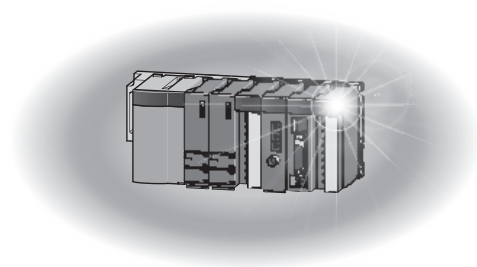


Mitsubishi Programmable Controller

MELSEC **Q** series

PROFIBUS-DP Slave Module User's Manual

-QJ71PB93D



• SAFETY PRECAUTIONS •

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

In this manual, the safety instructions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

 WARNING	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 minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[DESIGN PRECAUTIONS]

 WARNING
- 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. Failure to do so may result in an accident due to an incorrect output or malfunction. - The input data from the master station remains unchanged from the data prior to the communication error. - When the master station becomes faulty, the output status of the QJ71PB93D will be as in the parameter settings of the master station. - 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

- Do not install the PROFIBUS cables together with the main circuit lines or power cables.
Keep a distance of 100mm or more between them.
Failure to do so may result in malfunction due to noise.

[INSTALLATION PRECAUTIONS]

CAUTION

- Use the programmable controller under the environment specified in the user's manual of the CPU module used.
Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the module, while pressing the module mounting lever in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
Incorrect mounting may cause malfunctions, a failure, or a drop of the module.
When using the programmable controller in an environment of frequent vibrations, fix the module with a 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.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
Failure to do so may result in damage to the product.
- Do not directly touch any conductive parts and electronic components of the module.
Doing so can cause malfunction or failure of the module.

[WIRING PRECAUTIONS]

WARNING

- Shut off the external power supply (all phases) used in the system before wiring the PROFIBUS cables.
Failure to do so may result in failure or malfunctions of the module.
- 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.

 CAUTION

- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- Place the PROFIBUS cables in a duct or clamp them.
If not, dangling cables may swing or inadvertently be pulled, resulting in damages to the module or cables or malfunctions due to poor 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 to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
Do not remove the film during wiring.
Remove it for heat dissipation before system operation.

[STARTING AND MAINTENANCE PRECAUTIONS]

 WARNING

- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the connector screws or module fixing screws.
Failure to do so may result in electric shock or cause the module to fail or malfunction.
Undertightening can cause drop of the screw, short circuit, or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

 CAUTION

- Do not disassemble or modify the modules.
Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm (9.85 inches) away in all directions from the programmable controller.
Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
Failure to do so may cause the module to fail or malfunction.
- After the first use of the product, do not mount/remove the module to/from the base unit more than 50 times (IEC 61131-2 compliant).
Exceeding the limit of 50 times may cause malfunction.
- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body.
Failure to do so may cause the module to fail or malfunction.

[DISPOSAL PRECAUTIONS]



CAUTION

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

• CONDITIONS OF USE FOR THE PRODUCT •

- (1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
- i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
 - ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

- (2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the PRODUCT in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTS are required. For details, please contact the Mitsubishi representative in your region.

REVISIONS

* The manual number is given on the bottom left of the back cover.

Print Date	* Manual Number	Revision
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Japanese Manual Version SH-080317-F

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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.

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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)

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

- (1) Method of ensuring compliance
To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.
 - QCPU User's Manual (Hardware Design, Maintenance and Inspection)
 - Safety Guidelines
(This manual is included with the CPU module or base unit.)
The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.
- (2) Additional measures
No additional measures are necessary for the compliance of this product with EMC and Low Voltage 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 the Q00JCPU, Q00CPU, Q00UJCPU, Q00UCPU, Q01CPU, Q01UCPU, Q02CPU, Q02HCPU, Q02PHCPU, Q02UCPU, Q03UDCPU, Q03UDVCPU, Q03UDECPU, Q04UDHCPU, Q04UDVCPU, Q04UDEHCPU, Q06HCPU, Q06PHCPU, Q06UDHCPU, Q06UDVCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q12HCPU, Q12PHCPU, Q13UDHCPU, Q13UDVCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q25HCPU, Q25PHCPU, Q26UDHCPU, Q26UDVCPU, Q26UDEHCPU, Q50UDEHCPU, and Q100UDEHCPU modules
GX Developer	The product name of the software package for the MELSEC programmable controllers
GX Works2	
GX Configurator-DP	The configurator for the QJ71PB93D Generic term for the product name SWnD5C-PROFID-E ("n" means version 7 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

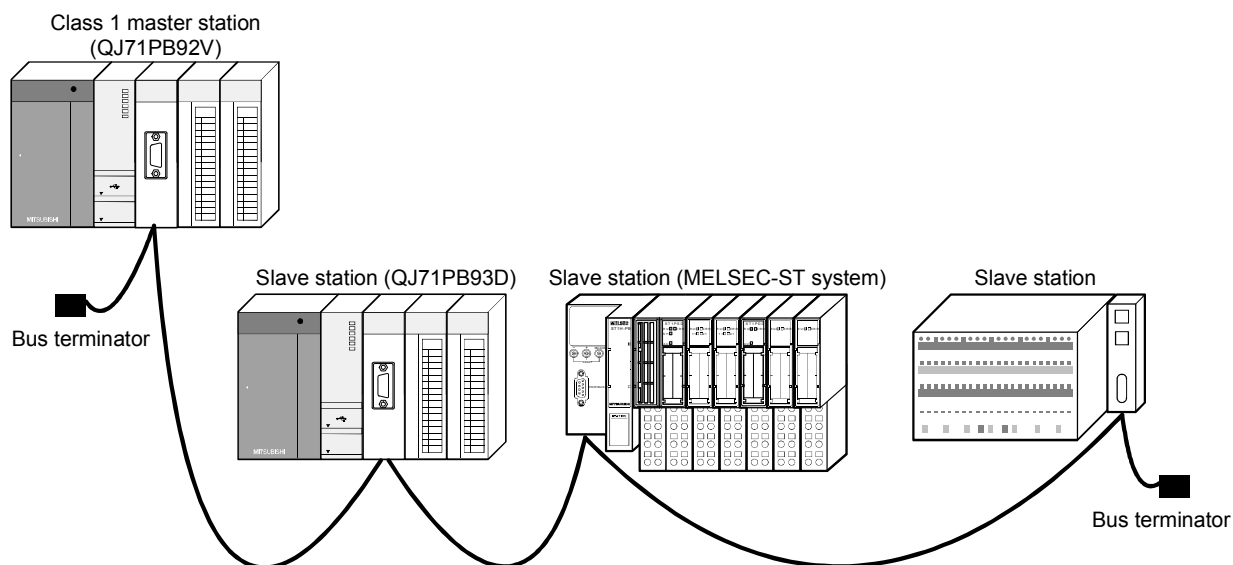
The product configuration of this product is given in the table below.

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 QJ71PB93D Features

1

(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.

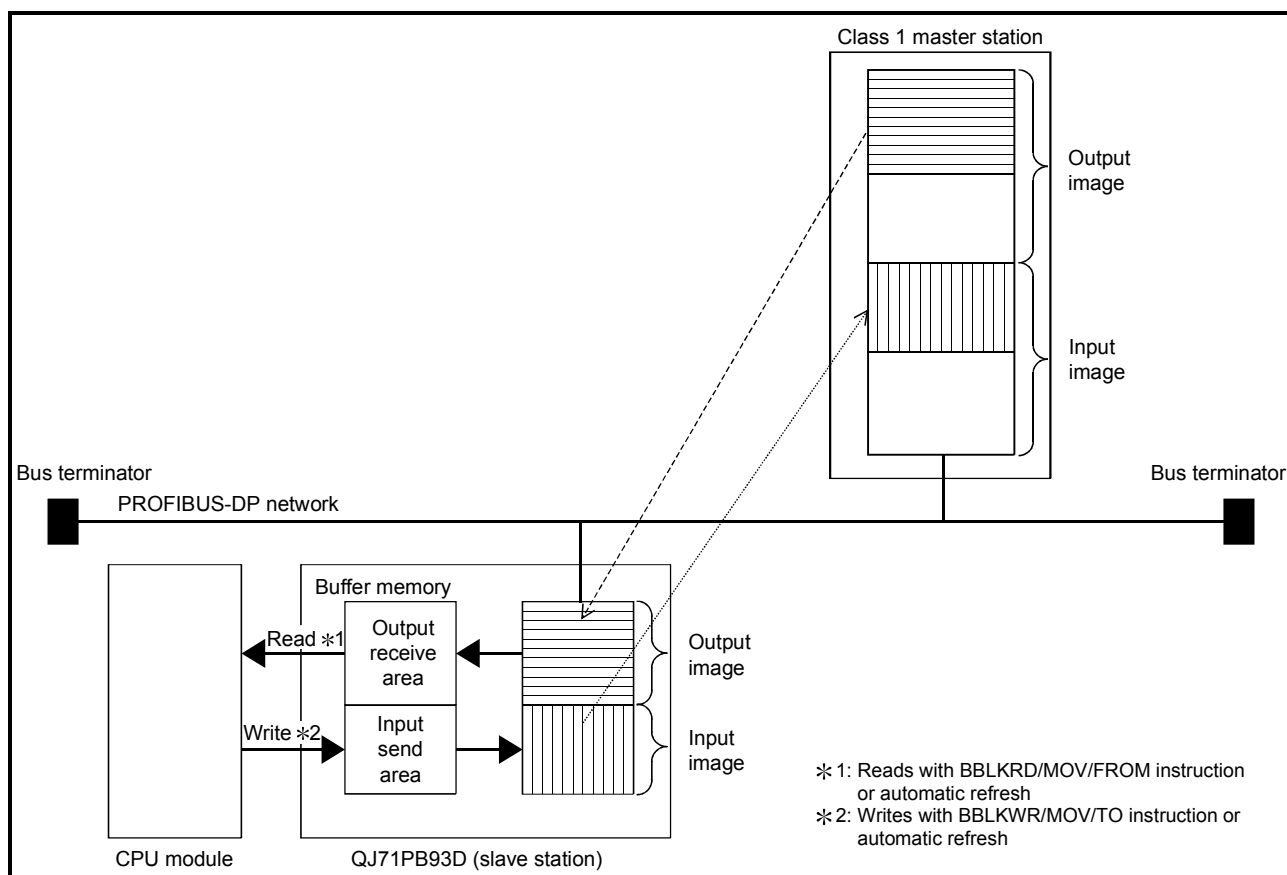
The QJ71PB93D supports the PROFIBUS-DPV0 function.

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	} Max. 192 words in total
Output data	: Max. 122 words	



(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 with a 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	Q02PHCPU	Up to 64	○	○
		Q06PHCPU			
		Q12PHCPU			
		Q25PHCPU			
	Redundant CPU	Q12PRHCPU	Up to 53	×	○
		Q25PRHCPU			
	Universal model QCPU	Q00UJCPU	Up to 8	○	○
		Q00UCPU	Up to 24		
		Q01UCPU			
Q02UCPU		Up to 36			
Q03UDCPU		Up to 64			
Q04UDHCPU					
Q06UDHCPU					

(To the next page)

2 SYSTEM CONFIGURATION

MELSEC-Q

Mountable CPU module			No. of mountable modules*1	Mountable base unit*2	
CPU type		CPU model name		CPU type	CPU model name
Programmable controller CPU	Universal model QCPU	Q10UDHCPU	Up to 64	○	○
		Q13UDHCPU			
		Q20UDHCPU			
		Q26UDHCPU			
		Q03UDVCPU			
		Q04UDVCPU			
		Q06UDVCPU			
		Q13UDVCPU			
		Q26UDVCPU			
		Q03UDECPU			
		Q04UDEHCPU			
		Q06UDEHCPU			
		Q10UDEHCPU			
		Q13UDEHCPU			
		Q20UDEHCPU			
		Q26UDEHCPU			
		Q50UDEHCPU			
		Q100UDEHCPU			
		Safety CPU			
	C Controller module		Q06CCPU-V-H01	Not mountable	×
		Q06CCPU-V	Up to 64	○	○
		Q06CCPU-V-B			
		Q12DCCPU-V			
		Q24DHCCPU-V	Up to 62		
		Q24DHCCPU-LS			

○: 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 Safety CPU modules cannot be mounted to an extension base unit.

REMARKS

When using the module with a C Controller module, refer to the user's manual for the C Controller module.

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, refer to the User's Manual (Multiple CPU System) for CPU module used.

(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 or GX Works2: 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)

2 SYSTEM CONFIGURATION

MELSEC-Q

System		Software Version		
		GX Developer	GX Configurator-DP ^{*1}	GX Works2 ^{*2}
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 7.00A or later	Version 1.11M or later
	Multiple CPU system	Version 8 or later		Version 1.14Q or later
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single CPU system	Version 4 or later		Version 1.11M or later
	Multiple CPU system	Version 6 or later		Version 1.14Q or later
Q02PH/Q06PHCPU	Single CPU system	Version 8.68W or later	Version 7.04E or later	Version 1.86Q or later
	Multiple CPU system			
Q12PH/Q25PHCPU	Single CPU system	Version 7.10L or later	Version 7.00A or later	
	Multiple CPU system			
Q12PRH/Q25PRHCPU	Redundant system	Version 8.17T or later	Version 7.00A or later ^{*3}	
Q00UJCPU	Single CPU system	Version 8.76E or later	Version 7.04E or later	Version 1.11M or later
Q00U/Q01UCPU	Single CPU system			Version 1.14Q or later
	Multiple CPU system			
Q02UCPU	Single CPU system	Version 8.48A or later	Version 7.03D or later	Version 1.11M or later
	Multiple CPU system			Version 1.14Q or later
Q03UD/Q04UDH/ Q06UDHCPU	Single CPU system		Version 7.02C or later	Version 1.11M or later
	Multiple CPU system			Version 1.14Q or later
Q10UDH/ Q20UDHCPU	Single CPU system	Version 8.76E or later	Version 7.04E or later	Version 1.11M or later
	Multiple CPU system			Version 1.14Q or later
Q13UDH/ Q26UDHCPU	Single CPU system	Version 8.62Q or later	Version 7.03D or later	Version 1.11M or later
	Multiple CPU system			Version 1.14Q or later
Q03UDV/Q04UDV/ Q06UDV/Q13UDV/ Q26UDVCPU	Single CPU system	Not available	Version 7.09K or later	Version 1.95Z or later
	Multiple CPU system			
Q03UDE/Q04UDEH/ Q06UDEH/Q13UDEH/ Q26UDEHCPU	Single CPU system	Version 8.68W or later	Version 7.03D or later	Version 1.11M or later
	Multiple CPU system			Version 1.14Q or later
Q10UDEH/ Q20UDEHCPU	Single CPU system	Version 8.76E or later	Version 7.04E or later	Version 1.11M or later
	Multiple CPU system			Version 1.14Q or later
Q50UDEH/ Q100UDEHCPU	Single CPU system	Not available	Version 7.07H or later	Version 1.25B or later
	Multiple CPU system			

*1 The operation mode of the QJ71PB93D cannot be changed using GX Configurator-DP Version 7.03D or later.

Change the mode using operation mode change request area (buffer memory address: 8CFH).

*2 For how to use GX Configurator-DP and GX Works2 together, refer to the GX Configurator-DP Operating Manual.

*3 To mount the QJ71PB93D on an extension base unit, use GX Configurator-DP Version 7.03D or later.

2.2 When Used in a Redundant System

For the precautions on when using an extension base unit, refer to the User's Manual (Redundant System) for the CPU module used.

2.3 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.

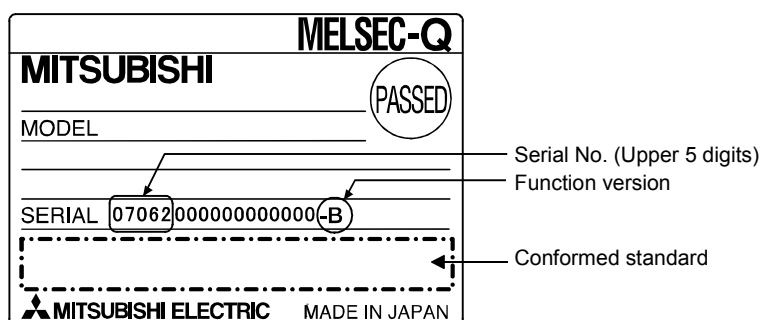
If data are read from or written to the buffer memory with the X1D status ignored, the CPU module may detect an error to stop the sequence calculation.

2.4 Checking Serial No. and Function Version

The serial No. and function version of the QJ71PB93D can be checked on the rating plate, on the front of the module, and on the System monitor of GX Developer.

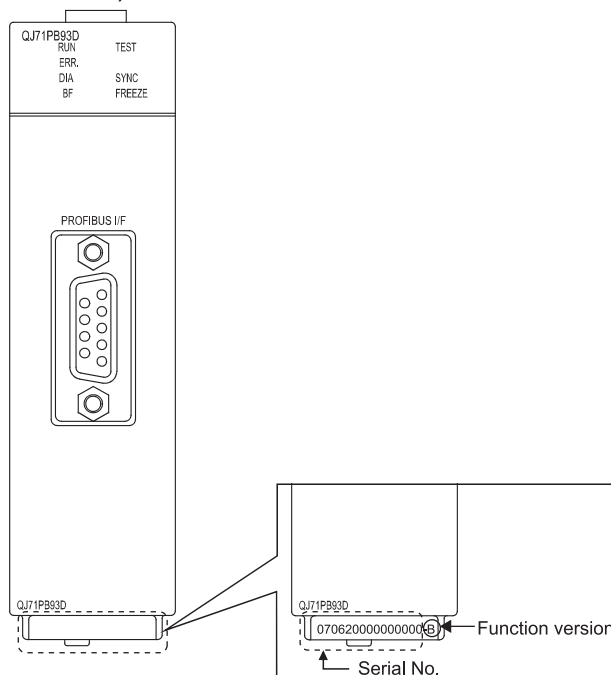
(1) Checking on the rating plate

The rating plate is located on the side of the QJ71PB93D.



(2) Checking on the front of the module

The serial No. and function version on the rating plate are printed on the front (at the bottom) of the module.



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 User's Manual (Hardware Design, Maintenance and Inspection) for the CPU module used.

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 User's Manual (Hardware Design, Maintenance and Inspection) for the CPU module used.

(1) Transmission distance

Transmission Speed	Transmission Distance	Max. Transmission Distance when Repeater is Used *3
9.6 kbps	1200 m (3937 ft.)/segment	4800 m (15748 ft.)/network
19.2 kbps		
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	100 m (328 ft.)/segment	400 m (1312 ft.)/network
6 Mbps		
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) × 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)

$$\text{Master station} + \text{Slave station} * 1 \leq 126$$

*1: Including the QJ71PB93D

- (b) Number of connectable modules per segment

$$\text{Master station} + \text{Slave station} * 1 + \text{repeaters} * 2 \leq 32$$

*1: Including the QJ71PB93D

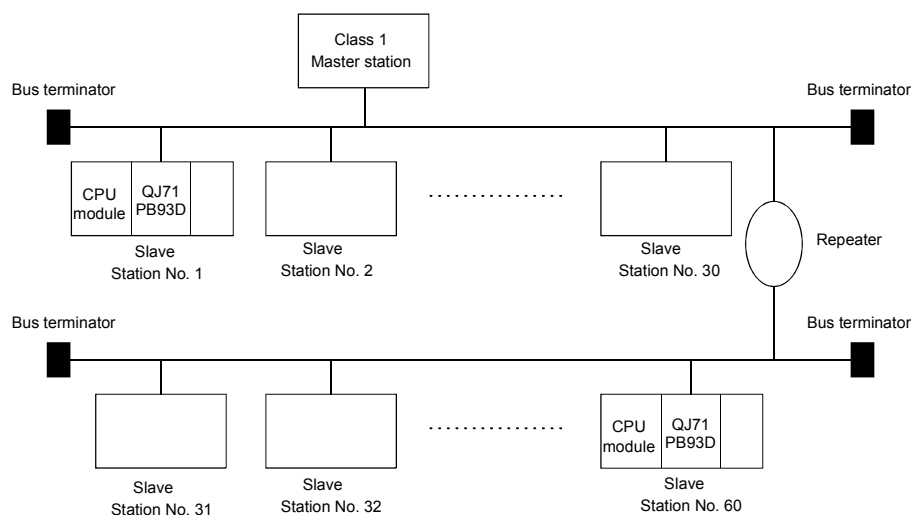
*2: A repeater is counted for both segments.

- (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 SPECIFICATIONS

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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.

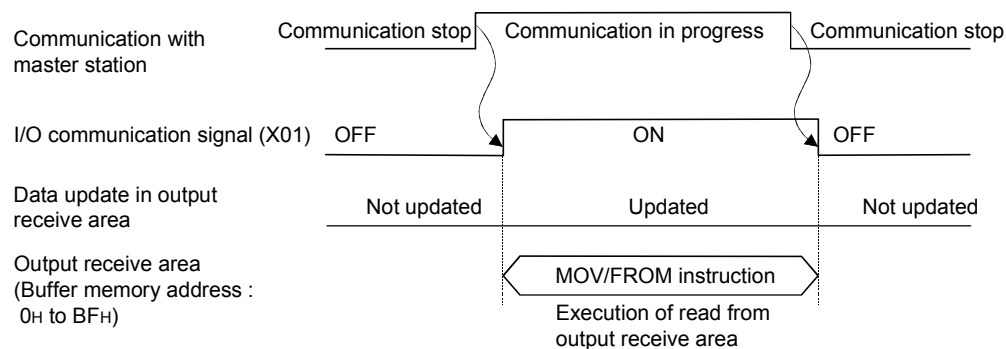
(2) I/O communication signal (X01)

- (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)

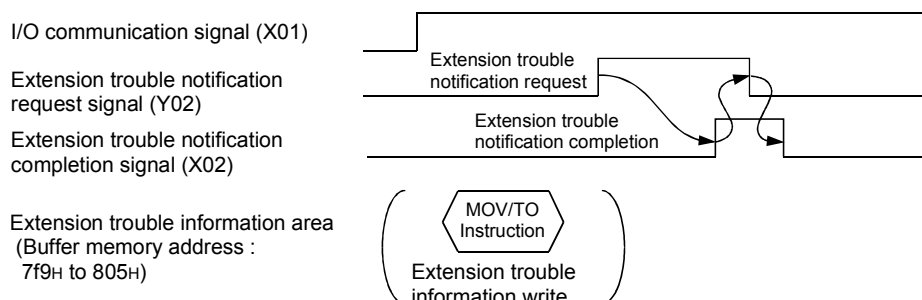
The communication watchdog timer setting can be confirmed in the "Current communication watchdog timer value (buffer memory address: 8D1H)" of the QJ71PB93D.

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



(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).

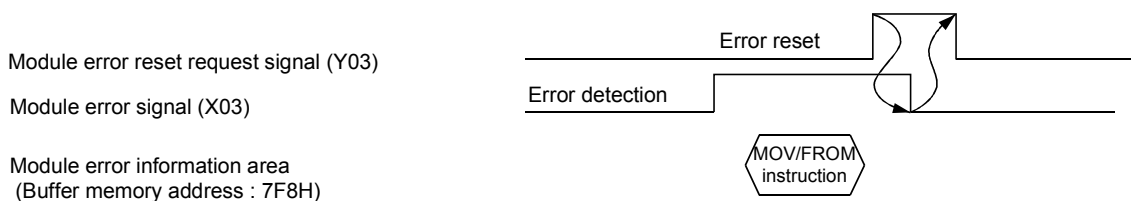


POINT

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.



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.

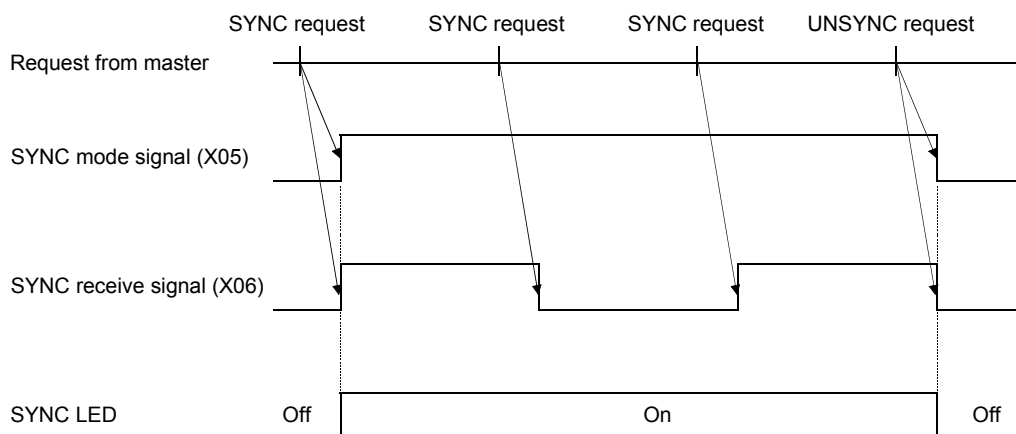
However, if the communication watchdog timer setting in the master station side parameters is "invalid", the SYNC mode signal (X05) does not turn off since a communication time-out error does not occur. (The output data in the output receive area is held.)

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.

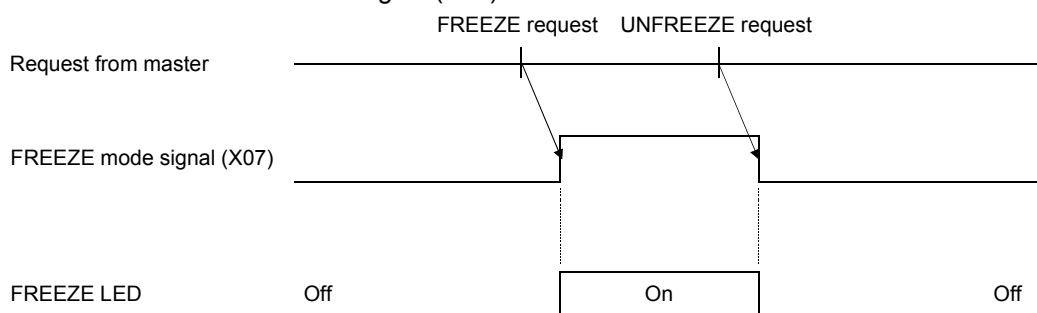
However, if the communication watchdog timer setting in the master station side parameters is "invalid", the SYNC receive signal (X06) does not turn off since a communication time-out error does not occur. (The output data in the output receive area is held.)

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.

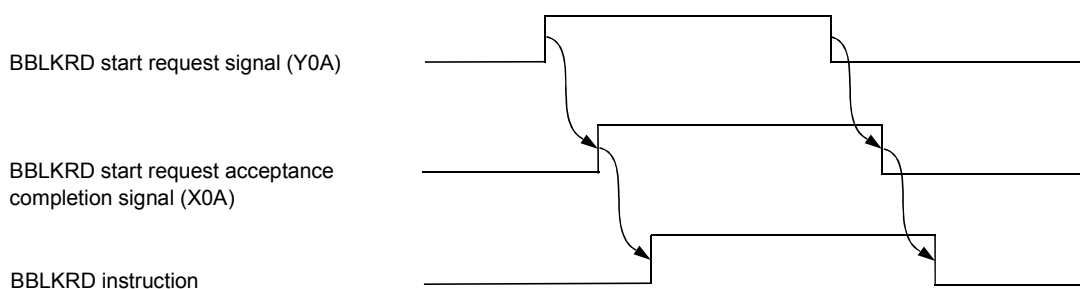
However, if the communication watchdog timer setting in the master station side parameters is "invalid", the FREEZE mode signal (X07) does not turn off since a communication time-out error does not occur. (The output data in the output receive area is held.)

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)

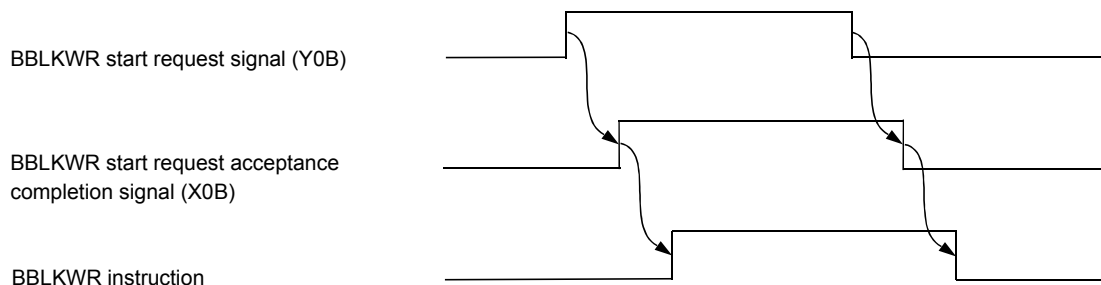
- (a) This signal is used as an interlock condition signal to execute the dedicated instruction BBLKRD.
- (b) When the BBLKRD start request signal (Y0A) is turned on in the sequence program, the BBLKRD start request acceptance completion signal (X0A) turns on.
- (c) When the BBLKRD start request signal (Y0A) is turned off in the sequence program, the BBLKRD start request acceptance completion signal (X0A) also turns off.



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

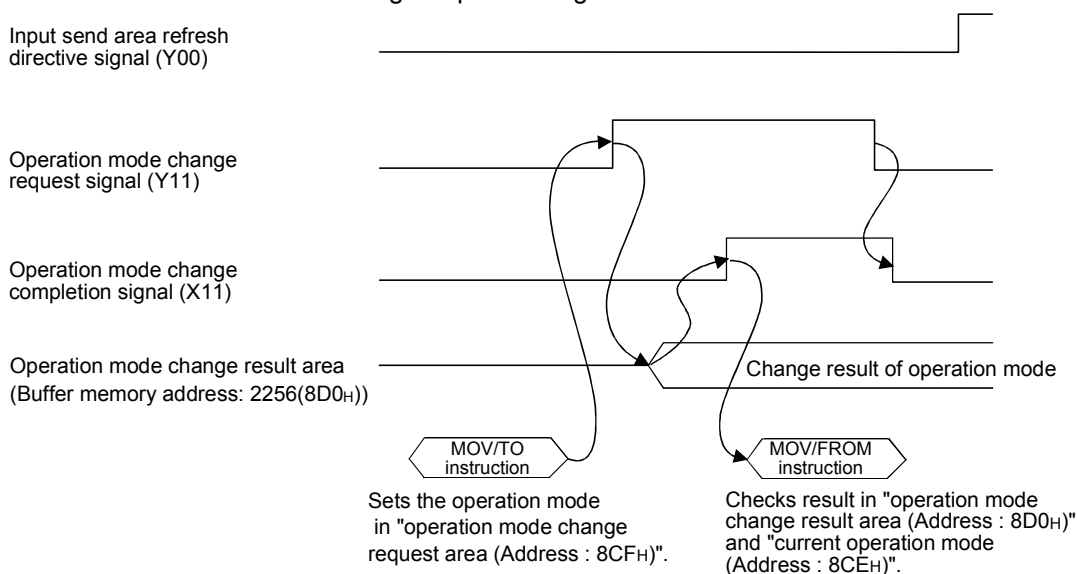
- (a) This signal is used as an interlock condition signal to execute the dedicated instruction BBLKWR.
- (b) When the BBLKWR start request signal (Y0B) is turned on in the sequence program, the BBLKWR start request acceptance completion signal (X0B) turns on.

- (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.



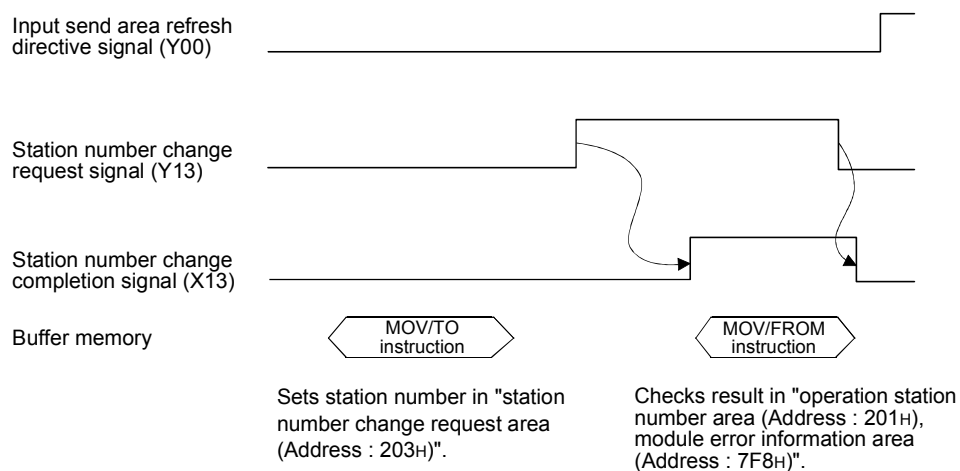
(10) Operation mode change completion signal (X11)

- (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.



(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.

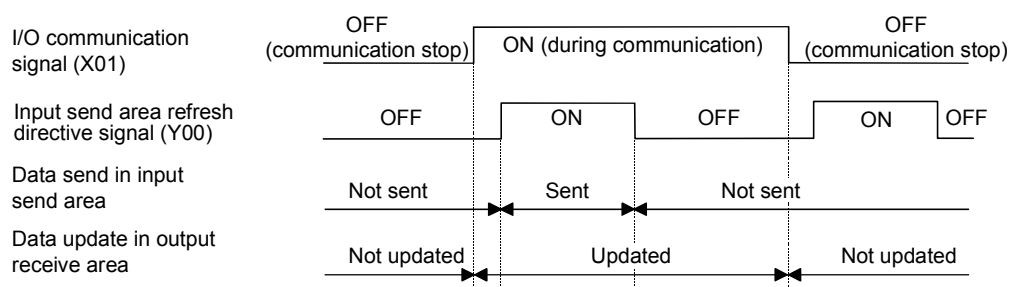


(12) Module READY signal (X1D)

- (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.



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	When X01 is OFF, no data is sent from the Master station's input area to the QJ71PB93D's input send area, and the output receive area is not updated.
ON	ON	When both X01 and Y00 are ON, data is sent from the Master station's input area to the QJ71PB93D's input send area, and the output receive area is updated with data from the Master station's output area.
	OFF	When X01 is ON and Y00 is OFF, 0 data is sent from the Master station's input area to the QJ71PB93D's input send area, but the output receive area is still updated with data from the Master station's output 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: 7F9H to 805H) 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: 7F8H).
- (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			
0 _H	0	Output receive area	Stores the output data received from the master station. (Max. usable range 122 words)	Read
BF _H	191			
C0 _H	192	System area (Use prohibited)	—	—
FF _H	255			
100 _H	256	Input send area	Used to set the input data to be sent to the master station. (Max. usable range 122 words)	Read/Write
1BF _H	447			
1C0 _H	448	System area (Use prohibited)	—	—
1FF _H	511			
200 _H	512	Operation baud rate	Stores the baud rate in current operation.	Read
201 _H	513	Operation station number	Stores the station number in current operation.	Read
202 _H	514	Station number set on flash ROM	Stores the station number saved on the flash ROM.	Read
203 _H	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
204 _H	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
205 _H	517	System area (Use prohibited)	—	—
7F7 _H	2039			
7F8 _H	2040	Module error information	Stores the error code detected by the QJ71PB93D.	Read
7F9 _H	2041	Extension trouble information area	Used to set the extension trouble notification data to the master station.	Read/Write
805 _H	2053			
806 _H	2054	System area (Use prohibited)	—	—
8CD _H	2253			
8CE _H	2254	Current operation mode	Stores the operation mode in current operation.	Read
8CF _H	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
8D0 _H	2256	Operation mode change result	Stores the result of changing the operation mode in response to the operation mode change request signal (Y11).	Read
8D1 _H	2257	Current communication watchdog timer value	Stores the communication watchdog timer value in current operation.	Read
8D2 _H	2258	Self-diagnostic status type code display area	Stores the diagnostic status type code at the time of self-diagnostics.	Read
8D3 _H	2259	Swapping function setting status	Stores the setting status of the swapping function in current operation.	Read
8D4 _H	2260	System area (Use prohibited)	—	—
8DF _H	2271			
8E0 _H	2272	Output receive area used status	Stores the current used status of the output receive area.	Read
8EB _H	2283			
8EC _H	2284	System area (Use prohibited)	—	—
8EF _H	2287			
8F0 _H	2288	Input send area used status	Stores the current used status of the input send area.	Read
8FB _H	2299			
8FC _H	2300	System area (Use prohibited)	—	—
AFF _H	2815			

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 0H to BFH: 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 100H to 1BFH: 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 200H: Un\G512)

Stores the baud rate in current operation.

Baud Rate	Stored Value
Baud rate not yet recognized	0000H
9.6 kbps	96E2H
19.2 kbps	19E3H
45.45 kbps	45E3H
93.75 kbps	93E3H
187.5 kbps	18E4H
500 kbps	05E5H
1.5 Mbps	15E5H
3 Mbps	03E6H
6 Mbps	06E6H
12 Mbps	12E6H

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 201H: 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 b8 b7 b6 b5 b4 b3 b2 b1 b0
	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 to 125). (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 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)

7F9 _H	Data length
7FA _H	Extension trouble information
?	
805 _H	

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).

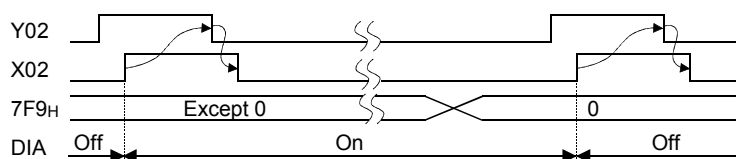
(b) When extended trouble is removed

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)

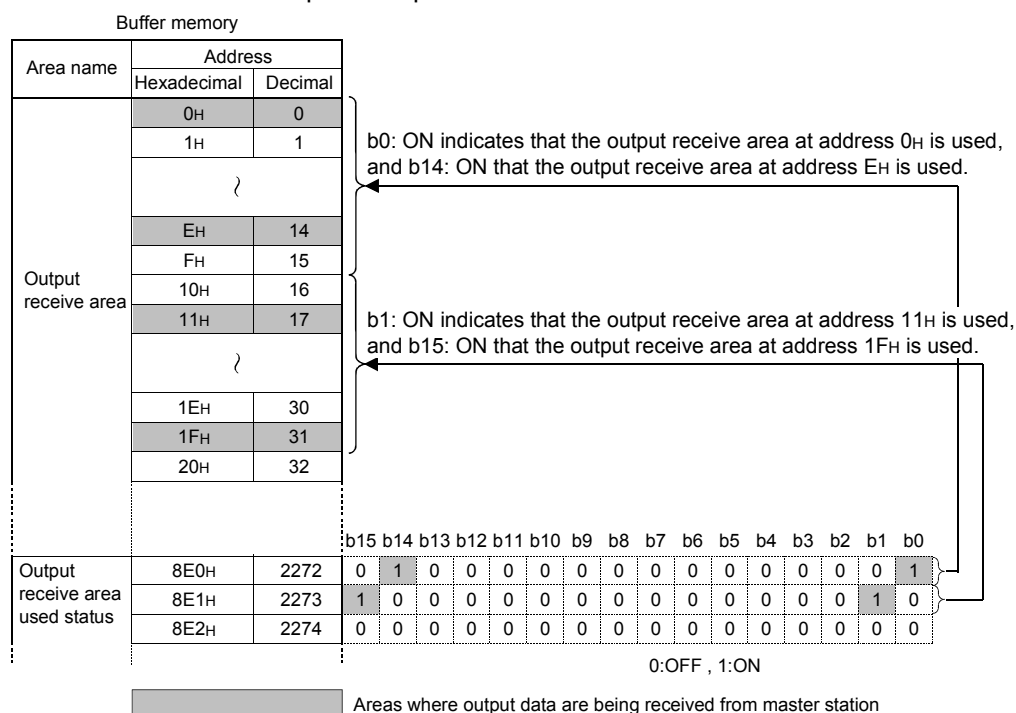
Stores the used status of the output receive area.

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	BDH	BBH	BAH	B9H	B8H	B7H	B6H	B5H	B4H	B3H	B2H	B1H	B0H

• Example of output receive area used status



(17) Input send area used status

(buffer memory address 8F0H to 8FBH: Un\G2288 to Un\G2299)

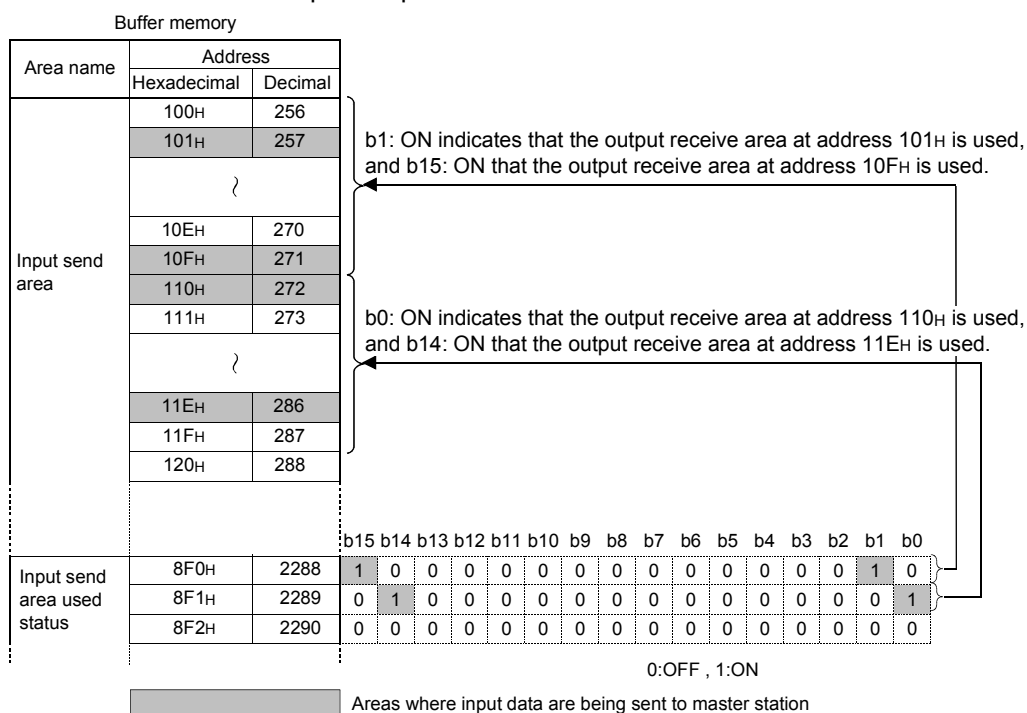
Stores the used status of the input send area.

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



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) Changing the operation mode

Set the operation mode using the operation mode change request area (Buffer memory address: 8CFH) and the operation mode change request signal (Y11).

REMARKS

Refer to Section 5.6 for how to change the operation mode.

4 FUNCTIONS

4.1 Functions for Communication with Class 1 Master

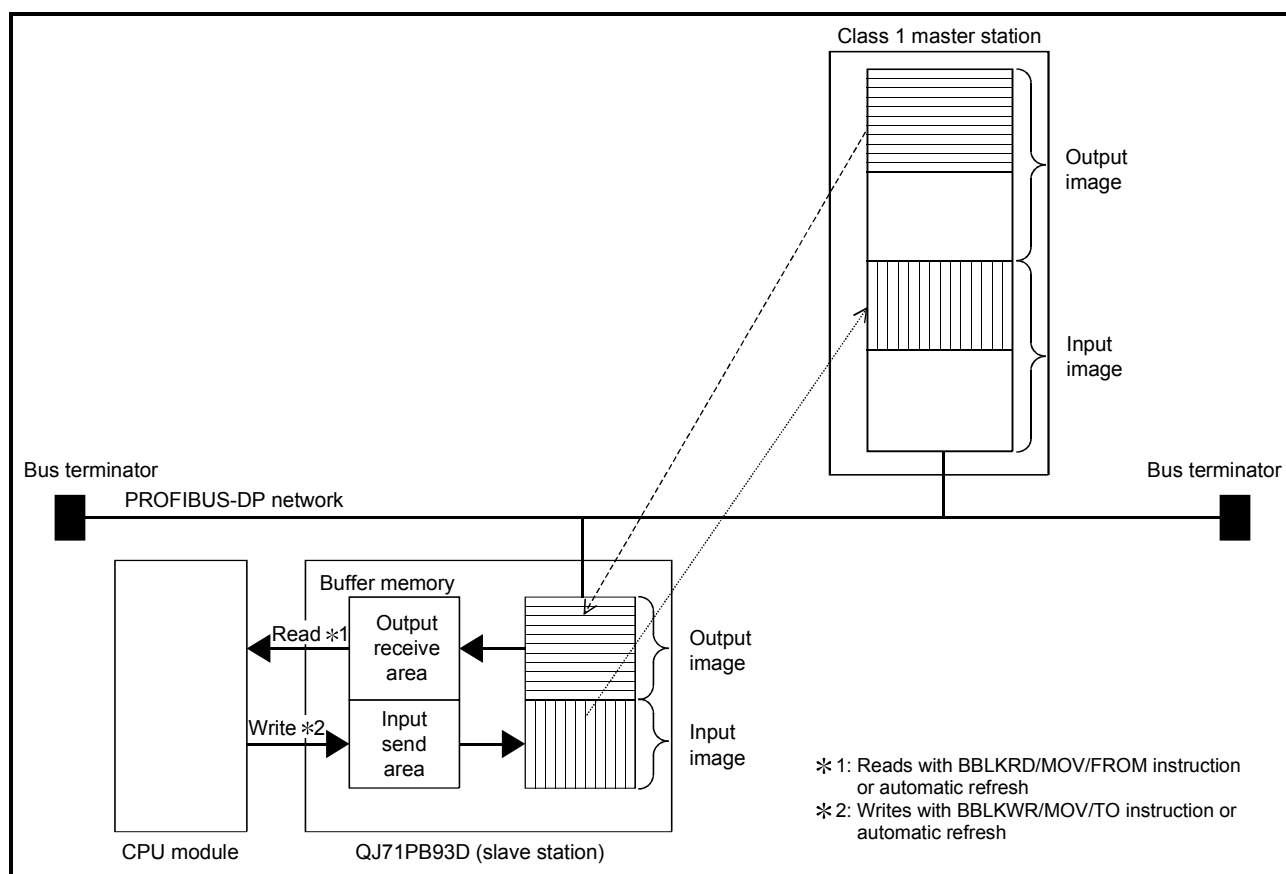
This section explains the functions provided for communication between the QJ71PB93D and class 1 master station.

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	} Max. 192 words in total
Output data : Max. 122 words	



(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

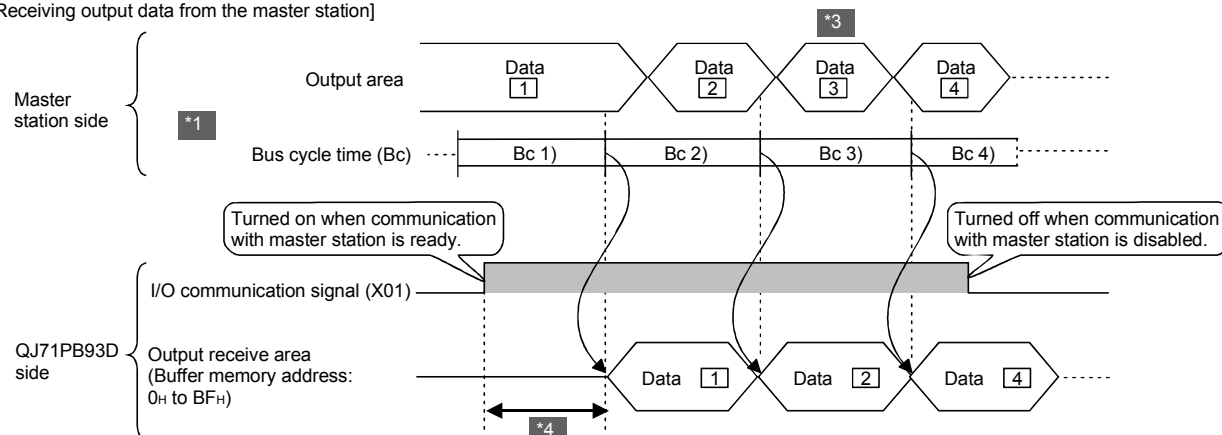
(2) Sending/receiving I/O data

The sending and receiving process is described below.

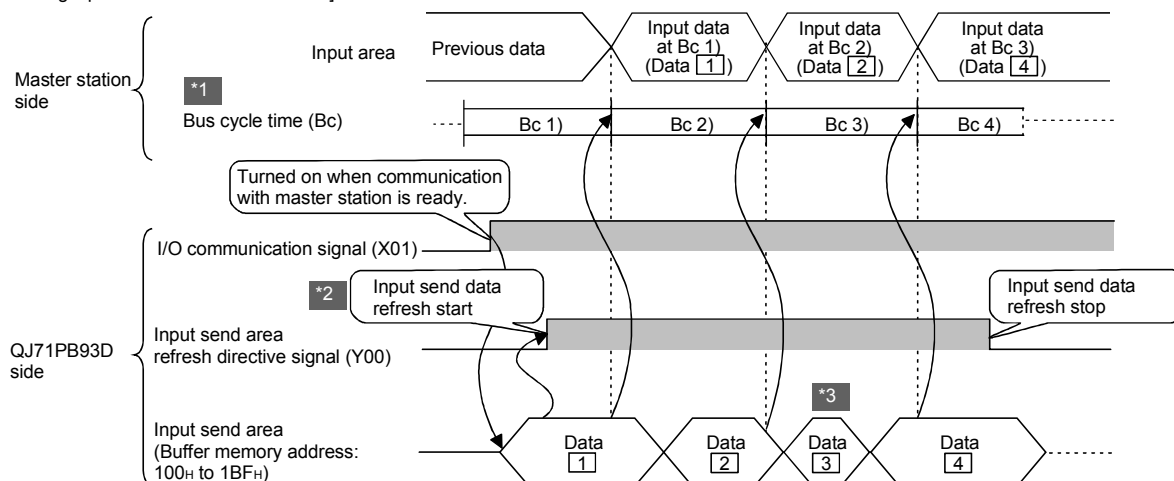
- (a) The I/O communication signal (X01) turns on when the QJ71PB93D is ready to communicate with the master station.
- (b) When the I/O communication signal (X01) turns on, data output from the master station are stored into the output receive area (Buffer memory address: 0H to BFH).
- (c) When sending 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.

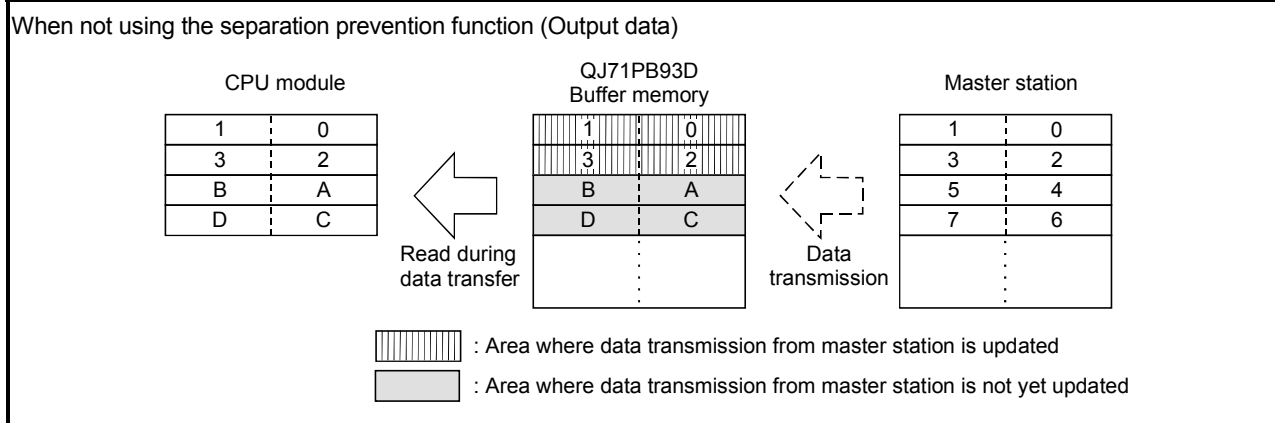
*4: Transmission delay equal to 1 bus cycle time occurs to read the data in the output receive area after X01 turns on.

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

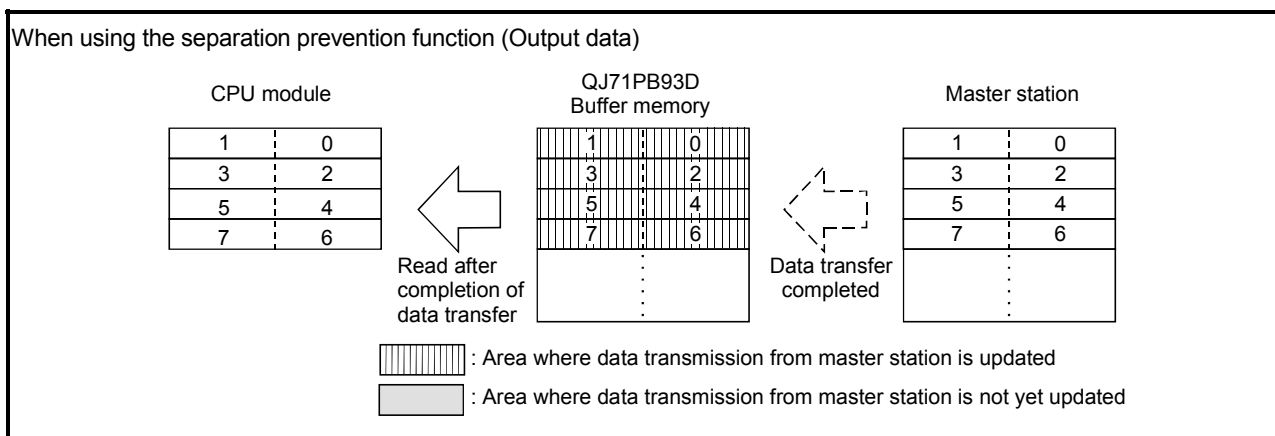
The I/O data separation prevention function is a function to prevent the I/O data of the CPU module from being unmatched with the I/O data of the master station.

The following shows an example of output data separation.



(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.



(2) How to prevent data inconsistency

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

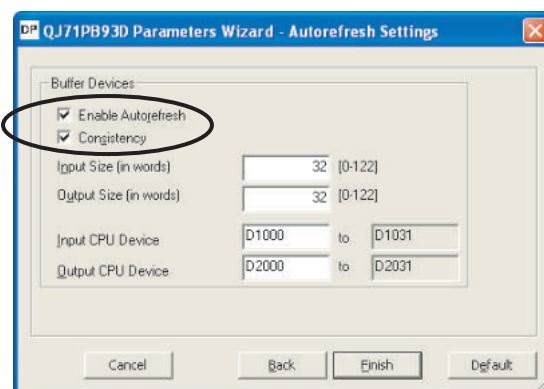
This function is not available when the MOV or FROM/TO instruction is used for buffer memory reading/writing.

(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 Autorefresh” and “Consistency” boxes in the “Buffer Devices” area on the parameter setting window.

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.)

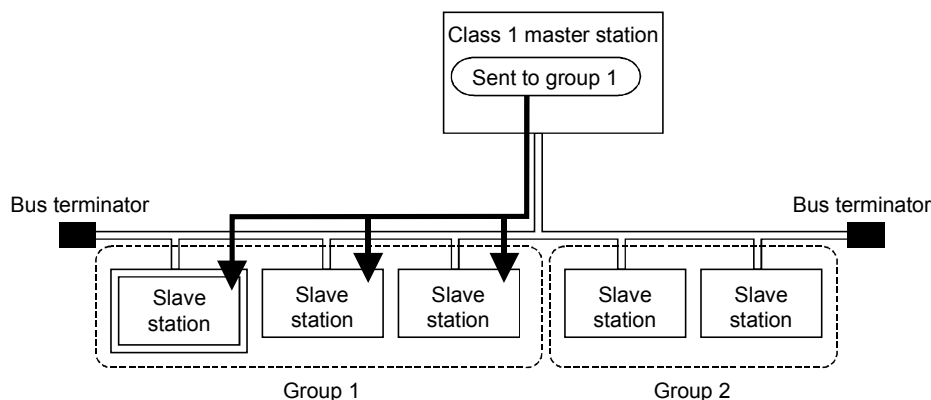
They can be executed when the separation prevention function is disabled in the automatic refresh setting.

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.)



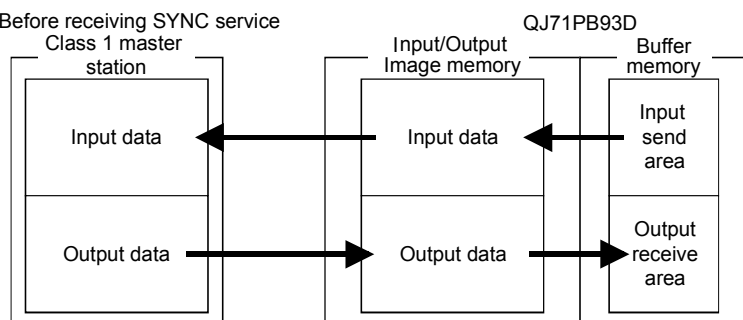
(1) Global control services available for QJ71PB93D

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

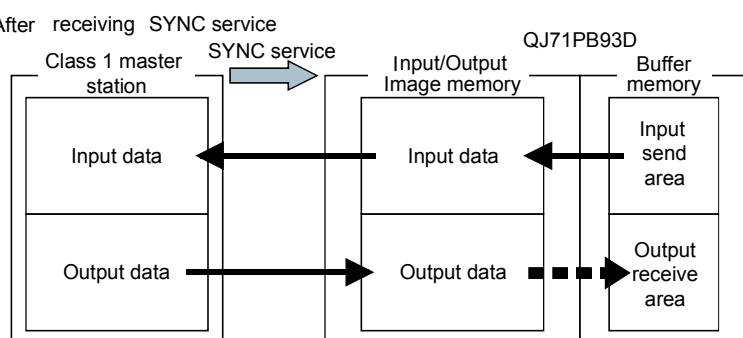
Service name	Description
SYNC	Starts the SYNC (output synchronization) mode. During the SYNC mode, the output status is refreshed every time the SYNC service is received. The output status is held as long as the SYNC service is not received.
UNSYNC	Ends the SYNC (output synchronization) mode.
FREEZE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



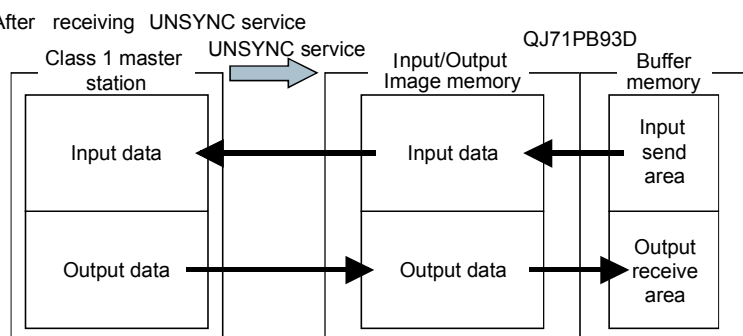
- Upon reception of the SYNC service, the SYNC mode is started and refresh from the output data area to the output receive area is stopped.

- 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

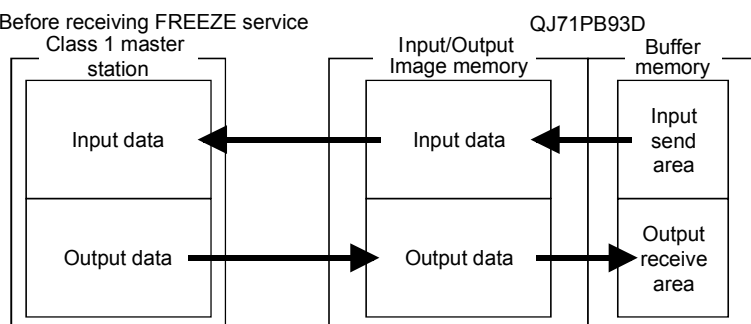


- Upon reception of the UNSYNC service, the SYNC mode is terminated and refresh from the output data area to the output receive area is restarted.

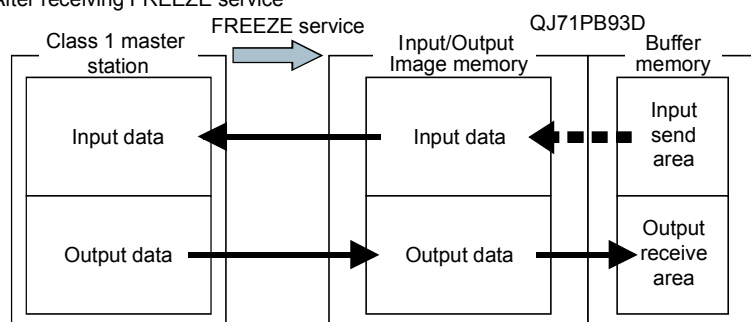
- When the UNSYNC service is received and the SYNC mode is ended, the SYNC LED of the QJ71PB93D turns off.

(b) When receiving FREEZE and UNFREEZE services

1) Before receiving FREEZE service



2) After receiving FREEZE service



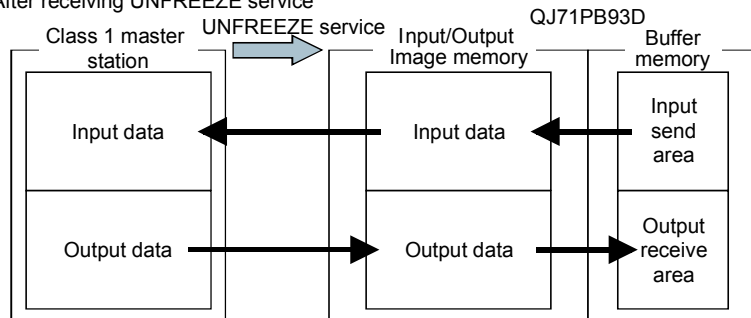
- Upon reception of the FREEZE service, the FREEZE mode is started and refresh from the input send area to the input data area is stopped.

- 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.

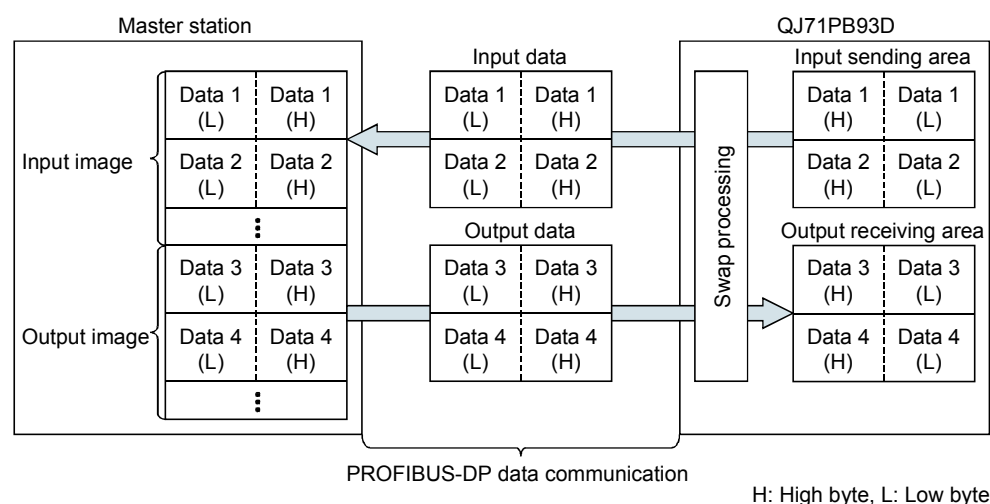
Use this function when the used master station handles the high and low bytes of word data in reverse to those of the QJ71PB93D.

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

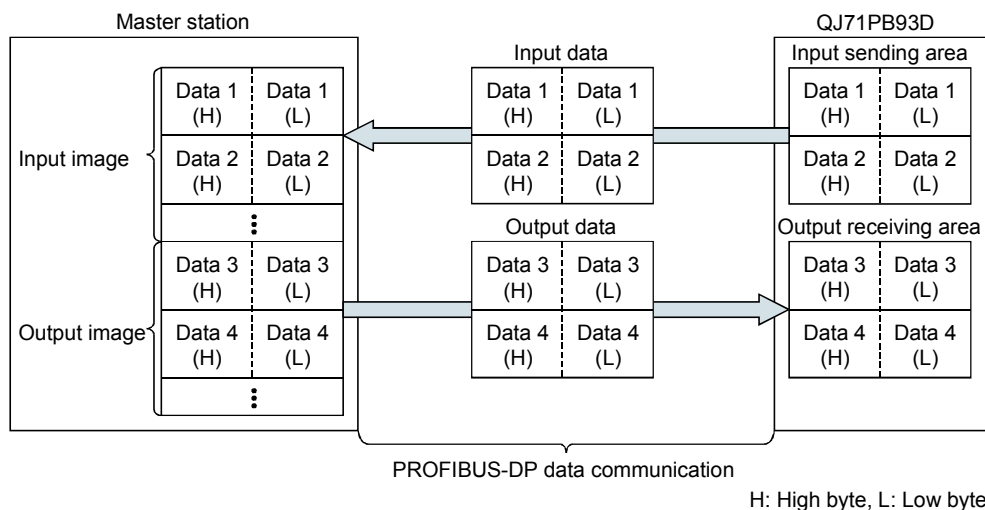
The swap function setting changes depending on the master station type as described below.

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

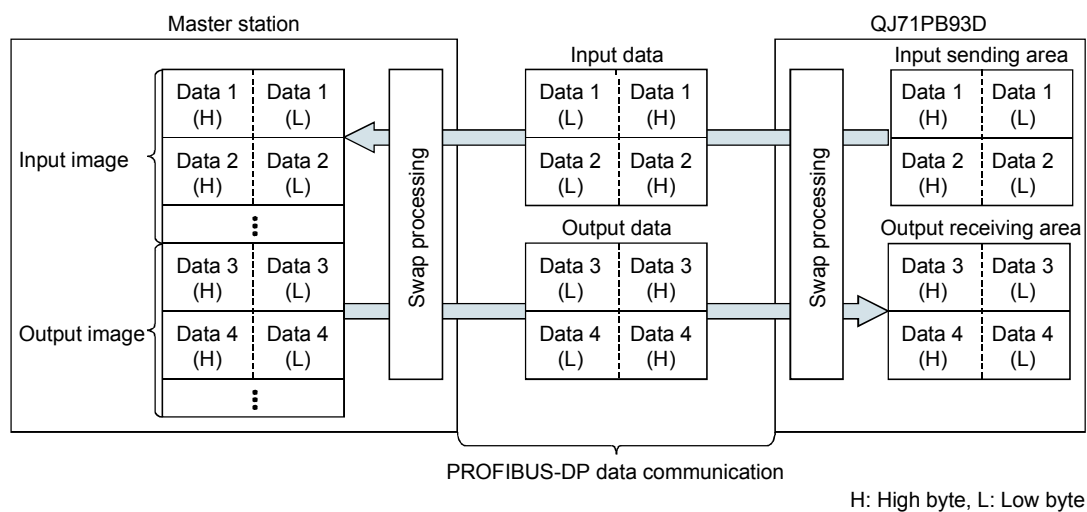
(b) Operation outline

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

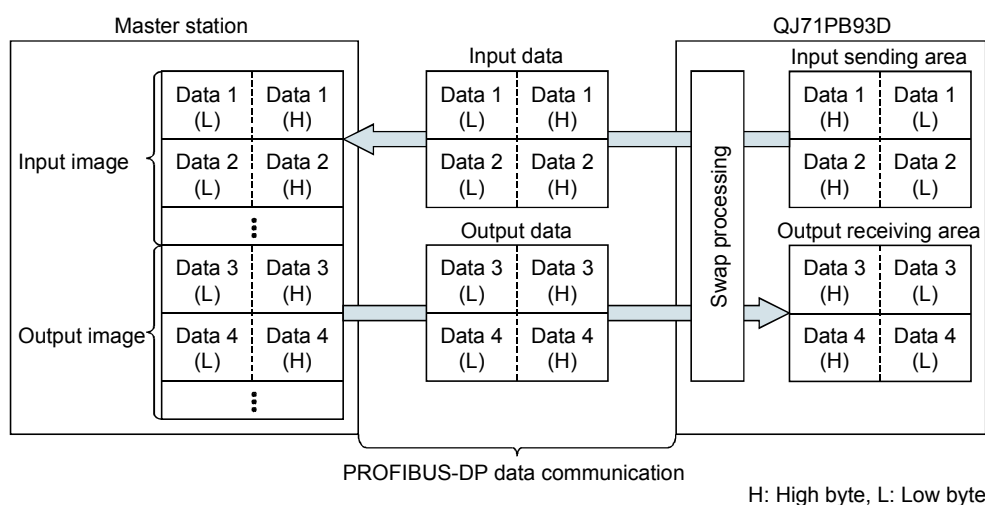
- 1) When the master station is the QJ71PB92V/QJ71PB92D/
A1SJ71PB92D/AJ71PB92D (not swapped)



- 2) When the master station is the QJ71PB92V/QJ71PB92D (swapped)



- 3) When high and low bytes of word data are reversed (swap) between the master station and the QJ71PB93D

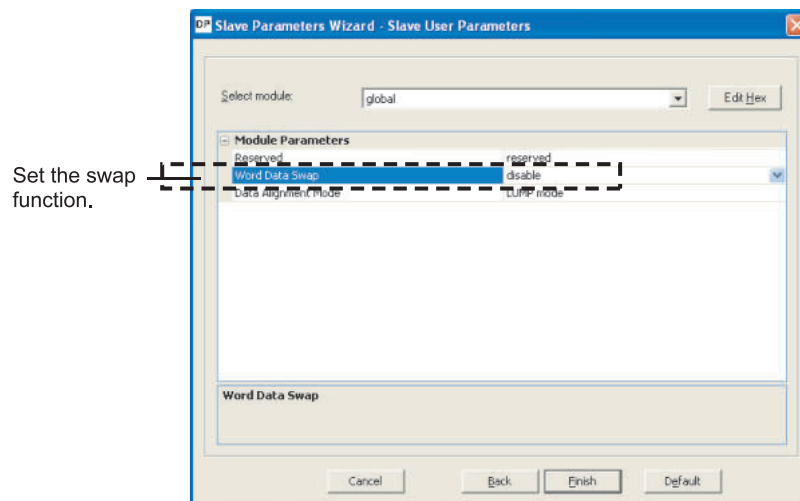


(c) How to set the swap function

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



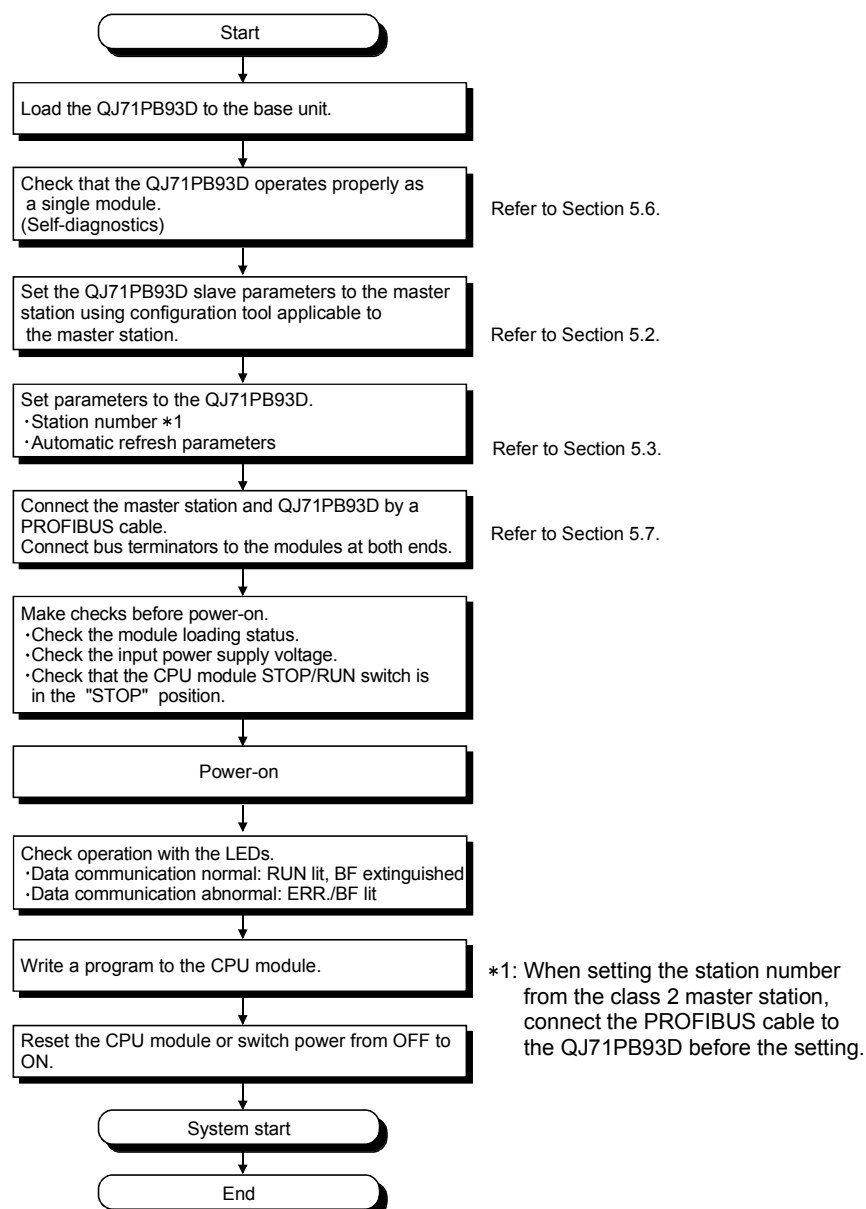
REMARKS

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 SETTINGS AND PROCEDURES BEFORE SYSTEM OPERATION

5.1 Procedures before Operation

The following diagram illustrates the procedure before system operation.



5.2 Parameter Setting to Master Station

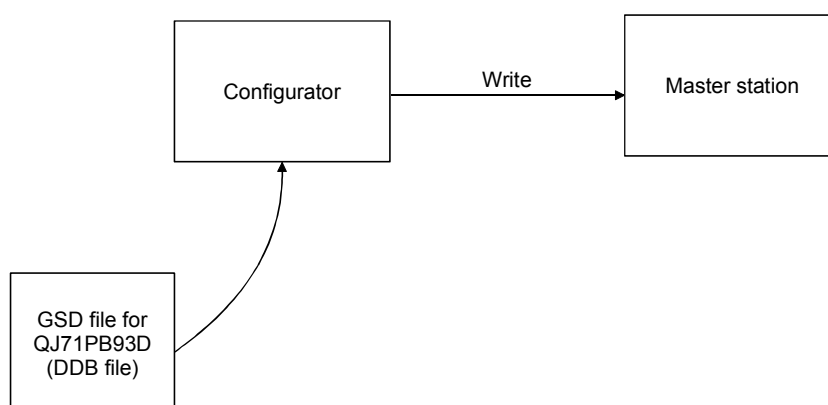
In PROFIBUS-DP systems, slave parameters for the QJ71PB93D must be set to the master station.

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	—
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

(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 Mitsubishi 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	}	Total max. 192 words
Output data: Max. 122 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.

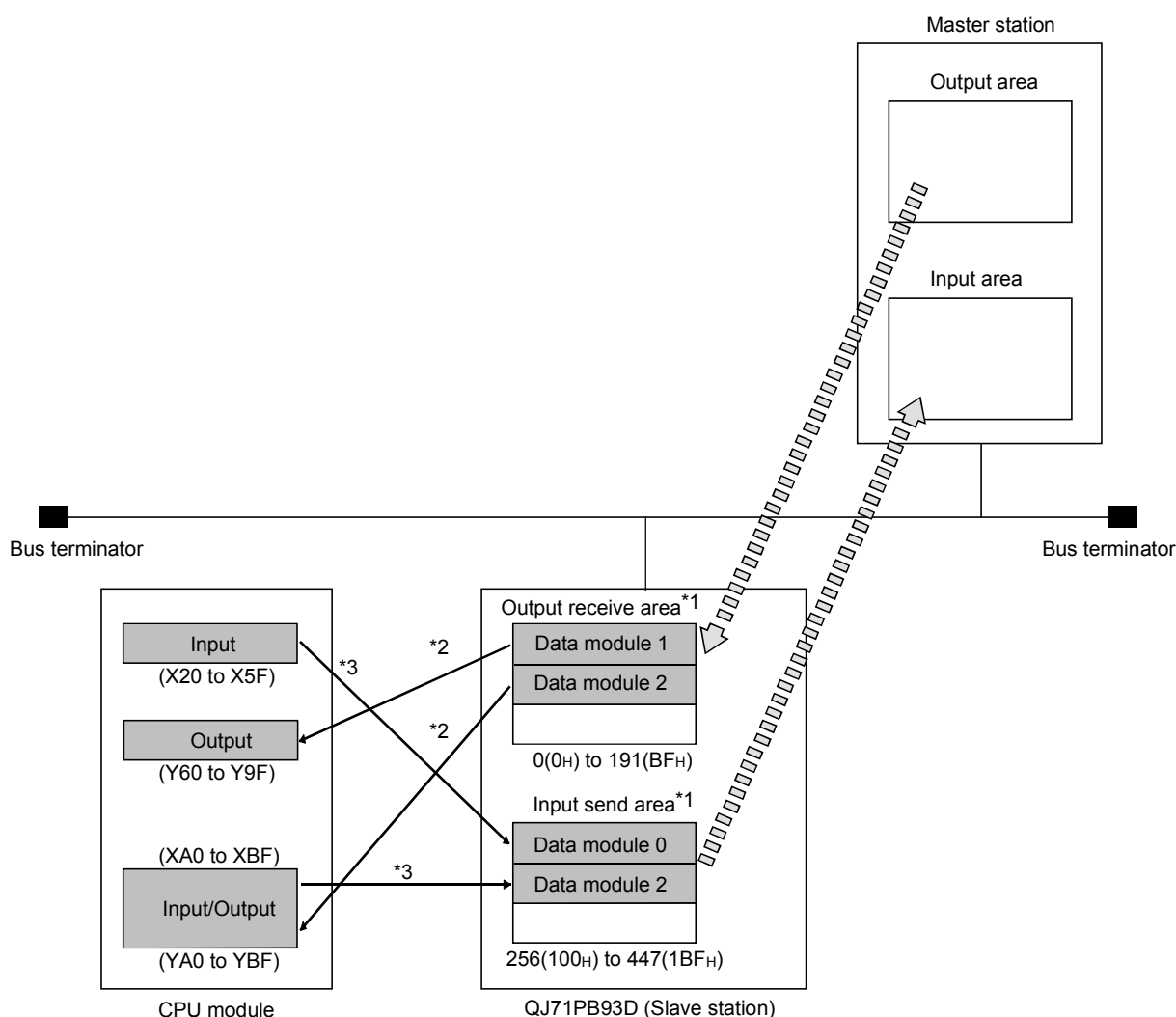
(a) Total data size

The total data size of the data modules 0 to 2 is as follows.

- Input data size: Data module 0 (input, 4 words)
+ data module 2 (input, 2 words)
= 6 words
- Output data size: Data module 1 (output, 4 words)
+ data module 2 (output, 2 words)
= 6 words
- Total data size: Input data 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.

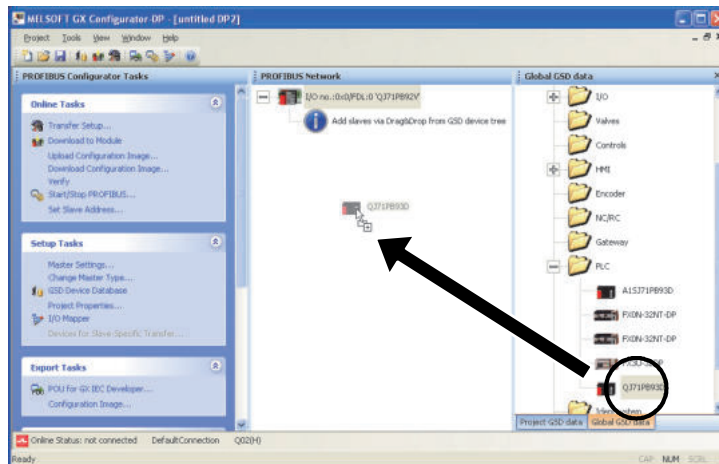
*3: Writes with BBLKWR/MOV/TO instruction or automatic refresh.

(4) Setting method when using GX Configurator-DP

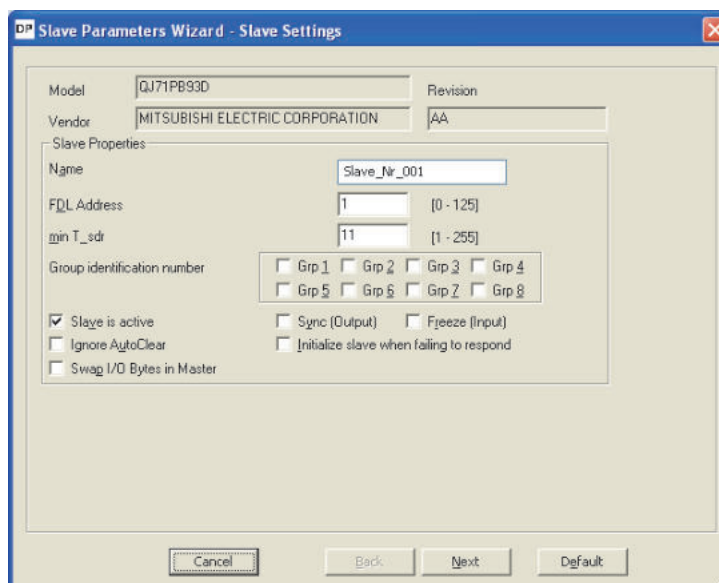
This section describes how to make setting from GX Configurator-DP.

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

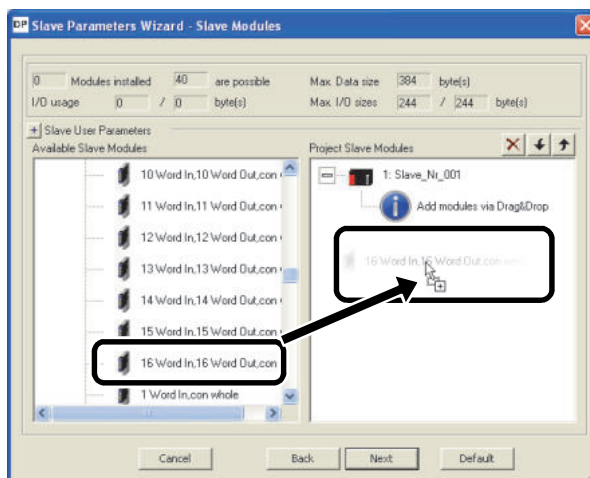
- 1) Drag the "QJ71PB93" in the "Global GSD data" window to the "PROFIBUS Network" window.



- 2) Click the **Next** button in the "Slave Settings" window.



- 3) Set the I/O configuration of the slave station in the "Slave Modules" window.



- 4) Write the configured parameters to 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	

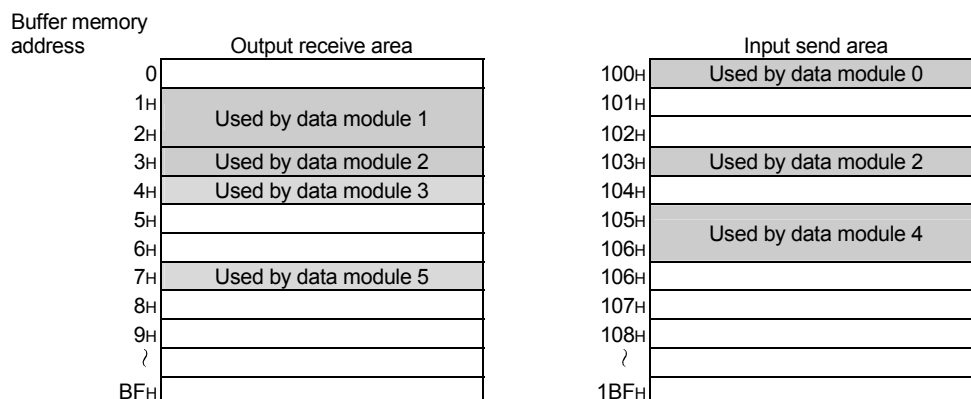
(1) Data assignment modes

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.

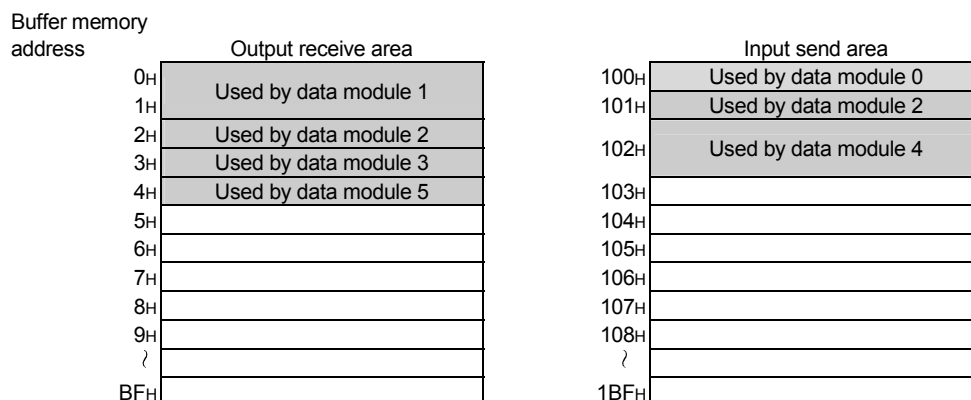


(b) LUMP mode (Default)

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.



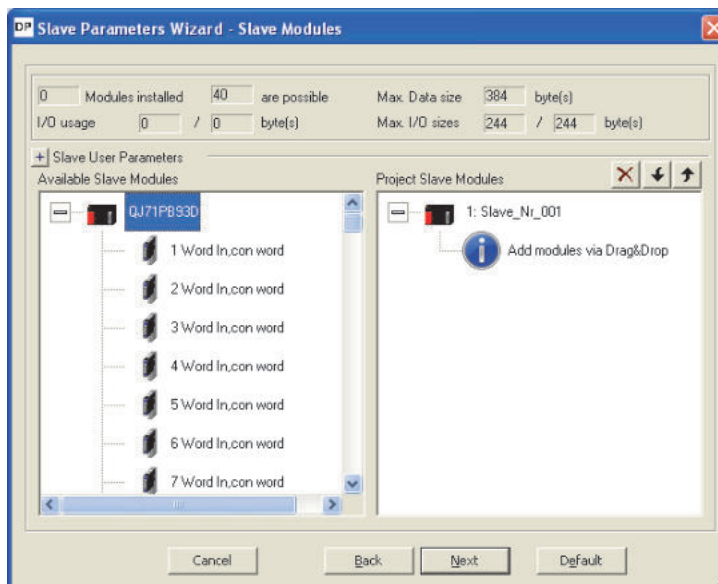
(2) Setting method when using GX Configurator-DP

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

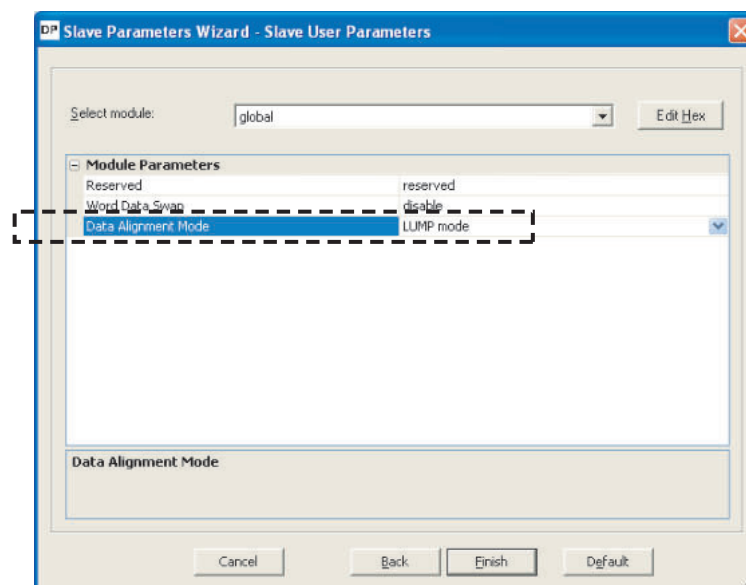
When using another configuration tool, refer to the relevant manual.

- 1) Open the "Slave Modules" window (refer to Section 5.2.1 (4)).

Click the **Next** button.



- 2) Set a mode for the "Data Alignment Mode" in the "Slave User Parameters" window.



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.

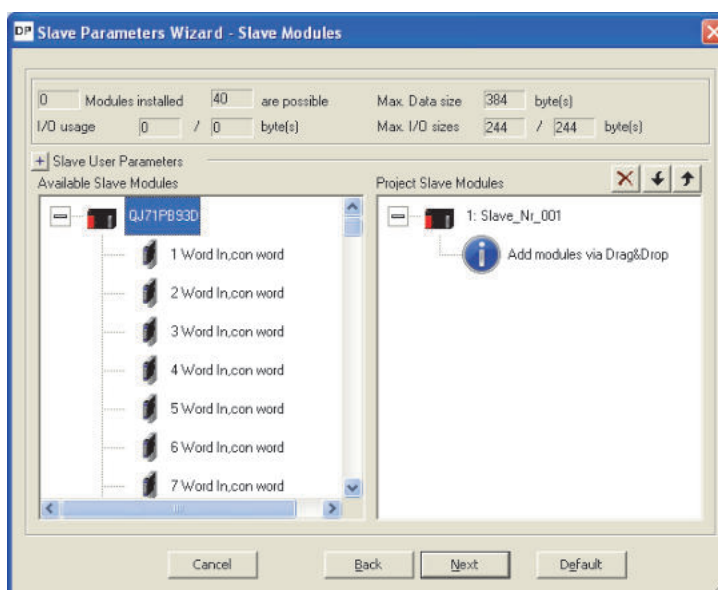
5.2.3 Swap setting

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

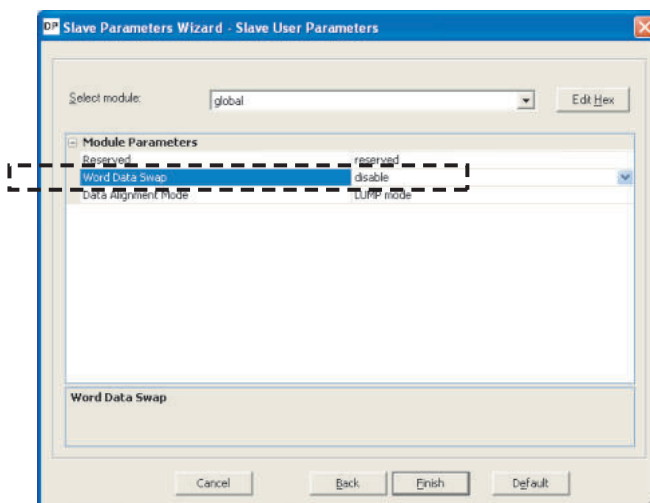
(1) Setting method when using GX Configurator-DP

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

- 1) Open the "Slave Modules" window (refer to Section 5.2.1(4)).
Click the **Next** button.



- 2) Configure the setting for "Word Data Swap" in the "Slave User Parameters" window.



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

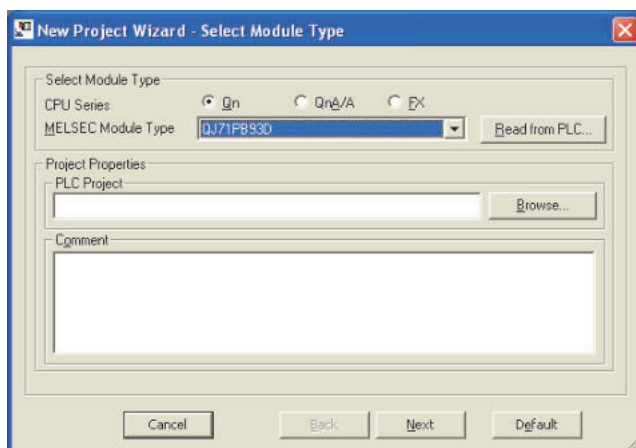
The following explains the procedure for setting the FDL address (station number) and automatic refresh parameters using GX Configurator-DP.

Refer to the GX Configurator-DP Operating Manual for usage of GX Configurator-DP.

(1) Setting procedure

- 1) Select [Project] → [New] in GX Configurator-DP.

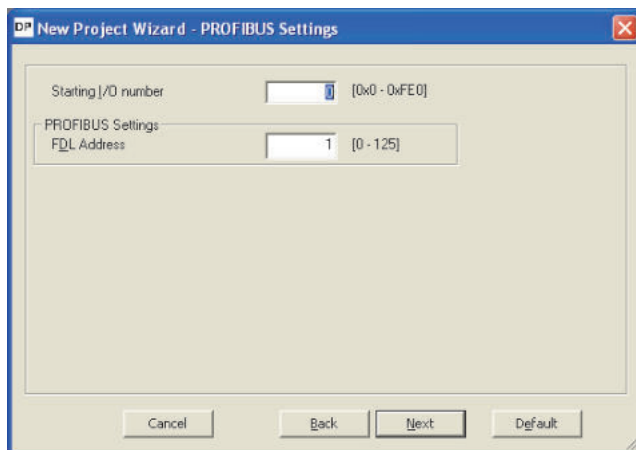
- 2) Select "QJ71PB93D" in the "Select Module Type" window and click the **Next** button.



Item	Description
CPU Series	Qn
MELSEC Module Type	QJ71PB93D

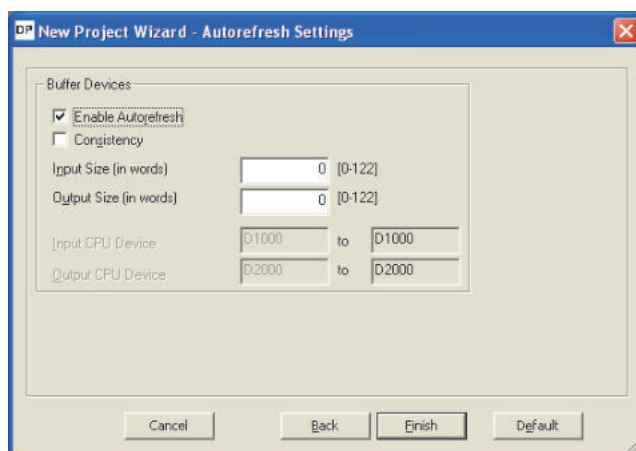
When automatic refresh of the other intelligent function module is set, set the project file of GX Developer or GX IEC Developer to "PLC Project".
(Refer to the GX Configurator-DP Version7 Operating Manual.)

- 3) Set the station number as follows and click the **Next** button.



Item	Description
Starting I/O number	Set the starting I/O number of the slave module with three digits. • Setting range: 000 _H to FE0 _H (default: 000 _H)
FDL Address	Set the FDL address (station number). • Setting range: 0 to 125 (default: 1)

- 4) Set the auto refresh parameter as follows and click the **Finish** button.

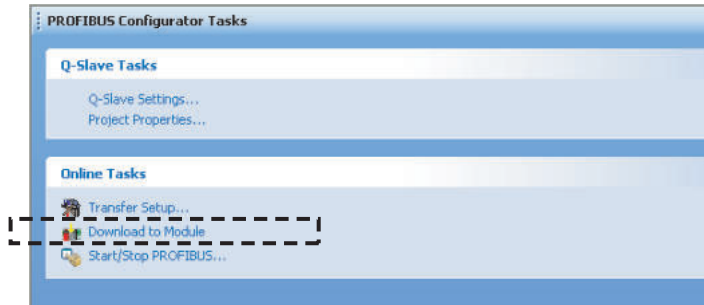


Item	Description
Enable Autorefresh	Check to enable the automatic refresh of device in the QCPU module and buffer memory areas in the slave module (default: checked). • Unchecked: automatic refresh is disabled. • Checked: automatic refresh is enabled.
Consistency	Check to enable the separation prevention at the time of automatic refresh (default: unchecked). For details of the separation prevention, refer to Section 4.1.2. • Unchecked: separation prevention is disabled. • Checked: separation prevention is enabled.
Input Size (In words)	Set the number of words of the data to be transferred from the slave module to the QCPU module (default: 0). • Setting range: 0 to 122
Output Size(In words)	Set the number of words of the data to be transferred from the QCPU module to the slave module (default: 0). • Setting range: 0 to 122
Input CPU Device	Set the data storage device when transferring the data in the output receive area of the slave module to the QCPU module (default: D1000). The value of this item can be set when the setting value of "Input Size" is 1 or more.
Output CPU Device	Set the data storage device when transferring the data of the QCPU module to the input send area of the slave module (default: D2000). The value of this item can be set when the setting value of "Output Size" is 1 or more.

(2) Writing the configured parameters

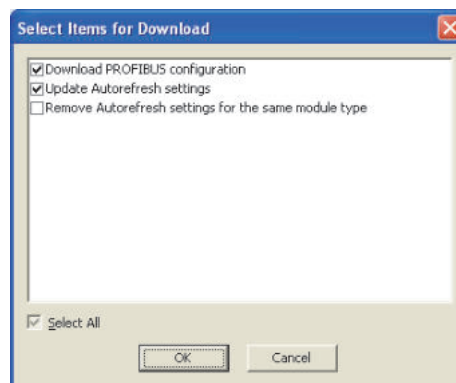
Write the configured parameters to the CPU module with the following steps.

- 1) Select the "Download to Module" in the "Task Panel".



- 2) Select the "Download PROFIBUS configuration" in the "Select Items for Download" window.

When automatic refresh parameter is set, check also "Update Autorefresh settings"



- 3) Click **OK** to write the parameters to the CPU module.
- 4) When automatic refresh parameters are set, automatic refresh will be enabled by powering off and on the programmable controller or by resetting the CPU module.

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

Automatic refresh parameters written in the CPU module can be checked in the "Autorefresh Settings" window in GX configurator-DP.

(4) Number of automatic refresh parameter

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 must not exceed the following limit.

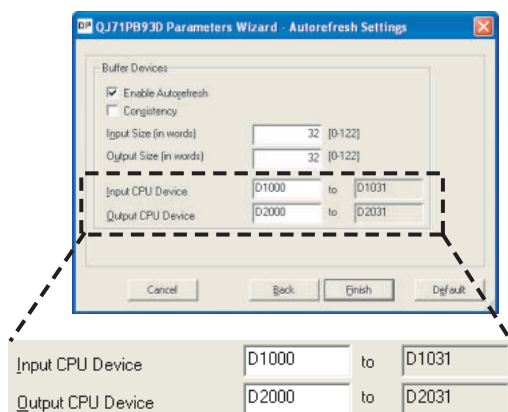
CPU Type	Max. No. of Auto-refresh Parameter
Q00J/Q00/Q01CPU	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	256
Q02PH/Q06PH/Q12PH/Q25PHCPU	256
Q12PRH/Q25PRHCPU	256
Q00UJ/Q00U/Q01UCPU	256
Q02UCPU	1024
Q03UD/Q04UDH/Q06UDH/Q10UDH/ Q13UDH/Q20UDH/Q26UDH/Q03UDV/ Q04UDV/Q06UDV/Q13UDV/Q26UDV/ Q03UDE/Q04UDEH/Q06UDEH/Q10UDEH/ Q13UDEH/Q20UDEH/Q26UDEH/Q50UDEH/ Q100UDEHCPU	2048
MELSECNET/H remote I/O station	256

(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 User's Manual (Hardware Design, Maintenance and Inspection) for the CPU module used.

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) A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, 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 within the following torque 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.

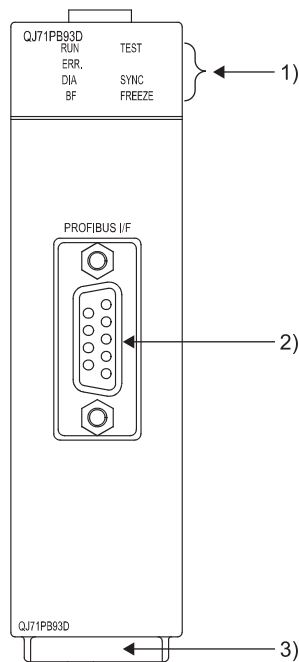
However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration or shock.

5.4.2 Installation environment

Refer to the User's Manual (Hardware Design, Maintenance and Inspection) for the CPU module used.

5.5 Part Names

This section explains the part names of the QJ71PB93D.



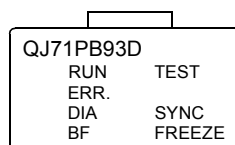
No.	Name	Description
1)	LED	Displays the QJ71PB93D status. (Refer to (1) in this section)
2)	PROFIBUS interface connector	Connector for connecting the cable for the PROFIBUS-DP network. *1
3)	serial number display	Displays the serial number on the rating plate.

*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 takes about 5 seconds to complete the self-diagnosis.

(1) Procedure for self-diagnosis

The procedure for self-diagnosis is as follows.

- 1) Set the CPU module to STOP.
- 2) Select [Online] → [Debug] → [Device test] from the menu of GX Developer.
- 3) Set 2_H (self-diagnosis mode) in the operation mode change request area (buffer memory address: 8CF_H).
- 4) Turn on the operation mode change request signal (Y11) to start the self-diagnosis automatically.
- 5) The TEST LED on the 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) Select [Online] → [Debug] → [Device test] from the menu of GX Developer.
- 2) Set 0_H (normal operation mode) in the operation mode change request area (buffer memory address: 8CF_H).
- 3) Turn on the operation mode change request signal (Y11).

(b) When completed abnormally

If the self-diagnostic result is an error, please consult your local Mitsubishi representative.

(4) Cautions

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

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

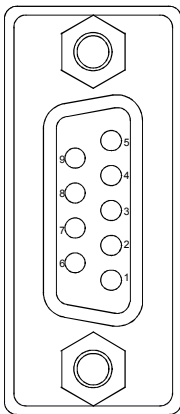
5.7 Wiring

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

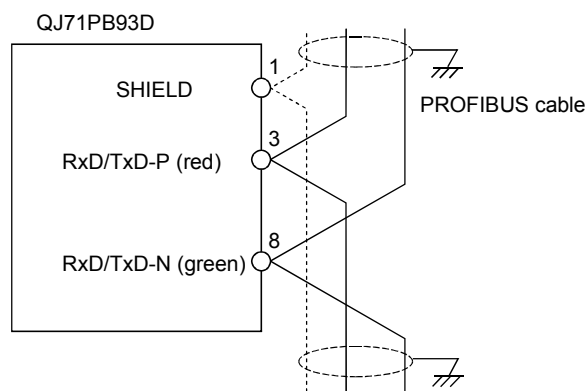
The following shows the PROFIBUS cable and wiring specifications.

(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 165Ω (f=3 to 20 MHz)
Capacity	Less than 30 pF/m
Conductor resistance	Less than 110Ω/km
Cross-sectional area	0.34mm ² or more
Wire diameter	22 AWG
Type	Stranded
Material	Copper
Temperature rating	60°C or more

(b) Wiring specifications

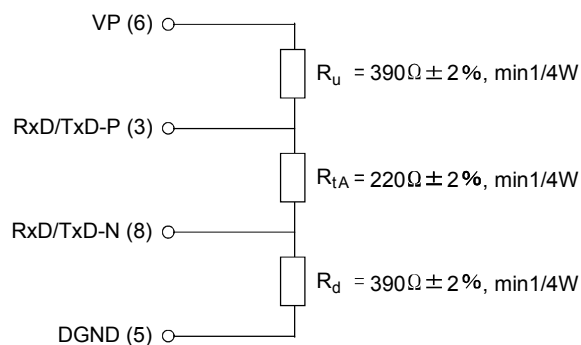


(3) Connector

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.



(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 : 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 are described below.

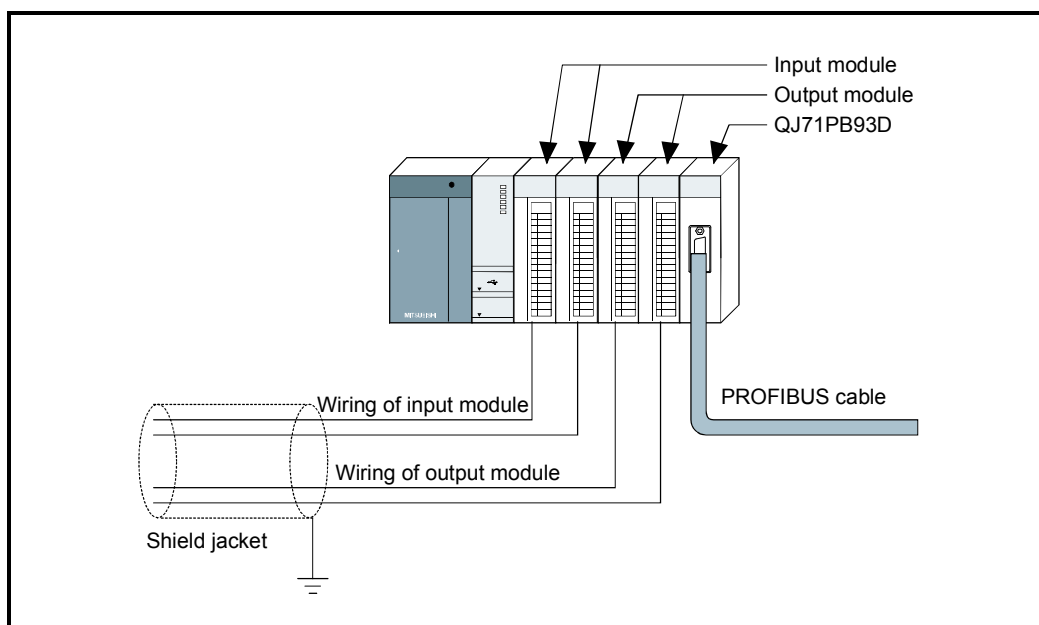
(1) Communication cable wiring

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.

[illegible]

6 TRANSMISSION DELAY TIME

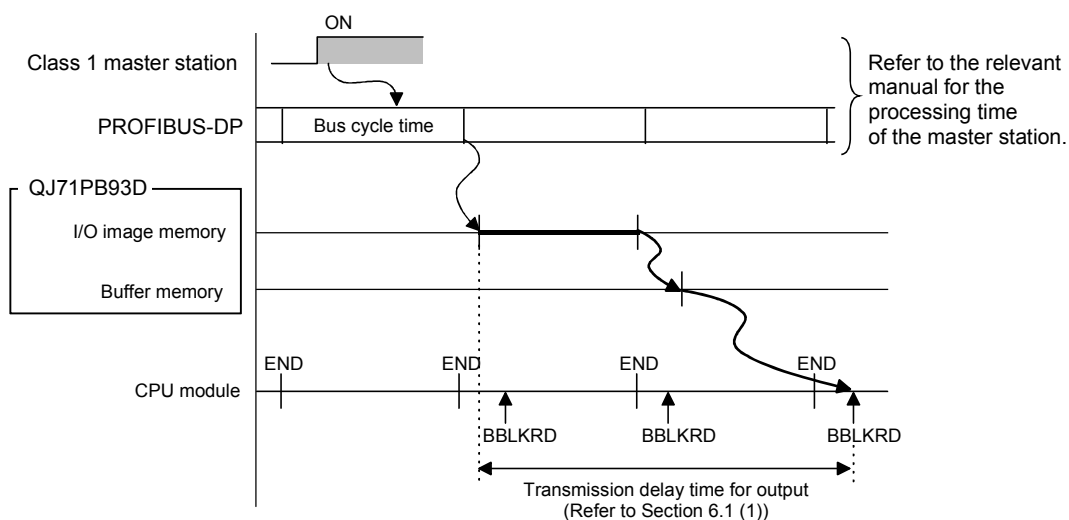
This section explains the processing time of the QJ71PB93D.

Communication processing between the master station and QJ71PB93D is shown below.

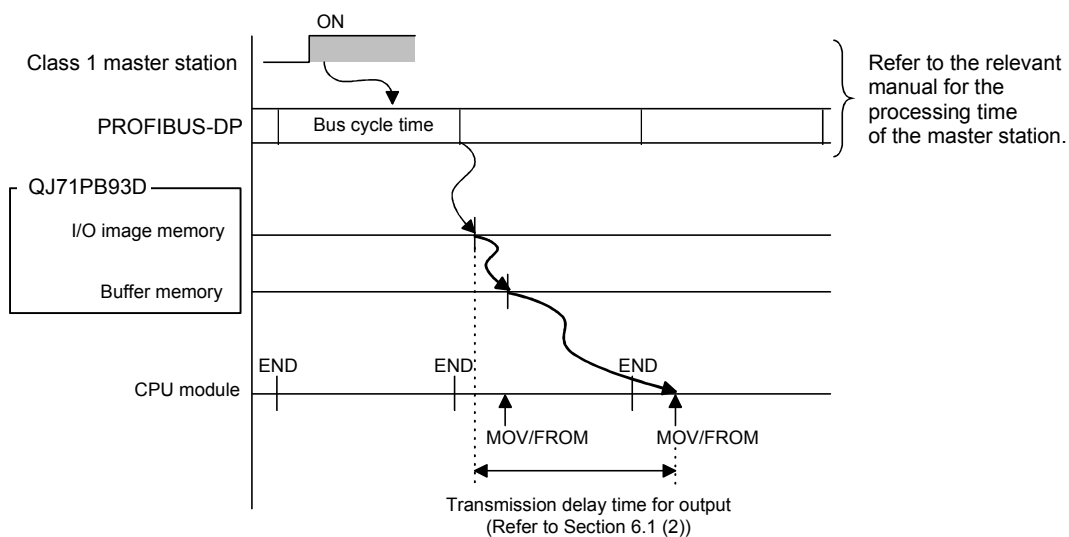
(1) The processing of the output receive data

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

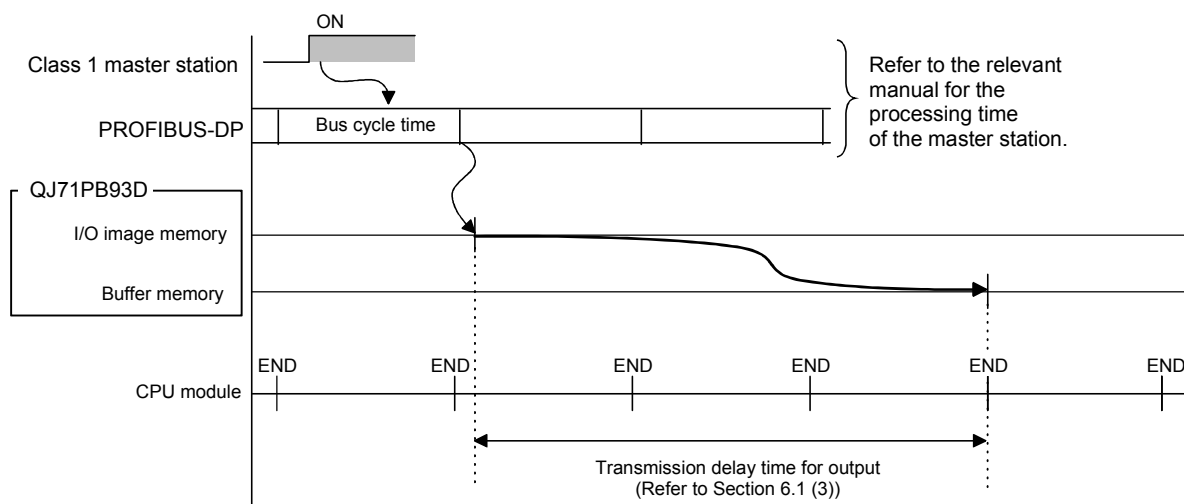
(a) When BBLKRD instruction is used



(b) When MOV/FROM instruction is used



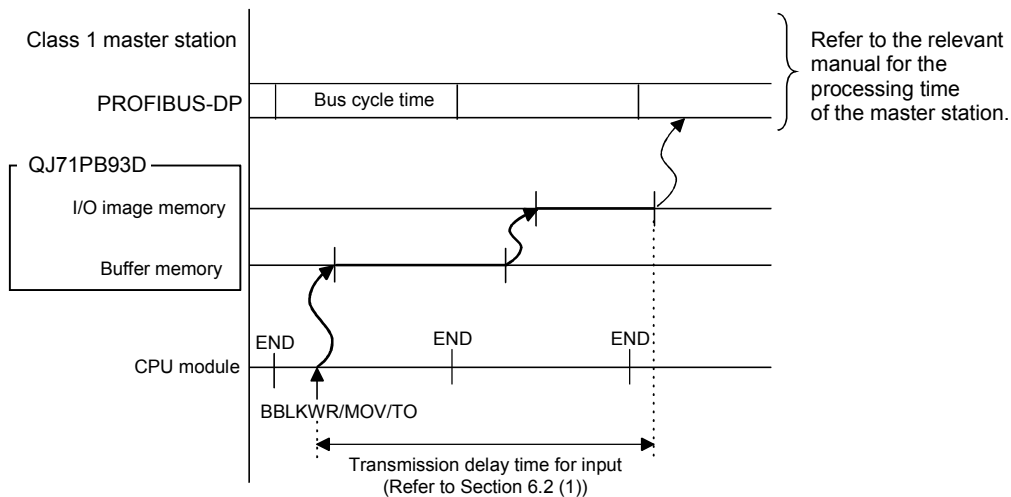
(c) When automatic refresh is used



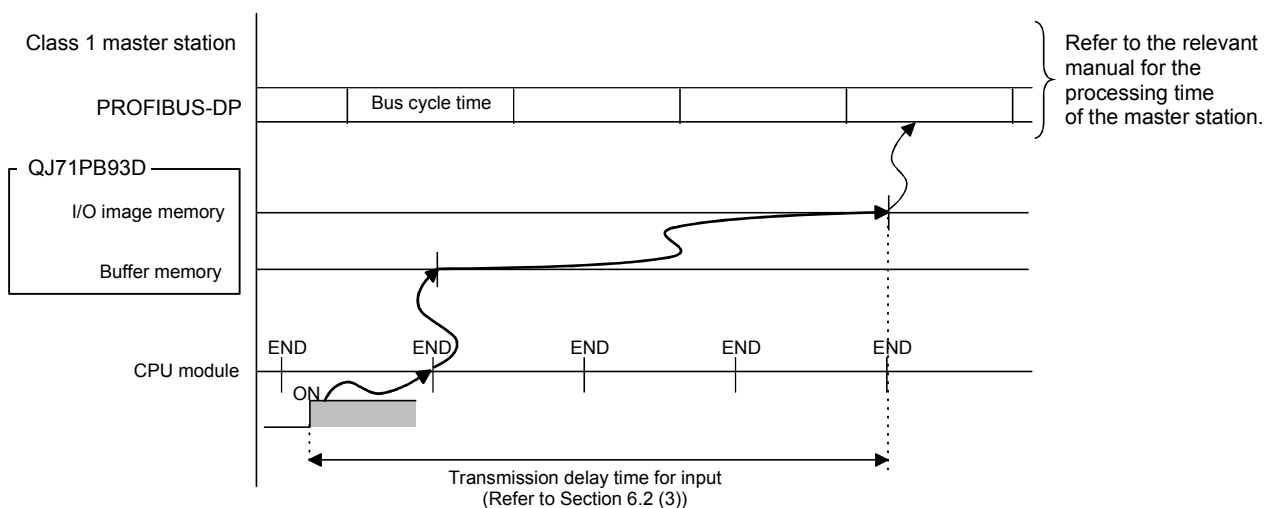
(2) The processing of the input send data

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

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



(b) When automatic refresh is used



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 $\text{Scan} \leq \text{Bc}$

Transmission delay time in input transmission = $\text{Bc} \times 3 + 0.2$ [ms]

(b) When $\text{Scan} > \text{Bc}$

Transmission delay time of input transmission = $\text{Bc} \times 2 + \text{Scan} + 0.2$ [ms]

(2) When MOV/TO instruction is used

Transmission delay time of input transmission = $\text{Bc} \times 2 + 0.2$ [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	$\text{Scan} \times 0.5 + 0.2$ [ms]
Max. value	$\text{Scan} + 0.2$ [ms]

(b) When the separation prevention function is used.

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

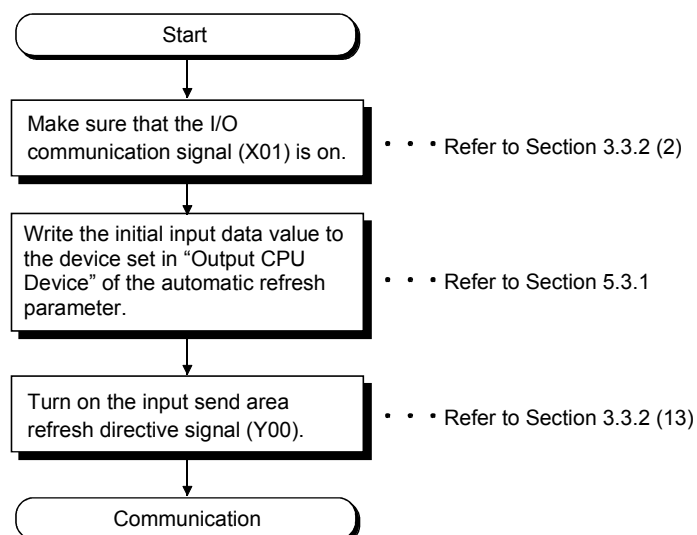
This chapter gives program examples of station number setting, I/O data communication, and global control-driven program execution.

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.

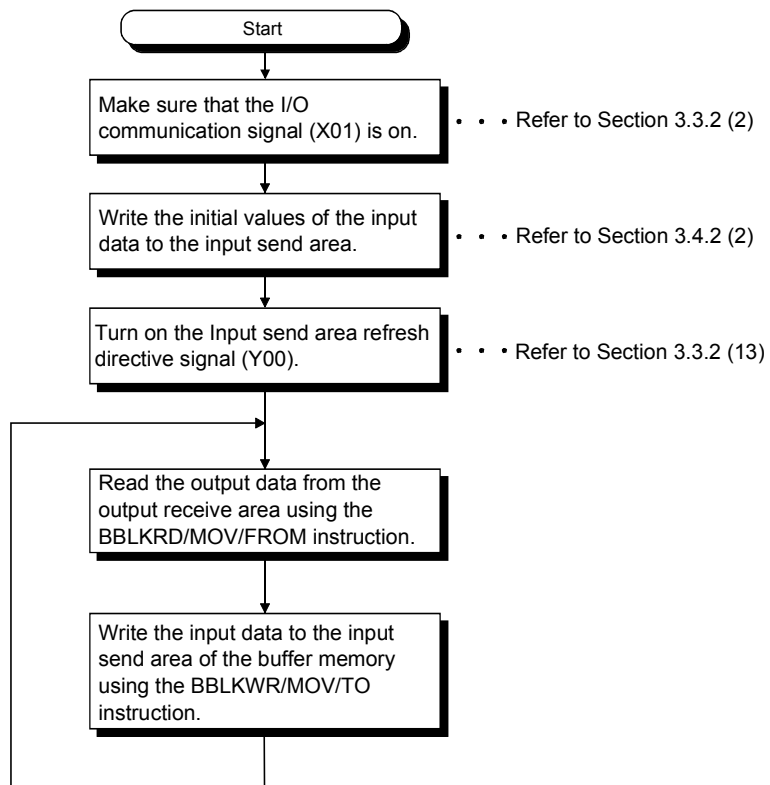
7.1 Communication Sequence

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



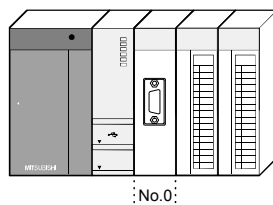
(2) When not using the automatic refresh



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. *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.

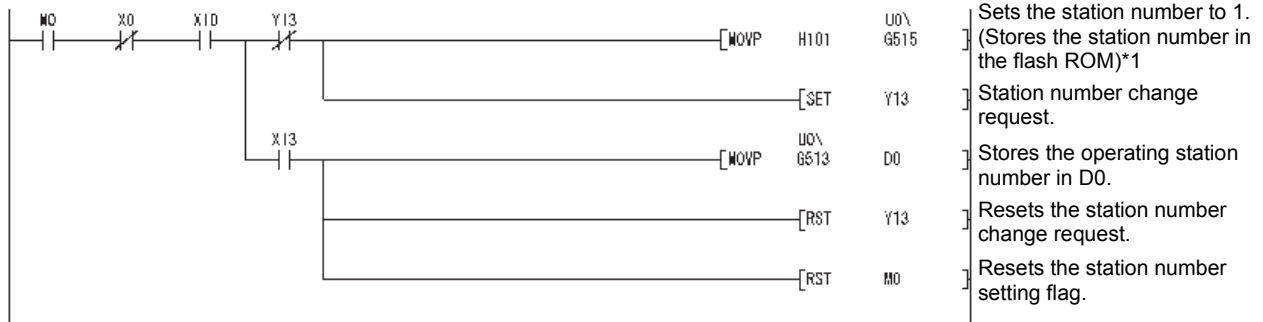
(a) Devices used by the QJ71PB93D

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



*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.

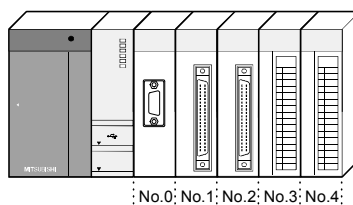
7.3 Communication of I/O Data

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. *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	Select	
2	1[*-1]	Input	QX41	32points	0020		
3	2[*-2]	Output	QY41P	32points	0040		
4	3[*-3]	Intelli.	Q64AD	16points	0060	Select	
5	4[*-4]	Intelli.	Q64DA	16points	0070	Select	
6	5[*-5]						
7	6[*-6]						

REMARKS

Refer to Section 5.2.2 for details of the LUMP mode.

(2) Settings

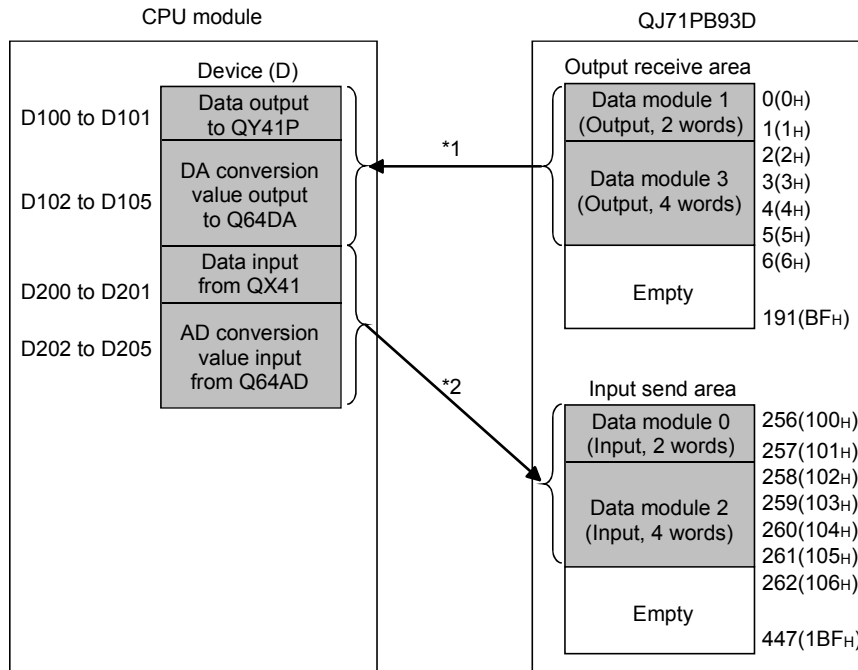
The following configuration and operation are set in the program example given in this section.

(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

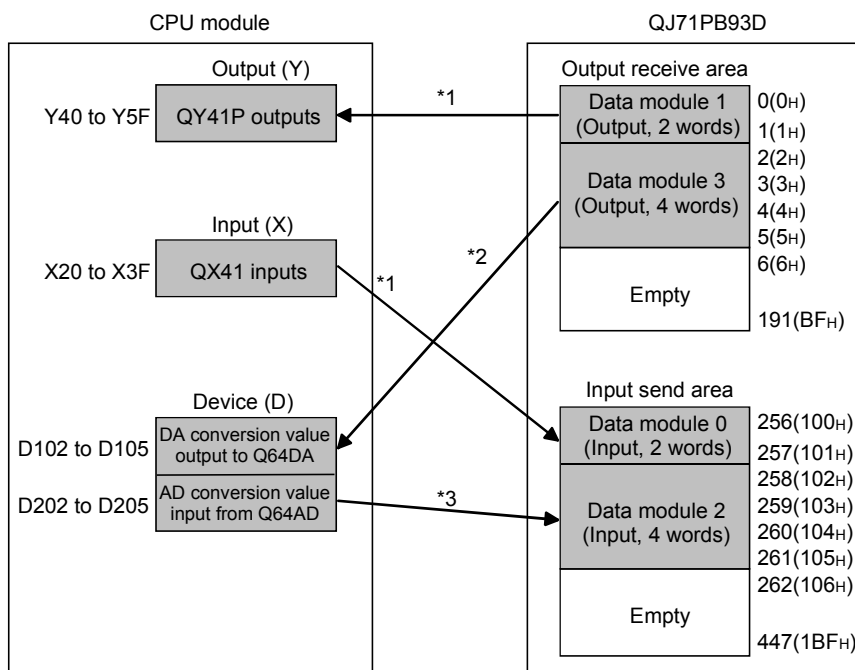


* 1: The output receive area data are read to D100 to D105 using the BBLKRD instruction. The data in D100 to D105 are written to the QY41P and Q64DA.

* 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

**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

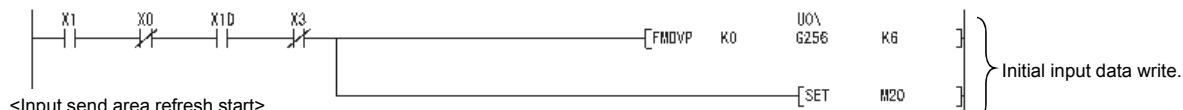
(c) Devices used for automatic refresh or buffer memory reading

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)	—	

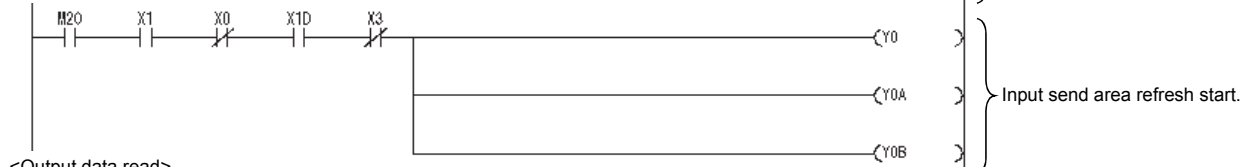
(4) Program example

(a) When using dedicated instructions (BBLKRD/BBLKWR)

<Initial input data write>



<Input send area refresh start>



<Output data read>



Outputs data to Y40 to Y5F.

Writes digital value to Q64DA.

<Input data write>

Stores data in X20 to X3F into D200.

Reads digital value from Q64AD.

Input data write.

<Error handling>

Stores error code.

Resets error.

<Extension trouble information notification request>

Turns on extension trouble notification flag when error code is other than 0.

Sets extension trouble notification data length.

Sets extension trouble notification data.

Stores extension trouble notification data in buffer memory.

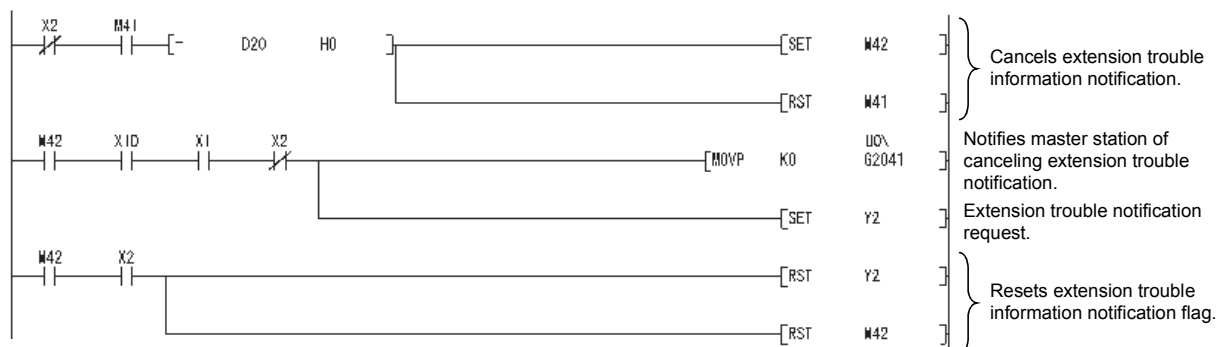
Extension trouble notification request.

Resets extension trouble notification request.

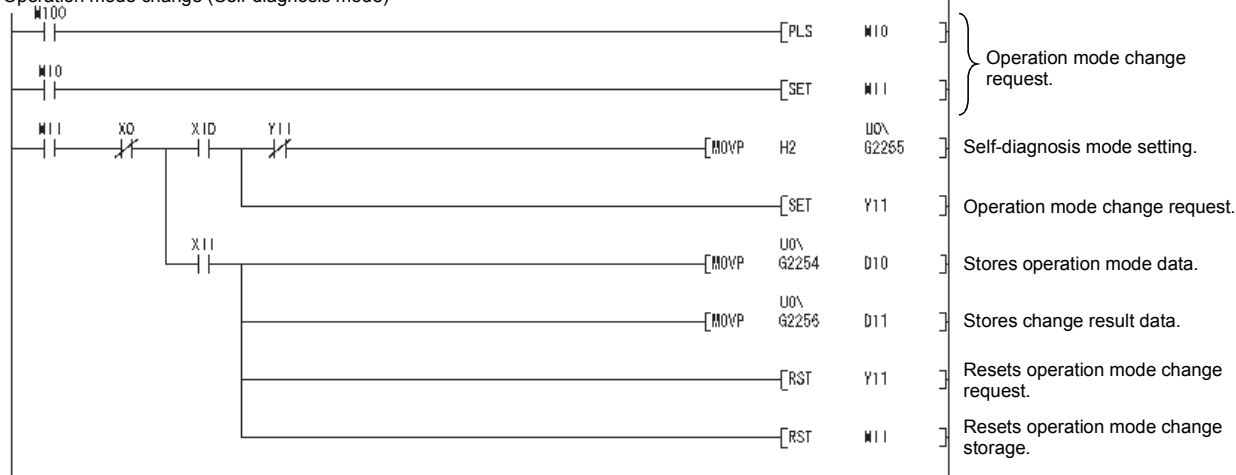
Extension trouble notification completion flag.

Stores error code.

<Cancel of extension trouble information notification>



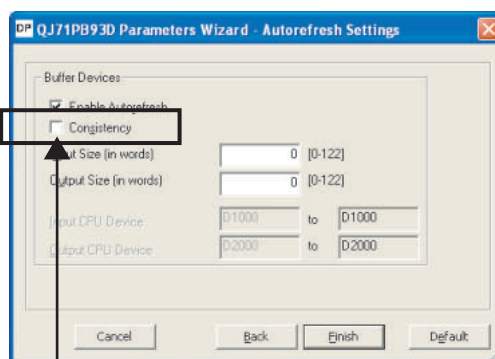
<Operation mode change (Self-diagnosis mode)>



POINT

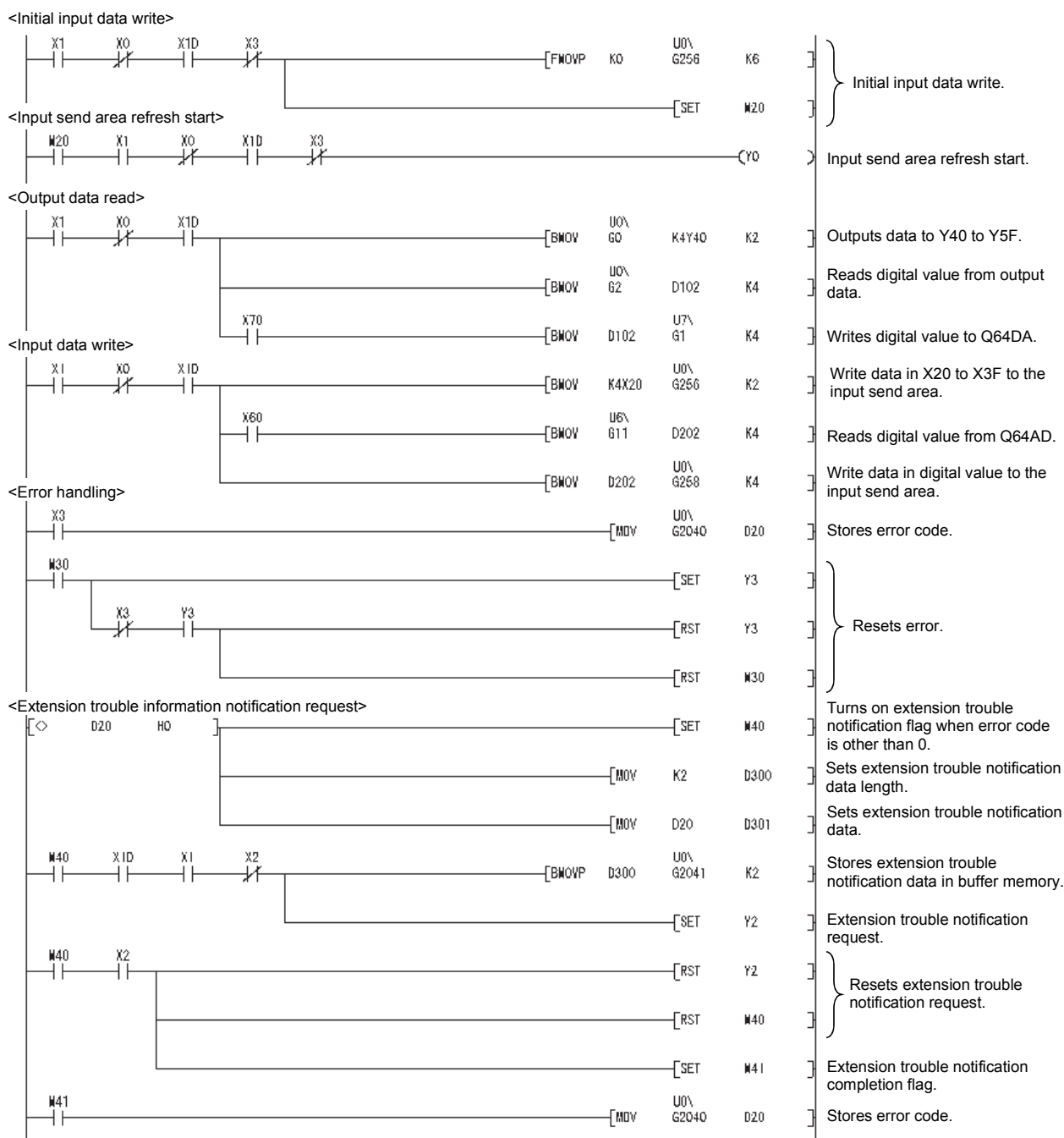
Confirm that Consistency is disabled with Autom. Refresh enabled. (Refer to Section 5.3.1)

When the automatic refresh and data separation prevention functions are enabled, dedicated instructions are not processed.



Make sure the box is unchecked.

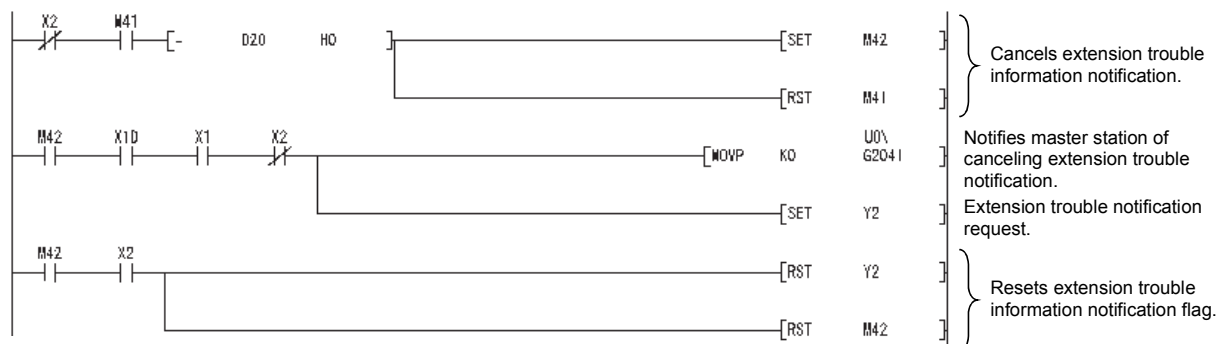
(b) When using MOV instruction



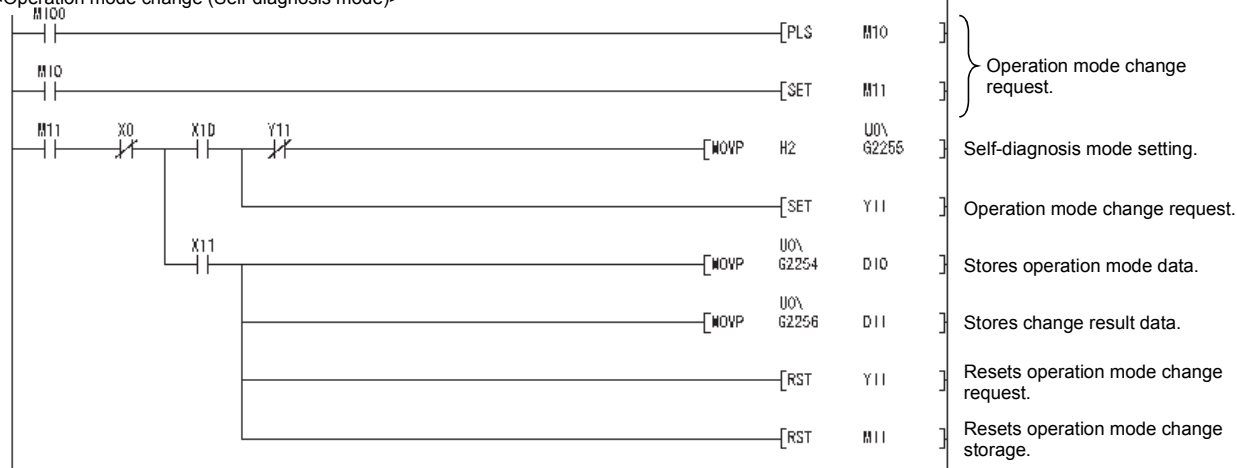
7 PROGRAMMING

MELSEC-Q

<Cancel of extension trouble information notification>



<Operation mode change (Self-diagnosis mode)>

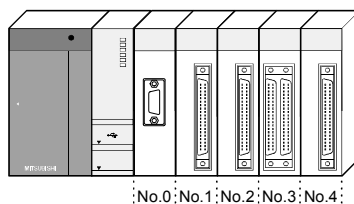


7.3.2 DIVIDED mode

(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. *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:

I/O Assignment[*]						
	Slot	Type	Model name	Points	StartXY	
0	PLC	PLC	Q25HCPU			
1	0(*-0)	Intelli.	QJ71PB93D	32points	0000	Select
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

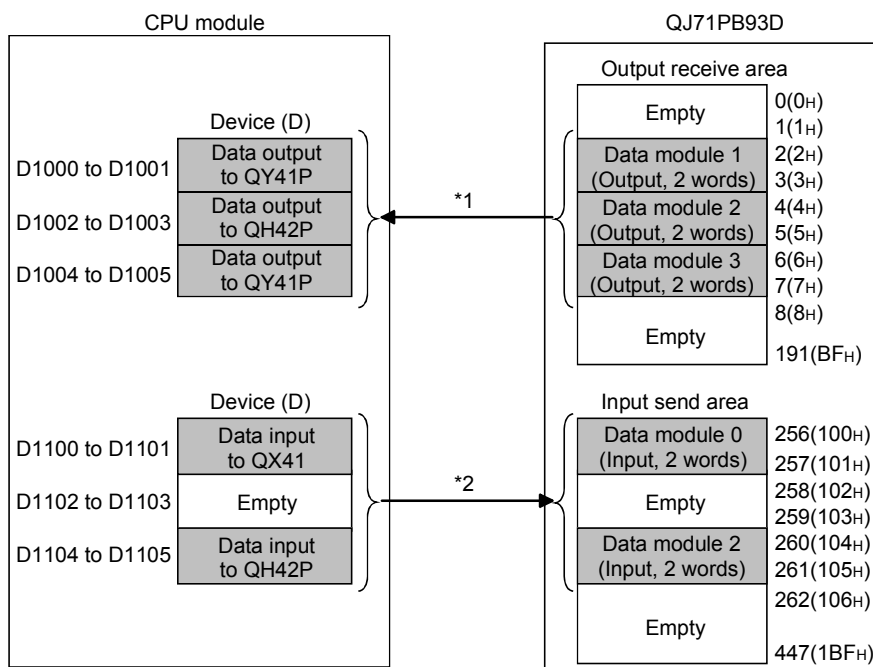
The following configuration and operation are set in the program example given in this section.

(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

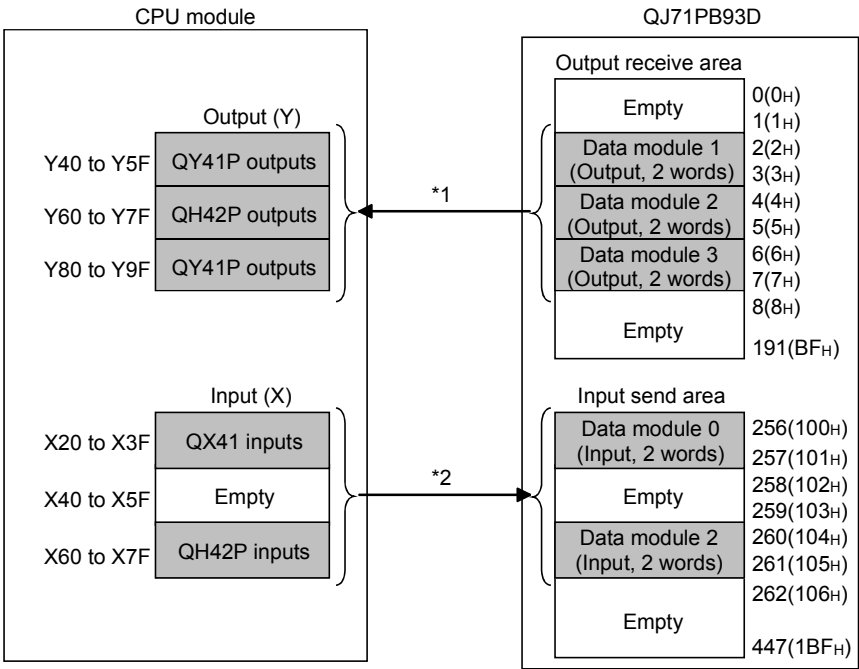
(b) Used states of QJ71PB93D output receive area and input send area

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



- *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

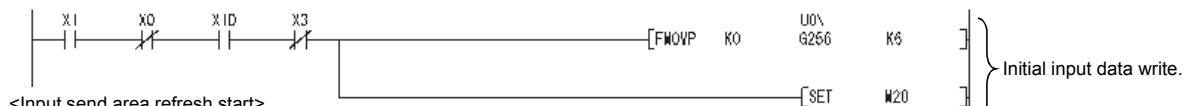
(c) Devices used for automatic refresh or buffer memory reading

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		—

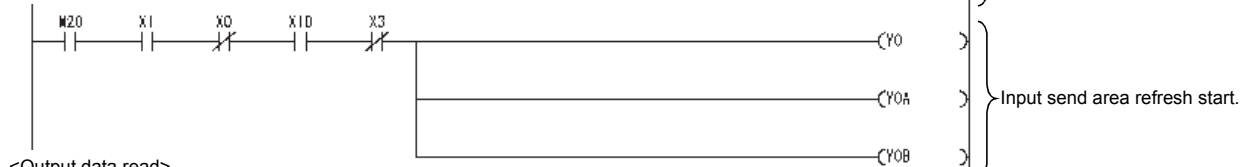
(4) Program example

(a) When using dedicated instructions (BBLKRD/BBLKWR)

<Initial input data write>



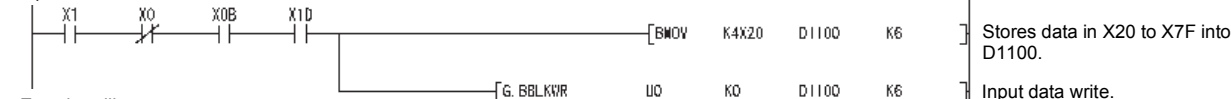
<Input send area refresh start>



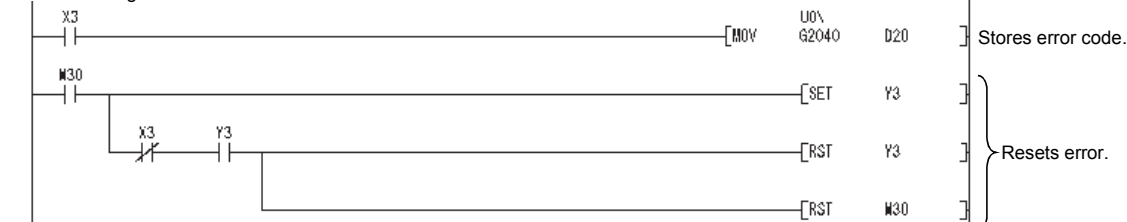
<Output data read>



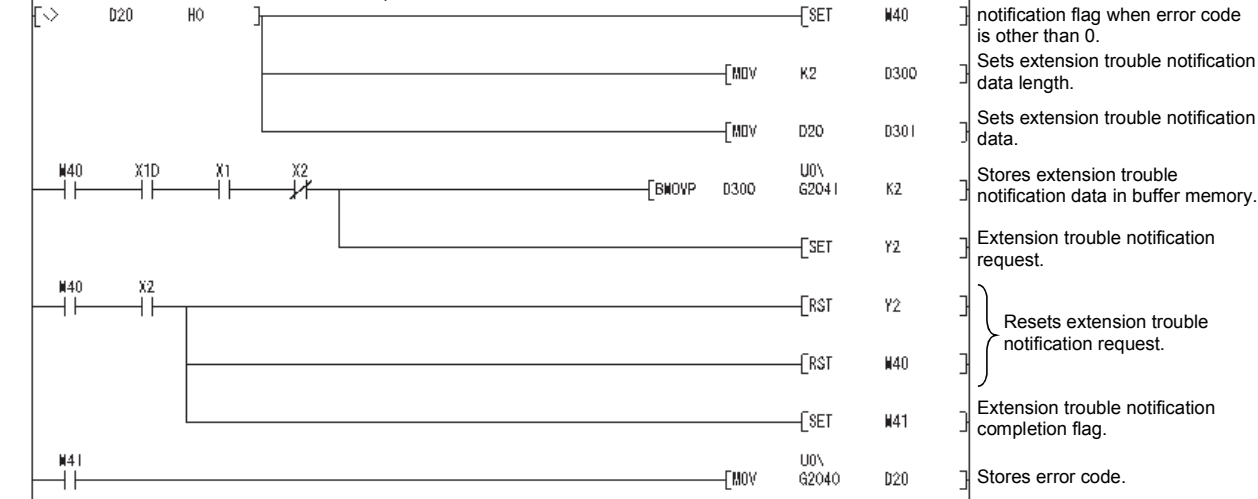
<Input data write>



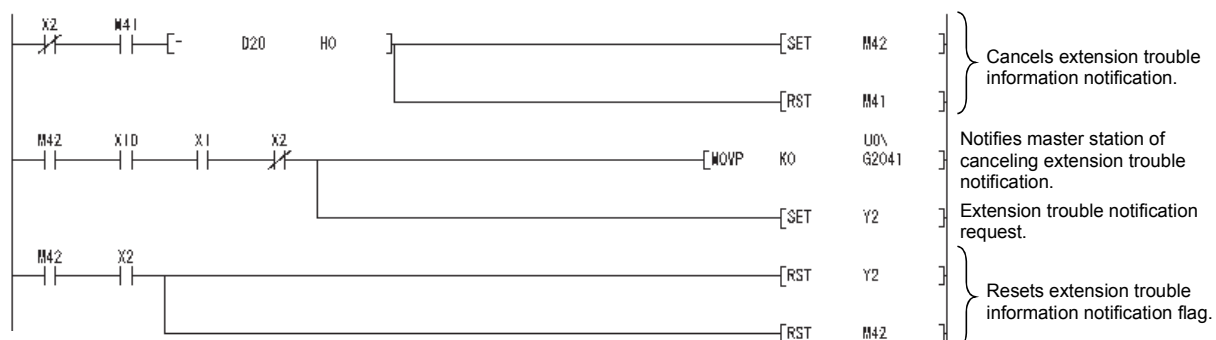
<Error handling>



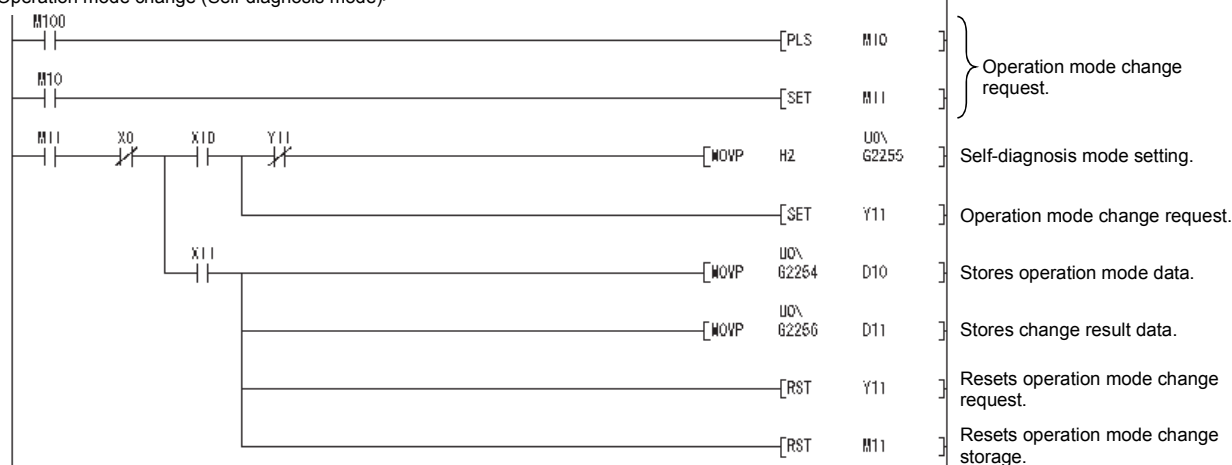
<Extension trouble information notification request>



<Cancel of extension trouble information notification>



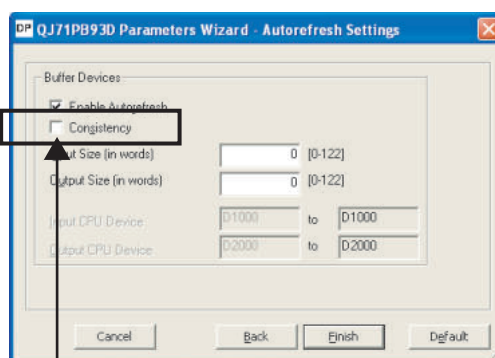
<Operation mode change (Self-diagnosis mode)>



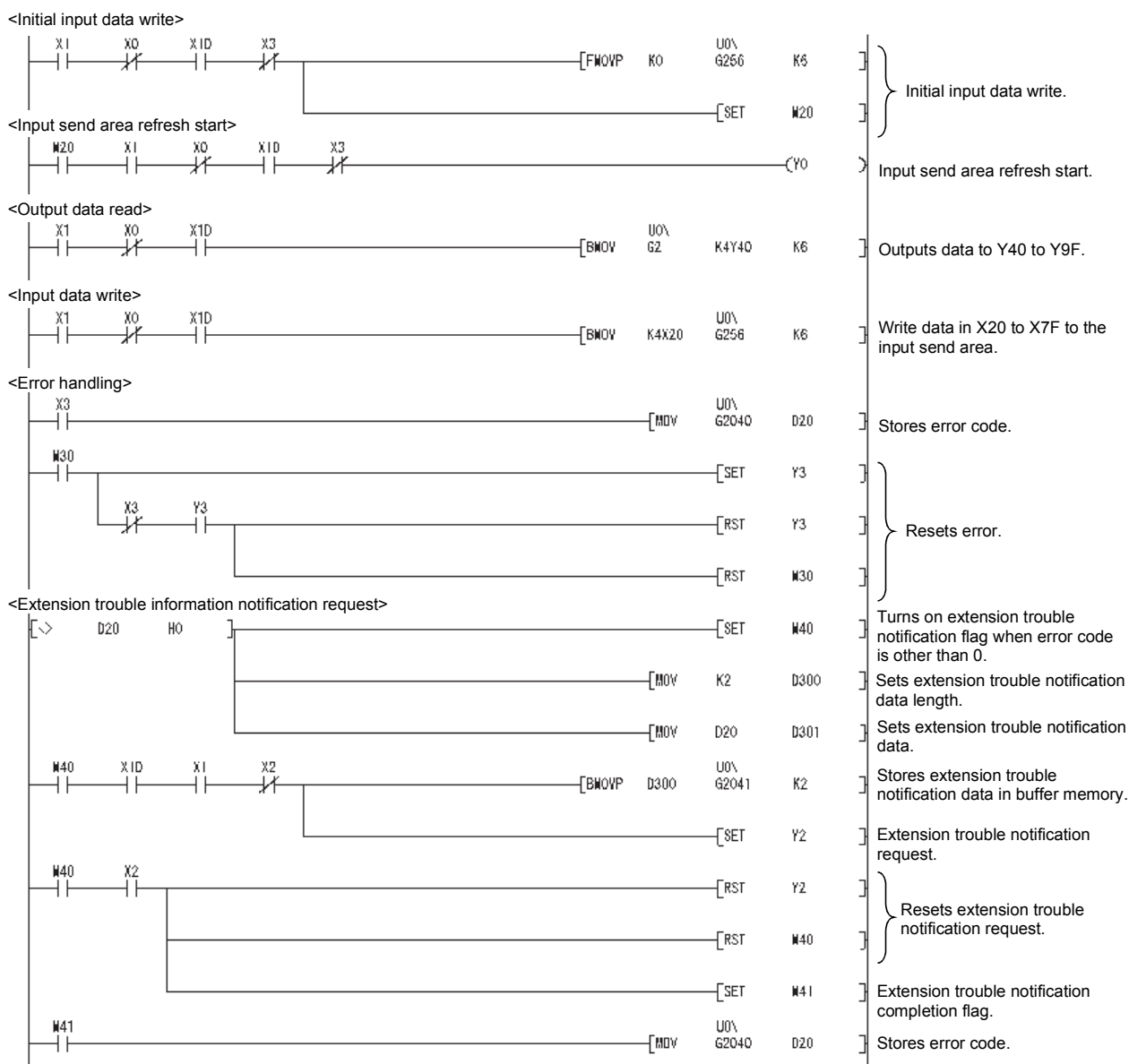
POINT

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.



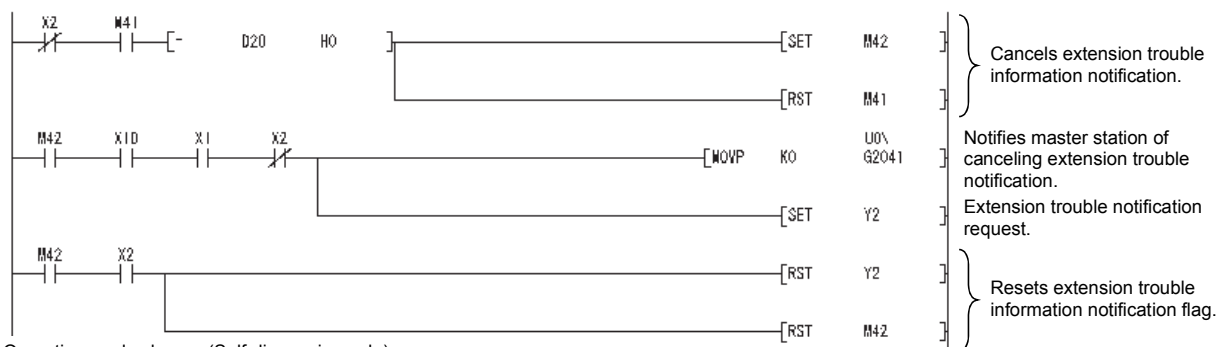
(b) When using MOV instruction



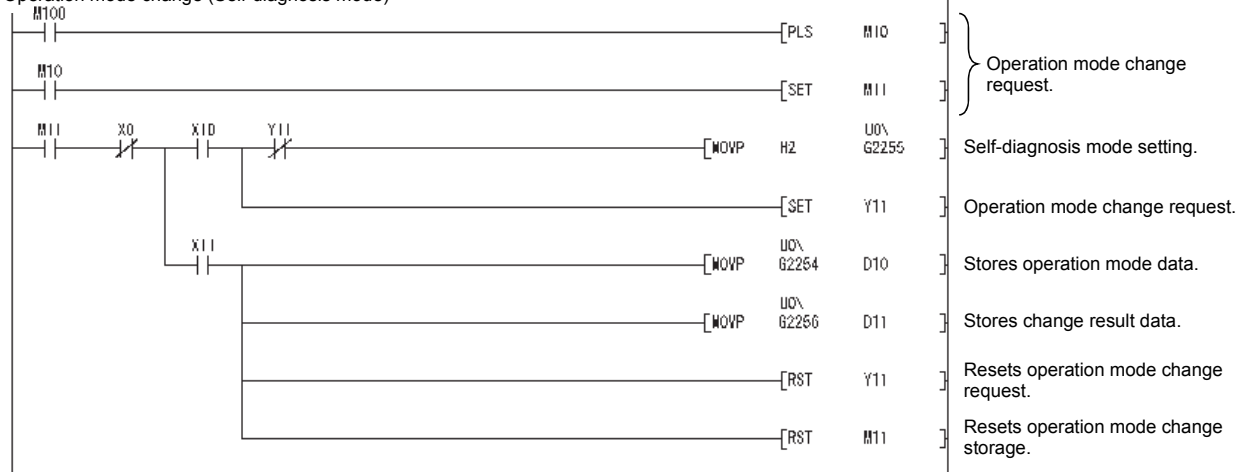
7 PROGRAMMING

MELSEC-Q

<Cancel of extension trouble information notification>



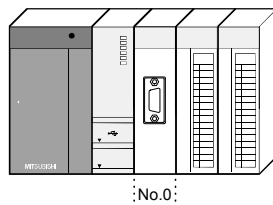
<Operation mode change (Self-diagnosis mode)>



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 examples given in this section use the following device assignments.

(a) Devices used by the QJ71PB93D

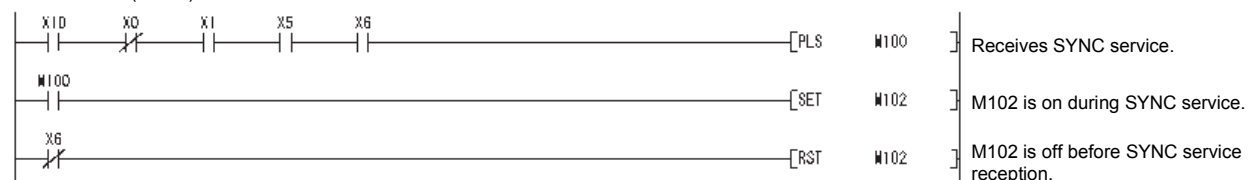
Device	Description	Device	Description
X0	Watchdog timer error	X6	SYNC receive
X1	I/O communication	X7	FREEZE mode
X5	SYNC mode	X1D	Module READY

(b) Devices used by user

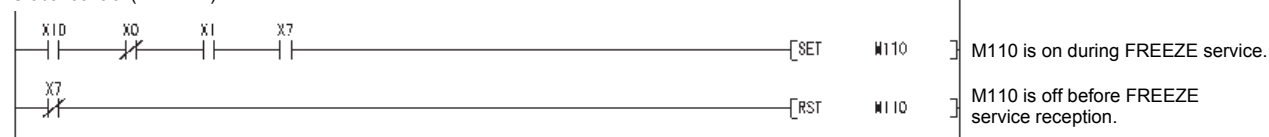
Device	Description	Device	Description
M100	X6 ON processing	M110	FREEZE processing
M102	SYNC processing		—

(3) Program example

<Global control (SYNC)>



<Global control (FREEZE)>



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

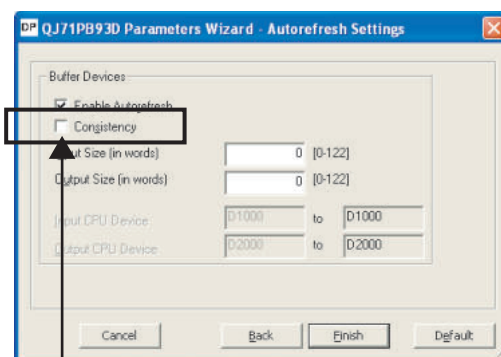
(1) CPU module usable for dedicated instructions

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.

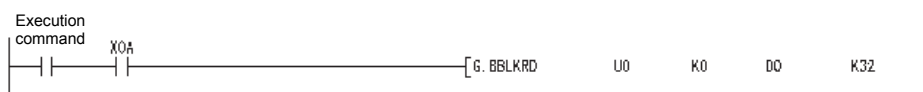
- When using BBLKRD: Turn on the BBLKRD start request signal (Y0A)
- When using BBLKWR: Turn on the BBLKWR start request signal (Y0B)

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)

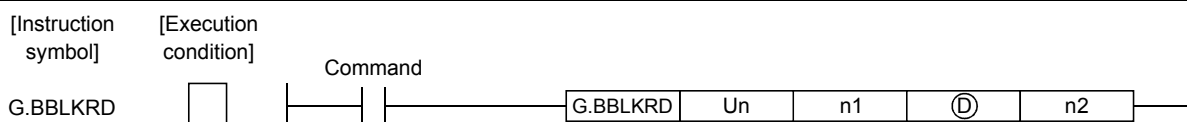
(Example) BBLKRD instruction

**(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	—	○		—			—	○	—



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 FE _H	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.

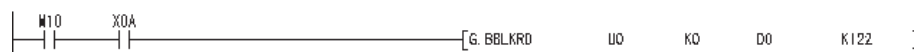
Error

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.

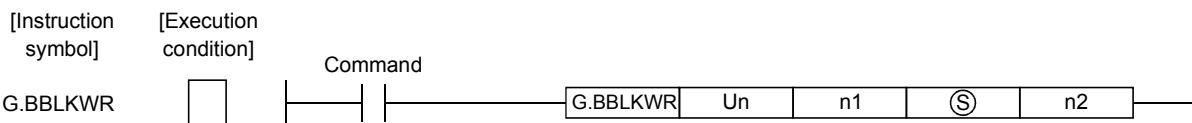
Program Example

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.



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	—	○		—			—	○	—
Ⓢ	—	○		—			—	—	—
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	
Ⓢ	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.

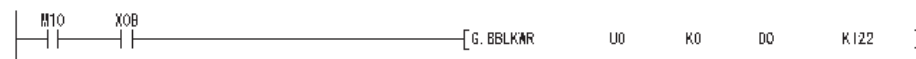
Error

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.



9 TROUBLESHOOTING

The following is the troubleshooting of the QJ71PB93D.

POINT
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.

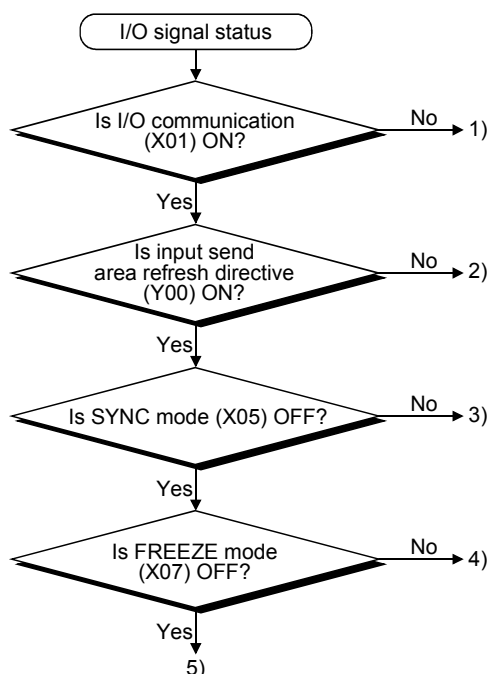
LED	Status	Cause	Action
RUN	Off	Watchdog timer error occurred.	Please consult your local Mitsubishi representative.
ERR.	On	Parameter setting error or module error occurred.	Check the error code and take corrective actions. (Refer to Section 9.4)
BF	On	Communication error was detected or data communication 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).

9.3 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.	• 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.	• 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.	• 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.	
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.	

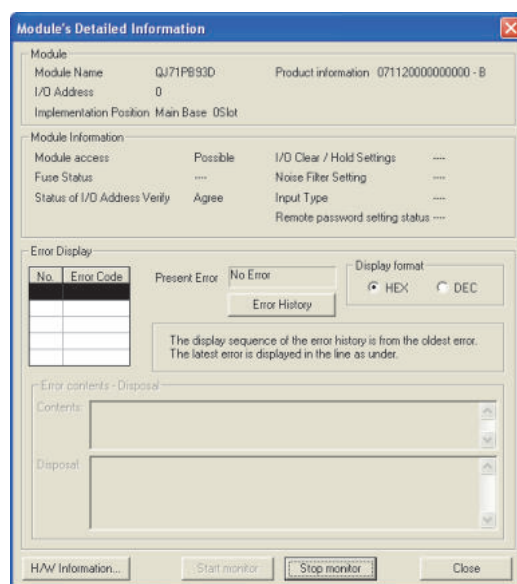
9.5 Checking the QJ71PB93D Status by System Monitor of GX Developer

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

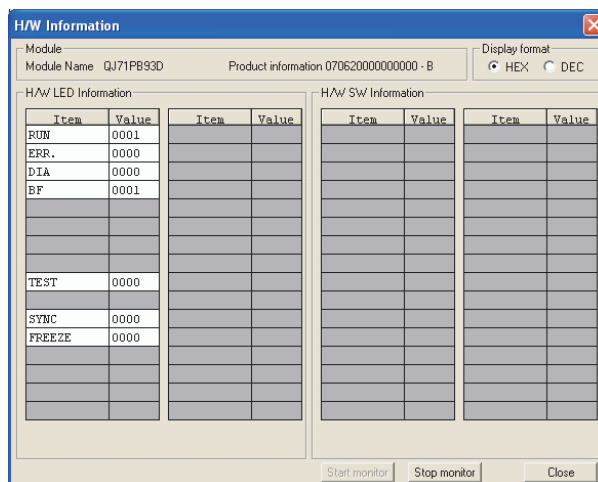
[Diagnostics] → [System monitor] → [Select QJ71PB93D] → [Module's Detailed Information]

(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. <u>0706200000000000</u> - B ↑ Serial number ↑ Function version
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: 7F8H) 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

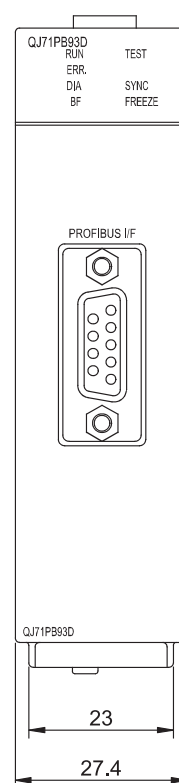
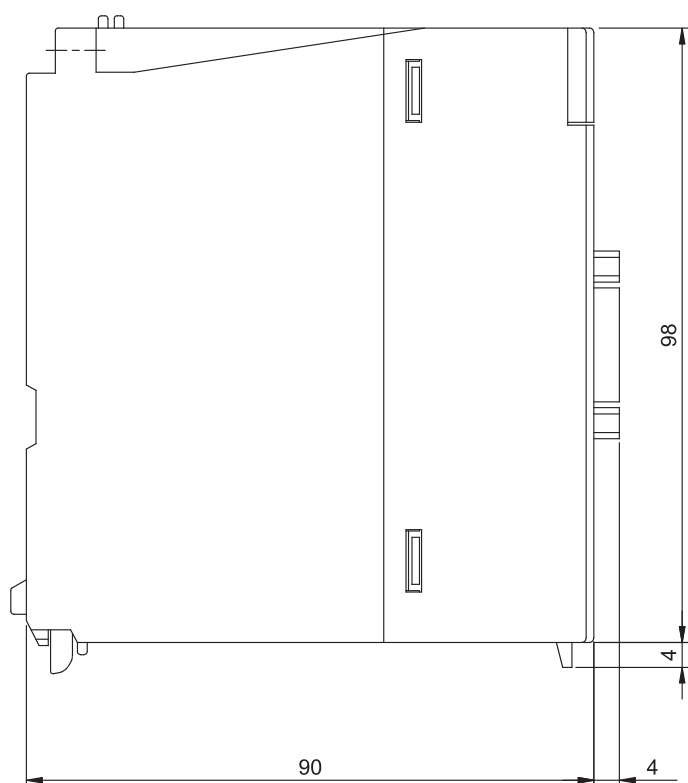
Type	Item	QJ71PB93D	A1SJ71PB93D
Automatic refresh		Present	Absent
Separation prevention function		- Automatic refresh - Dedicated instructions (With the FROM/TO instruction, division of one-word data is prevented.)	FROM/TO instructions
Watchdog timer error signal		X00	X0D
Operating station number indication	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)

Appendix 2 External Dimensions



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[A]

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applicable module	2- 1
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MEMO

[illegible]

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

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5. Changes in product specifications

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