Changes for the Better

MITSUBISHI

PROGRAMMABLE CONTROLLERS

MELSEC-F

# USER'S MANUAL

## CC-Link INTERFACE BLOCK FX2N-32CCL

FX2N

**Foreword**

- This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the the FX2N-32CCL CC-Link Interface Block. It should be read and understood before attempting to install or use the unit.
- Further information can be found in the FX PROGRAMMING MANUAL(II), FX0N/FX1N/FX2N/FX2NC/FX3U/FX3UC series hardware manuals.
- If in doubt at any stage of the installation of the FX2N-32CCL CC-Link Interface Block always consult a professional electrical engineer who is qualified and trained to the local and national standards that applies to the installation site.
- If in doubt about the operation or use of the FX2N-32CCL CC-Link Interface Block please consult the nearest Mitsubishi Electric distributor.
- This manual is subject to change without notice.

# FX2N-32CCL CC-Link INTERFACE BLOCK

## USER'S MANUAL

Manual number : JY992D71801
Manual revision : E
Date : June 2008

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

## Guidelines for the safety of the user and protection of the FX2N-32CCL CC-Link Interface Block

This manual provides information for the installation and use of the FX2N-32CCL CC-Link Interface 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 said product. All maintenance should be carried out in accordance with established safety practices.

c) All operators of the completed equipment (see Note) should be trained to use this product in a safe manner in compliance to established safety practices. The operators should also be familiar with documentation which is associated with the actual operation of the completed equipment.

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 throughout this manual certain symbols will be used to highlight points 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 **POSSIBLY** cause physical and property damage.

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

**Software warnings**

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

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

3 ) 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.
- Please contact a Mitsubishi Electric distributor for more information concerning applications in life critical situations or high reliability.

# CONTENTS

1. Introduction .....1-1
1.1 Outline of product .....1-1
1.2 Connection to CC-Link .....1-3
1.3 System configuration of entire CC-Link .....1-4
2. Product Specifications .....2-1
2.1 Outside dimensions and nomenclature .....2-2
2.2 General specifications and performance specifications .....2-3
3. Connection and Wiring .....3-1
3.1 Connection to PC .....3-1
3.2 Wiring of power supply .....3-2
3.3 Wiring of CC-Link .....3-4
4. Setting of Remote Device Stations .....4-1
4.1 Setting of station Nos., number of stations and transmission speed .....4-1
4.2 List of number of remote points and remote Nos. .....4-3
5. Assignment of Buffer Memory (BFM) .....5-1
5.1 Outline of data communication .....5-1
5.2 BFM dedicated to read .....5-2
5.3 BFM dedicated to write .....5-9
5.4 System area of remote I/O .....5-13
5.5 Contents of errors .....5-14

6. Programming Examples .....6-1
6.1 System configuration .....6-1
6.2 Flow of communication data .....6-3
6.3 Program in master PC .....6-5
6.4 Program in FX PC .....6-11

# 1. Introduction

The CC-Link interface block FX2N-32CCL is an interface block which connects the FX0N/FX1N/FX2N/FX2NC/FX3U/FX3UC PLC to the CC-Link.

## 1.1 Outline of product

### Applicable PC

The FX2N-32CCL can be connected as a special extension block of the FX0N/FX1N/FX2N/FX2NC/FX3U/FX3UC Series PLC.

### Control instruction

The buffer memory of the FX2N-32CCL is read and written by FROM/TO instructions.

### Connection to CC-Link

The FX2N-32CCL is connected as a remote device station to the CC-Link system.
Shielded twisted pair cables are used for wiring.

### Number of I/O points

Eight I/O points (including input and output) are occupied in the FX PC.
However, the capacity of the 5 V DC power supplied from the PC is limited.
The current consumption of 5 V DC in the FX2N-32CCL is 130 mA. Make sure that the total current consumption of 5 V DC including other special blocks does not exceed the criteria.

### Station No. and number of stations

Station No. : 1 to 64 (rotary switch)
Number of stations: 1 to 4 (rotary switch)

**Transmission speed**
**Transmission distance**

10 Mbps : 100 m
5 Mbps : 150 m
2.5 Mbps : 200 m
625 kbps : 600 m
156 kbps : 1,200 m

Detailed specifications conform to the CC-Link system common specifications.

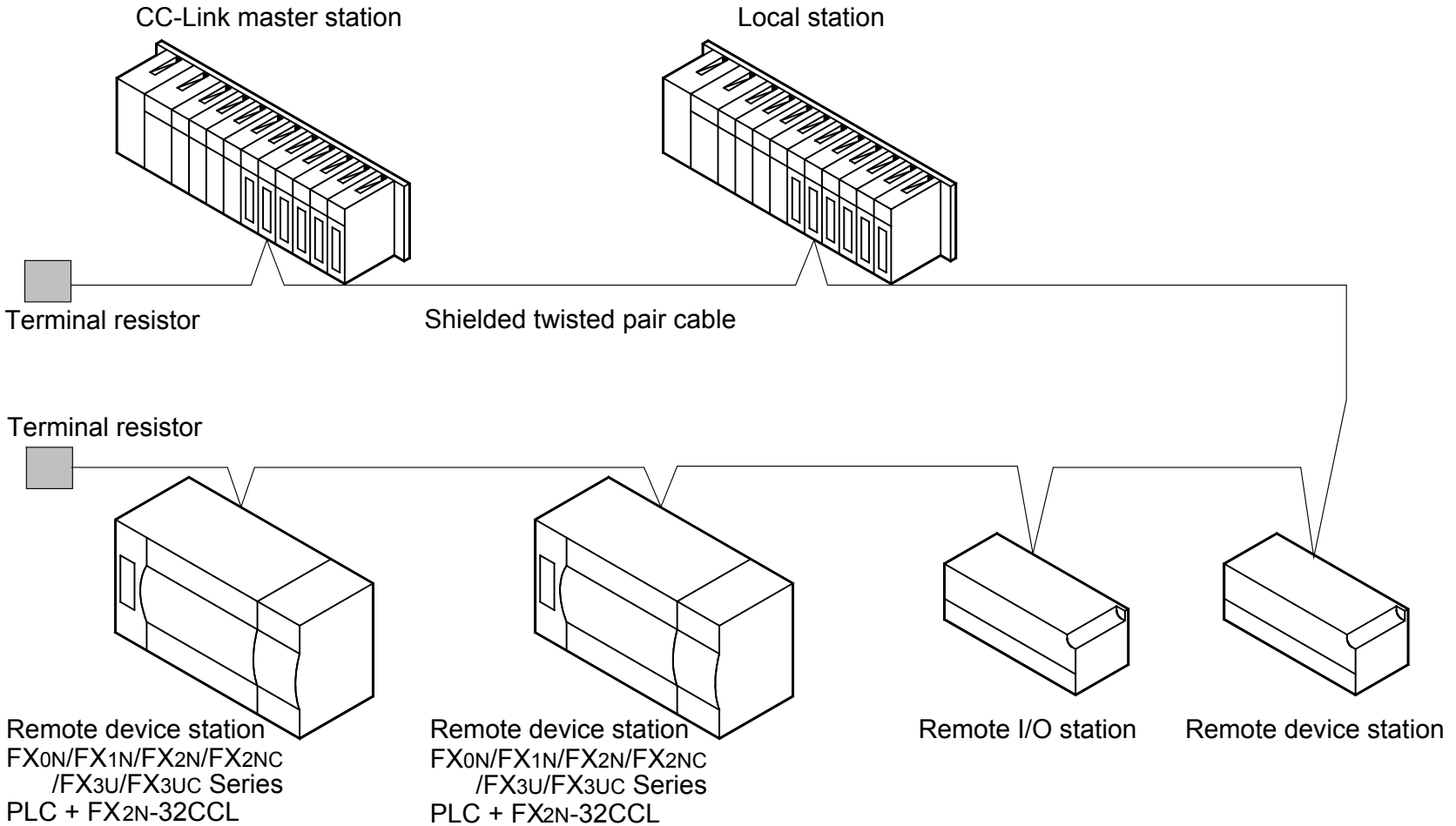
**Number of remote points**

The number of remote I/O points in one station is 32 input points and 32 output points. However, the upper 16 points of the final station are occupied by the CC-Link system as the system area.
The number of remote registers in one station is 4 points of RW write area and 4 points of RW read area.

Because the number of stations can be selected within the range of 1 to 4, the system can be constructed in accordance with the control size.

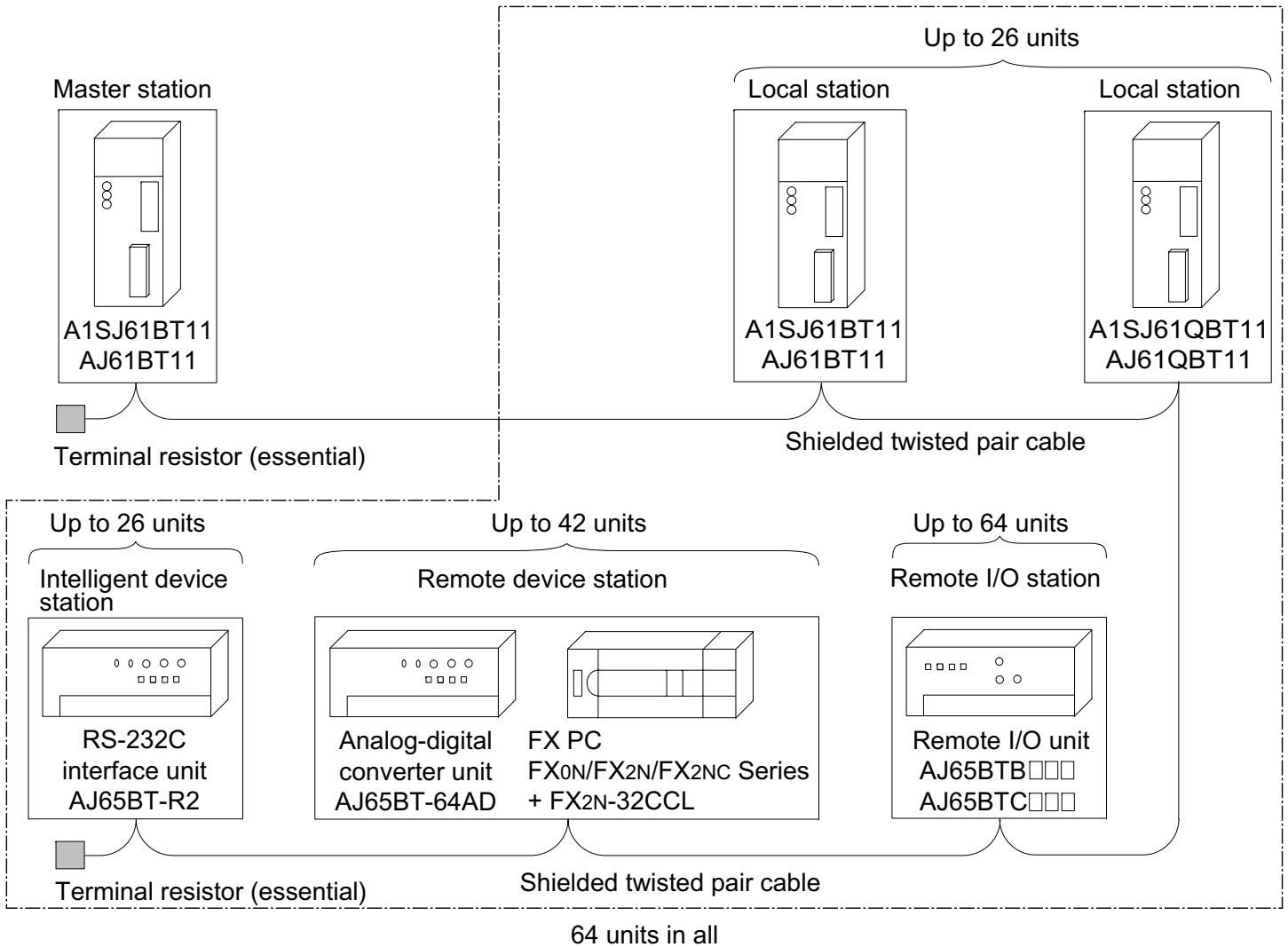
## 1.2 Connection to CC-Link

The FX PC connected with the interface block FX2N-32CCL functions as a remote device station in the CC-Link system.
One to four FX2N-32CCL units can be used at a time, and station Nos. not assigned to these FX2N-32CCL units should be assigned to other remote device stations, remote I/O stations and local stations.
The number of connectable units, the transmission speed, the transmission distance, etc. conform to the CC-Link system common specifications.



## 1.3 System configuration of entire CC-Link

The figure below shows the system configuration of the entire CC-Link.
For the details, refer to the user manual of the master unit in the CC-Link system.



# 2. Product Specifications

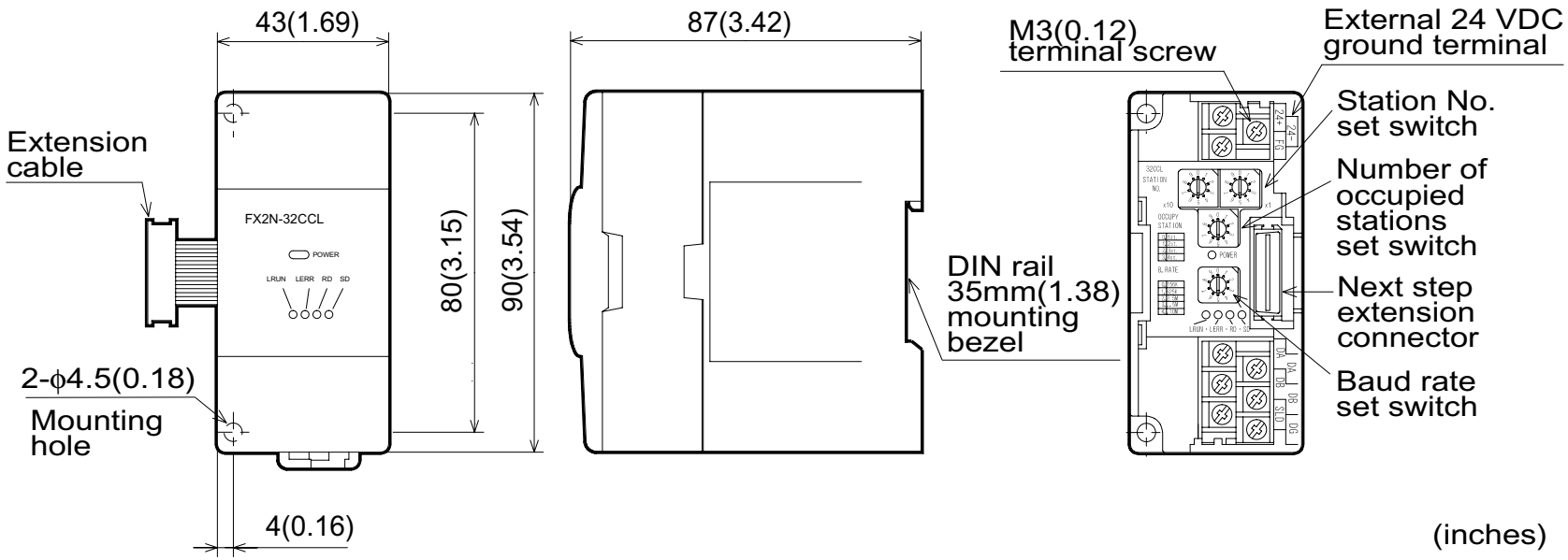
### Cautions on design

- For the status of each station in the case in which the PC CPU stops its operation or communication error has occurred in the data link, read thoroughly the contents of "5. Data Link Processing Time" of the user manual of the master unit.
  Construct an interlock circuit in a PC program so that the system can operate conservatively using the communication status information (SB, SW).
  If the interlock circuit is not correctly constructed, wrong output or malfunction may occur, and an accident may occur at the end.
  - Receive data from the master station or a local station in which a data link error has occurred
  1 ) Remote input (RX), remote output (RY)
  The data varies depending on setting of the condition set switch on the unit and setting of the input data (SW4) in a station in which a data link error has occurred.OFF: Data is cleared (All OFF).
  ON: The data just before an error occurred is held.
  2 ) Remote register (RWw, RWr)
  The data just before an error occurred is held without regard to setting of the SW4.

- Never bind the communication cable together with the main circuit, the power cable, etc. Never locate the communication cable near the main circuit, the power cable, etc.
  Keep the communication cable by 100 mm or more from the main circuit, the power cable, etc. If this distance is not kept, malfunction may occur due to noise.

## 2.1 Outside dimensions and nomenclature

Outer paint color: Munsell 0.08GY/7.64/0.81 Weight: Approx.200 g
Accessories: Special block No. label.




**[Front face of top cover]** **[Side]** **[Inside of top cover]**

POWER LED : Lit when 5 VDC power is supplied from the PC main unit.

L RUN LED : Lit while communication is performed correctly.

L ERR LED : Lit when a communication error has occurred.
Lit when a rotary switch is incorrectly set. Flickers when setting of a rotary switch is changed while the power is turned on.

RD LED : Lit while data is received.

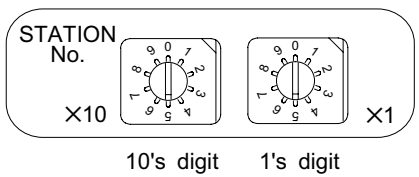
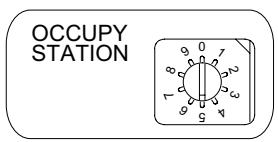
SD LED : Lit while data is sent.

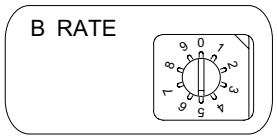
## 2.2 General specifications and performance specifications

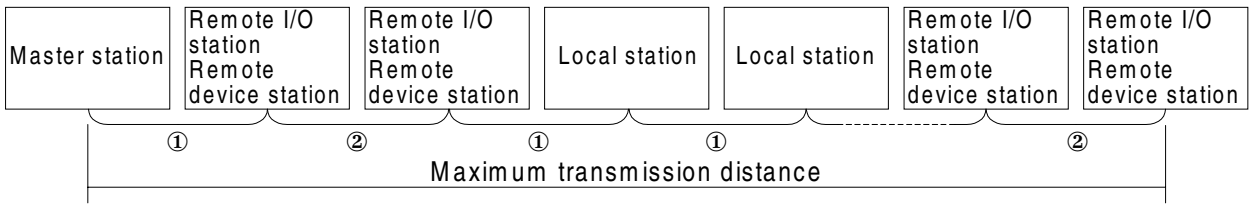
### General specifications

Dielectric strength: 500 VAC for 1 min (between external terminals as a whole and ground terminal) Other specifications are equivalent to those of the PC basic unit.

### Performance specifications

| Item | Specifications of FX2N-32CCL |
|---|---|
| **Drive power supply** | 24 VDC+/-10%, 50 mA (supplied from external terminal) |
| **Control power supply** | 5 VDC, 130 mA (supplied from PC via extension cable) |
| **Insulation method** | Network bus and internal power supply are insulated each other by photocoupler. |
| **Station type** | Remote device station |
| **Station No.<br>Number of stations** | Station No.: 1 to 64 (set by rotary switch)<br>  <br>0, 65 to 99: Setting error<br>Number of stations: 1 to 4 (set by rotary switch)<br>  <br>0: 1 station 1: 2 stations<br>2: 3 stations 3: 4 stations<br>4 to 9: Not available |
| **Number of remote device points<br>Number of remote register points** | The number of remote I/O points in one station is 32 input points and 32 output points. However, the upper 16 points are occupied by the CC-Link system as the system area.<br>The number of remote register points in one station is 4 points of RW write area and 4 points of RW read area.<br>For the details of the number of remote points and the remote Nos. in accordance with setting of the number of stations, refer to "4.2 List of number of remote points and remote Nos." |

<table>
<tr><th>Item</th><th>Specifications of FX2N-32CCL</th></tr>
<tr><td>Transmission speed</td><td>156 kbps, 625 kbps, 2.5 Mbps, 5 Mbps, 10 Mbps (set by rotary switch)<br> 

0: 156 kbps 1: 625 kbps 2: 2.5 Mbps<br>3: 5 Mbps 4: 10 Mbps 5 to 9: Setting error</td></tr>
<tr><td>Maximum transmission distance</td><td>It varies depending on the transmission speed.<br>1 )The cable length between the master/local station and an adjacent station should be 2 m or more without regard to setting of the transmission speed.<br>2 )When the transmission speed is 5 Mbps or 10 Mbps, the maximum transmission distance varies depending on the cable length between remote I/O stations and remote device stations.<br> 

FX PC functions as a remote device station.
<table>
<tr><th>Transmission speed</th><th>①</th><th>②</th><th>Maximum transmission distance</th></tr>
<tr><td>156kbps</td><td rowspan="8">2 m or more</td><td>30 cm or more</td><td>1200 m</td></tr>
<tr><td>625kbps</td><td>30 cm or more</td><td>600 m</td></tr>
<tr><td>2.5Mbps</td><td>30 cm or more</td><td>200 m</td></tr>
<tr><td rowspan="2">5Mbps</td><td>60 cm or more</td><td>150 m</td></tr>
<tr><td>30 to 59 cm</td><td>110 m</td></tr>
<tr><td rowspan="3">10Mbps</td><td>1 m or more</td><td>100 m</td></tr>
<tr><td>60 to 99 cm</td><td>80 m</td></tr>
<tr><td>30 to 59 cm</td><td>50 m</td></tr>
</table></td></tr>
</table>

| Item | Specifications of $FX_{2N}$-32CCL |
|---|---|
| **Operation indication** | LEDs (POWER, L RUN, L ERR, RD, SD) |
| **Number of occupied I/O points** | Eight I/O points (including input and output) of FX PLC |
| **Applicable PC** | $FX_{0N}$/$FX_{1N}$/$FX_{2N}$/$FX_{2NC}$/$FX_{3U}$/$FX_{3UC}$ Series PLC |
| **Communication with PC** | Communication is performed from the FX PLC via the buffer memory using FROM/TO instructions. |

Memo

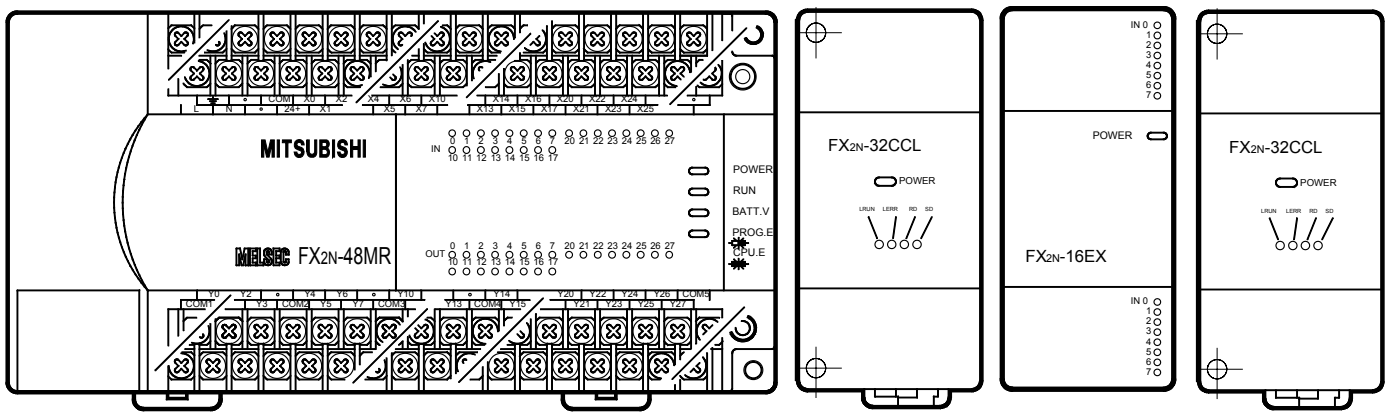
# 3. Connection and Wiring

## 3.1 Connection to PC

### Connection of extension cable

The FX2N-32CCL can be connected directly to the FX0N/FX1N/FX2N/FX3U Series main unit or connected on the right side of an other extension block or extension unit.
For connection to the main unit or an extension block of the FX2NC Series PLC, use an FX2NC-CNV-IF.
For connection to the main unit or a special function block of the FX3UC Series PLC, use an FX2NC-CNV-IF or FX3UC-1PS-5V.
A unit No. 0 to 7 is automatically assigned to each special function unit or block connected to the PLC main unit starting from the one nearest the main unit.*1
For the FX3UC-32MT-LT PLC main unit, the unit numbers start at No.1.
However, the capacity of the 5V DC power supplied from the PLC is limited. The FX2N-32CCL consumes 130mA of current from the 5V DC power supply. Make sure that the total current consumption from the 5V DC power supply including other special function blocks does not exceed the capacity.

*1 Because the unit No.0 is assigned to the built-in CC-Link/LT master in the FX3UC-32MT-LT, the unit numbers assigned to special function units/blocks start at No.1.




FX2N-48MR-ES/UL
X000~X027
Y000~Y027

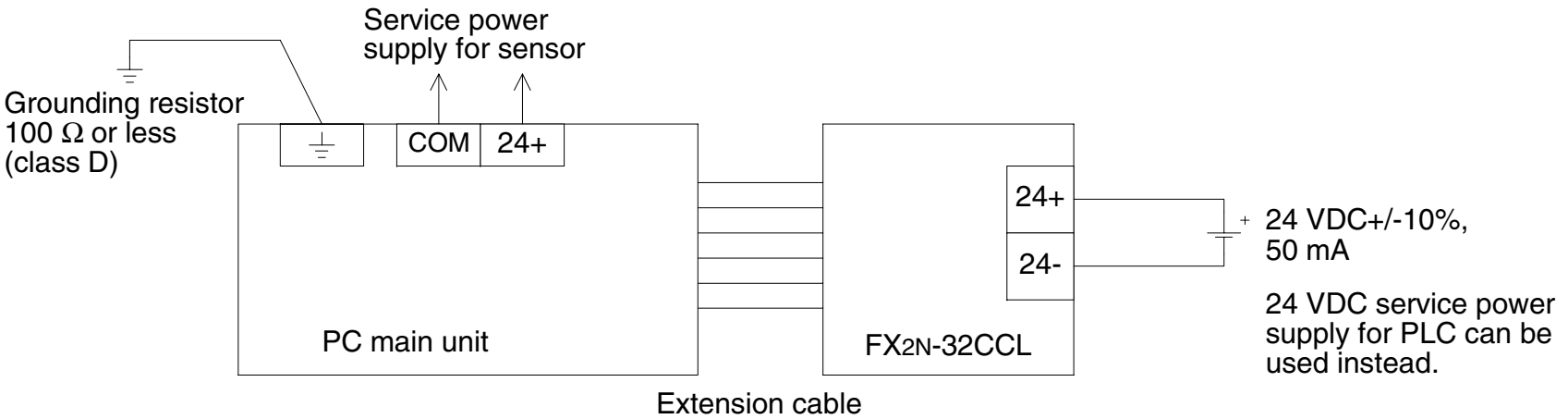
FX2N-32CCL special function block
No.0

FX2N-16EX -ES/UL
X030~X047

FX2N-32CCL special function block
No.1

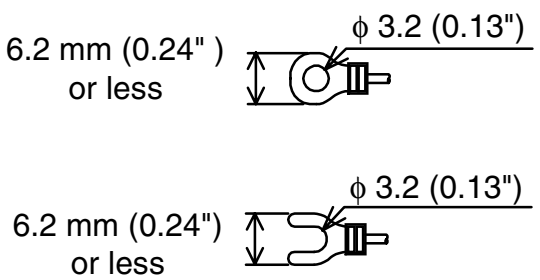
## 3.2 Wiring of power supply

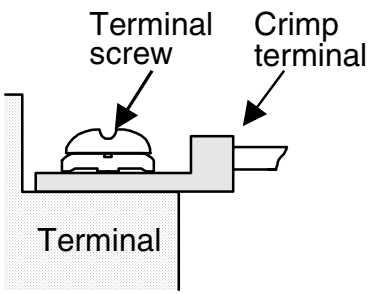
### Wiring



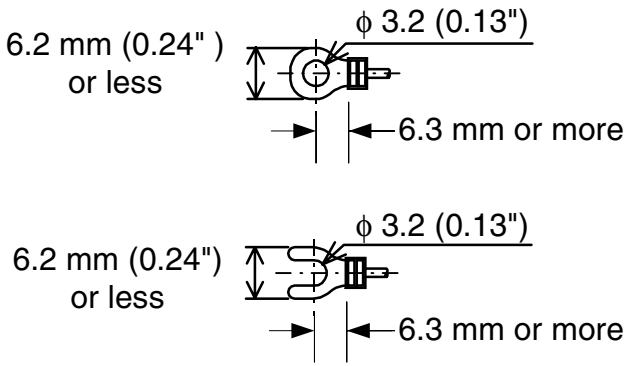

### Handling of crimp-style terminal

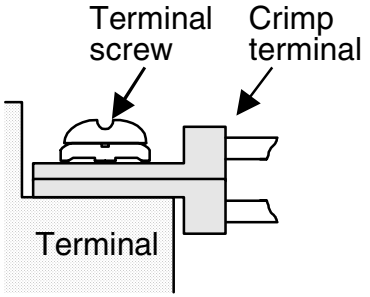
- Use crimp-style terminals of the dimensions shown as follows.
- The terminal tightening torque should be 0.5 to 0.8 N•m.
  Tighten terminals securely so that malfunction will not occur.
- Handle the crimp terminal of the following size when 1 wire is used per terminal.



- Handle the crimp terminal of the following size when 2 wires are used per terminal.

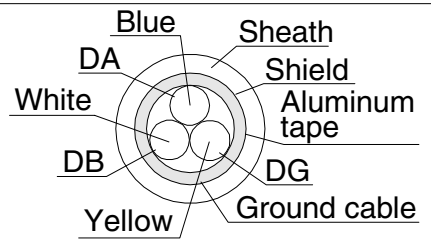


## 3.3 Wiring of CC-Link

### Specifications of twisted pair cable

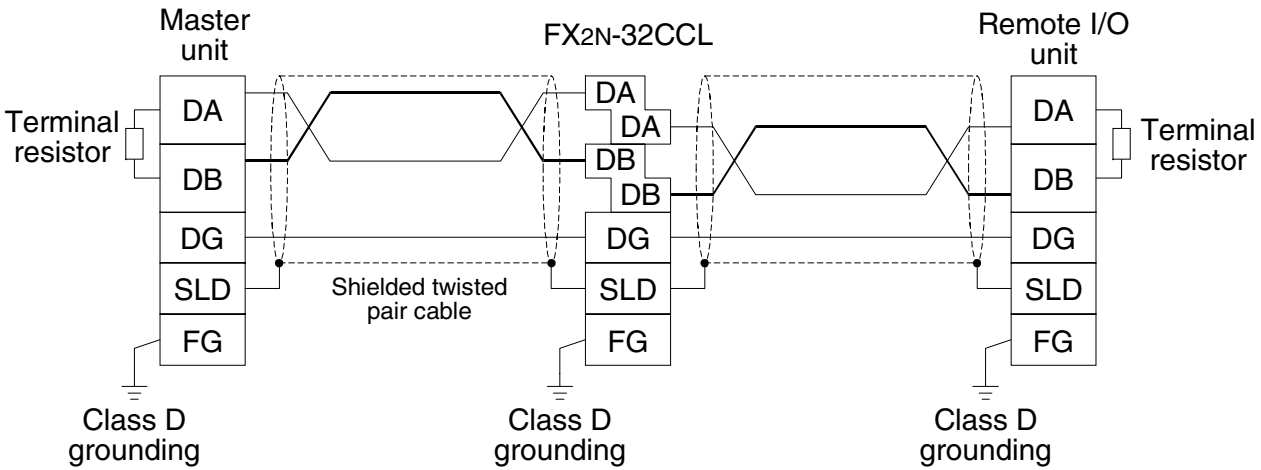
This paragraph describes a recommended twisted cable usable in the CC-Link.
If any cable other than the recommended one shown in the table below is used, the performance of the CC-Link is not assured.
The table below shows the model name and the specifications of the recommended cable.

| Item | Specifications |
|---|---|
| Model name | FANC-SB 0.5mm$^2$×3 |
| Cable type | Shielded twisted pair cable |
| Conductor cross sectional area | 0.5mm$^2$ |
| Conductor resistance (20°C) | 37.8 Ω/km or less |
| Insulation resistance | 10,000 MΩ-km or more |
| Withstand voltage | 500 VDC, 1 min |
| Electrostatic capacity (kHz) | 60 nF/km or less |
| Characteristic impedance (1 MHz) | 100±15Ω |
| Cross section |  |
| Outside dimensions | 7mm |
| Approximate weight | 65kg/km |

About the shielded twisted pair cables, consult the nearest MITSUBISHI ELECTRIC CORPORATION service center.

### Wiring of twisted pair cable

Wire the FX2N-32CCL and the CC-Link using shielded twisted pair cables as shown in the figure below.



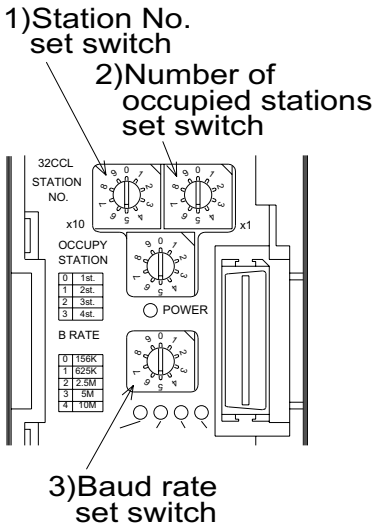

- Connect the terminals DA and DA, DB and DB as well as DG and DG of each station with shielded twisted pair cables. Because two DA terminals and two DB terminals are provided in the FX2N-32CCL, a next station can be easily connected.
- Connect the SLD terminal of each station to a shield of a shielded twisted pair cable.
- Perform Class D grounding to the FG terminal of each station.
- Wiring of each station can be performed from any point without regard to the station No.
- When the FX2N-32CCL is used as the terminal station, connect a terminal resistor between the terminals DA and DB of the FX2N-32CCL. The terminal resistor is packed together with the Master unit.
- The maximum transmission distance and the distance between stations in the CC-Link system vary depending on the selected transmission speed. For the details, refer to the maximum transmission distance described in "2.2 General specifications and performance specifications" or the specifications described in the manual of the CC-Link master unit.

# 4. Setting of Remote Device Stations

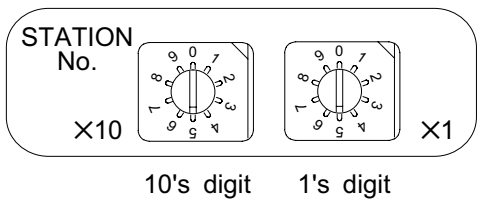
## 4.1 Setting of station Nos., number of stations and transmission speed

### Setting the rotary switch

The station No., the number of stations and the transmission speed can be set using rotary switches provided inside the panel cover of the FX2N-32CCL.
Setting of each rotary switch becomes valid when the power of the FX PC is turned on.
Set each rotary switch while the power of the PC is turned off. If setting of a rotary switch (except the rotary switch for the number of stations) is changed while the power of the PC is turned on, the L ERR LED is lit.



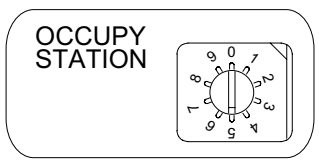

1 ) Station No.: 1 to 64




Set the station No. within the range of 1 to 64.
One to four FX2N-32CCL units can be used at a time. Pay attention so that the station No. set here is not assigned to an other unit.

0, 65 to 99: Setting error

2 ) Number of stations: 1 to 4

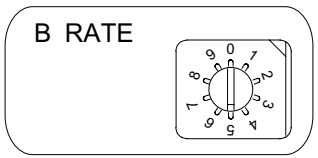



Numerics 1 to 3 correspond to 1 to 4 stations respectively.

0: 1 station
1: 2 stations
2: 3 stations
3: 4 stations
4 to 9: Not available

The number of remote device points is determined by the number of stations set here.
(☞ 4.2)

3 ) Baud rate (transmission speed): 156 kbps, 625 kbps, 2.5 Mbps, 5 Mbps, 10 Mbps




Numerics 0 to 4 correspond to 156 kbps to10 Mbps respectively.

| | |
|---|---|
| 0: 156 kbps | 3: 5 Mbps |
| 1: 625 kbps | 4: 10 Mbps |
| 2: 2.5 Mbps | 5 to 9: Setting error |

Set the transmission speed in accordance with the specifications of the maximum

transmission distance and the transmission speed. (☞ 2.2)

## 4.2 List of number of remote points and remote Nos.

In the FX2N-32CCL, the number of remote points vary depending on the selected number of stations (1 to 4).

- Thirty-two remote input points and 32 remote output points are available in one station. However, the upper 16 points of the final station are occupied by the CC-Link as the system area.
- Four read points and four write points are available as remote registers in one station.

Table of number of remote points and remote Nos. in accordance with selected number of stations

| Number of stations | Type | Remote input | Remote output | Remote register for write | Remote register for read |
|---|---|---|---|---|---|
| 1 | User area | RX00 to RX0F (16 points) | RY00 to RY0F (16 points) | RWr0 to RWr3 (4 points) | RWw0 to RWw3 (4 points) |
| | System area | RX10 to RX1F (16 points) | RY10 to RY1F (16 points) | — | — |
| 2 | User area | RX00 to RX2F (48 points) | RY00 to RY2F (48 points) | RWr0 to RWr7 (8 points) | RWw0 to RWw7 (8 points) |
| | System area | RX30 to RX3F (16 points) | RY30 to RY3F (16 points) | — | — |
| 3 | User area | RX00 to RX4F (80 points) | RY00 to RY4F (80 points) | RWr0 to RWrB (12 points) | RWw0 to RWwB (12 points) |
| | System area | RX50 to RX5F (16 points) | RY50 to RY5F (16 points) | — | — |
| 4 | User area | RX00 to RX6F (112 points) | RY00 to RY6F (112 points) | RWr0 to RWrF (16 points) | RWw0 to RWwF (16 points) |
| | System area | RX70 to RX7F (16 points) | RY70 to RY7F (16 points) | — | — |

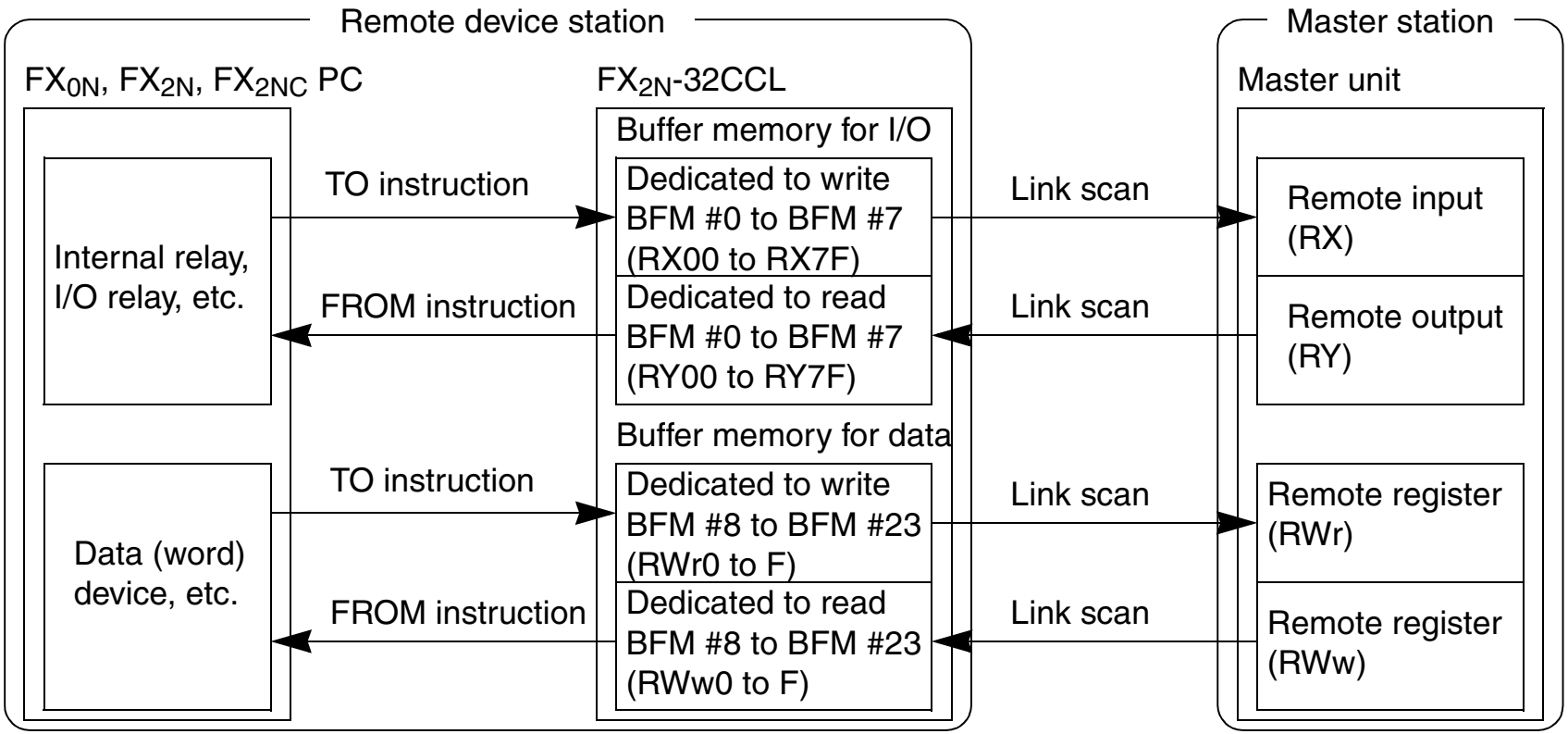
# 5. Assignment of Buffer Memory (BFM)

## 5.1 Outline of data communication

The interface block FX2N-32CCL transfers data between the master station in the CC-Link via the built-in buffer memory (BFM) backed up by the 16-bit RAM memory. This buffer memory consists of memory dedicated to write and memory dedicated to read. Numbers of #0 to #31 are assigned respectively to each type of buffer memory.

By writing data from the FX PC to the memory dedicated to write using a TO instruction, the data can be sent to the master station. The data sent from the master station is read from the memory dedicated to read to the FX PC using a FROM instruction.

**Flow of data**



## 5.2 BFM dedicated to read

**Master station → FX** Buffer memory dedicated to read

In this buffer memory, data written from the master station and the system information on the FX2N-32CCL are saved.

The contents of the buffer memory can be read from the FX PC using FROM instructions.

| BFM No. | Description |
|---|---|
| #0 | Remote output RY00 to RY0F (set station) |
| #1 | Remote output RY10 to RY1F (set station) |
| #2 | Remote output RY20 to RY2F (set station + 1) |
| #3 | Remote output RY30 to RY3F (set station + 1) |
| #4 | Remote output RY40 to RY4F (set station + 2) |
| #5 | Remote output RY50 to RY5F (set station + 2) |
| #6 | Remote output RY60 to RY6F (set station + 3) |
| #7 | Remote output RY70 to RY7F (set station + 3) |
| #8 | Remote register RWw 0 (set station) |
| #9 | Remote register RWw 1 (set station) |
| #10 | Remote register RWw 2 (set station) |
| #11 | Remote register RWw 3 (set station) |
| #12 | Remote register RWw 4 (set station+ 1) |
| #13 | Remote register RWw 5 (set station+ 1) |
| #14 | Remote register RWw 6 (set station+ 1) |
| #15 | Remote register RWw 7 (set station+ 1) |

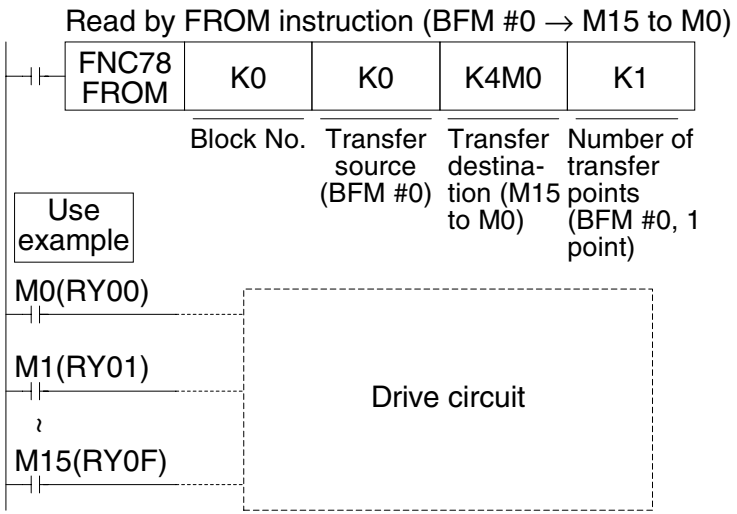
| BFM No. | Description |
|---|---|
| #16 | Remote register RWw 8 (set station+ 2) |
| #17 | Remote register RWw 9 (set station+ 2) |
| #18 | Remote register RWw A (set station+ 2) |
| #19 | Remote register RWw B (set station+ 2) |
| #20 | Remote register RWw C (set station+ 3) |
| #21 | Remote register RWw D (set station+ 3) |
| #22 | Remote register RWw E (set station+ 3) |
| #23 | Remote register RWw F (set station+ 3) |
| #24 | Set value of baud rate |
| #25 | Communication status |
| #26 | CC-Link model code |
| #27 | Set value of its own station No. |
| #28 | Set value of number of occupied stations |
| #29 | Error code |
| #30 | FX Series model code (K7040) |
| #31 | Not available |

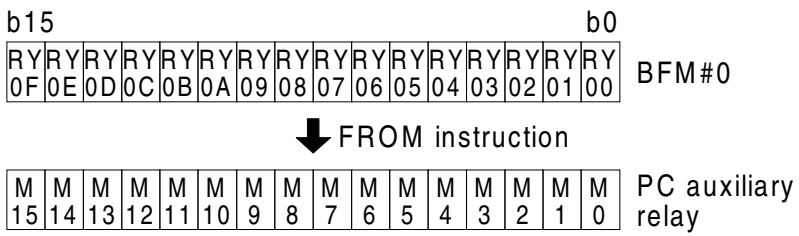
### Details of buffer memory

### [BFM #0 to #7 (remote output RY00 to RY7F)]

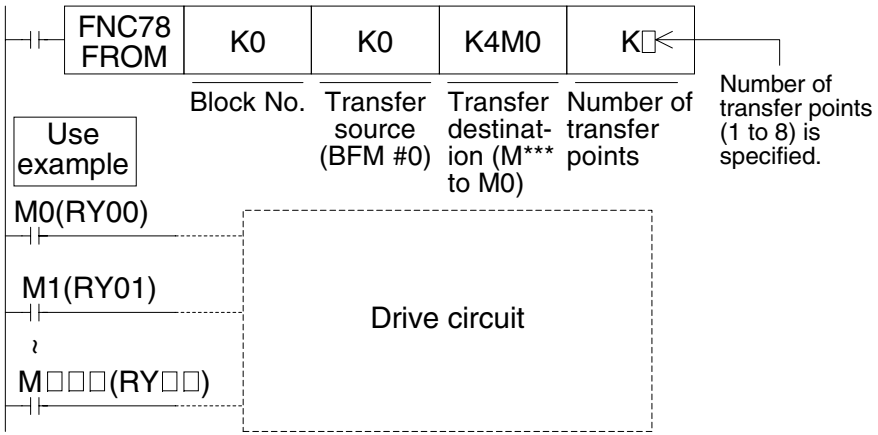
- Sixteen remote output points RY□F to RY□0 are assigned for b15 to b0 of each buffer memory consisting of 16 bits.
  The ON/OFF status information shown by each bit indicates the contents of the remote output written from the master unit to the $FX_{2N}$-32CCL.
  The FX PC reads this information to bit devices and word devices of the PC using FROM instructions.
- In the $FX_{2N}$-32CCL, the remote output point range (RY00 to RY7F) varies depending on the selected number of stations (1 to 4).
  The upper 16 points in the final station are occupied by the CC-Link system as the system area, so cannot be used as the user area. (☞ 4.2)

Example in which the ON/OFF status of BFM #0 b0 to b15 is read to the auxiliary relay in the FX PC

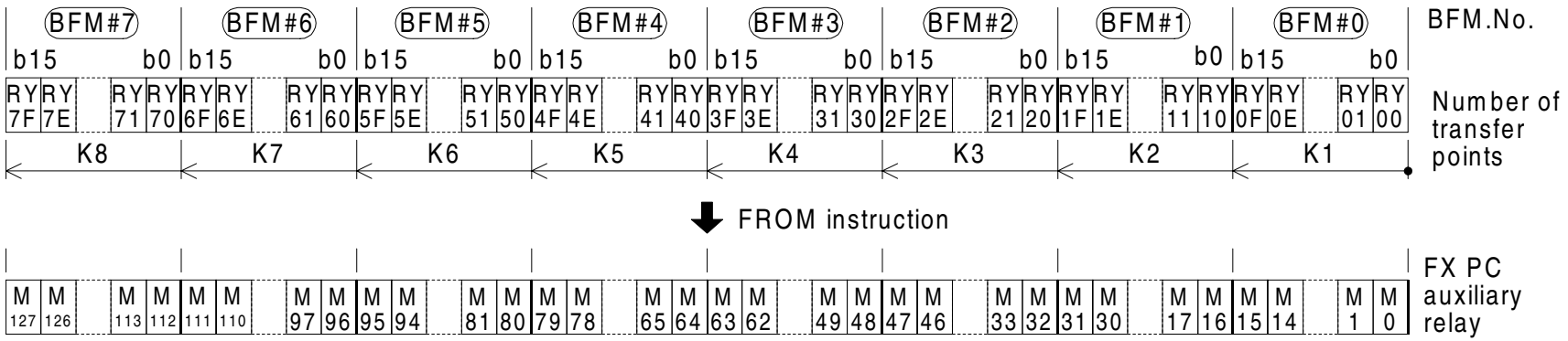


Example in which the ON/OFF status of multiple BFM points are read to the FX PC




- By changing the number of transfer points of FROM instruction within the range of K1 to K8, BFM #0 to BFM #7 can be read at a time to the auxiliary relay in the FX PC.
- When the output relays (Y) are specified as the transfer destination, they are processed by octal (Y□7 to Y□0) at a time.



**[BFM #8 to #23 (remote register RWw0 to RWwF)]**

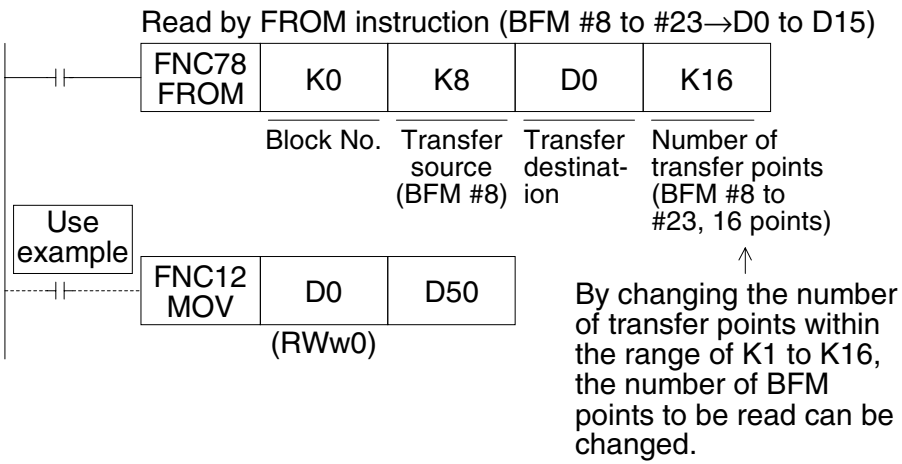
- To each buffer memory No., a remote register No. RWw0 to RWwF is assigned.
  The information saved in the buffer memory indicates the contents of the remote register written from the master unit to the FX2N-32CCL.
  The FX PC can read this information to the word device and the bit device in the PC using FROM instructions.
- In the FX2N-32CCL, the remote register range (RWw0 to RWwF) varies depending on the selected number of stations (1 to 4). (☞ 4.2)

Example in which BFM #8 to BFM #23 are read to D0 to D15 in the FX PC

| BFM No. | RWw No. |
|---|---|
| #8 | 0 |
| #9 | 1 |
| #10 | 2 |
| #11 | 3 |
| #12 | 4 |
| #13 | 5 |
| #14 | 6 |
| #15 | 7 |
| #16 | 8 |
| #17 | 9 |
| #18 | A |
| #19 | B |
| #20 | C |
| #21 | D |
| #22 | E |
| #23 | F |

FROM instruction ➡

| PC data register |
|---|
| D0 |
| D1 |
| D2 |
| D3 |
| D4 |
| D5 |
| D6 |
| D7 |
| D8 |
| D9 |
| D10 |
| D11 |
| D12 |
| D13 |
| D14 |
| D15 |



**[BFM #24 (set value of baud rate)]**

The setting of the baud rate (transmission speed) set switch provided in the FX2N-32CCL is saved as a numeric of 0 to 4.
The saved value is determined when the power of the FX PC is turned on. If the setting is changed while the power is turned on, the changed setting becomes valid when the power is turned on at the next time.

0: 156 kbps 1: 625 kbps 2: 2.5 Mbps 3: 5 Mbps 4: 10 Mbps

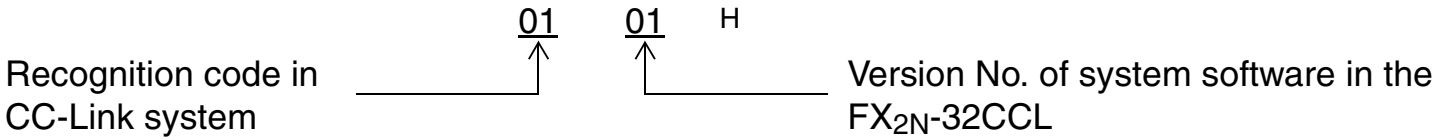
**[BFM #25 (communication status)]**

The communication status between the CC-Link and the information on the master PC are saved as the ON/OFF information to b15 to b0.
The information on the master PC is valid exclusively while link communication is performed.

| | | |
|---|---|---|
| **b0** | CRC error | This bit turns ON when there is a discrepancy with the CRC value due to unwanted noise or other disruptions affecting the transmission path. |
| **b1** | Timeout error | This error occurs when the next refresh is not given during the execution of a current refresh.<br>This bit turns ON when the transmission data send time exceeds the fixed time for normal reception completion.<br>The line may be shut down, the system may go down, or the power may be turned OFF. |
| **b2 ~ 6** | Not available | - |
| **b7** | Link execution | This bit is ON during data link with the master station. |
| **b8** | Master PLC RUN status | This bit is ON when the PLC connected to the master station is in RUN mode.<br>This bit operates only during normal data link operation. |
| **b9** | Master PLC error status | This bit turns ON when the PLC connected to the master station has an error.<br>The status is only valid when the master station CPU's operation specification for CPU shut down setting is "CONTINUE", and during normal data link operation.<br>For details, refer to the master unit manual. |
| **b10 ~ 15** | Not available | - |

**[BFM #26 (CC-Link model code)]**

The model code is saved in the following format.




**[Set value of BFM #27 (its own station No.)]**

The setting of the station No. set switch provided in the $FX_{2N}$-32CCL is saved as a numeric of 1 to 64.
The saved value is determined when the power of the FX PC is turned on. If the setting is changed while the power is turned on, the changed setting becomes valid when the power is turned on at the next time.

**[BFM #28 (set value of number of occupied stations)]**

The setting of the number of occupied stations set switch provided in the $FX_{2N}$-32CCL is saved as a numeric of 0 to 3.
0: 1 station 1: 2 stations 2: 3 stations 3: 4 stations

**[BFM #29 (error code)]**

The contents of an error are saved as the ON/OFF information to b15 to b0.

| | | |
|---|---|---|
| **b0** | Station number setting error | This bit turns ON when the rotary switch is set outside the allowable setting range. |
| **b1** | Transmission rate setting error (Band rate setting error) | This bit turns ON when the rotary switch is set outside the allowable setting range. |
| **b2 ~ 3** | Not available | - |
| **b4** | Station number change error | This bit turns ON when the rotary switch setting is changed after the FX2N-32CCL is started.<br>It turns OFF when the rotary switch is returned to its previous setting. |
| **b5** | Transmission rate change error<br>(Band rate change error) | This bit turns ON when the rotary switch setting is changed after the FX2N-32CCL is started.<br>It turns OFF when the rotary switch is returned to its previous setting. |
| **b6 ~ 7** | Not available | - |
| **b8** | External 24 V power failure. | This bit turns ON when the external power supply 24V DC is not supplied. |
| **b9 ~ 15** | Not available | - |

**[BFM #30 (FX Series model code)]**

The model code assigned to each special extension device in the FX Series is saved here.
The model code of the FX2N-32CCL is K7040.

## 5.3 BFM dedicated to write

**FX → master station** Buffer memory dedicated to write

In this buffer memory, the contents written from the FX PC to the master station are saved.
The FX PC writes the contents of bit devices and data (word) devices of the PC using TO instructions.

| BFM No. | Description |
|---|---|
| #0 | Remote input RX00 to RX0F (set station) |
| #1 | Remote input RX10 to RX1F (set station) |
| #2 | Remote input RX20 to RX2F (set station + 1) |
| #3 | Remote input RX30 to RX3F (set station + 1) |
| #4 | Remote input RX40 to RX4F (set station + 2) |
| #5 | Remote input RX50 to RX5F (set station + 2) |
| #6 | Remote input RX60 to RX6F (set station + 3) |
| #7 | Remote input RX70 to RX7F (set station + 3) |
| #8 | Remote register RWr 0 (set station) |
| #9 | Remote register RWr 1 (set station) |
| #10 | Remote register RWr 2 (set station) |
| #11 | Remote register RWr 3 (set station) |
| #12 | Remote register RWr 4 (set station + 1) |
| #13 | Remote register RWr 5 (set station + 1) |
| #14 | Remote register RWr 6 (set station + 1) |
| #15 | Remote register RWr 7 (set station + 1) |

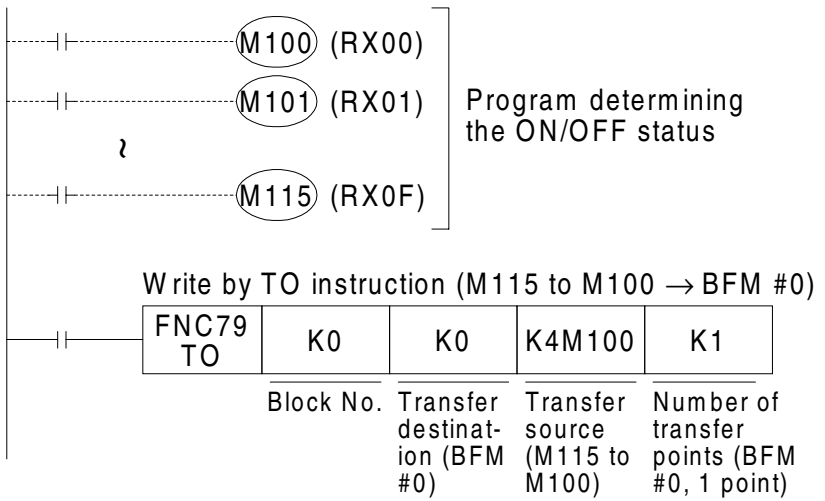
| BFM No. | Description |
|---|---|
| #16 | Remote register RWr 8 (set station + 2) |
| #17 | Remote register RWr 9 (set station + 2) |
| #18 | Remote register RWr A (set station + 2) |
| #19 | Remote register RWr B (set station + 2) |
| #20 | Remote register RWr C (set station + 3) |
| #21 | Remote register RWr D (set station + 3) |
| #22 | Remote register RWr E (set station + 3) |
| #23 | Remote register RWr F (set station + 3) |
| #24 | Undefined (Write is disabled.) |
| #25 | Undefined (Write is disabled.) |
| #26 | Undefined (Write is disabled.) |
| #27 | Undefined (Write is disabled.) |
| #28 | Undefined (Write is disabled.) |
| #29 | Undefined (Write is disabled.) |
| #30 | Undefined (Write is disabled.) |
| #31 | Not available |

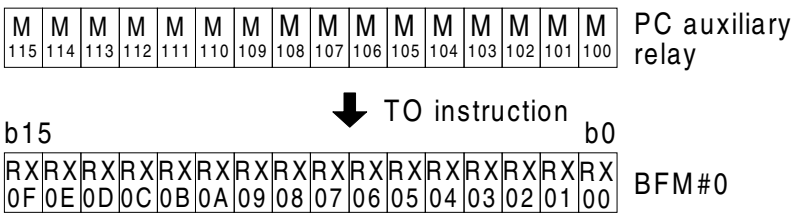
### Details of buffer memory

### [BFM #0 to #7 (remote input RX00 to RX7F)]

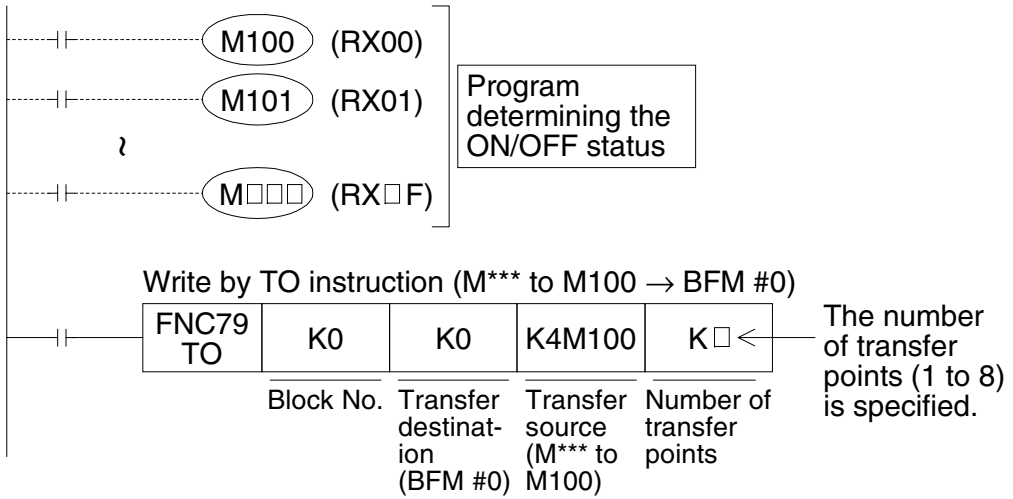
- Sixteen remote input points RX□F to RX□0 are assigned for b15 to b0 of each buffer memory consisting of 16 bits.
  The information to be written to the master unit should be preliminarily transferred from the FX PC to these buffer memories.
  The FX PC can write the contents of bit devices and word devices of the FX PC using TO instructions.
- In the FX2N-32CCL, the remote input point range (RX00 to RX7F) varies depending on the selected number of stations (1 to 4).
  The upper 16 points of the final station are occupied by the CC-Link system as the system area, so cannot be used as the user area. (☞ 4.2)

Example in which the ON/OFF status of the FX PC is written to BFM #0 b15 to b0

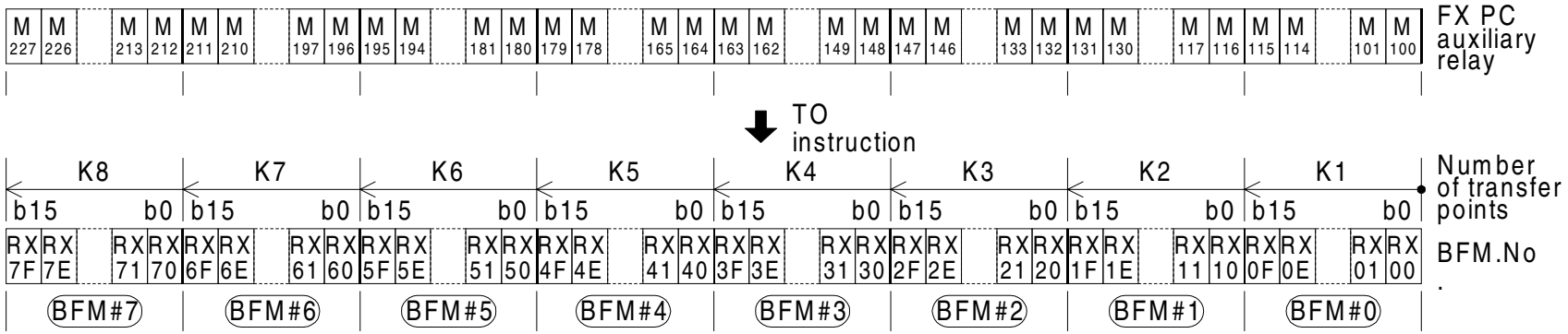


Example in which the ON/OFF status of the FX PC is written to multiple BFM points




- By changing the number of transfer points of TO instruction within the range of K1 to K8, the contents of auxiliary relays in the FX PC can be written to two or more BFM points.



**[BFM #8 to #23 (remote register RWr0 to RWrF)]**

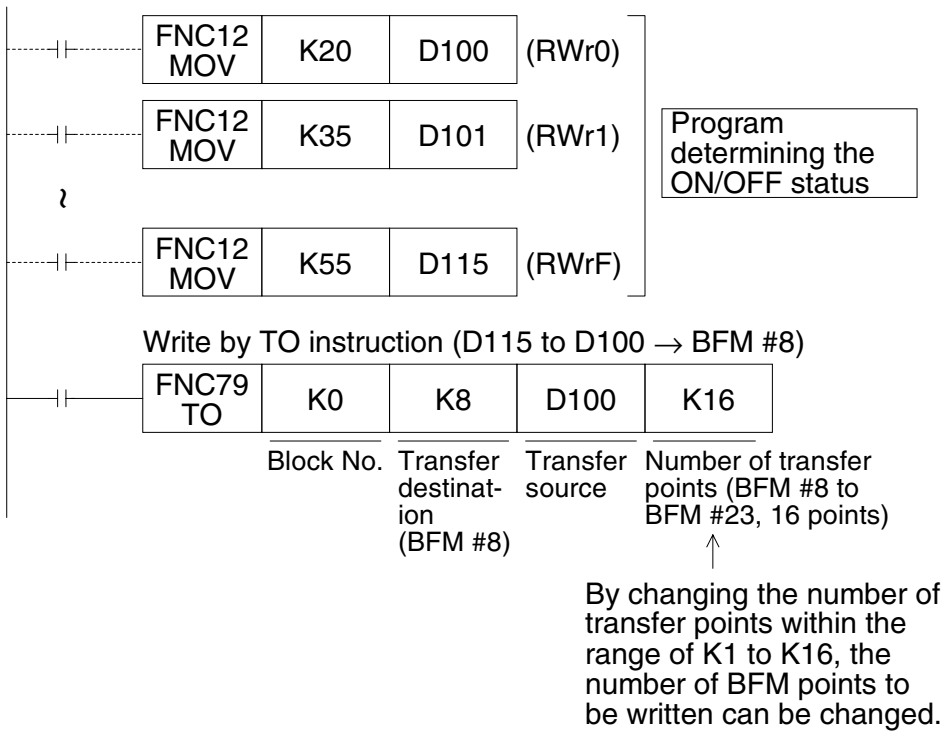
- To each buffer memory No., a remote register No. RWr0 to RWrF is assigned.
  The information to be written to the master unit should be preliminarily transferred from the FX PC to this buffer memory.
  The FX PC can write the contents of word devices and bit devices of the FX PC using TO instructions.
- In the FX2N-32CCL, the remote register point range (RWr0 to RWrF) varies depending on the selected number of stations (1 to 4). (☞ 4.2)

Example in which D100 to D115 in the FX PC are written to BFM #8 to BFM #23

| PC data register |
|---|
| D100 |
| D101 |
| D102 |
| D103 |
| D104 |
| D105 |
| D106 |
| D107 |
| D108 |
| D109 |
| D110 |
| D111 |
| D112 |
| D113 |
| D114 |
| D115 |

TO instruction ➡

| BFM No. | RWw No. |
|---|---|
| #8 | 0 |
| #9 | 1 |
| #10 | 2 |
| #11 | 3 |
| #12 | 4 |
| #13 | 5 |
| #14 | 6 |
| #15 | 7 |
| #16 | 8 |
| #17 | 9 |
| #18 | A |
| #19 | B |
| #20 | C |
| #21 | D |
| #22 | E |
| #23 | F |



## 5.4 System area of remote I/O

As to the number of remote I/O points (RX00 to RX7F/RY00 to RY7F) in the FX2N-32CCL, the range and the number of points vary depending on the selected number of stations (1 to 4).
The upper 16 points of the final station are occupied by the CC-Link system as the system area, so cannot be used as the user area. (☞ 4.2) The tables below show assignment of the system area.

**Master station → FX** Dedicated to read

| Device No. | Description |
|---|---|
| RY(2n-1)0 | Unusable |
| RY(2n-1)1 | Unusable |
| RY(2n-1)2 | Unusable |
| RY(2n-1)3 | Unusable |
| RY(2n-1)4 | Unusable |
| RY(2n-1)5 | Unusable |
| RY(2n-1)6 | Unusable |
| RY(2n-1)7 | Unusable |
| RY(2n-1)8 | Initial data processing completion flag |
| RY(2n-1)9 | Initial data processing request flag |
| RY(2n-1)A | Error reset request flag |
| RY(2n-1)B | Undefined |
| RY(2n-1)C | Reserved (unusable) |
| RY(2n-1)D | Reserved (unusable) |
| RY(2n-1)E | Reserved (unusable) |
| RY(2n-1)F | Reserved (unusable) |

**FX → Master station** Dedicated to write

| Device No. | Description |
|---|---|
| RX(2n-1)0 | Unusable |
| RX(2n-1)1 | Unusable |
| RX(2n-1)2 | Unusable |
| RX(2n-1)3 | Unusable |
| RX(2n-1)4 | Unusable |
| RX(2n-1)5 | Unusable |
| RX(2n-1)6 | Unusable |
| RX(2n-1)7 | Unusable |
| RX(2n-1)8 | Initial data processing request flag |
| RX(2n-1)9 | Initial data processing completion flag |
| RX(2n-1)A | Error status flag |
| RX(2n-1)B | Remote ready |
| RX(2n-1)C | Reserved (unusable) |
| RX(2n-1)D | Reserved (unusable) |
| RX(2n-1)E | Reserved (unusable) |
| RX(2n-1)F | Reserved (unusable) |

"n" indicates the number of occupied stations.
(Example: When three stations are occupied, the device Nos. are "RY50 to RY5F" and "RX50 to RX5F".)

## 5.5 Contents of errors

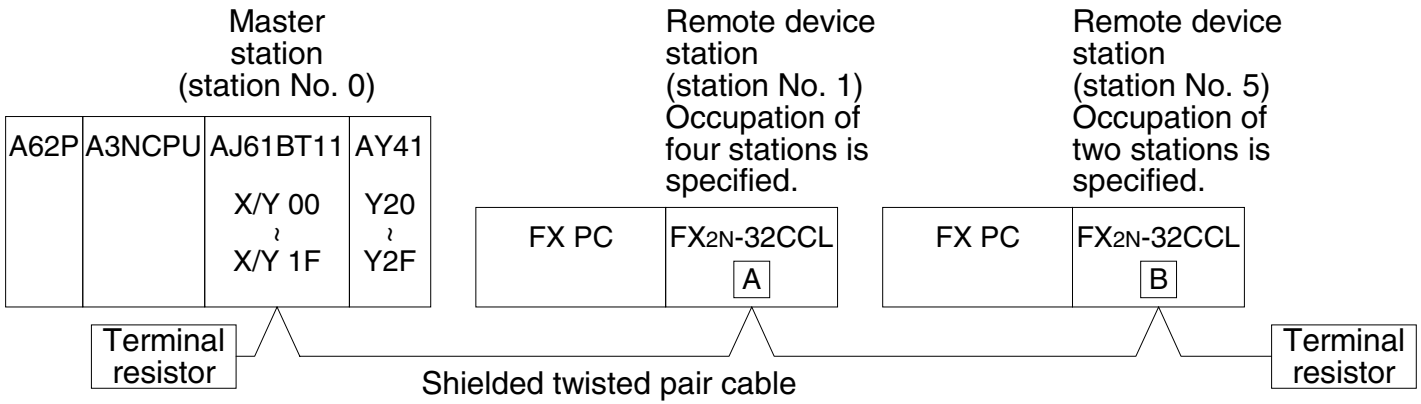
The table below shows the contents of errors indicated by LEDs provided in the $FX_{2N}$-32CCL.
The causes of an error can be detected based on the contents of the error saved in the buffer memory dedicated to read BFM #29 and the status of the LED. (☞ 5.2)
For errors related to the PC and the master unit, refer to the user's manual (detailed manuals) of the PC and the master unit.

| L RUN | L ERR | Causes of error |
|---|---|---|
| Lit ● | Extinguished ○ | Data link is in the normal status. |
| Extinguished ○ | Extinguished ○ | The following causes are estimated.<br>For details, refer to the user's manual (detailed manual) of the master unit.<br>• A cable is disconnected.<br>(L ERR LED is extinguished on units after the unit in which disconnection has occurred.)<br>• A cable is short-circuited.<br>(L RUN LED is extinguished on all the units.)<br>• Link of the master station is stopped.<br>(L RUN LED is extinguished on all the units except the master station.)<br>• Power supplied to the $FX_{2N}$-32CCL is turned off.<br>(ERR LED is extinguished on the master station and the local stations.)<br>• Same station No. is assigned to the $FX_{2N}$-32CCL and an other station.<br>(L RUN LED is extinguished on the unit to which the same station No. is assigned.)<br>• The transmission speed is incorrectly set.<br>• The $FX_{2N}$-32CCL is not set to a parameter. |
| Extinguished ○ | Lit ● | The unit is started up while the station No. set switch is set to an unallowable value. |
| Extinguished ○ | Flickers ★ | Setting of the station No. set switch or the transmission speed set switch is changed during data linking. |

# 6. Programming Examples

## 6.1 System configuration

A sample program is explained in the system configuration shown below.



### Preparation

1 ) Set the station No. set switch, the mode set switch, the transmission set switch and the condition set switch provided on the master unit. (☞ User's manual of master unit)

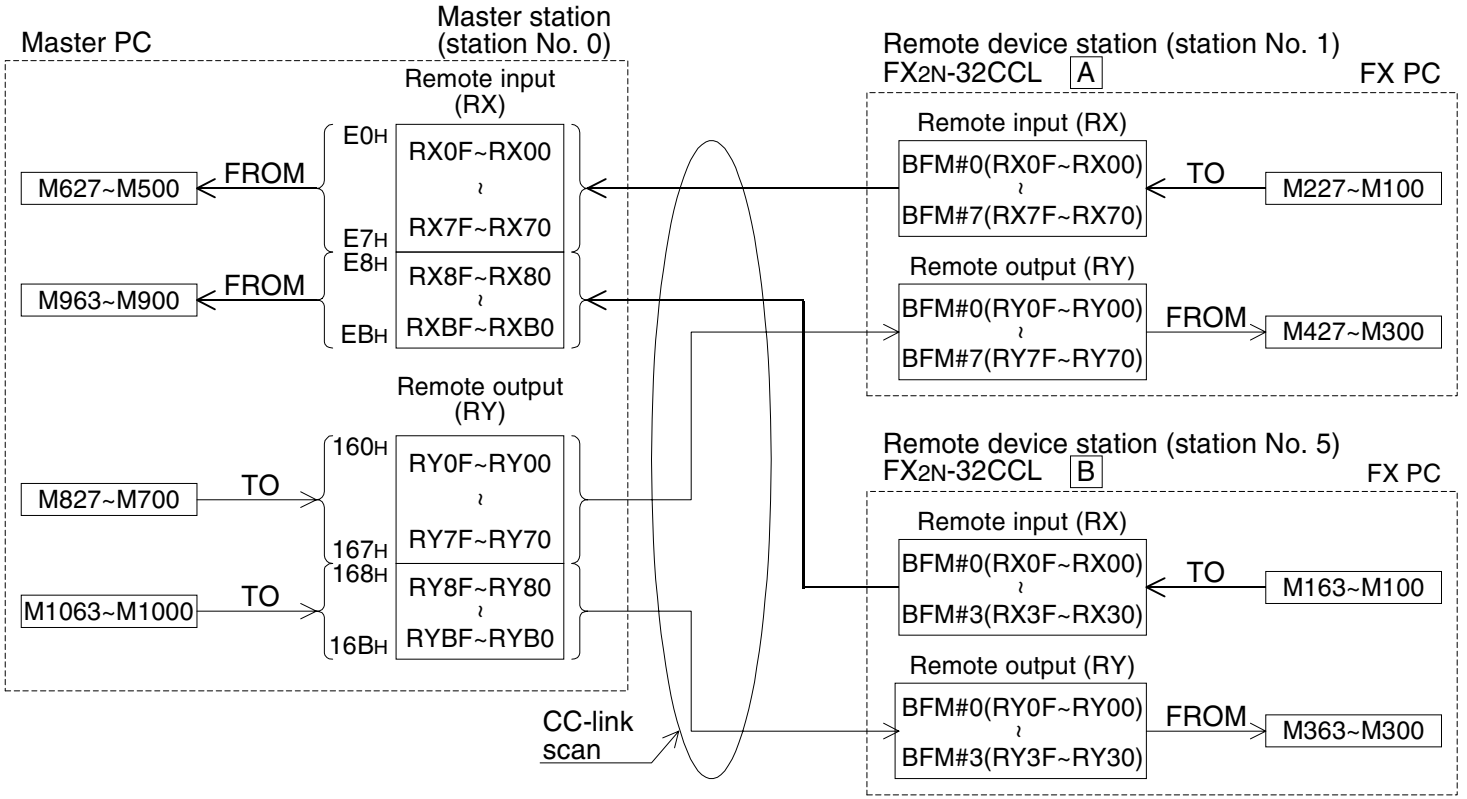
2 ) Set the station No. set switch, the number of occupied stations set switch and the transmission speed set switch provided on the $FX_{2N}$-32CCL. (☞ 4.1)

| Item | Setting of $FX_{2N}$-32CCL (station No. 1) | Setting of $FX_{2N}$-32CCL (station No. 5) |
|---|---|---|
| Station No. | 1 (rotary switch) | 5 (rotary switch) |
| Number of occupied stations | 4 (rotary switch) | 2 (rotary switch) |
| Transmission speed | In accordance with setting in master unit (rotary switch) | |
| Assignment of number of remote points and No.<br><br>Number of points and No. are determined by selected number of occupied stations. | Number of remote points and No. when four stations are occupied<br>•Remote input:<br>RX00 to RX6F (112 points) for user area<br>RX70 to RX7F (16 points) for system area<br>•Remote output:<br>RY00 to RY6F (112 points) for user area<br>RY70 to RY7F (16 points) for system area<br>•Remote register:<br>RWr0 to RWrF (16 points) for write<br>RWw0 to RWwF (16 points) for read | Number of remote points and No. when two stations are occupied<br>•Remote input:<br>RX00 to RX2F (48 points) for user area<br>RX30 to RX3F (16 points) for system area<br>•Remote output:<br>RY00 to RY2F (48 points) for user area<br>RY30 to RY3F (16 points) for system area<br>•Remote register:<br>RWr0 to RWr7 (8 points) for write<br>RWw0 to RWw7 (8 points) for read |

## 6.2 Flow of communication data

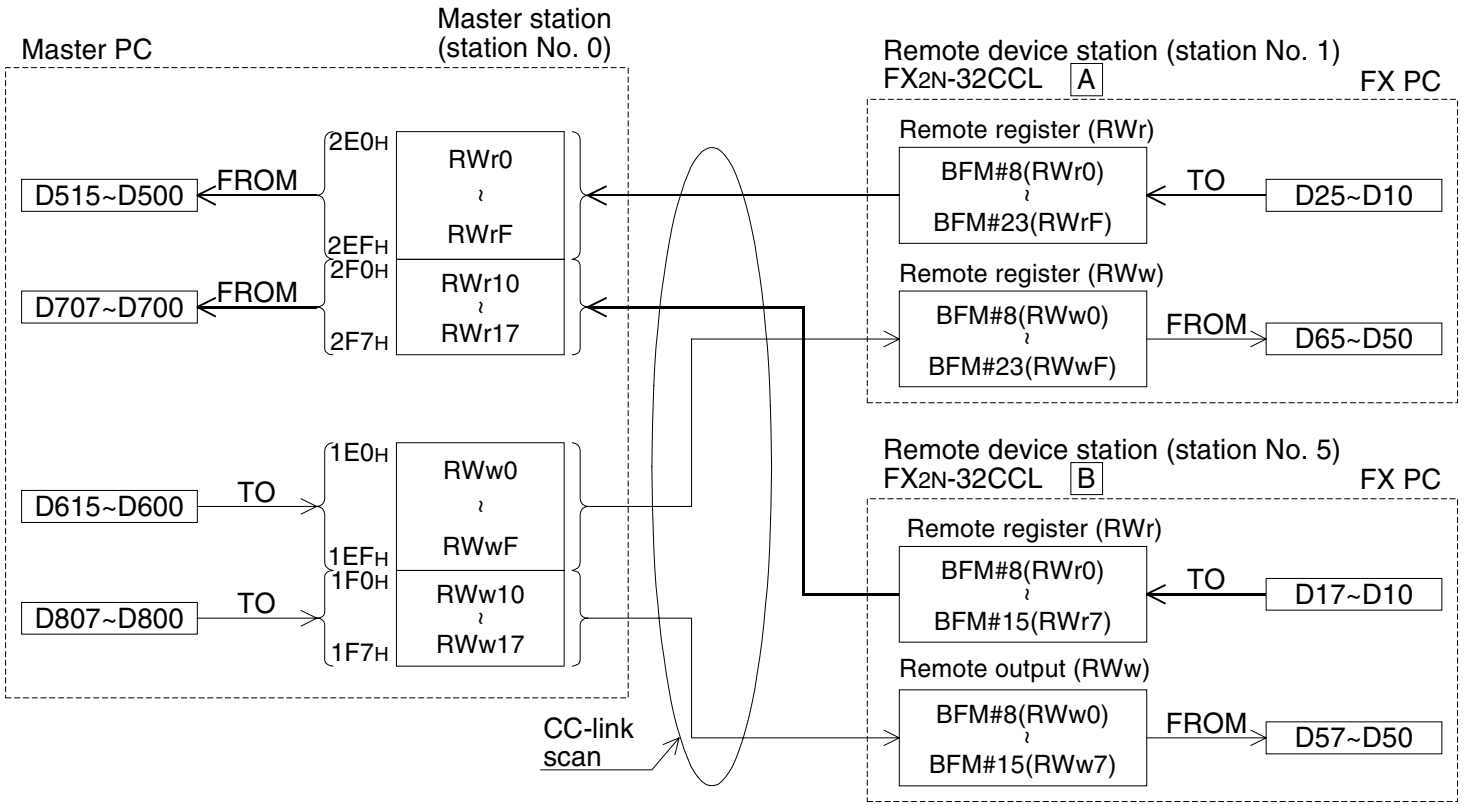
### Remote input (RX), remote output (RY)

In a sample program, communication is performed between remote inputs and remote outputs as shown in the figure below.



### Remote register (RWr, RWw)

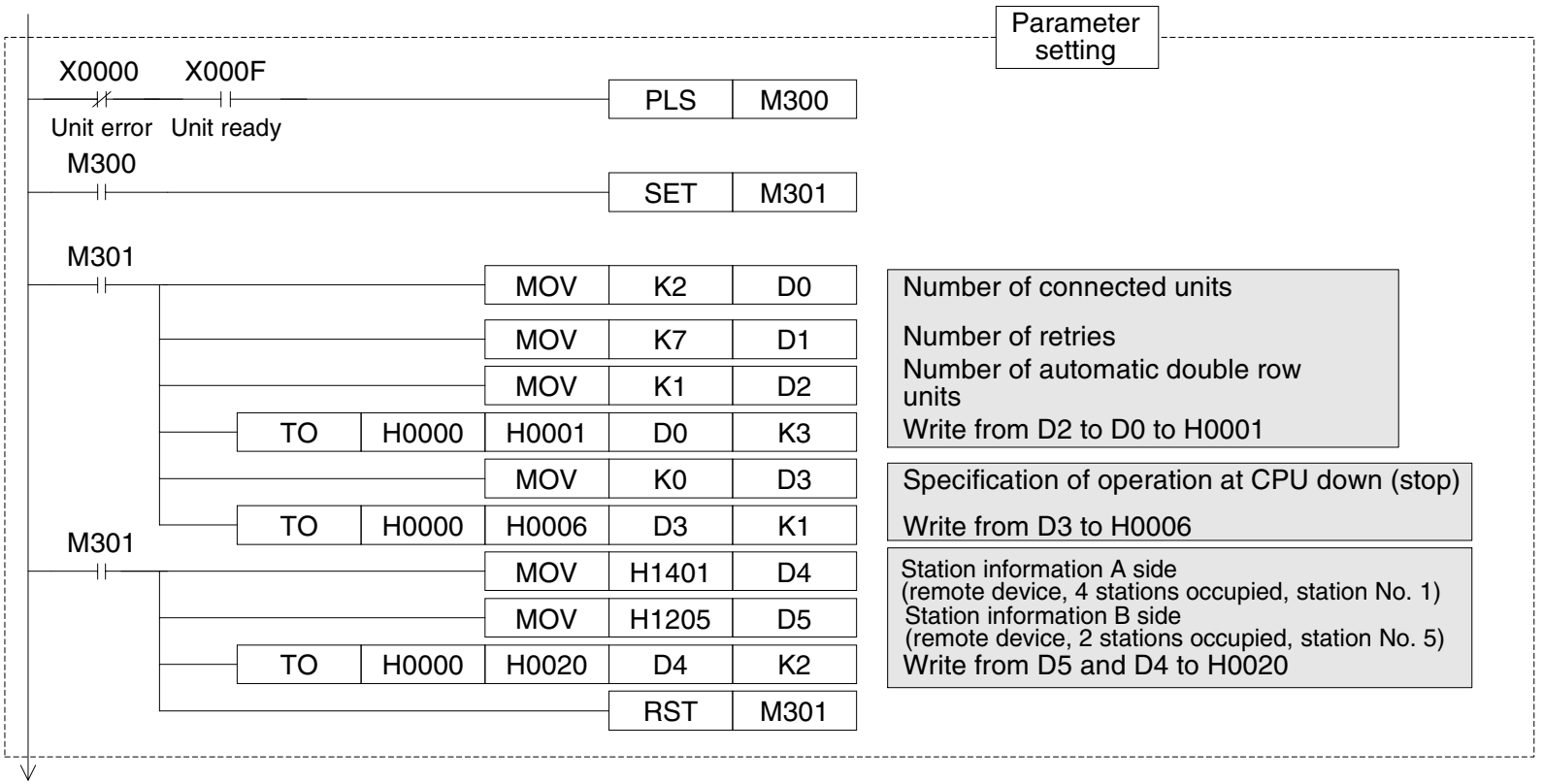
In a sample program, communication is performed in remote registers as shown in the figure below.

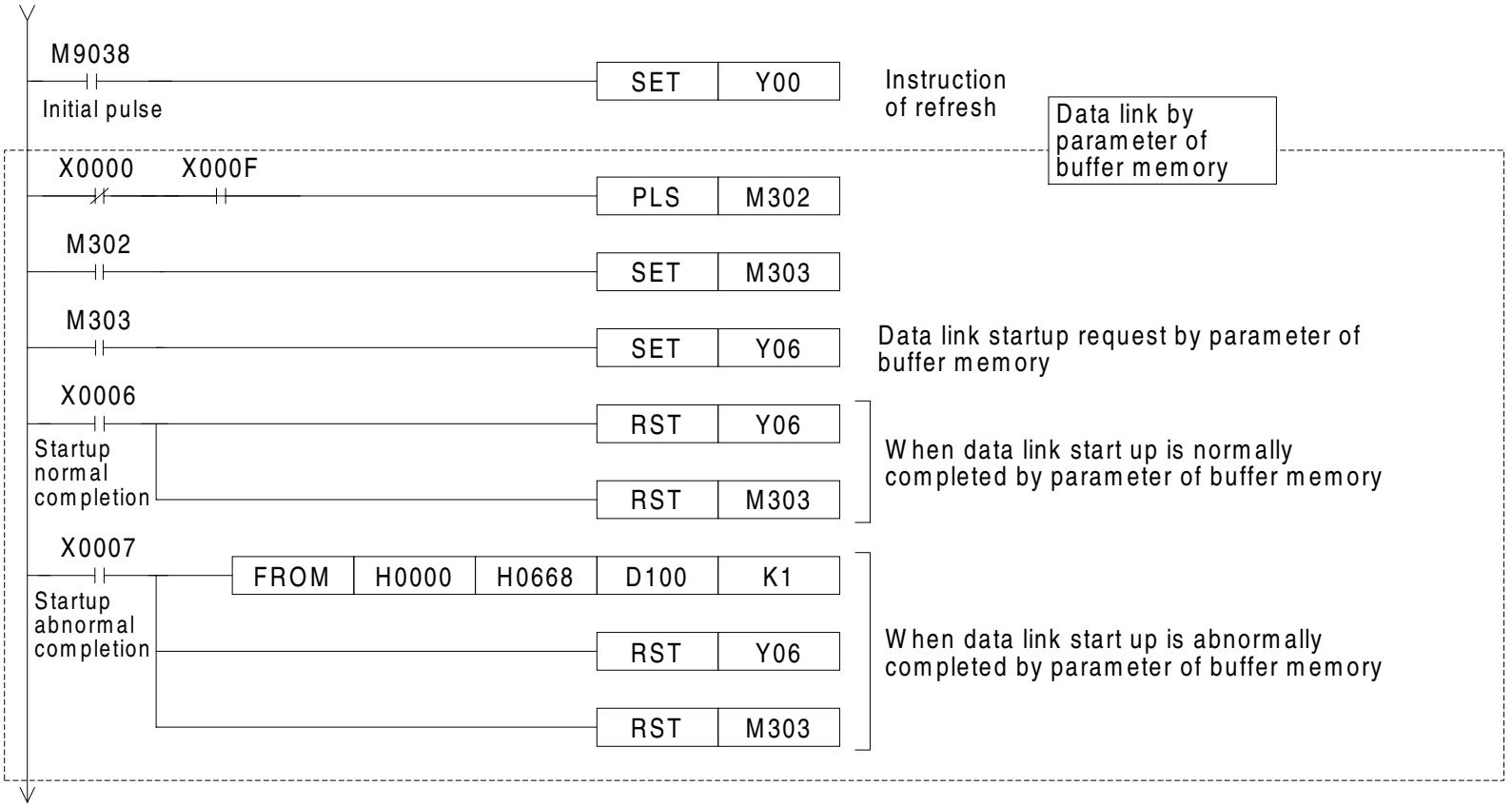


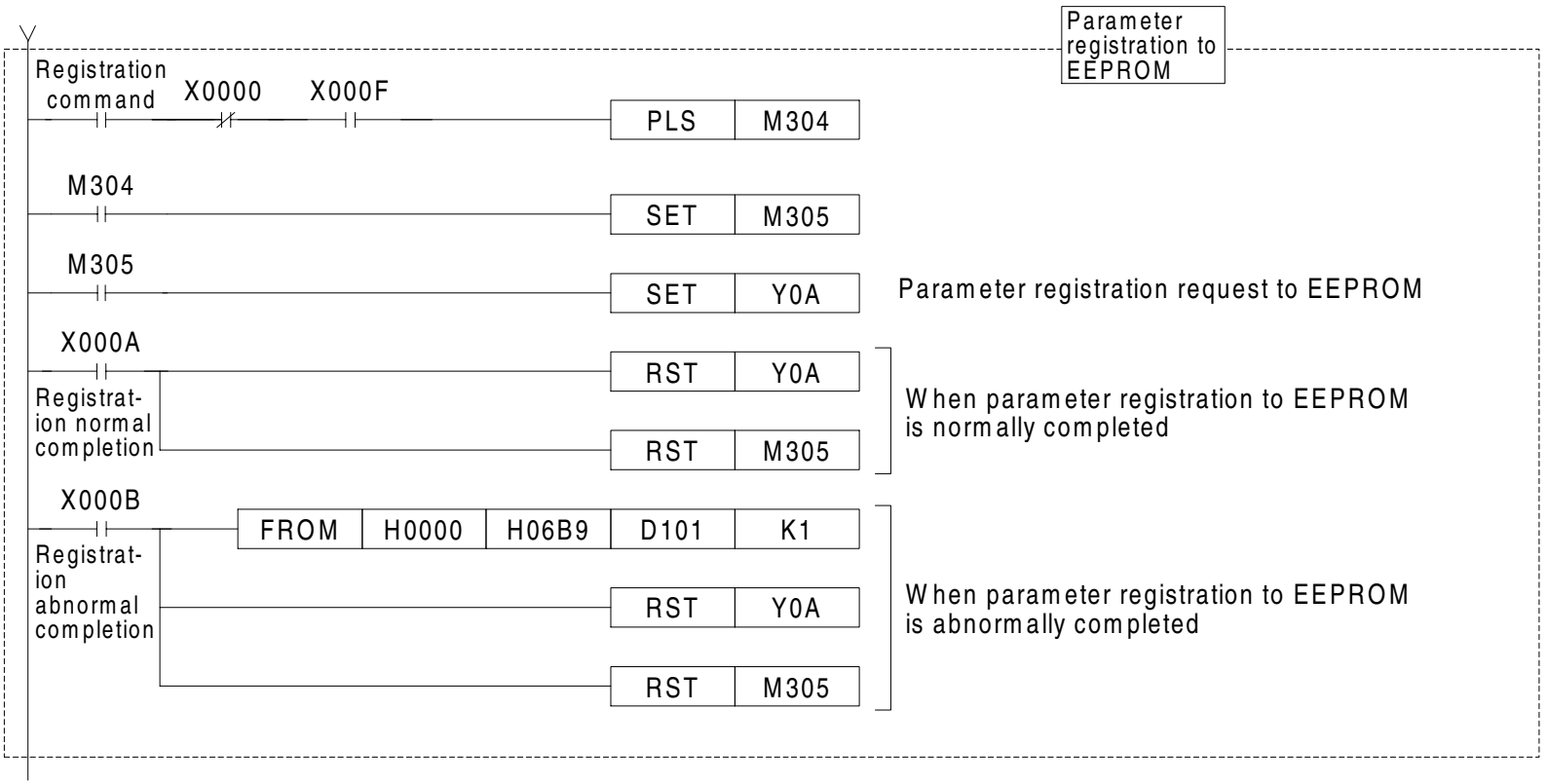
## 6.3 Program in master PC

When the PC CPU starts to run, data linking is automatically started by the program shown below.

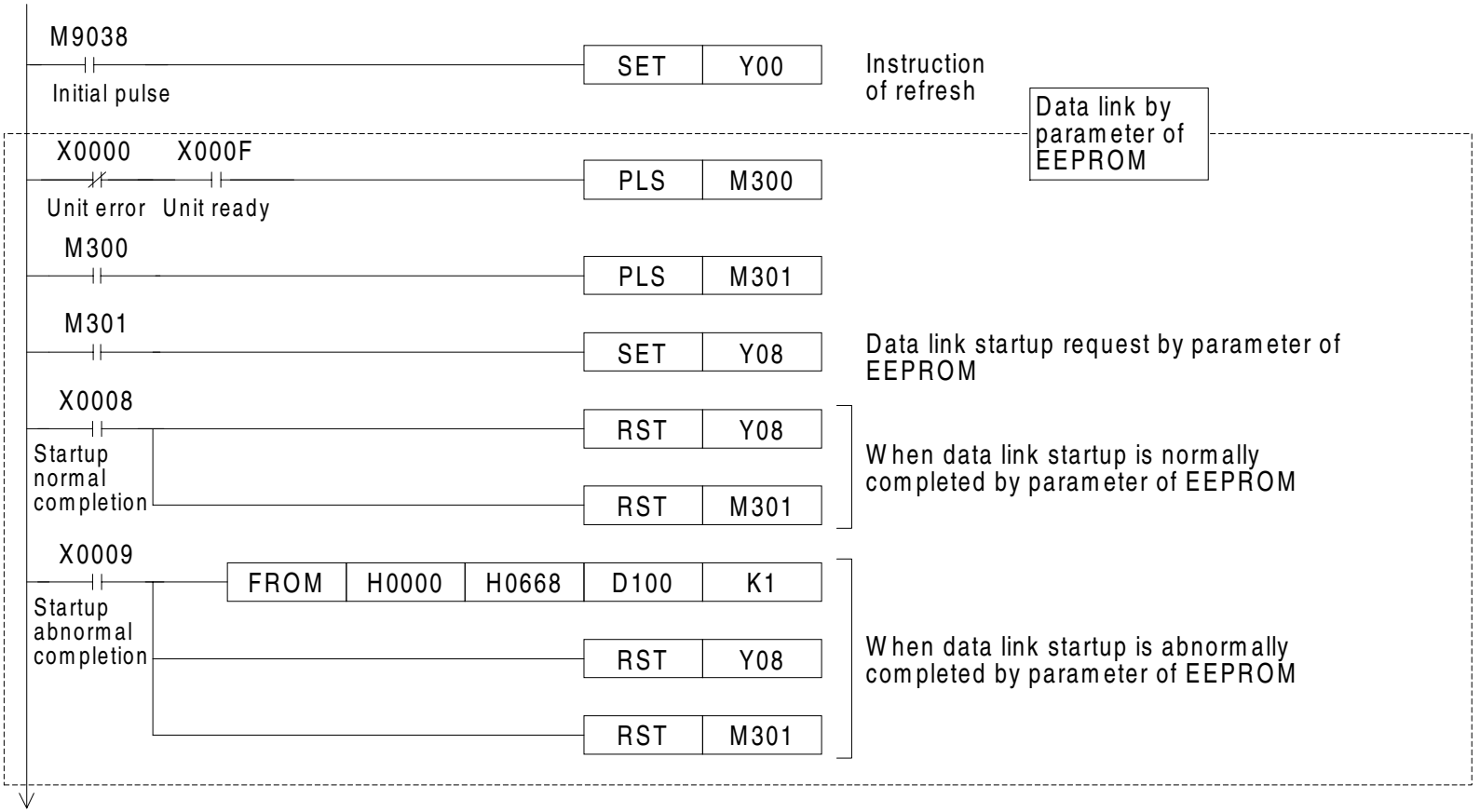
**During debugging**



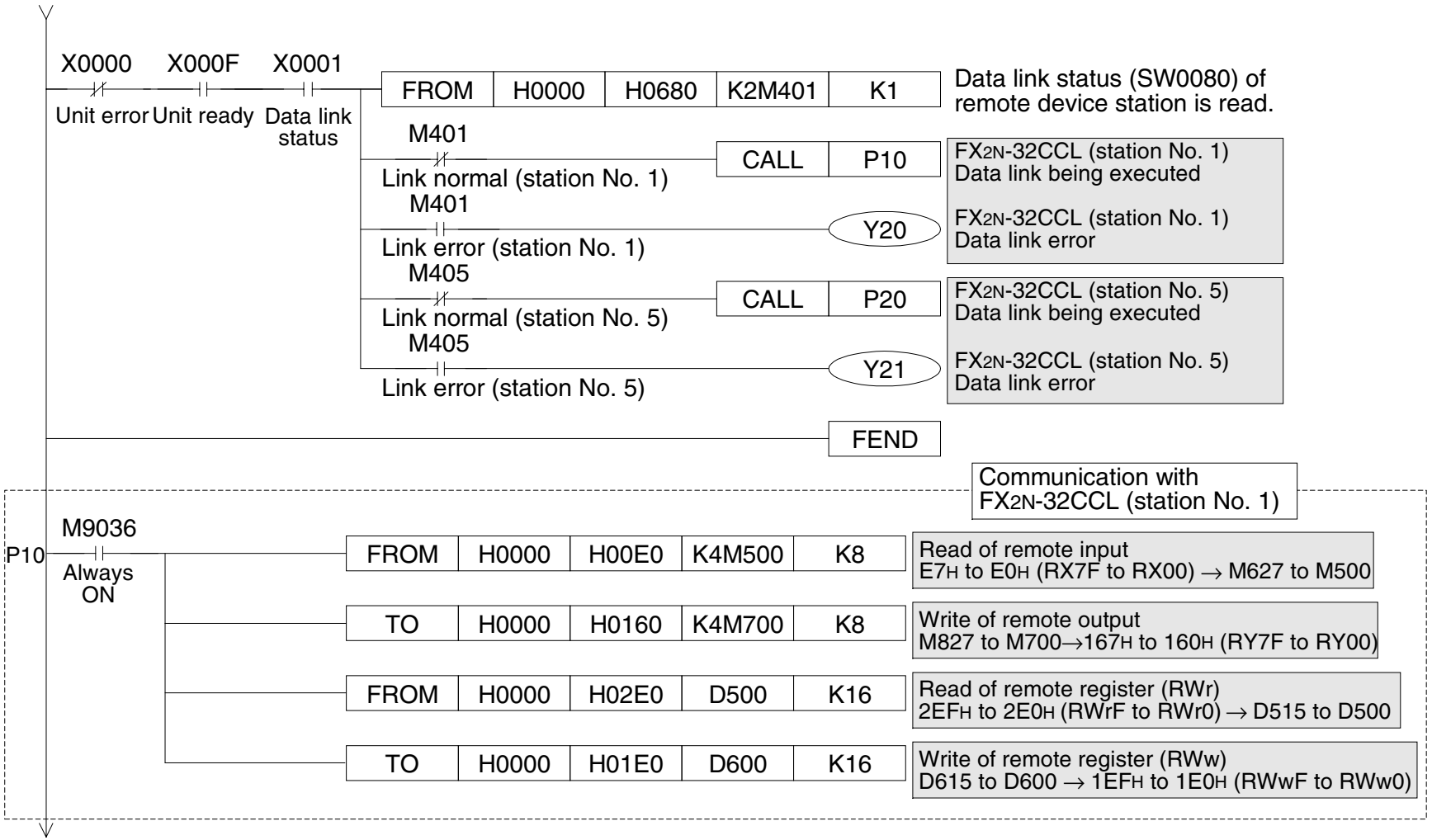

M9038
Initial pulse
SET Y00
Instruction of refresh
Data link by parameter of buffer memory
X0000 X000F
PLS M302
M302
SET M303
M303
SET Y06
Data link startup request by parameter of buffer memory
X0006
Startup normal completion
RST Y06
RST M303
When data link start up is normally completed by parameter of buffer memory
X0007
Startup abnormal completion
FROM H0000 H0668 D100 K1
RST Y06
RST M303
When data link start up is abnormally completed by parameter of buffer memory

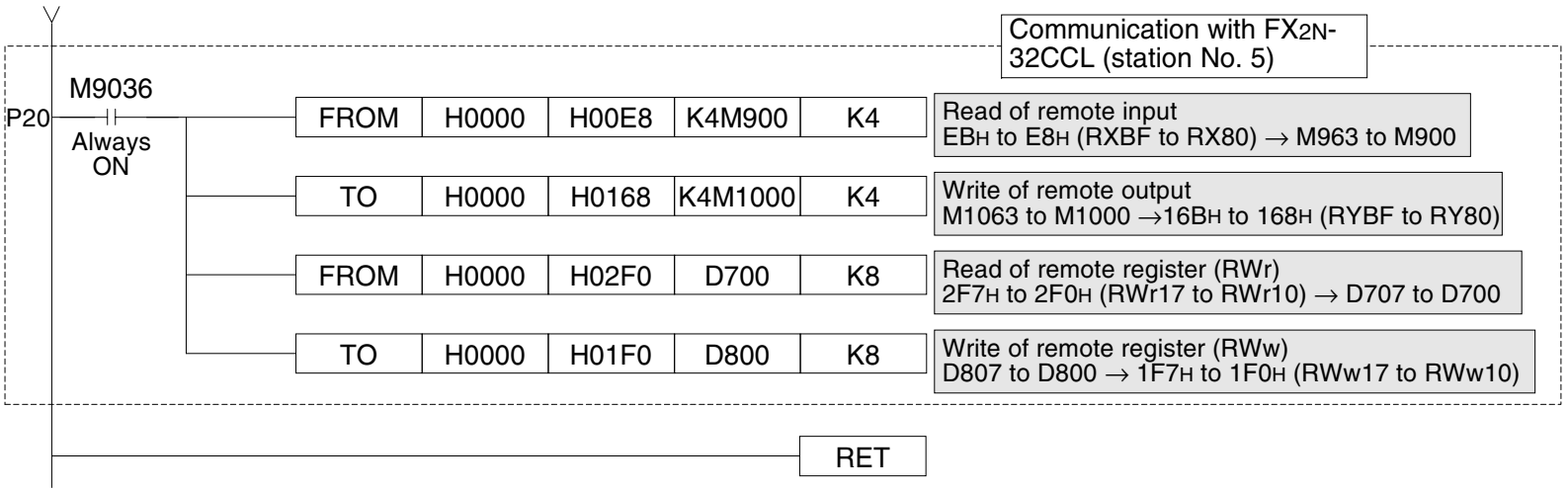

Parameter registration to EEPROM
Registration command
X0000
X000F
PLS M304
M304
SET M305
M305
SET Y0A
Parameter registration request to EEPROM
X000A
Registration normal completion
RST Y0A
RST M305
When parameter registration to EEPROM is normally completed
X000B
Registration abnormal completion
FROM H0000 H06B9 D101 K1
RST Y0A
RST M305
When parameter registration to EEPROM is abnormally completed

## During operation



## Program for communication with remote device station

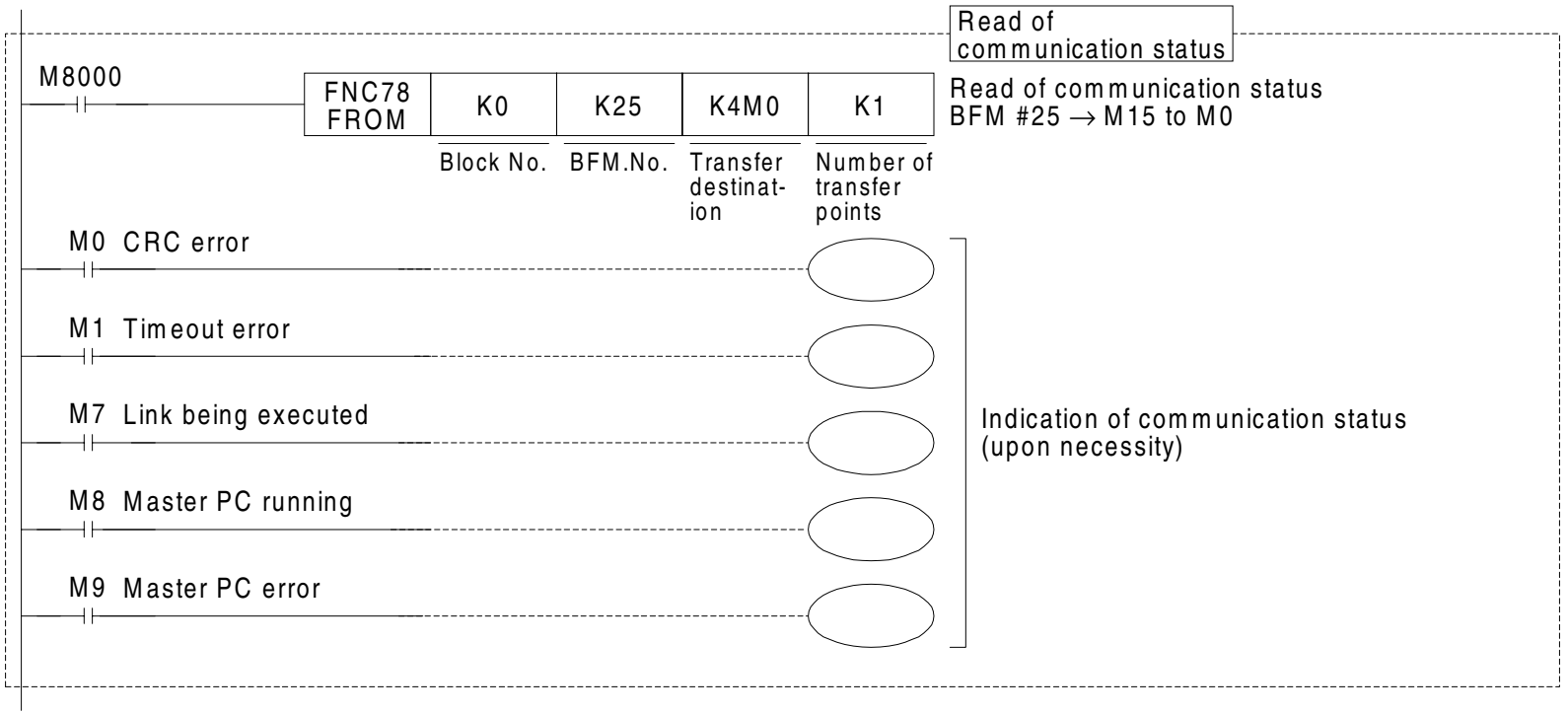


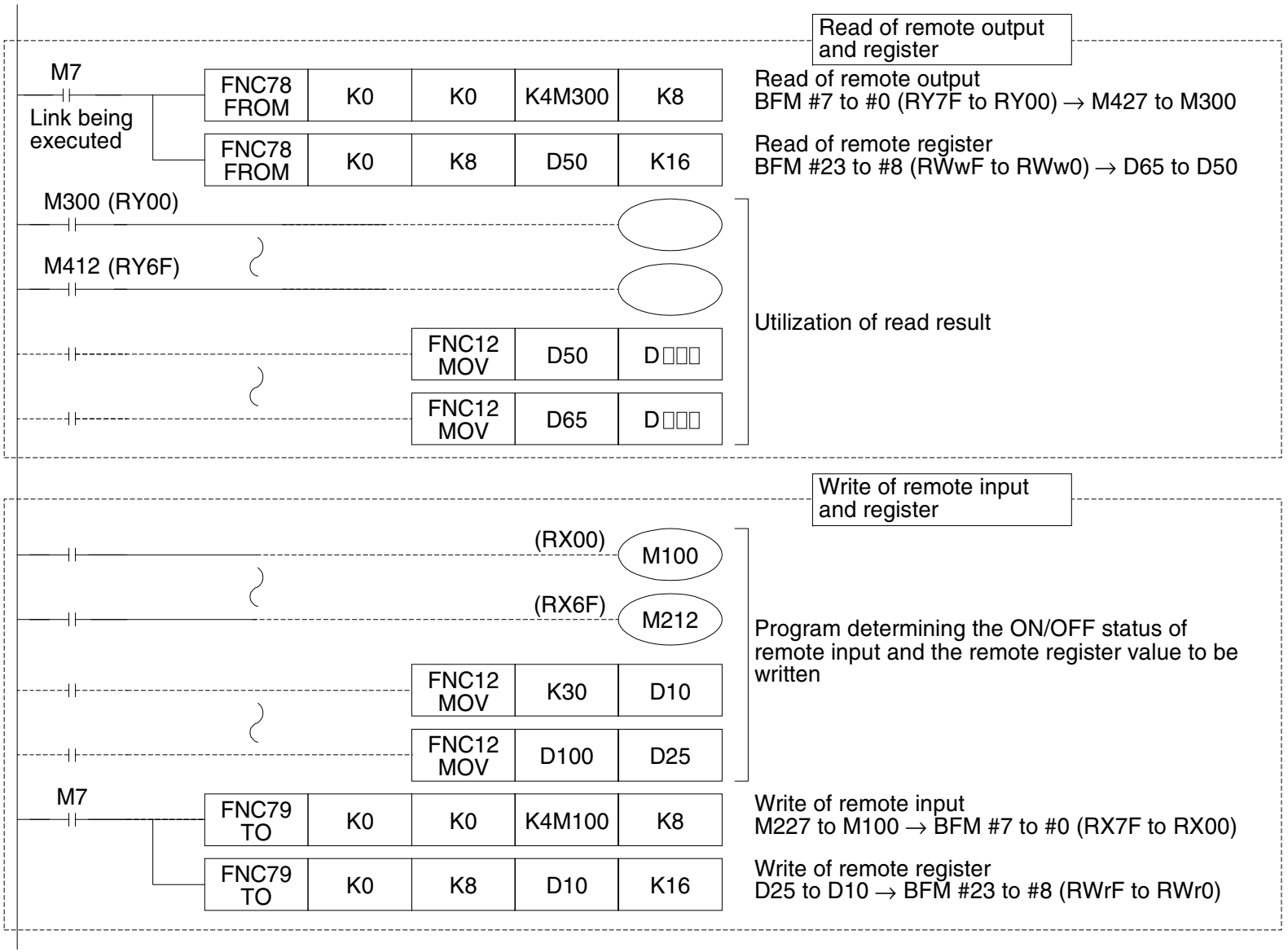

Communication with FX2N-32CCL (station No. 5)
M9036
P20
Always ON
FROM H0000 H00E8 K4M900 K4
Read of remote input
EBH to E8H (RXBF to RX80) → M963 to M900
TO H0000 H0168 K4M1000 K4
Write of remote output
M1063 to M1000 →16BH to 168H (RYBF to RY80)
FROM H0000 H02F0 D700 K8
Read of remote register (RWr)
2F7H to 2F0H (RWr17 to RWr10) → D707 to D700
TO H0000 H01F0 D800 K8
Write of remote register (RWw)
D807 to D800 → 1F7H to 1F0H (RWw17 to RWw10)
RET

## 6.4 Program in FX PC

When the PC starts to run, data linking is automatically started by the program shown below.

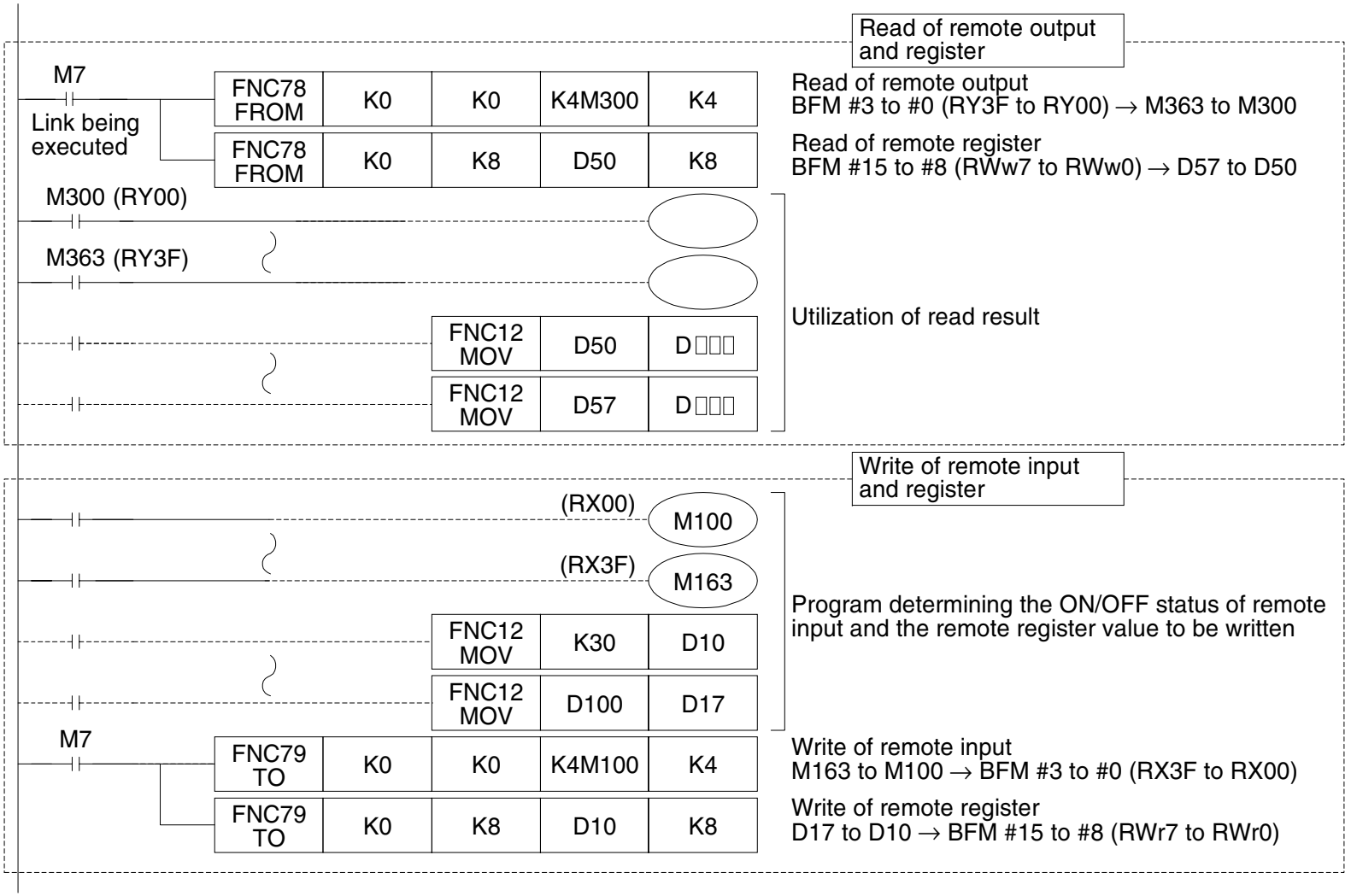
**Communication program in station No. 1**




Read of remote output and register
M7
Link being executed
FNC78 FROM K0 K0 K4M300 K8
Read of remote output
BFM #7 to #0 (RY7F to RY00) → M427 to M300
FNC78 FROM K0 K8 D50 K16
Read of remote register
BFM #23 to #8 (RWwF to RWw0) → D65 to D50
M300 (RY00)
M412 (RY6F)
FNC12 MOV D50 D□□□
FNC12 MOV D65 D□□□
Utilization of read result
Write of remote input and register
(RX00) M100
(RX6F) M212
FNC12 MOV K30 D10
FNC12 MOV D100 D25
Program determining the ON/OFF status of remote input and the remote register value to be written
M7
FNC79 TO K0 K0 K4M100 K8
Write of remote input
M227 to M100 → BFM #7 to #0 (RX7F to RX00)
FNC79 TO K0 K8 D10 K16
Write of remote register
D25 to D10 → BFM #23 to #8 (RWrF to RWr0)

### Example of communication program in station No. 2

The contents equivalent to those in the station No. 1 described above are to be programmed as a communication status read program.



Memo

# USER'S MANUAL

## CC-Link INTERFACE BLOCK FX2N-32CCL

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
HIMEJI WORKS: 840, CHIYODA CHO, HIMEJI, JAPAN

| MODEL | FX2N-32CCL-U-E |
|---|---|
| MODEL CODE | 09R711 |

JY992D71801E
(MEE)

Effective June 2008
Specifications are subject to change without notice.