PROFIBUS-DP Slave Module

User's Manual

MITSUBISHI

Mitsubishi
Programmable Controller

MELSEC-Q

QJ71PB93D

• SAFETY PRECAUTIONS •

(Read these precautions before using.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the user's manual of the CPU module used.
In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

◇ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the ⚠CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[DESIGN PRECAUTIONS]

◇ DANGER

- When a communication error occurs on PROFIBUS-DP, the status of the faulty station is as follows. Configure an interlock circuit in the sequence program using the communication status information (input X1) so that the system can operate safely.
  Erroneous outputs and mis-operation could cause accidents.
  (1) The input data from the master station remains unchanged from the data prior to the communication error.
  (2) When the master station becomes faulty, the output status of the QJ71PB93D will be as in the parameter settings of the master station.
  (3) When any QJ71PB93D is down, the output state of other slave stations will be in accordance with the parameter settings of the master station.
- Do not output (turn on) the "Use prohibited" signal as the output signal to an intelligent function module from the CPU module.
  Writing data into the "system area" or outputting a signal for "Use prohibited" may cause system malfunction in the programmable controller.

⚠ CAUTION

- When the PROFIBUS cable is laid, do not lay it close to main circuits or power lines.
  They should be installed 100mm(3.9inch) or more from each other.
  Not doing so could result in noise that would cause malfunctioning.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the programmable controller under the environment specified in the user's manual of the CPU module to be used.
  Otherwise, it may cause electric shocks, fires, malfunctions, product deterioration or damage.
- While pressing the installation lever located at the bottom of the module, insert the module fixing projection into the fixing hole in the base unit to mount the module.
  Incorrect mounting may cause malfunctions, a failure or a drop of the module.
  In an environment of frequent vibrations, secure the module with the screw.
- Tighten the screws within the range of specified torque.
  If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may damage the module.
- Do not touch the conductive area or electric parts of the module.
  Doing so may cause module malfunctioning or breakdowns.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Be sure to shut off all phases of the external power supply used by the system before wiring PROFIBUS cables.
  Failure to do so may result in failure or malfunctions of the module.
- Be careful not to let foreign matter such as filings or wire chips get inside the module. These can cause fire, breakdowns and malfunctioning.
- Be sure to place the PROFIBUS cables in a duct or clamp them.
  If not, dangling cables may be shifted or inadvertently pulled, resulting in damages to the module or cables or malfunctions due to poor cable contact.
- When disconnecting the PROFIBUS cable from the module, do not pull by holding the cable section. To disconnect the cable, make sure to hold the connector which is coupled with the module. Do not attempt to pull the cable to disconnect it from the module. It could damage the module or the cable, or cause malfunction due to a poor contact of the cable.
- A protective film is attached onto the module top to prevent foreign matter such as wire chips from entering the module when wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.

[STARTING AND MAINTENANCE PRECAUTIONS]

◇ DANGER

- Before cleaning, be sure to shut off all phases of the external power supply used by the system. Failure to do so may cause electrical shocks.

⚠ CAUTION

- Never disassemble or modify the module.
  This may cause breakdowns, malfunctioning, injury and/or fire.
- When using a wireless communication device such as a cellular phone, keep a distance of 25cm (9.85 inch) or more from the programmable controller in all directions. Failure to do so can cause a malfunction.
- Be sure to shut off all phases of the external power supply before mounting or removing the module.
  Failure to do so may result in failure or malfunctions of the module.
- Do not mount/remove the module onto/from the base unit more than 50 times (IEC 61131-2 compliant), after the first use of the product.
  Failure to do so may cause the module to malfunction due to poor contact of connector.
- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body.
  Failure to do so can cause the module to fail or malfunction.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

REVISIONS

Print Date	* Manual Number	Revision
Mar., 2002	SH(NA)-080318E-A	First Edition
Apr., 2004	SH(NA)-080318E-B	Correction Section 2.1, 2.3, 3.1, 3.3.2, 3.5, 5.2.1, 7.3.1, 7.3.2, 9.5 Addition SAFETY PRECAUTIONS
Aug., 2004	SH(NA)-080318E-C	Correction SAFETY PRECAUTIONS, Section 5.2.1, Chapter 7, Section 8.1, 8.2
Aug., 2006	SH(NA)-080318E-D	Correction SAFETY PRECAUTIONS, Conformation to the EMC Directive and Low Voltage Instruction, Section 2.3, 3.1 to 3.5, 5.1, 5.5, 5.7.2, 8.1, 8.2, 9.5, Appendix 2 Addition About Manuals, About the Generic Terms and Abbreviations, Meanings and Definitions of Terms, Section 1.1, 2.1, 2.2, 4.1.1 to 4.1.4, 5.2.1 to 5.2.3, 5.6, 5.7.1, Chapter 6, Section 6.1, 6.2, 7.1 to 7.4, Chapter 8, Appendix 1 New Addition Section 5.3 Section number change Section 3.5 → 5.2, 3.5.1 to 3.5.3 → 5.2.1 to 5.2.3, 3.6 → 3.5, 5.1.1 → 5.2, 5.2 to 5.5 → 5.4 to 5.7
Jul., 2007	SH(NA)-080318E-E	Change of a term "PLC" was changed to "programmable controller". Correction About the Generic Terms and Abbreviations, Section 2.1, 2.3, 3.1, 3.4.1, 5.5, 8.2 to 8.3, Appendix 1 Addition Section 5.3.1, 5.4.1, 7.3.1, 7.3.2, 9.4 Section number change Chapter 8(3) → Section 8.1, Section 8.1 to 8.2 → 8.2 to 8.3
Nov., 2007	SH(NA)-080318E-F	Correction Section 3.3.2, 3.4.1, 7.3.1

Japanese Manual Version SH-080317-E

INTRODUCTION

Thank you for purchasing the Mitsubishi Programmable Controller MELSEC-Q Series.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the graphic operation terminal you have purchased, so as to ensure correct use.
Please forward a copy of this manual to the end user.

CONTENTS

About Manuals

The following are manuals related to this product.

Request for the manuals as needed according to the chart below.

Related Manuals

Manual Name	Manual Number
PROFIBUS-DP Master Module User's Manual Describes the overview, system configuration, specifications, functions, procedures before system operation, programming and dedicated instructions of the QJ71PB92V. (Sold separately)	SH-080572ENG (13JR84)
PROFIBUS-DP Interface Module User's Manual Describes the overview, system configuration, specifications, functions, procedures before system operation, programming and dedicated instructions of the QJ71PB92D. (Sold separately)	SH-080127 (13JR22)
Type AJ71PB92D/A1SJ71PB92D PROFIBUS-DP Interface Module User's Manual Describes the overview, system configuration, specifications, functions, procedures before system operation and programming of the A1SJ71PB92D/AJ71PB92D.　　　　(Sold separately)	IB-66773 (13JL20)
GX Configurator-DP Version 7 Operating Manual Explains the overview, installation method, screen operations, etc. of GX Configurator-DP Version 7. (Sold separately)	SH-080579ENG (13JU54)

Conformation to the EMC Directive and Low Voltage Instruction

When incorporating the Mitsubishi programmable controller into other machinery or equipment and keeping compliance with the EMC and low voltage directives, refer to Chapter 3 "EMC Directive and Low Voltage Instruction" of the User's Manual (hardware) supplied with your CPU module or base unit.

The CE logo is printed on the rating plate of the programmable controller, indicating compliance with the directives.

Note that no additional measures are necessary for this product to make compliance with the directives.

About the Generic Terms and Abbreviations

Unless otherwise specified, this manual uses the following generic terms and abbreviations to describe the Type QJ71PB93D PROFIBUS-DP slave module.

Generic Term/Abbreviation	Description of the abbreviation/general terms
QJ71PB93D	Abbreviation for the model QJ71PB93D PROFIBUS-DP slave module.
QJ71PB92V	Abbreviation for the model QJ71PB92V PROFIBUS-DP master module.
QJ71PB92D	Abbreviation for the model QJ71PB92D PROFIBUS-DP interface module.
A1SJ71PB92D	Abbreviation for the model A1SJ71PB92D PROFIBUS-DP interface module.
AJ71PB92D	Abbreviation for the model AJ71PB92D PROFIBUS-DP interface module.
CPU module	Generic term for Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU, Q25PHCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU and Q06UDHCPU modules.
GX Developer	Generic product name for SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV, and SWnD5C-GPPW-EVA. ("n" means version 4 or later.) "-A" and "-V" mean "volume license product" and "version-upgrade product" respectively.
GX Configurator-DP	Generic term for the product name SWnD5C-PROFID-E. ("n" means version 5 or later.)
PROFIBUS-DP	Abbreviation of PROFIBUS-DP network.
BBLKRD	Abbreviation for G.BBLKRD.
BBLKWR	Abbreviation for G.BBLKWR.

Meanings and Definitions of the Terms

The terms used in this manual have the following meanings and definitions.

Term	Definition
PROFIBUS-DPV0	A basic version of PROFIBUS-DP. The following functions are executable: • I/O data exchange • Diagnostic information notification etc.
PROFIBUS-DPV1	A PROFIBUS-DP version for which the following functions have been added to the basic functionality of PROFIBUS-DPV0. • Acyclic communication • Alarm function etc.
PROFIBUS-DPV2	A PROFIBUS-DP version for which the following functions have been added to the PROFIBUS-DPV1 functionality. • Time stamping etc.
Class 1 master station	A device exchanging I/O data with a slave stations. (QJ71PB92V, QJ71PB92D, etc.)
Class 2 master station	A device that communicates with slave stations and checks their station number settings and/or operation states. The Class 2 master station is used as a master station for supervising the network, which can start, maintain, and diagnose the system.
Slave station	A device that exchanges I/O data with a Class 1 master station. (QJ71PB93D, ST1H-PB, etc.)
Repeater	A device used to connect different segments of PROFIBUS-DP.
Bus terminator	A terminating resistor that is connected to either end of each segment on PROFIBUS-DP.
Configuration tool	Software used to set slave parameters, etc. and to write them to a master station. (GX Configurator-DP, etc.)
GSD file	An electronic file that contains parameters of a slave station. The GSD file is used to set up the slave parameters on configuration tool.
Station number	The numbers assigned to a master station and slave stations. The station number is set within the range from 0 to 125.
Slave parameter	The parameter for a slave station, which is set on the master station. The setting items are described on the GSD File.
I/O configuration information (Data module)	Information on I/O configuration of a slave station.
Input data	Data sent by the QJ71PB93D and received by the master station. (data input by the master station.)
Output data	Data sent by the master station and received by the QJ71PB93D. (data output by the master station.)
Global control	This function enables synchronization command transmission for I/O data from a Class 1 master station to slave stations.
Communication watchdog timer	Watchdog timer set in the slave parameter of the master station.
Extended diagnostic error information	Diagnostic information specific to each slave station. Each of slave stations notifies of it to the master station when an error is detected.
Bus cycle time	PROFIBUS-DP processing time for the master station to perform cyclic transfer with each slave station.
Module watchdog timer	Watchdog timer in the QJ71PB93D.

Product Configuration

The product configuration of this product is given in the table below.

Model	Product name	Quantity
QJ71PB93D	QJ71PB93D PROFIBUS-DP slave module.	1

1 OVERVIEW

This is the user's manual for the QJ71PB93D PROFIBUS-DP slave module (hereafter abbreviated as "QJ71PB93D"), which is used to connect a MELSEC-Q series programmable controller to a PROFIBUS-DP network.
The QJ71PB93D operates as a slave station in the PROFIBUS-DP network.

1
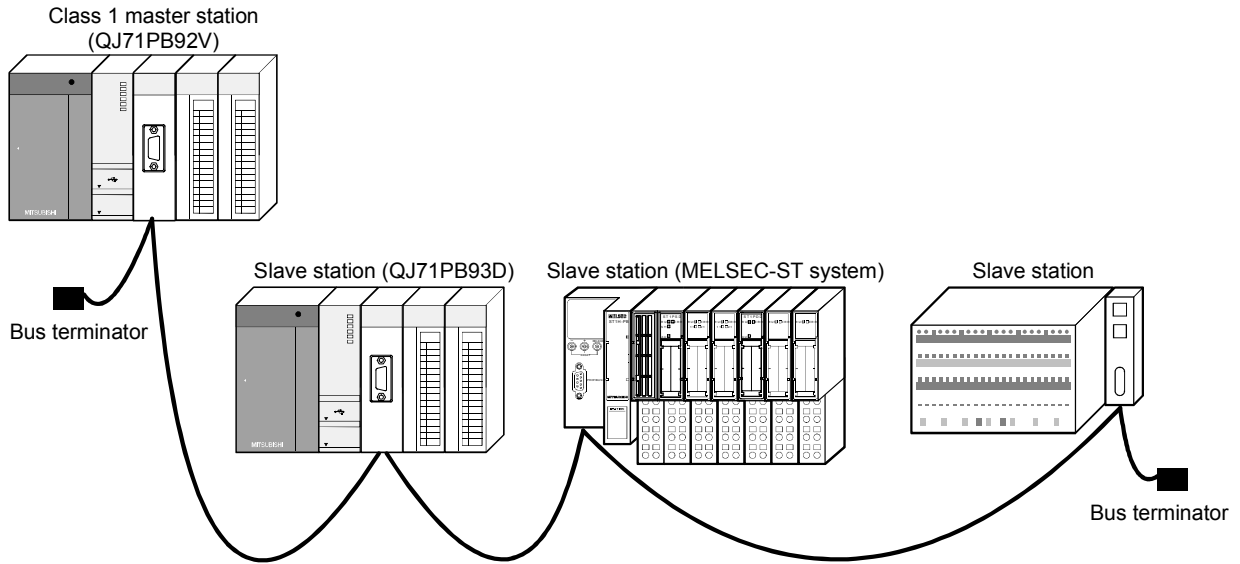
1.1 QJ71PB93D Features

(1) Conformance with EN50170 Volume 2 (Part 1, 2, 3, 4, 8)
The module conforms with EN50170 Volume 2 (Part 1, 2, 3, 4, 8) and can communicate with the master station as a PROFIBUS-DP slave station.

(2) I/O data communication with class 1 master station
The module can communicate I/O data with the class 1 master station (master station that makes data communication cyclically with a slave station) of PROFIBUS-DP.
The QJ71PB93D supports the PROFIBUS-DPV0 function.
PROFIBUS-DPV1 and PROFIBUS-DPV2, which are extended versions of PROFIBUS-DP, are not supported.

(a) Available data size
The QJ71PB93D can handle the following size of data. (Refer to Section 4.1.1)

Input data : Max. 122 words
Output data : Max. 122 words
} Max. 192 words in total
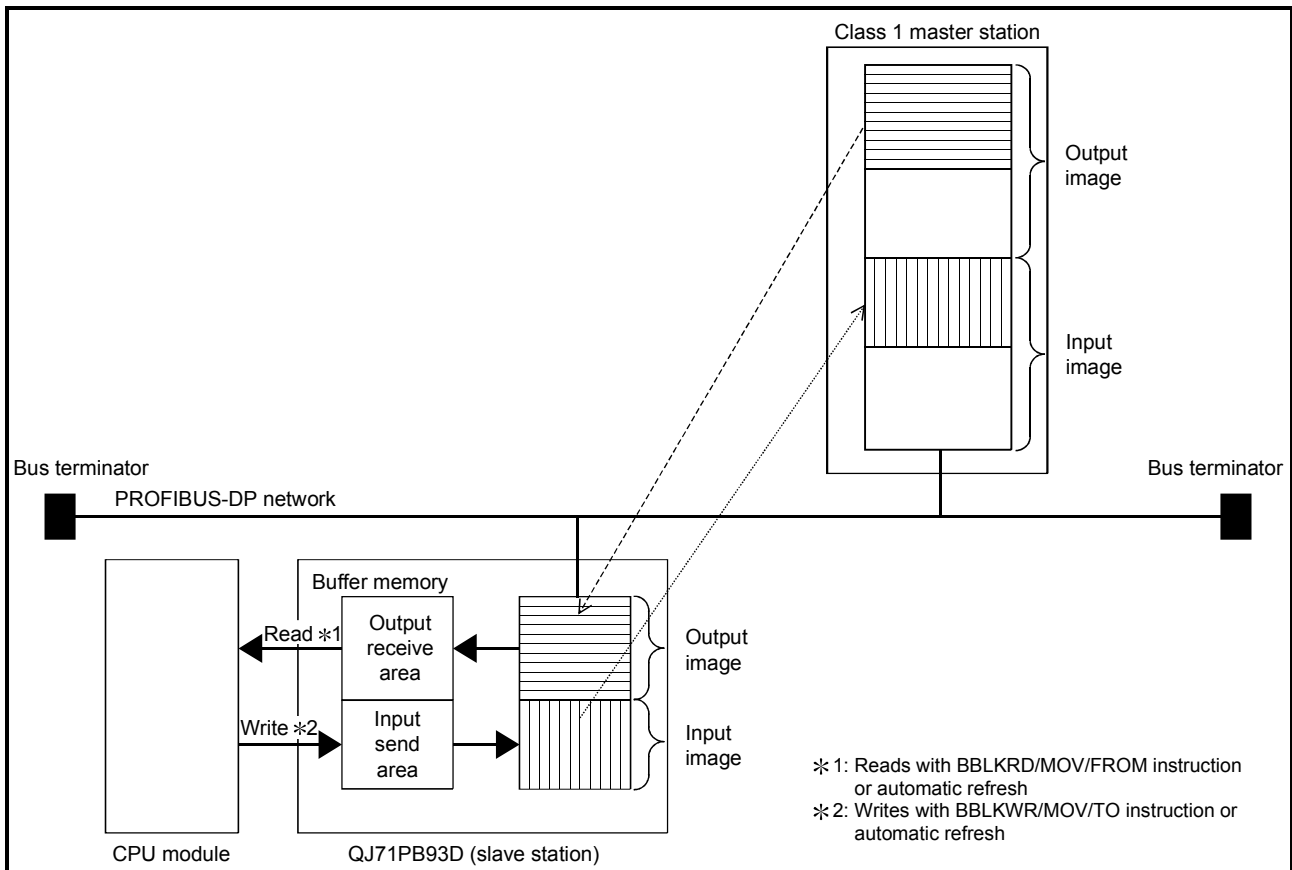
(3) Communication can be made by merely setting the master station parameters
After you have set the parameters at the master station, the QJ71PB93D can make communication by merely setting the station number. (Refer to Section 5.1)

(4) Swapping of I/O data

When I/O data is sent/received from/to the master station, their upper and lower bytes can be swapped.

Though PROFIBUS-DP handles the upper and lower bytes of I/O data differently depending on the master station type, the I/O data need not be swapped in a sequence program. (Refer to Section 4.1.4)

(5) Start/stop of refreshing the input send area

Refreshing of send data from the QJ71PB93D to the master station is controllable by an output signal (Y00).

Providing an interlock disables the buffer memory data from being sent to the master station at error occurrence. (Refer to Section 4.1.1)

(6) Extended trouble notification function

Data stored in the extended trouble information area of the buffer memory can be sent to the master station as extended trouble information* when the host is faulty, for example.

When the host is not faulty anymore, notify the master station that there is no fault. (Refer to Section 3.4.2(9))

$*$: Diagnostics Information (device-related trouble information set by the user as desired)

(7) Compatibility with global control function

Compatibility with the global control function allows the updating of I/O data at the QJ71PB93D to be controlled from the class 1 master station using the command (SYNC, UNSYNC, FREEZE, UNFREEZE) sent by the class 1 master. (Refer to Section 4.1.3)

(8) Communication with class 2 master station

The following communications can be made with the class 2 master station (master station designed for network management to perform booting, maintenance and diagnostics) of PROFIBUS-DP.

• Read from input send area/output receive area
• Read of I/O configuration information
• Station number change

For the way to use each function, refer to the manual of the class 2 master station used.

(9) I/O data separation prevention

For data transmission between the CPU module and buffer memory of QJ71PB93D, automatic refresh or dedicated instruction are used to prevent I/O data from being separated$*$. (Refer to Section 4.1.2)

$*$: The data of specified sizes are not matched with each other.

(10) Compatibility with multiple CPU system

Even when a plurality of CPU modules are installed through the multiple CPU system, this model can be controlled by any CPU module.

2 SYSTEM CONFIGURATION

2.1 Applicable Systems

This section describes applicable systems.

(1) Mountable modules, No. of mountable modules, and mountable base unit

(a) When mounting to CPU module

The following shows the mountable CPU modules, No. of mountable modules, and mountable base unit of the QJ71PB93D.
Power shortage may occur depending on the combination with other mounted modules or the number of mounted modules.
When mounting modules, pay attention to the power supply capacity.
When the power shortage occurs, review the combination of modules to be mounted.

Mountable CPU module		No. of mountable modules＊1	Mountable base unit＊2	
CPU type	CPU model name		Main base unit	Extension base unit
Programmable controller CPU	Basic model QCPU	Q00JCPU	Up to 8	○	○
		Q00CPU	Up to 24		
		Q01CPU			
	High Performance model QCPU	Q02CPU	Up to 64	○	○
		Q02HCPU			
		Q06HCPU			
		Q12HCPU			
		Q25HCPU			
	Process CPU	Q12PHCPU	Up to 64	○	○
		Q25PHCPU			
	Redundant CPU	Q12PRHCPU	Not mountable	×	×
		Q25PRHCPU			
	Universal model QCPU	Q02UCPU	Up to 36	○＊3	○＊3
		Q03UDCPU	Up to 64	○	○
		Q04UDHCPU			
		Q06UDHCPU			

○: Mountable, ×: Not mountable

＊1 Limited to the range of the number of I/O points in the CPU module
＊2 Mountable on any I/O slot of the mountable base unit.
＊3 GX Configurator-DP cannot be used for setting.
  Set station numbers in sequence programs. (Refer to Section 7.2.)
  Substitute dedicated instructions or MOV/FROM/TO instructions for automatic refresh. (Refer to Sections 4.1.1 (1) and 7.3.)

> **POINT**
> (1) There are restrictions on the number of automatic refresh parameters that can be set for CPU modules.
>   For details, refer to Section 5.3.1(5).
> (2) To utilize the data consistency function and dedicated instruction, use a CPU module whose first 5 digits of the serial No. is "02092" or later.
>   If this function is used in any other models, I/O data may be identified as invalid values.

(b) When mounting to remote I/O station of MELSECNET/H
The QJ71PB93D cannot be mounted to remote I/O station of the MELSECNET/H.
Mount it next to the CPU module on the MELSECNET/H remote master station.

(2) Compatibility with a multiple CPU system
When using the QJ71PB93D in a multiple CPU system, first read the QCPU User's Manual (Multiple CPU System).

(a) Compatible QJ71PB93D
The function version of the QJ71PB93D has been "B" from the first release and it supports the multiple CPU system.

(3) Compatibility with online module change
The QJ71PB93D cannot be changed online.

(4) Applicable software packages
Please configure the system by combining QJ71PB93D and software package as follows:
GX Developer   : For setting CPU module parameters and creating sequence programs (Required)
GX Configurator-DP : For setting the QJ71PB93D station number and automatic refresh parameter [1]

   [1] GX Configurator-DP is required when using automatic refresh.
       The station number can also be set on a sequence program. (Refer to Section 5.3)

System		Software Version	
		GX Developer	GX Configurator-DP
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 5 or later
	Multiple CPU system	Version 8 or later	
Q02/Q02H/Q06H/Q12H/Q25HCPU	Single CPU system	Version 4 or later	
	Multiple CPU system	Version 6 or later	
Q12PH/Q25PHCPU	Single CPU system	Version 7.10L or later	
	Multiple CPU system		
Q02UCPU	Single CPU system	Version 8.48A or later	Not available
	Multiple CPU system		
Q03UD/Q04UDH/Q06UDHCPU	Single CPU system	Version 8.48A or later	Version 7.02C or later
	Multiple CPU system		

2.2 Precautions for Configuring a System

(1) Precaution for station number setting

    (a) If a station number different from the one of the currently operating station is set during I/O data communication, the communication is suspended to execute the setting.

        It is restarted after completion of the station number setting.

    (b) Do not change the operation mode during execution of the station number setting.

        Doing so may disable proper station number setting or mode change.

(2) Precaution for parameter writing

    (a) If a parameter based on a station number setting different from the one of the currently operating station is written to the QJ71PB93D that is exchanging I/O data, the I/O data communication is suspended. It is restarted after completion of parameter writing.

    (b) Do not change the operation mode from the sequence program during parameter writing.

        Doing so may disable proper station number setting or mode change.

    (c) Do not write parameters from multiple GX Configurator-DPs to a single QJ71PB93D at the same time.

        Doing so makes the parameter values of the QJ71PB93D incorrect.

(3) When switching the operation mode using Y11/X11 on the sequence program

Be sure to switch the mode while the module READY signal (X1D) of the QJ71PB93D is ON.

If data are read from or written to the buffer memory with the X1D status ignored, the CPU module may detect an error to stop the sequence calculation.

2.3 Confirmation of Function Version and Serial No.

This section explains how to check the function version and serial No. of the QJ71PB93D.

(1) Checking the "Rating plate" on the side of the module

The serial No. and function version of the module are printed in the SERIAL section of the rating plate.
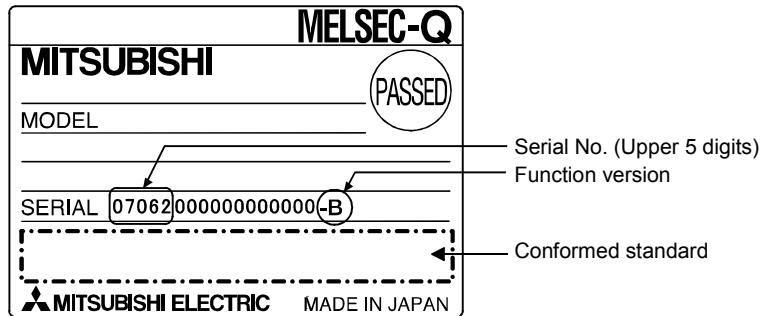
(2) Checking through GX Developer

The following explains how to check the serial No. and function version of the module through GX Developer.

The serial No. and function version are displayed on the "Product information list" or "Module's Detailed Information" screen of GX Developer.

The procedure for checking the serial No. and function version on the "Product information list" screen is shown below.

[Start Procedure]

"Diagnosis" → "System monitor" → "Product inf. list"
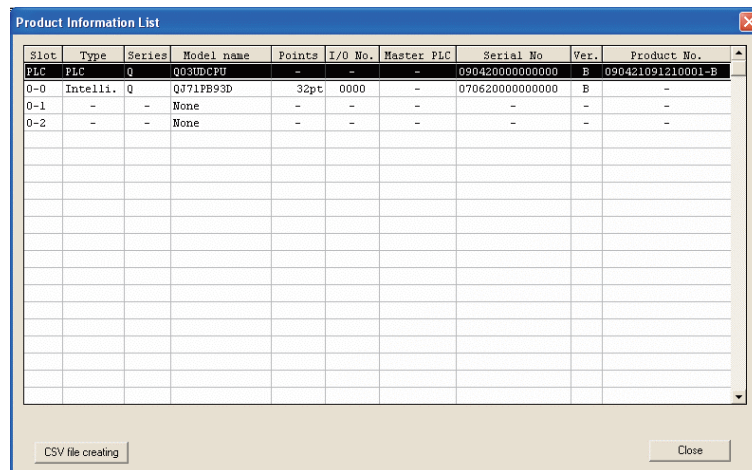
[Serial No., Ver., Product No.]

- The serial No. of the module is displayed in the "Serial No." column.
- The function version of the module is displayed in the "Ver." column.
- The serial No. (Product No.) shown on the rating plate is displayed in the "Product No." column. [*1]

  Note that "-" is displayed in the "Product No." column for the QJ71PB93D since this module is not supporting Product No. display.

✻1 The Product No. is displayed in the column only when the Universal model QCPU
is used.

POINT
The serial No. described on the rated plate may not match with the serial No. displayed on the product information of GX Developer.
・The serial No. on the rated plate describes the management information of the product.   ・The serial No. displayed on the product information of GX Developer describes the function information of the product.   The function information of the product is updated when adding functions.

3

3 SPECIFICATIONS

This chapter describes the performance specifications, network configuration, I/O signals, buffer memory and operation modes of the QJ71PB93D.
For the general specifications of the QJ71PB93D, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

3.1 Performance Specifications

Item		Specifications
PROFIBUS-DP station type		Slave station (Complies with EN50170 Volume2 (Part 1, 2, 3, 4, 8))
Station numbers that may be set		0 to 125 *2
Max. number of data that may be communicated		Number of I/O data is 192 words in total. (Size of I/O data is up to 122 words.)
Transmission specifications	Electrical standard/characteristics	Complies with EIA-RS485
	Medium	Shielded twisted pair cable (Type A) (Refer to Section 5.7.1)
	Network topology	Bus topology (Tree topology when repeaters are used)
	Data link method	Polling method
	Encoding method	NRZ
	Transmission speed *1	9.6 kbps to 12 Mbps (Refer to (1) in this section)
	Transmission distance	Differs depending on the transmission speed (Refer to (1) in this section)
	Maximum number of repeaters	3 units (Refer to (1) in this section)
	Number of connectable modules (Per segment)	32 units (including repeaters)
Flash ROM write count		Max. 10000 times
Number of occupied I/O points		32 points (I/O assignment : 32 intelligent points)
5VDC Internal power consumption		0.44 A
External dimensions		98(3.86) (H) × 27.4(1.08) (W) × 90(3.55) (D) [mm(inch)]
Weight		0.11 kg

*1 Transmission speed control within +/- 0.3% (EN50170 Volume 2 compliant)
*2 Factory-set to "126" (EN50170 Volume 2 compliant)
    Set a station number within 0 to 125 for I/O data communication.

For the noise immunity, withstand voltage, insulation resistance and others in the programmable controller system using this module, refer to the power supply module specifications given in the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

(1) Transmission distance

Transmission Speed	Transmission Distance	Max. Transmission Distance when Repeater is Used *3
9.6 kbps		
19.2 kbps	1200 m (3937 ft.)/segment	4800 m (15748 ft.)/network
93.75 kbps		
187.5 kbps	1000 m (3281 ft.)/segment	4000 m (13123 ft.)/network
500 kbps	400 m (1312 ft.)/segment	1600 m (5249 ft.)/network
1.5 Mbps	200 m (656 ft.)/segment	800 m (2625 ft.)/network
3 Mbps		
6 Mbps	100 m (328 ft.)/segment	400 m (1312 ft.)/network
12 Mbps		

*3 The max. transmission distance in the table above is based on the case where 3 repeaters are used.
    The calculation formula for the transmission distance extended using a repeater(s) is:
    Max. transmission distance [m/network] = (Number of repeaters + 1) x Transmission distance [m/segment]

3.2 Network Configuration

This section explains the basic PROFIBUS-DP configuration for using the QJ71PB93D as a slave station.

(1) System equipment

The following table shows the equipment required for the PROFIBUS-DP system.

System Equipment	Description
Slave station	QJ71PB93D
Class 1 master station	QJ71PB92V, QJ71PB92D, etc.
Configuration tool	Configurator applicable to the master station
Repeater	Required when 32 or more slave stations are connected
PROFIBUS cable	Refer to section 5.7.1
Bus terminator	

(2) Network configuration

In the PROFIBUS-DP system configuration, the following conditions must be satisfied:

(a) Number of connectable modules in the whole network (when repeaters are used)

Master station + Slave station $*1 \leqq 126$

$*1$: Including the QJ71PB93D

(b) Number of connectable modules per segment

Master station + Slave station $*1$ + repeaters $*2 \leqq 32$

$*1$: Including the QJ71PB93D

$*2$: A repeater is counted for both segments.

(c) Maximum number of repeaters

Up to 3 repeaters can be used for communication between master station and the QJ71PB93D.

(d) Number of slave stations that are connectable to master station

The maximum number of slave stations that may be connected to one master station depends on the specifications of the master station.
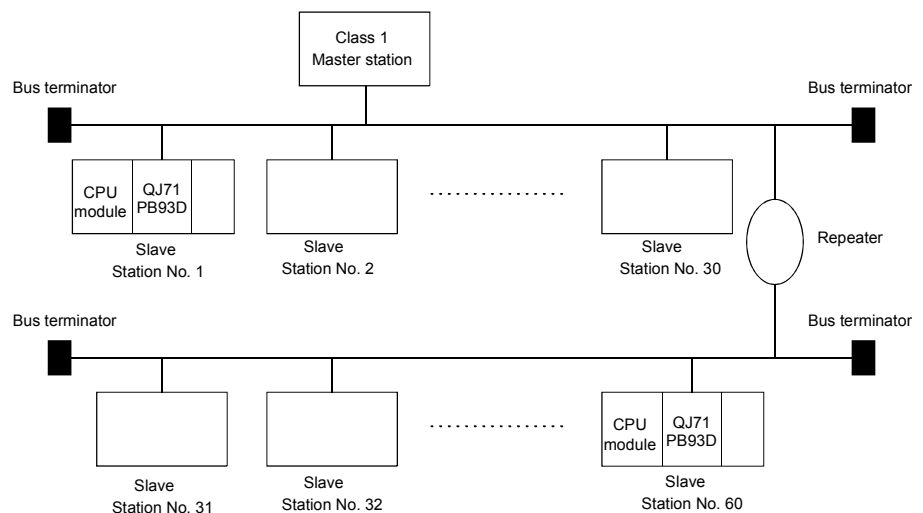
3.3 I/O Signal

3.3.1 I/O signal list

The I/O signal configuration used in the QJ71PB93D and the data communications with the CPU module are described below.
The following I/O signal assignment is based on the case where the start I/O No. of the QJ71PB93D is "0000" (installed to slot 0 of the main base unit).
Device X represents an input signal from the QJ71PB93D to the CPU module.
Device Y shows an output signal from the CPU module to the QJ71PB93D.
Refer to the corresponding reference sections for details.

Signal direction: QJ71PB93D → CPU module		Signal direction: CPU module → QJ71PB93D	
Device No.	Description	Device No.	Description
X00	Watchdog timer error	Y00	Input send area refresh directive signal
X01	I/O communication signal	Y01	Use prohibited
X02	Extension trouble notification completion signal	Y02	Extension trouble notification request signal
X03	Module error signal	Y03	Module error reset request signal
X04	Use prohibited	Y04	Use prohibited
X05	SYNC mode signal	Y05	
X06	SYNC receive signal	Y06	
X07	FREEZE mode signal	Y07	
X08	Use prohibited	Y08	
X09		Y09	
X0A	BBLKRD start request acceptance completion signal	Y0A	BBLKRD start request signal
X0B	BBLKWR start request acceptance completion signal	Y0B	BBLKWR start request signal
X0C	Use prohibited	Y0C	Use prohibited
X0D		Y0D	
X0E		Y0E	
X0F		Y0F	
X10		Y10	
X11	Operation mode change completion signal	Y11	Operation mode change request signal
X12	Use prohibited	Y12	Use prohibited
X13	Station number change completion signal	Y13	Station number change request signal
X14	Use prohibited	Y14	Use prohibited
X15		Y15	
X16		Y16	
X17		Y17	
X18		Y18	
X19		Y19	
X1A		Y1A	
X1B		Y1B	
X1C		Y1C	
X1D	Module READY signal	Y1D	
X1E	Use prohibited	Y1E	
X1F		Y1F	

POINT

Do not output (turn ON) the "Use prohibited" signals.
Doing so may cause the programmable controller system malfunction.

3.3.2 I/O signal detail description

(1) Watchdog timer error (X00)

(a) This signal turns on when a watchdog timer error occurs on the QJ71PB93D.

(b) The watchdog timer error (X00) does not turn off until the following operation is performed.
- Turning the programmable controller power OFF to ON
- Resetting the CPU module

If the signal turns on again, a hardware error may be the cause.

(2) I/O communication signal (X01)

(a) This signal turns on when the module is ready to communicate with the master station properly.

(b) While the I/O communication signal (X01) is on, the output receive area is updated to the output data sent from the master station.
(It is independent of the status of the input send area refresh directive signal (Y00).)

(c) The I/O communication signal (X01) turns off when a communication time-out error occurs due to a stop of communication with the master station. However, if the communication watchdog timer setting in the master station side parameters is "invalid", the I/O communication signal does not turn off since a communication time-out error does not occur.
(The output data in the output receive area is held.)

Communication watchdog timer Setting in Master Station Side Parameters	Operation at Master Station Fault
Invalid	No error (I/O communication signal (X01) remains on)
Valid (2 to 65025)	Communication time-out error occurrence (I/O communication signal (X01) turns off)

The communication watchdog timer setting can be confirmed in the "Current communication watchdog timer value (buffer memory address: 8D1H)" of the QJ71PB93D.

(d) Use this signal as a signal for interlocking output receive area read performed with the MOV/FROM instruction.

	Communication stop	Communication in progress	Communication stop
Communication with master station			
I/O communication signal (X01)	OFF	ON	OFF
Data update in output receive area	Not updated	Updated	Not updated
Output receive area (Buffer memory address : 0H to BFH)		MOV/FROM instruction — Execution of read from output receive area	
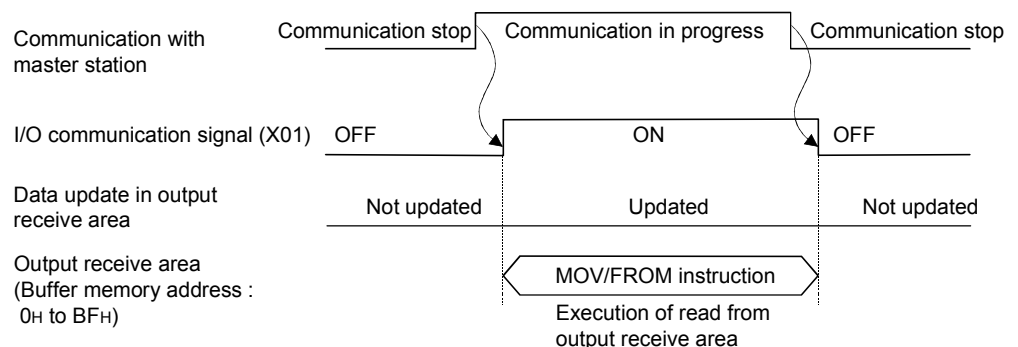
(3) Extension trouble notification completion signal (X02)

(a) The extension trouble notification completion signal (X02) turns on when the extension trouble information is sent to the master station by turning on the extension trouble notification request signal (Y02).
(While the I/O communication signal (X01) is off, the extension trouble notification completion signal (X02) does not turn on since an extension trouble notification request is ignored.)

(b) Turning off the extension trouble notification request signal (Y02) turns off the extension trouble notification completion signal (X02).

I/O communication signal (X01)

Extension trouble notification request signal (Y02)

Extension trouble notification completion signal (X02)

Extension trouble information area
(Buffer memory address :
7f9H to 805H)

Extension trouble notification request

Extension trouble notification completion

MOV/TO Instruction
Extension trouble information write
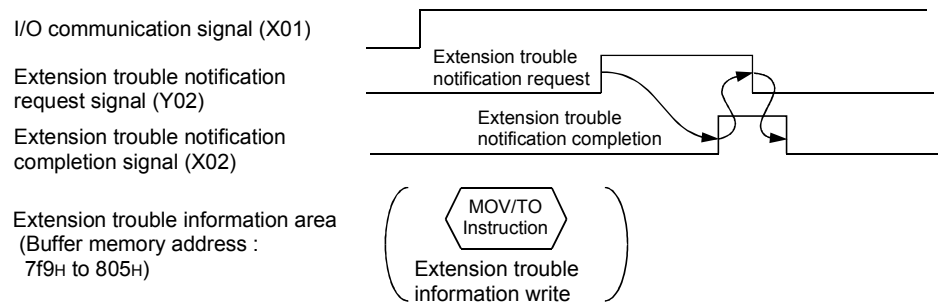
```
POINT
```
When performing the extension trouble notification requests consecutively, provide an interlock using the extension trouble notification completion signal (X02) in the procedure shown above.

(4) Module error signal (X03)

(a) This signal turns on when an error occurs.
At this time, an error code is stored into the module error information area (buffer memory address: 7F8H)).

(b) This signal turns off when the error is reset by turning on the module error reset request signal (Y03) or resetting the CPU, for example. At this time, the ERR. LED goes off and the error code is cleared.

(c) The module error reset request signal (Y03) turns off after confirming that the module error signal (X03) have turned off.

Module error reset request signal (Y03)

Module error signal (X03)

Module error information area
(Buffer memory address : 7F8H)

Error reset

Error detection

MOV/FROM instruction
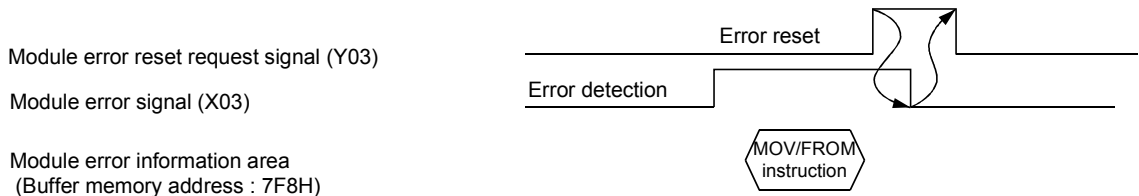
The error code is read from the buffer memory to the CPU module.

(5) SYNC mode signal (X05)

(a) This signal turns on when the QJ71PB93D is placed in the SYNC mode by a SYNC request from the master station.

(b) The SYNC mode signal (X05) turns off when the SYNC mode is terminated by an UNSYNC request from the master station, a communication stop or a CPU reset.

(c) The SYNC LED turns on/off in synchronization with the on/off of the SYNC mode signal (X05).

(d) The SYNC mode signal (X05) turns off if a communication time-out error occurs due to a stop of communication with the master station while the SYNC mode signal (X05) is on.
However, if the communication watchdog timer setting in the master station side parameters is "invalid", the SYNC mode signal (X05) does not turn off since a communication time-out error does not occur. (The output data in the output receive area is held.)

Communication watchdog timer Setting in Master Station Side Parameters	Operation at Master Station Fault
Invalid	No error (SYNC mode signal (X05) remains on)
Valid (2 to 65025)	Communication time-out error occurrence (SYNC mode signal (X05) turns off)

The communication watchdog timer setting can be confirmed in the "Current communication watchdog timer value (buffer memory address: 8D1H)" of the QJ71PB93D.

(6) SYNC receive signal (X06)

(a) The SYNC receive signal (X06) turns on receipt of a SYNC request from the master station.

(b) While the SYNC mode signal (X05) is on, the receipt of a SYNC request from the master station changes the on/off state of the SYNC receive signal (X06).
At this time, the SYNC mode signal (X05) remains on.

(c) The SYNC receive signal (X06) turns off when the SYNC mode is terminated by an UNSYNC request from the master station, a communication stop or a CPU reset.
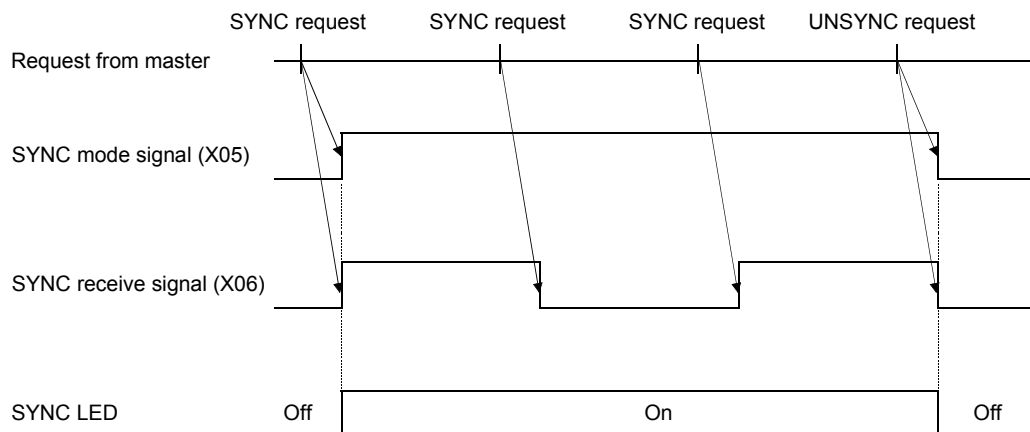
(d)   The SYNC receive signal (X06) turns off if a communication time-out error occurs due to a stop of communication with the master station while the SYNC receive signal (X06) is on.
However, if the communication watchdog timer setting in the master station side parameters is "invalid", the SYNC receive signal (X06) does not turn off since a communication time-out error does not occur. (The output data in the output receive area is held.)

Communication watchdog timer Setting in Master Station Side Parameters	Operation at Master Station Fault
Invalid	No error (SYNC receive signal (X06) remains on)
Valid (2 to 65025)	Communication time-out error occurrence (SYNC receive signal (X06) turns off)

The communication watchdog timer setting can be confirmed in the "Current communication watchdog timer value (buffer memory address: 8D1H)" of the QJ71PB93D.

(7)   FREEZE mode signal (X07)

(a)   The FREEZE mode signal (X07) turns on when the QJ71PB93D is placed in the FREEZE mode by a FREEZE request from the master station.

(b)   The FREEZE mode signal (X07) turns off when the FREEZE mode is terminated by an UNFREEZE request from the master station, a communication stop or a CPU reset.

(c)   The FREEZE LED turns on/off in synchronization with the on/off of the FREEZE mode signal (X07).
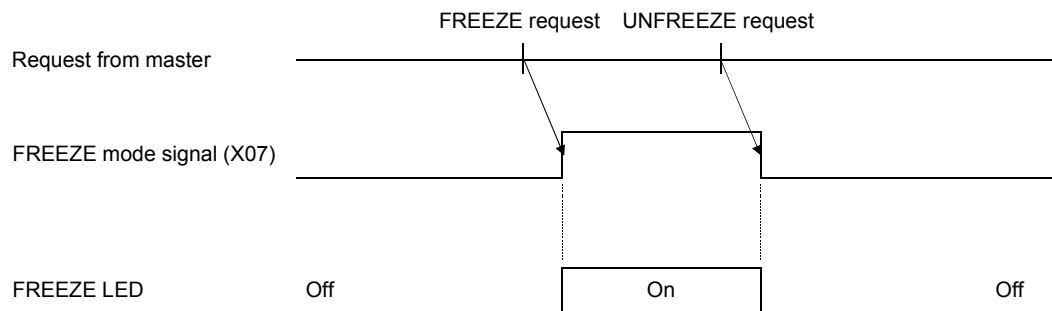
(d) The FREEZE mode signal (X07) turns off if a communication time-out error occurs due to a stop of communication with the master station while the FREEZE mode signal (X07) is on.
However, if the communication watchdog timer setting in the master station side parameters is "invalid", the FREEZE mode signal (X07) does not turn off since a communication time-out error does not occur. (The output data in the output receive area is held.)

Communication watchdog timer Setting in Master Station Side Parameters	Operation at Master Station Fault
Invalid	No error (FREEZE mode signal (X07) remains on)
Valid (2 to 65025)	Communication time-out error occurrence (FREEZE mode signal (X07) turns off)

The communication watchdog timer setting can be confirmed in the "Current communication watchdog timer value (buffer memory address: 8D1H)" of the QJ71PB93D.

(8) BBLKRD start request acceptance completion signal (X0A)

(a) This signal is used as an interlock condition signal to execute the dedicated instruction BBLKRD.

(b) When the BBLKRD start request signal (Y0A) is turned on in the sequence program, the BBLKRD start request acceptance completion signal (X0A) turns on.

(c) When the BBLKRD start request signal (Y0A) is turned off in the sequence program, the BBLKRD start request acceptance completion signal (X0A) also turns off.

BBLKRD start request signal (Y0A)

BBLKRD start request acceptance completion signal (X0A)

BBLKRD instruction
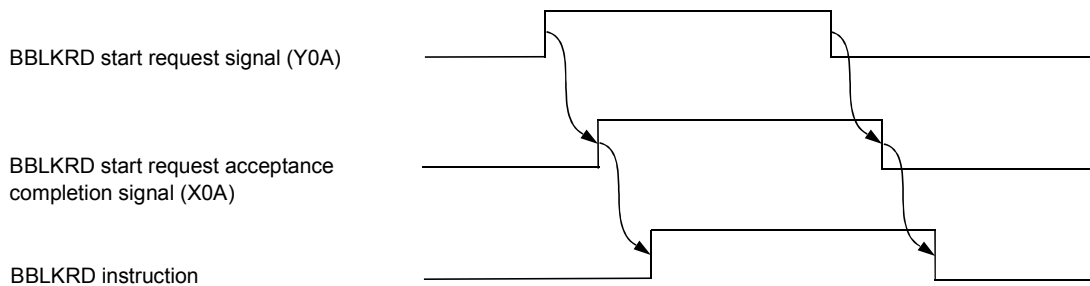
(9) BBLKWR start request acceptance completion signal (X0B)

(a) This signal is used as an interlock condition signal to execute the dedicated instruction BBLKWR.

(b) When the BBLKWR start request signal (Y0B) is turned on in the sequence program, the BBLKWR start request acceptance completion signal (X0B) turns on.

(c) When the BBLKWR start request signal (Y0B) is turned off in the sequence program, the BBLKWR start request acceptance completion signal (X0B) also turns off.

BBLKWR start request signal (Y0B)

BBLKWR start request acceptance completion signal (X0B)

BBLKWR instruction
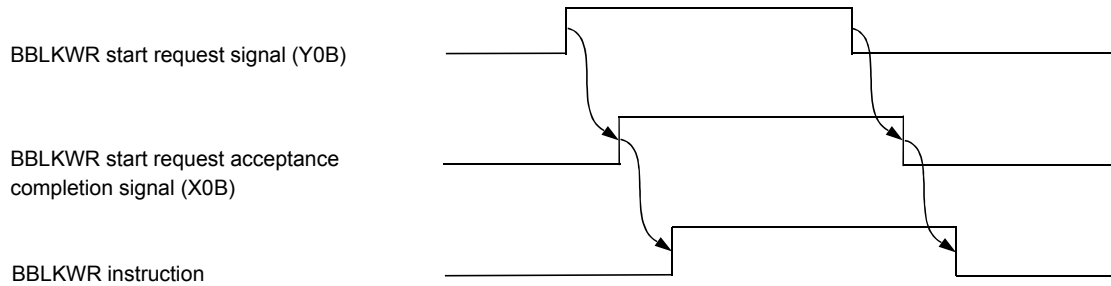
(10) Operation mode change completion signal (X11)

(a) This signal turns on when an operation mode change is completed by setting the required operation mode to the operation mode change request area (buffer memory address: 8CFH) and turning on the operation mode change request signal (Y11).
At this time, the result is stored into the operation mode change result area (buffer memory address: 8D0H).

(b) Turning off the operation mode change request signal (Y11) after confirmation of the result turns off the operation mode change completion signal (X11).

(c) This signal turns on at either normal or abnormal completion of an operation mode change.
At abnormal completion, the operation mode change request is made invalid and operation continues in the operation mode that had been used before the change request was given.

Input send area refresh directive signal (Y00)

Operation mode change request signal (Y11)

Operation mode change completion signal (X11)

Operation mode change result area (Buffer memory address: 2256(8D0H))

Change result of operation mode

MOV/TO instruction

MOV/FROM instruction

Sets the operation mode in "operation mode change request area (Address : 8CFH)".

Checks result in "operation mode change result area (Address : 8D0H)" and "current operation mode (Address : 8CEH)".

(11) Station number change completion signal (X13)

(a) This signal turns on when the station number setting is completed by setting the station number to the station number change request area (buffer memory address: 203H) and turning on the station number change request signal (Y13).

(b) Check the setting result in the operation station number area (buffer memory address: 201H) and module error information area (buffer memory address: 7F8H) of the buffer memory.

(c) Turning off the station number change request signal (Y13) after confirmation of the result turns off the station number change completion signal (X13).

(d) If a station number error (error code: 1002H) has occurred, the station number change request is made invalid and operation continues with the station number that had been used before the change request was given.

(e) Turning on the station number change request signal (Y13) suspends I/O communication.
Turning on the station number change completion signal (X13) resumes I/O communication.

Input send area refresh directive signal (Y00)

Station number change request signal (Y13)

Station number change completion signal (X13)

Buffer memory

MOV/TO instruction

Sets station number in "station number change request area (Address : 203H)".

MOV/FROM instruction

Checks result in "operation station number area (Address : 201H), module error information area (Address : 7F8H)".

(12) Module READY signal (X1D)

(a) This signal turns on when the QJ71PB93D is enabled for access from the CPU module. (It turns on regardless of the operation mode.)

(b) This signal turns off when the QJ71PB93D is disabled for access from the CPU module due to a module watchdog timer error, hardware fault or like.

(13) Input send area refresh directive signal (Y00)

(a)   Turning on this signal during communication with the master station (I/O communication signal (X01) = ON) starts data communication of the input send area (buffer memory addresses: 100$_H$ to 1BF$_H$) in the buffer memory.

(b)   Turning this signal off stops sending of the data in the input send area to the master station. (0 data are sent.)

(c)   While the I/O communication signal (X01) is off, ON of the input send area refresh directive signal (Y00) is invalid.

	OFF (communication stop)	ON (during communication)	OFF (communication stop)
I/O communication signal (X01)			
Input send area refresh directive signal (Y00)	OFF	ON / OFF	ON / OFF
Data send in input send area	Not sent	Sent	Not sent
Data update in output receive area	Not updated	Updated	Not updated

---

POINT

The following are the relationships between data send and receive of the QJ71PB93D, which vary with the states of the I/O communication signal (X01) and input send area refresh directive signal (Y00).

X01 State	Y00 State	Data in Output Receive Area/Input Send Area
OFF	ON/OFF	Master station: Input area ← Not sent → QJ71PB93D Input send area; Output area ← Not updated → QJ71PB93D Output receive area
ON	ON	Master station: Input area ← Sent → QJ71PB93D Input send area; Output area → Updated → QJ71PB93D Output receive area
ON	OFF	Master station: Input area ← 0 data sent → QJ71PB93D Input send area; Output area → Updated → QJ71PB93D Output receive area

(14) Extension trouble notification request signal (Y02)

    (a)   Turning on the extension trouble notification request signal (Y02) sends the data set in the extension trouble information area (buffer memory address: 7F9$_H$ to 805$_H$) to the master station as extension trouble information. (The extension trouble notification request is ignored while the I/O communication signal (X01) is off.)

    (b)   When you have checked that the extension trouble notification completion signal (X02) is on, turn off the extension trouble notification request signal (Y02).

    (c)   Refer to (3) in this section for the on/off timing.

POINT

To turn on/off Y02, provide an interlock using X02.

---

(15) Module error reset request signal (Y03)

    (a)   Turning on the module error reset request signal (Y03) resets the error of the QJ71PB93D. (The module error signal (X03) turns off and the ERR. LED goes off.)

    (b)   When you have checked that the module error signal (X03) is off, turn off the module error reset request signal (Y03).

    (c)   Making an error reset clears the error code in the module error information area (buffer memory address: 7F8$_H$).

    (d)   Refer to (4) in this section for the on/off timing.

(16) BBLKRD start request signal (Y0A)

    (a)   This signal is used to start the processing of the dedicated instruction BBLKRD.
When executing the dedicated instruction BBLKRD, always turn on the BBLKRD start request signal (Y0A) to turn on the BBLKRD start request acceptance completion signal (X0A) so that it is used as an interlock condition.

    (b)   When the BBLKRD start request signal (Y0A) is turned on in the sequence program, the QJ71PB93D starts the processing of the dedicated instruction BBLKRD.

    (c)   When the BBLKRD start request signal (Y0A) is turned off from the sequence program, the processing of the dedicated instruction BBLKRD is ignored.

    (d)   Only when using the dedicated instruction BBLKRD, turn on the BBLKRD start request signal (Y0A).
Note that, if the dedicated instruction BBLKRD is not executed after the BBLKRD start request signal (Y0A) has been turned on, the transmission delay time between the master and a slave stations is prolonged.

(17) BBLKWR start request signal (Y0B)

(a)   This signal is used to start the processing of the dedicated instruction BBLKWR.
When executing the dedicated instruction BBLKRD, always turn on the BBLKRD start request signal (Y0B) to turn on the BBLKRD start request acceptance completion signal (X0B) so that it is used as an interlock condition.

(b)   When the BBLKWR start request signal (Y0B) is turned on in the sequence program, the QJ71PB93D starts the processing of the dedicated instruction BBLKWR.

(c)   When the BBLKWR start request signal (Y0B) is turned off from the sequence program, the processing of the dedicated instruction BBLKWR is ignored.

(d)   Only when using the dedicated instruction BBLKWR, turn on the BBLKWR start request signal (Y0B).
Note that, if the dedicated instruction BBLKWR is not executed after the BBLKWR start request signal (Y0B) has been turned on, the transmission delay time between the master and a slave stations is prolonged.

(18) Operation mode change request signal (Y11)

(a)   Turn on the operation mode change request signal (Y11) when changing the operation mode to the one set in the operation mode change request area (buffer memory address: 8CF$_H$).

(b)   When you have checked that the operation mode change completion signal (X11) is on, turn off the operation mode change request signal (Y11).

(c)   Refer to (10) in this section for the on/off timing.

(19) Station number change request signal (Y13)

(a)   Turn on the station number change request signal (Y13) when changing the station number to the one set in the station number change request area (buffer memory address: 203$_H$).

(b)   When you have checked that the station number change completion signal (X13) is on, turn off the station number change request signal (Y13).

(c)   Refer to (11) in this section for the on/off timing.

> **POINT**
>
> Station numbers can be set from the class 2 master station.
> In this case, specifying "TRUE" for "No_Add_Chg" disables the station number change on the QJ71PB93D.
> The station number of the QJ71PB93D cannot be changed while the station number change is disabled.
> To change the station number again, clear the station number in the station number change request area of the QJ71PB93D (buffer memory address: 515(203$_H$)) to cancel the disabled status. (Refer to Section 3.4.2 (6))

3.4 Buffer Memory List

3.4.1 Buffer memory/configuration

The configuration of the buffer memory used to receive and send data with the QJ71PB93D and the CPU module is described below.

Buffer memory address		Area name	Description	Read/Write
Hexadecimal	decimal			
0H BFH	0 191	Output receive area	Stores the output data received from the master station. (Max. usable range 122 words)	Read
C0H FFH	192 255	System area (Use prohibited)	—	—
100H 1BFH	256 447	Input send area	Used to set the input data to be sent to the master station. (Max. usable range 122 words)	Read/Write
1C0H 1FFH	448 511	System area (Use prohibited)	—	—
200H	512	Operation baud rate	Stores the baud rate in current operation.	Read
201H	513	Operation station number	Stores the station number in current operation.	Read
202H	514	Station number set on flash ROM	Stores the station number saved on the flash ROM.	Read
203H	515	Station number change request area	Used to set a new station number to be set in response to the station number change request signal (Y13).	Read/Write
204H	516	Station number rewritable count to flash ROM	Stores the remaining number of times when the station number can be saved onto the flash ROM during continuous operation.	Read
205H 7F7H	517 2039	System area (Use prohibited)	—	—
7F8H	2040	Module error information	Stores the error code detected by the QJ71PB93D.	Read
7F9H 805H	2041 2053	Extension trouble information area	Used to set the extension trouble notification data to the master station.	Read/Write
806H 8CDH	2054 2253	System area (Use prohibited)	—	—
8CEH	2254	Current operation mode	Stores the operation mode in current operation.	Read
8CFH	2255	Operation mode change request area	Used to set a new operation mode to be set in response to the operation mode change request signal (Y11).	Read/Write
8D0H	2256	Operation mode change result	Stores the result of changing the operation mode in response to the operation mode change request signal (Y11).	Read
8D1H	2257	Current communication watchdog timer value	Stores the communication watchdog timer value in current operation.	Read
8D2H	2258	Self-diagnostic status type code display area	Stores the diagnostic status type code at the time of self-diagnostics.	Read
8D3H	2259	Swapping function setting status	Stores the setting status of the swapping function in current operation.	Read
8D4H 8DFH	2260 2271	System area (Use prohibited)	—	—
8E0H 8EBH	2272 2283	Output receive area used status	Stores the current used status of the output receive area.	Read
8ECH 8EFH	2284 2287	System area (Use prohibited)	—	—
8F0H 8FBH	2288 2299	Input send area used status	Stores the current used status of the input send area.	Read
8FCH AFFH	2300 2815	System area (Use prohibited)	—	—

POINT

Do not write any data in the "system area (Use prohibited)" of the buffer memory.
If data is written to the "system area (Use prohibited)" , there is a risk that the programmable controller system may malfunction.

3.4.2 Buffer memory detail description

    (1)   Output receive area
           (buffer memory address 0_H to BF_H: Un\G0 to Un\G191)
        Stores the output data received from the master station.
        The structure varies with the data module setting and data assignment mode
        setting in the slave parameters. (Refer to Section 5.2.1 to 5.2.3)

    (2)   Input send area
           (buffer memory address 100_H to $1BF_H$: Un\G256 to Un\G447)
        Used to store the input data to be sent to the master station.
        The structure varies with the data module setting and data assignment mode
        setting in the slave parameters. (Refer to Section 5.2.1 to 5.2.3)

    (3)   Operation baud rate (buffer memory address 200_H: Un\G512)
        Stores the baud rate in current operation.

Baud Rate	Stored Value
Baud rate not yet recognized	0000_H
9.6 kbps	$96E2_H$
19.2 kbps	$19E3_H$
45.45 kbps	$45E3_H$
93.75 kbps	$93E3_H$
187.5 kbps	$18E4_H$
500 kbps	$05E5_H$
1.5 Mbps	$15E5_H$
3 Mbps	$03E6_H$
6 Mbps	$06E6_H$
12 Mbps	$12E6_H$

        The stored value while the I/O communication signal (X01) is on is valid.
        Use the master station parameter to set the baud rate of the PROFIBUS-DP.

    (4)   Operation station number (buffer memory address 201_H: Un\G513)
        Stores the station number of the QJ71PB93D in current operation.
        The storage range is 0 to 126.
        The stored value while the I/O communication signal (X01) is on is valid.
        If the station number is not set (the station number is as set in the factory or has
        been cleared), "126" is stored.
        I/O data cannot be communicated if the station number is not set.

(5) Station number set on flash ROM

(buffer memory address 202H: Un\G514)

Stores the station number of the QJ71PB93D set to the flash ROM.
The storage range is 0 to 125.
If the station number is not set to the flash ROM (the station number is as set in the factory or has been cleared), "FFFFH" is stored.

(6) Station number change request area

(buffer memory address 203H: Un\G515)

Used to set any of the following values when setting a new station number of the QJ71PB93D in response to the station number change request signal (Y13).

Set Value	Description
0000H to 007DH or 0100H to 017DH	Set a station number. By turning on b8, the station number is saved onto the flash ROM. b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0 Fixed to 0 0: Not save onto the flash ROM 1: Save onto the flash ROM Set a station number within the range from 0H to 7DH (0 to125). (Example 1) Set the station number to 12. (Not saved onto the flash ROM): 000CH (Example 2) Set the station number to 12. (Saved onto the flash ROM): 010CH
FFFFH	Clears the station number. After clearing, the operation station number is "126". The station number set to the flash ROM is "FFFEH".

POINT

(1) Saving the station number to the flash ROM enables the operation based on the station number setting stored in the flash ROM even if the module is powered OFF and then ON or the CPU module is reset.
(2) At power-on or at CPU reset, "FFFEH" is stored.
Turn on the station number change request signal (Y13) after storing a setting value given in the above table.
Executing the station number change request with any invalid value results in a station number error (error code: 1002H).

---

(7) Station number rewritable count to flash ROM

(buffer memory address 204H: Un\G516)

Stores the remaining number of times when the station number setting can be saved onto the flash ROM during operation.
The initial value is 60.

(a) Counting down the number of times
Every time the station number is changed on the flash ROM, the count is decremented by 1.
The count is not decremented when station number setting is requested with the same station number as the one saved on the flash ROM (buffer memory address: 202H).

(b) Resetting the count

The count is reset to 60 by resetting the CPU, by powering on the QJ71PB93D or by clearing the station number on the flash ROM using the station number change request signal (Y13).

(c) If an attempt is made to rewrite the station number on the flash ROM at the remaining count of 0

A station number rewrite count excess error (error code: 2001$_H$) occurs and the station number on the flash ROM is not changed.

If the station number rewrite count excess error has occurred, switch power on again, reset the CPU, or clear the station number on the flash ROM using the station number change request signal (Y13). (This returns the remaining count to 60 times.)

(8) Module error information (buffer memory address 7F8$_H$: Un\G2040)

Stores the error code of the error that occurred in the QJ71PB93D.

Refer to Section 9.4 for the error codes.

(9) Extension trouble information area
(buffer memory address 7F9$_H$ to 805$_H$: Un\G2041 to Un\G2053)

Used to set the extension trouble information to be sent to the master station.

The extension trouble information sent by the QJ71PB93D is the Device Related Diagnostic specified in PROFIBUS.

The extension trouble information can be set in a sequence program.

Data length   : Data length of the data to be sent as extension trouble information (bytes units)

Extension trouble information : Any data to be set to the master station (max. 24 bytes)

```
7F9ᴴ  ┌─────────────────────┐
      │     Data length      │
7FAᴴ  ├─────────────────────┤
      │  Extension trouble   │
 ≀    │     information      │
805ᴴ  └─────────────────────┘
```

The extended trouble information area is used as described below when an extended trouble occurs and when the extended trouble is removed.

(a) When extended trouble occurs

When the host becomes faulty, for example, the data stored in the extended trouble information area of the buffer memory is sent to the master station as extended trouble information.

In the following procedure, the QJ71PB93D can notify the master station of the extended trouble of the host.

1) In the buffer memory 7FA$_H$ to 805$_H$, set the data to be sent to the master station.

2) In the buffer memory 7F9$_H$, set the length of the data to be sent to the master station.

3) Turn ON the extension trouble notification request signal (Y02).

4) After the extension trouble notification completion signal (X02) has turned ON, turn OFF the extension trouble notification request signal (Y02).

(b) When extended trouble is removed

When the host is not faulty anymore, notify the master station that there is no fault.

In the following procedure, the QJ71PB93D can notify the master station that the extended trouble of the host has been removed.

1) In the buffer memory 7F9H, set the data length 0.
2) Turn ON the extension trouble notification request signal (Y02).
3) After the extension trouble notification completion signal (X02) has turned ON, turn OFF the extension trouble notification request signal (Y02).

(c) DIA LED of QJ71PB93D front panel is turned on as follows.
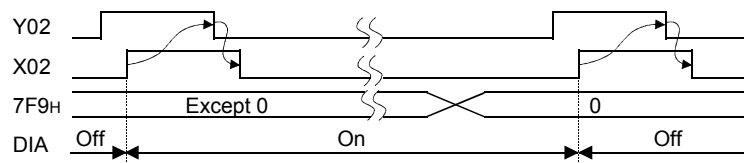
(10) Current operation mode (buffer memory address 8CEH: Un\G2254)

Stores the current operation mode.

Refer to Section 3.5 for the operation mode.

Stored Value	Mode
0000H	Normal operation mode
0002H	Self-diagnostic mode

At power-on or CPU reset, the module starts in the normal operation mode.

(11) Operation mode change request area
(buffer memory address 8CFH: Un\G2255)

Set any of the following values when changing the operation mode of the QJ71PB93D with the operation mode change request signal (Y11).

Set Value	Description
0000H	Normal operation mode
0002H	Self-diagnostic mode

At power-on or CPU reset, "FFFEH" is stored.

If an operation mode change request is executed with any value other than the set value, the operation cannot be guaranteed.

(12) Operation mode change result area
(buffer memory address 8D0H: Un\G2256)

Stores the result of changing the operation mode in response to the operation mode change request signal (Y11).

0 : Normal completion

1 : Abnormal completion (A change request was made with an illegal value set in the operation mode change request area (buffer memory address: 8CFH))

(13) Current communication watchdog timer value
(buffer memory address 8D1H: Un\G2257)

Stores the communication watchdog timer value set in the master station side parameters.

The stored value is invalid if the I/O communication signal (X01) is off.

    0   : Communication watchdog timer setting invalid

    Other than 0 : Communication watchdog timer setting (in increments of 10ms)

When the master station becomes faulty, the send/receive data and I/O communication signal (X01) statuses change depending on the communication watchdog timer setting.

Statuses at master station fault	Current communication watchdog timer value (This area)	
	0	Other than 0
Send data to master station *1	Retained *2	Cleared
Data update in output receive area	Retained *2	Cleared
I/O communication signal (X01)	ON *2	OFF

*1: The send data to the master station indicates the data that flows on the PROFIBUS-DP actually. It differs from the data in the input send area of the QJ71PB93D.

*2: If the communication watchdog timer setting is invalid (This area is 0), the data is retained since the communication watchdog timer does not count up if the master station becomes faulty during communication.

(14) Self-diagnostic status type code display area (buffer memory address 8D2H: Un\G2258)

The diagnostic status type code at the time of self-diagnostics is stored.

The following type code can be confirmed during self-diagnostics or at abnormal termination.

Status	Type Code	Description
During self-diagnostics	0001H to 0009H	During self-diagnostics
At normal termination	0H	Normal termination
At abnormal termination	8001H to 8006H	Hardware fault
	8007H	Swap test error

Refer to Section 5.6 for the way to run the self-diagnostics.

(15) Swapping function setting status
(buffer memory address 8D3H: Un\G2259)

Stores the setting status of the swapping function set in the master station side parameter.

The stored value while the I/O communication signal (X01) is on is valid.

    0 : Without swap setting

    1 : With swap setting

(16) Output receive area used status
(buffer memory address 8E0H to 8EBH: Un\G2272 to Un\G2283)

Stores the used status of the output receive area.

The bits corresponding to the buffer memory addresses in output receive area set by the master station parameters (Data module setting) turn on.

The stored value while the I/O communication signal (X01) is on is valid.

Buffer Memory Address		Corresponding Buffer Memory Addresses (Hexadecimal) in output receive area															
Hexadecimal	Decimal	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
8E0H	2272	FH	EH	DH	CH	BH	AH	9H	8H	7H	6H	5H	4H	3H	2H	1H	0H
8E1H	2273	1FH	1EH	1DH	1CH	1BH	1AH	19H	18H	17H	16H	15H	14H	13H	12H	11H	10H
8E2H	2274	2FH	2EH	2DH	2CH	2BH	2AH	29H	28H	27H	26H	25H	24H	23H	22H	21H	20H
8E3H	2275	3FH	3EH	3DH	3CH	3BH	3AH	39H	38H	37H	36H	35H	34H	33H	32H	31H	30H
8E4H	2276	4FH	4EH	4DH	4CH	4BH	4AH	49H	48H	47H	46H	45H	44H	43H	42H	41H	40H
8E5H	2277	5FH	5EH	5DH	5CH	5BH	5AH	59H	58H	57H	56H	55H	54H	53H	52H	51H	50H
8E6H	2278	6FH	6EH	6DH	6CH	6BH	6AH	69H	68H	67H	66H	65H	64H	63H	62H	61H	60H
8E7H	2279	7FH	7EH	7DH	7CH	7BH	7AH	79H	78H	77H	76H	75H	74H	73H	72H	71H	70H
8E8H	2280	8FH	8EH	8DH	8CH	8BH	8AH	89H	88H	87H	86H	85H	84H	83H	82H	81H	80H
8E9H	2281	9FH	9EH	9DH	9CH	9BH	9AH	99H	98H	97H	96H	95H	94H	93H	92H	91H	90H
8EAH	2282	AFH	AEH	ADH	ACH	ABH	AAH	A9H	A8H	A7H	A6H	A5H	A4H	A3H	A2H	A1H	A0H
8EBH	2283	BFH	BEH	BDH	BCH	BBH	BAH	B9H	B8H	B7H	B6H	B5H	B4H	B3H	B2H	B1H	B0H

• Example of output receive area used status

Buffer memory

Area name	Address	
	Hexadecimal	Decimal
	0H	0
	1H	1
	⟨	
	EH	14
Output receive area	FH	15
	10H	16
	11H	17
	⟨	
	1EH	30
	1FH	31
	20H	32

b0: ON indicates that the output receive area at address 0H is used, and b14: ON that the output receive area at address EH is used.

b1: ON indicates that the output receive area at address 11H is used, and b15: ON that the output receive area at address 1FH is used.

Output receive area used status	Hexadecimal	Decimal	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
	8E0H	2272	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	8E1H	2273	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	8E2H	2274	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0:OFF , 1:ON

Areas where output data are being received from master station

(17) Input send area used status
    (buffer memory address 8F0H to 8FBH: Un\G2288 to Un\G2299)
Stores the used status of the input send area.
The bits corresponding to the buffer memory addresses of the input send area
set in the master station parameters (Data module setting) turn on.
The stored value while the I/O communication signal (X01) is on is valid.

Buffer Memory Address		Corresponding Buffer Memory Addresses of Input Send Area (Hexadecimal)															
Hexadecimal	Decimal	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
8F0H	2288	10FH	10EH	10DH	10CH	10BH	10AH	109H	108H	107H	106H	105H	104H	103H	102H	101H	100H
8F1H	2289	11FH	11EH	11DH	11CH	11BH	11AH	119H	118H	117H	116H	115H	114H	113H	112H	111H	110H
8F2H	2290	12FH	12EH	12DH	12CH	12BH	12AH	129H	128H	127H	126H	125H	124H	123H	122H	121H	120H
8F3H	2291	13FH	13EH	13DH	13CH	13BH	13AH	139H	138H	137H	136H	135H	134H	133H	132H	131H	130H
8F4H	2292	14FH	14EH	14DH	14CH	14BH	14AH	149H	148H	147H	146H	145H	144H	143H	142H	141H	140H
8F5H	2293	15FH	15EH	15DH	15CH	15BH	15AH	159H	158H	157H	156H	155H	154H	153H	152H	151H	150H
8F6H	2294	16FH	16EH	16DH	16CH	16BH	16AH	169H	168H	167H	166H	165H	164H	163H	162H	161H	160H
8F7H	2295	17FH	17EH	17DH	17CH	17BH	17AH	179H	178H	177H	176H	175H	174H	173H	172H	171H	170H
8F8H	2296	18FH	18EH	18DH	18CH	18BH	18AH	189H	188H	187H	186H	185H	184H	183H	182H	181H	180H
8F9H	2297	19FH	19EH	19DH	19CH	19BH	19AH	199H	198H	197H	196H	195H	194H	193H	192H	191H	190H
8FAH	2298	1AFH	1AEH	1ADH	1ACH	1ABH	1AAH	1A9H	1A8H	1A7H	1A6H	1A5H	1A4H	1A3H	1A2H	1A1H	1A0H
8FBH	2299	1BFH	1BEH	1BDH	1BCH	1BBH	1BAH	1B9H	1B8H	1B7H	1B6H	1B5H	1B4H	1B3H	1B2H	1B1H	1B0H

• Example of input send area used status

Buffer memory

Area name	Address		
	Hexadecimal	Decimal	
Input send area	100H	256	
	101H	257	b1: ON indicates that the output receive area at address 101H is used, and b15: ON that the output receive area at address 10FH is used.
	〰		
	10EH	270	
	10FH	271	
	110H	272	
	111H	273	b0: ON indicates that the output receive area at address 110H is used, and b14: ON that the output receive area at address 11EH is used.
	〰		
	11EH	286	
	11FH	287	
	120H	288	

			b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Input send area used status	8F0H	2288	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	8F1H	2289	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	8F2H	2290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0:OFF , 1:ON

[gray box] Areas where input data are being sent to master station

3.5 Operation Mode

The QJ71PB93D has two operation modes, normal operation mode and self-diagnostic mode.

The modes will be described.

Operation Mode	Description	Reference Section
Normal operation mode	In this mode, communication is made as in the slave parameters set to the master station. Communication can be made if the slave parameters are within the setting ranges. (Set only the station number in a sequence program or GX Configurator-DP.) After power is switched on or the programmable controller CPU is reset, the QJ71PB93D operates in the normal operation mode.	Section 4.1.1
Self-diagnostic mode	In this mode, the QJ71PB93D is tested alone to diagnose a hardware fault. No communication is made with the master station.	Section 5.6

(1) When setting operation mode using output signal
   Set the operation mode using the operation mode change request area (Buffer memory address: 8CF$_H$) and the operation mode change request signal (Y11).

(2) When setting operation mode using GX Configurator–DP
   Set the operation mode using GX Configurator Client of GX Configurator–DP.

REMARKS

Refer to Section 5.6 for changing the operation mode.

4 FUNCTIONS

4.1 Functions for Communication with Class 1 Master

This section explains the functions provided for communication between the QJ71PB93D and class 1 master station.

4.1.1 I/O data communication function

This function allows the QJ71PB93D to operate as a PROFIBUS-DP slave station and to communicate I/O data with the master station.

A single QJ71PB93D can handle the following size of data.

Input data　: Max. 122 words
Output data: Max. 122 words　} Max. 192 words in total
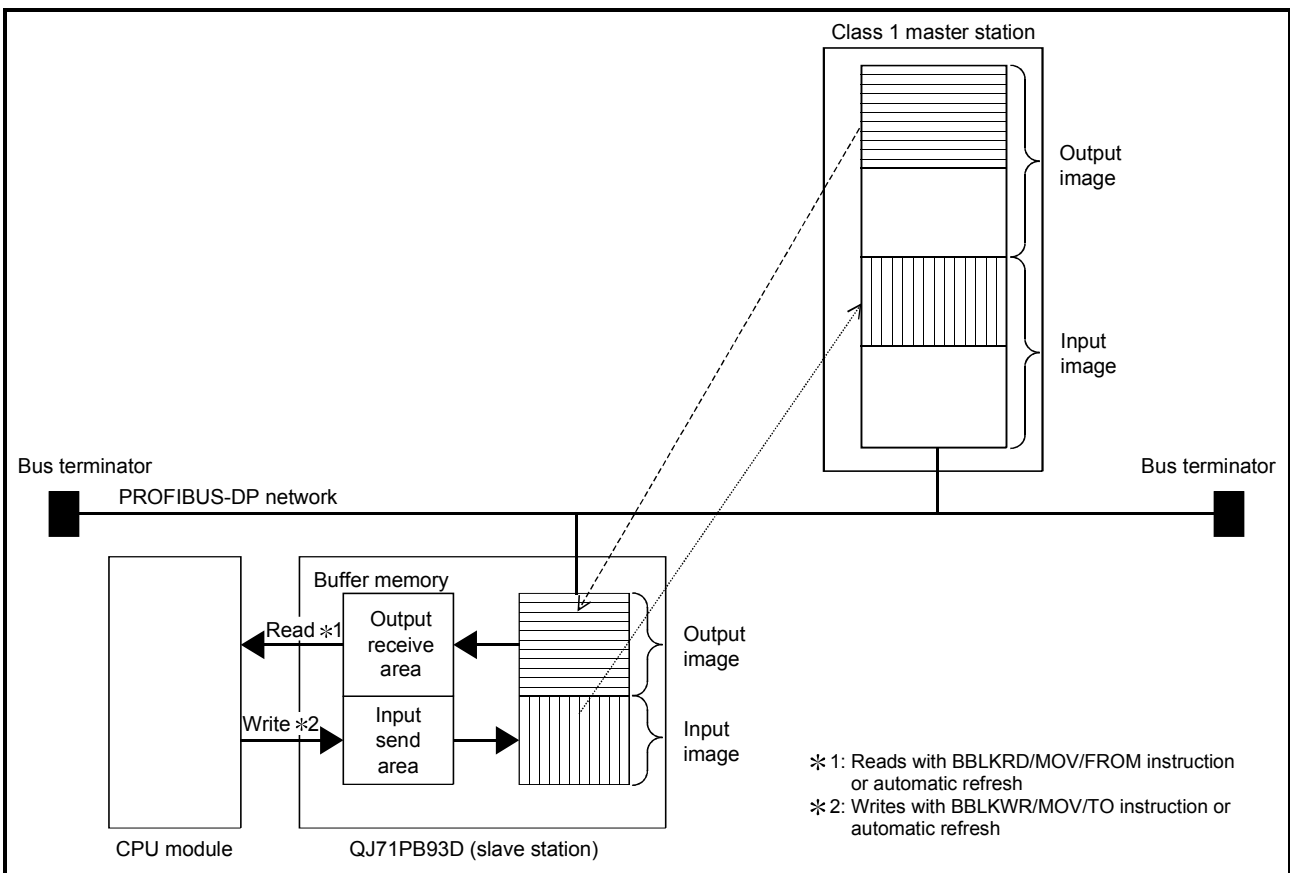
(1) Reading/writing I/O data
   (a) Where to be stored
      The I/O data are stored in the following buffer memory of the QJ71PB93D.
      • Input data: Input send area (Buffer memory address: 100H to 1BFH)
      • Output data: Output receive area (Buffer memory address: 0H to BFH)

   (b) Read/write methods
      Read or write I/O data (from the buffer memory) to devices in CPU module
      by the following methods.

Read/Write Methods	Setting Location	Data Consistency Function
Automatic refresh	GX Configurator-DP	Available
Dedicated instructions (BBLKRD, BBLKWR)	Sequence program	
MOV or FROM/TO instructions	Sequence program	Not available

(2) Sending/receiving I/O data
   The sending and receiving process is described below.
   (a) The I/O communication signal (X01) turns on when the QJ71PB93D is ready
      to communicate with the master station.

   (b) When the I/O communication signal (X01) turns on, data output from the
      master station are stored into the output receive area (Buffer memory
      address: 0H to BFH).

   (c) When sending input data to the master station, write the initial value to the
      input send area (Buffer memory address: 100H to 1BFH).

   (d) Turning on the input send area refresh directive signal (Y00) starts input
      data communication.
      Turning off the signal stops the input data communication.

(e) The I/O communication signal of the QJ71PB93D is turn off when communication with the master station is stopped.

[Receiving output data from the master station]

[Sending input data to the master station]
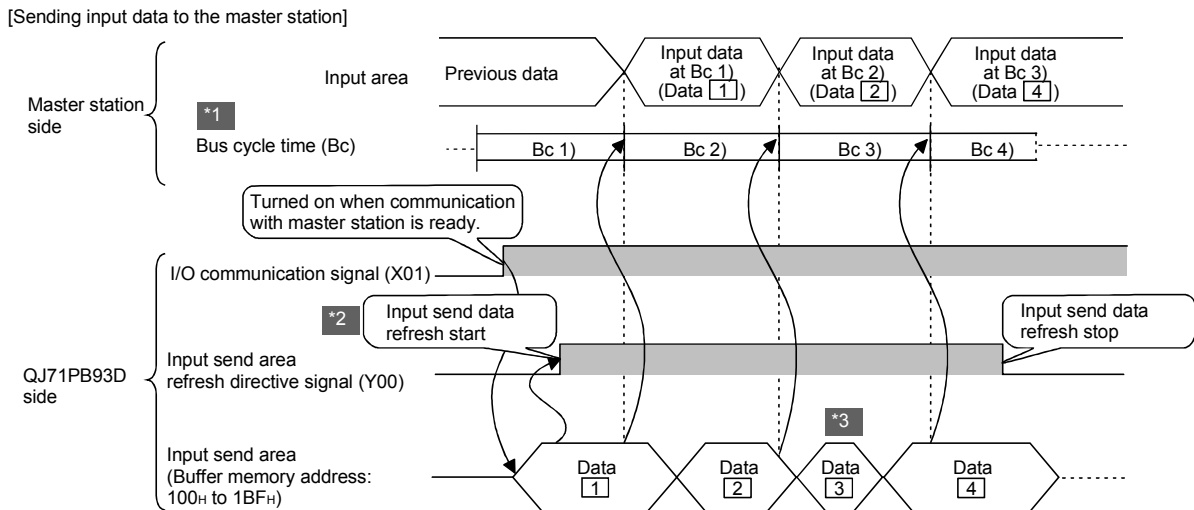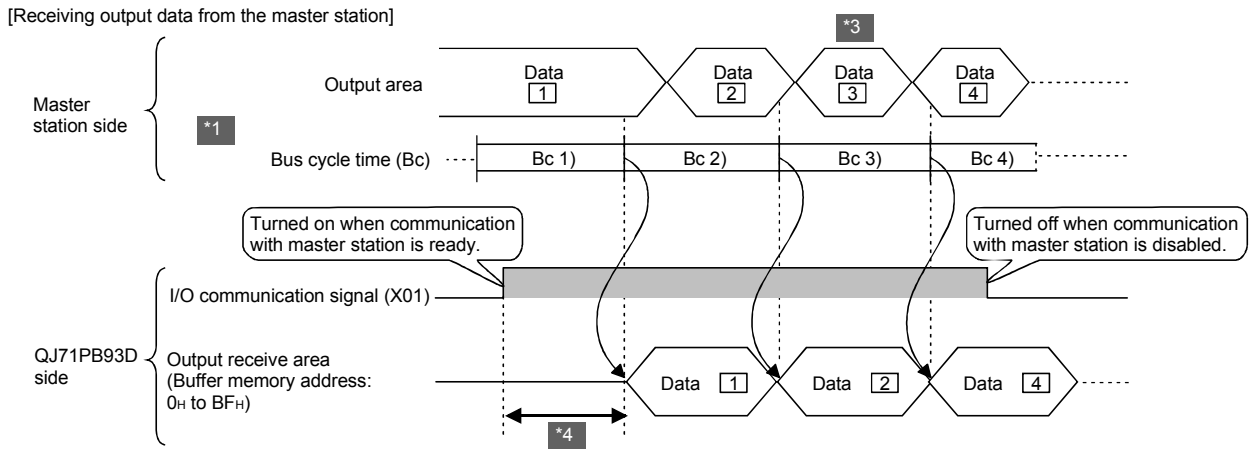
*1: For the bus cycle time calculation formula, refer to the manual for the PROFIBUS-DP module used as the master station.

*2: Y00 must be turned ON after X01 turns ON and data are stored in the input send area.

*3: Hold the data for more than 1 bus cycle time.
If the data are held for the time less than 1 bus cycle time, they may not be sent.

*4: Transmission delay equal to 1 bus cycle time occurs to read the data in the output receive area after X01 turns on.
Transmission delay equal to a maximum of 1 bus cycle time occurs to store data in the input receive area after X01 turns on.

4.1.2 I/O data separation prevention function

The I/O data separation prevention function is a function to prevent the I/O data of the CPU module from being unmatched with the I/O data of the master station.

The following shows an example of output data separation.

When not using the separation prevention function (Output data)
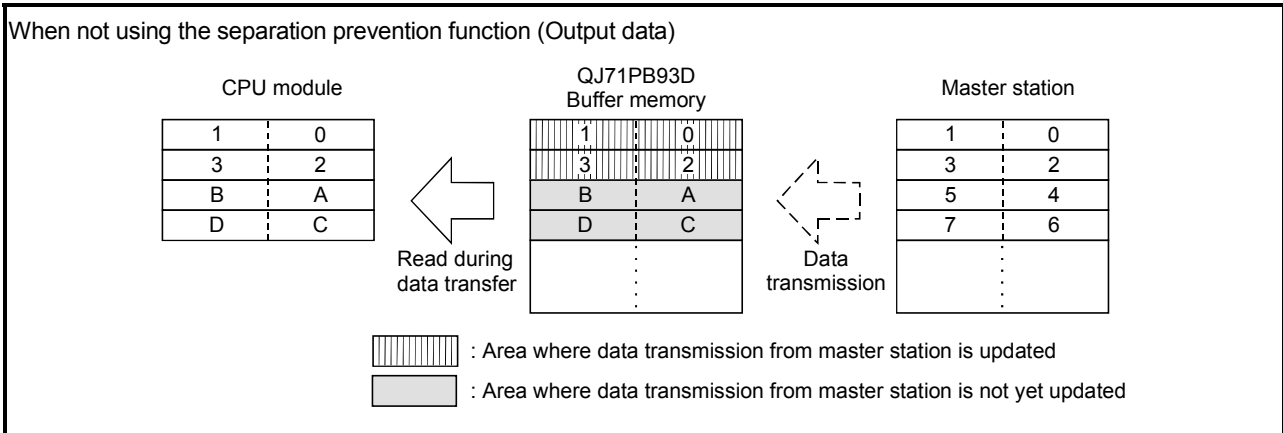
(1) I/O data separation prevention function

   (a) The separation of I/O data occurs when the buffer memory is also read from/written to the CPU module during the data transmission between the buffer memory of QJ71PB93D and the master station.

   (b) When the separation prevention function is used, the reading from the CPU module is waited during the data transmission from the master station to the buffer memory (output receive area) of QJ71PB93D, and executed after the data transmission has been completed.
   Also, the data transmission to the master station is waited until the writing from the CPU module to the buffer memory (input send area) of QJ71PB93D is completed, and executed after the writing has been completed.

When using the separation prevention function (Output data)
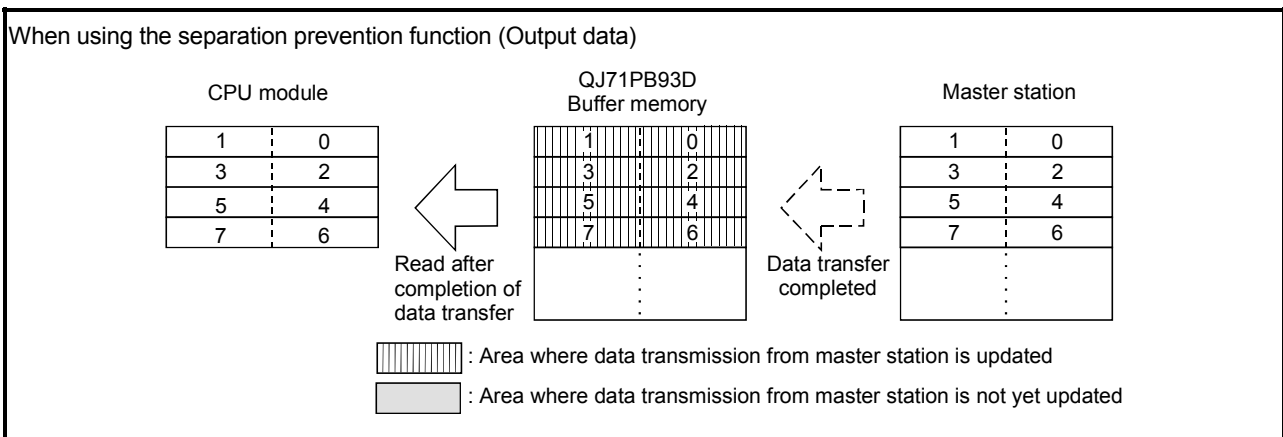
(2) How to prevent data inconsistency

The I/O data separation prevention function is executed by either of the following methods.

This function is not available when the MOV or FROM/TO instruction is used for buffer memory reading/writing.

(a) Using automatic refresh

Automatic refresh can be set in GX Configurator–DP.

To use the data separation prevention function at the time of automatic refresh, check the "Enable" and "Consistency" boxes in the Autom. Refresh area on the parameter setting screen.

Put checkmarks.
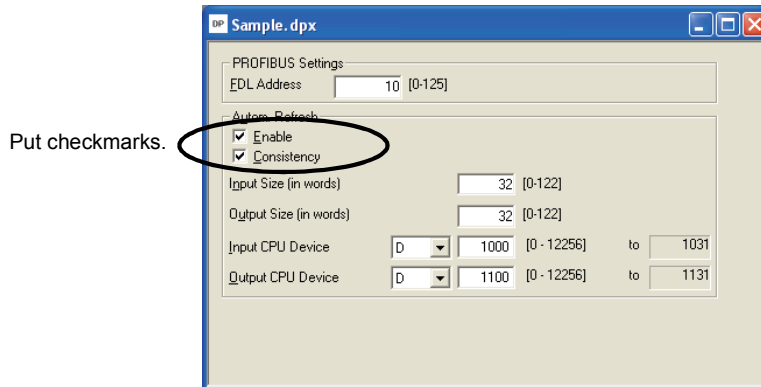
| REMARKS |

For the automatic refresh setting method, refer to Section 5.3.1.

(b) Using dedicated instruction

Using the BBLKRD or BBLKWR instruction to read or write data prevents I/O data separation. (Refer to Chapter 8)

| REMARKS |

Refer to Section 7.3.1 and 7.3.2 for program examples of the I/O data communication using dedicated instructions.

(3) Precautions

  (a) Applicable CPU module

    To utilize the separation prevention function, use a CPU module whose first five digits of the serial No. is "02092" or later. (Refer to Section 2.3)

  (b) Transmission delay time caused by the separation prevention function

    The delay time in transmission between the CPU module and master station is lengthened because the QJ71PB93D have to wait for reading from or writing to the CPU module and data transfer from/to the master station. (Refer to Chapter 6)

    The separation prevention function can be disabled in the automatic refresh setting. (Refer to Section 5.3.1 (2))

    Disable the separation prevention function when it is not necessary.

  (c) When the separation prevention function is enabled in the automatic refresh setting

    Dedicated instructions are not executable. (They are not processed.)

    They can be executed when the separation prevention function is disabled in the automatic refresh setting.

4.1.3 Global control function

The inputs/outputs of slave stations are controlled simultaneously for each specified group by multicasting (broadcasting) from the master station. (Refer to (1) in this section)
Set group numbers when using the global control function.
The group numbers are set to the slave parameters of the master station. (Refer to (2) in this section.)
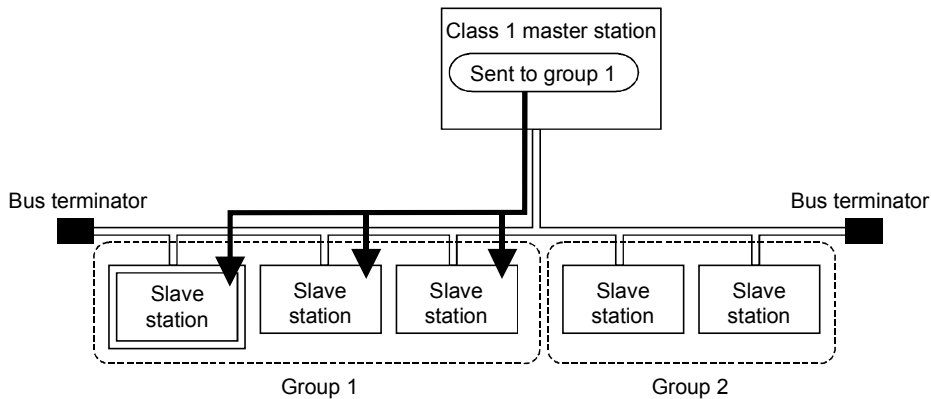
(1)   Global control services available for QJ71PB93D

The following table describes the global control services available for the global control function of the QJ71PB93D.

Service name	Description
SYNC	Starts the SYNC (output synchronization) mode. During the SYNC mode, the output status is refreshed every time the SYNC service is received. The output status is held as long as the SYNC service is not received.
UNSYNC	Ends the SYNC (output synchronization) mode.
FREEZE	Starts the FREEZE (input synchronization) mode. During the FREEZE mode, the input status is refreshed every time the FREEZE service is received. The input status is held as long as the FREEZE service is not received.
UNFREEZE	Ends the FREEZE (input synchronization) mode.

(a) When receiving SYNC and UNSYNC services

1) Before receiving SYNC service
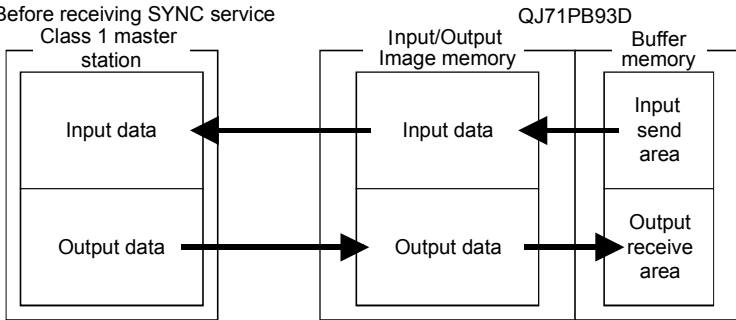
2) After receiving SYNC service
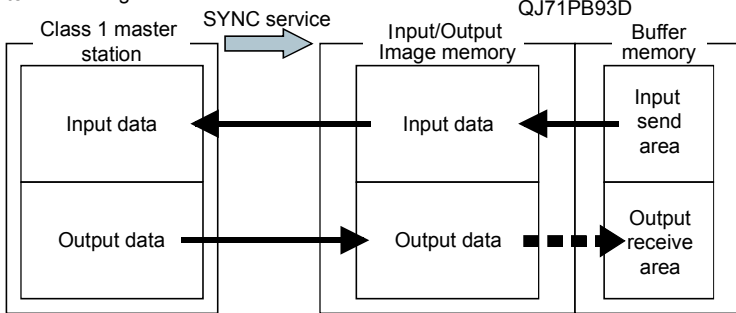
· Upon reception of the SYNC service, the SYNC mode is started and refresh from the output data area to the output receive area is stopped.

· During the SYNC mode, the SYNC LED of the QJ71PB93D is on.

· When the SYNC service is received during the SYNC mode, refresh to the output receive area is performed only once.

· Even during the SYNC mode, refresh from the input send area to the input data area is executed continuously.

3) After receiving UNSYNC service

· Upon reception of the UNSYNC service, the SYNC mode is terminated and refresh from the output data area to the output receive area is restarted.

· When the UNSYNC service is received and the SYNC mode is ended, the SYNC LED of the QJ71PB93D turns off.

(b)   When receiving FREEZE and UNFREEZE services

1) Before receiving FREEZE service
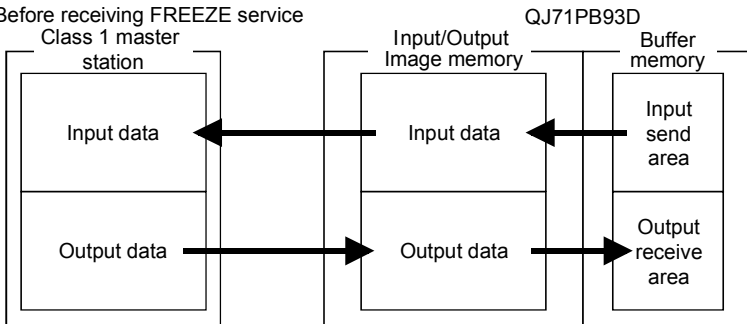
2) After receiving FREEZE service
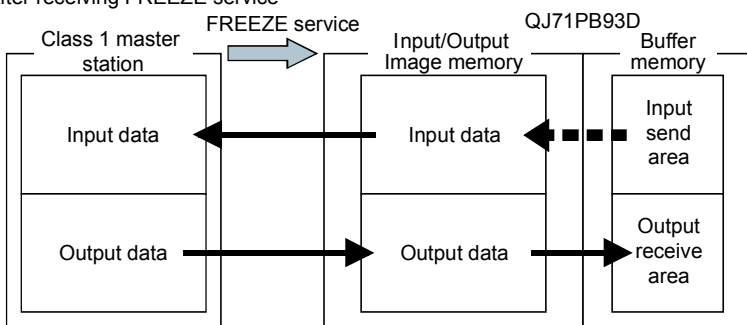
· Upon reception of the FREEZE service, the FREEZE mode is started and refresh from the input send area to the input data area is stopped.

· During the FREEZE mode, the FREEZE LED of the QJ71PB93D is on.

· When the FREEZE service is received during the FREEZE mode, refresh to the input sending area is performed only once.

· Even during the FREEZE mode, refresh from the output data area to the output receive area is executed continuously.

3) After receiving UNFREEZE service
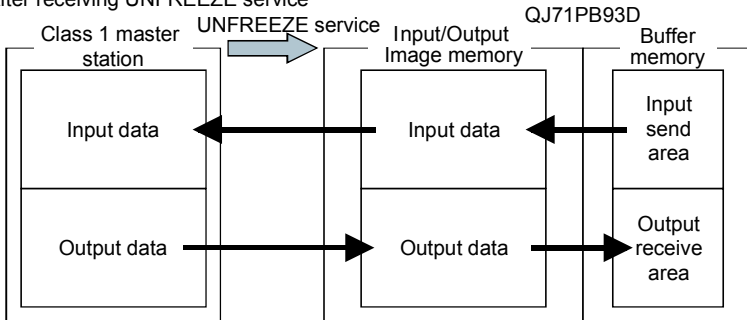
· Upon reception of the UNFREEZE service, the FREEZE mode is terminated and refresh from the input send area to the input data area is restarted.

· When the UNFREEZE service is received and the FREEZE mode is ended, the FREEZE LED of the QJ71PB93D turns off.

(2)   Group selection

There are a total of 8 groups from 1 to 8.

The QJ71PB93D is allowed to belong to any of the 8 groups. (Specify the group using the configuration tool of the master station.)

4.1.4 Word data swapping function

The high and low bytes are swapped in word units when input or output data are sent to or received from the master station.
Use this function when the used master station handles the high and low bytes of word data in reverse to those of the QJ71PB93D.
Data can be swapped for communication without the need for creating a program for swapping the high and low bytes.

(1) Operation outline for swap function
The data stored in the input sending area are sent to the master station after their high and low bytes have been swapped.
The data received from the master station are stored into the output receiving area after their high and low bytes have been swapped.
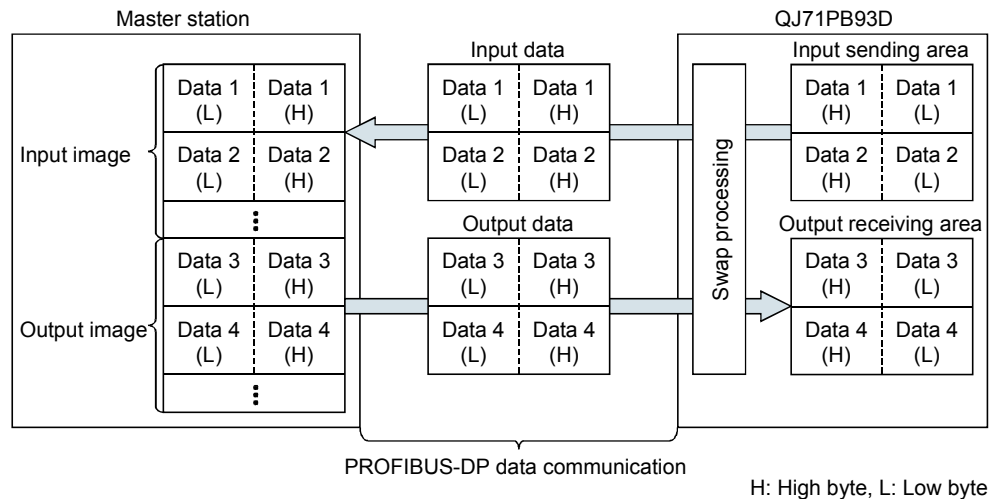
(2) Swap function setting
The setting required for swapping I/O data, the setting by master station type and the operation outline are described below.
(a) Swap function setting by master station type
The swap function setting changes depending on the master station type as described below.

Master station type		Swap function setting of QJ71PB93D
QJ71PB92V, QJ71PB92D	When swap is not executed on master station side (Default setting)	Disable (Not swapped)
	When swap is not executed on master station side	Enable (Swapped)
A1SJ71PB92D, AJ71PB92D		Disable (Not swapped)
Other master station		Set according to the specifications of the master station

(b) Operation outline

When the QJ71PB92V, QJ71PB92D, A1SJ71PB92D or AJ71PB92D is used as the master station, the operation outline is as shown below.

1) When the master station is the the QJ71PB92V/QJ71PB92D/ A1SJ71PB92D/AJ71PB92D (not swapped)

H: High byte, L: Low byte
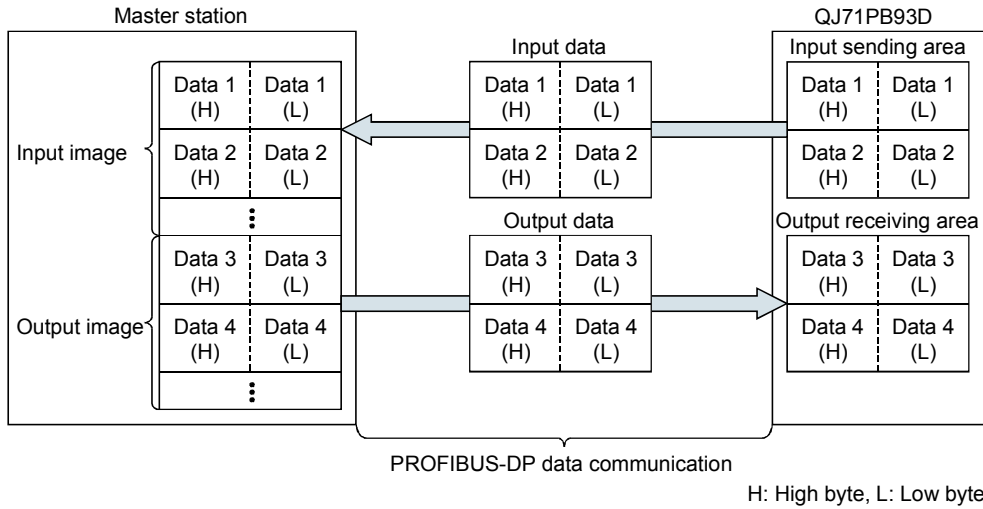
2) When the master station is the QJ71PB92V/QJ71PB92D (swapped)

H: High byte, L: Low byte
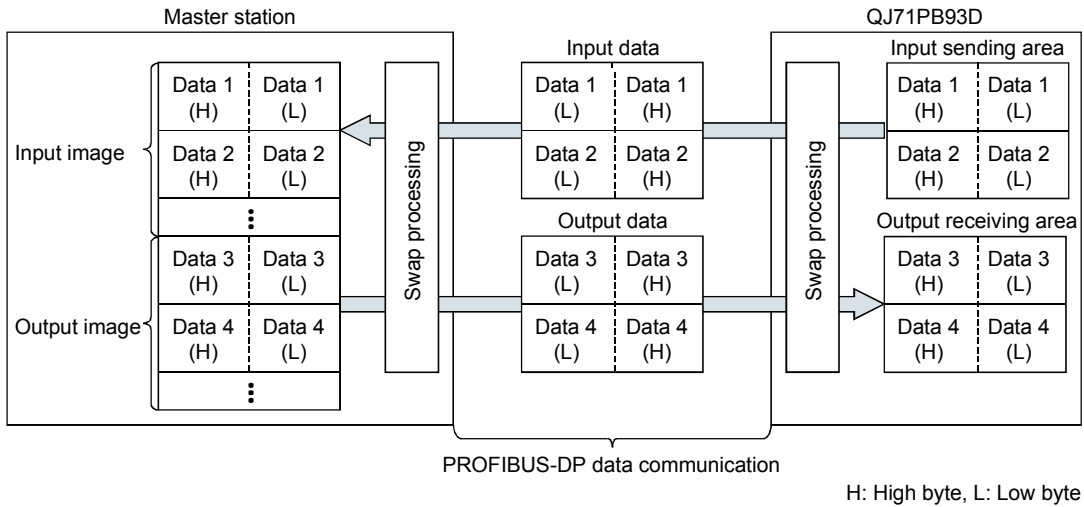
3) When high and low bytes of word data are reversed (swap) between the master station and the QJ71PB93D

PROFIBUS-DP data communication

H: High byte, L: Low byte
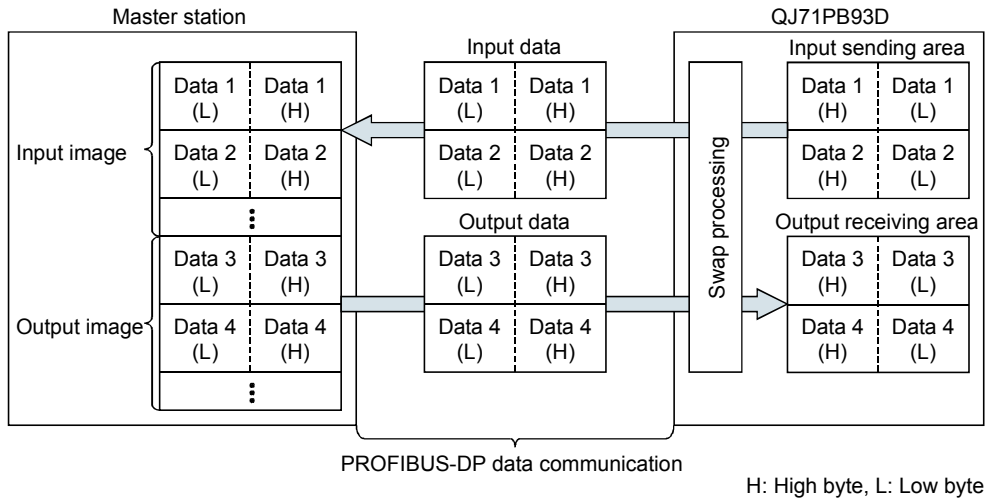
(c) How to set the swap function
The swap function can be set as a slave parameter of the master station (Word Data Swap in the user parameters setting).
Slave parameters of the master station are set from configuration tool on the master station.

In the case of GX Configurator-DP

Set the swap function.
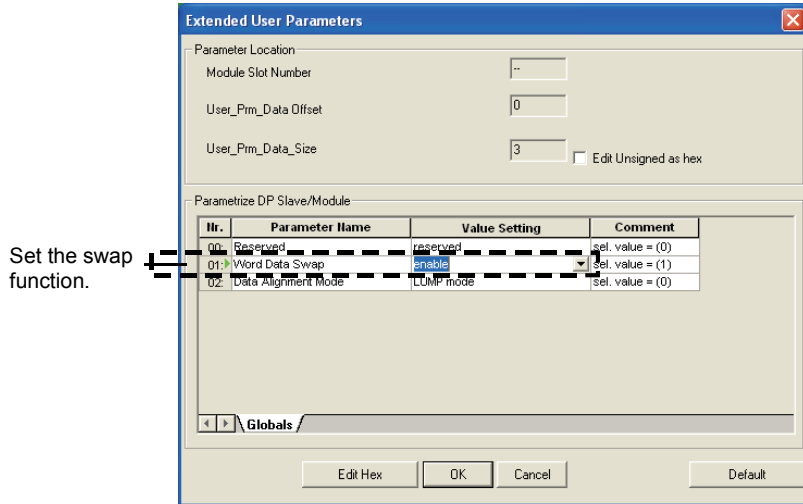
REMARKS

Refer to Section 5.2.3 for a setting example using GX Configurator-DP.
When using another configuration tool, refer to the relevant manual.

5 PROCEDURES BEFORE SYSTEM OPERATION

5.1 Procedures before Operation

The following diagram illustrates the procedure before system operation.

```
                    ┌─────────────────┐
                    │      Start       │
                    └────────┬─────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Load the QJ71PB93D to the base unit.   │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Check that the QJ71PB93D operates      │     Refer to Section 5.6.
        │ properly as a single module.           │
        │ (Self-diagnostics)                     │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Set the QJ71PB93D slave parameters to  │
        │ the master station using configuration │     Refer to Section 5.2.
        │ tool applicable to the master station. │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Set parameters to the QJ71PB93D.       │
        │ ·Station number *1                     │     Refer to Section 5.3.
        │ ·Automatic refresh parameters          │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Connect the master station and         │
        │ QJ71PB93D by a PROFIBUS cable.         │     Refer to Section 5.7.
        │ Connect bus terminators to the modules │
        │ at both ends.                          │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Make checks before power-on.           │
        │ ·Check the module loading status.      │
        │ ·Check the input power supply voltage. │
        │ ·Check that the CPU module STOP/RUN    │
        │  switch is in the "STOP" position.     │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │            Power-on                     │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Check operation with the LEDs.         │
        │ ·Data communication normal: RUN lit,   │
        │  BF extinguished                       │
        │ ·Data communication abnormal: ERR./BF  │
        │  lit                                   │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Write a program to the CPU module.     │
        └────────────────────┬──────────────────┘
                             ↓
        ┌───────────────────────────────────────┐
        │ Reset the CPU module or switch power   │
        │ from OFF to ON.                        │
        └────────────────────┬──────────────────┘
                             ↓
                    ┌─────────────────┐
                    │   System start   │
                    └────────┬─────────┘
                             ↓
                    ┌─────────────────┐
                    │       End        │
                    └─────────────────┘
```

*1: When setting the station number from the class 2 master station, connect the PROFIBUS cable to the QJ71PB93D before the setting.

5.2 Parameter Setting to Master Station

In PROFIBUS-DP systems, slave parameters for the QJ71PB93D must be set to the master station.
For the setting method, refer to the manual of the configuration tool to be used.

Item	Description	Reference
FDL Address	Set the station number of the QJ71PB93D. Setting range: 0 to 125	—
Watchdog	Set the watchdog timer period of the communication watchdog timer. The QJ71PB93D detects a communication error if data cannot be received from the master station within the configured time. If the communication watchdog timer has not been set, no error is detected. Setting range: 2 to 65025 (set value $\times$ 10ms)	—
Min T_sdr	Set the minimum response time during which the response frame is sent from the QJ71PB93D to the master station. Usually the default value is used. Setting range: 1 to 255	—
Group identification number	Specify groups (Grp1 to Grp8) to which the QJ71PB93D belongs. Multiple groups (Grp1 to Grp8) can be set.	—
Data module setting	Set the I/O configuration information (set to "Cfg_Data" of the master station). • Setting type: 96 pattern • Number of setting: 1 to 40	Section 5.2.1

Data assignment mode setting	Set the data layout of the output receive area/input send area of the buffer memory (set to "User_Prm_Data" of the master station).
	• Setting range
	  0 : LUMP mode (default)
	  1 : DIVIDED mode
		Section 5.2.2

Swap setting	Set whether the word data sent/received on the QJ71PB93D side will be swapped or not (set to "User_Prm_Data" of the master station).
	• Setting range
	  0 : Without swap (default)
	  1 : With swap
		Section 5.2.3

5

(1) Procedure for setting the slave parameters for QJ71PB93D to the master station

1. Read the GSD (DDB) file of the QJ71PB93D to the configurator corresponding to the master station used. (Refer to (2) in this section)

2. Set the QJ71PB93D slave parameters using the configurator.

3. Write the parameters to the master station.
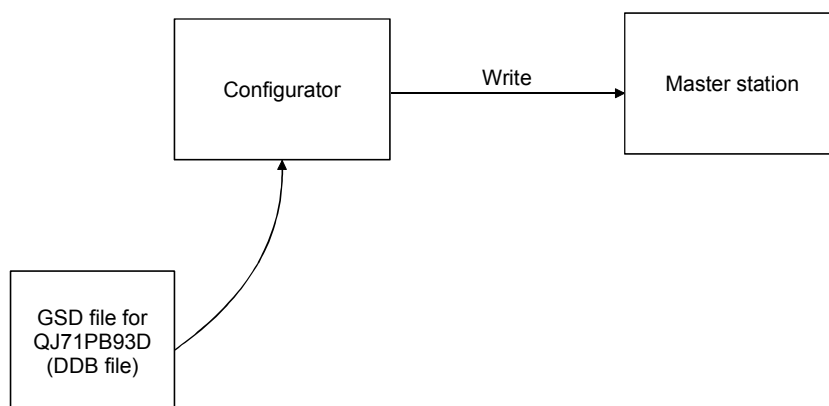
REMARKS

Refer to Section 5.2.1 to 5.2.3 for setting examples using GX Configurator-DP. When using another configuration tool on the master station, refer to the relevant manual.

(2) GSD (DDB) file

(a) When using GX Configurator-DP
GSD files have been incorporated into GX Configurator–DP.
GSD file installation is, therefore, unnecessary.

(b) When using another configuration tool on the master station
Please consult your local system service center or representative for the GSD (DDB) file of the QJ71PB93D.

5.2.1 Data module setting

Set the I/O configuration information of the master station and QJ71PB93D.

(1) Number of data modules to be set
   Set the data modules per QJ71PB93D within the following range.
   • Number of data modules: Max. 40 modules
   • Total data size
     Input data: Max. 122 words
     Output data: Max. 122 words } Total max. 192 words

(2) Data module setting pattern
   For data module setting, choose the corresponding one from among 96 patterns
   made available by combining I/O designation (3 types), data size (16 types) and
   separation prevention setting (2 types).

Setting Item	Types
I/O designation	Input, output, input/output
Data size	1 to 16 words
Separation prevention setting	Word unit (con word)/data module unit (con whole)

> **POINT**
>
> When even one data module is set to "data module unit (con whole)" in the
> separation prevention setting, data inconsistency is prevented based on the
> specified data size.

(3) Data module setting example
   The data module setting example given here assumes the following configuration.

   • Configuration example

		Data module 0	Data module 1	Data module 2
CPU module	QJ71PB93D	Input module 64 points (4 words) X20 to X5F	Output module 64 points (4 words) Y60 to Y9F	I/O module 32 points (2 words) XA0 to XBF YA0 to YBF

   • Setting example

Data Module Setting	QJ71PB93D Buffer Memory
Data module 0 (Input, 4 words, word unit)	Data module 0 area (4 words) is reserved in the input send area.
Data module 1 (Output, 4 words, word unit)	Data module 1 area (4 words) is reserved in the output receive area.
Data module 2 (Input/output, 2 words, word unit)	Data module 2 areas (2 words each) are reserved in the output receive area and input send area.

(a) Total data size
The total data size of the data modules 0 to 2 is as follows.
- Input date size: Data module 0 (input, 4 words)
  + data module 2 (input, 2 words)
  = 6 words
- Output date size: Data module 1 (output, 4 words)
  + data module 2 (output, 2 words)
  = 6 words
- Total date size: Input date size (6 words)
  + output data size (6 words)
  = 12 words

(b) Flows of data
The following indicates the flows of data between the modules.
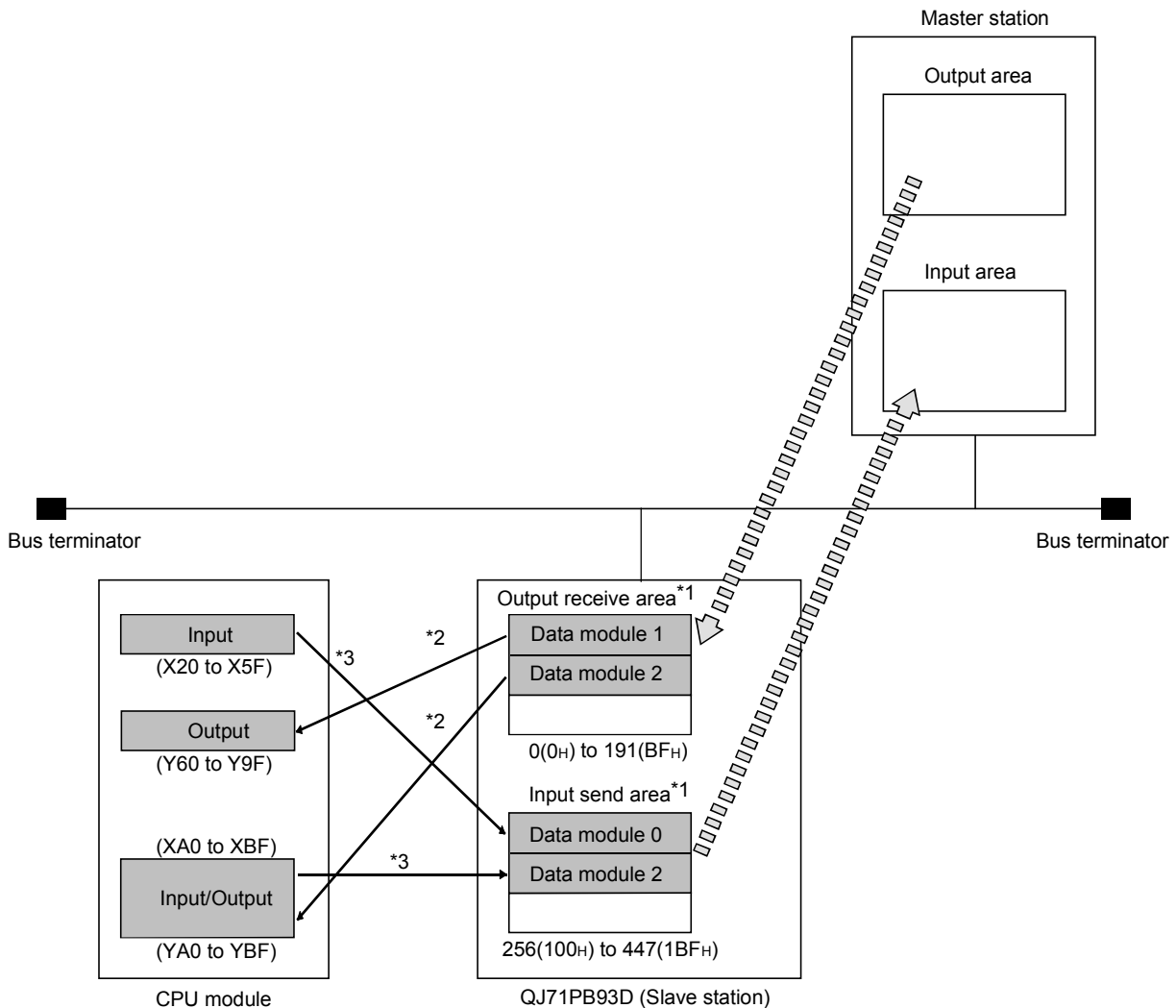
∗1: Use the data assignment mode setting to set the layout on the buffer memory. (Refer to Section 5.2.2)
∗2: Reads with BBLKRD/MOV/FROM instruction or automatic refresh.
∗3: Writes with BBLKWR/MOV/TO instruction or automatic refresh.

(4)   Setting method when using GX Configurator-DP

This section describes how to make setting from GX Configurator-DP.

When using another configuration tool, refer to the relevant manual.

1)   Add a slave station on the graphical network editor.

Right-click on the cable section.

Select Insert DP-Slave.
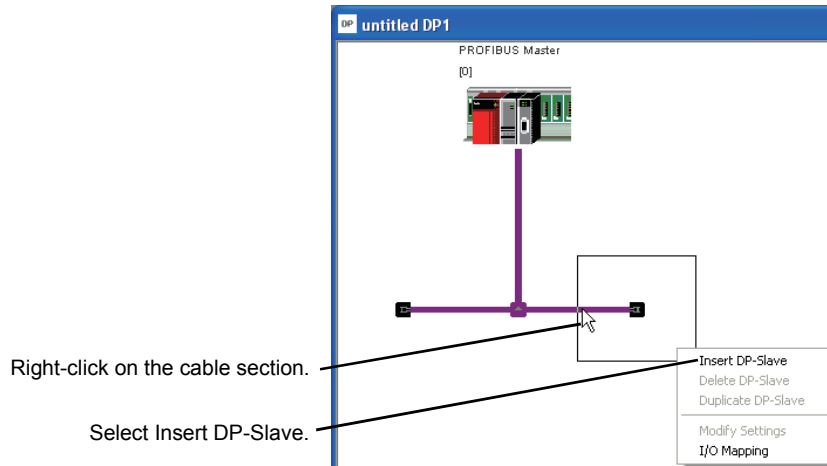
2)   The screen for selecting a slave station appears.
Select the QJ71PB93D.

Select Global.

Select PLC.

Select QJ71PB93D.
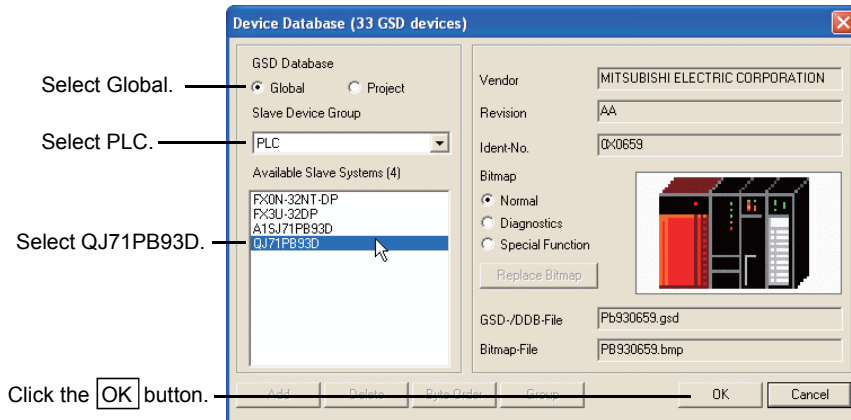
Click the OK button.

3) Click the |Select Modules| button in the Slave Parameter Settings dialog box.

Click the |Select Modules| button.
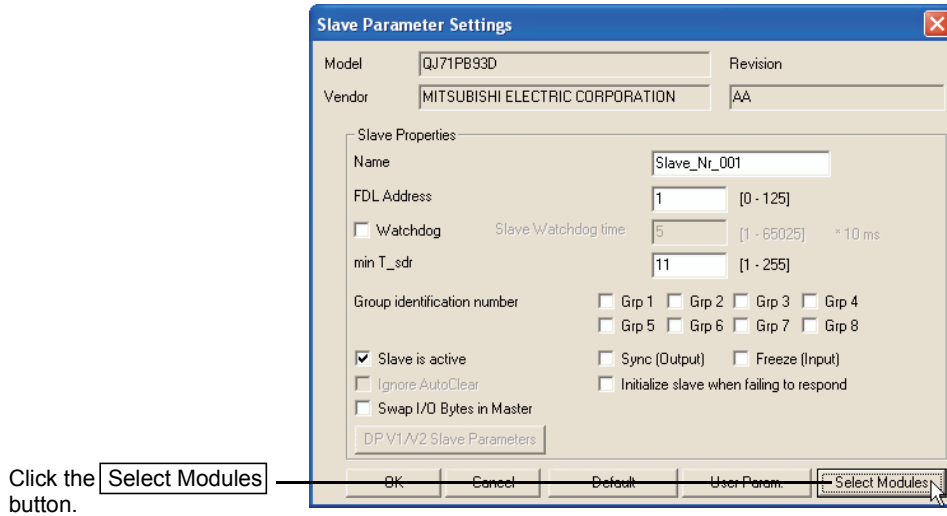
4) Perform the data module setting.
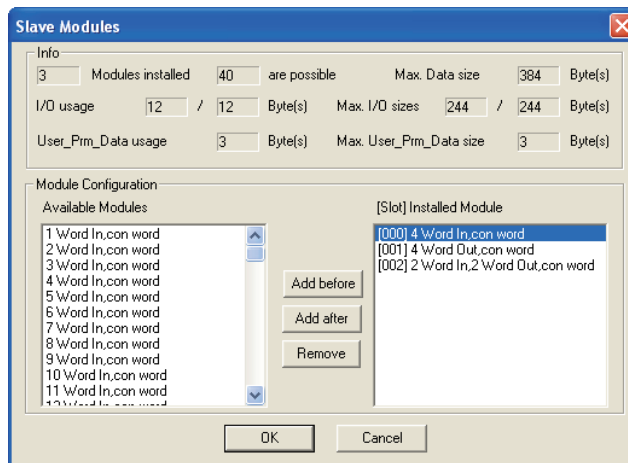
5) Write the configured parameters into the master station.

REMARKS

Refer to the GX Configurator-DP Operating Manual for creating projects and writing parameters to the master station by GX Configurator-DP.

5.2.2 Data assignment mode setting

Set how to assign each module in the output receive area or the input send area of the buffer memory.

This section gives an example of the output receive area and the input send area in the following data module setting.

		Data module 0	Data module 1	Data module 2	Data module 3	Data module 4	Data module 5
CPU module	QJ71PB93D	Input 1 word	Output 2 words	I/O 1 word	Output 1 word	Input 2 words	Output 1 word

Data Module Setting		Output Data	Input Data
Data module 0	1 word, input		1 word
Data module 1	2 words, output	2 words	
Data module 2	1 word, input/output	1 word	1 word
Data module 3	1 word, output	1 word	
Data module 4	2 words, input		2 words
Data module 5	1 word, output	1 word	

(1) Data assignment modes

There are the following two assignment modes.

(a) DIVIDED mode

In this mode, storage location of I/O data is assigned in the same way as the actual input/output of data modules.

Since arrangement in the assignment is the same as that of the actual inputs and outputs, reading from or writing to I/O modules and/or intelligent function modules can be done with a single instruction.

Buffer memory address

Output receive area		Input send area
0		100H Used by data module 0
1H	Used by data module 1	101H
2H		102H
3H	Used by data module 2	103H Used by data module 2
4H	Used by data module 3	104H
5H		105H Used by data module 4
6H		106H
7H	Used by data module 5	106H
8H		107H
9H		108H
⟨		⟨
BFH		1BFH
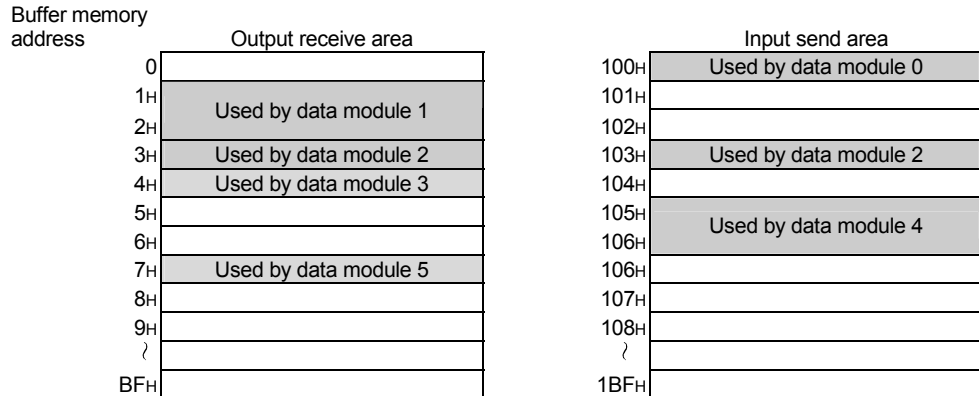
(b) LUMP mode (Default)

In this mode, the areas for storing input and output data are assigned in order of the data modules without allowing any empty space.

Because of this, reading from or writing to I/O modules and/or intelligent function modules may not be executable with a single instruction.

When storing data in the output receive area and the input send area, device areas can be used effectively.
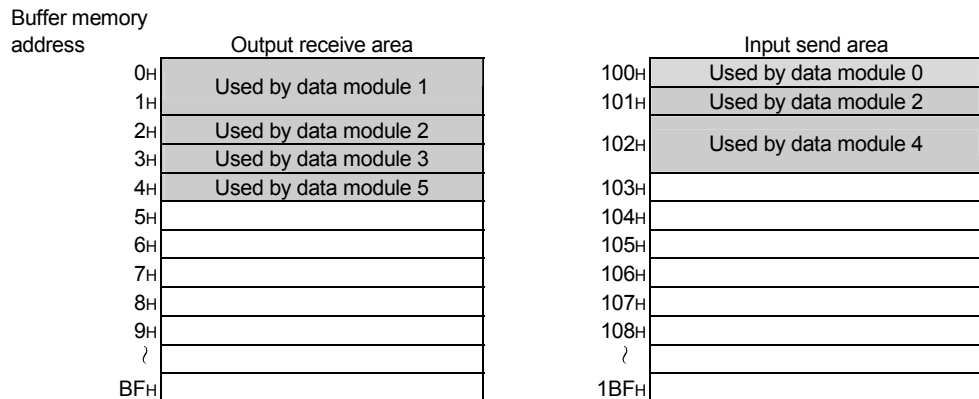
Buffer memory address

Output receive area		Input send area
0H	Used by data module 1	100H Used by data module 0
1H		101H Used by data module 2
2H	Used by data module 2	102H Used by data module 4
3H	Used by data module 3	
4H	Used by data module 5	103H
5H		104H
6H		105H
7H		106H
8H		107H
9H		108H
⟨		⟨
BFH		1BFH

(2) Setting method when using GX Configurator-DP

This section describes how to make setting from GX Configurator-DP.

When using another configuration tool, refer to the relevant manual.

1) From GX Configurator-DP, open the Slave Parameter Settings dialog box. (Refer to Section 5.2.1 (4)).

Click the User Param. button in the Slave Parameter Settings dialog box.

Click the User Param. button.
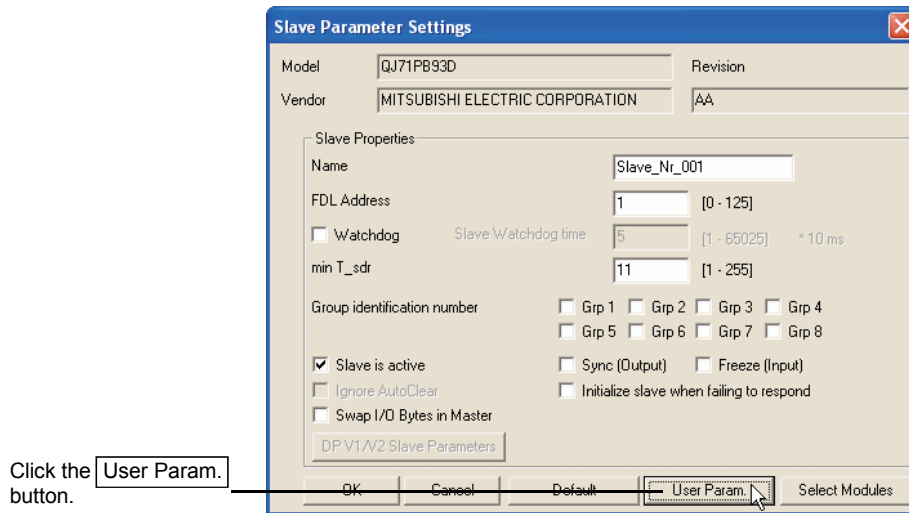
2) Set a mode for the Data Alignment Mode.

Set a data assignment mode.
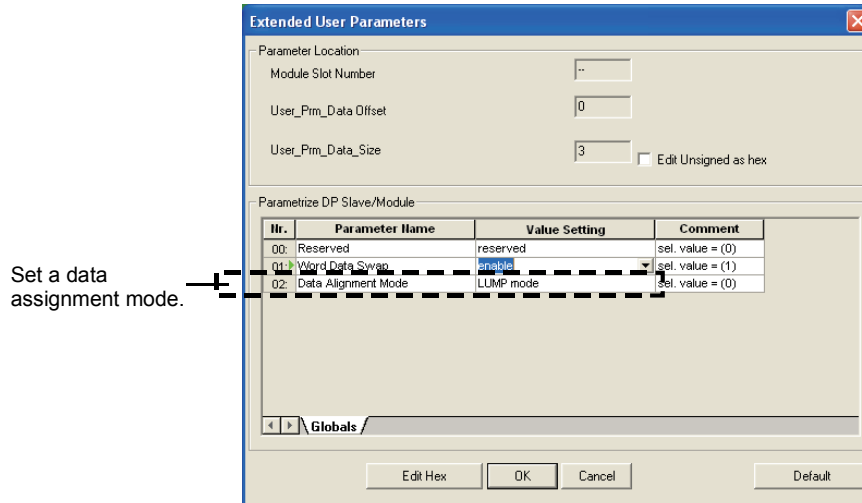
Item	Description
Data Alignment Mode	LUMP mode : Assigns data as a lump. (Default) DIVIDED mode : Assigns data individually.

3) Write the configured parameters into the master station.

REMARKS

Refer to the GX Configurator-DP Operating Manual for creating projects and writing parameters to the master station by GX Configurator-DP.

5.2.3 Swap setting

Set whether the word data swap function will be used or not.
Refer to Section 4.1.4 for the word data swap function.

(1) Setting method when using GX Configurator-DP

This section describes how to make setting from GX Configurator-DP.
When using another configuration tool, refer to the relevant manual.

1) From GX Configurator-DP, open the Slave Parameter Settings dialog
box. (Refer to Section 5.2.1 (4))
Click the User Param. button in the Slave Parameter Settings dialog
box.

Click the User Param.
button.
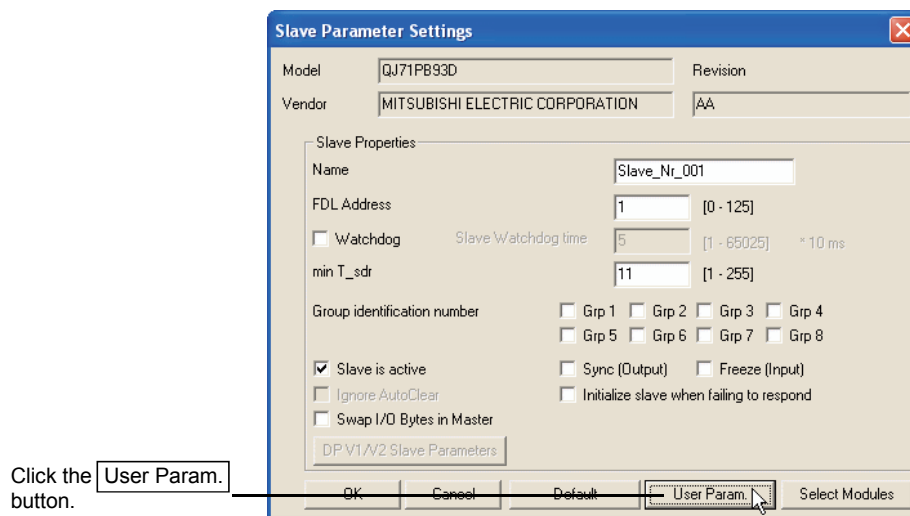
2) Make a desired setting for Word Data Swap.

Swap function setting
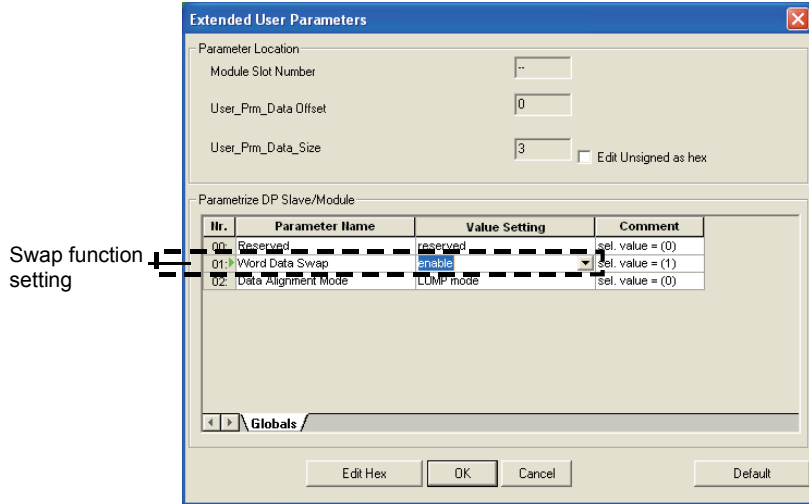
Item	Description
Word Data Swap	enable : Swaps the high and low bytes of data in units of words when receiving or sending I/O data. disable : Sends or receives I/O data as they are. (Default)

3) Write the configured parameters into the master station.

REMARKS

Refer to the GX Configurator-DP Operating Manual for creating projects and writing parameters to the master station by GX Configurator-DP.

5.3 Parameter Setting to Slave Station (QJ71PB93D)

Set the parameters displayed below to the QJ71PB93D.

Item	Description
Station number (FDL Address)	Set the station number of the QJ71PB93D. • Setting range From 0 to 125
Automatic refresh parameters (Autom. Refresh) ∗1	Set the parameters to automatically refresh the I/O data between the QJ71PB93D and CPU module.

∗1: Set the automatic refresh parameters only when using the automatic refresh.

(1) Parameter setting method
 (a) FDL address
  The FDL address can be set by either of the following:
  • GX Configurator-DP (Refer to Section 5.3.1)
  • Sequence program (Refer to Section 7.2)

 (b) Automatic refresh parameters
  The automatic refresh parameters can be set only in GX Configurator-DP.
  (Refer to Section 5.3.1)

5.3.1 Setting FDL address and automatic refresh parameters

The following explains the procedure for setting the FDL address (station number) and automatic refresh parameters using GX Configurator-DP.
Refer to the GX Configurator-DP Operating Manual for usage of GX Configurator-DP.

(1) Start procedure
  Select [File] → [New] → " QJ71PB93D (PROFIBUS DP V0 Slave)" in GX Configurator-DP.
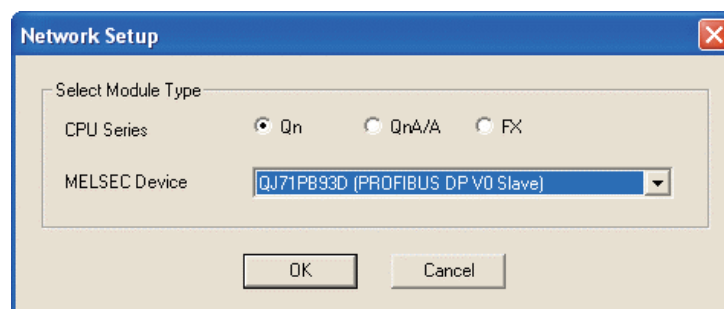
(2) Setting items
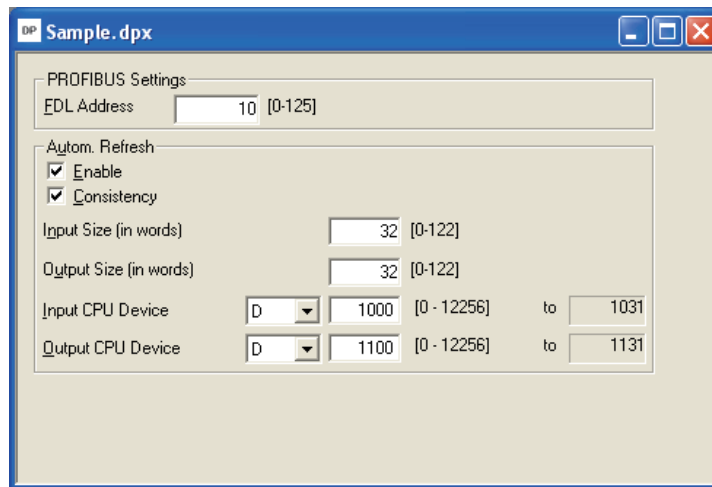
Item		Description
FDL Address		Set the station number of the QJ71PB93D. • Setting range: 0 to 125
Autom. Refresh		Set the automatic refresh.
	Enable	Enable the automatic refresh.
	Consistency	Enable the separation prevention at the time of automatic refresh. (Refer to Section 4.1.2)
	Input Size (in words)	Set the number of words of the data to be transferred from the QJ71PB93D to the CPU module.
	Output Size (in words)	Set the number of words of the data to be transferred from the CPU module to the QJ71PB93D.
	Input CPU Device	Set the target storage device for the case where the data in the output receive area (buffer memory address: 0$_H$ to BF$_H$) of the QJ71PB93D are transferred to the CPU module.
	Output CPU Device	Set the target storage device for the case where the CPU module data are transferred to the input send area (buffer memory address: 100$_H$ to 1BF$_H$) of the QJ71PB93D.

(3) Writing the configured parameters
Write the configured parameters to the CPU module in the following steps.
1) Save the settings from [File] → [Save As…].
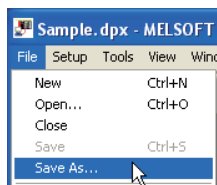
2) Select [Tool] → [Server Administrator].
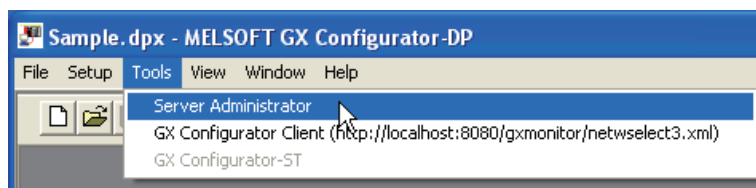
3) Click Start Server .
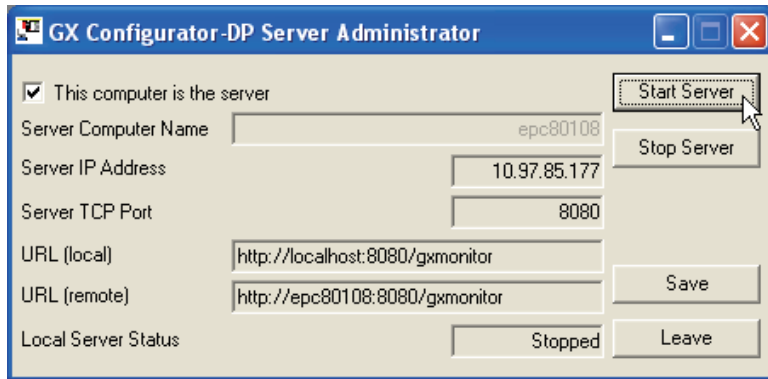
4) Select [Tools] → [GX Configurator Client].
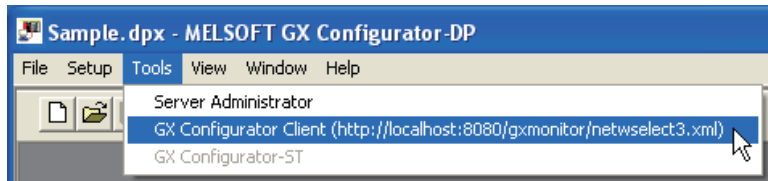
5) Connect the GX Configurator-DP to the CPU module.
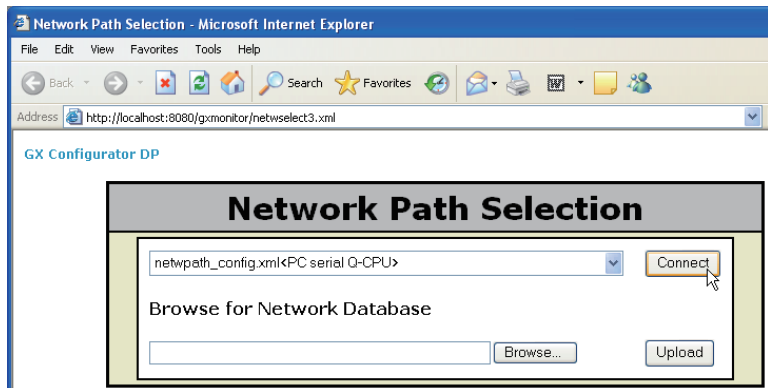
6) When the connection is completed, the list of installed modules is displayed.
   Select QJ71PB93D from the module list.
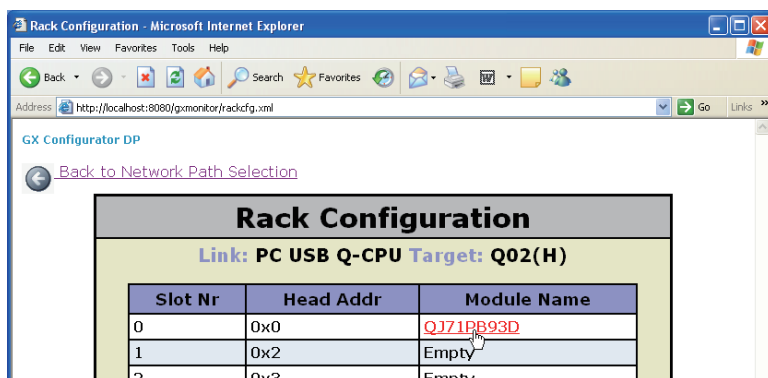
7) Select the parameter file (*.dpx) saved in step 1) for "Project".
Check the "Update Autorefresh in CPU" check box when automatic refresh parameters are set.
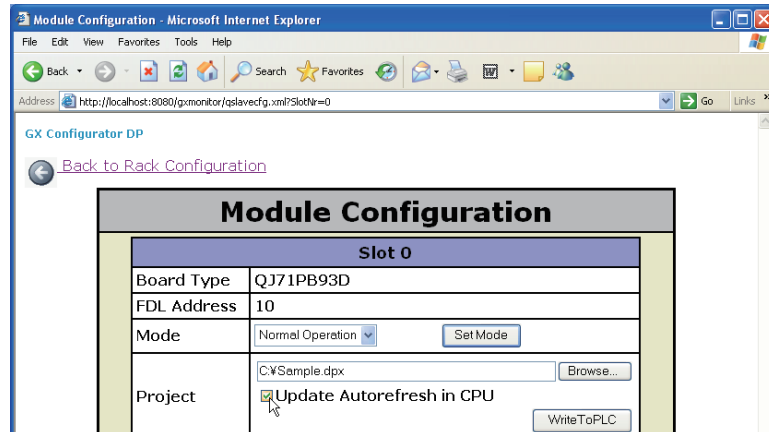
8) Click WriteToPLC to write the parameters into the CPU module.

9) Powering OFF and then ON the programmable controller or resetting the CPU module makes the automatic refresh enabled when automatic refresh parameters are set.

To set intelligent function module parameters for other modules to the same CPU module, perform the operation described in (4) in this section.

POINT

To change the FDL address, perform the following to stop the refresh of the I/O data between the master and slave stations.
 • Turn off the Input send area refresh directive signal (Y0) of the QJ71PB93D.
 • Stop I/O data communication on the master station side.
A new FDL address becomes effective right after the setting.
If the FDL address is changed during system operation, I/O data may be updated to those for the new FDL address.

REMARKS

Station numbers (FDL addresses) can also be set from a class 2 master station.
When setting the station number from the class 2 master station, setting "TRUE" for "No_Add_Chg" disables the station number change on the QJ71PB93D.
The station number of the QJ71PB93D cannot be changed with the station number change disabled.
To change the station number again, clear it by a station number change request area (buffer memory address: 515 (203H)) and then cancel the disabled status.
(Refer to Section 3.4.2 (6))

(4) When setting intelligent function module parameters for other modules

(a) When using GX Developer

After writing automatic refresh parameters with GX Configurator-DP, read out the intelligent function module parameters by "Read from PLC" in GX Developer.
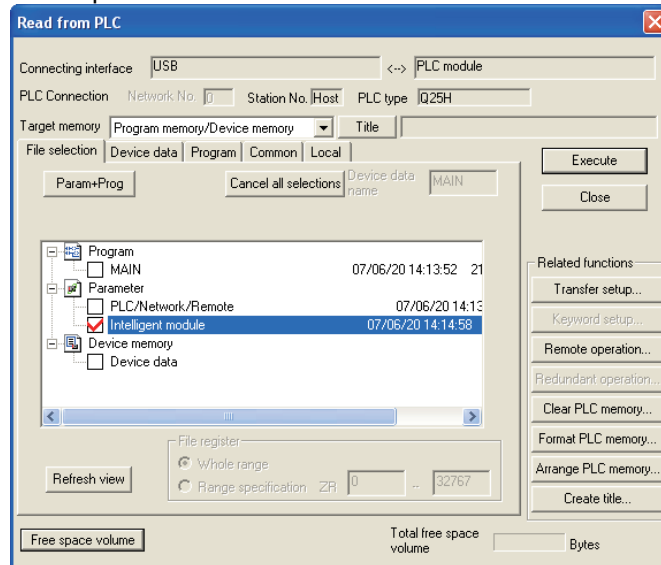
If intelligent function module parameters of other than the QJ71PB93D are written to the CPU module without the above operation, the automatic refresh parameters configured for the QJ71PB93D will be deleted.

REMARKS

(1) In the Intelligent function module utility of GX Developer, the module model name of the QJ71PB93D is displayed as " * ".
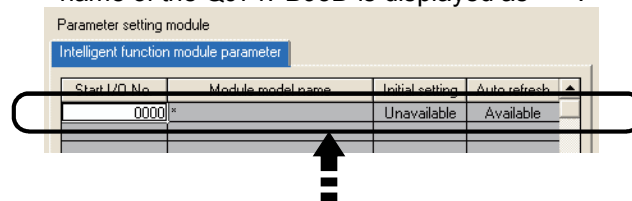
"*" is displayed in the Module model name field.

(2) The automatic refresh parameters can be checked on the "Auto Refresh Settings" page accessed by the web-based online access function of GX Configurator-DP.

(b) When using GX IEC Developer

Write the automatic refresh parameters to the CPU module by the following steps.

Editing the automatic refresh settings in GX IEC Developer without following the steps below will delete the automatic refresh parameters of the QJ71PB93D.

1) In the "PLC and GX IEC Developer (GID) Settings" dialog box, select "AutoRefresh (Update of GID/GD Project)".
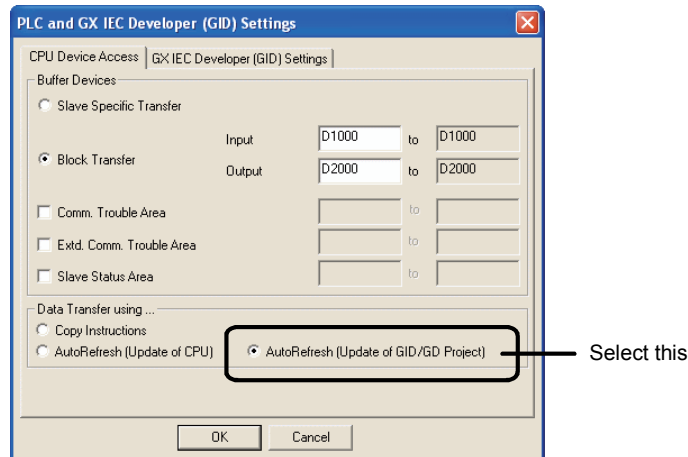
2) Set a GX IEC Developer project file in the "PLC and GX IEC Developer (GID) Settings" dialog box.
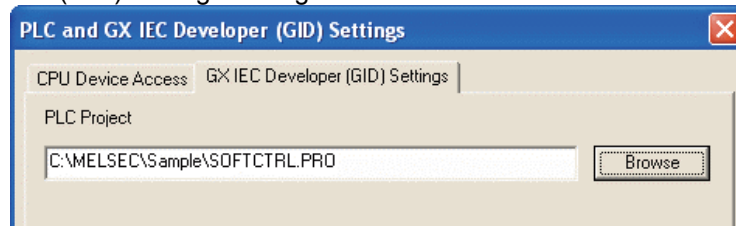
3) Write the parameters to the master module with the "Download to Module" command. This will add the automatic refresh parameters set by GX Configurator-DP to the GX IEC Developer project.

4) Start the intelligent function module utility from GX IEC Developer.
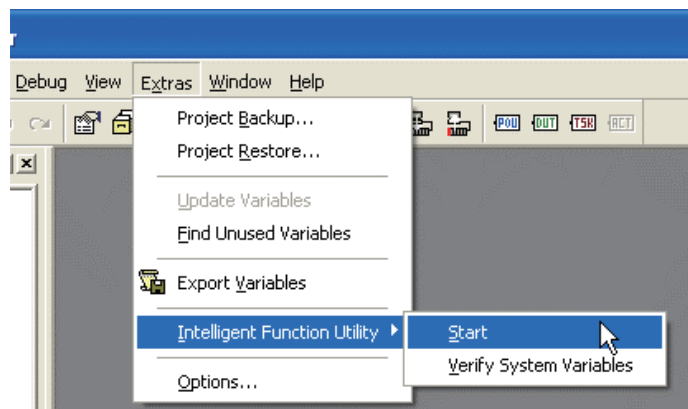
5) Edit the automatic refresh settings in the intelligent function module utility.

6) Write the intelligent function module parameters to the CPU module.
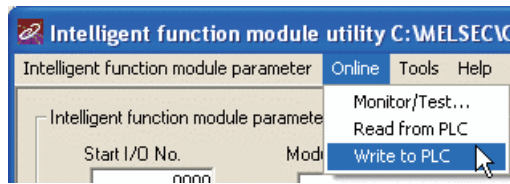
REMARKS

(1) In the Intelligent function module utility of GX Developer, the module model name of the QJ71PB93D is displayed as " * ".
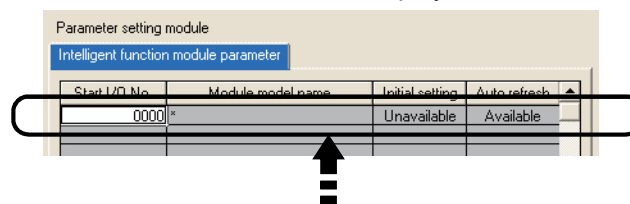
"*" is displayed in the Module model name field.

(2) The automatic refresh parameters can be checked on the "Auto Refresh Settings" page accessed by the web-based online access function of GX Configurator-DP.

(5) Number of automatic refresh parameter settings for QCPUs
There are restrictions on the number of automatic refresh parameters that can be set for CPU modules.
Set automatic refresh parameters properly so that the number of the parameters does not exceed the limit shown below.

(a) Number of automatic refresh parameters set for all intelligent function modules
When multiple intelligent function modules are mounted, the number of automatic refresh parameter settings must not exceed the following limit.

CPU Type	Max. No. of Auto-refresh Parameter Settings
Q00J/Q00/Q01CPU	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	256
Q12PH/Q25PHCPU	256
Q03UD/Q04UDH/Q06UDHCPU	2048

(b) Number of automatic refresh parameter settings for the QJ71PB93D
The following number of automatic refresh parameters can be set for one QJ71PB93D.

Target Module	Automatic Refresh Setting
QJ71PB93D	2 (Maximum)

Example: Counting the number of parameters for the automatic refresh setting.

This one line is counted as one setting.
If any device is not set, the line is not counted.
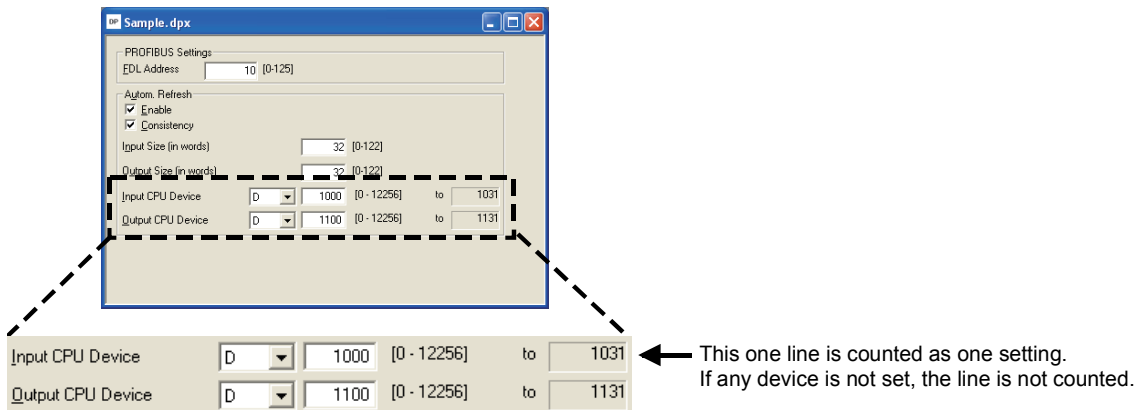
5.4 Installation

The following section explains the precautions when handling the QJ71PB93D, from the time they are unpacked until they are installed.
For more details on the module installation, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

5.4.1 Handling precautions

(1) Do not drop the module case or subject it to heavy impact since it is made of resin.

(2) Do not remove the PCB of each module from its case. This may cause a failure in the module.

(3) Be careful not to let foreign objects such as wire burrs enter the module during wiring. In the event any foreign object enters, remove it immediately.

(4) The top surface of the module is covered with a protective film to prevent foreign objects such as wire burrs from entering the module during wiring. Do not remove this film until the wiring is complete. Before operating the system, be sure to remove the film to provide adequate heat ventilation.

(5) Tighten the module fixing screws and connector mounting screws using torque within the following ranges.

Screw location	Tightening torque range
Module fixing screws (M3 screws) [*1]	0.36 to 0.48 N · m
PROFIBUS cable connector screws (#4-40 UNC screws)	0.20 to 0.28 N · m

＊1 The module can be easily fixed onto the base unit using the hook at the top of the module.
However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration or shock.

5.4.2 Installation environment

Refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

5.5 Part Names

This section explains the part names of the QJ71PB93D.
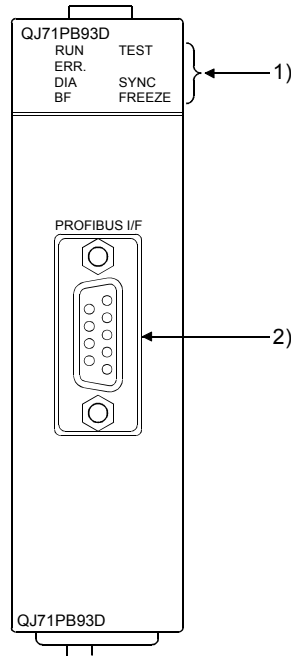
No.	Name	Description
1)	LED	Displays the QJ71PB93D status. (Refer to (1) in this section)
2)	PROFIBUS interface connector	Connector for connecting the table for the PROFIBUS-DP network. *1

*1: For the connector type, use a male D-Sub 9 pin.

The PROFIBUS cable must be created by the user. (for information regarding the cable wiring, refer to section 5.7.)

The size of the screw which can be used for the connector is #4-40 UNC.

(1) LED
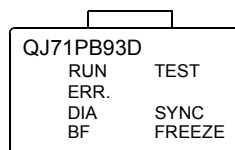
LED Name	Description		Reference
	ON	OFF	
RUN	Normal	Hardware error (module watchdog timer error) or power failure	Section 9.1
ERR.	Parameter setting error or module error occurrence	Normal	Section 9.1
SYNC	During SYNC mode	—	Section 4.1.3
FREEZE	During FREEZE mode	—	Section 4.1.3
DIA	Extended trouble information present	Extended trouble information absent	Section 3.4.2 (9)
BF	Before data communication or communication error detected	During data communication	Section 9.1
TEST	During execution of self-diagnostics	—	Section 5.6

5.6 Execution Method for Self-diagnosis

This section describes the procedure for self-diagnosis, status during self-diagnosis, and results after self-diagnosis.
It take about 5 seconds to complete the self-diagnosis.

(1) Procedure for self-diagnosis
The procedure for self-diagnosis is as follows.

(a) When using GX Configurator-DP
1) Set the CPU module to STOP.
2) Display the Module Configuration screen by the procedure given in Section 5.3.1 (3).
3) Select [Diagnostic Mode] in [Mode] and then click $\boxed{\text{Set Mode}}$.
4) When the self-diagnostics starts, the "TEST LED" lights up.
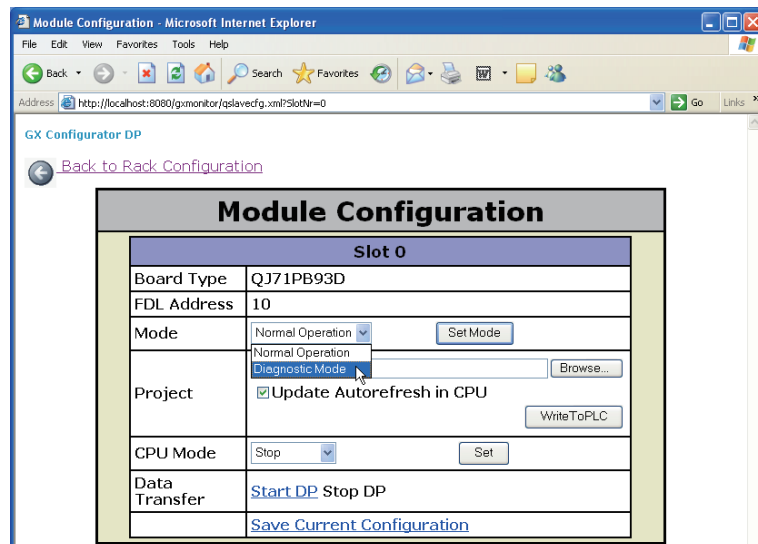
(b) When using GX Developer
1) Set the CPU module to STOP.
2) In the [Online] → [Debug] → [Device test] of GX Developer, set 2H (self-diagnosis mode) in the operation mode change request area (buffer memory address: 8CFH) and turn on the operation mode change request signal (Y11) to start the self-diagnosis automatically.
3) The TEST LED on QJ71PB93D will flash during the self-diagnosis.

(2) Self-diagnosis results

(a) When completed normally

The "TEST LED" and "ERR. LED" go off.

(b) When completed abnormally

The "TEST LED" and "ERR. LED" will light up.

If the self-diagnostic result is an error, any of the following type codes is stored into the self-diagnostic status type code display area (buffer memory address: 8D2$_H$).

The type code can be checked in the buffer memory batch monitor of GX Developer.

Result of Self-diagnostics	Type code
Normal	0$_H$
Hardware fault	8001$_H$ to 8006$_H$
Swap test error	8007$_H$

(3) Completion of the self-diagnostics

Perform the following operation after checking normal or abnormal termination of the self-diagnostics.

(a) When completed normally

Return the operation mode of the QJ71PB93D to the normal operation mode.

Doing this will place the QJ71PB93D in the state of waiting for parameter reception from the master station.

1) When using GX Configurator-DP

Select [Normal Operation] in [Mode] on the Module Configuration screen, and click Set Mode .

2) When using GX Developer

Select [Online] → [Debug] → [Device test] from the menu of GX Developer, set 0$_H$ (normal operation mode) in the operation mode change request area (buffer memory address: 8CF$_H$), and turn on the operation mode change request signal (Y11).

(b) When completed abnormally

If the self-diagnostic result is an error, consult your local service center or representative.

(4) Cautions

(a) Buffer memory monitoring during self-diagnostics

During the self-diagnosis, do not monitor the QJ71PB93D buffer memory from the GX Developer.

Monitor may stop if the buffer memory is monitored during the self-diagnosis.

(b) When changing the operation mode from GX Developer

Do not change the operation mode from GX Configurator-DP when changing it from GX Developer.

5.7 Wiring

5.7.1 PROFIBUS cable wiring

The following describes the pin assignments of the PROFIBUS interface connector on the QJ71PB93D, the PROFIBUS cable wiring specifications, bus terminator and other information.

(1) Pin assignments of the PROFIBUS interface connector

The following shows the pin assignments of the PROFIBUS interface connector (D-sub 9 pin female connector) on the QJ71PB93D.
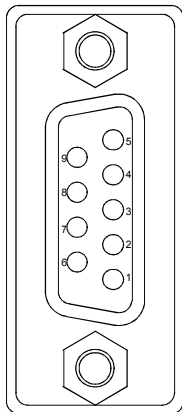
Pin No.	Signal Code	Name	Description	Cable color
1	—	SHIELD *1	Shield, protective ground	—
2	—	—	Open	—
3	B/B'	RxD/TxD-P	Receive/send data-P	Red
4	—	—	Open	—
5	C/C'	DGND *2	Data Ground	—
6	—	VP *2	Voltage +	—
7	—	—	Open	—
8	A/A'	RxD/TxD-N	Receive/send data-N	Green
9	—	—	Open	—

*1: Optional signal.
*2: Signal used to connect the bus terminator.

(2) PROFIBUS cable

The following shows the PROFIBUS cable and wiring specifications.

(a) PROFIBUS cable

Use a PROFIBUS cable that meets the following specifications (EN50170 Volume 2: Type A compliant).

Item	Transmission line
Applicable cable	Shielded twisted pair cable
Impedance	135 to 165 Ω (f=3 to 20 MHz)
Capacity	Less than 30 pF/m
Conductor resistance	Less than 110 Ω/km
Cross-sectional area	0.34mm^2 or more (22AWG)

(b) Wiring specifications
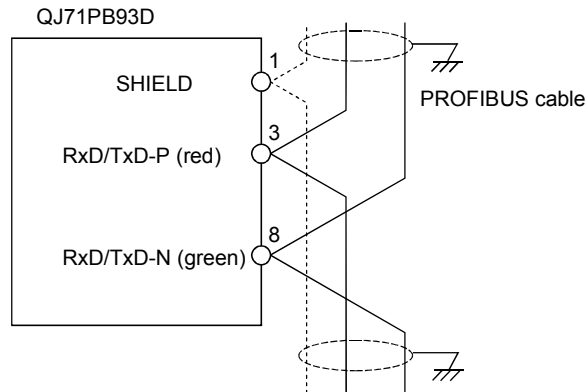
(3) Connector

Use a D-sub 9 pin male connector for the PROFIBUS cable.
The applicable screw size is #4-40 UNC.

(4) Wiring specifications for bus terminator

When the QJ71PB93D is a terminal station, use a connector with built-in bus terminator that meets the following wiring specifications.

$R_u = 390 \Omega \pm 2\%, \text{min} 1/4W$

$R_{tA} = 220 \Omega \pm 2\%, \text{min} 1/4W$

$R_d = 390 \Omega \pm 2\%, \text{min} 1/4W$
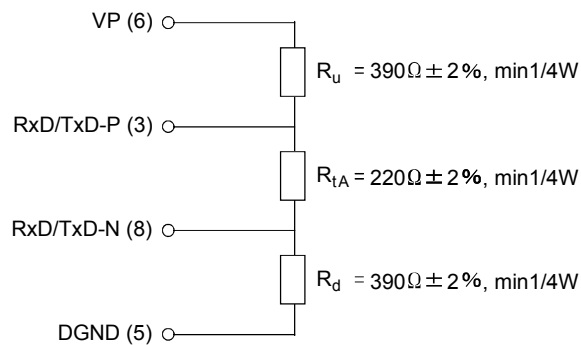
(5) PROFIBUS equipment

The PROFIBUS cables, connectors and other PROFIBUS equipment must be purchased or obtained at user's discretion.
For details on PROFIBUS equipment, access the following website.
• PROFIBUS International : http://www.profibus.com/

5.7.2 Wiring precautions

As one of the requirements to give full play to QJ71PB93D's functions and make up the system with high reliability, it is necessary to have an external wiring unsusceptible to an influence of noise. Precautions against external wiring of QJ71PB93D is described below.

(1) Communication cable wiring
Do not install the QJ71PB93D communication cable together with the main circuit, power lines and/or load carrying wires for other than the programmable controller, or bring them close.
Doing so may cause the QJ71PB93D to be affected by noise and surge induction.

(2) Wiring from I/O modules among programmable controllers
Keep the PROFIBUS cable away from I/O module cables as much as possible.
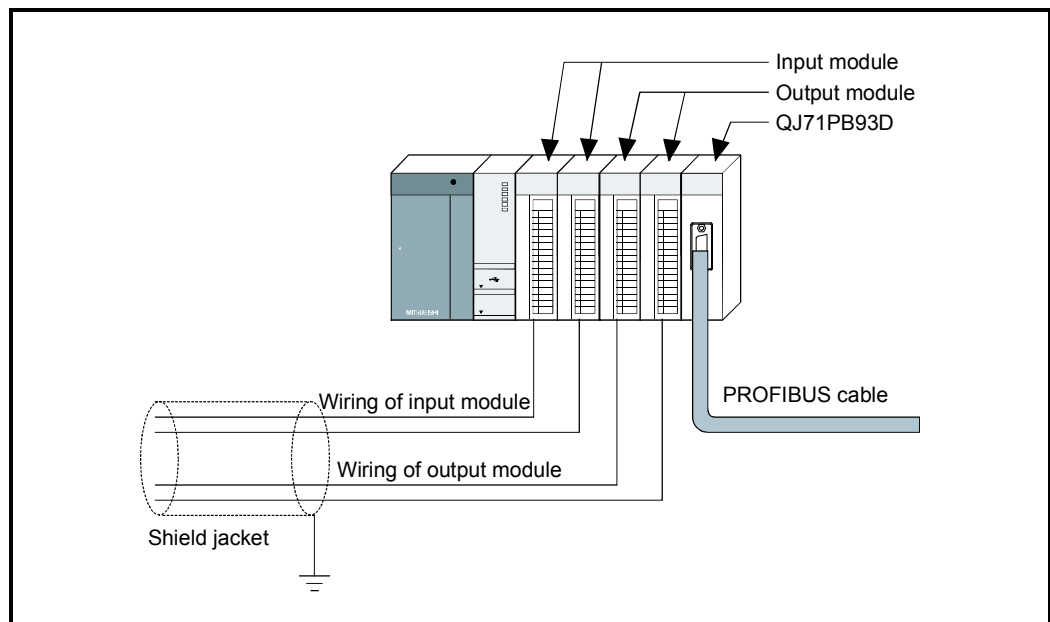
(3) Grounding
(a) When using the QJ71PB93D, basically ground the FG and LG terminals of the power supply module of the programmable controller.

(b) Grounding the module and other device with the same FG terminal may apply noise through the FG terminal and result in a communication error. If this error occurs, disconnect the FG terminal from the module.

6 TRANSMISSION DELAY TIME

This section explains the processing time of the QJ71PB93D.
Communication processing between the master station and QJ71PB93D is shown
below.

(1) The processing of the output receive data

The following shows how the output data from the master station are read out to
a CPU module.

(a) When BBLKRD instruction is used
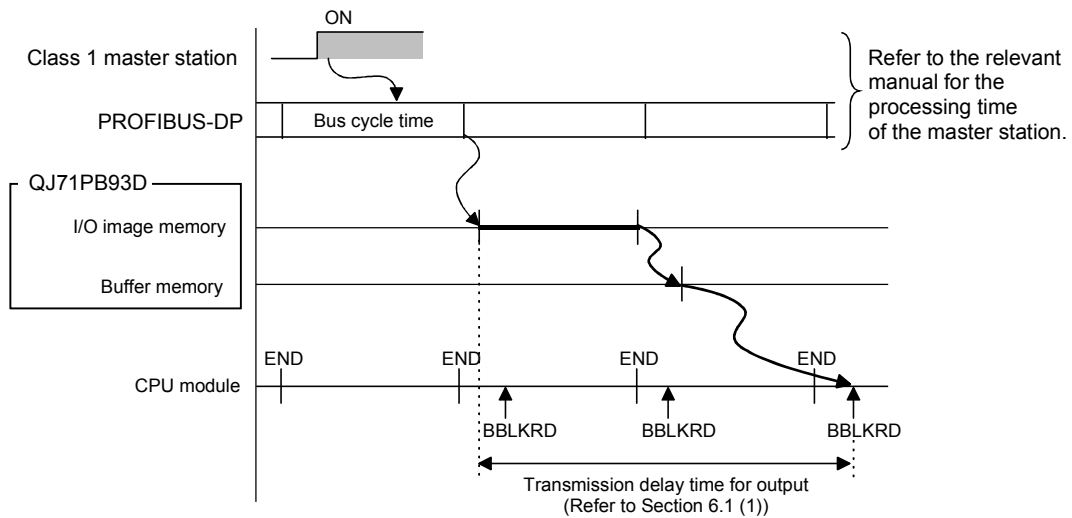
(b) When MOV/FROM instruction is used
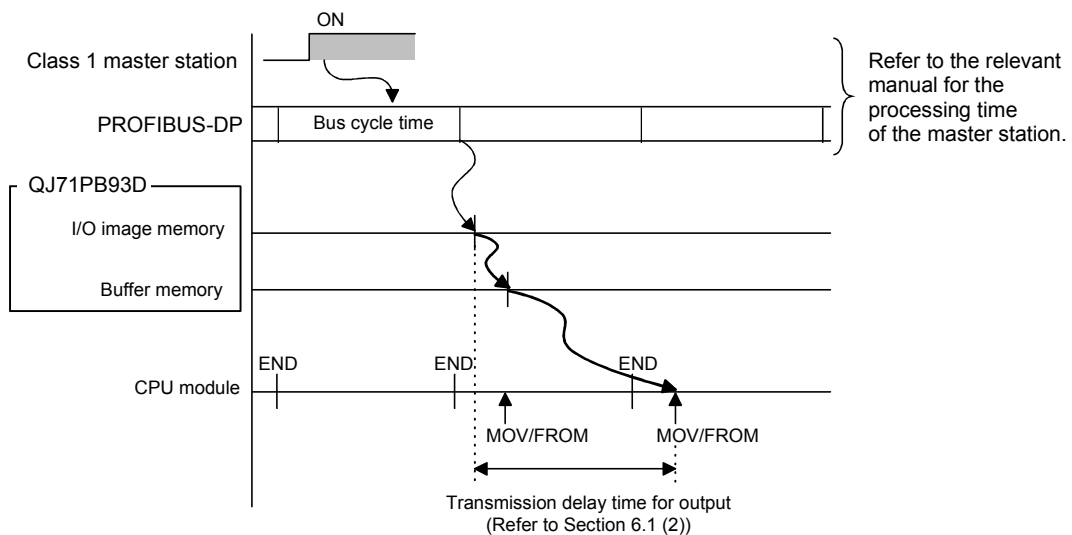
(c)   When automatic refresh is used
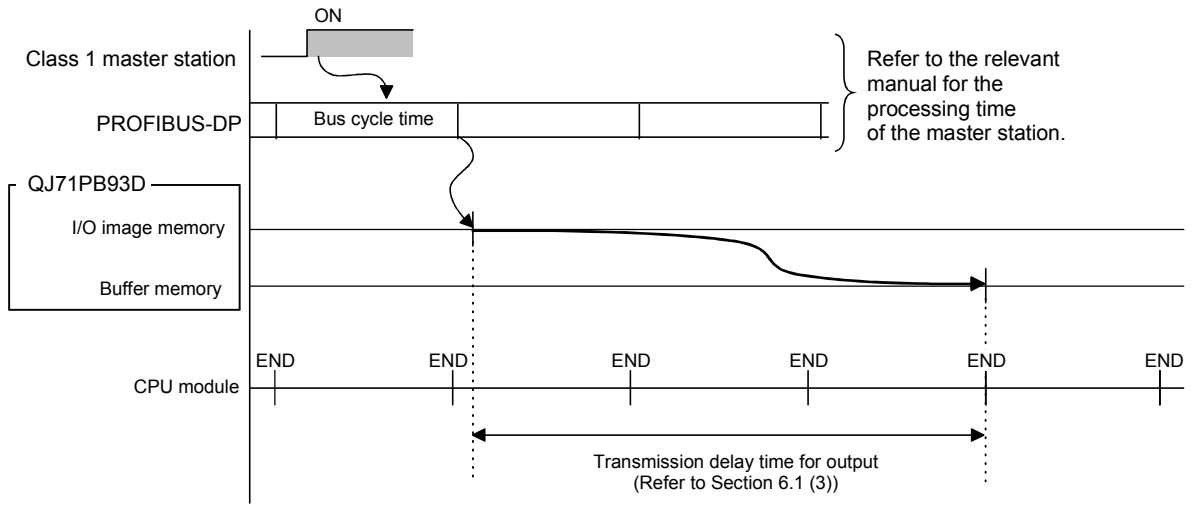
(2)   The processing of the input send data

The following shows how the CPU module data are sent to the master station.

(a)   When BBLKWR/MOV/TO instruction is used

Refer to the relevant manual for the processing time of the master station.

(b)   When automatic refresh is used

Refer to the relevant manual for the processing time of the master station.
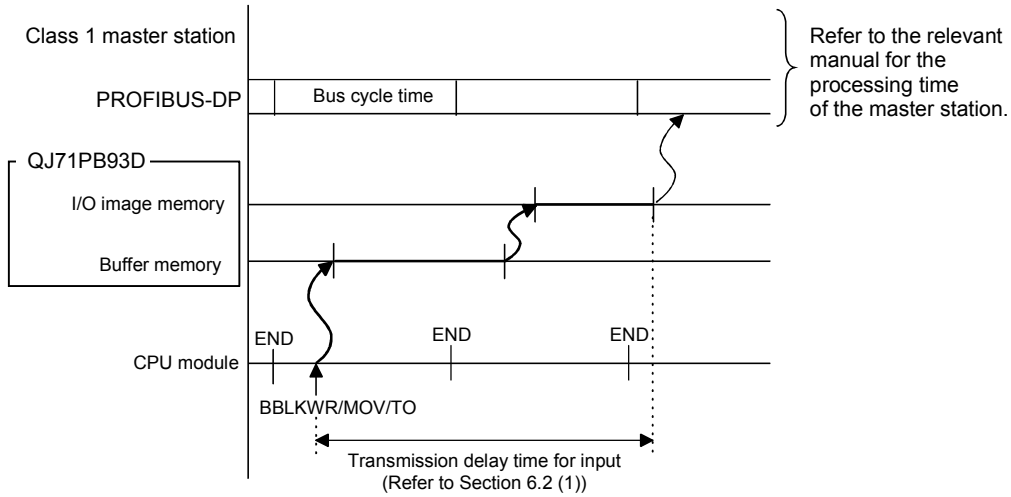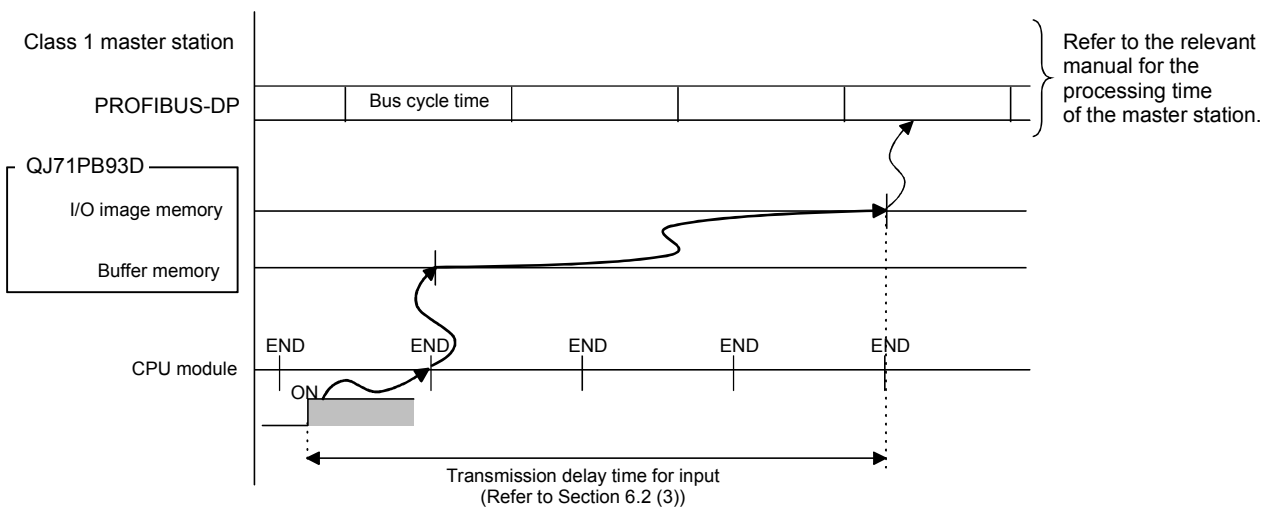
6.1 Transmission Delay Time of Output Receive (Master station → QJ71PB93D)

The formulas for calculating the delay time for the output receive data transmission are shown below.
The following symbols are used in the calculation formulas.
Bc: Bus cycle time
Scan: Scan time

(1) When BBLKRD instruction is used

Transmission delay time of output receive = $Bc + Scan + 0.2$ [ms]

(2) When MOV/FROM instruction is used

Transmission delay time of output receive = $Scan + 0.2$ [ms]

(3) When automatic refresh is used
   (a) When the separation prevention function is not used

Item	Transmission Delay Time in Output Reception
Normal value	$Scan \times 0.5 + 0.2$[ms]
Max. value	$Scan + 0.2$[ms]

   (b) When the separation prevention function is used.

Item	Transmission Delay Time in Output Reception
Normal value	$Scan \times 1.5 + 0.2$[ms]
Max. value	$Scan \times 3 + 0.2$[ms]

POINT
For the calculation formula of the bus cycle time, refer to the manual of the PROFIBUS-DP module used on the master station.

6.2 Transmission Delay Time of Input Send (QJ71PB93D → Master station)

The formulas for calculating the delay time for the input send data transmission are shown below.
The following symbols are used in the calculation formulas.
Bc: Bus cycle time
Scan: Scan time

(1) When BBLKWR instruction is used
   (a) When Scan $\leq$ Bc
       Transmission delay time in input transmission = $Bc \times 3 + 0.2$ [ms]

   (b) When Scan > Bc
       Transmission delay time of input transmission = $Bc \times 2 + Scan + 0.2$ [ms]

(2) When MOV/TO instruction is used
    Transmission delay time of input transmission = $Bc \times 2 + 0.2$ [ms]

(3) When automatic refresh is used
    (a) When the separation prevention function is not used.

Item	Transmission Delay Time in Output Reception
Normal value	$Scan \times 0.5 + 0.2$[ms]
Max. value	$Scan + 0.2$[ms]

   (b) When the separation prevention function is used.

Item	Transmission Delay Time in Output Reception
Normal value	$Scan \times 1.5 + 0.2$[ms]
Max. value	$Scan \times 4 + 0.2$[ms]

POINT
For the calculation expression of the bus cycle time, refer to the manual of the PROFIBUS-DP module used on the master station.

7 PROGRAMMING

This chapter gives program examples of station number setting, I/O data communication, and global control-driven program execution.
Before using the program examples introduced in this chapter in an actual system, fully check that there is no problem in control on the target system.

7.1 Communication Sequence

The following is the sequence of I/O data communication with the master station.
Refresh between the programmable controller CPU and QJ71PB93D and refresh of the QJ71PB93D buffer memory (output receive area, input send area) are executed asynchronously.

(1)　When using the automatic refresh

```
            ┌──────────────────────┐
            │        Start         │
            └──────────────────────┘
                       │
                       ▼
   ┌──────────────────────────────┐
   │ Make sure that the I/O        │
   │ communication signal (X01) is on. │ ・・・ Refer to Section 3.3.2 (2)
   └──────────────────────────────┘
                       │
                       ▼
   ┌──────────────────────────────┐
   │ Write the initial input data value to │
   │ the device set in "Output CPU  │
   │ Device" of the automatic refresh │ ・・・ Refer to Section 5.3.1
   │ parameter.                     │
   └──────────────────────────────┘
                       │
                       ▼
   ┌──────────────────────────────┐
   │ Turn on the input send area    │
   │ refresh directive signal (Y00). │ ・・・ Refer to Section 3.3.2 (13)
   └──────────────────────────────┘
                       │
                       ▼
            ┌──────────────────────┐
            │    Communication      │
            └──────────────────────┘
```

7
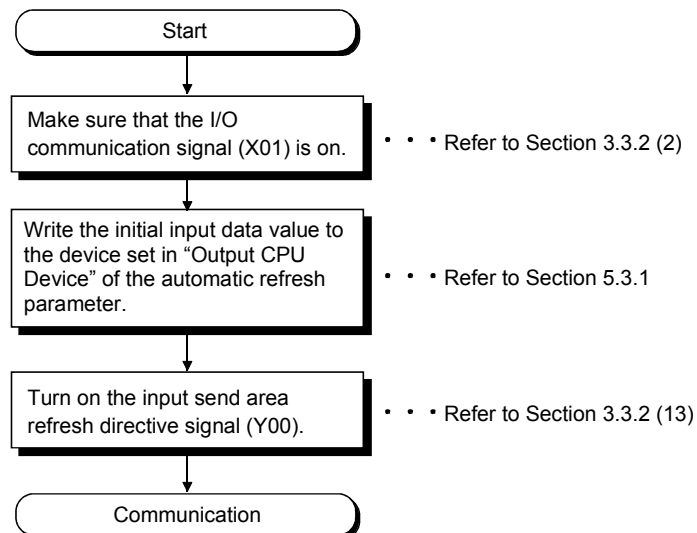
(2) When not using the automatic refresh

```
                    ┌──────────────────┐
                    │      Start       │
                    └──────────────────┘
                             │
        ┌────────────────────────────────────┐
        │ Make sure that the I/O             │ · · · Refer to Section 3.3.2 (2)
        │ communication signal (X01) is on.  │
        └────────────────────────────────────┘
                             │
        ┌────────────────────────────────────┐
        │ Write the initial values of the input │ · · · Refer to Section 3.4.2 (2)
        │ data to the input send area.       │
        └────────────────────────────────────┘
                             │
        ┌────────────────────────────────────┐
        │ Turn on the Input send area refresh │ · · · Refer to Section 3.3.2 (13)
        │ directive signal (Y00).            │
        └────────────────────────────────────┘
                             │
       ┌─────────────────────┤
       │        ┌────────────────────────────────────┐
       │        │ Read the output data from the      │
       │        │ output receive area using the      │
       │        │ BBLKRD/MOV/FROM instruction.       │
       │        └────────────────────────────────────┘
       │                     │
       │        ┌────────────────────────────────────┐
       │        │ Write the input data to the input  │
       │        │ send area of the buffer memory     │
       │        │ using the BBLKWR/MOV/TO            │
       │        │ instruction.                       │
       │        └────────────────────────────────────┘
       │                     │
       └─────────────────────┘
```

7

7.2 Station Number Setting

(1) System configuration example

This section gives a program example for setting a station number to the QJ71PB93D in the following configuration.
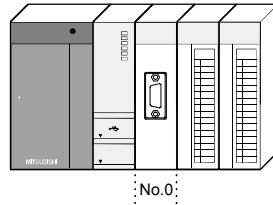
No.0

No. *1	Module	Input signal	Output signal
0	QJ71PB93D	X0 to X1F	Y0 to Y1F

*1: The QJ71PB93D is to be mounted in slot 0 of the base unit with the head I/O number set to "00H".

(2) Settings

In the program example, the station number of the QJ71PB93D is set to 1.

(3) Assignment of device in program example

The program example given in this section uses the following device assignments.

(a) Devices used by the QJ71PB93D

Device	Description	Device	Description
X0	Watchdog timer error		—
X13	Station number change completion	Y13	Station number change request
X1D	Module READY		—

(b) Devices used by user

Device	Description	Device	Description
M0	Station number setting flag	D0	Operation station number storage device

(4) Program example

`[MOVP  H101  U0\G515 ]`		Sets the station number to 1. (Stores the station number in the flash ROM)*1
`[SET  Y13 ]`		Station number change request.
`[MOVP  U0\G513  D0 ]`		Stores the operating station number in D0.
`[RST  Y13 ]`		Resets the station number change request.
`[RST  M0 ]`		Resets the station number setting flag.
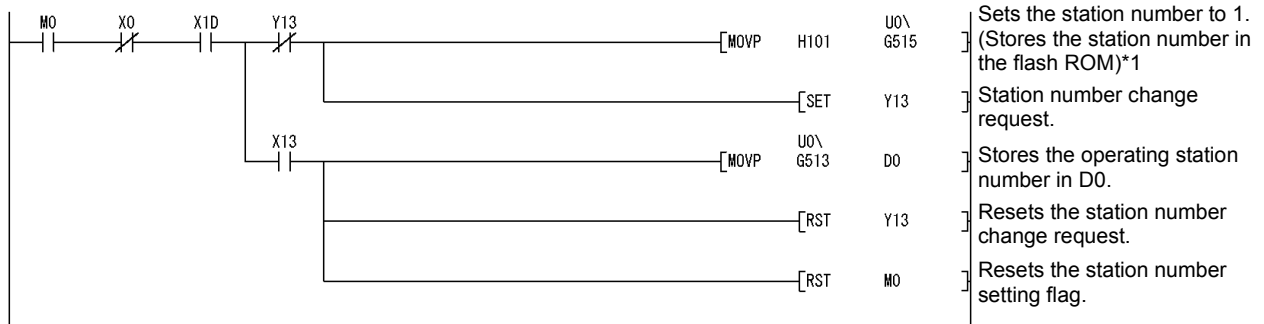
*1: When not writing the station number to the flash ROM, replace "H101" with "H1".

POINT

(1) Storing a station number in the flash ROM allows the QJ71PB93D to operate as the station number even if the power is switched from off to on or if the CPU module is reset.

(2) The station number can be also set from GX Configurator-DP. (Refer to Section 5.3.1)
However, if the station number is changed in this program example, do not perform it from GX Configurator-DP.

7.3 Communication of I/O Data

7.3.1 LUMP mode

(1) System configuration example

A program example for I/O data communication is provided here to show the case where the LUMP mode is used for data assignment of the following configuration.

Refer to (2) for the outline of the program example.

No.0 No.1 No.2 No.3 No.4
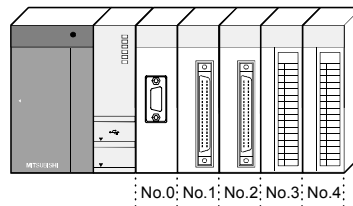
No. *1	Module	Input signal	Output signal
0	QJ71PB93D	X0 to X1F	Y0 to Y1F
1	QX41	X20 to X3F	—
2	QY41P	—	Y40 to Y5F
3	Q64AD	X60 to X6F	Y60 to Y6F
4	Q64DA	X70 to X7F	Y70 to Y7F

*1: Modules are to be mounted to the base unit from slot 0 as shown in the figure. Start I/O No. data are to be set as follows:

I/O Assignment(*)

	Slot	Type	Model name	Points	StartXY
0	PLC	PLC	Q25HCPU		
1	0(*-0)	Intelli.	QJ71PB93D	32points	0000
2	1(*-1)	Input	QX41	32points	0020
3	2(*-2)	Output	QY41P	32points	0040
4	3(*-3)	Intelli.	Q64AD	16points	0060
5	4(*-4)	Intelli.	Q64DA	16points	0070
6	5(*-5)				
7	6(*-6)				

REMARKS

Refer to Section 5.2.2 for details of the LUMP mode.

(2) Settings

The following configuration and operation are set in the program example given in this section.

(a) Data module setting of QJ71PB93D

Data module 0	Input, 2 words, word unit
Data module 1	Output, 2 words, word unit
Data module 2	Input, 4 words, word unit
Data module 3	Output, 4 words, word unit

(b) Used states of QJ71PB93D output receive area and input send area

1) When dedicated instruction (BBLKRD/BBLKWR) is used
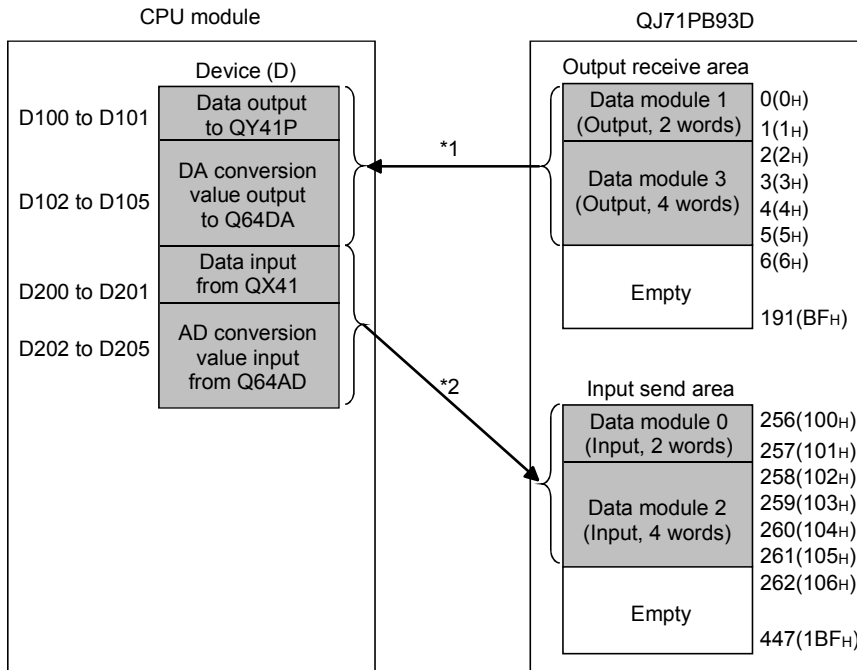
∗1: The output receive area data are read to D100 to D105 using the BBLKRD instruction.
The data in D100 to D105 are written to the QY41P and Q64DA.
∗2: Data of the QX41 and Q64AD are read to the D200 to D205 beforehand.
The data in D200 to D205 are written to the input send area using the BBLKWR instruction.

2) When MOV instruction is used
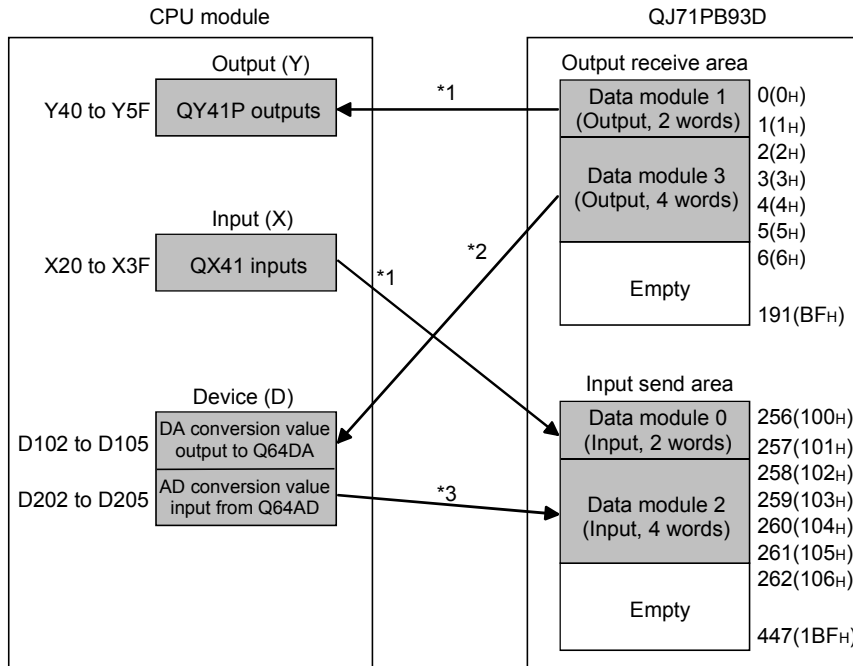
∗1: Data are read from Input (X) or written to Output (Y) using the BMOV instruction.
∗2: The output receive area data are read to D102 to D105 using the BMOV instruction.
   The data in D102 to D105 are written to the Q64DA.
∗3: Data of the Q64AD are read to D202 to D205 beforehand.
   With the BMOV instruction, the data in D202 to D205 are written to the input receive area.

REMARKS

Refer to Section 5.2.1 for the data module setting.

(3) Assignment of devices in program examples

The program examples given in this section use the following device assignments.

(a) Devices used by module

1) QJ71PB93D

Device	Description	Device	Description
X0	Watchdog timer error	Y0	Input send area refresh directive
X1	I/O communication		—
X2	Extension trouble notification completion	Y2	Extension trouble notification request
X3	Module error	Y3	Module error reset request
X0A	BBLKRD start request acceptance completion	Y0A	BBLKRD start request
X0B	BBLKWR start request acceptance completion	Y0B	BBLKWR start request
X11	Operation mode change completion	Y11	Operation mode change request
X1D	Module READY		—

2) QX41

Device	Description	Device	Description
X20 to X3F	Inputs of QX41		—

3) QY41P

Device	Description	Device	Description
	—	Y40 to Y5F	Outputs of QY41P

4) Q64AD

Device	Description	Device	Description
X60	Module READY		—

5) Q64DA

Device	Description	Device	Description
X70	Module READY		—

(b) Devices used by user

Device	Description	Device	Description
M10	Operation mode change flag	M40	Extension trouble notification flag
M11	Operation mode change storage	M41	Extension trouble notification completion flag
M20	Initial input data write	M42	Extension trouble cancel flag
M30	Error handling flag	M100	Self-diagnosis mode change

(c)   Devices used for automatic refresh or buffer memory reading

Device	Description	Device	Description
D10	Operation mode storage	D200 to D201	QX41 (X20 to X3F) input data storage
D11	Operation mode change result	D202 to D205	Analog-to-digital conversion value to be input from the Q64AD (CH.1 to 4)
D20	Error code storage	D300	Extension trouble information data length
D100 to D101	QY41P (Y40 to Y5F) output data storage	D301	Extension trouble information data
D102 to D105	Digital-to-analog conversion value to be output to Q64DA (CH.1 to 4)		—

(4) Program example
(a) When using dedicated instructions (BBLKRD/BBLKWR)

<Initial input data write>

```
   X1    X0    X1D    X3                                        U0\
───┤├────┤/├────┤├────┤/├──────────────────────[FMOVP  K0     G256    K6 ]
                                                                           ┐
                                               ─────────────────[SET    M20 ]   ├ Initial input data write.
                                                                           ┘
```

<Input send area refresh start>

```
   M20   X1    X0    X1D    X3
───┤├────┤├────┤/├────┤├────┤/├──────────────────────────────────────(Y0 )
                                                                           ┐
                                  ────────────────────────────────(Y0A )   ├ Input send area refresh start.
                                                                           │
                            ──────────────────────────────────────(Y0B )  ┘
```

<Output data read>

```
   X1    X0    X0A   X1D
───┤├────┤/├────┤├────┤├──────────────[G. BBLKRD  U0    K0    D100   K6 ]   Output data read.

                                       ────────────[BMOV  D100  K4Y40   K2 ]   Outputs data to Y40 to Y5F.
              X70                                          U7\
              ─┤├─────────────────────────────────[BMOV  D102  G1     K4 ]   Writes digital value to Q64DA.
```

<Input data write>

```
   X1    X0    X0B   X1D
───┤├────┤/├────┤├────┤├──────────────────────────[BMOV  K4X20  D200   K2 ]   Stores data in X20 to X3F into
                                                                              D200.
              X60                                         U6\
              ─┤├─────────────────────────────────[BMOV  G11   D202   K4 ]   Reads digital value from Q64AD.

                                       ────────────[G. BBLKWR  U0    K0    D200   K6 ]   Input data write.
```

<Error handling>

```
   X3                                                     U0\
───┤├──────────────────────────────────────────────[MOV  G2040  D20 ]   Stores error code.

   M30                                                                      ┐
───┤├───────────────────────────────────────────────────[SET    Y3 ]       │
         X3    Y3                                                           │
         ─┤/├───┤├────────────────────────────────────────[RST    Y3 ]      ├ Resets error.
                                                                           │
                    ──────────────────────────────────────[RST    M30 ]    ┘
```

<Extension trouble information notification request>

```
 ┌─◇───D20───H0───┐
─┤                ├───────────────────────────────────────[SET    M40 ]   Turns on extension trouble
 └────────────────┘                                                        notification flag when error code
                                                                           is other than 0.
                            ──────────────────────[MOV  K2     D300 ]   Sets extension trouble notification
                                                                       data length.
                            ──────────────────────[MOV  D20    D301 ]   Sets extension trouble notification
                                                                       data.
   M40   X1D   X1    X2                                    U0\
───┤├────┤├────┤├────┤/├───────────────────────────[BMOVP  D300  G2041   K2 ]   Stores extension trouble
                                                                               notification data in buffer memory.
                            ──────────────────────────────[SET    Y2 ]   Extension trouble notification
                                                                         request.
   M40   X2                                                                 ┐
───┤├────┤├──────────────────────────────────────────────[RST    Y2 ]      │ Resets extension trouble
                                                                           ├ notification request.
                    ──────────────────────────────────────[RST    M40 ]   ┘
                                                                         
                                  ────────────────────────[SET    M41 ]   Extension trouble notification
                                                                          completion flag.
   M41                                                     U0\
───┤├──────────────────────────────────────────────[MOV  G2040  D20 ]   Stores error code.
```

<Cancel of extension trouble information notification>

```
   X2    M41
  ──/├────┤├──[= D20  H0 ]─────────────────────[SET  M42 ]  } Cancels extension trouble
                                                              information notification.
                                        ────────[RST  M41 ]

   M42   X1D   X1    X2                              U0\
  ──┤├───┤├───┤├───┤/├──────────────────[MOVP K0   G2041 ]    Notifies master station of
                                                              canceling extension trouble
                                                              notification.
                                        ────────[SET  Y2  ]    Extension trouble notification
                                                              request.

   M42   X2
  ──┤├───┤├────────────────────────────────────[RST  Y2  ]  } Resets extension trouble
                                                              information notification flag.
                                        ────────[RST  M42 ]
```

<Operation mode change (Self-diagnosis mode)>

```
   M100
  ──┤├─────────────────────────────────────────[PLS  M10 ]  } Operation mode change
                                                              request.
   M10
  ──┤├─────────────────────────────────────────[SET  M11 ]

   M11   X0    X1D   Y11                             U0\
  ──┤├───┤/├───┤├───┤/├──────────────────[MOVP H2   G2255 ]    Self-diagnosis mode setting.

                                        ────────[SET  Y11 ]    Operation mode change request.

         X11                                       U0\
        ──┤├──────────────────────────────[MOVP G2254 D10 ]    Stores operation mode data.

                                                   U0\
                                         ─[MOVP G2256 D11 ]    Stores change result data.

                                        ────────[RST  Y11 ]    Resets operation mode change
                                                              request.

                                        ────────[RST  M11 ]    Resets operation mode change
                                                              storage.
```

POINT

(1) If changing the operation mode in this program example, do not change it from GX Configurator-DP.

(2) Confirm that Consistency is disabled with Autom. Refresh enabled. (Refer to Section 5.3.1)
When the automatic refresh and data separation prevention functions are enabled, dedicated instructions are not processed.

Make sure the box is unchecked.

(b)   When using MOV instruction

<Initial input data write>
```
  X1    X0    X1D    X3                              [FMOVP  K0    U0\     K6 ]    ┐
──┤├────┤/├────┤├─────┤/├─────────────────────              G256             │
                             │                     [SET           M20 ]      ├  Initial input data write.
```

<Input send area refresh start>
```
  M20    X1    X0    X1D    X3
──┤├────┤├────┤/├────┤├─────┤/├──────────────────────────────────────(Y0)──     ┘  Input send area refresh start.
```

<Output data read>
```
  X1    X0    X1D                                   [BMOV   U0\    K4Y40   K2 ]      Outputs data to Y40 to Y5F.
──┤├────┤/├────┤├──────────────────────────────            G0

                                                   [BMOV   U0\    D102    K4 ]      Reads digital value from output
                                                           G2                      data.

               X70                                 [BMOV   D102   U7\     K4 ]      Writes digital value to Q64DA.
              ─┤├──────────────────────────────                   G1
```

<Input data write>
```
  X1    X0    X1D                                   [BMOV   K4X20  U0\     K2 ]     Write data in X20 to X3F to the
──┤├────┤/├────┤├──────────────────────────────                   G256            input send area.

               X60                                 [BMOV   U6\    D202    K4 ]      Reads digital value from Q64AD.
              ─┤├──────────────────────────────            G11

                                                   [BMOV   D202   U0\     K4 ]      Write data in digital value to the
                                                                  G258             input send area.
```

<Error handling>
```
  X3                                               [MOV    U0\    D20 ]            Stores error code.
──┤├────────────────────────────────────────────          G2040

  M30                                              [SET           Y3 ]     ┐
──┤├─────┬──────────────────────────────────                              │
         │   X3    Y3                              [RST           Y3 ]     ├  Resets error.
         └──┤/├───┤├─────────────────────────                             │
                                                   [RST           M30 ]    ┘
```

<Extension trouble information notification request>
```
  [<>    D20    H0 ]                               [SET           M40 ]            Turns on extension trouble
──┤                ├─┬──────────────────────                                       notification flag when error code
                     │                                                             is other than 0.
                     │                             [MOV    K2     D300 ]           Sets extension trouble notification
                     │                                                             data length.
                     │                             [MOV    D20    D301 ]           Sets extension trouble notification
                                                                                   data.

  M40    X1D    X1    X2                            [BMOVP  D300   U0\     K2 ]     Stores extension trouble
──┤├────┤├─────┤├────┤/├─┬──────────────                          G2041            notification data in buffer memory.
                         │
                         └─────────────────────     [SET           Y2 ]            Extension trouble notification
                                                                                   request.

  M40    X2                                        [RST           Y2 ]     ┐       Resets extension trouble
──┤├────┤├──┬──────────────────────────────                               ├       notification request.
            │                                      [RST           M40 ]    ┘
            │
            ├──────────────────────────────        [SET           M41 ]            Extension trouble notification
            │                                                                      completion flag.

  M41                                              [MOV    U0\    D20 ]            Stores error code.
──┤├────────────────────────────────────────              G2040
```

<Cancel of extension trouble information notification>

```
    X2    M41
────┤/├───┤├───[= D20  H0 ]────────────────────────[SET  M42 ]    Cancels extension trouble
                                                                  information notification.

                                               ─────────────────[RST  M41 ]

    M42   X1D   X1    X2                                    U0\
────┤├───┤├───┤├───┤/├──────────────────[MOVP K0   G2041]    Notifies master station of
                                                                  canceling extension trouble
                                                                  notification.
                                               ─────────────────[SET  Y2  ]    Extension trouble notification
                                                                  request.

    M42   X2
────┤├───┤├──────────────────────────────────────[RST  Y2  ]    Resets extension trouble
                                                                  information notification flag.
                                               ─────────────────[RST  M42 ]
```

<Operation mode change (Self-diagnosis mode)>

```
    M100
────┤├──────────────────────────────────────────[PLS  M10 ]    Operation mode change
                                                                  request.
    M10
────┤├──────────────────────────────────────────[SET  M11 ]

    M11   X0    X1D   Y11                                   U0\
────┤├───┤/├───┤├───┤/├──────────────────[MOVP H2   G2255]    Self-diagnosis mode setting.

                                               ─────────────────[SET  Y11 ]    Operation mode change request.

          X11                                              U0\
         ─┤├──────────────────────────────[MOVP G2254  D10 ]    Stores operation mode data.

                                                            U0\
                                               ──[MOVP G2256  D11 ]    Stores change result data.

                                               ─────────────────[RST  Y11 ]    Resets operation mode change
                                                                  request.

                                               ─────────────────[RST  M11 ]    Resets operation mode change
                                                                  storage.
```

┌───┐
│ POINT   │
│ If changing the operation mode in this program example, do not change it from GX │
│ Configurator-DP.   │
└───┘

7.3.2 DIVIDED mode

(1) System configuration example

A program example for I/O data communication is provided here to show the case where the DIVIDED mode is used for data assignment of the following configuration.

Refer to (2) for the outline of the program example.

No.0 No.1 No.2 No.3 No.4
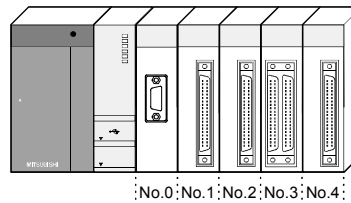
No. *1	Module	Input signal	Output signal
0	QJ71PB93D	X0 to X1F	Y0 to Y1F
1	QX41	X20 to X3F	—
2	QY41P	—	Y40 to Y5F
3	QH42P	X60 to X7F	Y60 to Y7F
4	QY41P	—	Y80 to Y9F

*1: Modules are to be mounted to the base unit from slot 0 as shown in the figure. Start I/O No. data are to be set as follows:

	Slot	Type	Model name	Points	StartXY
0	PLC	PLC	Q25HCPU		
1	0(*-0)	Intelli.	QJ71PB93D	32points	0000
2	1(*-1)	Input	QX41	32points	0020
3	2(*-2)	Output	QY41P	32points	0040
4	3(*-3)	I/O mix	QH42P	32points	0060
5	4(*-4)	Output	QY41P	32points	0080
6	5(*-5)				
7	6(*-6)				

REMARKS

Refer to Section 5.2.2 for details of the DIVIDED mode.

(2) Settings

The following configuration and operation are set in the program example given in this section.

(a) Data module setting of QJ71PB93D

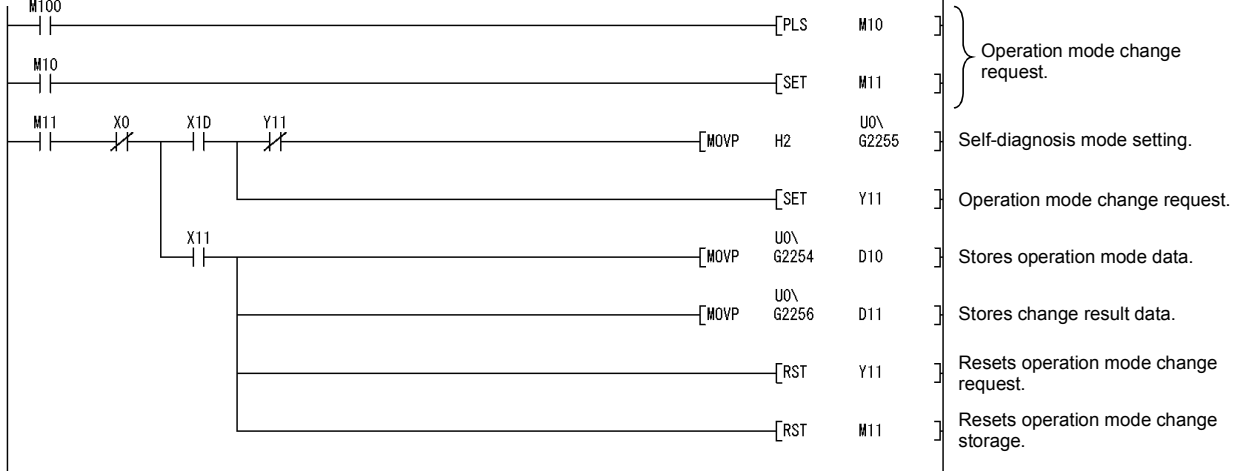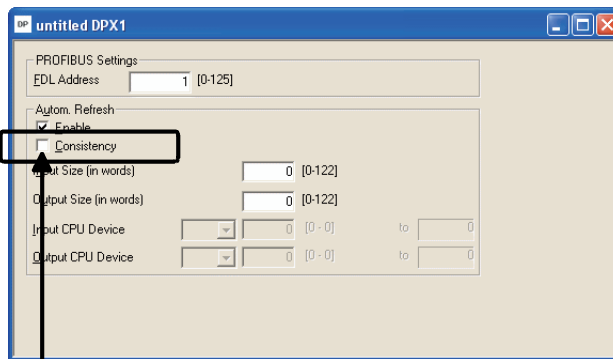| Data module 0	Input, 2 words, word unit
Data module 1	Output, 2 words, word unit
Data module 2	Input/output, 2 words, word unit
Data module 3	Output, 2 words, word unit

(b) Used states of QJ71PB93D output receive area and input send area

1) When dedicated instruction (BBLKRD/BBLKWR) is used

CPU module		QJ71PB93D	

CPU module

Device (D)

D1000 to D1001	Data output to QY41P
D1002 to D1003	Data output to QH42P
D1004 to D1005	Data output to QY41P

*1

Device (D)

D1100 to D1101	Data input to QX41
D1102 to D1103	Empty
D1104 to D1105	Data input to QH42P

*2

QJ71PB93D

Output receive area

Empty	0(0H)
	1(1H)
Data module 1 (Output, 2 words)	2(2H)
	3(3H)
Data module 2 (Output, 2 words)	4(4H)
	5(5H)
Data module 3 (Output, 2 words)	6(6H)
	7(7H)
	8(8H)
Empty	
	191(BFH)

Input send area

Data module 0 (Input, 2 words)	256(100H)
	257(101H)
Empty	258(102H)
	259(103H)
Data module 2 (Input, 2 words)	260(104H)
	261(105H)
	262(106H)
Empty	
	447(1BFH)

*1: The output receive area data are read to D1000 to D1005 using the BBLKRD instruction.
   The data in D1000 to D1005 are written to the QY41P and QH42P.

*2: Data of the QX41 and QH42P are read to the D1100 to D1105 beforehand.
   The data in D1100 to D1105 are written to the input send area using the BBLKWR instruction.

2) When MOV instruction is used
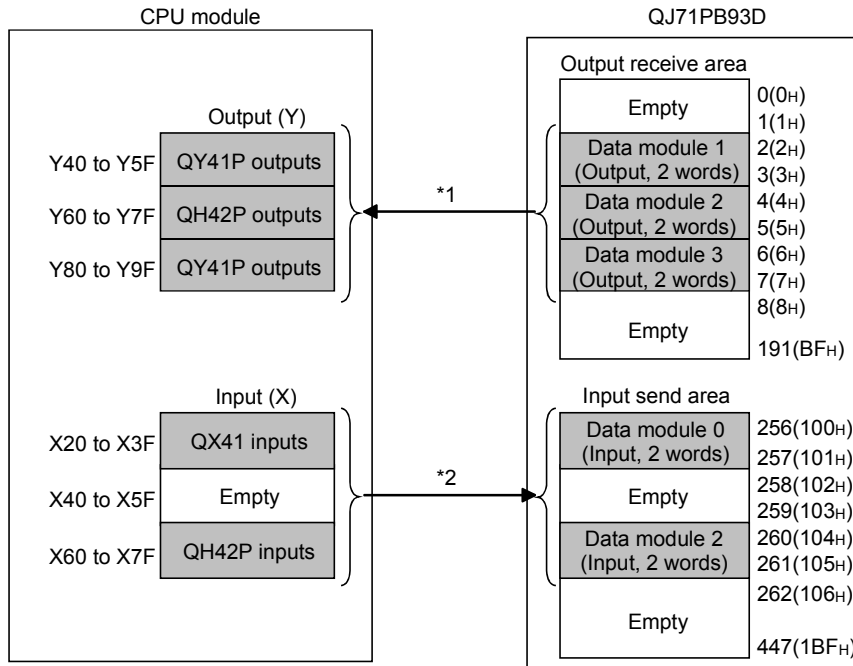
∗1: The output receive area data are read to output (Y) using the BMOV instruction.
∗2: With the BMOV instruction, the data in input (X) are written to the input receive area.

REMARKS

Refer to Section 5.2.1 for the data module setting.

(3) Assignment of devices in program examples
The program examples given in this section use the following device assignments.
(a) Devices used by module
1) QJ71PB93D

Device	Description	Device	Description
X0	Watchdog timer error	Y0	Input send area refresh directive
X1	I/O communication		—
X2	Extension trouble notification completion	Y2	Extension trouble notification request
X3	Module error	Y3	Module error reset request
X0A	BBLKRD start request acceptance completion	Y0A	BBLKRD start request
X0B	BBLKWR start request acceptance completion	Y0B	BBLKWR start request
X11	Operation mode change completion	Y11	Operation mode change request
X1D	Module READY		—

2) QX41

Device	Description	Device	Description
X20 to X3F	Inputs of QX41		—

3) QY41P

Device	Description	Device	Description
	—	Y40 to Y5F	Outputs of QY41P

4) QH42P

Device	Description	Device	Description
X60 to X7F	Inputs of QH42P	X60 to X7F	Outputs of QH42P

5) QY41P

Device	Description	Device	Description
	—	X80 to X9F	Outputs of QY41P

(b) Devices used by user

Device	Description	Device	Description
M10	Operation mode change flag	M40	Extension trouble notification flag
M11	Operation mode change storage	M41	Extension trouble notification completion flag
M20	Initial input data write	M42	Extension trouble cancel flag
M30	Error handling flag	M100	Self-diagnosis mode change

(c) Devices used for automatic refresh or buffer memory reading

Device	Description	Device	Description
D10	Operation mode storage	D301	Extension trouble information data
D11	Operation mode change result	D1000 to D1005	Output data storage
D20	Error code storage	D1100 to D1105	Input data storage
D300	Extension trouble information data length		—

(4) Program example
   (a) When using dedicated instructions (BBLKRD/BBLKWR)

<Initial input data write>

```
  X1    X0    X1D   X3                                      U0\
--| |---|/|---| |---|/|----------------------[FMOVP  K0    G256    K6 ]
                                             [SET    M20 ]
```
}Initial input data write.

<Input send area refresh start>

```
  M20   X1    X0    X1D   X3
--| |---| |---|/|---| |---|/|---------------------------------(Y0 )
                                                             (Y0A)
                                                             (Y0B)
```
}Input send area refresh start.

<Output data read>

```
  X1    X0    X0A   X1D
--| |---|/|---| |---| |-----------[G. BBLKRD   U0    K2    D1000   K6 ]
```
Output data read.
```
                                  [BMOV        D1000 K4Y40  K6 ]
```
Outputs data to Y40 to Y9F.

<Input data write>

```
  X1    X0    X0B   X1D
--| |---|/|---| |---| |-----------[BMOV        K4X20 D1100  K6 ]
```
Stores data in X20 to X7F into D1100.
```
                                  [G. BBLKWR   U0    K0    D1100   K6 ]
```
Input data write.

<Error handling>

```
  X3                                                        U0\
--| |----------------------------------------[MOV    G2040   D20 ]
```
Stores error code.

```
  M30
--| |----------------------------------------[SET    Y3 ]
        X3    Y3
        |/|---| |----------------------------[RST    Y3 ]
                                             [RST    M30 ]
```
}Resets error.

<Extension trouble information notification request>

```
 [<>   D20   H0 ]----------------------------[SET    M40 ]
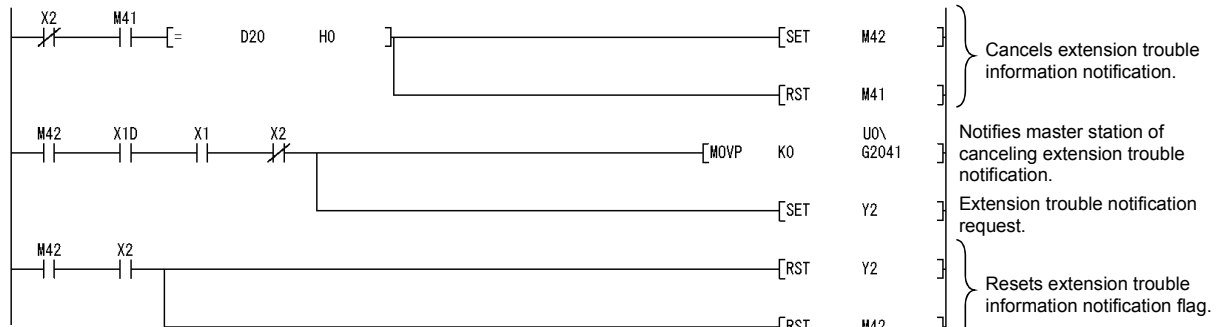```
Turns on extension trouble notification flag when error code is other than 0.
```
                                             [MOV   K2   D300]
```
Sets extension trouble notification data length.
```
                                             [MOV   D20   D301]
```
Sets extension trouble notification data.

```
  M40   X1D   X1   X2   U0\
--| |---| |---| |---|/|-----------------------[BMOVP   D300   G2041   K2]
```
Stores extension trouble notification data in buffer memory.
```
                                             [SET   Y2]
```
Extension trouble notification request.

```
  M40   X2
--| |---| |----------------------------------[RST   Y2]
                                             [RST   M40]
```
}Resets extension trouble notification request.
```
                                             [SET   M41]
```
Extension trouble notification completion flag.

```
  M41   U0\
--| |--[MOV   G2040   D20]
```
Stores error code.

<Cancel of extension trouble information notification>

```
   X2    M41
───┤/├───┤├───┤=   D20    H0 ├────────────────────[SET    M42 ]    ⎫  Cancels extension trouble
                                                                    ⎬  information notification.
                                          ────────────[RST    M41 ]    ⎭

   M42   X1D   X1    X2                                      U0\
───┤├────┤├────┤├────┤/├──────────────────────[MOVP   K0    G2041]    Notifies master station of
                                                                      canceling extension trouble
                                                                      notification.
                                          ────────────[SET    Y2  ]    Extension trouble notification
                                                                      request.

   M42   X2                                                           ⎫  Resets extension trouble
───┤├────┤├──────────────────────────────────────────[RST    Y2  ]    ⎬  information notification flag.
                                                                      ⎭
                                          ────────────[RST    M42 ]
```

<Operation mode change (Self-diagnosis mode)>

```
   M100
───┤├──────────────────────────────────────────────────[PLS    M10 ]    ⎫  Operation mode change
                                                                        ⎬  request.
   M10                                                                  ⎭
───┤├──────────────────────────────────────────────────[SET    M11 ]

   M11   X0    X1D   Y11                                      U0\
───┤├────┤/├───┤├────┤/├──────────────────────[MOVP   H2    G2255]    Self-diagnosis mode setting.

                                          ────────────[SET    Y11 ]    Operation mode change request.

        X11                                                 U0\
       ─┤├──────────────────────────────────[MOVP   G2254   D10 ]    Stores operation mode data.

                                                            U0\
                                          ────[MOVP   G2256   D11 ]    Stores change result data.

                                          ────────────[RST    Y11 ]    Resets operation mode change
                                                                      request.

                                          ────────────[RST    M11 ]    Resets operation mode change
                                                                      storage.
```
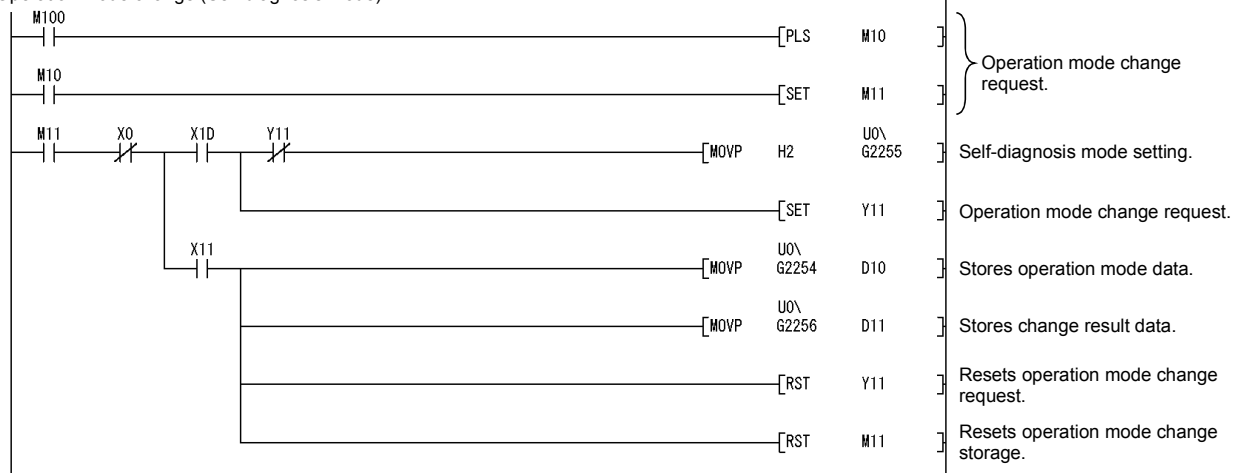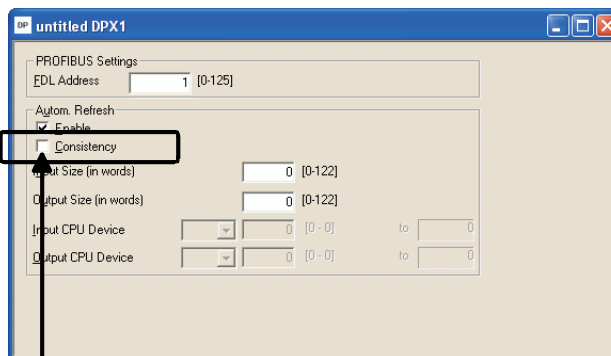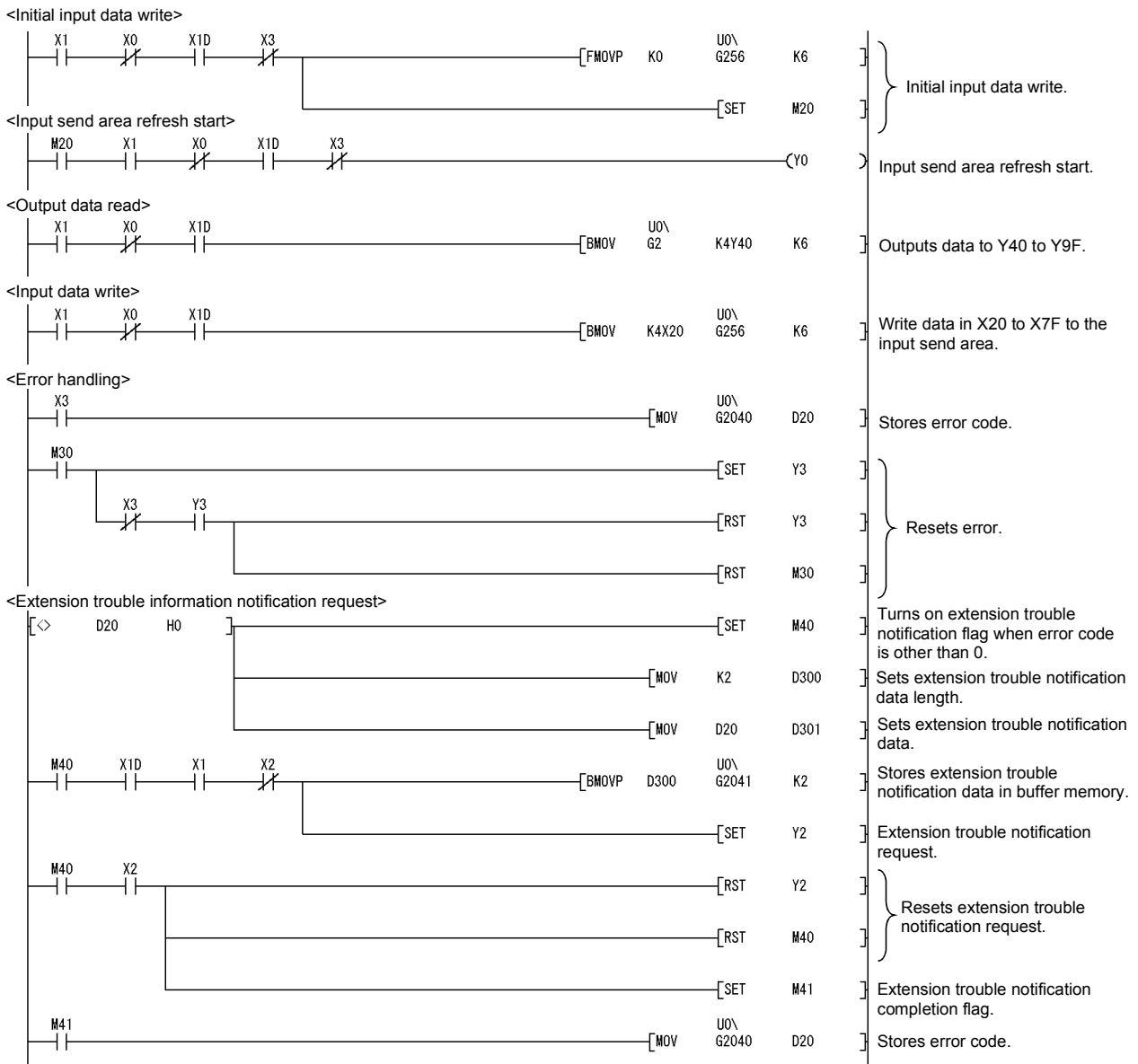
> **POINT**
>
> (1) If changing the operation mode in this program example, do not change it from GX Configurator-DP.
>
> (2) Confirm that Consistency is disabled with Autom. Refresh enabled. (Refer to Section 5.3.1)
>
> When the automatic refresh and data separation prevention functions are enabled, dedicated instructions are not processed.
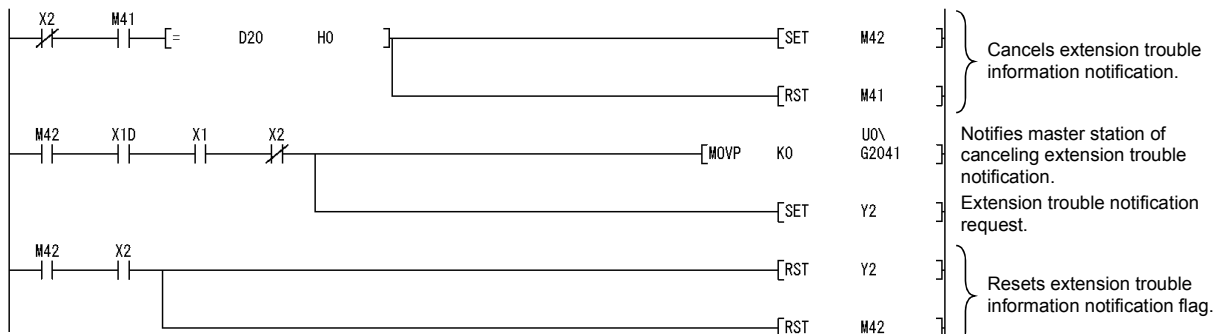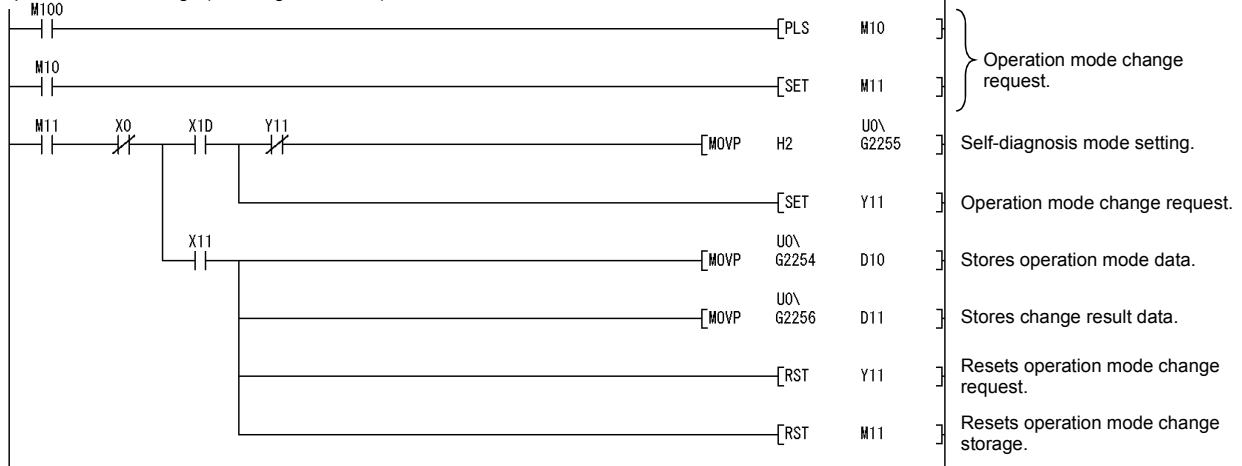>
> Make sure the box is unchecked.

(b) When using MOV instruction

<Initial input data write>

```
     X1      X0      X1D     X3                                  U0\
    ─┤├─────┤/├─────┤├─────┤/├──────────────────[FMOVP   K0      G256    K6  ]   ┐
                             │                                                   │
                             └──────────────────────────────────[SET     M20 ]  ├ Initial input data write.
                                                                                ┘
```

<Input send area refresh start>

```
     M20     X1      X0      X1D     X3
    ─┤├─────┤├─────┤/├─────┤├─────┤/├─────────────────────────────────(Y0 )      Input send area refresh start.
```

<Output data read>

```
     X1      X0      X1D                                         U0\
    ─┤├─────┤/├─────┤├─────────────────────────────[BMOV   G2      K4Y40   K6  ]  Outputs data to Y40 to Y9F.
```

<Input data write>

```
     X1      X0      X1D                                                 U0\
    ─┤├─────┤/├─────┤├─────────────────────────────[BMOV   K4X20   G256    K6  ]  Write data in X20 to X7F to the
                                                                                  input send area.
```

<Error handling>

```
     X3                                                          U0\
    ─┤├───────────────────────────────────────────[MOV    G2040   D20 ]          Stores error code.

     M30
    ─┤├───────────────────────────────────────────────────[SET     Y3  ]   ┐
        │                                                                    │
        │  X3      Y3                                                        │
        └─┤/├─────┤├──────────────────────────────────────[RST     Y3  ]    ├ Resets error.
                                                                             │
                                                                             │
                                                            [RST     M30 ]   ┘
```

<Extension trouble information notification request>

```
    [<>     D20     H0  ]──────────────────────────────────[SET     M40 ]        Turns on extension trouble
                                                                                 notification flag when error code
                                                                                 is other than 0.

                                                            [MOV    K2      D300 ] Sets extension trouble notification
                                                                                  data length.

                                                            [MOV    D20     D301 ] Sets extension trouble notification
                                                                                  data.

     M40     X1D     X1      X2                                      U0\
    ─┤├─────┤├─────┤├─────┤/├──────────────────────[BMOVP  D300    G2041   K2  ]  Stores extension trouble
                             │                                                     notification data in buffer memory.
                             └───────────────────────────────[SET     Y2  ]       Extension trouble notification
                                                                                  request.

     M40     X2
    ─┤├─────┤├─────────────────────────────────────────[RST     Y2  ]   ┐
                │                                                         ├ Resets extension trouble
                │                                                         │  notification request.
                │                                             [RST     M40 ]   ┘
                │
                └──────────────────────────────────────────[SET     M41 ]        Extension trouble notification
                                                                                 completion flag.

     M41                                                        U0\
    ─┤├───────────────────────────────────────────[MOV    G2040   D20 ]          Stores error code.
```

<Cancel of extension trouble information notification>

```
     X2   M41
─────┼/┼──┤ ├──[=    D20    H0  ]─────────────────────[SET   M42  ]─┐  Cancels extension trouble
                                                                    │  information notification.
                                            ─────────────[RST   M41  ]─┘

     M42  X1D  X1   X2                                          U0\
─────┤ ├──┤ ├──┤ ├──┤/┼──────────────────────[MOVP   K0    G2041 ]─   Notifies master station of
                                                                      canceling extension trouble
                                                                      notification.
                                            ─────────────[SET   Y2   ]─   Extension trouble notification
                                                                          request.

     M42  X2
─────┤ ├──┤ ├───────────────────────────────────────[RST   Y2   ]─┐  Resets extension trouble
                                                                   │  information notification flag.
                                            ─────────────[RST   M42  ]─┘
```

<Operation mode change (Self-diagnosis mode)>

```
     M100
─────┤ ├────────────────────────────────────────────[PLS   M10  ]─┐
                                                                   │  Operation mode change
     M10                                                           │  request.
─────┤ ├────────────────────────────────────────────[SET   M11  ]─┘

     M11  X0   X1D  Y11                                         U0\
─────┤ ├──┤/┼──┤ ├──┤/┼──────────────────────[MOVP   H2    G2255 ]─   Self-diagnosis mode setting.

                                            ─────────────[SET   Y11  ]─   Operation mode change request.

          X11                                U0\
          ┤ ├──────────────────────[MOVP   G2254  D10  ]─   Stores operation mode data.

                                             U0\
                              ─────[MOVP   G2256  D11  ]─   Stores change result data.

                                            ─────────────[RST   Y11  ]─   Resets operation mode change
                                                                          request.

                                            ─────────────[RST   M11  ]─   Resets operation mode change
                                                                          storage.
```

POINT

If changing the operation mode in this program example, do not change it from GX Configurator-DP.

7.4 Global Control-driven Program Execution

(1) System configuration example

This section shows a program example added when the program for the following configuration is executed using global control reception as a trigger.
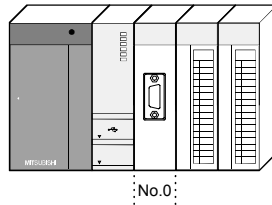
No. *1	Module	Input signal	Output signal
0	QJ71PB93D	X0 to X1F	Y0 to Y1F

*1: The QJ71PB93D is to be mounted in slot 0 of the base unit with the head I/O number set to "00H".

(2) Assignment of devices in program examples

The program example given in this section use the following device assignments.

(a) Devices used by the QJ71PB93D

Device	Description	Device	Description
X0	Watchdog timer error	X6	SYNC receive
X1	I/O communication	X7	FREEZE mode
X5	SYNC mode	X1D	Module READY

(b) Devices used by user

Device	Description	Device	Description
M100	X6 ON processing	M110	FREEZE processing
M102	SYNC processing		—

(3) Program example

<Global control (SYNC)>

<Global control (FREEZE)>

		[PLS M100]	Receives SYNC service.
		[SET M102]	M102 is on during SYNC service.
		[RST M102]	M102 is off before SYNC service reception.
		[SET M110]	M110 is on during FREEZE service.
		[RST M110]	M110 is off before FREEZE service reception.
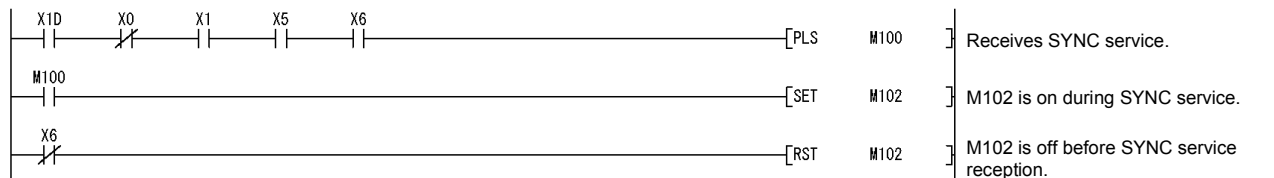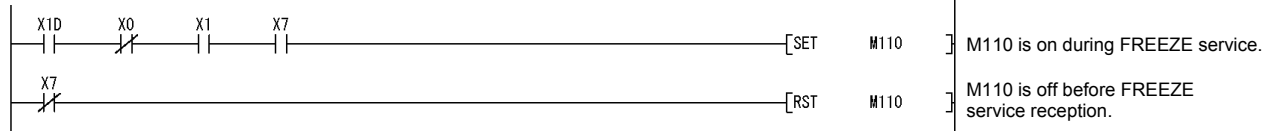
8 DEDICATED INSTRUCTIONS

A "dedicated instruction" is defined as an instruction designed to make programming easy for use of the intelligent function module functionality.
This chapter describes the dedicated functions available for the QJ71PB93D.

(1) List of dedicated functions
The following list shows the dedicated instructions available for the QJ71PB93D.

Dedicated instruction	Description	Reference
BBLKRD	Reads data from the buffer memory of a specified module, ensuring data consistency.	Section 8.2
BBLKWR	Writes data to the buffer memory of a specified module, ensuring data consistency.	Section 8.3

(2) Available devices
The following devices are available for the dedicated instructions:

Internal devices		File register	Constant *1
Bit	Word		
—	T,ST,C,D,W	R,ZR	K,H

*1: Available devices are given in each of the Constant field.

8.1 Precautions for Execution of Dedicated Instructions

(1) CPU module usable for dedicated instructions
For execution of dedicated functions, use a CPU module whose first 5 digits of the serial No. are "02092" or later.

(2) Check that Consistency is disabled with Autom. Refresh enabled.
If the automatic refresh and data separation prevention functions are enabled, use of dedicated instructions is not allowed. (They are not processed.)
Dedicated instructions are executable if the data separation prevention function is disabled in the automatic refresh setting. (Refer to Section 5.3.1)
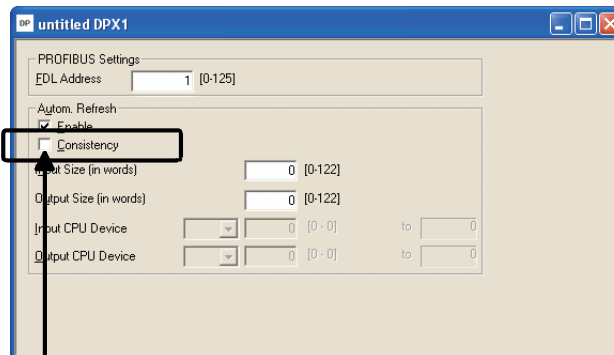
Make sure the box is unchecked.

(3) Transmission delay time when using a dedicated instruction
Use of the data consistency function increases the transmission delay time.
(Refer to Section 6.1, 6.2)

(4) Execution timing

Dedicated instructions can be executed any time.

Dedicated instructions are not processed while the QJ71PB93D is executing the data consistency function. (Refer to Section 4.1.2)

Therefore, in a program that is executed only once at the leading or trailing edge of the pulse, I/O data may not be read or written.

(5) Number of executions within one scan

Execute dedicated instructions only once in one scan.

(6) Before executing a dedicated instruction

(a) Data module setting

Configure the data modules in the slave parameter setting on the master station.

Dedicated instructions are not executable if this data module setting is incomplete.

• When using BBLKRD: Set an output or I/O module

• When using BBLKWR: Set an input or I/O module

(b) Turn on the start request signal for the dedicated instruction

Turn on the following signal before executing a dedicated instruction.

• When using BBLKRD: Turn on the BBLKRD start request signal (Y0A)

• When using BBLKWR: Turn on the BBLKWR start request signal (Y0B)

Attempting to execute a dedicated instruction with the above signal OFF results in no processing (no execution).

Note that, as interlock signals for execution of dedicated instructions, the following signals must be used.

• When using BBLKRD: The BBLKRD start request acceptance completion signal (X0A)

• When using BBLKWR: The BBLKWR start request acceptance completion signal (X0B)

(Example) BBLKRD instruction

```
Execution
command    X0A
  ┤ ├       ┤ ├                           ─[ G. BBLKRD      U0       K0       D0       K32    ]─
```
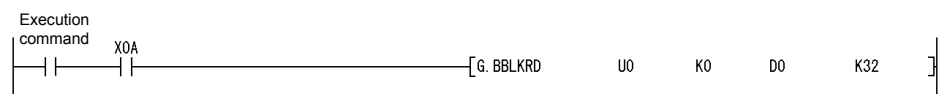
(7) Execution of the BBLKRD and BBLKWR instructions

The BBLKRD and BBLKWR instructions work independently.

8.2 G.BBLKRD

Set data	Usable devices								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module U□\G□	Index register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
n1	—	○		—		—	—	○	—
Ⓓ	—	○		—		—	—	—	—
n2	—	○		—		—	—	○	—

[Instruction symbol]   [Execution condition]

Command

G.BBLKRD

G.BBLKRD	Un	n1	Ⓓ	n2

Setting Data

Setting data	Detail	Set Range	Data Type
Un	Module head I/O number of QJ71PB93D (Upper 2 digits of the I/O number in 3-digit notation)	0 to FEH	BIN16 bit
n1	Head address of buffer memory in output receive area	Specified device area	
Ⓓ	Head number of device in which read data is stored	Specified device area	Device name
n2	Number of reading data	1 to 122 (Word)	BIN16 bit

Function

Reads the data of the output receive area (buffer memory) while simultaneously preventing data separation.

Error

If the following event is encountered, an operation error will occur (Error code: 4101).
• A value out of the set range is set for the set data.
• The size of the data obtained by adding the number of data to be read to the head address of the data to be read exceeds the buffer memory size.
• The number of data to be read for the head address and subsequent is less than the number of reading data.

Program Example

Program for reading 122-point data, starting at the buffer memory address 0 in the output receive area of the QJ71PB93D (module head I/O number 0), to D0 to D121 when M10 turns on.

M10	X0A			G. BBLKRD	U0	K0	D0	K122	
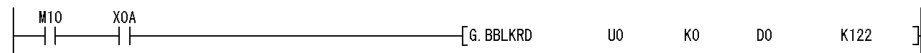
8.3 G.BBLKWR

Set data	Usable devices								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
n1	—	○		—		—	—	○	—
⑤	—	○		—		—	—	—	—
n2	—	○		—		—	—	○	—

[Instruction symbol]   [Execution condition]

Command

G.BBLKWR   ⎍   ┤├──┤│├───────────[G.BBLKWR   Un   n1   ⑤   n2]──

Setting Data

Setting data	Detail	Set Range	Data Type
Un	Module head I/O number of QJ71PB93D (Upper 2 digits of the I/O number in 3-digit notation)	0 to FEH	BIN16 bit
n1	Head address of buffer memory in input send area Set the head address as the offset address from 0H. Example: Set "100H" as "0H", and "120H" as "20H".	Specified device area	
⑤	Head number of device in which write data is stored	Specified device area	Device name
n2	Number of writing data	1 to 122 (Word)	BIN16 bit

Function

Writes data to the input send area (buffer memory) while simultaneously preventing data separation.

Error

If the following event is encountered, an operation error will occur (Error code: 4101).
• A value out of the set range is set for the set data.
• The size of the data obtained by adding the number of data to be written to the head address for data writing exceeds the buffer memory size.
• The number of data to be written for the head address and subsequent is less than the number of writing data.

Program Example

Program for writing the 122-point data of D0 to D121 to the addresses, starting at the buffer memory address 100H in the input send area of the QJ71PB93D (module head I/O number 0) when M10 turns on.

```
   M10   X0B
  ──┤├───┤├────────────────────[ G. BBLKWR   U0   K0   D0   K122 ]──
```
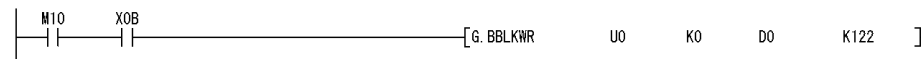
9 TROUBLESHOOTING

The following is the troubleshooting of the QJ71PB93D.

When any error has occurred, first check the CPU module or power supply module for a fault.

When the CPU module has no fault, refer to Sections 9.1 to 9.4.

9.1 LED-indicated Error Causes and Actions

The following indicates the causes of the errors indicated by the LEDs and the actions to be taken.

LED	Status	Cause	Action
RUN	Off	Watchdog timer error occurred.	Consult your local service center or representative.
ERR.	On	Parameter setting error or module error occurred.	Check the error code and take corrective actions. (Refer to Section 9.4)
BF	On	Communication error was detected or data communication is not yet started.	• Check the parameter setting and cable wiring and check for open cable and like. (Refer to Section 9.2) • Start data communication. • Set the station number.

9.2 Checks and Actions for Network-related Faults

Checked Area	Action
Transmission path	Use three or less repeaters to be relayed (Refer to Section 3.1).
	Use each segment within the specified length (Refer to Section 3.1).
	Install one bus terminator at each end (Refer to Section 3.1).
	Use within the specified number of devices connected in each segment (Refer to Section 3.1).
	Check the cable wiring and check for open cable (Refer to Section 5.7).
	Check whether the cables are of Type A or not.
LED	Confirm the error with the on/off status of the LEDs and take the corrective action (Refer to Section 9.1).
Module error information of buffer memory (Buffer memory address: 7F8H)	Confirm the error with the error code and take the corrective action (Refer to Section 9.4).
Master station	Confirm the error of the master station and take the corrective action (Refer to the master station manual).

9

9.3 Causes of Failure to Make Normal Data Communication and Actions to Be Taken

The following I/O signal status flowchart indicates the causes of a failure to make normal data communication and the actions to be taken.

	Status	Cause	Action
1)	No I/O communication.	A communication start request is not given from the master station.	• Check the master station. • Check the transmission path (Refer to Section 9.2).
2)	Output data is not sent to master station.	• The output refresh directive is not given. • Any of the slave parameters of the master station is wrong.	• Turn on the input send area refresh directive signal (Y00). • Check the slave parameters of the master station.
3)	Output data is held and data does not change.	In the SYNC mode.	Execute the UNSYNC service from the master station.
4)	Input data is held and data does not change.	In the FREEZE mode.	Execute the UNFREEZE service from the master station.
5)	Data is not communicated to a correct area.	The buffer memory address of the MOV/FROM/TO instruction is wrong.	• Check the used status of the data modules in the input send area used status (buffer memory address: 8F0H to 8FBH and output receive area used status (buffer memory address: 8E0H to 8EBH) [*1]. • Check the sequence program.
	Error does not occur in QJ71PB93D when master station becomes faulty.	The communication watchdog timer setting in the parameter is 0.	• Check the current setting with the current communication watchdog timer value (buffer memory address: 8D1H) [*1]. • Set the communication watchdog timer in the master station parameter.
	Upper and lower bytes of data sent and received are inverse.	The swap setting in the slave parameter of the master station is not appropriate for the data sent/received by the master.	• Check the current setting with the swap function setting status (buffer memory address: 8D3H) [*1]. • Set "Yes/No" of swap setting in the master station parameter according to the data sent/received by the master station.

*1: Check during I/O communication (when X01 is ON).

9.4 Error Code List

The following are the error codes of the QJ71PB93D.
Any of the error codes is stored into the module error information (buffer memory address: 7F8H) at error occurrence.

Error Code	Error Name	Description	Corrective Action
1001H	Station number error	The station number saved on the flash ROM is outside the range.	Set the station number to within the range again.
1002H		An attempt was made to change the station number to the one outside the range.	Set the station number to within the range.
1006H	Station number rewrite error	A station number change request was given (Y13 turned on) in the following station number rewrite disabled status. • "TRUE" was set for "No_Add_Chg" in the station number setting from the class 2 master station.	Clear the station number with a station number change request.
2001H	Station number rewrite count excess error	Station number rewrite to the flash ROM was performed more than 60 times consecutively.	• Switch power on again. • Give a station number change request to clear the station number. (Refer to Section 3.4.2(6))
2002H	Flash ROM memory access error	Hardware fault.	Change the module.
3002H	Illegal receive parameter error	The setting of the communication watchdog timer is too long.	Check the slave parameters of the master station.
3003H		The "Min T_sdr" value is outside the setting range.	
3004H		The data length of a user parameter is incorrect.	Check "User_Prm_Data_Size" in GX Configurator-DP. (Refer to Sections 5.2.2 (2) and 5.2.3 (1).)
3006H	Communication chip fault	Hardware fault.	Change the module.
3007H	Communication time-out error	Time-out occurred in communication with the master station.	• Check the master station status. • Check the cable connection status. • Increase the setting of the communication watchdog timer.
3061H	I/O configuration information error	The data module is not a word type.	Check the slave parameters of the master station.
3062H		The swap setting is outside the range.	
3063H		The data assignment mode setting is outside the range.	
3064H		The data module count setting is outside the range.	
3065H		The data module setting is outside the range.	
3066H		The station number set in the parameter is illegal.	

9.5 Checking the QJ71PB93D Status by System Monitor of GX Developer

When you select the module detailed information of the QJ71PB93D in the system monitor of GX Developer, you can check the error code and LED ON/OFF states.

(1) Operation of GX Developer

[Diagnostics] →[System monitor] → [Select QJ71PB93D] → [Module's Detailed Information]

(2) Module detailed information
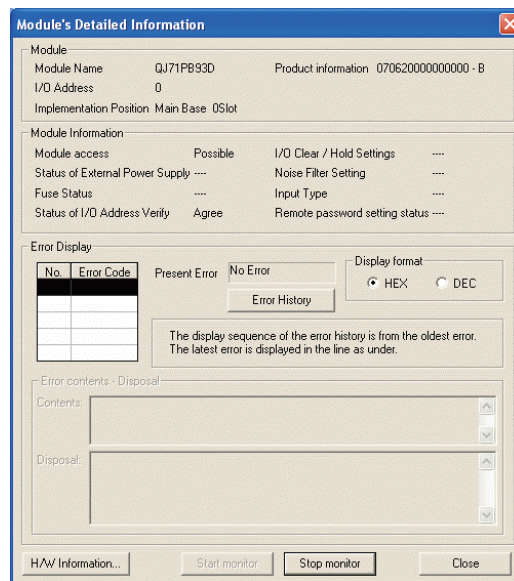
	Item	Description
Module	Module Name	Displays the model name of the target module.
	I/O Address	Displays the head I/O number of the target module.
	Implementation Position	Displays the slot position where the module is mounted.
	Product information	Displays the serial No. and function version of the target module. 070620000000000 - B Function version Serial number
Module information	Module access	Display Enable when the Module READY signal (X1D) is on and the Watch dog timer error (X00) is off.
	Status of I/O Address Verify	Displays whether or not the module parameterized by the user matches the mounted module.
Error Display	Present Error	Displays "No error" only.
	Error History	Does no display an error code stored in the Module error information area (buffer memory address: 7F8$_H$) of the QJ71PB93D.
Error contents • Disposal	Contents	No display for the QJ71PB93D.
	Disposal	

(3) H/W Information
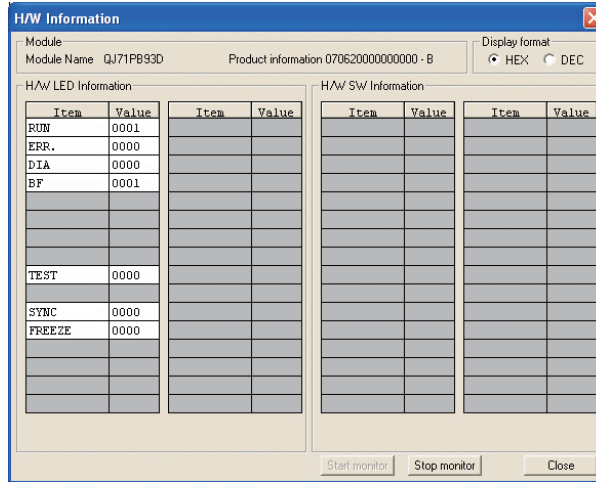
(a) H/W LED information

The LED ON/OFF states of the QJ71PB93D are displayed.

For the value of each item, "0001" indicates ON and "0000" OFF.

Item	Description
RUN	ON : Normal OFF: Hardware error (module watchdog timer error)
ERR.	ON : Parameter setting error or module error occurrence OFF: Normal
DIA	ON : Extension trouble information present OFF: Extension trouble information absent
BF	ON : Before data communication or communication error detection OFF: During data communication
TEST	ON : During self-diagnostic execution
SYNC	ON : During SYNC mode
FREEZE	ON : During FREEZE mode

APPENDICES

Appendix 1   Differences Between QJ71PB93D and A1SJ71PB93D

The following indicates the differences between the MELSEC-Q series QJ71PB93D and MELSEC-A series A1SJ71PB93D.

(1)   Functions, specifications

Type \ Item		QJ71PB93D	A1SJ71PB93D
Automatic refresh		Present	Absent
Separation prevention function		• Automatic refresh • Dedicated instructions (With the FROM/TO instruction, division of one-word data is prevented.)	FROM/TO instructions
Watchdog timer error signal		X00	X0D
Operating station number indication	LED	Absent	LED B0 to B6 lit
	Buffer memory	Station number is stored into operating station number (address: 201H).	Station number is stored into operating station number (address: 201H).
Self-diagnostic error display method at its occurrence		Type code is stored into the self-diagnostic status type code display area (buffer memory address: 8D2H).	LED B0 to B6 lit

(2)   Precautions for program diversion

The following gives the precautions for diverting the A1SJ71PB93D programs to the QJ71PB93D.

(a)   Correct the watchdog timer error from X0D to X00.

(b)   To read or write IO data with the data consistency protected, use either of the following:

• Automatic refresh
• Dedicated instructions (BBLKRD/BBLKWR)

App

Appendix 2　External Dimensions

QJ71PB93D
RUN　　TEST
ERR.
DIA　　SYNC
BF　　FREEZE

PROFIBUS I/F

QJ71PB93D

98 (3.86)

90 (3.55)　　4　(0.16)

27.4 (1.08)

Unit ： mm (inch)

App

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MEMO

WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not , compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi programmable controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the programmable controller applications.

In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable controller range of applications.

However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

PROFIBUS-DP Slave Module

User's Manual

MODEL	QJ71PB93D-U-S-E
MODEL CODE	13JR57
SH(NA)-080318E-F(0711)MEE	

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