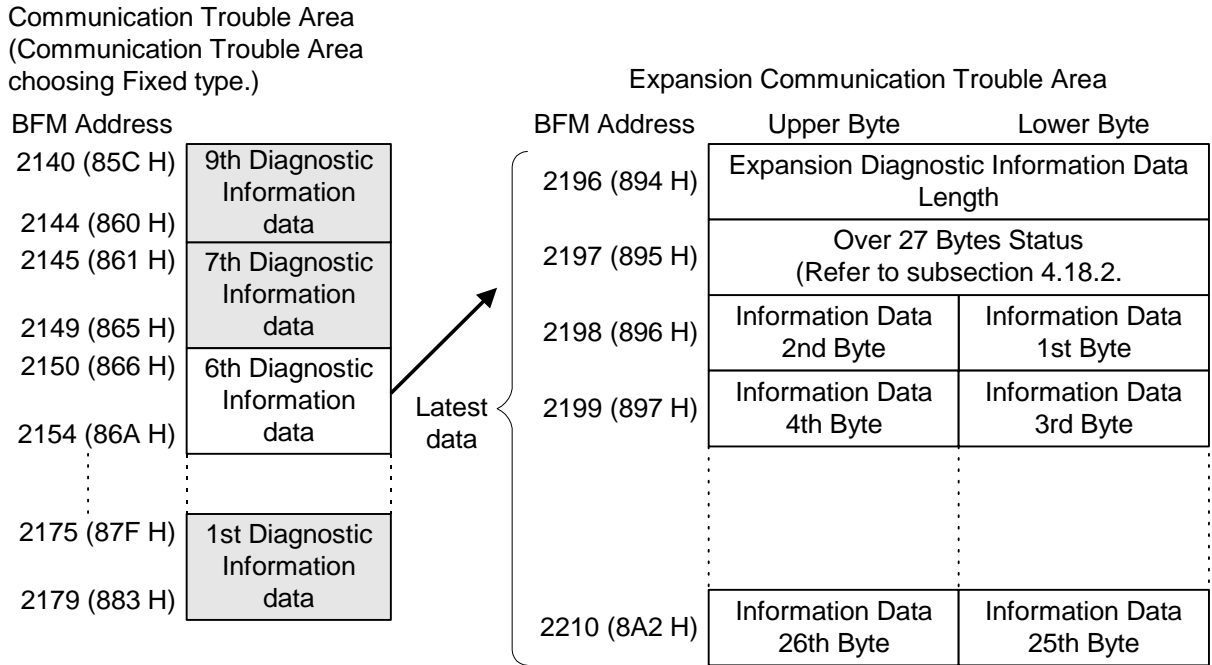
b) Otherwise


An unexpected error has occurred. In this case, please contact a service representative.


4.19 Expansion Communication Trouble Area <BFM #2196 ~ #2210> (Read Only)

The Expansion Communication Trouble Area shows only the latest Expansion Diagnostic Information in error code 0200 H. For Communication Trouble Information Area, refer to section 4.17. For Error code 0200 H, refer to 4.17.2.

Figure 4.26:Expansion Communication Trouble Area



 : This Information does not have the Expansion Diagnostic Information, when Error Code ≠ 0200 H, or Diagnostic status Bit 11 is OFF when Error Code = 0200 H

 : This Information has the Expansion Diagnostic Information, when Diagnostic status Bit 11 is ON when Error Code = 0200 H

4.19.1 BFM #2196

The latest Expansion Diagnostic Information stored from BFM #2198 is stored as a byte length unit in BFM #2196.

Figure 4.27:Expansion Diagnostic Information Data Length in BFM #2196

| BFM Address | Upper Byte | Lower Byte |
|--------------|---|----------------------------|
| 2196 (894 H) | Expansion Diagnostic Information Data Length = 21 (bytes) | |
| 2197 (895 H) | Over 27 Bytes Status = OFF (Bit 7 = OFF) | |
| 2198 (896 H) | Information Data 2nd Byte | Information Data 1st Byte |
| 2199 (897 H) | Information Data 4th Byte | Information Data 3rd Byte |
| | | |
| 2208 (8A0 H) | Free Area | Information Data 21th Byte |
| 2209 (8A1 H) | Free Area | Free Area |
| 2210 (8A2 H) | Free Area | Free Area |



Note;

When using a slave with expansion diagnostic information of more than 32 bytes, the network will be limited. Maximum expansion diagnostic information data length is the smaller of the value obtained from a slave address by the following equation or 244 bytes.

$$\begin{aligned} \text{Maximum expansion diagnostic information data length (bytes)} \\ = [12600 \div N^{*1} - 10] \text{ or } [244] \end{aligned}$$

*1 The value of N is the smaller of the value obtained by the following equation or 300.

$$N = [(\text{Max. slave address value} - \text{Min. slave address value} + 1) \times 5] \text{ or } [300]$$



It is not possible to communicate normally with the slave when the maximum diagnosis information data length (Max_Diag_Data_Len) has been decided by the slave's GSD file is larger than the value obtained by the above expression.

In this case, please try the following things.

- 1) Make the slave address consecutive number if possible.
- 2) Change setting so that this value may become small if the maximum diagnosis information data length on the slave side can be set.
- 3) Reduce connected number of the slave.

4.19.2 BFM #2197

Only Bit 7 is valid in BFM #2197. Other bits always are turned OFF (0). Bit 7 is turned ON when the slave sends Expansion Diagnostic Information of 27 bytes or more.

4.19.3 BFM #2198 ~ #2210

The following information is stored in this area:

- Device related diagnostic information
This stores the slave module inherent diagnostic information that is not set by the Profibus-DP standards.
- Identifier related diagnostic information
For slave modules, whether or not a module error has occurred is stored as bit information.
- Channel related diagnostic information
For slave modules, this area stores the diagnostic information for each module that is outputting an error.

For individual information, refer to 4.18.3 1), 2), 3).

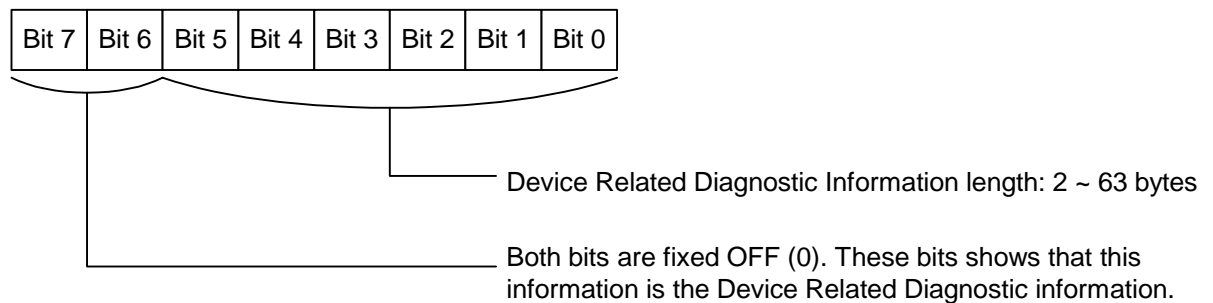
1) Device related diagnostic information

This stores the slave module inherent diagnostic information that is not set by the Profibus-DP standards. The device related diagnostic information can be divided to header and diagnostic information. Please see Figure 4.29 for the constitution of the header byte.

Figure 4.28: Device Related Diagnostic Information

| BFM Address | Upper Byte | Lower Byte |
|--------------|-----------------------------|-----------------------------|
| 2198 (896 H) | Information Data (2nd Byte) | Header (1st byte) |
| 2199 (897 H) | Information Data (4th Byte) | Information Data (3rd Byte) |
| | | |
| | | |

Figure 4.29: Header Byte for Device Related Diagnostic Information



- 2) Identifier related diagnostic information
 For slave modules, whether or not a module error has occurred is stored as bit information. The identifier related diagnostic information can be divided to header and diagnostic information. Please see Figure 4.30 for the constitution of the header byte and Figure 4.31 for the constitution of the diagnostic information.
 For identifier number, refer to subsection 4.18.3 4)

Figure 4.30: Identifier Related Diagnostic Information

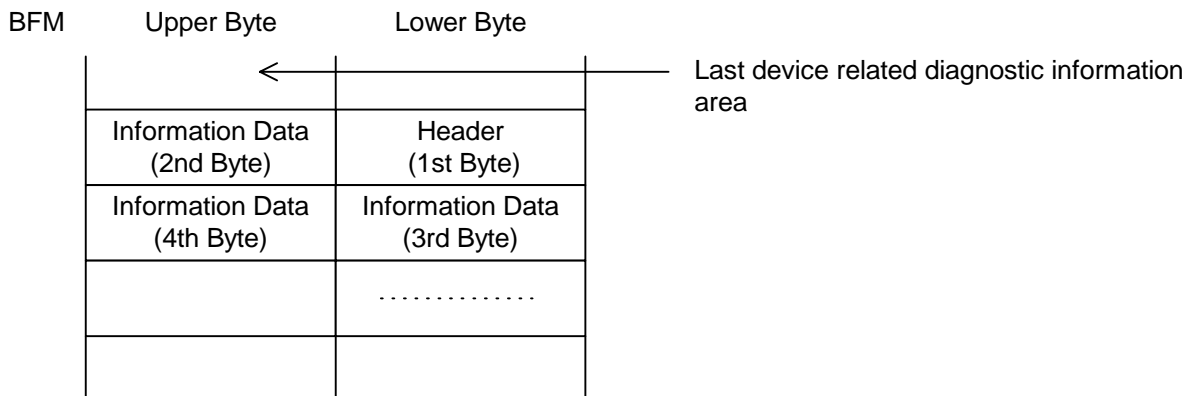


Figure 4.31: Header Byte for Identifier related Diagnostic Information

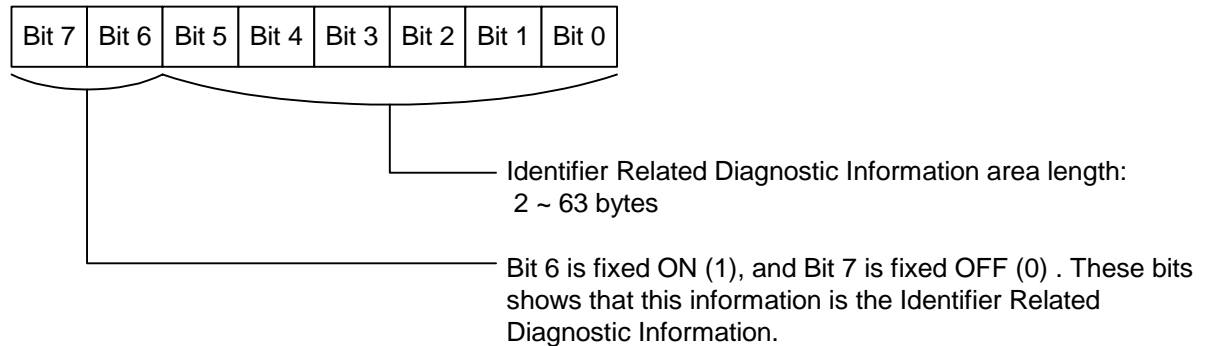
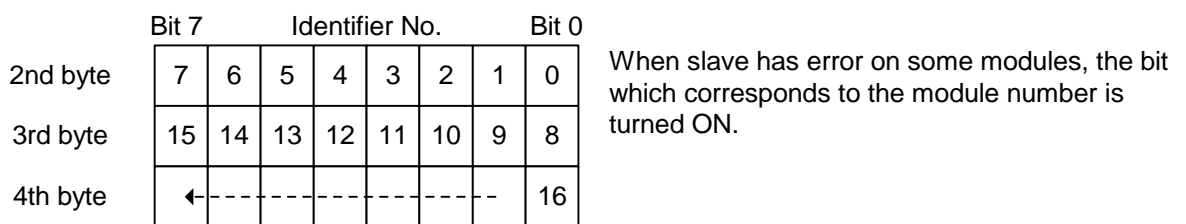


Figure 4.32: Diagnostic Information Data Byte



3) Channel related diagnostic information

For slave modules, this area stores the Diagnostic Information for each module that is outputting an error. This area does not have a header and stores this information at the end of the identifier related diagnostic information. Each channel of diagnostic information consists of an identifier number, channel number, and error status of 3 bytes. For identifier number and channel number, refer to subsection 4.18.3 4).

Figure 4.33: Channel Related Diagnostic Information

| BFM | Upper Byte | Lower Byte |
|-----|---|---|
| | Last identifier related diagnostic information area | |
| | 2nd byte of 1st channel related diagnostic information (Channel No.) | 1st byte of 1st channel related diagnostic information (Identifier No.) |
| | 1st byte of 2nd channel related diagnostic information (Identifier No.) | 3rd byte of 1st channel related diagnostic information (Error status) |
| | 3rd byte of 2nd channel related diagnostic information (Error status) | 2nd byte of 2nd channel related diagnostic information (Channel No.) |
| | | 1st byte of 3rd channel related diagnostic information (Identifier No.) |

Figure 4.34: Identifier Number (First Byte Data)

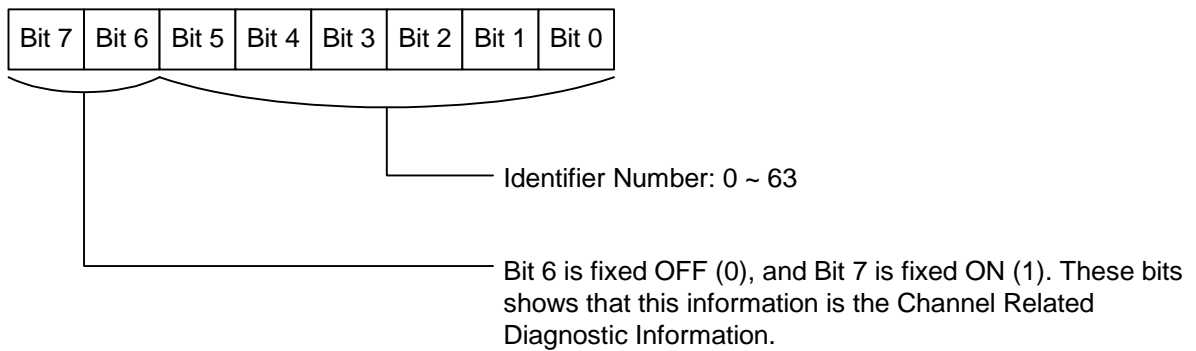


Figure 4.35: Channel Number (Second Byte Data)

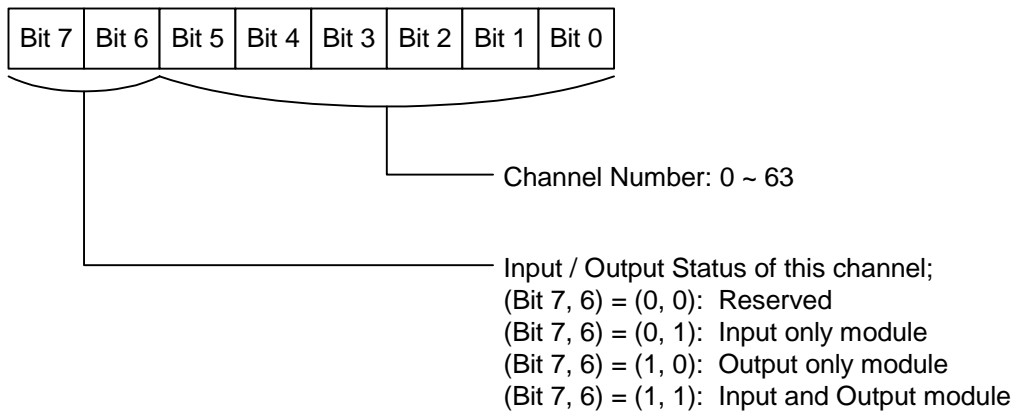
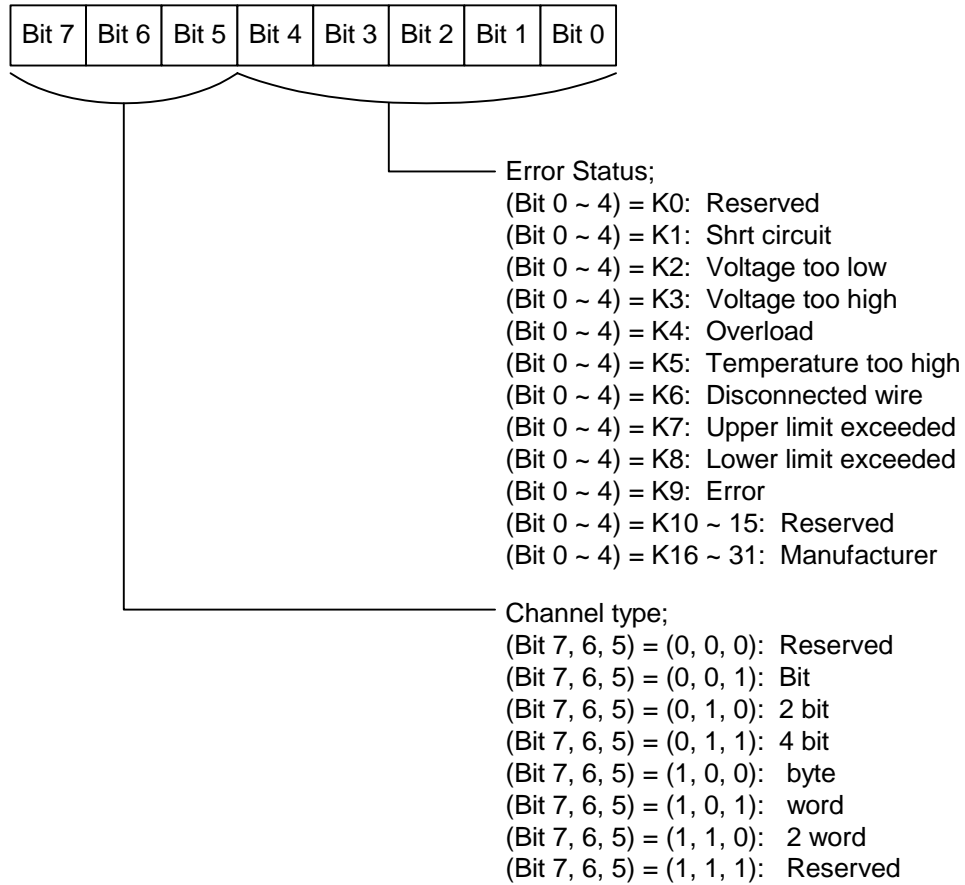


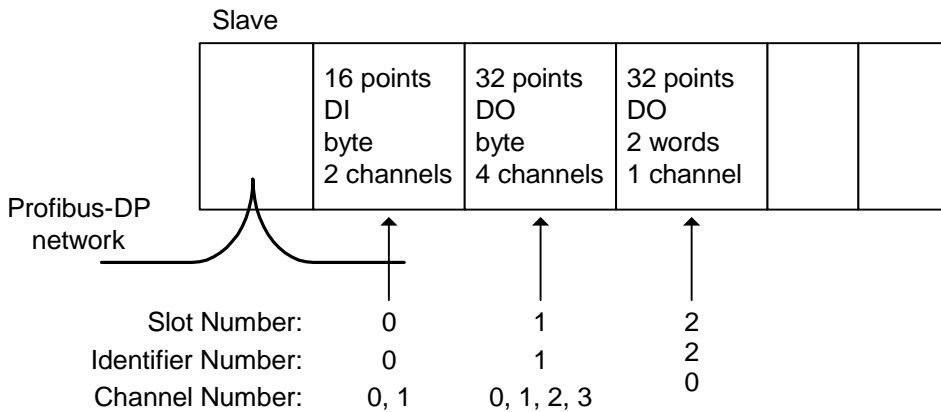
Figure 4.36: Error Status (Third Byte Data)



4) Identifier Number and Channel Number

The identifier number is that which is attached from the header of each slave module. Each module can have multiple channels as in Figure 4.37. For the channel numbering method, refer to the manual of each slave.

Figure 4.37: Identifier Number and Channel Number



4.19.4 Example of the Expansion Communication Trouble Area

Figure 4.38: Example of the Expansion Communication Trouble Area

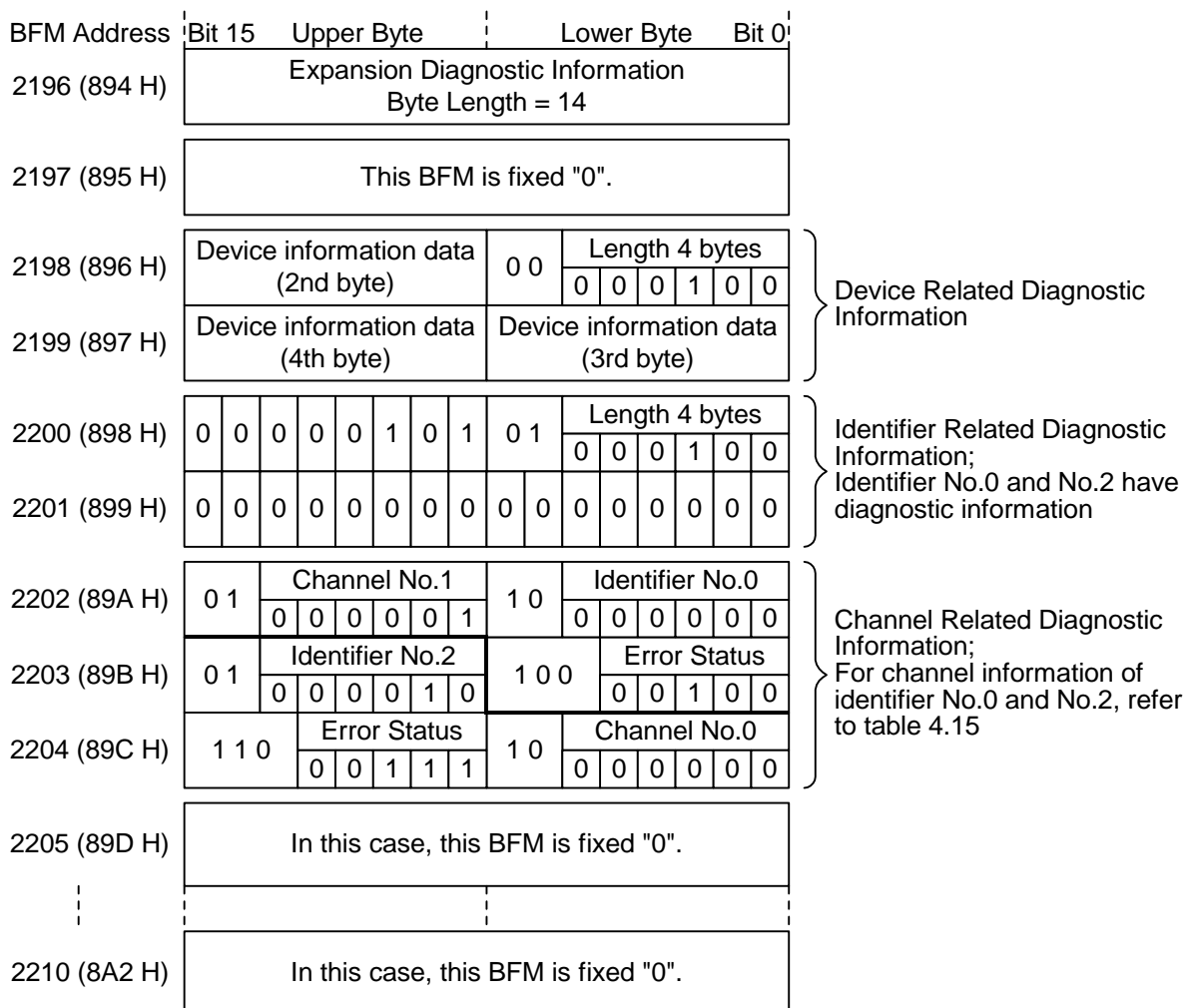
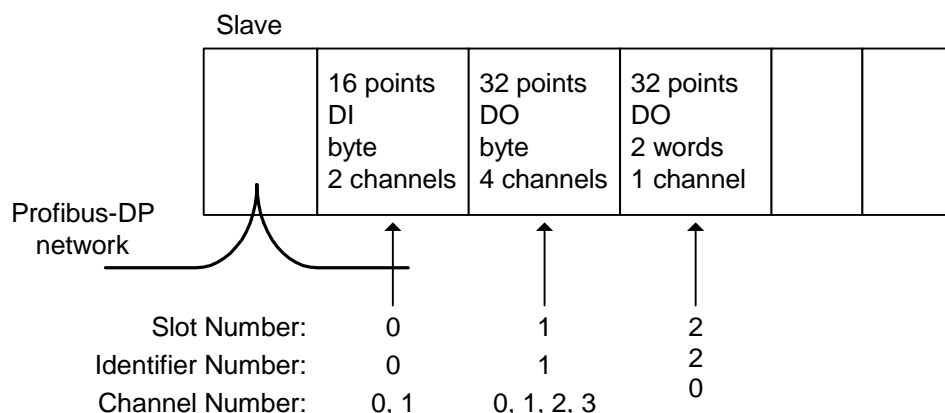


Table 4.19: Example of channel related diagnostic information

| Identifier No. | Channel No. | Input/Output Status | Channel Type | Error Status |
|----------------|-------------|---------------------|--------------|------------------------|
| No.0 | No.1 | Input | Byte | Overload |
| No.2 | No.0 | Output | 2 words | Upper limited exceeded |

Figure 4.39: Example Identifier Number and Channel Number



4.20 Slave Diagnostic Status Cancel <BFM #2180> (Read / Write)

This stores the value that masks the slave Diagnostic status (error code = 0200 H detailed data 2). Even if the slave diagnostic status corresponding to this area bit occurs the Communication Trouble Detection flag (BFM #0 Bit 1) and RSP ERR LED does not turn ON. In addition, the diagnostic information is not stored in the Communication Trouble Area (BFM #2140 ~ #2179). The default value is 02B9 H.

For the Diagnostic Status of further information, refer to 4.17.2.



Note;

This 02B9 H diagnostic information also occurs during normal situation and is masked. This value can only be changed when Exchange Start Request flag (BFM #2 Bit 0) is OFF. If this flag is turned ON, changes are ignored.

Figure 4.40: Slave Diagnostic Status Channel Area

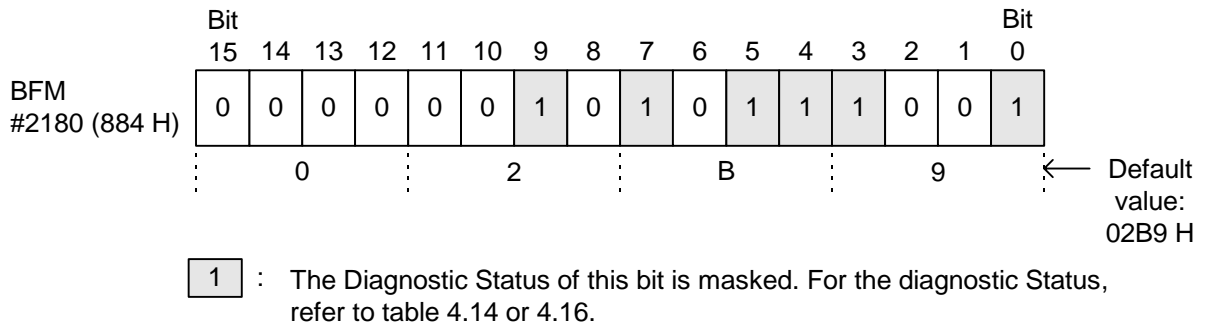


Table 4.20: Diagnostic Status

| Bit No. | Name |
|---------|-------------------------------|
| 0 | Parameter allocation request |
| 1 | Slave status error |
| 2 | Not used (This bit is OFF.) |
| 3 | WDT monitoring |
| 4 | FREEZE mode |
| 5 | SYNC mode |
| 6 | Not used (This bit is OFF.) |
| 7 | The cyclic communication stop |

| Bit No. | Name |
|---------|---|
| 8 | No comms with slave |
| 9 | Slave not ready |
| 10 | Parameter mis-match |
| 11 | Expansion Diagnostic Information received |
| 12 | Not support function |
| 13 | Incorrect slave data |
| 14 | Incorrect parameter |
| 15 | Multiple master comms |

4.21 Global Control Area <BFM #2181> (Read / Write)

Global control contains 4 functions, SYNC, UNSYNC, FREEZE, and UNFREEZE. These are functions used to maintain/cancel slave I/O for which multicast communication is conducted at the same time.

Each slave which executes a global control function belongs to 1 or more groups among 8 groups. The number of the group containing the slaves is set by the configuration software. In the 64DP-M the group can be arbitrary specified and the global control commands transmitted using multicast communication. As a result, the 64DP-M selects the slave, and it is possible to conduct the global control.

The global control function is executed using the Communication Status flag (BFM #0, #1), the Communication Control flag (BFM #2) and the Global Control Area (BFM #2181).

This section explains about the Global Control Area. The buffer memory assigned as follows can decide group and function for executing global control.

For further explanation of global control refer to chapter 5. For the Communication Status flag, refer to section 4.2. For the Communication Control flag, refer to section 4.3.

Table 4.21: Global Control Area

| Bit No. | Description | ON (1) | OFF (0) |
|-----------|-------------------------|---|---|
| Bit 0, 1 | Not used | | |
| Bit 2 ~ 5 | Global control commands | For global control command executed, refer to Table 4.22. | |
| Bit 6, 7 | Not used | | |
| Bit 8 *1 | Group 1 | This group executes global control command Bit 2 ~ 5. | This group does not execute global control command Bit 2 ~ 5. |
| Bit 9 *1 | Group 2 | | |
| Bit 10 *1 | Group 3 | | |
| Bit 11 *1 | Group 4 | | |
| Bit 12 *1 | Group 5 | | |
| Bit 13 *1 | Group 6 | | |
| Bit 14 *1 | Group 7 | | |
| bit 15 *1 | Group8 | | |

*1 when executing the global command, multiple groups can be chosen.

Table 4.22: Selecting Global Control command

| Bit No. | | | | Global Control Commands | | | |
|---------|-----------|-------|-----------|-------------------------|--------|--------|------|
| Bit 2 | Bit 3 | Bit 4 | Bit 5 | UNFREEZE | FREEZE | UNSYNC | SYNC |
| 0 | 0 | 0 | 0 | ✗ | ✗ | ✗ | ✗ |
| 1 | 1 or 0 *1 | 0 | 0 | ✓ | ✗ | ✗ | ✗ |
| 0 | 1 | 0 | 0 | ✗ | ✓ | ✗ | ✗ |
| 0 | 0 | 1 | 1 or 0 *1 | ✗ | ✗ | ✓ | ✗ |
| 0 | 0 | 0 | 1 | ✗ | ✗ | ✗ | ✓ |
| 1 | 1 or 0 *1 | 1 | 1 or 0 *1 | ✓ | ✗ | ✓ | ✗ |
| 0 | 1 | 1 | 1 or 0 *1 | ✗ | ✓ | ✓ | ✗ |
| 1 | 1 or 0 *1 | 0 | 1 | ✓ | ✗ | ✗ | ✓ |
| 0 | 1 | 0 | 1 | ✗ | ✓ | ✗ | ✓ |

✓: Execute, ✗: Not Execute

*1 The global control command from which either state is executed, is the same.

4.22 Information Dwell Time Setting <BFM #2184> (Read / Write)

The Information Dwell Time Setting buffer memory is used to set the time period where the Diagnostic Information is not received after the exchange start. The buffer memory is adjusted in one second steps. Default value is 20 (20 × 1 second = 20 second). The setting range is 1 ~ 30.



Note;

By this setting, when the master power supply ON is faster than the slave power supply ON etc., it is made not to detect a temporary error that occurs during starting up system.

4.23 Slave Status Area <BFM #2212 ~ #2216> (Read Only)

The Slave Status Area is used to check the status for communicating to each slaves. The communication status of all slaves can be checked by BFM #2212 value. If BFM #2212 value is “K0”, all slaves are normal status. If the BFM’s value is “K1”, all slaves are faulty. This faulty slave can be checked by viewing each bit status in BFM #2213 ~ #2216. When 64DP-M has faultily slave, the bit which corresponds to the faultily slave state is turned ON by 64DP-M. Allocation of the input faultily is shown in the following table 4.21.

The Slave Status Area is allocated as follows.

Figure 4.41: Slave Status Area (BFM #2212 ~ #2216)

| | |
|--------------|---|
| BFM Address | |
| 2212 (8A4 H) | Communication status for all stations (value = K0, or K1) |
| 2213 (8A5 H) | Communication status for station No.1 ~ station No.60 (For allocation of bits, refer to Table 4.19.) |
| 2214 (8A6 H) | |
| 2215 (8A7 H) | |
| 2216 (8A8 H) | |

Table 4.23: Status of Each Slave (BFM #2213 ~ #2216)

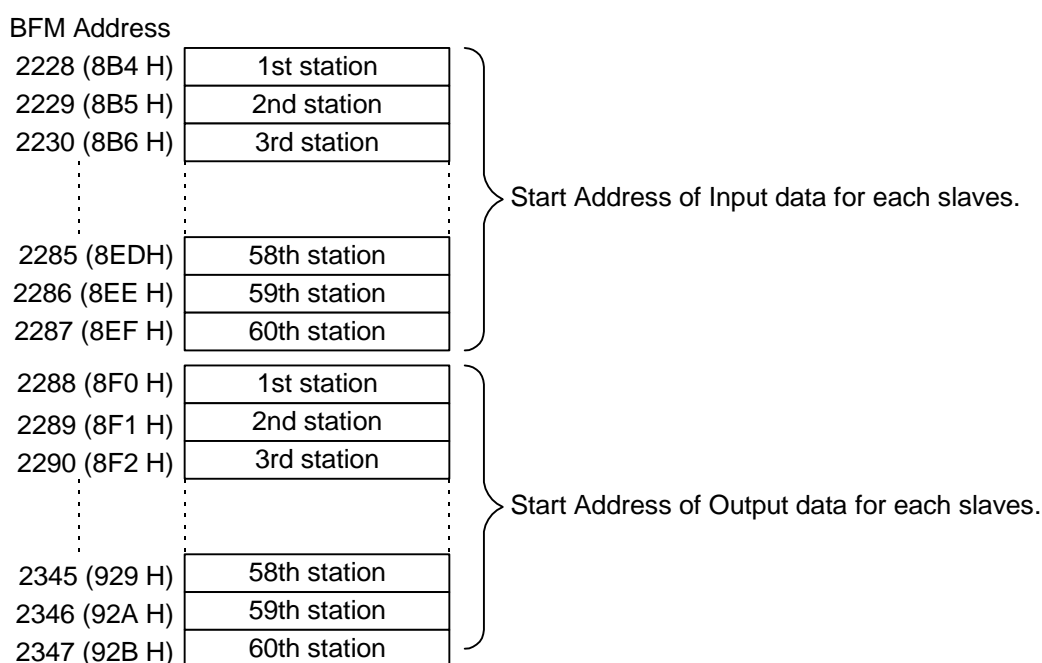
| BFM No. | Bit No. | Slave No. | |
|-------------|-----------|-----------|----|
| BFM #2213 | Bit 0 | 1 | |
| | Bit 1 | 2 | |
| | Bit 2 | 3 | |
| | ⋮ | | |
| | Bit 15 | 16 | |
| BFM #2214 | Bit 0 | 17 | |
| | Bit 1 | 18 | |
| | Bit 2 | 19 | |
| | ⋮ | ⋮ | |
| | ⋮ | ⋮ | |
| | Bit 15 | 32 | |
| BFM #2215 | Bit 0 | 33 | |
| | Bit 1 | 34 | |
| | Bit 2 | 35 | |
| | ⋮ | | |
| | ⋮ | | |
| | Bit 15 | 48 | |
| | BFM #2216 | Bit 0 | 49 |
| | | Bit 1 | 50 |
| Bit 2 | | 51 | |
| ⋮ | | ⋮ | |
| ⋮ | | ⋮ | |
| Bit 11 | | 60 | |
| Bit 12 ~ 15 | Not used | | |

4.24 Input / Output Start Address Area <BFM #2228 ~ #2347> (Extended Service Mode Only) <Read Only>

The Input / Output Start Address Area is used to check start address of input and output data for each slave. However, This value is effective when the extended service mode (ONLINE 2) is used. When the normal service mode (ONLINE 1) use, this value is "K 100" in all areas.

Data is set in this area during module startup according to the parameters stored in the 64DP-M. The start address is set in 1 word units for both input and output. The data range is from K100 ~ K2019. If nothing is assigned, K100 will be set.

Figure 4.42: Input / Output Start Address Area



Example;

Configuration is as follows.

Table 4.24: Example Configuration

| Station No. | Input Data Length | Output Data Length |
|------------------------------|-------------------|--------------------|
| Station No.1 (Address No.0) | 3 bytes | 5 bytes |
| Station No.2 (Address No. 2) | 6 bytes | 2 bytes |

Figure 4.43: Input / Output Start Address Area of Example (BFM #2228 ~ #2347)

| BFM Address | Content | Area |
|--------------|--|---------------------------|
| 2228 (8B4 H) | Input start address of 1st station is 100 (064 H). | Input start address area |
| 2229 (8B5 H) | Input start address of 2nd station is 102 (066 H). | |
| 2230 (8B6 H) | Input start address of 3rd station is 100 (064 H). | |
| ... | ... | |
| 2285 (8EDH) | Input start address of 58th station is 100 (064 H). | |
| 2286 (8EE H) | Input start address of 59th station is 100 (064 H). | |
| 2287 (8EF H) | Input start address of 60th station is 100 (064 H). | Output start address area |
| 2288 (8F0 H) | Output start address of 1st station is 1060 (424 H). | |
| 2289 (8F1 H) | Output start address of 2nd station is 1063 (427 H). | |
| 2290 (8F2 H) | Output start address of 3rd station is 100 (064 H). | |
| ... | ... | |
| 2345 (929 H) | Output start address of 58th station is 100 (064 H). | |
| 2346 (92A H) | Output start address of 59th station is 100 (064 H). | |
| 2347 (92B H) | Output start address of 60th station is 100 (064 H). | |

Figure 4.44: Input Data Area and Output Data Area of Example (BFM #100 ~ #2019)

| BFM Address | Upper byte | Lower byte | Area |
|--------------|-------------------------|-------------------------|------------------|
| 100 (064 H) | 2nd byte of 1st station | 1st byte of 1st station | Input Data Area |
| 101 (065 H) | Free area | 3rd byte of 1st station | |
| 102 (066 H) | 2nd byte of 2nd station | 1st byte of 2nd station | |
| 103 (067 H) | 4th byte of 2nd station | 3rd byte of 2nd station | |
| 104 (068 H) | 6th byte of 2nd station | 5th byte of 2nd station | |
| 105 (069 H) | Free area | Free area | |
| ... | ... | ... | Output Data Area |
| 1059 (423 H) | Free area | Free area | |
| 1060 (424 H) | 2nd byte of 1st station | 1st byte of 1st station | |
| 1061 (425 H) | 4th byte of 1st station | 3rd byte of 1st station | |
| 1062 (426 H) | Free area | 5th byte of 1st station | |
| 1063 (427 H) | 2nd byte of 2nd station | 1st byte of 2nd station | |
| 1064 (428 H) | Free area | Free area | Free area |
| ... | ... | ... | |
| 2019 (7E3 H) | Free area | Free area | |

MEMO

5. Global Control

The 64DP-M supports SYNC/UNSYNC and FREEZE/UNFREEZE global control service. The 64DP-M is normally set as UNSYNC and UNFREEZE in global control mode.

5.1 SYNC and UNSYNC Global Control

The SYNC/UNSYNC global control commands the output data communication from the master to the slave.

1) SYNC global control command

The output data to the slave which belongs to the group which is specified by BFM #2181 is made to freeze (not refresh output data). When the following SYNC/UNSYNC global control command is sent, output data to those slaves is updated.

2) UNSYNC global control command

SYNC global control mode of the slave which belongs to the group which specifies by BFM #2181 is released. Output data is updated by usual polling.



Note

When using SYNC global control command, output data (sending to slave) is not refreshed until next SYNC or UNSYNC global command is sent to the slave. That is, even if output (send) data to the slave writes new data in the output data area (BFM #1060 ~ #2019) by TO instructions, these are not refreshed until the following SYNC or UNSYNC global command is issued from the Profibus-DP in SYNC global control mode.

5.2 FREEZE and UNFREEZE Global Control

The FREEZE/UNFREEZE global control commands the input data communication from the slave to the master.

1) FREEZE global control command

The input data of the slave which belongs to the group which specifies by BFM #2181 is made to freeze (not refresh input data). When the following FREEZE/UNFREEZE global control command is sent, input data from those slaves is updated.

2) UNFREEZE global control command

FREEZE global control mode of the slave which belongs to the group which specifies by BFM #2181 is released. Input data is updated by usual polling.

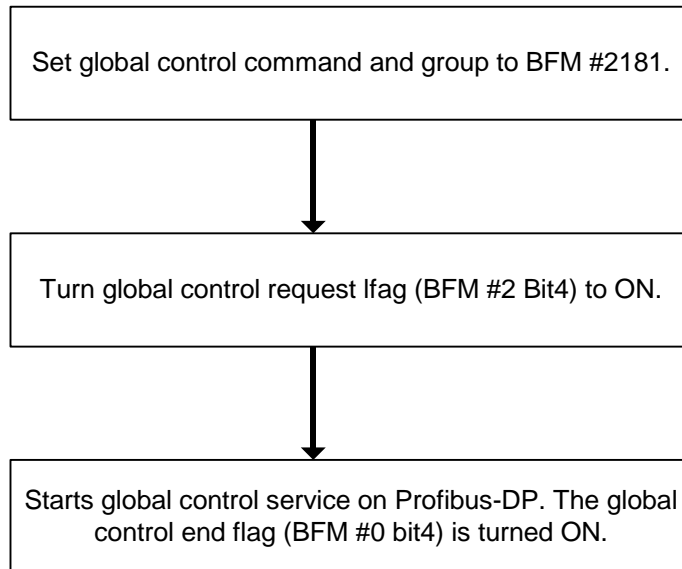


Note

When using FREEZE global control command, input data (receiving from slave) is not refreshed until next FREEZE or UNFREEZE global command is sent to the slave. That is, even if input (receive) data from the slave reads the input data area (BFM #1000 ~ #2019) by FROM instructions, these are not refreshed until the following FREEZE or UNFREEZE global command is issued from the Profibus-DP in FREEZE global control mode.

5.3 Global Control Service Process

Figure 5.1: Global Control Service Process



6. Mode and Displayed Station Address

6.1 Mode

The 64DP-M has 4 modes, decided by the mode setting switch. For setting instructions, refer to subsection 6.1.1.

Table 6.1: Mode

| Mode | Description |
|----------------------------------|--|
| ONLINE 1 (Normal service mode) | 64DP-M can exchange 32 bytes/slave. |
| ONLINE 2 (Extended service mode) | 64DP-M can exchange 244 byte/slave. |
| PRE SET (Parameter Setting mode) | This mode is used for setting the parameter. |
| TEST (Self diagnostic mode) | This mode is used for checking hardware of 64DP-M. For self test, refer to subsection 9.3. |

6.1.1 Mode Setting Switch

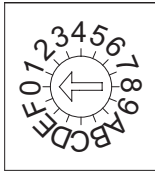
The mode is decided by the mode setting switch. Default setting is "0" (Online 1 mode).



Caution

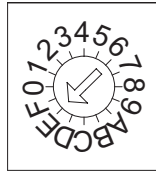
When changing the Mode, the power supply of the PLC and 64DP-M should be OFF.

Figure 6.1: Mode Switch



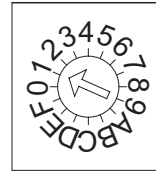
ONLINE 1

(Normal Service Mode)



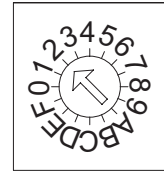
ONLINE 2

(Extended Service Mode)



PRE SET

(Parameter Setting Mode)



TEST

(Self Diagnostic Mode)

Table 6.2: Mode Switch

| Mode Switch Positions | Mode |
|-----------------------|----------------------------------|
| 0 | ONLINE 1 (Normal service mode) |
| 1 | PRE SET (Parameter Setting mode) |
| 2 | TEST (Self diagnostic mode) |
| E | ONLINE 2 (Extended service mode) |
| 3 ~ D, F | Not used |

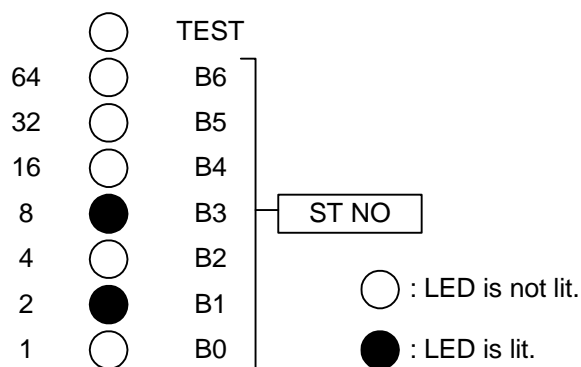
6.2 Displayed Station Address

The station address set by parameter is displayed by the STATION LEDs when 64DP-M is ONLINE 1 and ONLINE 2 mode. The station address is displayed by the STATION LED (B0-B6) in binary. The parameter is set by configuration software (ProfiMap). For the ProfiMap configuration software, please see the MELSEC ProfiMap Configuration System for Open Networks Software Manual.

Example

When station address is 10, display is as follows.

Figure 6.2: Example Displayed Station Address



7. Setting Parameters and Configuration

Use ProfiMap to set the parameters and configuration for Profibus-DP. For information on ProfiMap refer to the ProfiMap manual.

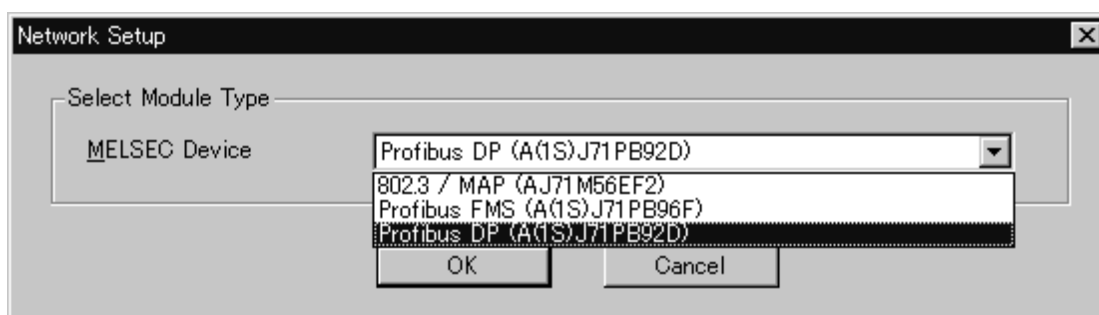
For example setting of parameter and configuration, refer to section 8.3.



Note

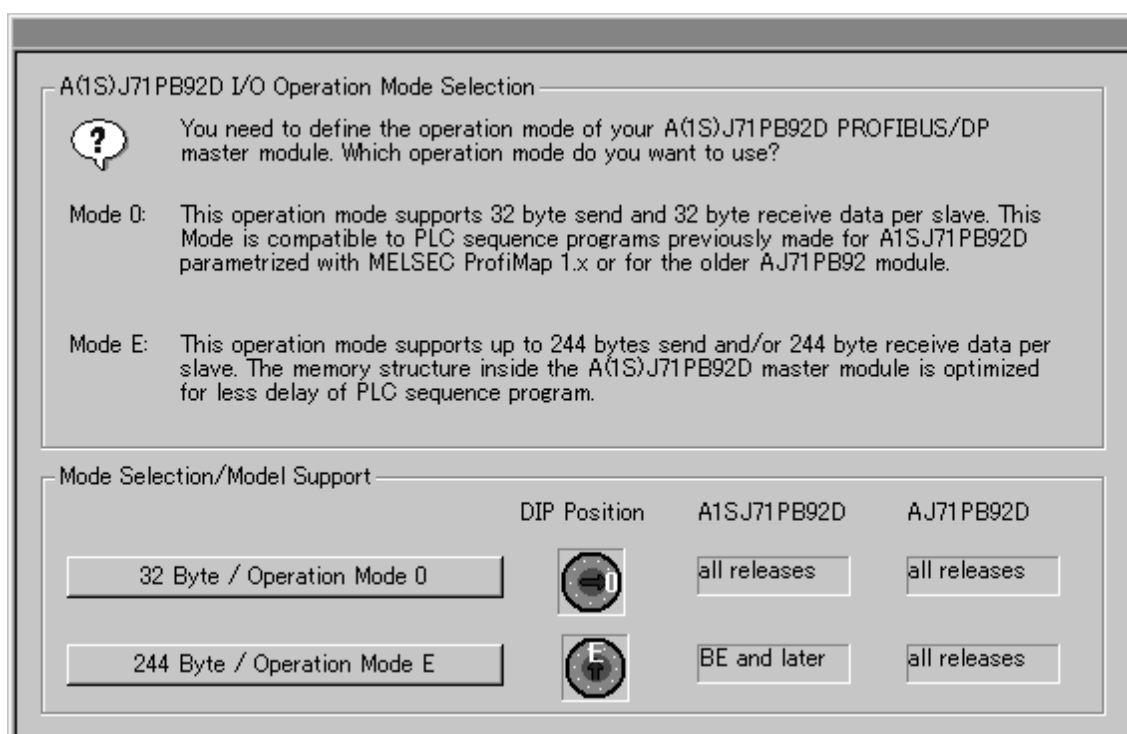
The module type is chosen [Profibus DP (A1S)J71PB92D)] from the drop-down list box in the Network Setup.

Figure 7.1: Network Setup



The operation mode is chosen by the [32 Byte / Operation Mode 0] or [244 Byte / Operation Mode E] button in the following window.

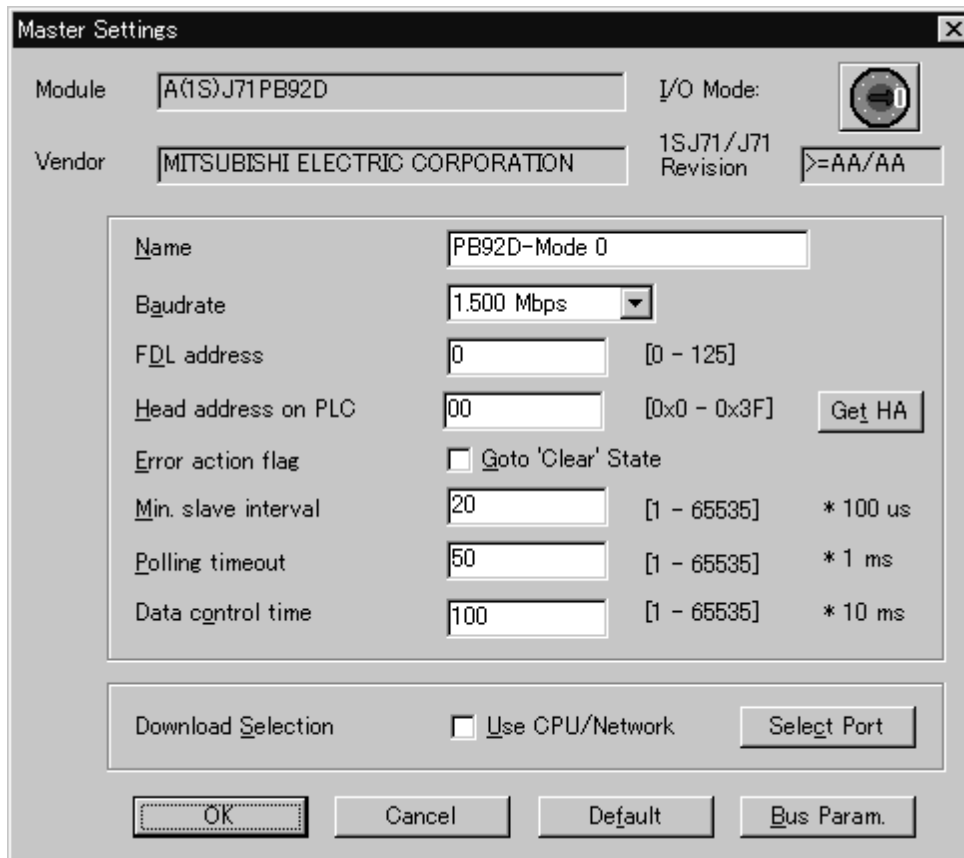
Figure 7.2: Select Operation Mode



7.1 Master Parameter

Set each part in the following dialog box.

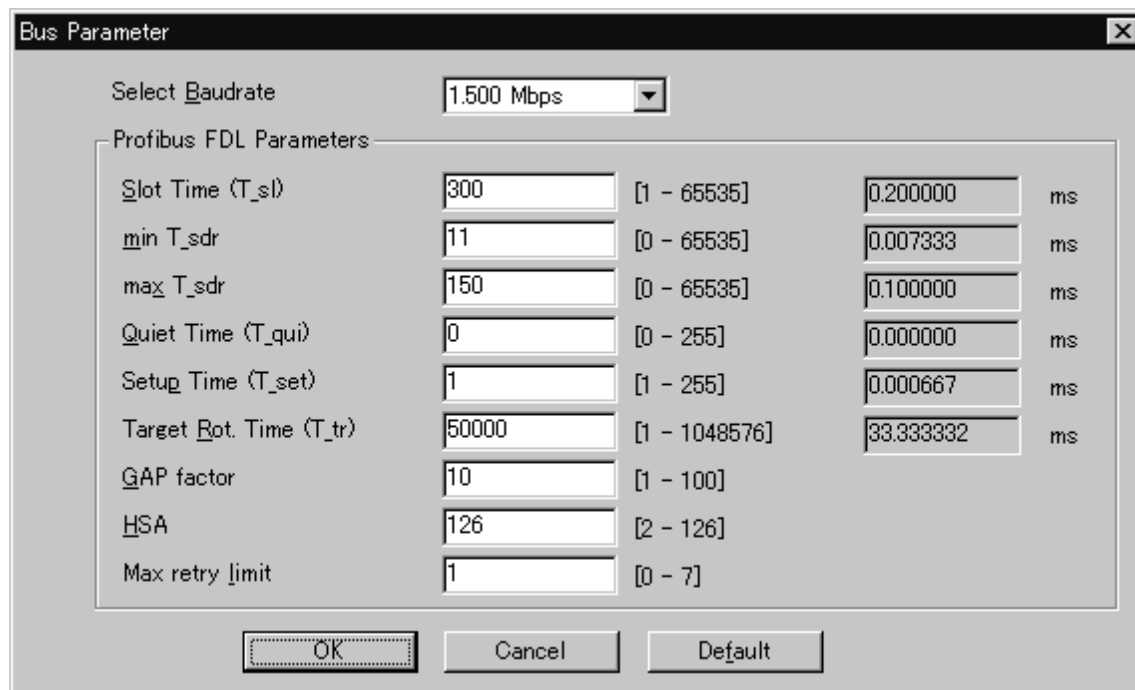
Figure 7.3: Master Parameter



7.2 Bus Parameter

Set each part in the following dialog box.

Figure 7.4: Bus parameter



Note

Max ST delay resp (Max Tsdr), Quiet Time (Tqui), Setup Time (Tset) in the parameter to be set by the ProfiMap must match the maximum value connected to the network, including the master station. The value of 64DP-M show the following table.

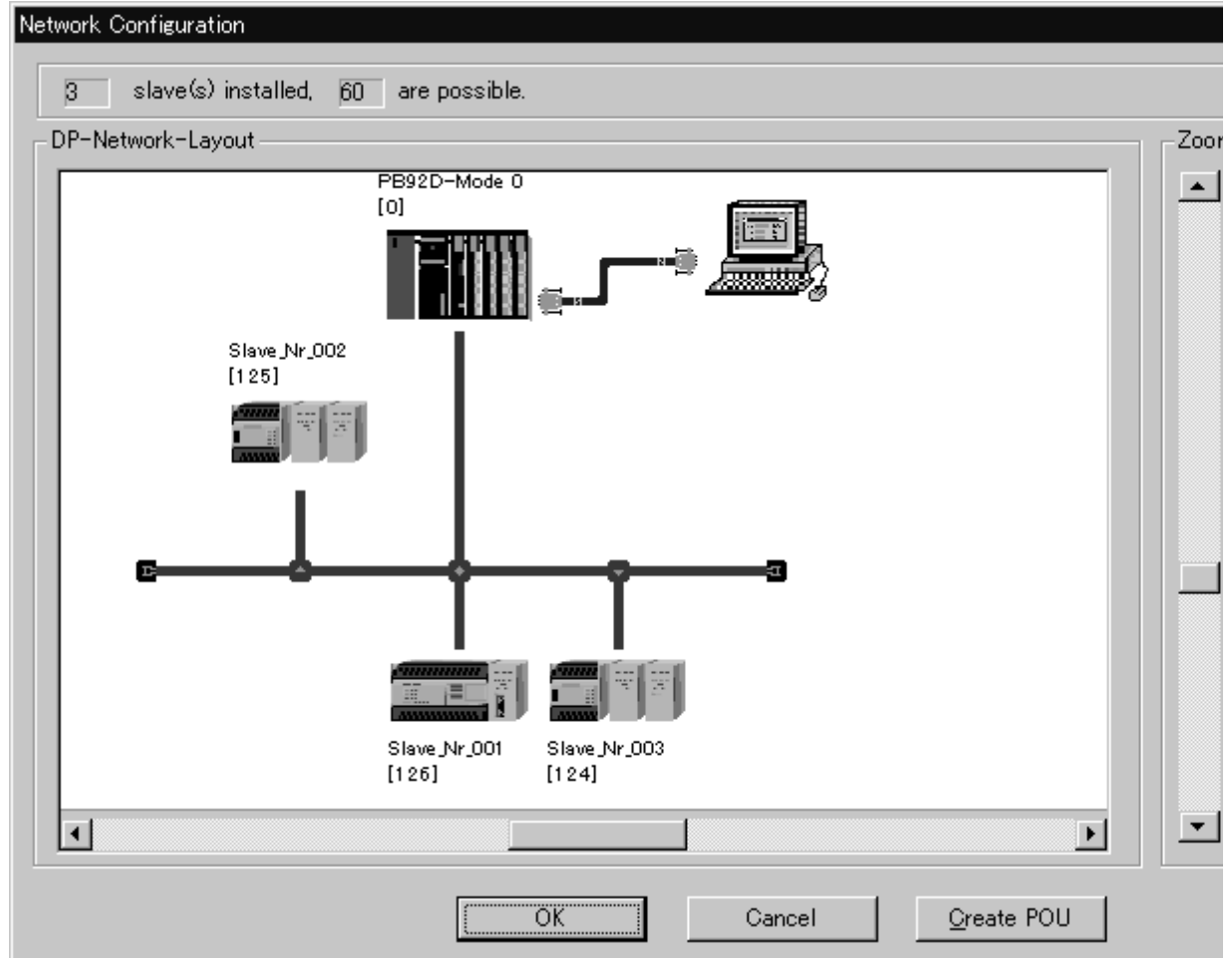
Table 7.1: Max Tsdr, Tqui, Tset and Baud Rate

| Items | 9.6k ~ 187.5kbps | 500kbps | 1.5Mbps | 3Mbps | 6Mbps | 12Mbps |
|----------|---------------------|---------|---------|-------|-------|--------|
| Max Tsdr | 60 | 100 | 150 | 250 | 450 | 800 |
| Tqui | 0 | 0 | 0 | 3 | 6 | 9 |
| Tset | 1 | 1 | 1 | 4 | 8 | 16 |

7.3 Network Configuration

Set the slave parameter and system configuration in the following dialog box.

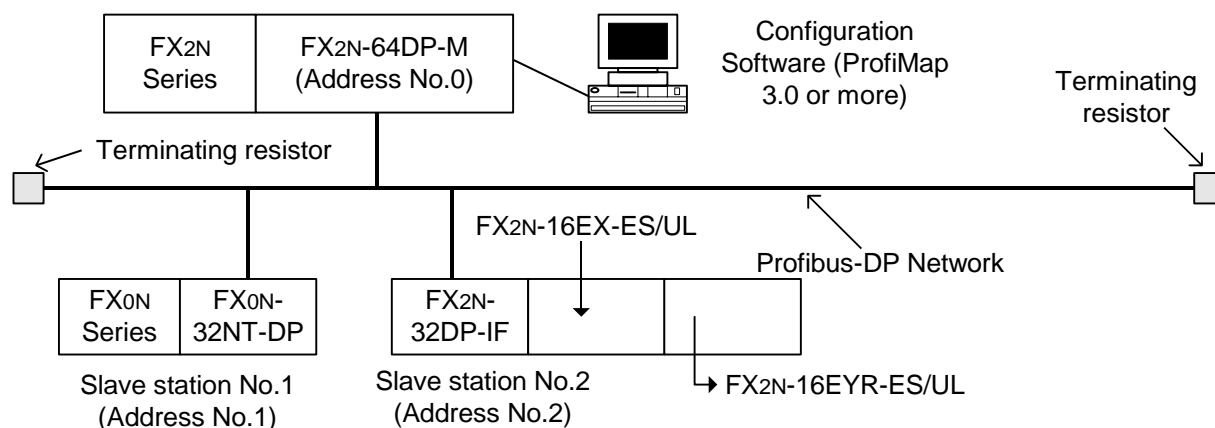
Figure 7.1: Network Configuration



8. Example Program

8.1 System Configuration

Figure 8.1: System Configuration



8.2 Contents of Operation

- D0 ~ D15 of master (FX2N PLC) is written in D0 ~ D15 of slave station 1 (FX0N PLC), and D20 ~ D35 of slave station 1 is written to D40 ~ D55 of master. In slave station 1 D0 is moved to D20 and D1 is moved to D21. Therefore, the value of D0 and D1 that sent from master to slave station 1 returns to D40 and D41.
- D60 in master (FX2N PLC) is output to the FX2N-16EYR-ES/UL on the slave station 2 (FX2N-32DP-IF), and the input status of FX2N-16EX-ES/UL on the slave station 2 are read to D20 in master.
- When an error occurs on Profibus-DP, the error information is stored in D400 ~ D439, and Y000 is turned ON.
When X000 is turned ON, 64DP-M recovers from error, and Y000 is turned OFF.
When X001 is turned ON, the diagnostic information in D400 ~ D439 are cleared.
- When X002 is turned ON, the 64DP-M will restart.
- When X003 is turned ON with a watchdog timer error in 64DP-M, 64DP-M recovers from this error, and the 64DP-M will restart.

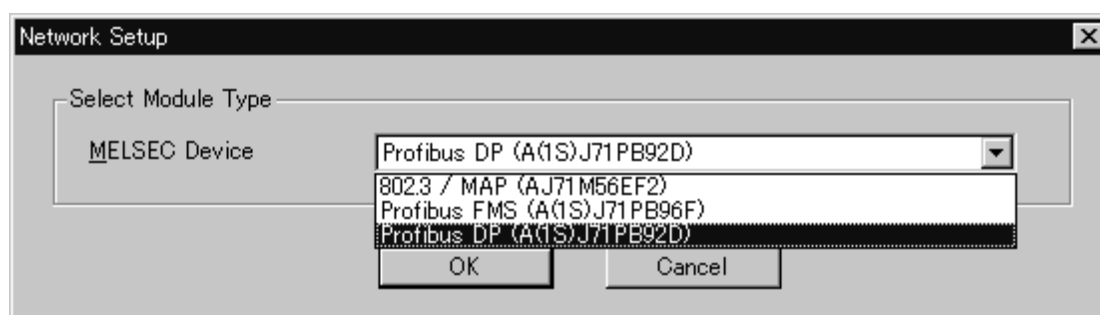
8.3 Parameter Setting

When setting the parameter of 64DP-M for Profibus-DP, use ProfiMap V3.00.
For operation of ProfiMap, please see the MELSEC ProfiMap Configuration System for Open Networks Software Manual.

1) Make Example Project

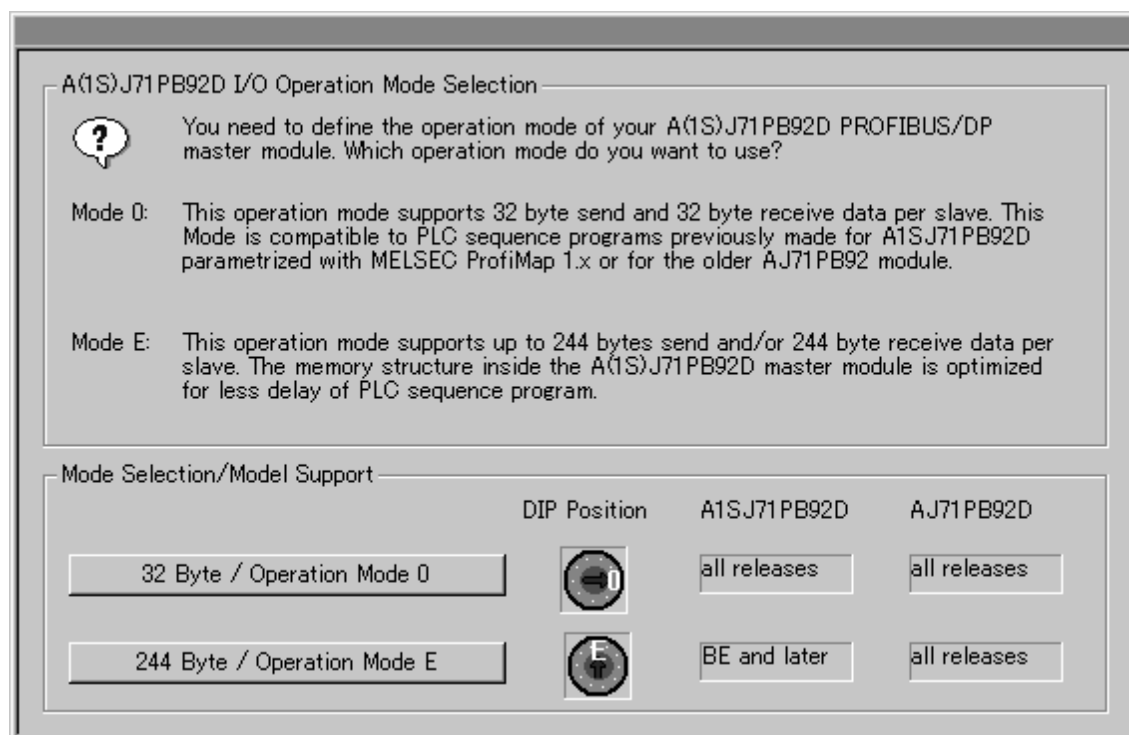
After selecting the command [New] in the [File] menu choose the module type Profibus DP (A(1S)J71PB92D) from the drop-down list box in the Network Setup.

Figure 8.2: Network Setup

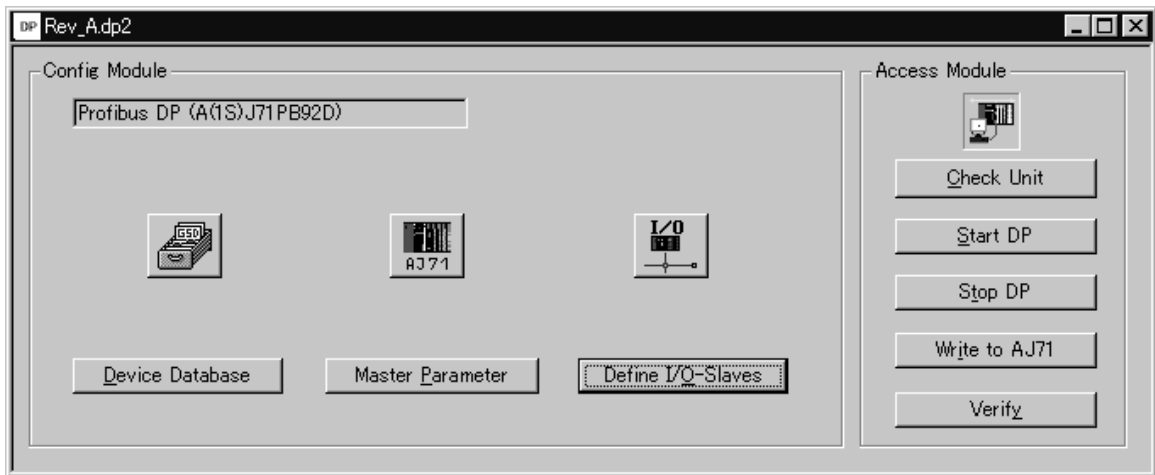


Click "OK" button, the dialog box below is displayed:

Figure 8.3: Operation Mode Selection



In this example, click on the 32 Byte / Operation Mode 0 button in the above dialog box.
The dialog box on the next page is automatically displayed.

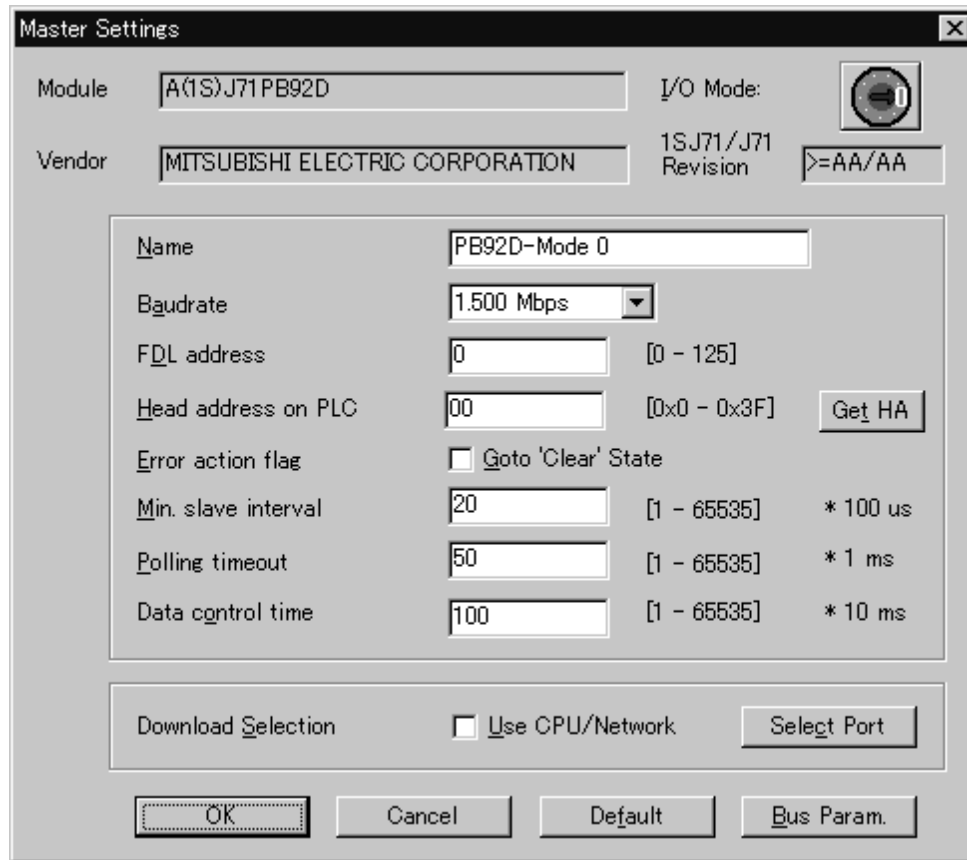
Figure 8.4: Project

- When clicking on the Master Parameter button, the master setting window opens. For master setting, refer to next page "2) Master parameter".
- When clicking on the Define I/O-Slaves button, the network configuration window opens. For network configuration, refer to "3) Network configuration".
- When clicking on the Write to AJ71 button, this project data is downloaded to 64DP-M

2) Master Setting

Within the Master parameters, the baud rate, different addresses and other parameters for the 64DP-M can be set.

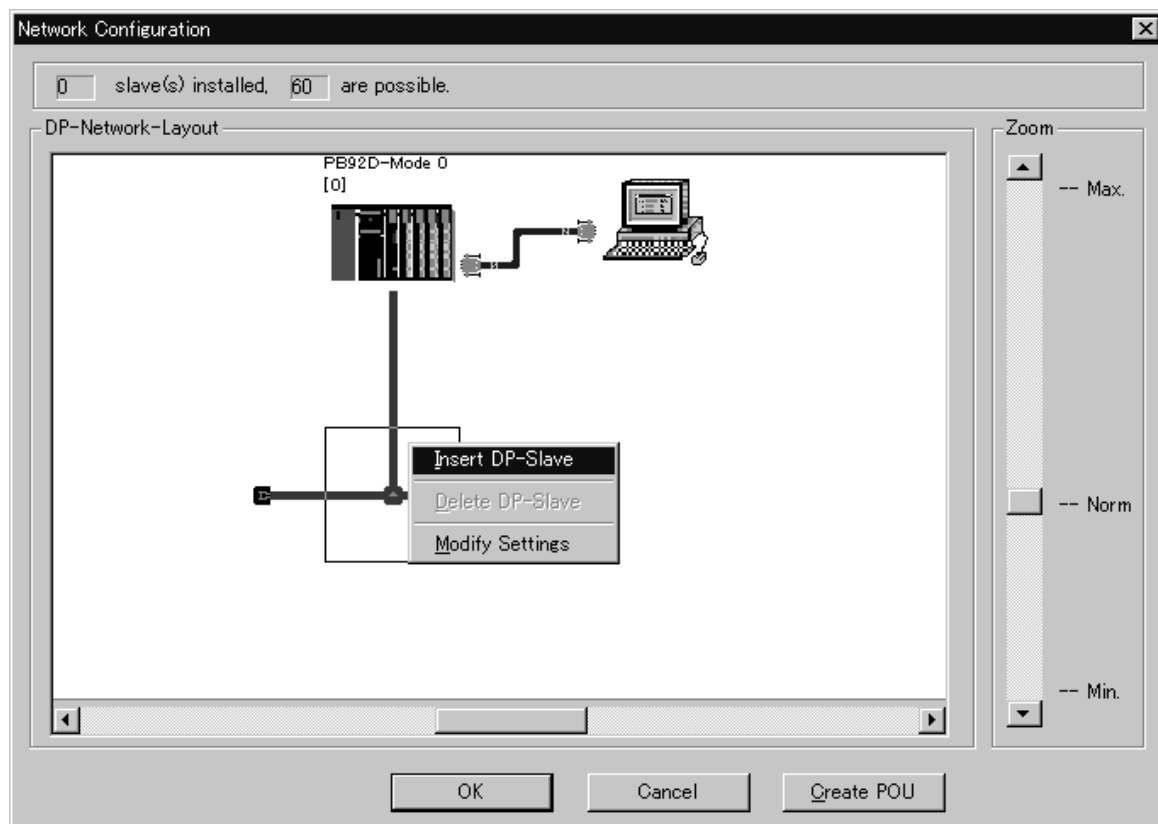
Figure 8.5: Master Setting



3) Network configuration

When clicking on the Define I/O-Slaves button, a symbolic graphical display of the network comes up which contains only the master station and the ProfiMap PC with the currently selected connection to the master station.

Figure 8.6: Insert New Insert DP-Slave



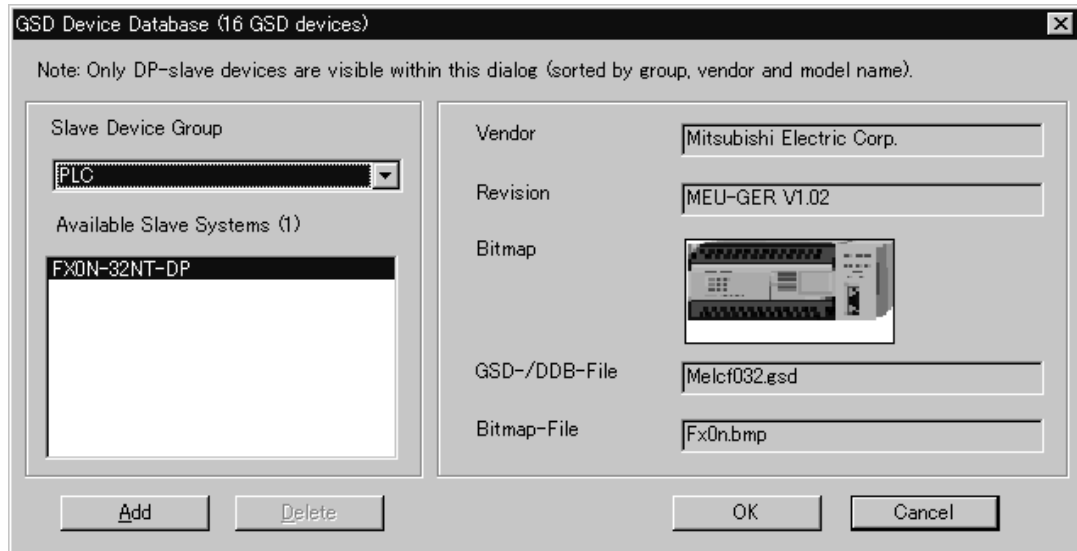
Right-click within the graphical network configuration editor and select Insert DP-Slave to access the Device Database.

After having selected a group in the window Device Database, a list of all slave models assigned to the respective group is displayed. For the selected slave the vendor and revision string, the path of the GSD file along with a thumbnail image of the bitmap and the bitmap file are displayed.

a) Setting of FX0N-32NT-DP

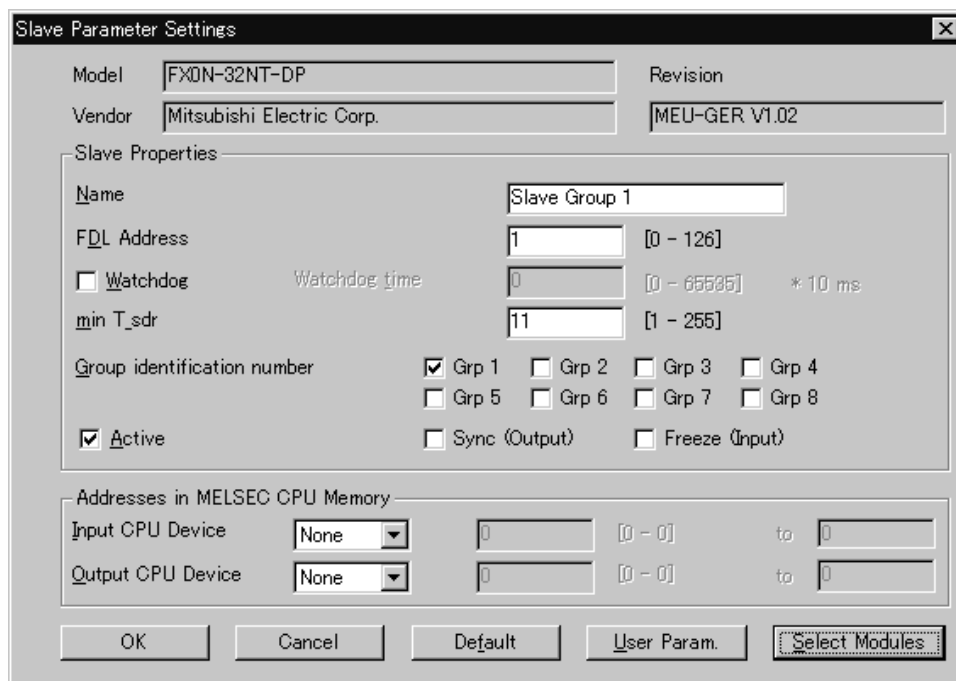
When PLC is selected in "Slave Device Group", the GSD Device Database dialog box appears as shown below.

Figure 8.7: Select Slave module



When a FX0N-32NT-DP is selected and the <OK> button has been pressed, the Slave Parameter Settings dialog box appears as shown below.

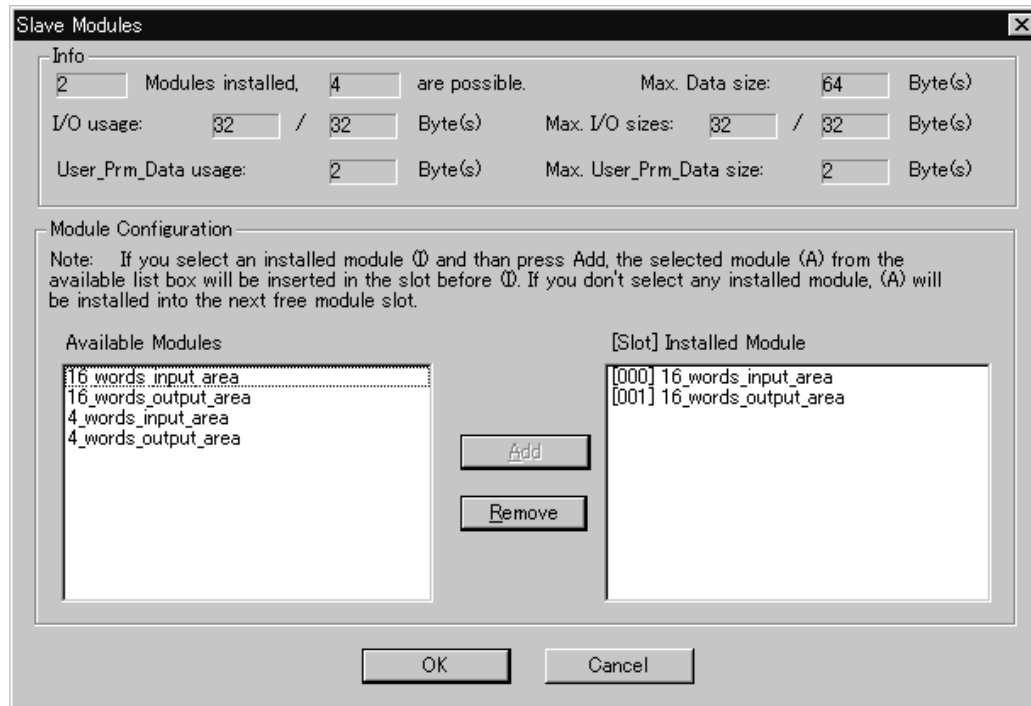
Figure 8.8: Slave Parameter Settings



When an FX0N-32NT-DP module is selected the type of module can be defined after clicking on <SELECT MODULES>. This button is enabled depending on the GSD file of the selected Profibus-DP slave.

The following dialog box is displayed:

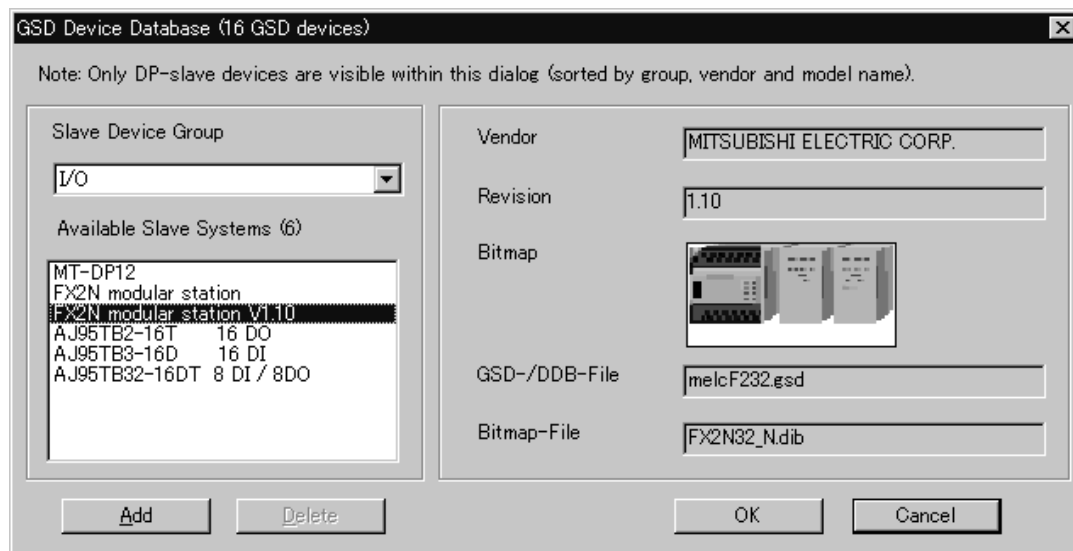
Figure 8.9: Select Modules Configuration



b) Setting of FX_{0N}-32NT-DP

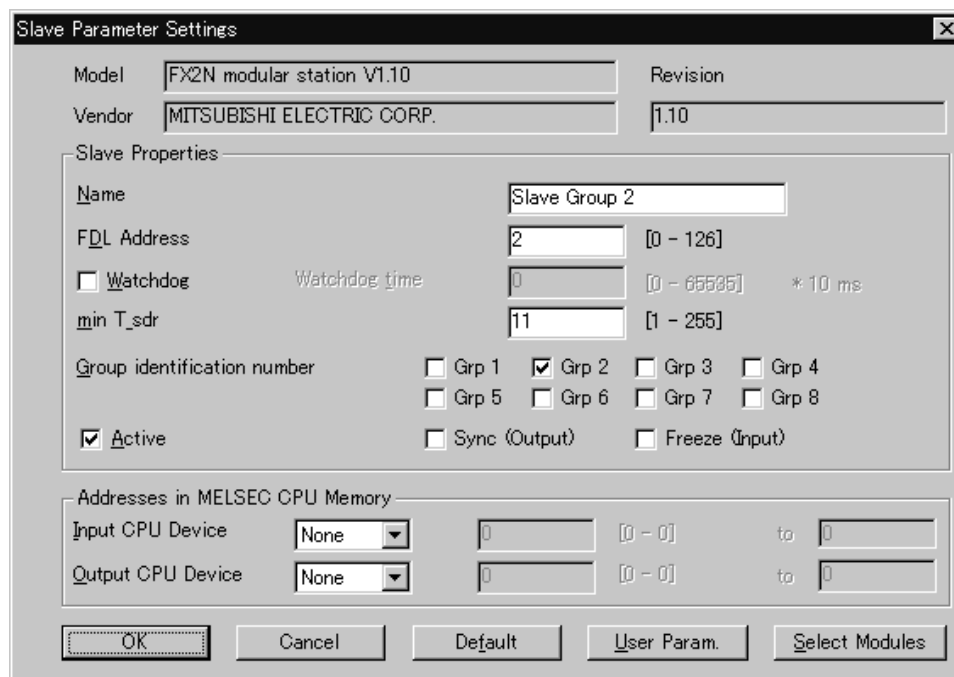
When I/O is selected in “Slave Device Group”, the GSD Device Database dialog box appears as shown below.

Figure 8.10: Select Slave module



When an FX_{2N} modular station V1.10 is selected and the <OK> button has been pressed, the Slave Parameter Settings dialog box appears as shown on the next page.

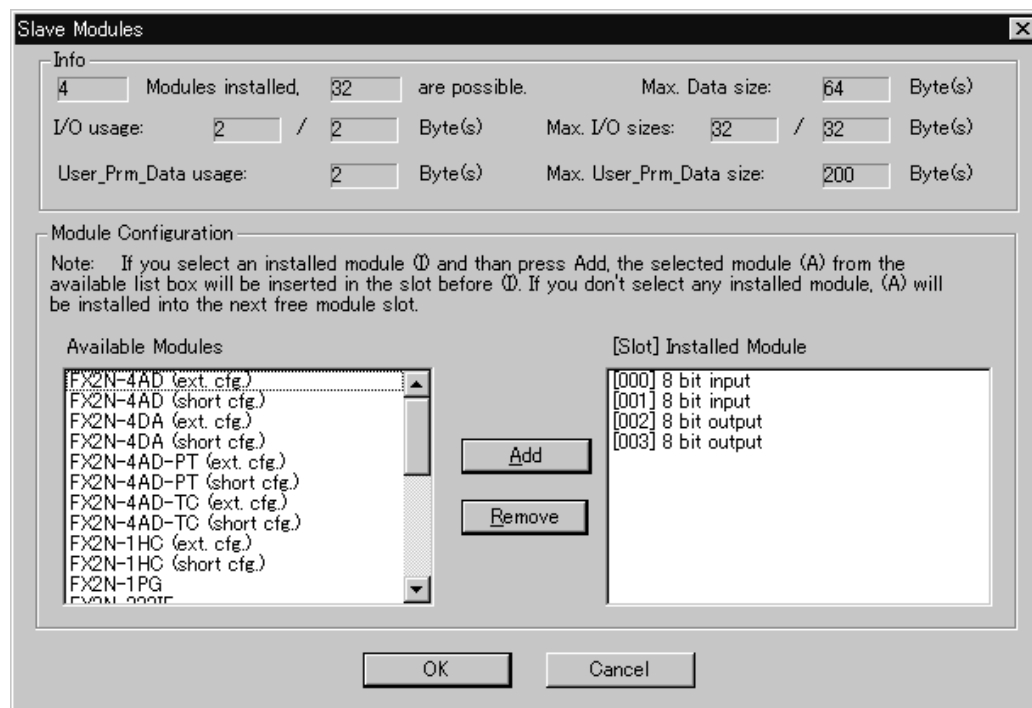
Figure 8.11: Slave Parameter Settings



When an FX0N-32NT-DP module is selected the type of module can be defined after clicking on <SELECT MODULES>. This button is enabled depending on the GSD file of the selected Profibus-DP slave.

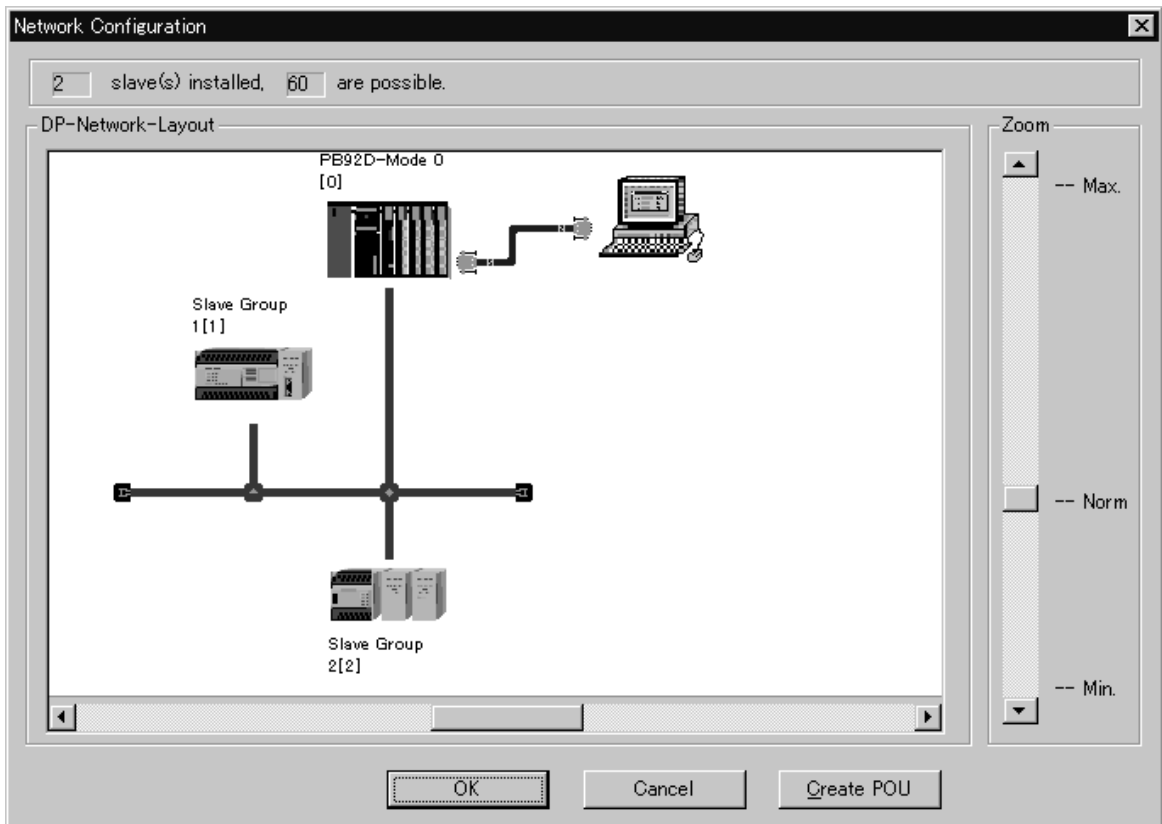
The following dialog box is displayed:

Figure 8.12: Select Modules Configuration



When the device configuration has been entered, click “OK” and the bitmap for that model is inserted into the graphical network layout. The bitmap of the installed slave device is shown in the following dialog box.

Figure 8.13: Network layout



8.4 Example Program

Figure 8.14 (page 8-11 ~ 8-22) is an example program for 64DP-M in the FX_{2N} PLC. Figure 8.15 (page 8-23) is an example program in the FX_{0N} PLC. For FX_{0N}-32NT-DP, refer to the FX_{0N}-32NT-DP User's Manual. For an explanation of each instruction, refer to FX Programming Manual (II).

Figure 8.14: Example Program of 64DP-M

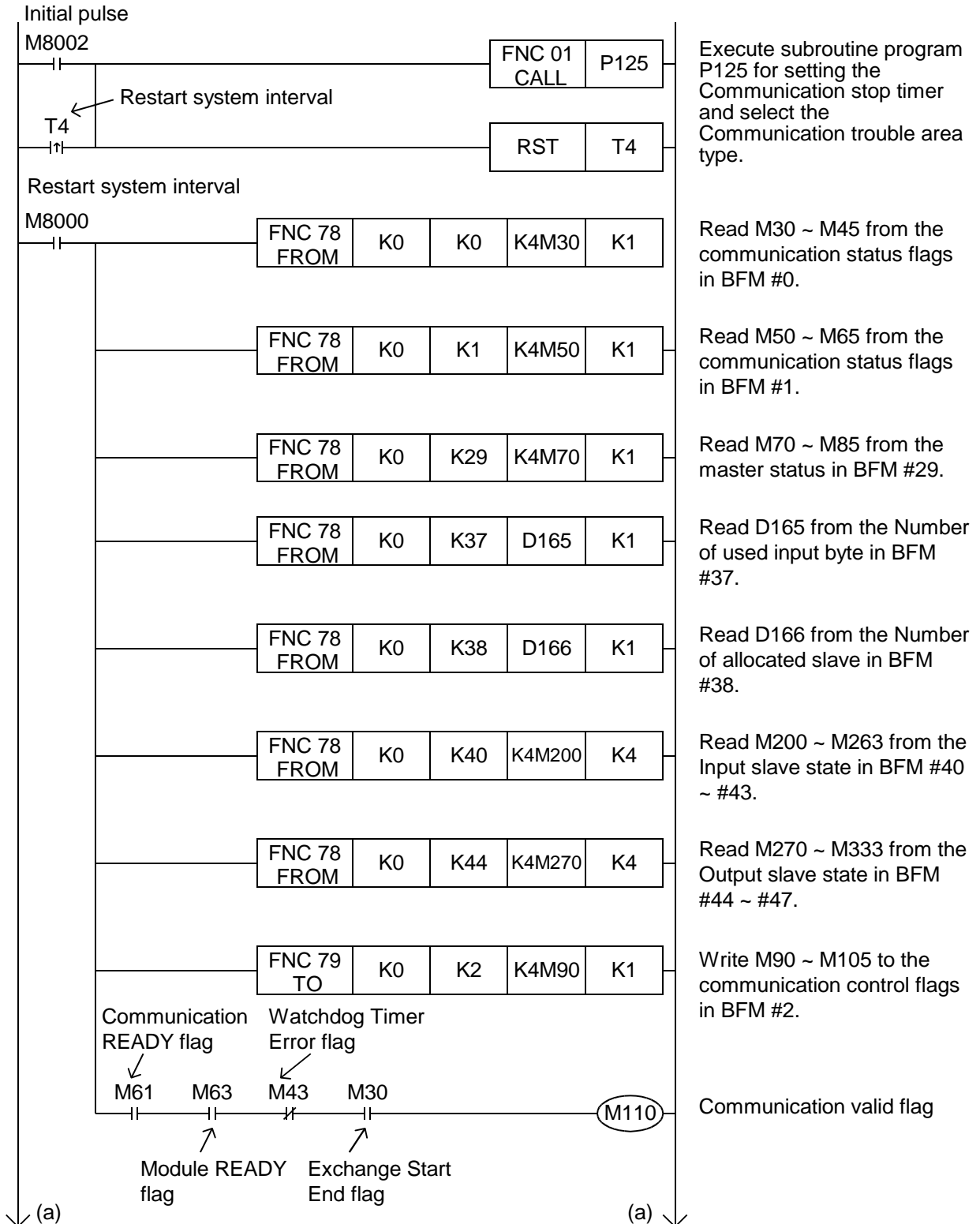


Figure 8.14: Example Program of 64DP-M

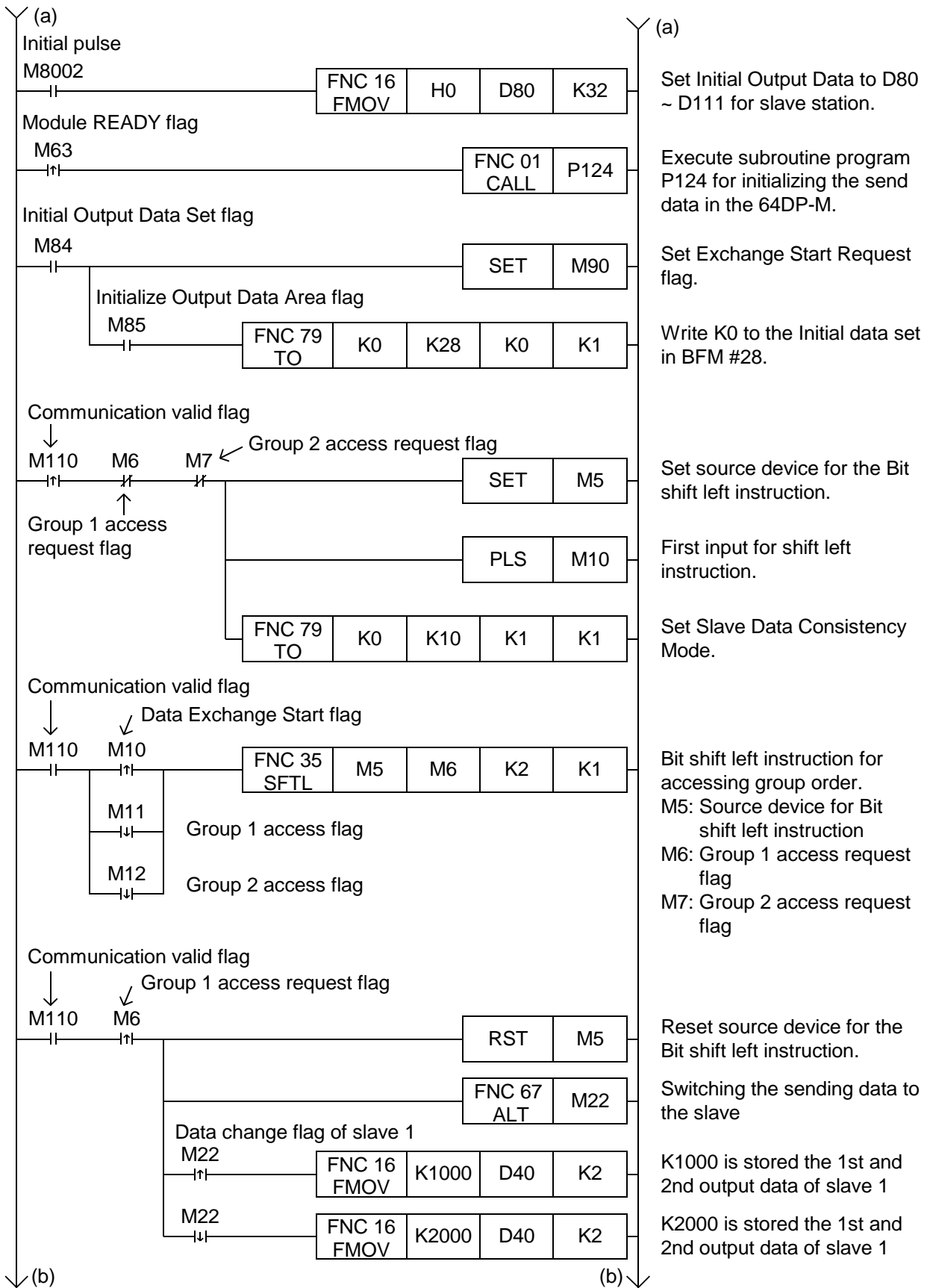


Figure 8.14: Example Program of 64DP-M

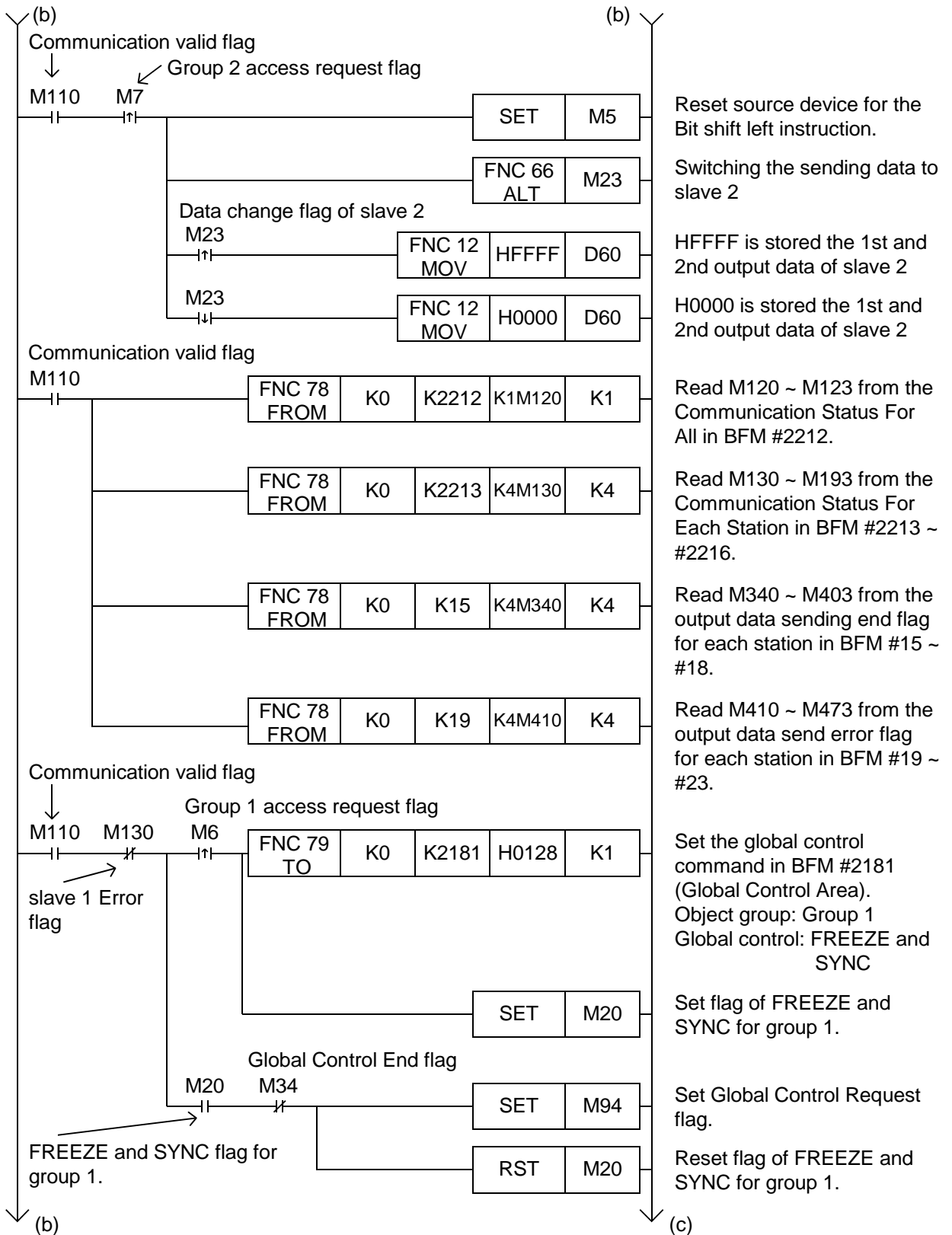


Figure 8.14: Example Program of 64DP-M

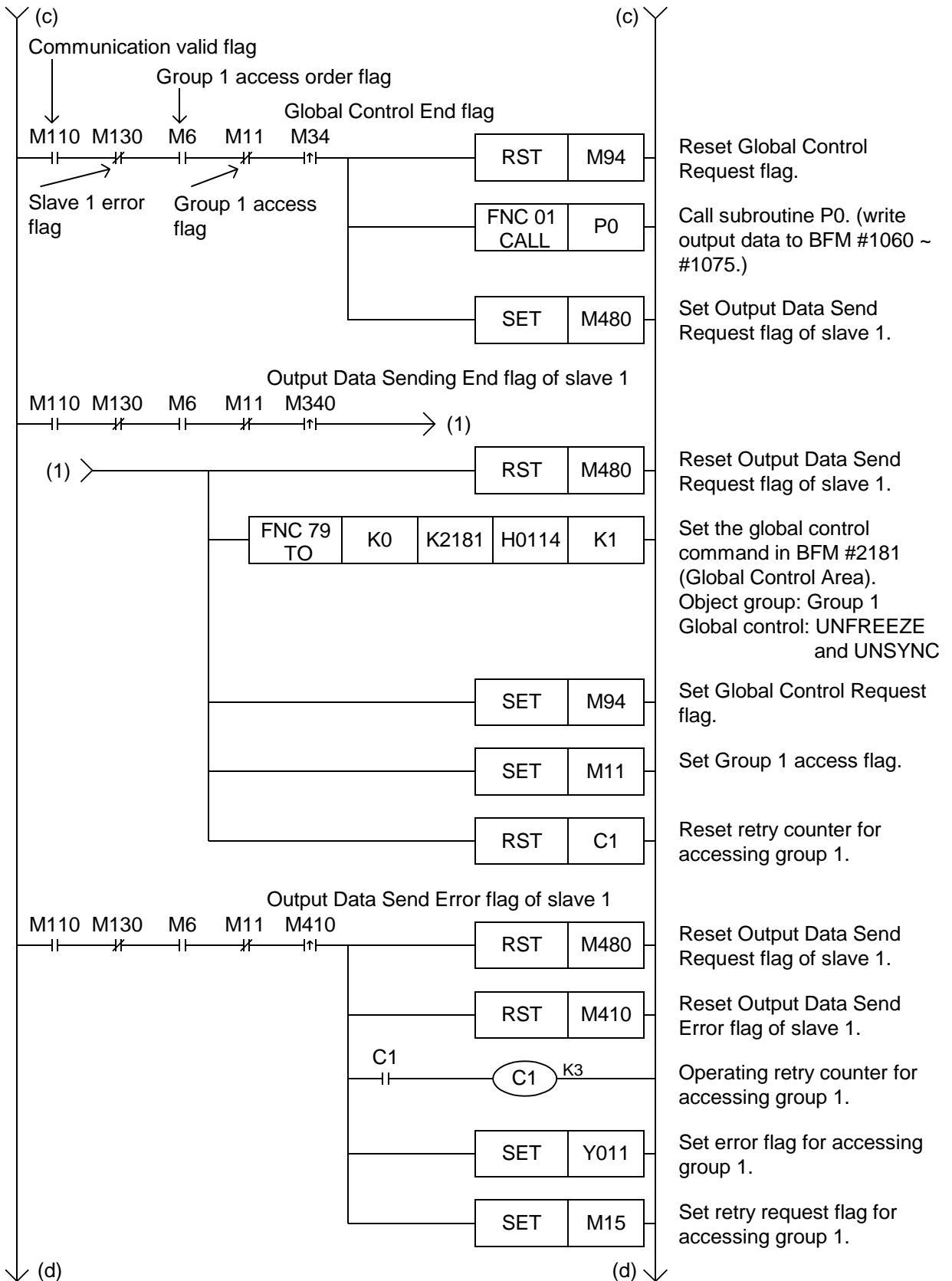


Figure 8.14: Example Program of 64DP-M

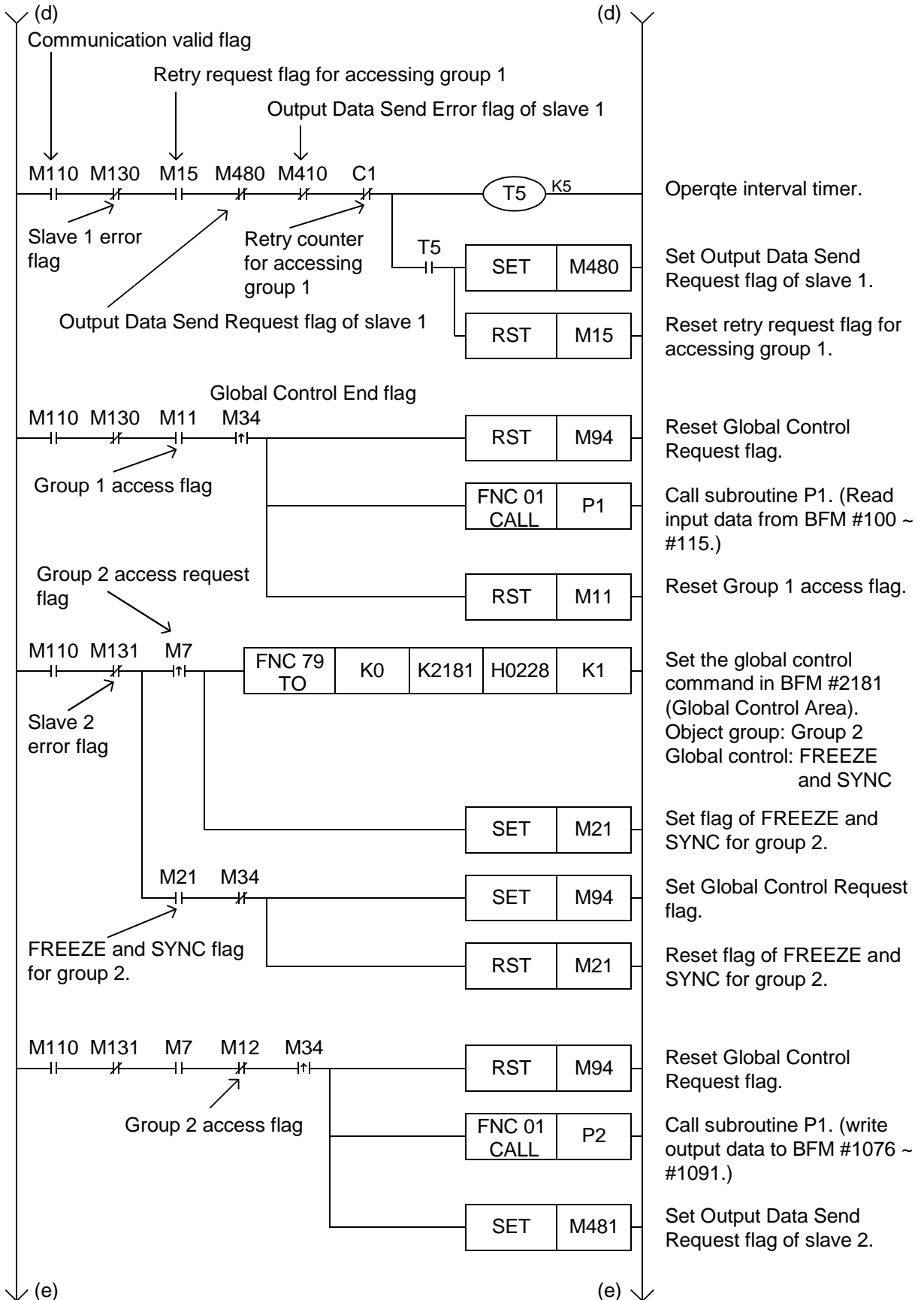


Figure 8.14: Example Program of 64DP-M

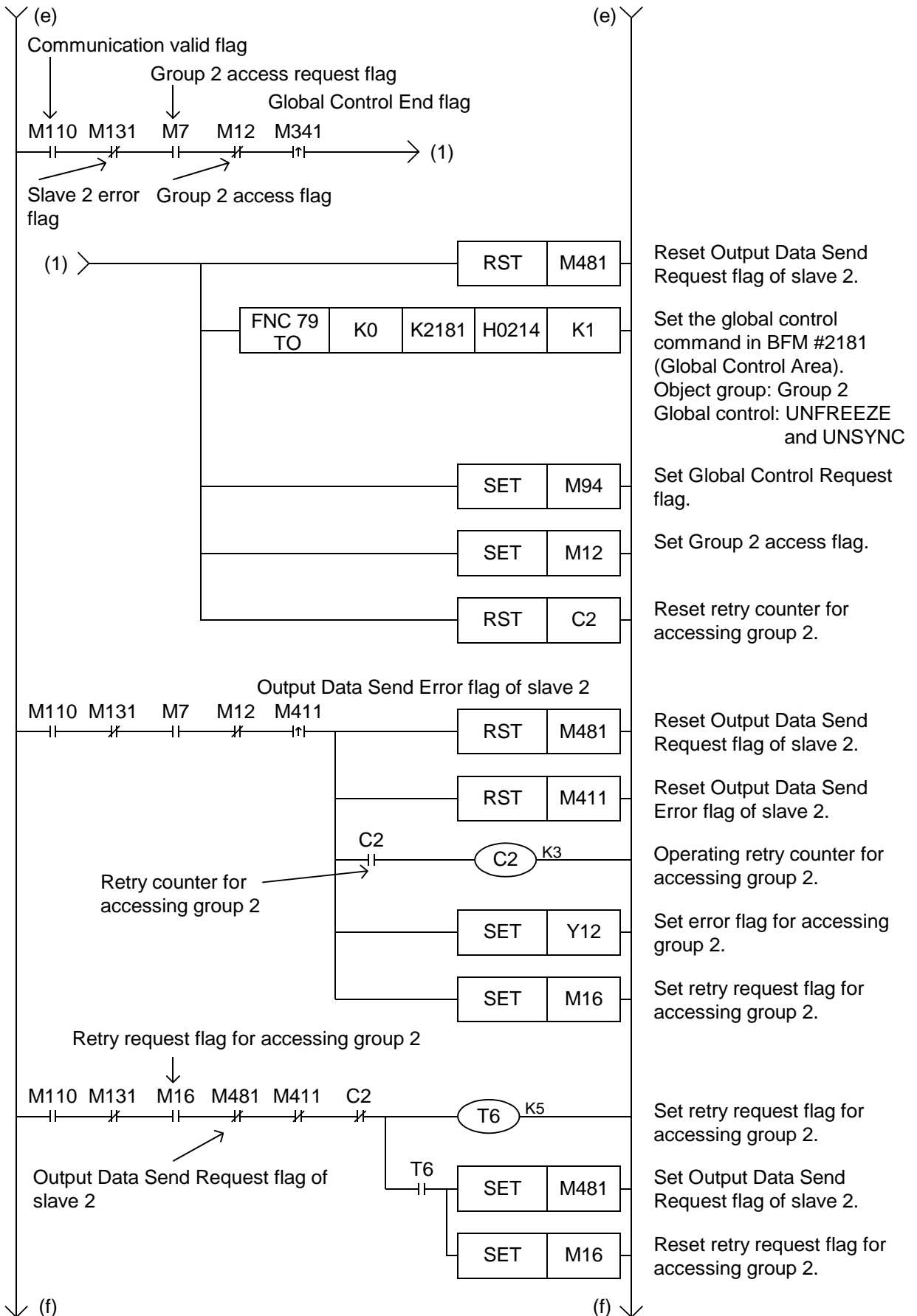


Figure 8.14: Example Program of 64DP-M

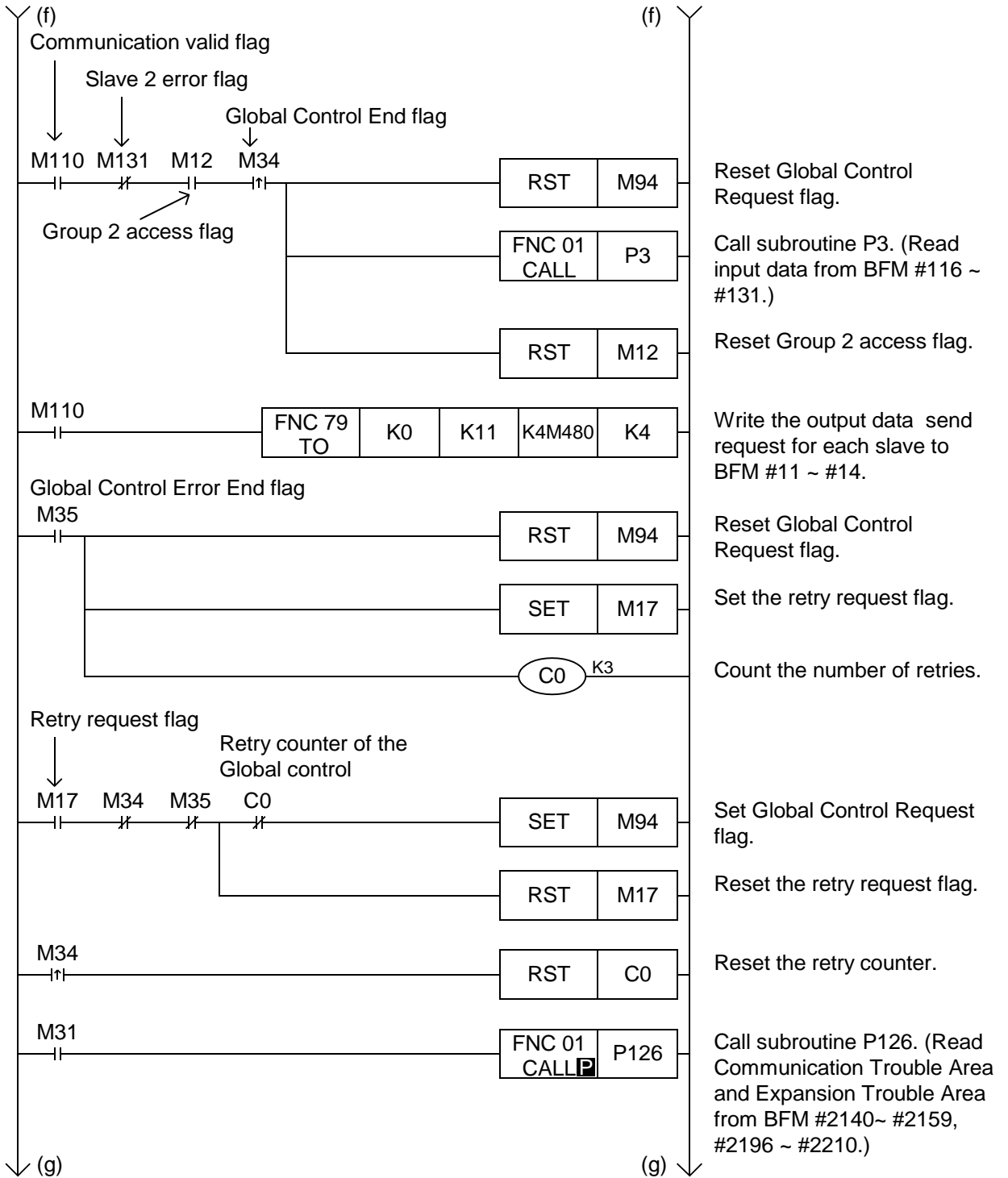


Figure 8.14: Example Program of 64DP-M

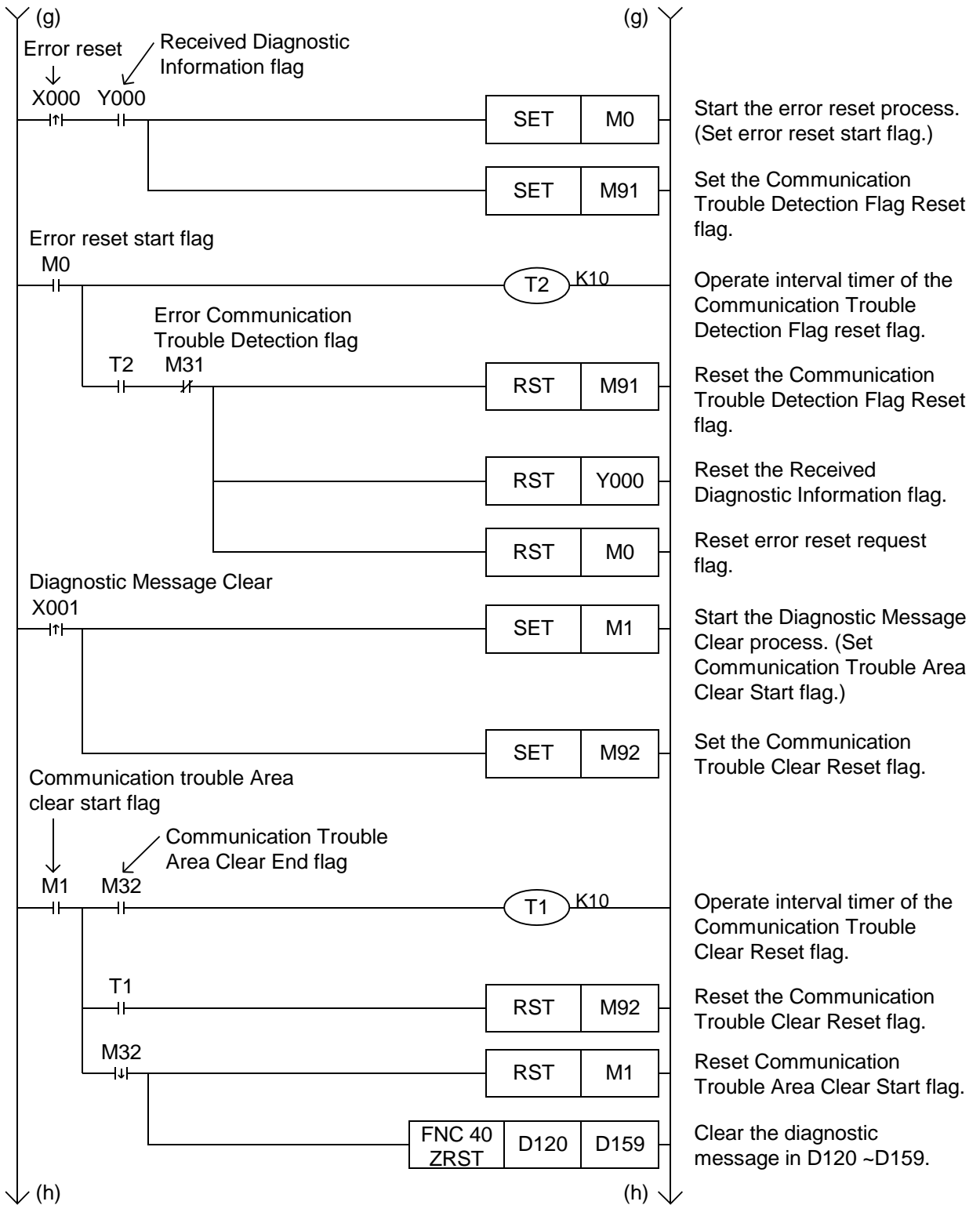


Figure 8.14: Example Program of 64DP-M

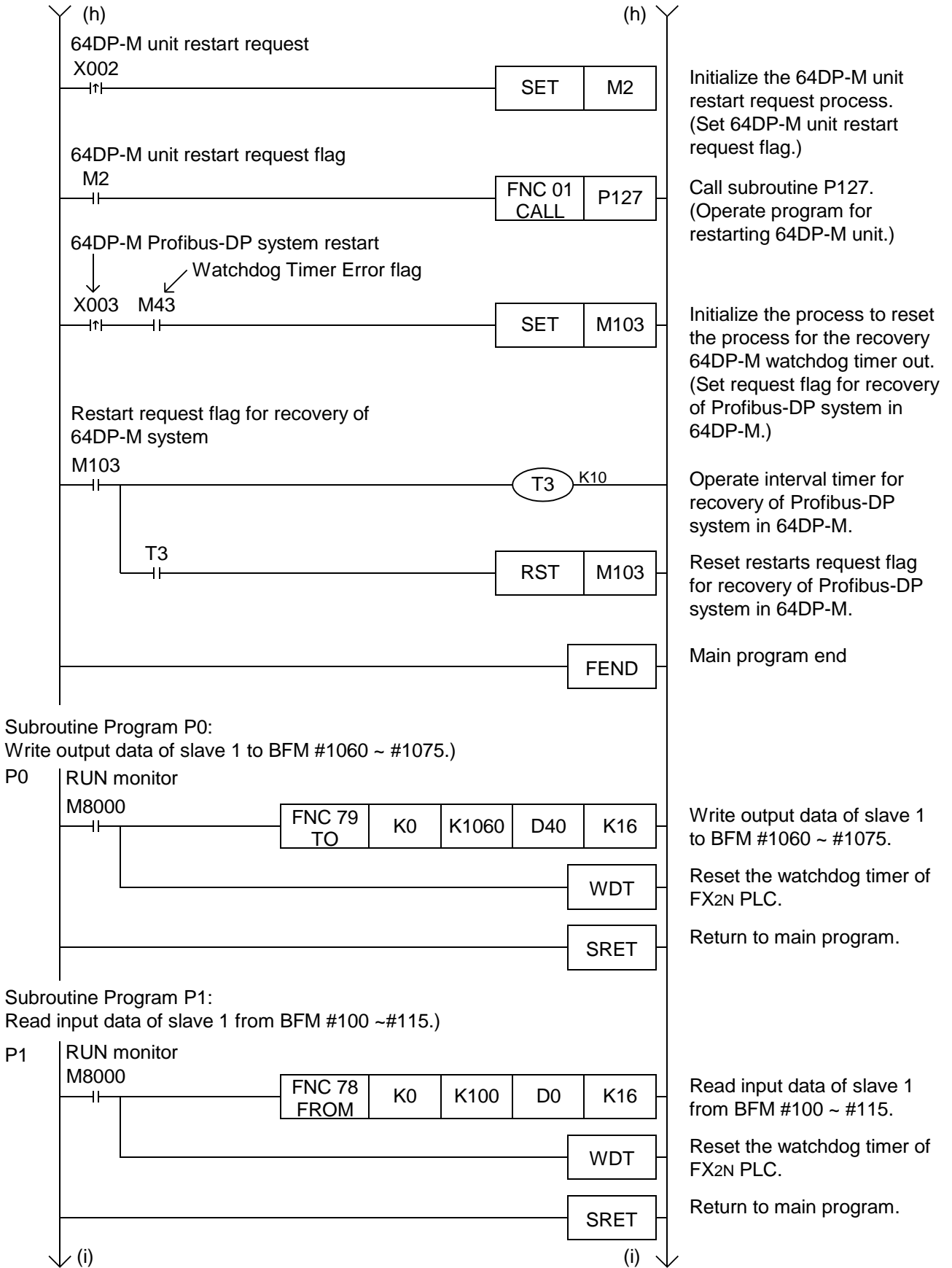


Figure 8.14: Example Program of 64DP-M

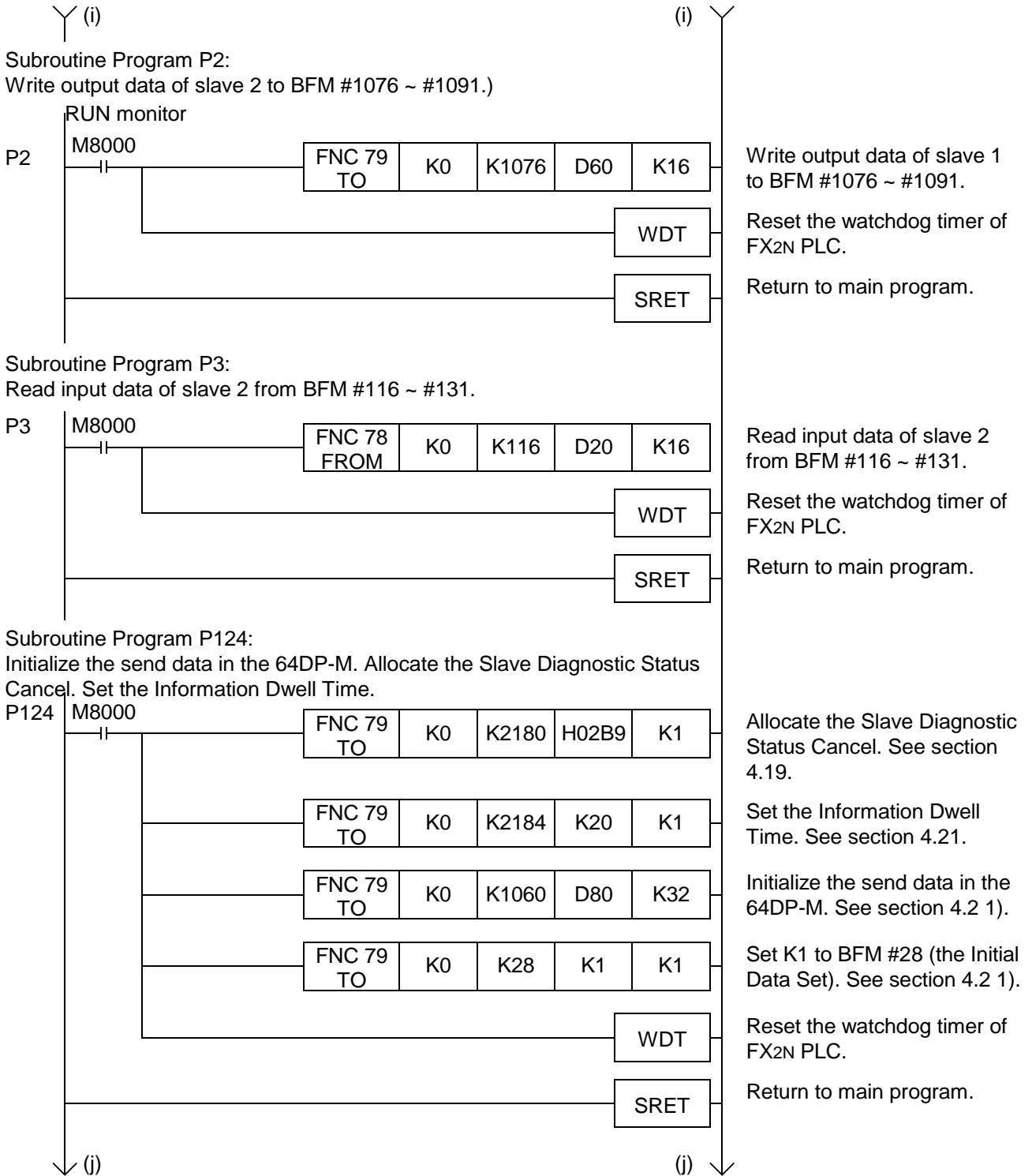


Figure 8.14: Example Program of 64DP-M

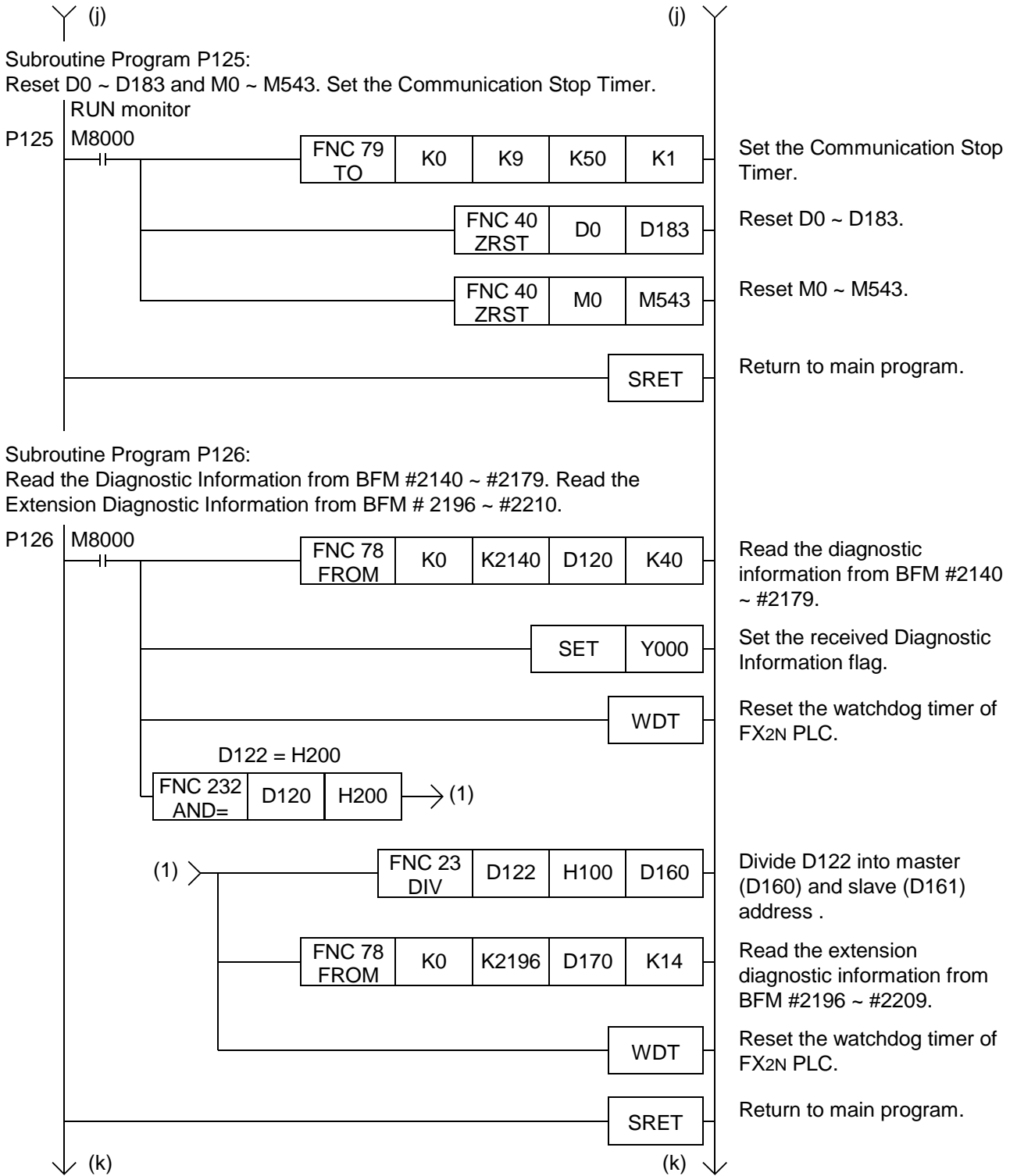


Figure 8.14: Example Program of 64DP-M

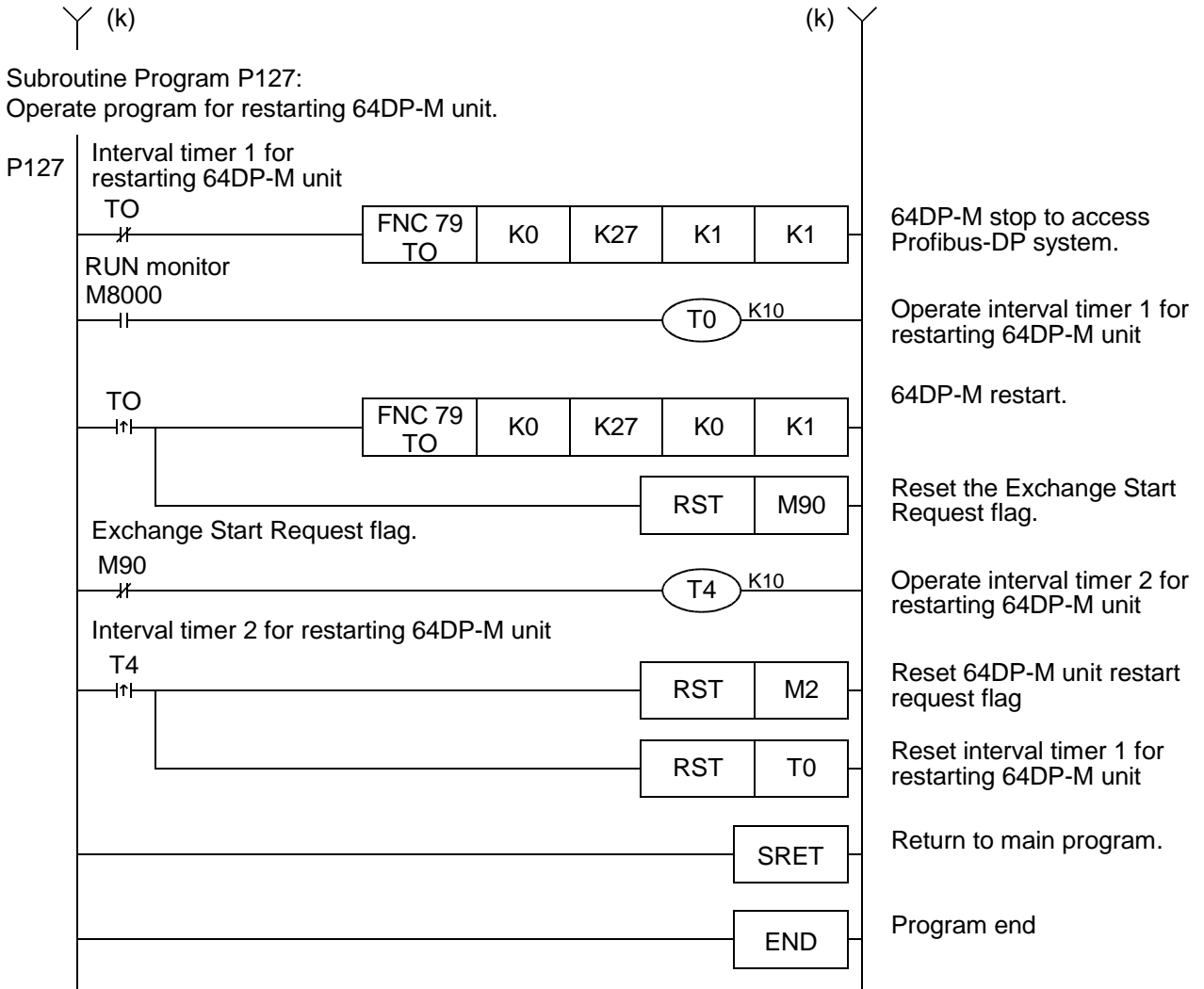
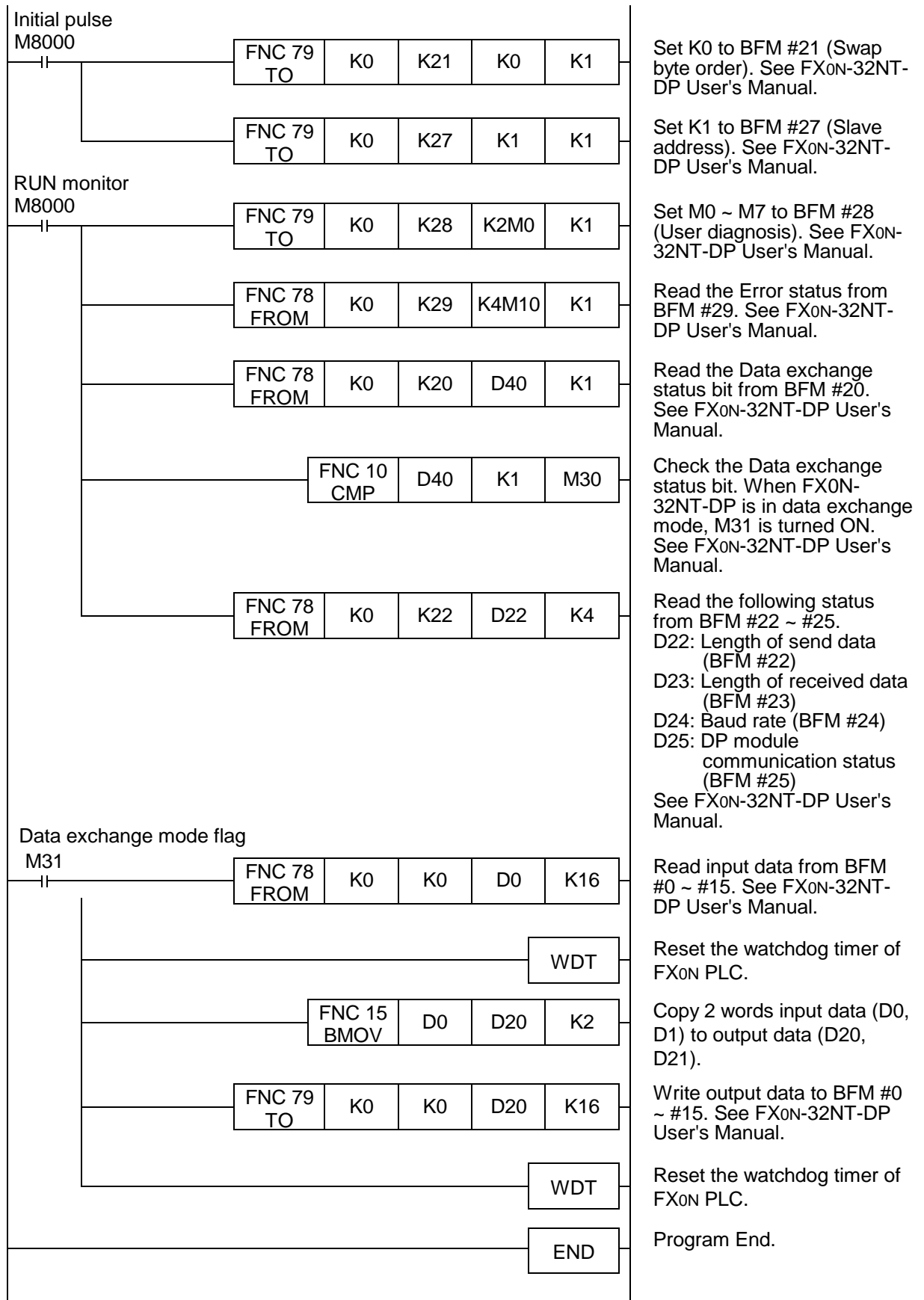


Figure 8.15: Example Program of FX0N-32NT-DP



MEMO

9. Diagnostics

If the 64DP-M does not see to operate normally, check the following items.

9.1 Preliminary Checks

1) Check "POWER LED"

If "POWER LED" is OFF, check the wiring of the 24V DC power supply, and check whether the 24V DC voltage source capacity is sufficient.

2) Check "RUN LED"

If "RUN LED" is OFF, check status of the Exchange Start Request (BFM #2 Bit0). If this bit is OFF, turns this bit to ON.

3) Check "FAULT LED"

If "FAULT LED" is OFF, check the diagnostic information in the Communication Trouble Area (BFM #2140 ~ #2179). For diagnostic information, refer to section 4.12.

4) Check the wiring and connection for the Profibus-DP

If the wiring and connection for the Profibus-DP is incorrect, correct wiring and connection.

5) Check the system configuration and parameter of the 64DP-M for the Profibus-DP

If the system configuration of Profibus-DP is not corresponding to parameter of the 64DP-M, match them.

6) Check the error of the PLC.

If the FROM/TO instruction error occurs at this instruction for the 64DP-M in the PLC, operate correctly this instruction.

9.2 Check the Status of the LEDs for the 64DP-M

1) POWER LED check

Table 9.1: POWER LED Check

| State | Description |
|-------|--|
| Lit | The 24V DC power supply (PLC or external power supply) is correctly supplied. |
| Unlit | Check wiring of power supply, and check whether the 24V DC voltage source capacity of 24V DC power supply. |

2) RUN LED check

Table 9.2: RUN LED Check

| State | Description |
|-------|--|
| Lit | Normal Operation |
| Unlit | The watchdog timer timed out. Please contact a service representative. |

3) SD/RD LED check

Table 9.3: SD/RD LED Check

| State | Description |
|----------|--|
| Lit | If 64DP-M is the exchange start processing or exchange stop processing status, this state of LED is normal operation. However, when 64DP-M exchange to slave(s), check parameter setting of slave in 64DP-M. |
| Flashing | 64DP-M exchanges data to the slave(s). |
| Unlit | 64DP-M does not exchanges data to the slave(s). Check correctly state of the Exchange start end flag (BFM #0 bit 0). |

4) TOKEN LED check

Table 9.4: Token LED Check

| State | Description |
|----------|--|
| Lit | 64DP-M is in operation mode 0 or E. |
| Flashing | 64DP-M is in operation mode 0 or E with a multi master configuration. |
| Unlit | 64DP-M is in not operation mode 0 or E. Check mode switch, wiring, address setting about duplicate address, and if the HSA exceeds the network maximum station Number. |

5) RADY LED check

Table 9.5: RADY LED Check

| State | Description |
|-------|--|
| Lit | 64DP-M is in operation mode 0 or E. If it is not in these mode, please contact a service representative. |
| Unlit | 64DP-M is not operation mode 0 or E. If it is in these mode, please contact a service representative. |

6) FROM/TO LED check

Table 9.6: FROM/TO Check

| State | Description |
|-------|---|
| Lit | BFM in 64DP-M is accessed from PLC. |
| Unlit | BFM in 64DP-M is not accessed from PLC. Please check program about FROM/TO instruction. |

7) PRM. SET LED check

Table 9.7: PRM. SET LED Check

| State | Description |
|----------|--|
| Lit | 64DP-M is in operation mode 1. |
| Flashing | When this LED is flashing in operation mode 1, there is not parameter in 64DP-M. Please write parameter to 64DP-M. |
| Unlit | 64DP-M is in operation mode 0 or E. |

8) RSP ERR LED check

Table 9.8: RSP ERR Check

| State | Description |
|-------|---|
| Lit | 64DP-M is fault when exchange data to slave. Check diagnostic information. For diagnostic information, refer to section 4.12. |
| Unlit | 64DP-M is normal operation. |

9) FAULT LED check

Table 9.9: FAULT LED Check

| State | Description |
|-------|--|
| Lit | 1) When exchange start request flag (BFM #2 bit 0) is turned OFF to ON, check parameter about following points. <ul style="list-style-type: none"> • There is no active slave on the network. • There is slave station of same as master station address. 2) In other case, please contact a service representative. |
| Unlit | 64DP-M is normal operation. |

9.3 Self Diagnostic of the 64DP-M

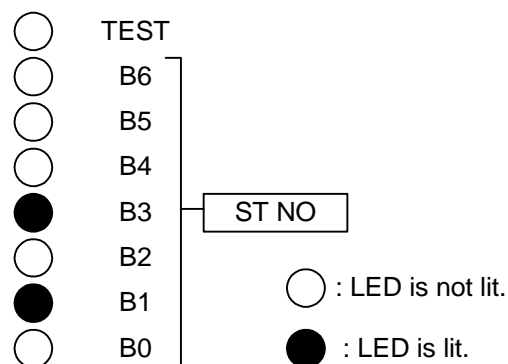
When setting the self diagnostic mode (The mode switch is “2” position.), TEST LED and ST NO LED will be lit as following table. When the test result is normal, these tests are repeated in order of a) - e). If an error is detected, then the LED status at the time the error occurs for that test will be displayed. If error state is displayed, please contact a service representative.

Table 9.10: Self Diagnostic

| Items | | | LED State | | | | | | | |
|----------------|-------------|------|-----------|----|----|----|----|----|----|---|
| Description | Order | TEST | B6 | B5 | B4 | B3 | B2 | B1 | B0 | |
| MPU test | During test | a) | ● | ○ | ○ | ○ | ○ | ○ | ● | ● |
| | Error | - | ● | ● | ○ | ○ | ○ | ○ | ● | ○ |
| Timer test | During test | b) | ● | ○ | ○ | ○ | ○ | ● | ○ | ● |
| | Error | - | ● | ● | ○ | ○ | ○ | ● | ○ | ○ |
| Interrupt test | During test | c) | ● | ○ | ○ | ○ | ○ | ● | ● | ● |
| | Error | - | ● | ● | ○ | ○ | ○ | ● | ● | ○ |
| DRAM test | During test | d) | ● | ○ | ○ | ○ | ● | ○ | ● | ● |
| | | e) | ● | ○ | ○ | ○ | ● | ● | ○ | ● |
| | Error | - | ● | ● | ○ | ○ | ● | ● | ● | ○ |

○: This LED is not lit. ●: This LED is lit.

Figure 9.1: LED Location



9.4 Diagnostic Information and Error Code

For error code and diagnostic information, refer to section 4.18. For expansion diagnostic information, refer to section 4.19.

Appendix A: Further Information Manual List

Table A-1: Further Information Manual List

| Manual name | Manual No. | Discription |
|---|-------------|---|
| FX _{2N} Series Programmable controllers Hardware Manual | JY992D66301 | This manual contents explanations for wiring, installation and specification, etc. about FX _{2N} Series programmable controller. |
| FX Series of Programmable controllers Programming Manual II | JY992D88101 | This manual contains explanations for instruction of the FX _{1S} , FX _{1N} , FX _{2N} and FX _{2NC} Series programmable controller. |
| FX _{0N} -32NT-DP Profibus-DP Interface Unit User's Manual | JY992D61401 | This manual contents explanations for wiring, installation, specification and allocation BFM's, etc. about FX _{0N} -32NT-DP Profibus-DP Interface Unit. |
| FX _{2N} -32DP-IF Profibus-DP Interface Unit Hardware Manual | JY992D77101 | This manual contents explanations for wiring, installation and specification, etc. about FX _{2N} -32DP-IF Profibus-DP Interface Unit. However, this hardware manual's text is already contained in this user's manual. |
| FX _{2N} -32DP-IF Profibus-DP Interface Unit User's Manual | JY992D79401 | This manual contents explanations for wiring, installation, specification and parameter, etc. about FX _{2N} -32DP-IF Profibus-DP Interface Unit. However, this hardware manual's text is already contained in this user's manual. |
| FX _{2N} -64DP-M Profibus-DP Master Block Hardware Manual | JY992D82901 | This manual contents explanations for wiring, installation and specification, etc. about FX _{2N} -64DP-M Profibus-DP Master Block. However, this hardware manual's text is already contained in this user's manual. |
| MELSEC ProfiMap Configuration System for Open Networks Software Manual | - | This manual contents explanations for operation of MELSEC ProfiMap Configuration System for Open Networks Software. |

MEMO

USER'S MANUAL

FX₂N-64DP-M Profibus-DP Master Block



HEAD OFFICE: MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100-8310 TELEX: J24532 CABLE MELCO TOKYO
HIMEJI WORKS: 840, CHIYODA CHO, HIMEJI, JAPAN

JY992D88001B
(MEE)

Effective MAR. 2001
Specification are subject
to change without notice.