MITSUBISHI ELECTRIC

MELSEC ST Series

Programmable Logic Controllers

User's Manual

Profibus/DP
Head Module

Art. no.: 157181
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SH(NA)-080436ENG
Version A

MITSUBISHI ELECTRIC INDUSTRIAL AUTOMATION

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in this manual. Also pay careful attention to safety and handle the module properly.
The precautions given in this manual are concerned with this product. Refer to the user's manual of the network system to use for a description of the network system safety precautions.
These SAFETY PRECAUTIONS classify the safety precautions into two categories: "DANGER" and "CAUTION".

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

Depending on circumstances, procedures indicated by ⚠ CAUTION may also be linked to serious results.
In any case, it is important to follow the directions for usage.

Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠ DANGER

● If a communication error occurs in the network, the error station (MELSEC-ST system) shows the following behavior.All outputs turn OFF. (In the MELSEC-ST system, the output status at the time of error can be set to clear/hold/preset by using user parameters of each slice module. As “clear” is set by default, the outputs turn OFF when an error occurs. In the case where the system operates safely with the output set to “hold” or “preset”, change the parameter settings.)Create in the program an interlock circuit that will ensure the system operates safely based on the communication status information.Failure to do so may cause an accident due to mis-output or malfunction.

● Create an external fail safe circuit that will ensure the MELSEC-ST system operates safely, even when the external power supply or the system fails.
Accident may occur due to output error or malfunctioning.
(1) The status of output changes depending on the setting of various functions that control the output. Take sufficient caution when setting for those functions.
(2) Normal output may not be obtained due to malfunctions of output elements or the internal circuits.Configure a circuit to monitor signals which may lead to a serious accident.

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[DESIGN PRECAUTIONS]

⚠ CAUTION

- Make sure to initialize the network system after changing parameters of the MELSEC-ST system or the network system. If unchanged data remain in the network system, this may cause malfunctions.

- Do not install the control wires or communication cables together with the main circuit or power wires. Keep a distance of 100 mm (3.94 inch) or more between them. Not doing so could result in malfunctions due to noise.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the MELSEC-ST system in the general environment specified in the MELSEC-ST system users manual. Using this MELSEC-ST system in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product.

- Mount the head module and base module on the DIN rail securely (one rail for one module) referring to the MELSEC-ST system users manual and then fix them with stoppers. Incorrect mounting may result in a fall of the module, short circuits or malfunctions.

- Secure the module with several stoppers when using it in an environment of frequent vibration. Tighten the screws of the stoppers within the specified torque range. Undertightening can cause a drop, short circuit or malfunction. Overtightening can cause a drop, short circuit or malfunction due to damage to the screw or module.

- Make sure to externally shut off all phases of the power supply for the whole system before mounting or removing a module. Failure to do so may damage the module.
  (1) Online replacement of the power distribution module and/or the base module is not available. When replacing either of the modules, shut off all phases of the external power supply.
  Failure to do so may result in damage to all devices of the MELSEC-ST system.
  (2) The I/O modules and the intelligent function modules can be replaced online.
  Since online replacement procedures differ depending on the module type, be sure to make replacement as instructed.
  For details, refer to the chapter describing the online module change in the user's manual of the head module (for the I/O module) or the corresponding intelligent function module.

- Do not directly touch the module's conductive parts or electronic components. Doing so may cause malfunctions or failure of the module.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Make sure to securely connect each cable connector. Failure to do so may cause malfunctions due to poor contact.

- DIN rail must be conductive; make sure to ground it prior to use. Failure to do so may cause electric shocks or malfunctions. Undertightening can cause a drop, short circuit or malfunction. Overtightening can cause a drop, short circuit or malfunction due to damage to the screw or module.

[WIRING PRECAUTIONS]

⚠ DANGER

- Completely turn off the external power supply when installing or placing wiring. Not completely turning off all power could result in electric shock or damage to the product.

⚠ CAUTION

- Make sure to ground the control panel where the MELSEC-ST system is installed in the manner specified for the MELSEC-ST system. Failure to do so may cause electric shocks or malfunctions.

- Check the rated voltage and the terminal layout and wire the system correctly. Connecting an inappropriate power supply or incorrect wiring could result in fire or damage.

- Tighten the terminal screws within the specified torque. If the terminal screws are loose, it could result in short circuits, fire, or erroneous operation. Overtightening may cause damages to the screws and/or the module, resulting in short circuits or malfunction.

- Prevent foreign matter such as chips or wiring debris from entering the module. Failure to do so may cause fires, damage, or erroneous operation.

- When connecting the communication and power supply cables to the module, always run them in conduits or clamp them. Not doing so can damage the module and cables by pulling a dangling cable accidentally or can cause a malfunction due to a cable connection fault.

- When disconnecting the communication and power supply cables from the module, do not hold and pull the cable part. Disconnect the cables after loosening the screws in the portions connected to the module. Pulling the cables connected to the module can damage the module and cables or can cause a malfunction due to a cable connection fault.

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[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ DANGER

- Do not touch the terminals while power is on.
  Doing so could cause shock or erroneous operation.

- Make sure to shut off all phases of the external power supply for the system before cleaning the module or tightening screws.
  Not doing so can cause the module to fail or malfunction.

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ CAUTION

- Do not disassemble or modify the modules.
  Doing so could cause failure, erroneous operation, injury, or fire.

- Do not drop or give a strong impact to the module since its case is made of resin. Doing so can damage the module.

- Make sure to shut off all phases of the external power supply for the system before mounting/removing the module onto/from the control panel. Not doing so can cause the module to fail or malfunction.

- Before handling the module, make sure to touch a grounded metal object to discharge the static electricity from the human body.
  Failure to do say cause a failure or malfunctions of the module.

- When using any radio communication device such as a cellular phone, keep a distance of at least 25cm (9.85 inch) away from the MELSEC-ST system.
  Not doing so can cause a malfunction.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

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

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REVISIONS

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

Print Date	* Manual Number	Revision
Dec., 2003	SH(NA)-080436ENG-A	First edition

Japanese Manual Version SH-080435-A

INTRODUCTION

Thank you for choosing the ST1H-PB MELSEC-ST PROFIBUS-DP head module.
Before using the module, please read this manual carefully to fully understand the functions and performance of the ST1H-PB MELSEC-ST PROFIBUS-DP head module and use it correctly.

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About Manuals

The following manuals are related to this product.
Referring to this list, please request the necessary manuals.

Relevant Manuals

Manual Name	Manual Number (Model Code)
MELSEC-ST System User's Manual Explains the system configuration of the MELSEC-ST system and the performance specifications, functions, handling, wiring and troubleshooting of the power distribution modules, base modules and I/O modules. (Sold separately)	SH-080456ENG (13JR72)
GX Configurator-ST Version 1 Operating Manual Explains how to operate GX Configurator-ST, how to set the intelligent function module parameters, and how to monitor the MELSEC-ST system. (Sold separately)	SH-080439ENG (13JU47)

Compliance with the EMC Directive and the Low Voltage Directive

When incorporating the Mitsubishi MELSEC-ST system that is compliant with the EMC directive and the low voltage directive into other machine or equipment and making it comply with the EMC directive and the low voltage directive, refer to "EMC Directive and Low Voltage Directive" of the MELSEC-ST System User's Manual.
The CE logo is printed on the rating plate of the MELSEC-ST system products compliant to the EMC Directive and the Low Voltage Directive.
For making this product comply with the EMC directive and the low voltage directive, please refer to "EMC Directive and Low Voltage Directive" of the MELSEC-ST System User's Manual.

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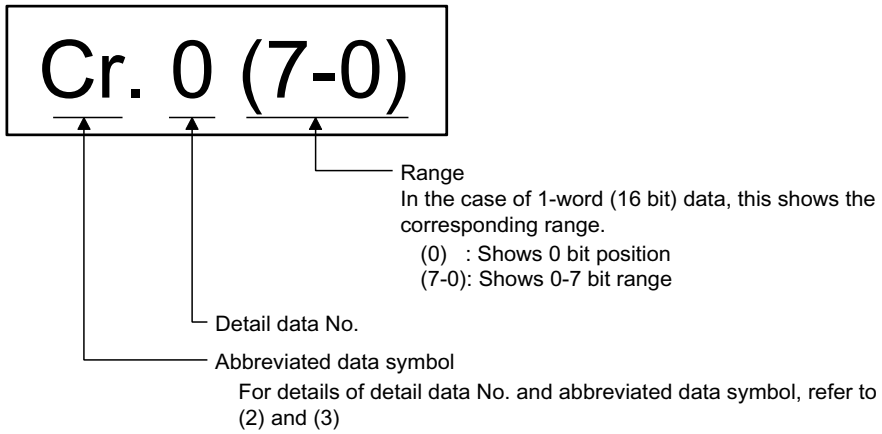
This manual explains each area for input data and output data using the following symbols.

(1) Data symbol

<Example: Cr Command result area>



(2) Input data

Data symbol		Area	Unit	Detail data No. notation
Br	Br.00 to Br.FF	Bit Input Area	1 bit/1 signal	Hexadecimal
Er	Er.00 to Er.FF	Error Information Area	1 bit/1 signal	Hexadecimal
Mr	Mr.0 to Mr.127	Module Status Area	1 bit/1 signal	Decimal
Cr	∗1	Command Result Area	1 word/1 signal	Decimal
Wr	Wr.00 to Wr.33	Word Input Area	1 word/1 signal	Hexadecimal

∗1: Following shows the data symbols and the corresponding detail areas within the command result area.

Data symbol		Area
Cr.0	Cr.0 (15 - 8)	Command Execution Area
	Cr.0 (7 - 0)	Start Slice No. of Execution Target
Cr.1		Executed Command No.
Cr.2		Response Data 1
Cr.3		Response Data 2

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(3) Output data

Data symbol		Area	Unit	Detail data No. notation
Bw	Bw.00 to Bw.FF	Bit Output Area	1 bit/1 signal	Hexadecimal
Ew	Ew.00 to Ew.FF	Error Clear Area	1 bit/1 signal	Hexadecimal
Sw	Sw.0 to Sw.7	System Area	1 word/1 signal	Decimal
Cw	*1	Command Execution Area	1 word/1 signal	Decimal
Ww	Ww.00 to Ww.33	Word Output Area	1 word/1 signal	Hexadecimal

*1: Following shows the data symbols and the corresponding detail areas within the command execution area.

Data symbol	Area
Cw.0	Start Slice No. of Execution Target
Cw.1	Command No. to be Executed
Cw.2	Argument 1
Cw.3	Argument 2

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About the Generic Terms and Abbreviations

Unless otherwise specified, this manual uses the following generic terms and abbreviations to explain the head module.

Generic Term/Abbreviation	Description
Head module	ST1H-PB, MELSEC-ST PROFIBUS-DP compatible head module.
PROFIBUS-DP	PROFIBUS-DP network.
Bus refreshing module	Module that distributes the external SYS. power supply and external AUX. power supply among the head module and slice modules.
Power feeding module	Module that distributes external AUX. power supply among slice modules.
Power distribution module	Bus refreshing module and Power feeding module.
Base module	Module that transfers data/connects between the head module and slice modules, and between slice modules and external devices.
Input module	Module that handles input data in bit units.
Output module	Module that handles output data in bit units.
Intelligent function module	Module that handles input/output data in word units.
I/O module	Input module and output module.
Slice module	Module that can be mounted to the base module: power distribution module, I/O module and intelligent function module.
MELSEC-ST system	System that consists of head module, slice modules, end plates and end brackets.
GX Configurator-ST	SWnD5C-STPB-E type products. (n: 1 or later)
Configuration software	Software used to set slave parameters for head module and slice modules.(e.g., GX Configurator-DP)

Term definition

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

Term	Definition
Master station	Class 1 master station that communicates I/O data with slave stations.
Slave station	Device that communicates I/O data with the master station.
Repeater	Device that connects PROFIBUS-DP segments.
Bus terminator	Terminator that is connected to both ends of each PROFIBUS-DP segment
FDL address	Address assigned to the master station/slave station.
Extended diagnostic information	Information that is notified from the slave station to the master station when an error occurs at a slave station.
Slave parameter	The slave station parameter (including user parameter) set by the master station. The setting items are described in the GSD file.
GSD file	The electronic file that includes description of the slave station parameter. The file is used to set slave parameters by the master station.
Input data	Data sent from the head module to the master station. The data consists of the following areas. ・[Br] Bit Input Area ・Information Area [Er] Error Information Area [Mr] Module Status Area [Cr] Command Result Area ・[Wr] Word Input Area
Output data	Data that the head module receives from the master station. The data consists of the following areas. ・[Bw] Bit Output Area ・Request Area [Ew] Error Clear Area [Sw] System Area [Cw] Command Execution Area ・[Ww] Word Output Area
I/O data	Data (input data, output data) transferred between the head module and the master station.
[Br.n] bit input	Bit input data of each module.
[Bw.n] bit output	Bit output data of each module
[Wr.n] word input	Word (16-bit) input data of an intelligent function module. In the case of analog input module, the digital output data value is stored.
[Ww.n] word output	Word (16-bit) output data of an intelligent function module. In the case of analog output module, the digital setting data value is stored.
Information area	Bit/Word input data for checking each module status and command execution results.
Request area	Bit/Word output data for requesting each module to clear errors/to execute commands.
Number of occupied I/O points	The area, that is equivalent to the occupied I/O points, is occupied in [Br] Bit Input Area/ [Bw] Bit Output Area.
Slice No.	No. assigned to every 2 occupied I/O points of each module. This numbering starts by assigning "0" to the head module and then proceeds in ascending order. (The maximum value No. is 127). The No. is used for specifying the execution target.
Command	Requesting from the master station in order to read the module status, to set/control the intelligent function module command parameters.
ST bus cycle time	Processing time for the head module to refresh the input/output status of each slice module.
Bus cycle time	PROFIBUS-DP processing time for the master station to perform cyclic transfer with each slave station.

Packing List

The following gives the packing list of the head module.

Model name	Product	Quantity
ST1H-PB	ST1H-PB MELSEC-ST PROFIBUS-DP head module	1
ST1A-EPL	ST1A-EPL end plate	1
ST1A-EBR	ST1A-EBR end bracket	2

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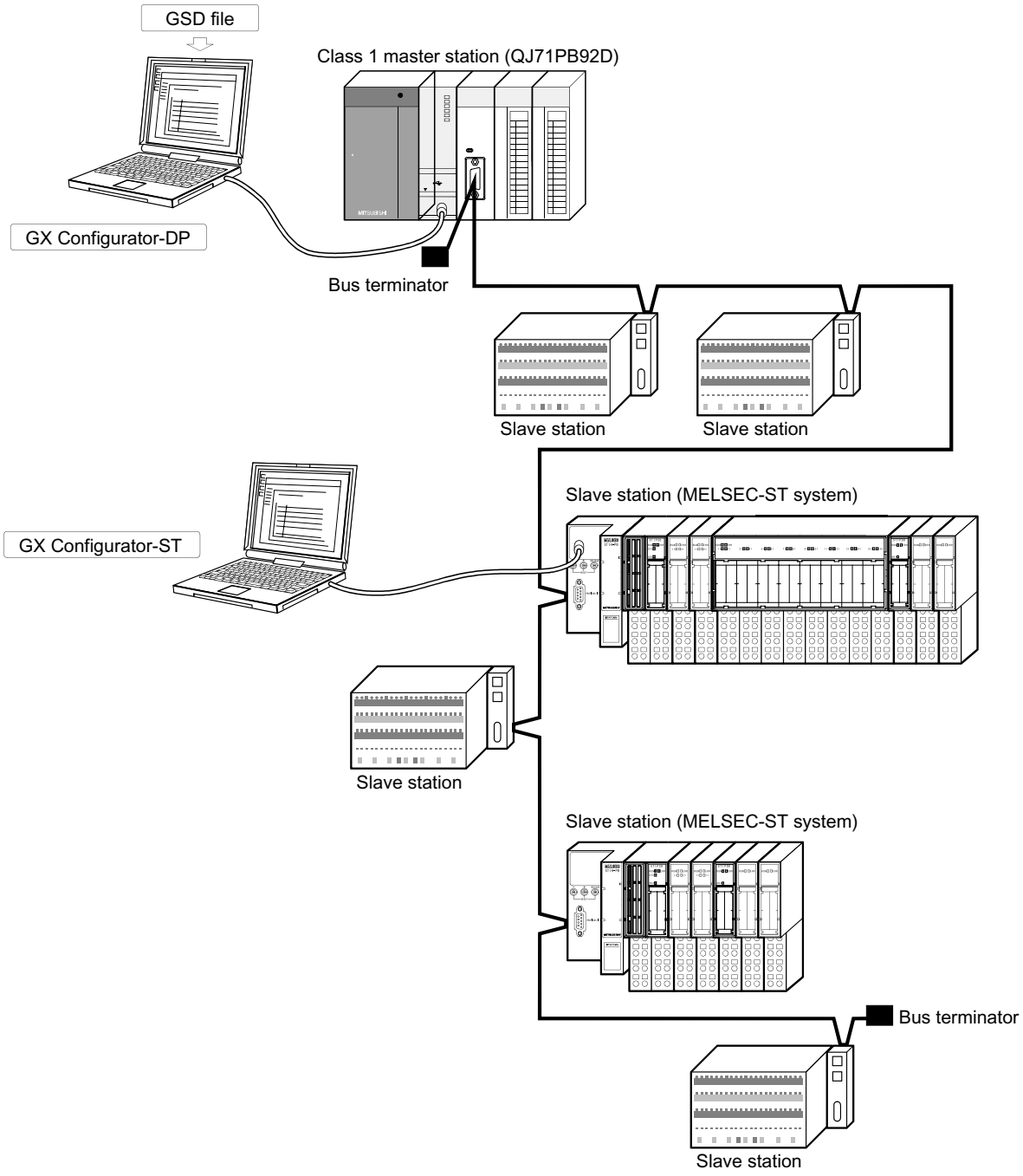
1 OVERVIEW

This manual explains the specifications, functions, pre-operation procedures and troubleshooting of the ST1H-PB MELSEC-ST PROFIBUS-DP head module (hereafter referred to as the head module).
The head module is used to connect a MELSEC-ST system to a PROFIBUS-DP network. (The head module operates as a slave station of a PROFIBUS-DP network.)

<System using QJ71PB92D>



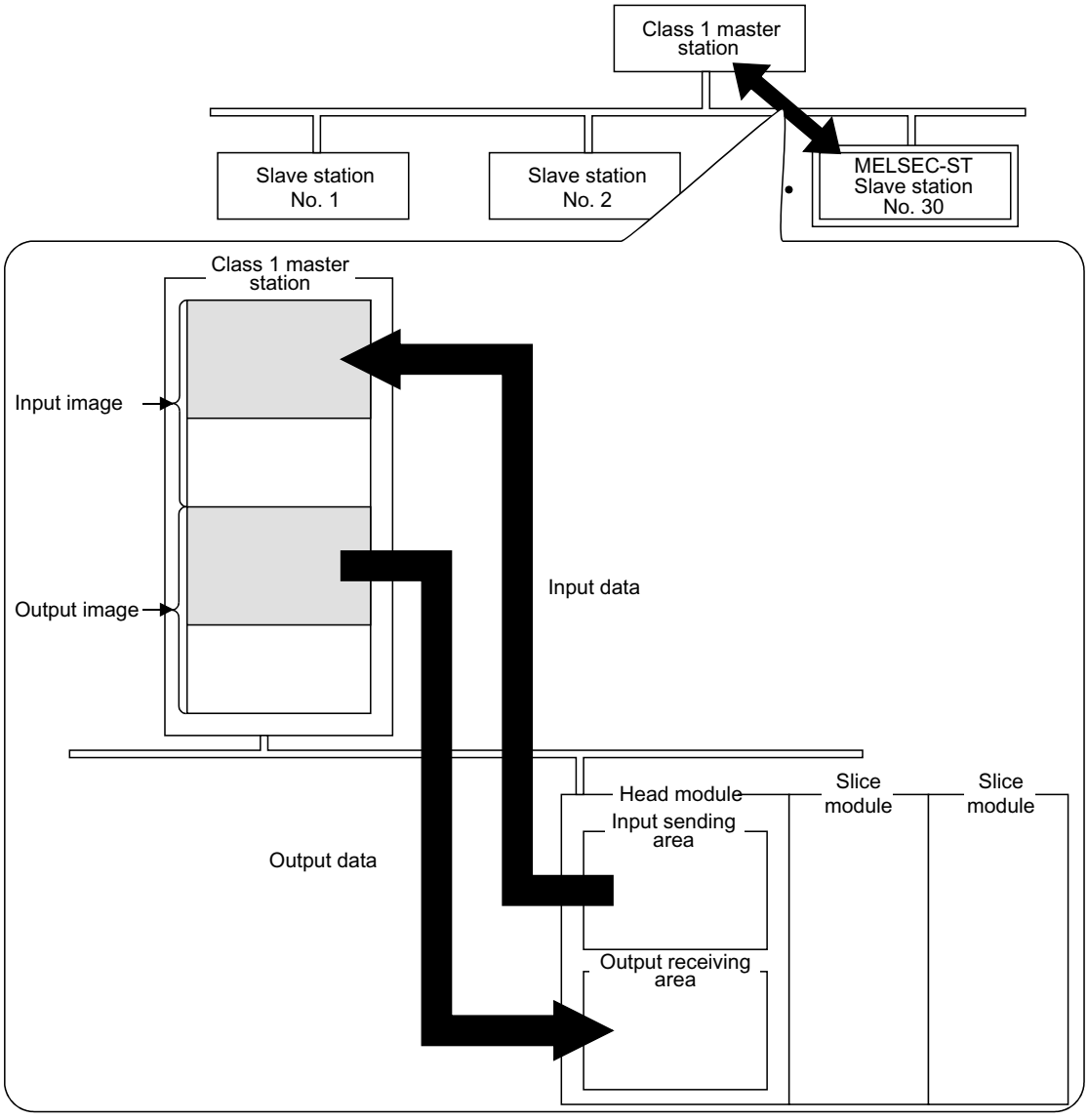
1 - 1

1.1 Features

The head module has the following features.

(1) MELSEC-ST system can be connected to PROFIBUS-DP network

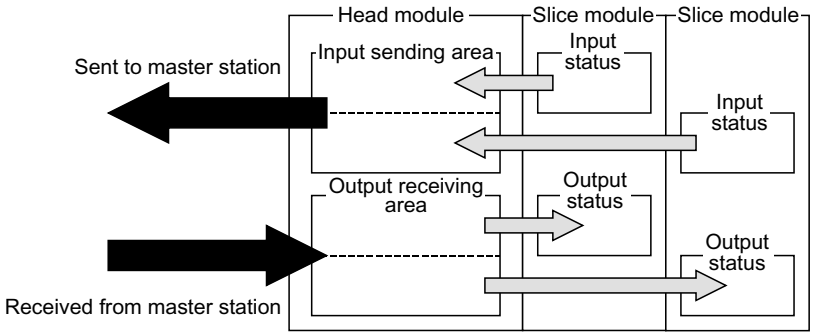
By mounting this module as the head module of a MELSEC-ST system, the MELSEC-ST system can be connected to the PROFIBUS-DP network.
The head module complies with EN50170 Volume 2 (Part 1, 2, 3, 4, 8) and communicates with the master station as a PROFIBUS-DP slave station.



1 - 2

(2) Controlling the MELSEC-ST system

The head module receives data output from the master station, stores the data into the output receiving area, and uses them to control each slice module.
Also, the head module gathers various information such as the input status data from each slice module into the input sending area, and sends them to the master station as input data.



(3) Functions for communication with master station

Using the following functions, the head module can communicate with the master station.

(a) I/O data size selection

The head module uses input data (head module → master station) and output data (master station → head module) to communicate with the master station.
By selecting the maximum input/output points appropriate for the MELSEC-ST system configuration on the head module, the input/output data communicated with the master station can be adjusted to the optimum size.
Also, the maximum I/O points can be set to a slightly larger size for future expansion of the MELSEC-ST system. (Refer to Section 6.1.1.)

(b) Supporting the global control functions

The head module supports the global control functions.
Using the commands (SYNC, UNSYNC, FREEZE, UNFREEZE) sent by the master station, the refresh of the head module I/O data can be controlled from the master station. (Refer to Section 4.2.2.)

(c) Extended diagnostic information notification function

When an error occurs in a slice module, the master station can be notified of the error as extended diagnostic information.
When the slice module is restored to normal, the master station is also notified of it. (Refer to Section 4.2.3.)

(d) Swapping of I/O data or extended diagnostic information bytes

When I/O data are sent to or received from the master station or when extended diagnostic information is sent to the master station, their high and low bytes can be swapped in word units.
This function eliminates the need for a high/low byte swapping program on the master station side, simplifying the program. (Refer to Section 4.2.4.)

(4) Controlling various slice modules

The head module can control various MELSEC-ST slice modules in the same system.

(a) Up to 63 slice modules can be mounted

The head module accepts up to 63 slice modules (up to 26 intelligent function modules).

(b) Error status and mounting status of each slice module can be checked

In each of input data area in the head module, the error status, mounting status, etc. of each slice module can be checked.

(c) Commands can be executed from master station

By executing commands from the master station using the command execution area of output data, the following is available.

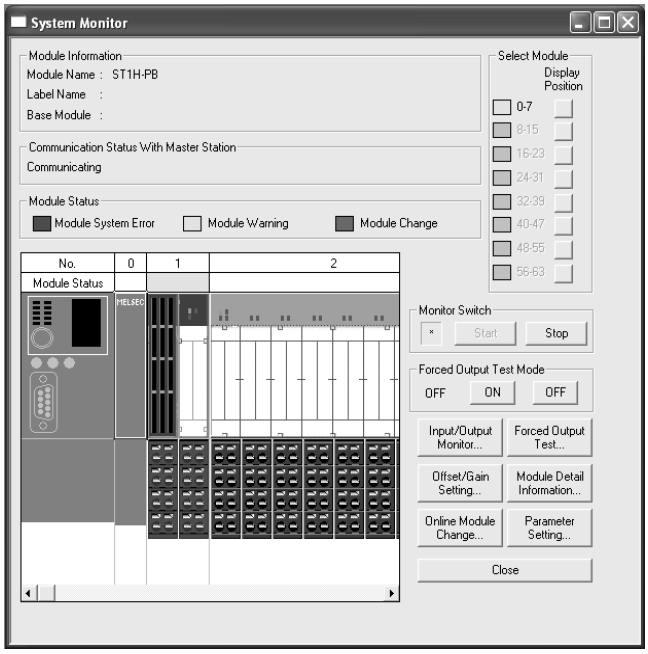
- Confirming the operating statuses of the head module and each slice module
- Reading error codes of the head module and/or each slice module
- Reading the head module error history
- Setting intelligent function module command parameters

(d) Output status at module error

Whether the refresh of output data to the other normally-operating slice module will be stopped or continued when an error occurs in a slice module can be preset. (Refer to Section 4.3.1.)

(5) GX Configurator-ST available

Using the personal computer where optional GX Configurator-ST is preinstalled and connecting it to the head module, such operations as parameter setting, system monitor, forced output test and online module change can be performed easily for the MELSEC-ST system.
Refer to Section 4.1 for the functions available for GX Configurator-ST.

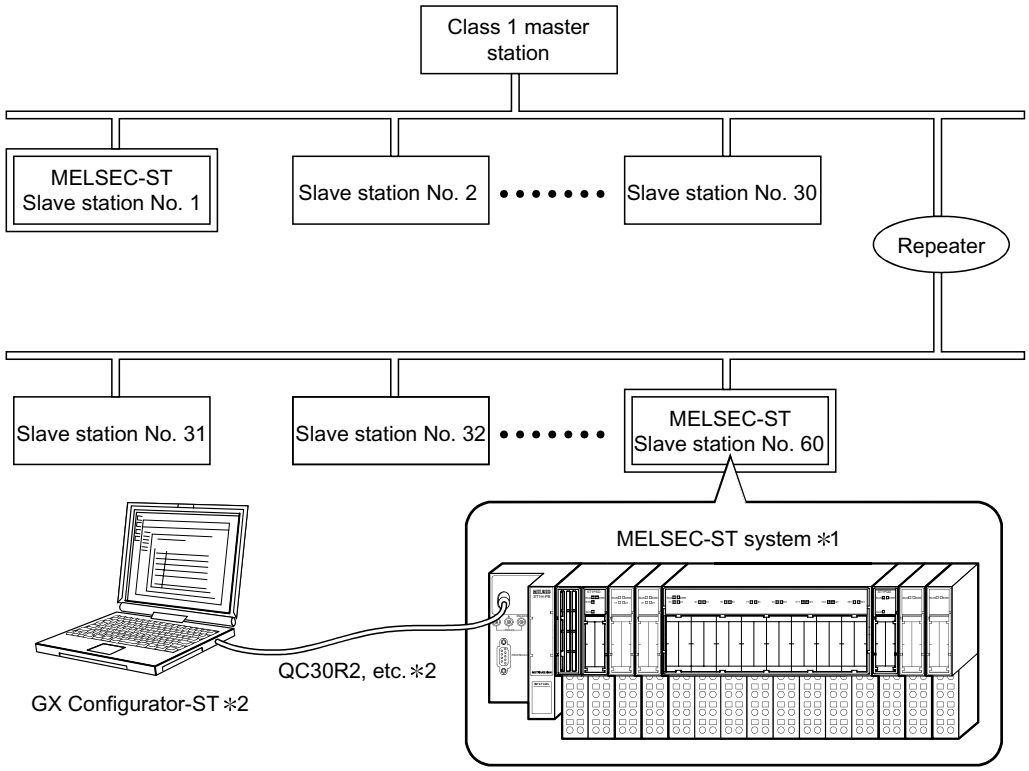


(6) Online module change

The I/O modules and intelligent function modules can be replaced without stopping the MELSEC-ST system. (Refer to Section 4.4.)

2 SYSTEM CONFIGURATION

This chapter explains the system configuration in which the head module is used.



∗1: For the MELSEC-ST system configuration, refer to the MELSEC-ST System User's Manual.

∗2: For the system configuration for use of GX Configurator-ST, refer to the GX Configurator-ST Manual.

REMARK

Prepare the PROFIBUS cable and bus terminator on the user side.
Refer to Section 5.5 for PROFIBUS cable wiring and bus terminal.

MEMO

2 - 2

3 SPECIFICATIONS

This chapter explains the performance specifications of the head module.
For the general specifications of the head module, refer to the MELSEC-ST System User's Manual.

3.1 Performance Specifications

This section explains the performance specifications of the head module.

Item		Specifications
PROFIBUS-DP station type		Slave station (compliant with EN50170 Volume 2 (Part 1, 2, 3, 4, 8))
Applicable FDL address		0 to 99 ＊1
Maximum input/output points		32-point mode/64-point mode/128-point mode/256-point mode
I/O data size		Varies depending on the maximum input output points. (Refer to (1) in this section)
Maximum number of connected slice modules		—
	In 32-point mode	14 modules ＊2
	In 64-point mode	30 modules ＊2
	In 128-point mode	62 modules ＊2
	In 256-point mode	63 modules ＊2
Number of occupied I/O points		4 input and 4 output points
Number of occupied slices		2
Information amount	Input data	Br.n: Number of occupancy 4, Er.n: Number of occupancy 4, Mr.n: Number of occupancy 2, Wr.n: Number of occupancy 0
	Output data	Bw.n: Number of occupancy 4, Ew.n: Number of occupancy 4, Ww.n: Number of occupancy 0
Transmission specifications		—
	Electrical standards and characteristics	EIA-RS485 compliant
	Applicable cable	Shielded twisted pair cable (Type A) ＊3
	Network configuration	Bus type (tree type when repeaters are used)
	Data link method	Polling
	Transmission encoding method	NRZ
	Transmission speed ＊4	9.6kbps to 12Mbps (refer to (2) in this section)
	Transmission distance	Varies depending on the transmission speed. (refer to (2) in this section)
	Maximum number of repeaters	3 repeaters per network
	Maximum number of stations	32 stations (including repeaters) per segment
	Number of connection nodes	32 nodes per segment
5V DC internal current consumption		0.530A
External dimensions		114.5 (4.51 in.) (H) × 50.5 (1.99 in.) (W) × 74.5 (2.93 in.) (D) [mm]
Weight		0.10 kg

＊1: Factory-set to "FDL address 0".
＊2: Configure the system within the range where the conditions in Section 6.1 (1) are satisfied.
＊3: Refer to Section 5.5.1 for details of the cable.
＊4: Within ±0.3% for transmission speed control (EN50170 Volume 2 compliant)

(1) I/O data sizes

The following table indicates the data sizes for maximum input/output points.
Refer to Section 3.2.1 and Section 3.2.2 for the I/O data offset addresses.

Item \ Maximum input/output points	32-point mode		64-point mode		128-point mode		256-point mode	
	Input	Output	Input	Output	Input	Output	Input	Output
Bit I/O points	32 bits	32 bits	64 bits	64 bits	128 bits	128 bits	256 bits	256 bits
Word I/O points	Max. 52 words (Variable)	Max. 52 words (Variable)	Max. 52 words (Variable)	Max. 52 words (Variable)	Max. 52 words (Variable)	Max. 52 words (Variable)	Max. 32 words (Variable)	Max. 32 words (Variable)
Request/Information area	14 bytes	14 bytes	20 bytes	20 bytes	32 bytes	32 bytes	56 bytes	56 bytes
Total	Max. 122 bytes	Max. 122 bytes	Max. 132 bytes	Max. 132 bytes	Max. 152 bytes	Max. 152 bytes	Max. 152 bytes	Max. 152 bytes

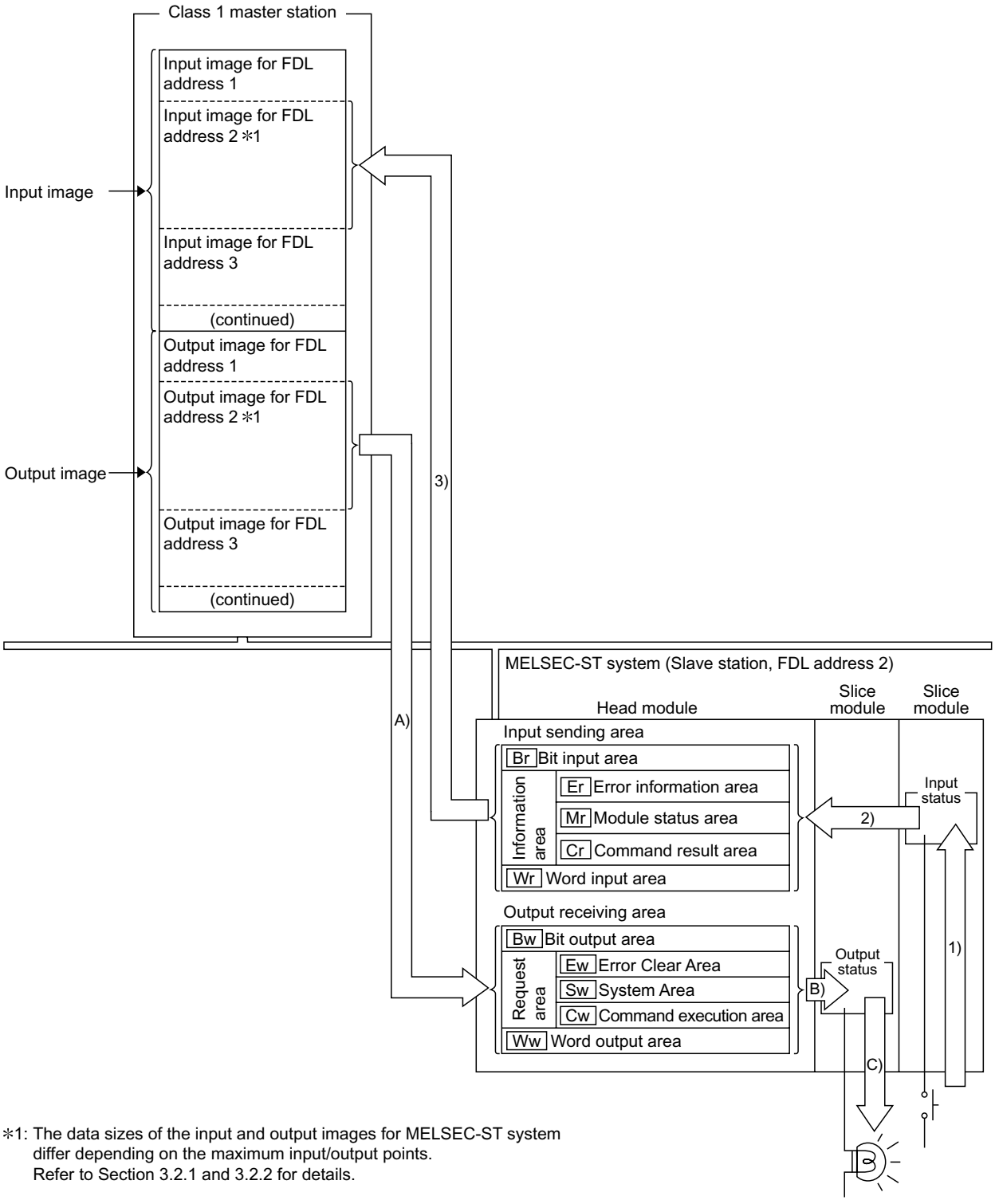
(2) Transmission distance

Transmission speed	Transmission distance [m/segment]	Maximum transmission distance when using repeater [m/network] ∗1
9.6kbps	1200m(3937 ft.)/segment	4800m(15748 ft.)/network
19.2kbps		
45.45kbps		
93.75kbps		
187.5kbps	1000m(3281 ft.)/segment	4000m(13123 ft.)/network
500kbps	400m(1312 ft.)/segment	1600m(5249 ft.)/network
1.5Mbps	200m(656 ft.)/segment	800m(2625 ft.)/network
3Mbps	100m(328 ft.)/segment	400m(1312 ft.)/network
6Mbps		
12Mbps		

∗1: The maximum transmission distance in the above table is based on the example of using 3 repeaters.
Use the following expression when increasing the transmission distance using repeaters.
Maximum transmission distance [m/number of networks] =
(number of repeaters + 1) × transmission distance [m/segment]

3.2 Communication between Master Station and MELSEC-ST System

For communication between the master station and MELSEC-ST system, use input data sent from the head module to the master station and output data sent from the master station to the head module.



*1: The data sizes of the input and output images for MELSEC-ST system differ depending on the maximum input/output points.
Refer to Section 3.2.1 and 3.2.2 for details.

[Processing outline of MELSEC-ST system → Master station]

1) The status data of the external device are imported to the input status area of the slice module.
2) The input status data of each slice module is stored into the input sending area of the head module.
3) The input data in the input sending area is sent to the corresponding input image area in the master station.

[Processing outline of Master station → MELSEC-ST system]

A) The corresponding output image is sent from the master station to the head module.
B) The output data received in the output receiving area of the head module is refreshed to the output status area of the corresponding slice module.
C) The output status data of the slice module is output to the external device.

(1) Input data

The following table indicates the construction of input data.
Refer to Section 3.2.1 and Section 3.2.3 for the data sizes of input data, the details of the areas, and the areas used by the head module.

Data name			Description
Input data	Br Bit input area		Stores the ON/OFF information of Br.n Bit inputs entered from the head module and slice modules.
	Information area	Er Error information area	Stores the statuses (error information) of the head module and slice modules.
		Mr Module status area	Stores the information of the slice modules recognized by the head module.
		Cr Command result area	Stores the results of executing a command to the head module or corresponding slice module.
	Wr Word input area		Stores Wr.n Word input values received from the intelligent function modules in order of the mounted position.

(2) Output data

The following table indicates the construction of output data.
Refer to Section 3.2.2 and Section 3.2.3 for the data sizes of output data, the details of the areas, and the areas used by the head module.

Data name			Description
Output data	Bw Bit output area		Stores the ON/OFF information of Bw.n Bit outputs provided to the head module and slice modules.
	Request area	Ew Error clear area	Stores the error information clear requests of the head module and slice modules.
		Sw System area	System area used by the head module.
		Cw Command execution area	Stores the command for controlling the head module or corresponding slice module.
	Ww Word output area		Stores Ww.n Word output values sent to the intelligent function modules in order of the mounted position.

3.2.1 Input data specifications

This section explains the data sizes of input data and the details of each area.

POINT
In this manual, input data addresses (input image addresses on the master station side) are indicated as offset addresses (word unit). [Offset address] Denotes a data position in word units, relative to the first address of the input image assigned for the MELSEC-ST system on the master station side.

(1) Input data sizes

The input data sizes differ depending on the setting of the maximum I/O points.
The input data sizes for the maximum I/O points are indicated below.
Refer to Section 6.1 for details of the maximum I/O points.

(a) 32-point mode

Offset address (Decimal)	Application		Data size	
+0 +1	Br.00 to Br.1F	Br Bit input area	2 words	・・・Refer to (2) in this section.
+2 +3	Er.00 to Er.1F	Er Error information area	2 words	・・・Refer to (3) in this section.
+4	Mr.0 to Mr.15	Mr Module status area	1 word	・・・Refer to (4) in this section.
+5 to +8	Cr.0 to Cr.3	Cr Command result area	4 words	・・・Refer to (5) in this section.
+9 to +60	Wr.00 to Wr.33	Wr Word input area	Minimum size : 0 words Maximum size: 52 words	Size variable ∗1・・・Refer to (6) in this section.

∗1: The data size of the Wr Word input area is a sum total of the Wr Word input area sizes used by the mounted intelligent function modules.
This data size is 0 when no intelligent function modules are mounted.

(b) 64-point mode

Offset address (Decimal)	Application		Data size	
+0 to +3	Br.00 to Br.3F	Br Bit input area	4 words	・・・Refer to (2) in this section.
+4 to +7	Er.00 to Er.3F	Er Error information area	4 words	・・・Refer to (3) in this section.
+8 to +9	Mr.0 to Mr.31	Mr Module status area	2 words	・・・Refer to (4) in this section.
+10 to +13	Cr.0 to Cr.3	Cr Command result area	4 words	・・・Refer to (5) in this section.
+14 to +65	Wr.00 to Wr.33	Wr Word input area	Minimum size : 0 words Maximum size: 52 words	Size variable ∗1 ・・・Refer to (6) in this section.

∗1: The data size of the Wr Word input area is a sum total of the Wr Word input area sizes used by the mounted intelligent function modules.
This data size is 0 when no intelligent function modules are mounted.

(c) 128-point mode

Offset address (Decimal)	Application		Data size	
+0 to +7	Br.00 to Br.7F	Br Bit input area	8 words	・・・Refer to (2) in this section.
+8 to +15	Er.00 to Er.7F	Er Error information area	8 words	・・・Refer to (3) in this section.
+16 to +19	Mr.0 to Mr.63	Mr Module status area	4 words	・・・Refer to (4) in this section.
+20 to +23	Cr.0 to Cr.3	Cr Command result area	4 words	・・・Refer to (5) in this section.
+24 to +75	Wr.00 to Wr.33	Wr Word input area	Minimum size : 0 words Maximum size: 52 words	Size variable ∗1 ・・・Refer to (6) in this section.

∗1: The data size of the Wr Word input area is a sum total of the Wr Word input area sizes used by the mounted intelligent function modules.
This data size is 0 when no intelligent function modules are mounted.

(d) 256-point mode

Offset address (Decimal)	Application		Data size	
+0 to +15	Br.00 to Br.FF	Br Bit input area	16 words	・・・Refer to (2) in this section.
+16 to +31	Er.00 to Er.FF	Er Error information area	16 words	・・・Refer to (3) in this section.
+32 to +39	Mr.0 to Mr.127	Mr Module status area	8 words	・・・Refer to (4) in this section.
+40 to +43	Cr.0 to Cr.3	Cr Command result area	4 words	・・・Refer to (5) in this section.
+44 to +95	Wr.00 to Wr.1F	Wr Word input area	Minimum size : 0 words Maximum size: 32 words	Size variable ∗1・・・Refer to (6) in this section.

∗1: The data size of the Wr Word input area is a sum total of the Wr Word input area sizes used by the mounted intelligent function modules.
This data size is 0 when no intelligent function modules are mounted.

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(2) Br Bit input area

The Br Bit input area stores the ON/OFF information of the Br.n bit inputs entered from the head module and slice modules.
Each of the head module and slice modules occupies 2 bits per slice.
The construction of the Br Bit input area is shown below.

Maximum input/output points																
256-point mode	128-point mode	64-point mode	32-point mode													
				b15												b0
				Br.0F	Br.0E	Br.0D	Br.0C	Br.0B	Br.0A	Br.09	Br.08	Br.07	Br.06	Br.05	Br.04	Br.03	Br.02	Br.01	Br.00
			Used area	7		6		5		4		3		2		1		0	
				Br.1F	Br.1E	Br.1D	Br.1C	Br.1B	Br.1A	Br.19	Br.18	Br.17	Br.16	Br.15	Br.14	Br.13	Br.12	Br.11	Br.10
		Used area		15		14		13		12		11		10		9		8	
				Br.2F	Br.2E	Br.2D	Br.2C	Br.2B	Br.2A	Br.29	Br.28	Br.27	Br.26	Br.25	Br.24	Br.23	Br.22	Br.21	Br.20
				23		22		21		20		19		18		17		16	
				Br.3F	Br.3E	Br.3D	Br.3C	Br.3B	Br.3A	Br.39	Br.38	Br.37	Br.36	Br.35	Br.34	Br.33	Br.32	Br.31	Br.30
	Used area			31		30		29		28		27		26		25		24	
				Br.4F	Br.4E	Br.4D	Br.4C	Br.4B	Br.4A	Br.49	Br.48	Br.47	Br.46	Br.45	Br.44	Br.43	Br.42	Br.41	Br.40
				39		38		37		36		35		34		33		32	
				Br.5F	Br.5E	Br.5D	Br.5C	Br.5B	Br.5A	Br.59	Br.58	Br.57	Br.56	Br.55	Br.54	Br.53	Br.52	Br.51	Br.50
				47		46		45		44		43		42		41		40	
				Br.6F	Br.6E	Br.6D	Br.6C	Br.6B	Br.6A	Br.69	Br.68	Br.67	Br.66	Br.65	Br.64	Br.63	Br.62	Br.61	Br.60
				55		54		53		52		51		50		49		48	
				Br.7F	Br.7E	Br.7D	Br.7C	Br.7B	Br.7A	Br.79	Br.78	Br.77	Br.76	Br.75	Br.74	Br.73	Br.72	Br.71	Br.70
Used area				63		62		61		60		59		58		57		56	
				Br.8F	Br.8E	Br.8D	Br.8C	Br.8B	Br.8A	Br.89	Br.88	Br.87	Br.86	Br.85	Br.84	Br.83	Br.82	Br.81	Br.80
				71		70		69		68		67		66		65		64	
				Br.9F	Br.9E	Br.9D	Br.9C	Br.9B	Br.9A	Br.99	Br.98	Br.97	Br.96	Br.95	Br.94	Br.93	Br.92	Br.91	Br.90
				79		78		77		76		75		74		73		72	
				Br.AF	Br.AE	Br.AD	Br.AC	Br.AB	Br.AA	Br.A9	Br.A8	Br.A7	Br.A6	Br.A5	Br.A4	Br.A3	Br.A2	Br.A1	Br.A0
				87		86		85		84		83		82		81		80	
				Br.BF	Br.BE	Br.BD	Br.BC	Br.BB	Br.BA	Br.B9	Br.B8	Br.B7	Br.B6	Br.B5	Br.B4	Br.B3	Br.B2	Br.B1	Br.B0
				95		94		93		92		91		90		89		88	
				Br.CF	Br.CE	Br.CD	Br.CC	Br.CB	Br.CA	Br.C9	Br.C8	Br.C7	Br.C6	Br.C5	Br.C4	Br.C3	Br.C2	Br.C1	Br.C0
				103		102		101		100		99		98		97		96	
				Br.DF	Br.DE	Br.DD	Br.DC	Br.DB	Br.DA	Br.D9	Br.D8	Br.D7	Br.D6	Br.D5	Br.D4	Br.D3	Br.D2	Br.D1	Br.D0
				111		110		109		108		107		106		105		104	
				Br.EF	Br.EE	Br.ED	Br.EC	Br.EB	Br.EA	Br.E9	Br.E8	Br.E7	Br.E6	Br.E5	Br.E4	Br.E3	Br.E2	Br.E1	Br.E0
				119		118		117		116		115		114		113		112	
				Br.FF	Br.FE	Br.FD	Br.FC	Br.FB	Br.FA	Br.F9	Br.F8	Br.F7	Br.F6	Br.F5	Br.F4	Br.F3	Br.F2	Br.F1	Br.F0
				127		126		125		124		123		122		121		120	

Slice No.
Br Bit input area

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(3) Er Error information area

The Er Error information area stores the statuses (error information) of the head module and slice modules.

Each of the head module and slice modules occupies 2 bits per slice.

The construction of the Er Error information area is shown below.

Maximum input/output points				Slice No. / Er Error information area															
256-point mode	128-point mode	64-point mode	32-point mode	b15															b0
Used area	Used area	Used area	Used area	Er.0F	Er.0E	Er.0D	Er.0C	Er.0B	Er.0A	Er.09	Er.08	Er.07	Er.06	Er.05	Er.04	Er.03	Er.02	Er.01	Er.00
				7		6		5		4		3		2		1		0	
				Er.1F	Er.1E	Er.1D	Er.1C	Er.1B	Er.1A	Er.19	Er.18	Er.17	Er.16	Er.15	Er.14	Er.13	Er.12	Er.11	Er.10
				15		14		13		12		11		10		9		8	
				Er.2F	Er.2E	Er.2D	Er.2C	Er.2B	Er.2A	Er.29	Er.28	Er.27	Er.26	Er.25	Er.24	Er.23	Er.22	Er.21	Er.20
				23		22		21		20		19		18		17		16	
				Er.3F	Er.3E	Er.3D	Er.3C	Er.3B	Er.3A	Er.39	Er.38	Er.37	Er.36	Er.35	Er.34	Er.33	Er.32	Er.31	Er.30
				31		30		29		28		27		26		25		24	
				Er.4F	Er.4E	Er.4D	Er.4C	Er.4B	Er.4A	Er.49	Er.48	Er.47	Er.46	Er.45	Er.44	Er.43	Er.42	Er.41	Er.40
				39		38		37		36		35		34		33		32	
				Er.5F	Er.5E	Er.5D	Er.5C	Er.5B	Er.5A	Er.59	Er.58	Er.57	Er.56	Er.55	Er.54	Er.53	Er.52	Er.51	Er.50
				47		46		45		44		43		42		41		40	
				Er.6F	Er.6E	Er.6D	Er.6C	Er.6B	Er.6A	Er.69	Er.68	Er.67	Er.66	Er.65	Er.64	Er.63	Er.62	Er.61	Er.60
				55		54		53		52		51		50		49		48	
				Er.7F	Er.7E	Er.7D	Er.7C	Er.7B	Er.7A	Er.79	Er.78	Er.77	Er.76	Er.75	Er.74	Er.73	Er.72	Er.71	Er.70
				63		62		61		60		59		58		57		56	
				Er.8F	Er.8E	Er.8D	Er.8C	Er.8B	Er.8A	Er.89	Er.88	Er.87	Er.86	Er.85	Er.84	Er.83	Er.82	Er.81	Er.80
				71		70		69		68		67		66		65		64	
				Er.9F	Er.9E	Er.9D	Er.9C	Er.9B	Er.9A	Er.99	Er.98	Er.97	Er.96	Er.95	Er.94	Er.93	Er.92	Er.91	Er.90
				79		78		77		76		75		74		73		72	
				Er.AF	Er.AE	Er.AD	Er.AC	Er.AB	Er.AA	Er.A9	Er.A8	Er.A7	Er.A6	Er.A5	Er.A4	Er.A3	Er.A2	Er.A1	Er.A0
				87		86		85		84		83		82		81		80	
				Er.BF	Er.BE	Er.BD	Er.BC	Er.BB	Er.BA	Er.B9	Er.B8	Er.B7	Er.B6	Er.B5	Er.B4	Er.B3	Er.B2	Er.B1	Er.B0
				95		94		93		92		91		90		89		88	
				Er.CF	Er.CE	Er.CD	Er.CC	Er.CB	Er.CA	Er.C9	Er.C8	Er.C7	Er.C6	Er.C5	Er.C4	Er.C3	Er.C2	Er.C1	Er.C0
				103		102		101		100		99		98		97		96	
				Er.DF	Er.DE	Er.DD	Er.DC	Er.DB	Er.DA	Er.D9	Er.D8	Er.D7	Er.D6	Er.D5	Er.D4	Er.D3	Er.D2	Er.D1	Er.D0
				111		110		109		108		107		106		105		104	
				Er.EF	Er.EE	Er.ED	Er.EC	Er.EB	Er.EA	Er.E9	Er.E8	Er.E7	Er.E6	Er.E5	Er.E4	Er.E3	Er.E2	Er.E1	Er.E0
				119		118		117		116		115		114		113		112	
				Er.FF	Er.FE	Er.FD	Er.FC	Er.FB	Er.FA	Er.F9	Er.F8	Er.F7	Er.F6	Er.F5	Er.F4	Er.F3	Er.F2	Er.F1	Er.F0
				127		126		125		124		123		122		121		120	

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(4) Mr Module Status area

The Mr Module Status area stores the information of the slice modules recognized by the head module.
Each of the head module and slice modules occupies 1 bit per slice.
The construction of the Mr Module Status area is shown below.

Maximum input/output points																	
256-point mode	128-point mode	64-point mode	32-point mode	b15													b0
				Mr.15	Mr.14	Mr.13	Mr.12	Mr.11	Mr.10	Mr.9	Mr.8	Mr.7	Mr.6	Mr.5	Mr.4	Mr.3	Mr.2	Mr.1	Mr.0
			Used area	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
		Used area		Mr.31	Mr.30	Mr.29	Mr.28	Mr.27	Mr.26	Mr.25	Mr.24	Mr.23	Mr.22	Mr.21	Mr.20	Mr.19	Mr.18	Mr.17	Mr.16
	Used area			31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
				Mr.47	Mr.46	Mr.45	Mr.44	Mr.43	Mr.42	Mr.41	Mr.40	Mr.39	Mr.38	Mr.37	Mr.36	Mr.35	Mr.34	Mr.33	Mr.32
				47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
				Mr.63	Mr.62	Mr.61	Mr.60	Mr.59	Mr.58	Mr.57	Mr.56	Mr.55	Mr.54	Mr.53	Mr.52	Mr.51	Mr.50	Mr.49	Mr.48
Used area				63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
				Mr.79	Mr.78	Mr.77	Mr.76	Mr.75	Mr.74	Mr.73	Mr.72	Mr.71	Mr.70	Mr.69	Mr.68	Mr.67	Mr.66	Mr.65	Mr.64
				79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
				Mr.95	Mr.94	Mr.93	Mr.92	Mr.91	Mr.90	Mr.89	Mr.88	Mr.87	Mr.86	Mr.85	Mr.84	Mr.83	Mr.82	Mr.81	Mr.80
				95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80
				Mr.111	Mr.110	Mr.109	Mr.108	Mr.107	Mr.106	Mr.105	Mr.104	Mr.103	Mr.102	Mr.101	Mr.100	Mr.99	Mr.98	Mr.97	Mr.96
				111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96
				Mr.127	Mr.126	Mr.125	Mr.124	Mr.123	Mr.122	Mr.121	Mr.120	Mr.119	Mr.118	Mr.117	Mr.116	Mr.115	Mr.114	Mr.113	Mr.112
				127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112

Slice No.
Mr Module status

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(5) Cr Command result area

The Cr Command result area stores the results of executing a command to the head module or each slice module.
The values stored in the Cr Command execution area all turn to 0 when the Bw.03 Command execution request is turned off.
Refer to Chapter 8 for details of the commands.

(a) Construction of Cr Command result area

The construction of the Cr Command result area is shown below.

Maximum input/output points				b15 b8	b7 b0
256-point mode	128-point mode	64-point mode	32-point mode		
Used area	Used area	Used area	Used area	Cr.0(15-8) Command execution result	Cr.0(7-0) Start slice No. of execution target
				Cr.1 Executed command No.	
				Cr.2 Response data 1	
				Cr.3 Response data 2	

(b) Data stored into Cr Command result area

Data stored into the Cr Command result area are described below.

Cr Command result area		Information	Description
Cr.0	Cr.0 (15-8)	Command execution result	Stores the command execution result.
	Cr.0 (7-0)	Start slice No. of execution target	Stores the start slice No. of the execution target head module or slice module.
Cr.1		Executed command No.	Stores the command No. of the executed command.
Cr.2		Response data 1	Stores the response data from the execution target head module or slice module.
Cr.3		Response data 2	

(6) Wr Word input area

The Wr Word input area stores Wr.n Word input values received from the intelligent function modules in order of the mounted position.

(a) Construction of Wr Word input area

The construction of the Wr Word input area is shown below.

Maximum input/output points				b15 b0
256-point mode	128-point mode	64-point mode	32-point mode	
Used area	Used area	Used area	Used area	Wr.00 Intelligent function module word input data 1
				Wr.01 Intelligent function module word input data 2
				• • •
				Wr.1E Intelligent function module word input data 31
				Wr.1F Intelligent function module word input data 32
				• • •
				Wr.32 Intelligent function module word input data 51
				Wr.33 Intelligent function module word input data 52

(b) Data size of Wr Word input area

Calculate the data size of the Wr Word input area as described below according to the mounting conditions of the intelligent function modules.

1) When no intelligent function modules are used

The data size of the Wr Word input area is 0.

2) When intelligent function modules are used

Reserve the Wr Word input area for as many as the Wr.n Word input points used by the intelligent function modules.
The Wr Word input area is assigned in order of mounting the intelligent function modules.

<Wr Word input area assignment example>

1) System example

Start slice No.	Mounted module			
	Module type	Number of Occupied Slices	Wr.n Word input points	Wr Word input area
0	Head module	2	——	——
2	Bus refreshing module	1	——	——
3	Input module	1	——	——
4	Output module	1	——	——
5	Power feeding module	1	——	——
6	Intelligent function module 1)	2	2 words	Wr.00 Wr.01
8	Intelligent function module 2)	2	2 words	Wr.02 Wr.03
10	Intelligent function module 3)	2	2 words	Wr.04 Wr.05

2) Wr Word input area assignment example
In the system example in above 1), the Wr Word input area is assigned as shown below.

Wr.00 Intelligent function module 1) word input data 1
Wr.01 Intelligent function module 1) word input data 2
Wr.02 Intelligent function module 2) word input data 1
Wr.03 Intelligent function module 2) word input data 2
Wr.04 Intelligent function module 3) word input data 1
Wr.05 Intelligent function module 3) word input data 2

POINT

For the intelligent function module that can be operated by only the Ww.n Word output, the number of Wr.n Word input points can be changed to 0 by the slave parameter setting.
Refer to Section 6.1.4 for the setting in the case where the Wr.n Word input is not used for the intelligent function module.

3.2.2 Output data specifications

This section explains the data sizes of output data and the details of each area.

POINT
In this manual, output data addresses (output image addresses on the master station side) are indicated as offset addresses (word unit). [Offset address] Denotes a data position in word units, relative to the first address of the output image assigned for the MELSEC-ST system on the master station side.

(1) Output data sizes

The output data sizes differ depending on the setting of the maximum I/O points.
The output data sizes for the maximum I/O points are indicated below.
Refer to Section 6.1 for details of the maximum I/O points.

(a) 32-point mode

Offset address (Decimal)	Application		Data size	
+0	Bw.00 to Bw.1F	Bw Bit output area	2 words	・・・Refer to (2) in this section.
+1				
+2	Ew.00 to Ew.1F	Ew Error clear area	2 words	・・・Refer to (3) in this section.
+3				
+4	Sw.0	Sw System Area	1 words	・・・Refer to (4) in this section.
+5	Cw.0 to Cw.3	Cw Command execution area	4 words	・・・Refer to (5) in this section.
to				
+8				
+9	Ww.00 to Ww.33	Ww Word output area	Minimum size: 0 words Maximum size: 52 words	Size variable ∗1・・・Refer to (6) in this section.
to				
+60				

∗1: The data size of the Ww Word output area is a sum total of the Ww Word output area sizes used by the mounted intelligent function modules.
This data size is 0 when no intelligent function modules are mounted.

(b) 64-point mode

Offset address (Decimal)	Application		Data size	
+0				
to	Bw.00 to Bw.3F	Bw Bit output area	4 words	・・・Refer to (2) in this section.
+3				
+4				
to	Ew.00 to Ew.3F	Ew Error clear area	4 words	・・・Refer to (3) in this section.
+7				
+8	Sw.0 to Sw.1	Sw System Area	2 words	・・・Refer to (4) in this section.
+9				
+10				
to	Cw.0 to Cw.3	Cw Command execution area	4 words	・・・Refer to (5) in this section.
+13				
+14				
to	Ww.00 to Ww.33	Ww Word output area	Minimum size: 0 words Maximum size: 52 words	Size variable ∗1・・・Refer to (6) in this section.
+65				

∗1: The data size of the Ww Word output area is a sum total of the Ww Word output area sizes used by the mounted intelligent function modules.
This data size is 0 when no intelligent function modules are mounted.

(c) 128-point mode

Offset address (Decimal)	Application		Data size	
+0				
to	Bw.00 to Bw.7F	Bw Bit output area	8 words	・・・Refer to (2) in this section.
+7				
+8				
to	Ew.00 to Ew.7F	Ew Error clear area	8 words	・・・Refer to (3) in this section.
+15				
+16				
to	Sw.0 to Sw.3	Sw System Area	4 words	・・・Refer to (4) in this section.
+19				
+20				
to	Cw.0 to Cw.3	Cw Command execution area	4 words	・・・Refer to (5) in this section.
+23				
+24				
to	Ww.00 to Ww.33	Ww Word output area	Minimum size: 0 words Maximum size: 52 words	Size variable ∗1・・・Refer to (6) in this section.
+75				

∗1: The data size of the Ww Word output area is a sum total of the Ww Word output area sizes used by the mounted intelligent function modules.
This data size is 0 when no intelligent function modules are mounted.

(d) 256-point mode

Offset address (Decimal)	Application		Data size	
+0 to +15	Bw.00 to Bw.FF	Bw Bit output area	16 words	・・・Refer to (2) in this section.
+16 to +31	Ew.00 to Ew.FF	Ew Error clear area	16 words	・・・Refer to (3) in this section.
+32 to +39	Sw.0 to Sw.7	Sw System Area	8 words	・・・Refer to (4) in this section.
+40 to +43	Cw.0 to Cw.3	Cw Command execution area	4 words	・・・Refer to (5) in this section.
+44 to +95	Ww.00 to Ww.1F	Ww Word output area	Minimum size: 0 words Maximum size: 32 words	Size variable ∗1 ・・・Refer to (6) in this section.

∗1: The data size of the Ww Word output area is a sum total of the Ww Word output area sizes used by the mounted intelligent function modules.
This data size is 0 when no intelligent function modules are mounted.

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(2) Bw Bit output area

The Bw Bit output area stores the ON/OFF information of the Bw.n Bit outputs provided to the head module and slice modules.
Each of the head module and slice modules occupies 2 bits per slice.
The construction of the Bw Bit output area is shown below.

Maximum input/output points				Slice No. / Bw Bit output area															
256-point mode	128-point mode	64-point mode	32-point mode	b15															b0
Used area	Used area	Used area	Used area	Bw.0F	Bw.0E	Bw.0D	Bw.0C	Bw.0B	Bw.0A	Bw.09	Bw.08	Bw.07	Bw.06	Bw.05	Bw.04	Bw.03	Bw.02	Bw.01	Bw.00
				7		6		5		4		3		2		1		0	
				Bw.1F	Bw.1E	Bw.1D	Bw.1C	Bw.1B	Bw.1A	Bw.19	Bw.18	Bw.17	Bw.16	Bw.15	Bw.14	Bw.13	Bw.12	Bw.11	Bw.10
				15		14		13		12		11		10		9		8	
				Bw.2F	Bw.2E	Bw.2D	Bw.2C	Bw.2B	Bw.2A	Bw.29	Bw.28	Bw.27	Bw.26	Bw.25	Bw.24	Bw.23	Bw.22	Bw.21	Bw.20
				23		22		21		20		19		18		17		16	
				Bw.3F	Bw.3E	Bw.3D	Bw.3C	Bw.3B	Bw.3A	Bw.39	Bw.38	Bw.37	Bw.36	Bw.35	Bw.34	Bw.33	Bw.32	Bw.31	Bw.30
				31		30		29		28		27		26		25		24	
				Bw.4F	Bw.4E	Bw.4D	Bw.4C	Bw.4B	Bw.4A	Bw.49	Bw.48	Bw.47	Bw.46	Bw.45	Bw.44	Bw.43	Bw.42	Bw.41	Bw.40
				39		38		37		36		35		34		33		32	
				Bw.5F	Bw.5E	Bw.5D	Bw.5C	Bw.5B	Bw.5A	Bw.59	Bw.58	Bw.57	Bw.56	Bw.55	Bw.54	Bw.53	Bw.52	Bw.51	Bw.50
				47		46		45		44		43		42		41		40	
				Bw.6F	Bw.6E	Bw.6D	Bw.6C	Bw.6B	Bw.6A	Bw.69	Bw.68	Bw.67	Bw.66	Bw.65	Bw.64	Bw.63	Bw.62	Bw.61	Bw.60
				55		54		53		52		51		50		49		48	
				Bw.7F	Bw.7E	Bw.7D	Bw.7C	Bw.7B	Bw.7A	Bw.79	Bw.78	Bw.77	Bw.76	Bw.75	Bw.74	Bw.73	Bw.72	Bw.71	Bw.70
				63		62		61		60		59		58		57		56	
				Bw.8F	Bw.8E	Bw.8D	Bw.8C	Bw.8B	Bw.8A	Bw.89	Bw.88	Bw.87	Bw.86	Bw.85	Bw.84	Bw.83	Bw.82	Bw.81	Bw.80
				71		70		69		68		67		66		65		64	
				Bw.9F	Bw.9E	Bw.9D	Bw.9C	Bw.9B	Bw.9A	Bw.99	Bw.98	Bw.97	Bw.96	Bw.95	Bw.94	Bw.93	Bw.92	Bw.91	Bw.90
				79		78		77		76		75		74		73		72	
				Bw.AF	Bw.AE	Bw.AD	Bw.AC	Bw.AB	Bw.AA	Bw.A9	Bw.A8	Bw.A7	Bw.A6	Bw.A5	Bw.A4	Bw.A3	Bw.A2	Bw.A1	Bw.A0
				87		86		85		84		83		82		81		80	
				Bw.BF	Bw.BE	Bw.BD	Bw.BC	Bw.BB	Bw.BA	Bw.B9	Bw.B8	Bw.B7	Bw.B6	Bw.B5	Bw.B4	Bw.B3	Bw.B2	Bw.B1	Bw.B0
				95		94		93		92		91		90		89		88	
				Bw.CF	Bw.CE	Bw.CD	Bw.CC	Bw.CB	Bw.CA	Bw.C9	Bw.C8	Bw.C7	Bw.C6	Bw.C5	Bw.C4	Bw.C3	Bw.C2	Bw.C1	Bw.C0
				103		102		101		100		99		98		97		96	
				Bw.DF	Bw.DE	Bw.DD	Bw.DC	Bw.DB	Bw.DA	Bw.D9	Bw.D8	Bw.D7	Bw.D6	Bw.D5	Bw.D4	Bw.D3	Bw.D2	Bw.D1	Bw.D0
				111		110		109		108		107		106		105		104	
				Bw.EF	Bw.EE	Bw.ED	Bw.EC	Bw.EB	Bw.EA	Bw.E9	Bw.E8	Bw.E7	Bw.E6	Bw.E5	Bw.E4	Bw.E3	Bw.E2	Bw.E1	Bw.E0
				119		118		117		116		115		114		113		112	
				Bw.FF	Bw.FE	Bw.FD	Bw.FC	Bw.FB	Bw.FA	Bw.F9	Bw.F8	Bw.F7	Bw.F6	Bw.F5	Bw.F4	Bw.F3	Bw.F2	Bw.F1	Bw.F0
				127		126		125		124		123		122		121		120	

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(3) Ew Error clear area

The Ew Error clear area stores the error information clear requests of the head module and slice modules.

This area is used to clear the corresponding error information (turn off the bit) of the head module or slice module after the error is remedied.

Each of the head module and slice modules occupies 2 bits per slice.

The construction of the Ew Error clear area is shown below.

Maximum input/output points																
256-point mode	128-point mode	64-point mode	32-point mode													
				b15												b0
				Ew.0F	Ew.0E	Ew.0D	Ew.0C	Ew.0B	Ew.0A	Ew.09	Ew.08	Ew.07	Ew.06	Ew.05	Ew.04	Ew.03	Ew.02	Ew.01	Ew.00
			Used area	7		6		5		4		3		2		1		0	
				Ew.1F	Ew.1E	Ew.1D	Ew.1C	Ew.1B	Ew.1A	Ew.19	Ew.18	Ew.17	Ew.16	Ew.15	Ew.14	Ew.13	Ew.12	Ew.11	Ew.10
		Used area		15		14		13		12		11		10		9		8	
				Ew.2F	Ew.2E	Ew.2D	Ew.2C	Ew.2B	Ew.2A	Ew.29	Ew.28	Ew.27	Ew.26	Ew.25	Ew.24	Ew.23	Ew.22	Ew.21	Ew.20
				23		22		21		20		19		18		17		16	
				Ew.3F	Ew.3E	Ew.3D	Ew.3C	Ew.3B	Ew.3A	Ew.39	Ew.38	Ew.37	Ew.36	Ew.35	Ew.34	Ew.33	Ew.32	Ew.31	Ew.30
	Used area			31		30		29		28		27		26		25		24	
				Ew.4F	Ew.4E	Ew.4D	Ew.4C	Ew.4B	Ew.4A	Ew.49	Ew.48	Ew.47	Ew.46	Ew.45	Ew.44	Ew.43	Ew.42	Ew.41	Ew.40
				39		38		37		36		35		34		33		32	
				Ew.5F	Ew.5E	Ew.5D	Ew.5C	Ew.5B	Ew.5A	Ew.59	Ew.58	Ew.57	Ew.56	Ew.55	Ew.54	Ew.53	Ew.52	Ew.51	Ew.50
				47		46		45		44		43		42		41		40	
				Ew.6F	Ew.6E	Ew.6D	Ew.6C	Ew.6B	Ew.6A	Ew.69	Ew.68	Ew.67	Ew.66	Ew.65	Ew.64	Ew.63	Ew.62	Ew.61	Ew.60
				55		54		53		52		51		50		49		48	
				Ew.7F	Ew.7E	Ew.7D	Ew.7C	Ew.7B	Ew.7A	Ew.79	Ew.78	Ew.77	Ew.76	Ew.75	Ew.74	Ew.73	Ew.72	Ew.71	Ew.70
Used area				63		62		61		60		59		58		57		56	
				Ew.8F	Ew.8E	Ew.8D	Ew.8C	Ew.8B	Ew.8A	Ew.89	Ew.88	Ew.87	Ew.86	Ew.85	Ew.84	Ew.83	Ew.82	Ew.81	Ew.80
				71		70		69		68		67		66		65		64	
				Ew.9F	Ew.9E	Ew.9D	Ew.9C	Ew.9B	Ew.9A	Ew.99	Ew.98	Ew.97	Ew.96	Ew.95	Ew.94	Ew.93	Ew.92	Ew.91	Ew.90
				79		78		77		76		75		74		73		72	
				Ew.AF	Ew.AE	Ew.AD	Ew.AC	Ew.AB	Ew.AA	Ew.A9	Ew.A8	Ew.A7	Ew.A6	Ew.A5	Ew.A4	Ew.A3	Ew.A2	Ew.A1	Ew.A0
				87		86		85		84		83		82		81		80	
				Ew.BF	Ew.BE	Ew.BD	Ew.BC	Ew.BB	Ew.BA	Ew.B9	Ew.B8	Ew.B7	Ew.B6	Ew.B5	Ew.B4	Ew.B3	Ew.B2	Ew.B1	Ew.B0
				95		94		93		92		91		90		89		88	
				Ew.CF	Ew.CE	Ew.CD	Ew.CC	Ew.CB	Ew.CA	Ew.C9	Ew.C8	Ew.C7	Ew.C6	Ew.C5	Ew.C4	Ew.C3	Ew.C2	Ew.C1	Ew.C0
				103		102		101		100		99		98		97		96	
				Ew.DF	Ew.DE	Ew.DD	Ew.DC	Ew.DB	Ew.DA	Ew.D9	Ew.D8	Ew.D7	Ew.D6	Ew.D5	Ew.D4	Ew.D3	Ew.D2	Ew.D1	Ew.D0
				111		110		109		108		107		106		105		104	
				Ew.EF	Ew.EE	Ew.ED	Ew.EC	Ew.EB	Ew.EA	Ew.E9	Ew.E8	Ew.E7	Ew.E6	Ew.E5	Ew.E4	Ew.E3	Ew.E2	Ew.E1	Ew.E0
				119		118		117		116		115		114		113		112	
				Ew.FF	Ew.FE	Ew.FD	Ew.FC	Ew.FB	Ew.FA	Ew.F9	Ew.F8	Ew.F7	Ew.F6	Ew.F5	Ew.F4	Ew.F3	Ew.F2	Ew.F1	Ew.F0
				127		126		125		124		123		122		121		120	

Slice No.

Ew Error clear area

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(4) Sw System area

The Sw System area is used by the head module system.
Store 0 (fixed) into the Sw System area.
The construction of the Sw System area is shown below.

<table>
<tr><th colspan="4">Maximum input/output points</th><th rowspan="2">b15 b0</th></tr>
<tr><th>256-point mode</th><th>128-point mode</th><th>64-point mode</th><th>32-point mode</th></tr>
<tr><td rowspan="8">Used area</td><td rowspan="3">Used area</td><td rowspan="2">Used area</td><td>Used area</td><td>Sw.0 System Area 1</td></tr>
<tr><td></td><td>Sw.1 System Area 2</td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>Sw.2 System Area 3</td></tr>
<tr><td>Sw.3 System Area 4</td></tr>
<tr><td colspan="3" rowspan="4"></td><td>Sw.4 System Area 5</td></tr>
<tr><td>Sw.5 System Area 6</td></tr>
<tr><td>Sw.6 System Area 7</td></tr>
<tr><td>Sw.7 System Area 8</td></tr>
</table>

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(5) Cw Command execution area

The Cw Command execution area stores the information of the command to be executed for the head module or each slice module.
Refer to Chapter 8 for details of the commands.

(a) Construction of Cw Command execution area

The construction of the Cw Command execution area is shown below.

Maximum input/output points				b15 b0
256-point mode	128-point mode	64-point mode	32-point mode	
Used area	Used area	Used area	Used area	Cw.0 Start slice No. of execution target
				Cw.1 Command No. to be executed
				Cw.2 Argument 1
				Cw.3 Argument 2

(b) Data stored into Cw Command execution area

Data stored into the Cw Command execution area are described below.

Cw Command execution area	Information	Description
Cw.0	Start slice No. of execution target	Stores the start slice No. of the execution target head module or slice module.
Cw.1	Command No. to be executed	Stores the command No. of the command to be executed.
Cw.2	Argument 1	Stores the argument used in the command.
Cw.3	Argument 2	

(6) Ww Word output area

Stores the Ww.n Word output values of the intelligent function modules in order of the mounted position.

(a) Construction of Ww Word output area

The construction of the Ww Word output area is shown below.

Maximum input/output points				b15 b0
256-point mode	128-point mode	64-point mode	32-point mode	
Used area	Used area	Used area	Used area	Ww.00 Intelligent function module word input data 1
				Ww.01 Intelligent function module word input data 2
				• • •
				Ww.1E Intelligent function module word input data 31
				Ww.1F Intelligent function module word input data 32
				• • •
				Ww.32 Intelligent function module word input data 51
				Ww.33 Intelligent function module word input data 52

(b) Data size of Ww Word output area

Calculate the data size of the Ww Word output area as described below according to the mounting conditions of the intelligent function modules.

1) When no intelligent function modules are used

The data size of the Ww Word output area is 0.

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2) When intelligent function modules are used

Reserve the Ww Word output area for as many as the Ww.n Word output points used by the intelligent function modules.
The Ww Word output area is assigned in order of mounting the intelligent function modules.

<Ww Word output area assignment example>

1) System example

Start slice No.	Mounted module			
	Module type	Number of Occupied Slices	Ww.n Word output points	Ww Word output area
0	Head module	2	——	——
2	Bus refreshing module	1	——	——
3	Input module	1	——	——
4	Output module	1	——	——
5	Power feeding module	1	——	——
6	Intelligent function module 1)	2	2 words	Ww.00 Ww.01
8	Intelligent function module 2)	2	2 words	Ww.02 Ww.03
10	Intelligent function module 3)	2	2 words	Ww.04 Ww.05

2) Ww Word output area assignment example
In the system example in above 1), the Ww Word output area is assigned as shown below.

Ww.00 Intelligent function module 1) word output data 1
Ww.01 Intelligent function module 1) word output data 2
Ww.02 Intelligent function module 2) word output data 1
Ww.03 Intelligent function module 2) word output data 2
Ww.04 Intelligent function module 3) word output data 1
Ww.05 Intelligent function module 3) word output data 2

POINT

For the intelligent function module that can be operated by only the Wr.n Word input, the number of Ww.n Word output points can be changed to 0 by the slave parameter setting.
Refer to Section 6.1.4 for the setting in the case where the Ww.n Word output is not used for the intelligent function module.

3.2.3 I/O data used by head module

This section explains the areas used for I/O data by the head module and their applications and information.

REMARK

For the applications of the areas assigned to each slice module, refer to the manual of each slice module.

(1) Input data

(a) Br Bit input area

The following table describes the applications of the Br Bit input area used by the head module.
The head module uses the first 4 bits (Br.00 to Br.03) of the Br Bit input area.

Br.n Bit input	Application	Br.n Bit input status
Br.00	Module READY Stores the information on whether the head module can communicate with the master station.	0: MELSEC-ST system being prepared or error occurred 1: MELSEC-ST system ready
Br.01	Forced output test mode Stores the information on whether the head module is in the forced output test mode.	0: Waiting for forced output test mode to be executed 1: Forced output test mode being executed
Br.02	Online module change (OMC) Stores the information on whether the MELSEC-ST system is ready for online module change.	0: Waiting for online module change to be executed 1: Online module change being executed
Br.03	Command execution Stores the information on the execution status of the command requested in the Cw Command execution area.	0: Command being executed or waiting for command request 1: Command execution

0: OFF, 1: ON

(b) Er Error information area

The following table indicates the information of the Er Error information area used by the head module and the error codes corresponding to the error information.

The head module uses the first 4 bits (Er.00 to Er.03) of the Er Error information area.

Read the error code from the head module by any of the following methods. (Refer to Section 9.2.1)

- Extended diagnostic information notification function
- Command
- GX Configurator-ST

The stored error information can be cleared by turning ON the Ew.00 Error Clear Request.

Er.n Error information				Information	Error code *1
Er.03	Er.02	Er.01	Er.00		
0	0	0	0	Normal	—
0	0	0	1	FDL address change error	F201H
1	0	1	1	User parameter setting error	F203H
1	1	0	0	Module error	F200H
1	1	0	1	Parameter read error (Online module change)	C101H to C13FH
1	1	1	0	Replaced module error (Online module change)	C201H to C23FH

0: OFF, 1: ON

*1: Refer to Section 9.2.2 for the error codes.

(c) Mr Module status area

The following table indicates the information of the Mr Module status area used by the head module.

The head module uses the first 2 bits (Mr.0 to Mr.1) of the Mr Module status area.

Mr.n Module status		Information	Description
Mr.1	Mr.0		
0	0	Hardware fault	A hardware fault occurred in the head module.
1	1	Normal	The head module is operating normally.

0: OFF, 1: ON

(2) Output data

(a) Bw Bit output area

The following table describes the applications of the Bw Bit output area used by the head module.

The head module uses the first 4 bits (Bw.00 to Bw.03) of the Bw Bit output area.

Bw.n Bit output	Application	Bw.n Bit output status
Bw.00	System area Use prohibited	0 (Fixed)
Bw.01		
Bw.02		
Bw.03	Command request The command sent from the master station is requested to be executed.	0: Command not requested 1: Command requested

0: OFF, 1: ON

(b) Ew Error clear area

1) Ew Error clear area of each slice module

The error clear request bit of each slice module is the first bit of the assigned Ew Error clear area.

<Example>

When the number of occupied slices is "4" and the start slice No. is "66", the error clear request bit is Ew.84

Ew.8B	Ew.8A	Ew.89	Ew.88	Ew.87	Ew.86	Ew.85	Ew.84	Ew.n Error clear
System Area (Use prohibited)							Error clear request	Application
69		68		67		66		Slice No.

2) Ew Error clear area of head module

The following table indicates the information of the Ew Error clear area used by the head module.

The head module uses the first 4 bits (Ew.00 to Ew.03) of the Ew Error clear area.

Ew.n Error clear	Application	Ew.n Error clear status
Ew.00	Error clear request Stores the error information clear request of the head module.	0: Error clear not requested 1: Error clear requested
Ew.01	System area Use prohibited	0 (Fixed)
Ew.02		
Ew.03		

0: OFF, 1: ON

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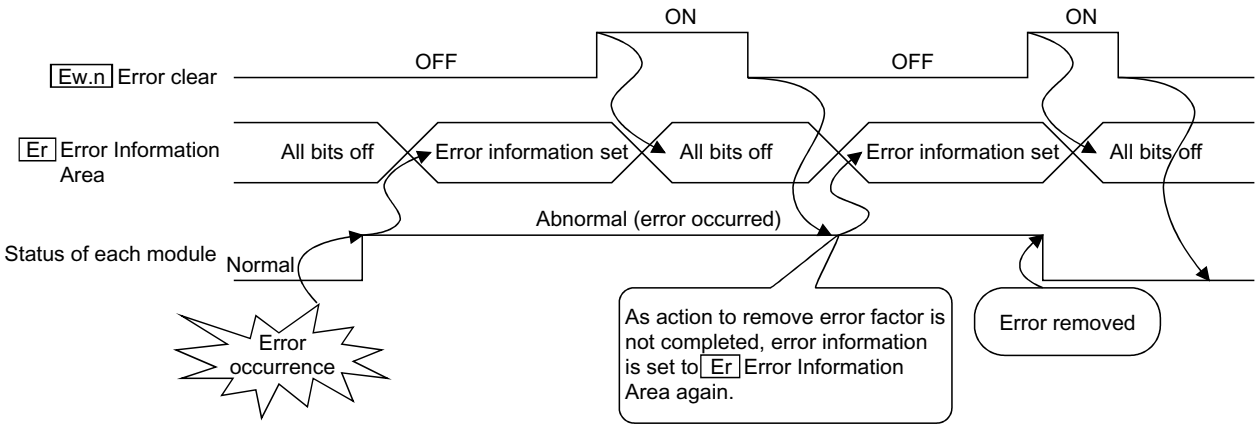
3) Precautions for using the Ew.n error clear

If an error cause has not yet been eliminated when the error clear request bit is turned off, the error information is set to the Er Error information area again.
(While the Ew.n Error clear is on, the corresponding bits of the Er Error information area all turn off.)



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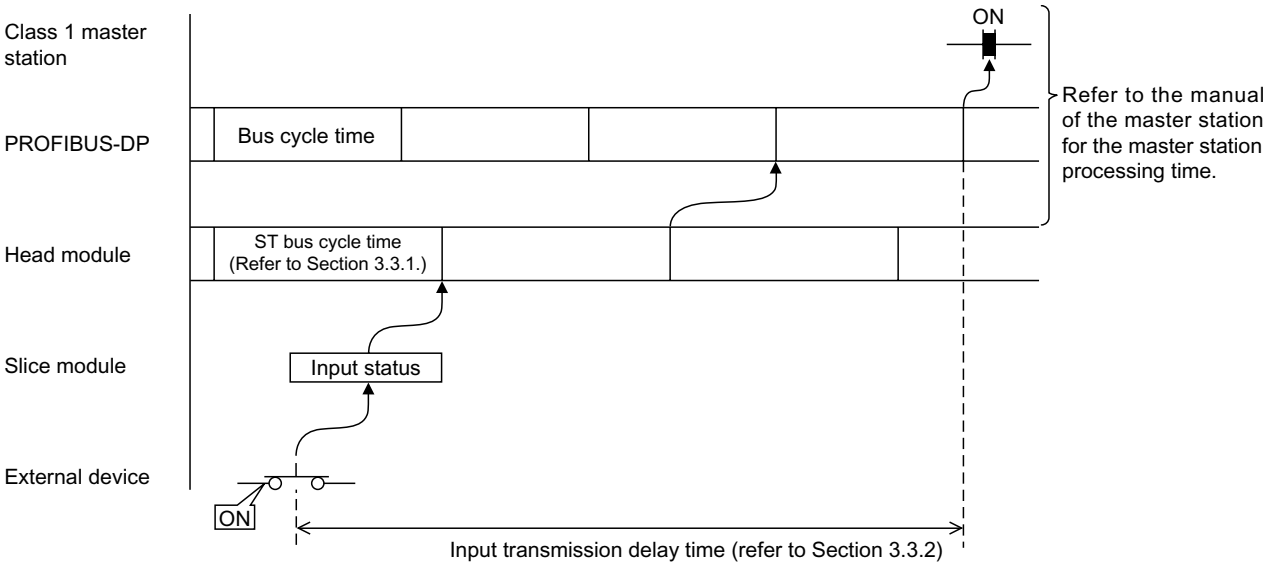
3.3 Head Module Processing Time

This section explains the processing time of the head module in the MELSEC-ST system.
Communication processings between the master station and MELSEC-ST system are outlined below.

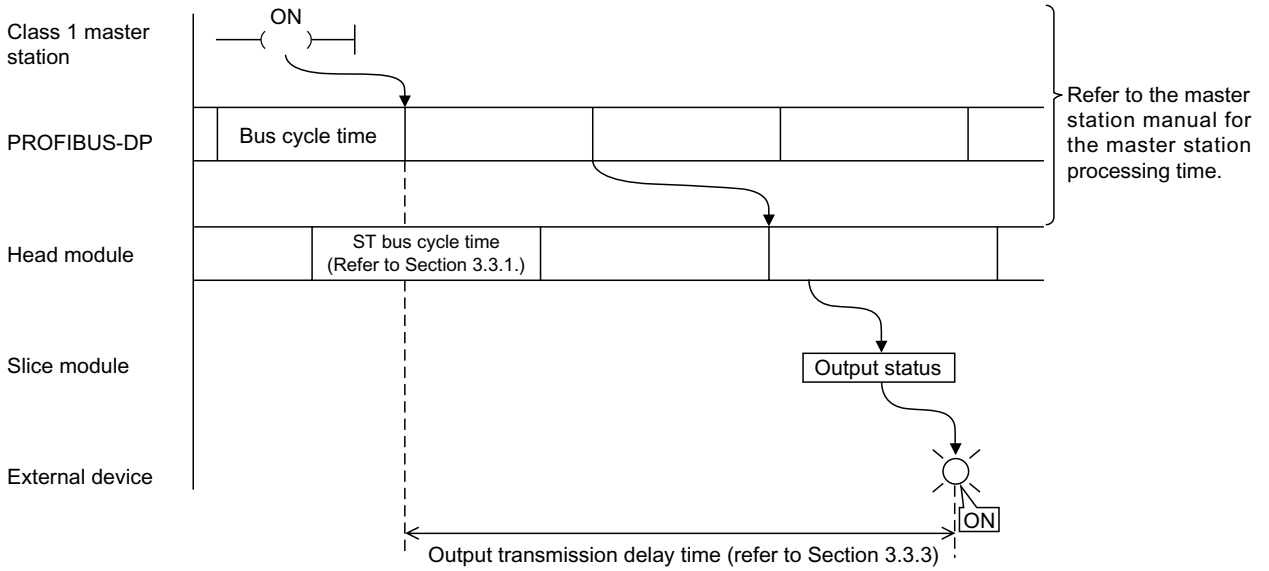
(1) Input data processing outline

How input data from an external device is sent to the master station is shown below.



(2) Output data processing outline

How output data from the master station is output to an external device is shown below.



3 - 27

3.3.1 ST bus cycle time

ST bus cycle time is the time required for the head module to refresh input or output data for the slice modules.
This section explains the ST bus cycle time expression and processing time example.

(1) ST bus cycle time expression

The expression for calculating the ST bus cycle time is given below.

ST bus cycle time [μs] = {24 × (1) + 2))[*1]}
+ (157 × number of mounted intelligent function modules) + (internal processing time [*2])

∗1: Calculate 1) and 2) by the following expressions.

- When there are slice modules whose occupied I/O points are equal to or less than 4 points
  1) = number of mounted slice modules
- When there are slice modules whose occupied I/O points are greater than 4 points
  2) = (number of occupied I/O points / 4) × number of mounted slice modules

<Example>

When there are three slice modules having 2 occupied I/O points, two slice modules having 4 points, and three slice modules having 16 points
1) + 2) = 5 + (16 / 4) × 3 = 17

∗2: The internal processing time changes depending on the maximum input/output points.

- 32-point mode: 385μs
- 64-point mode: 400μs
- 128-point mode: 430μs
- 256-point mode: 490μs

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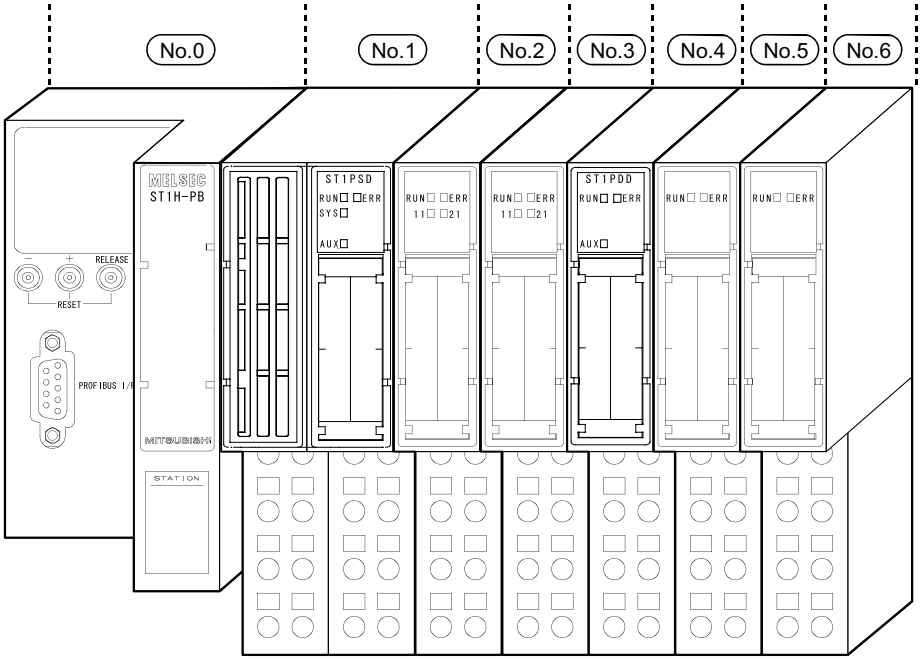
(2) Processing time example

The following system configuration example is used to explain a processing time example of ST bus cycle time.
(The following table uses the maximum input/output points sheet provided in Appendix 2.1.)



No.	Module name	Number of Occupied I/O Points	Start Slice No. (Number of occupied slices)	Wr.n	Ww.n	5V DC Internal Current Consumption (Total)	24V DC Current (Total)	Slot Width (Total)
0	ST1H-PB	4	0(2)	—	—	0.530A(0.530A)	0A(0A)	—
1	ST1PSD	2	2(1)	—	—	—	—	25.2mm(25.2mm)
2	ST1X2-DE1	2	3(1)	—	—	0.085A(0.615A)	∗1	12.6mm(37.8mm)
3	ST1Y2-TE2	2	4(1)	—	—	0.090A(0705A)	∗1	12.6mm(50.4mm)
4	ST1PDD	2	5(1)	—	—	0.060A(0.765A)	—	12.6mm(63.0mm)
5	ST1AD2-V	4	6(2)	2	2	0.110A(0.875A)	∗1	12.6mm(75.6mm)
6	ST1DA2-V	4	8(2)	2	2	0.095A(0.970A)	∗1	12.6mm(88.2mm)
Total		20	—	4	4	—	—	—

∗1: The 24V DC current changes depending on the external device connected to each slice module.
Confirm the current consumption of the external device connected to each slice module, and calculate the total value.
Refer to the MELSEC-ST System User's Manual for details of current consumption calculation.

Number of mounted intelligent function modules: 2
Maximum input/output points: 32-point mode

ST bus cycle time = {24 × (6 + 0)} + (157 × 2) + 385 ≒ 843 [μs]

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3.3.2 Input transmission delay time

This section explains the time required from when the slice module receives input data from the external device until it outputs that data onto the PROFIBUS-DP line.

(1) Average delay time

Average input transmission delay time is indicated below.

Input transmission delay time = 1) + (1.5 × ST bus cycle time)
+ (0.5 × bus cycle time)

1): For input module ・・・Input module response time
For intelligent function module ・・Intelligent function module processing time
For details, refer to the MELSEC-ST System User's Manual or intelligent function module manual.

ST bus cycle time: Refer to Section 3.3.1.

Bus cycle time: Refer to the manual of the master station.

(2) Maximum delay time

Maximum input transmission delay time is indicated below.

Input transmission delay time = 1) + (2.0 × ST bus cycle time)
+ (1.0 × bus cycle time)

1): For input module ・・・Input module response time
For intelligent function module ・・Intelligent function module processing time
For details, refer to the MELSEC-ST System User's Manual or intelligent function module manual.

ST bus cycle time: Refer to Section 3.3.1.

Bus cycle time: Refer to the manual of the master station.

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3.3.3 Output transmission delay time

This section explains the time required from when the head module receives output data from the master station until the slice module outputs data to the external device.

(1) Average delay time

Average output transmission delay time is indicated below.

Output transmission delay time = (1.0 × ST bus cycle time) + 1)

ST bus cycle time: Refer to Section 3.3.1.

1): For output module ・・・Output module response time
For intelligent function module ・・Intelligent function module processing time
For details, refer to the MELSEC-ST System User's Manual or intelligent function module manual.

(2) Maximum delay time

Maximum output transmission delay time is indicated below.

Output transmission delay time = (1.5 × ST bus cycle time) + 1)

ST bus cycle time: Refer to Section 3.3.1.

1): For output module ・・・Output module response time
For intelligent function module ・・Intelligent function module processing time
For details, refer to the MELSEC-ST System User's Manual or intelligent function module manual.

4 FUNCTIONS

This chapter explains the head module functions.

4.1 Function List

The head module functions are listed below.

(1) Network functions

The following table describes the head module functions used in the PROFIBUS-DP network.
To use the following functions, set the user parameters on the configuration software of the master station.

Function name	Description	Reference section
I/O data communication function	Communicates I/O data with the master station.	Section 4.2.1
Global control function	Controls the inputs/outputs of slave stations in the specified group simultaneously by multicasting (broadcasting) from the master station.	Section 4.2.2
Extended diagnostic information notification function	Notifies the master station of head module and slice module errors as extended diagnostic information.	Section 4.2.3
Swap function	Swaps the high and low bytes in word units when input or output data are sent to or received from the master station or when extended diagnostic information is sent to the master station. When the master station handles the high and low bytes of word data in reverse to the head module, using this function allows data communication without creating a high/low byte swapping program.	Section 4.2.4
I/O data consistency function	Prevents data inconsistency between the communication data of PROFIBUS-DP and the I/O data of the head module.	Section 4.2.5

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(2) Control functions

The following table describes the functions used by the head module to control the slice modules.

Function name	Description	Operation method				Reference section
		1)	2)	3)	4)	
Setting of output status at module error	Sets whether the refresh of data output to the other normally operating output modules and intelligent function modules will be stopped or continued when an error occurs in a slice module.	○	×	×	×	Section 4.3.1
Information monitor	Monitors various information of the head module and slice modules.	×	×	×	○	＊1
Status monitor	Monitors the operating statuses of the slice modules and the error history, etc. of the head module.	×	×	○	○	Section 4.3.2
Online module change	The I/O modules and intelligent function modules can be replaced without stopping the MELSEC-ST system.	×	○	×	○	Section 4.4
Forced output test function	Forcibly outputs the Bw.n Bit Output, Ew.n Error Clear and Ww.n Word Output of the head module and each slice module.	×	×	×	○	＊1
Intelligent function module parameter read/write	Reads or writes parameters from or to the ROM or RAM of the intelligent function module.	△＊2	×	○	○	Section 4.3.3
Head module reset	Resets the MELSEC-ST system.	×	○	×	○	Section 5.3.2
Head module parameter read	Reads the MELSEC-ST system parameters sent from the master station to the head module.	×	×	×	○	＊1
PROFIBUS-DP network parameter read	Reads the PROFIBUS-DP network parameters sent from the master station to the head module.	×	×	×	○	＊1
PROFIBUS-DP communication data read	Reads the input data sent from the head module to the master station and the output data sent from the master station to the head module.	×	×	×	○	＊1
Self-diagnostics	Runs a hardware test on the single head module.	×	○	×	×	Section 5.4
Command execution	Executes a command requested by the master station.	×	×	○	×	Chapter 8

○: Can be executed, ×: Cannot be executed

1) Use the configuration software of the master station to set the user parameter.
2) Use the button or switch of the head module to perform operation.
3) Execute a command from the master station.
4) Use GX Configurator-ST to perform operation.

＊1: For the operation of GX Configurator-ST, refer to the GX Configurator-ST Operating Manual.

＊2: Setting from the configuration software of the master station allows the user parameters to be written to only the RAM of the intelligent function module.

4 - 2

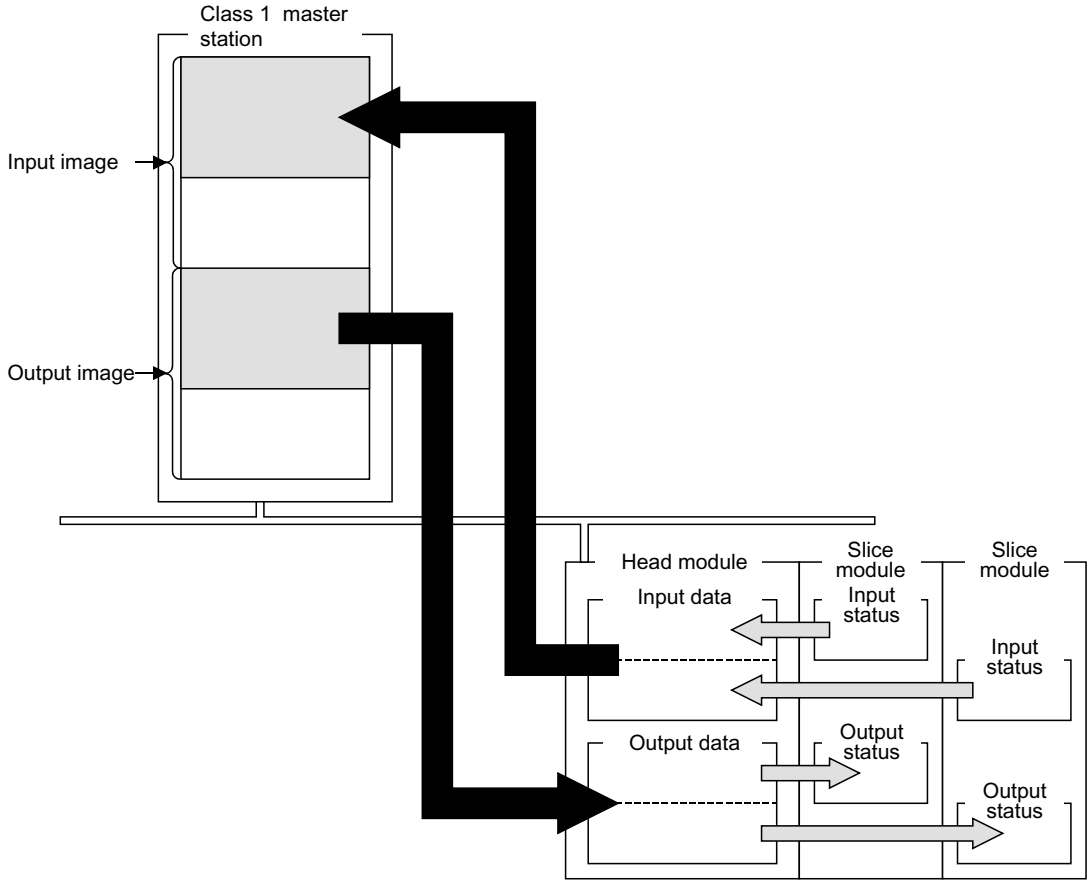
4.2 Network Functions

This section explains the head module functions used in the PROFIBUS-DP network.

4.2.1 I/O data communication function

(1) I/O data communication function

I/O data can be communicated with the Class 1 master station (master station that makes cyclic data communication with slave stations) of PROFIBUS-DP.
The head module can exchange up to 304-byte data in total with the master station: up to 152-byte input data (head module → master station) and up to 152-byte output data (master station → head module).



(2) I/O data size

The size of I/O data communicated with the master station changes depending on the maximum input/output points.
Refer to Chapter 6 for the maximum input/output points.
Refer to Section 3.2.1 and Section 3.2.2 for the I/O data size for the maximum input/output points.

(3) I/O status when the CPU stop error has occurred in master station

If an error (PLC CPU stop error) has occurred in a master station, the I/O status of the master station varies with the master station used.
The following table shows the I/O status when an error has occurred in a master station for each model.

Maser station model	Master station I/O status		Communication status
	Input data	Output data	
QJ71PB92D	The input data sent from slave stations are refreshed.	The output data sent to slave stations when the CPU stops are held.	Continued
AJ71PB92D, A1SJ71PB92D	The input data sent from slave stations when the CPU stops are held.	Cleared	Stopped
Master stations other than above	Refer to the manual for the master station		

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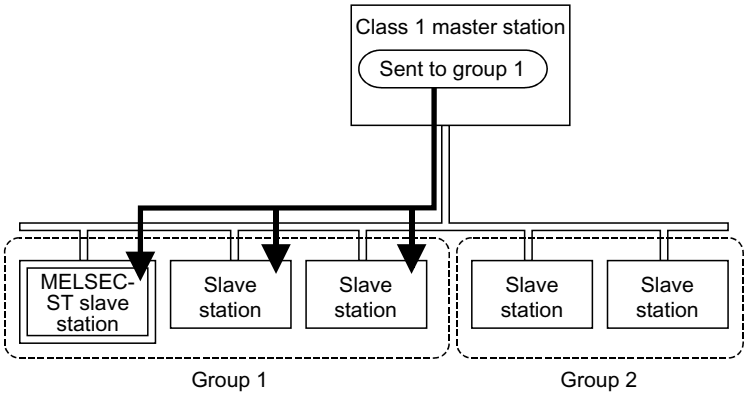
4.2.2 Global control function

(1) Global control function

The inputs/outputs of slave stations are controlled simultaneously for each specified group by multicasting (broadcasting) from the master station.
The head module that executes the global control function belongs to one or more groups specified by the master station.
Set the group number of the head module using the configuration software of the master station.



(2) Global control services available for head module

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

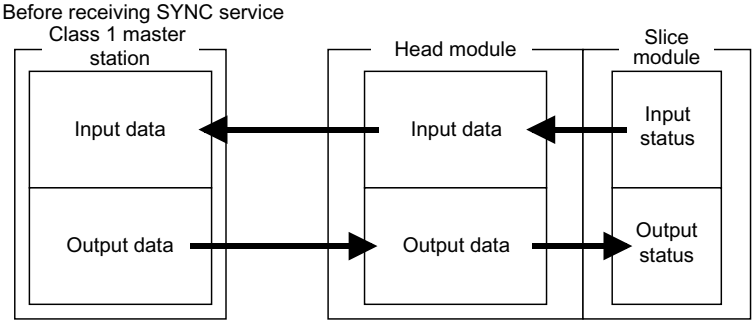
Service name	Description
SYNC	Starts the SYNC (output synchronization) mode. During the SYNC mode, the output status is refreshed every time the SYNC service is received. The output status is held as long as the SYNC service is not received.
UNSYNC	Ends the SYNC (output synchronization) mode.
FREEZE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

(3) Outline of service operations

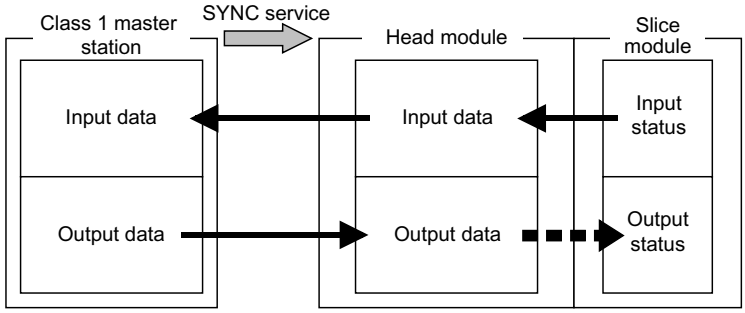
The following shows the outline of the SYNC and UNSYNC services and FREEZE and UNFREEZE services.

(a) When receiving SYNC and UNSYNC services

1) Before receiving SYNC service

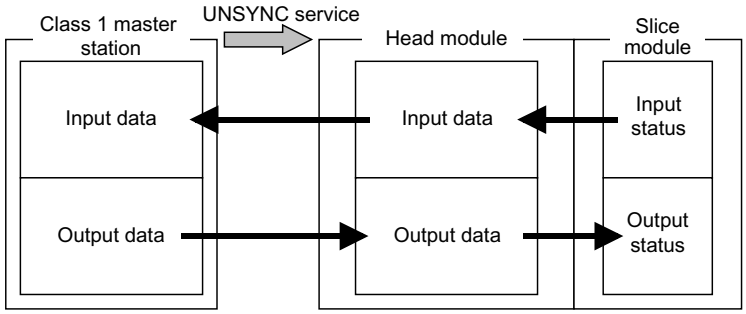


2) After receiving SYNC service



- When receiving the SYNC service, the head module enters the SYNC mode, and stops refresh from its output receiving area to the output status area of the slice module.
- During the SYNC mode, the SYN. LED of the head module is on.
- When the SYNC service is received during the SYNC mode, refresh to the output status area is performed only once.
- Even during the SYNC mode, refresh from the input status area to the input sending area is executed continuously.

3) After receiving UNSYNC service



- When receiving the UNSYNC service, the head module ends the SYNC mode and resumes refresh from its output receiving area to the output status area of the slice module.
- When the UNSYNC service is received and the SYNC mode is ended, the SYN. LED of the head module turns off.

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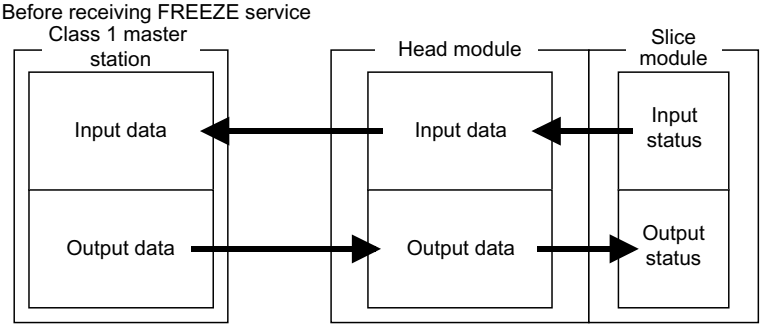
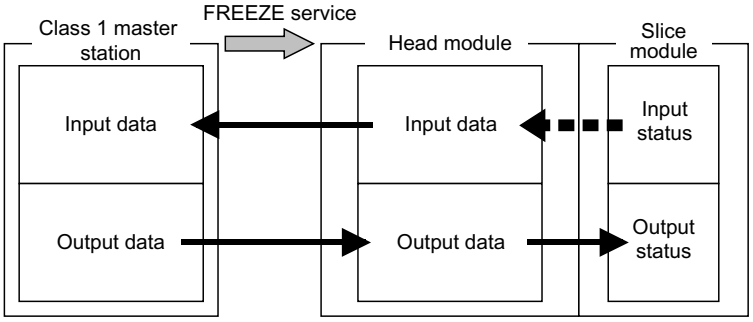
(b) When receiving FREEZE and UNFREEZE services

1) Before receiving FREEZE service

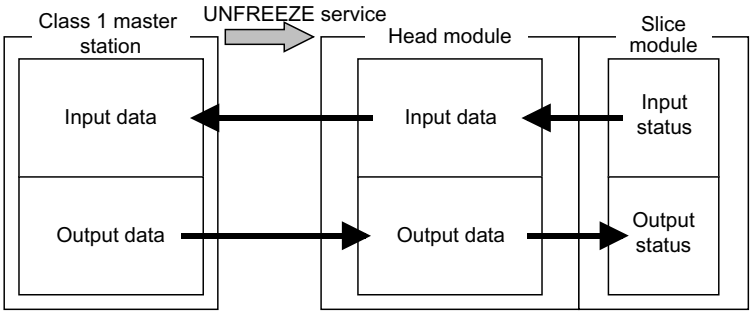


2) After receiving FREEZE service



- When receiving the FREEZE service, the head module enters the FREEZE mode, and stops refresh from the input status area of the slice module to the input sending area of the head module.
- During the FREEZE mode, the FRE. LED of the head module 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 receiving data to the output status area is executed continuously.

3) After receiving UNFREEZE service



- When receiving the UNFREEZE service, the head module ends the FREEZE mode, and resumes refresh from the input status area of the slice module to the input sending area area of the head module.
- When the UNFREEZE service is received and the FREEZE mode is ended, the FRE. LED of the head module turns off.

(4) Group selection

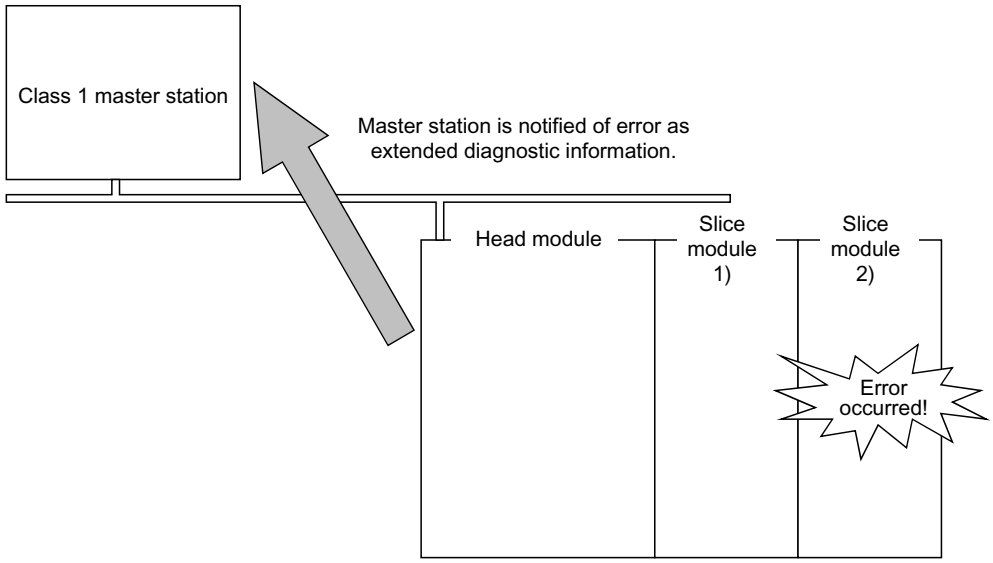
There are a total of 8 groups from 1 to 8.

The head module is allowed to belong to any of the 8 groups. (Specify the group using the configuration software of the master station.)

4.2.3 Extended diagnostic information notification function

(1) Extended diagnostic information notification function

When errors occur in the head module and/or slice modules, this function can notify the master station of the errors of up to 2 modules in chronological order.
When the head module has notified the master station of extended diagnostic information, the DIA LED of the head module is on.
When the head module and/or slice modules return to normal, the master station is notified and the DIA LED of the head module turns off.



(2) Setting of extended diagnostic information notification function

The extended diagnostic information notification function defaults to "Enable (Notified)".
When the master station is not notified of extended diagnostic information, the extended diagnostic information notification function setting must be changed on the configuration software of the master station.
Use the "Ext_Diag information" user parameter to set this function.
The setting items of Ext_Diag information are as follows.

Item	Description
Enable (Default)	Notifies the master station of head module and/or slice module errors as extended diagnostic information.
Disable	If errors occur in the head module and/or slice modules, does not notify the master station of extended diagnostic information.

(3) Extended diagnostic information data

(a) Data sent to master station

When the extended diagnostic information notification function is set to "Enable (notified)", the head module sends the following data to the extended diagnostic information area of the master station.
Refer to the manual of the master station for the extended diagnostic information area of the master station.

Offset address (Unit: Word)	Name		
+ 0	Head module error code		
+ 1	Error slice module information ＊1	First module	Error slice No.
+ 2			Detail error code 1
+ 3			Detail error code 2
+ 4		Second module	Error slice No.
+ 5			Detail error code 1
+ 6			Detail error code 2

＊1: The error slice module information of two modules is stored in chronological order.

REMARK

Depending on the master station, the high and low bytes of the extended diagnostic information data sent from the head module may be reverse to those of the extended diagnostic information area of the master station.
In that case, use the swap function of the head module.
Refer to Section 4.2.4 for details.

(b) Details of sending data area

1) Head module error code area

Stores an error code corresponding to the error that occurred in the head module.
Refer to Section 9.2.2 for the error codes of the head module.

2) Error slice module information area

Stores the information of up to 2 error slice modules in chronological order.

The details of the error slice module information area are described below.

Name	Description
Error slice No.	Stores the start slice No. of the slice module where an error occurred. (Stores 0000H when no error has occurred.)
Detail error code 1	Stores the error code *1 *2 of the slice module where an error occurred. (Stores 0000H when no error has occurred.)
Detail error code 2	

*1: The error code stored into this area is the same as the value stored into the Cr Command result area when the command (0101H) is executed.
For error codes of the intelligent function module, refer to the manual of the intelligent function module.
When an error occurred in the power distribution module or I/O module, an error code of the head module is stored.

*2: If a hardware or similar fault occurs in the slice module, FFFFH is stored into Detail error code 1.
In that case, please consult your local Mitsubishi representative, explaining a detailed description of the problem.

REMARK

When the master station is not notified of the extended diagnostic information, confirm the error information in the Er Error information area of each module, and execute the command (0101H) to read the error code.

4.2.4 Swap function

(1) Swap function

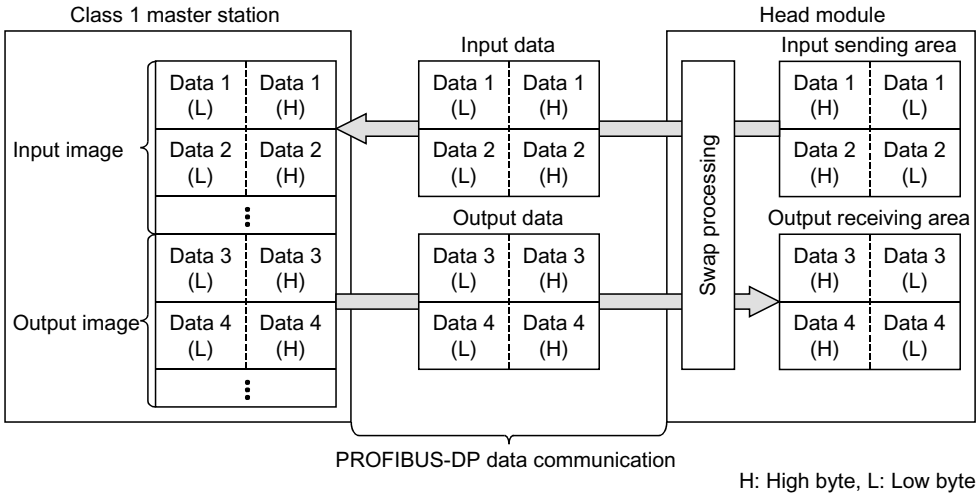
The high and low bytes are swapped in word units when input or output data are sent to or received from the master station or when extended diagnostic information is sent to the master station.

When the relevant user parameter of the head module is set to "Enable (swapped)", the following processing is executed.

- I/O data ....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.
- Extended diagnostic information .... The extended diagnostic information data are sent to the master station after their high and low bytes have been swapped.

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

Data can be swapped for communication without the need for creating a program for swapping the high and low bytes.



(2) Setting and operation outline for I/O data swapping

The following describes the setting for I/O data swapping, the swap function setting by the master station type, and operation outline.

(a) Setting at master station

To swap I/O data, swap setting must be made on the configuration software of the master station.

Make the swap setting of I/O data using the "Swap of input/output data" user parameter.

The setting items of Swap of input/output data are as follows.

Item	Description
Enable	The high and low bytes are swapped in word unit when I/O data are sent or received.
Disable (Default)	Swap is not executed when I/O data are sent or received.

(b) Swap function setting by master station type

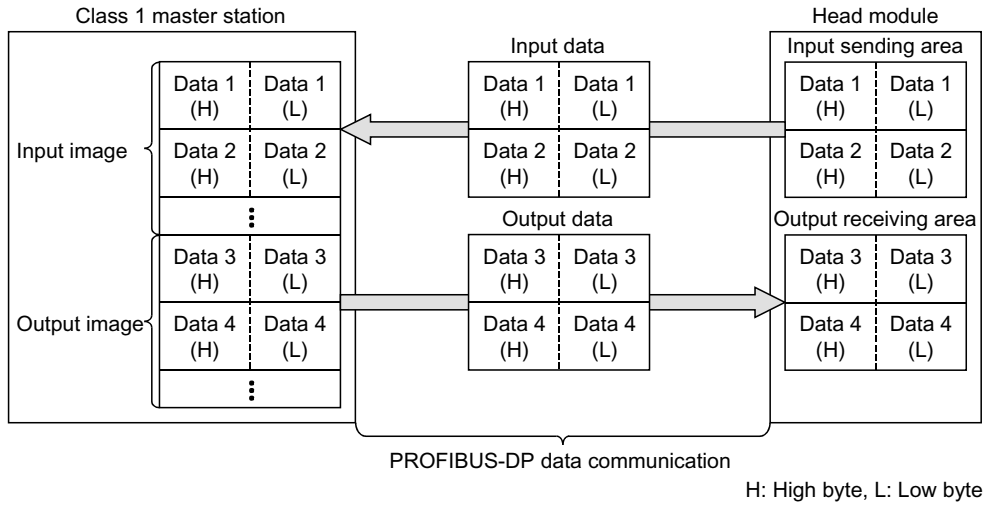
The swap function setting changes depending on the master station type as described below.

Master station type		Swap function setting of head module
AJ71PB92D, A1SJ71PB92D		Disable (Not swapped)
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)
Other master station		Set according to the specifications of the master station

(c) Operation outline

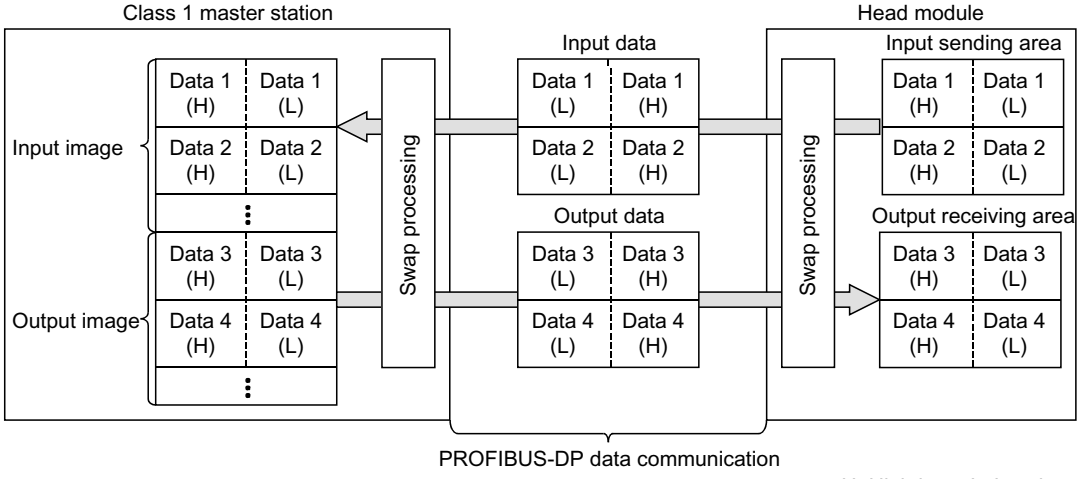
When the AJ71PB92D, A1SJ71PB92D or QJ71PB92D is used as the master station, the operation outline is as shown below.

1) When the master station is the AJ71PB92D, A1SJ71PB92D or QJ71PB92D (not swapped)



H: High byte, L: Low byte

2) When the master station is the QJ71PB92D (swapped)



H: High byte, L: Low byte

(3) Setting and operation outline for extended diagnostic information swapping

The following describes the setting for extended diagnostic information swapping and the data construction of the extended diagnostic information.

(a) Setting at master station

To swap extended diagnostic information, swap setting must be made on the configuration software of the master station.

Make the swap setting of extended diagnostic information using the "Swap of Ext_Diag information" user parameter.

The setting items of Swap of Ext_Diag information are as follows.

Item	Description
Enable	The high and low bytes are swapped in word units when extended diagnostic information is sent.
Disable (Default)	Swap is not executed when extended diagnostic information is sent.

(b) 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 head module
AJ71PB92D, A1SJ71PB92D, QJ71PB92D	Disable (Not swapped)
Other master station	Set according to the specifications of the master station

(c) Data construction of extended diagnostic information

The data construction of extended diagnostic information is shown below.

<When "Disable (not swapped)" is selected>

Offset address (Unit: Word)	Extended diagnostic information	
+0	Head module error code	
	H	L
+1	First module error slice No.	
	H	L
+2	First module detail error code 1	
	H	L
+3	First module detail error code 2	
	H	L
+4	Second module error slice No.	
	H	L
+5	Second module detail error code 1	
	H	L
+6	Second module detail error code 2	
	H	L

<When "Enable (swapped)" is selected>

Offset address (Unit: Word)	Extended diagnostic information	
+0	Head module error code	
	L	H
+1	First module error slice No.	
	L	H
+2	First module detail error code 1	
	L	H
+3	First module detail error code 2	
	L	H
+4	Second module error slice No.	
	L	H
+5	Second module detail error code 1	
	L	H
+6	Second module detail error code 2	
	L	H

H: High byte, L: Low byte

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4.2.5 I/O data consistency function

(1) I/O data consistency function

This function prevents data inconsistency between the communication data of PROFIBUS-DP and the I/O data of the head module.
When using either or both of the following items in the MELSEC-ST system, make the data consistency function setting.

- When intelligent function modules are used in the MELSEC-ST system
- When the master station requests the MELSEC-ST system to send a command

(2) Input data consistency

The input data to be sent from the head module to the master station are processed in the head module to prevent inconsistency.
No setting is required for input data consistency.

(3) Output data consistency

For the output data sent from the master station to the head module, the consistency function setting must be made using the configuration software of the master station.

(a) Setting at master station

Use the "Consistency function" user parameter to set the consistency function.
The setting items of Consistency function are as follows.
Refer to (3) (b) in this section for the selection of the consistency function.

Item	Description
Enable (Default)	Consistency processing of the head module and intelligent function module control operations is executed in the head module and intelligent function modules.
Disable	Consistency processing of the head module and intelligent function module control operations is not executed. ∗1

∗1: When the consistency function is set to "Disable", the time required for the command request to the head module and the control operation of the intelligent function module is shortened by one bus cycle time.

(b) Consistency function

Select Modules of the head module and the output data consistency function of the master station must be considered to set the consistency function.
A consistency function selection table is given below.

Select Modules of head module / Master station specifications	ST1H-PB **pts.-whole consistent	ST1H-PB **pts.-word consistent
When master station can prevent inconsistency of whole output data ∗1	Disable	Enable
When master station cannot prevent inconsistency of whole output data ∗1	Enable	

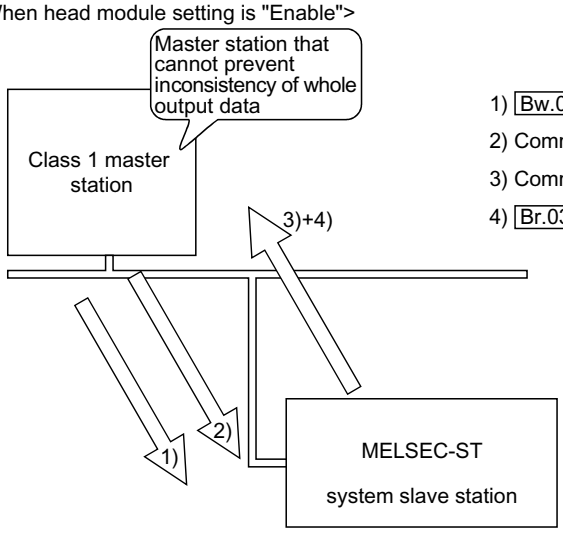
∗1: The size of output data changes depending on the maximum input/output points of the head module.
Refer to Section 3.2.2 for the output data size.

(4) Difference between operations depending on setting

The following shows a difference between head module and intelligent function module operations depending on the setting.

(a) Example of command execution

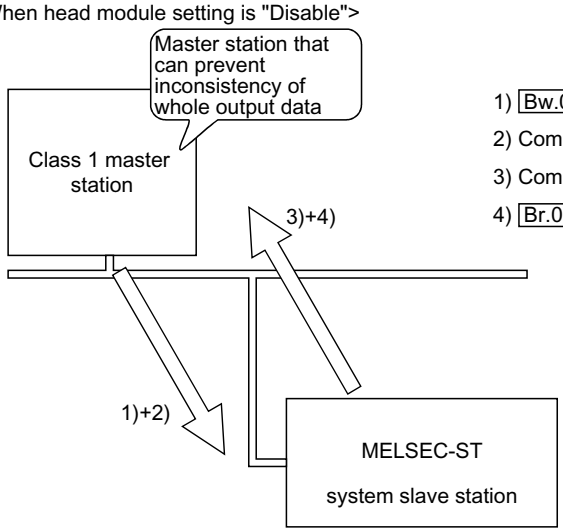
<When head module setting is "Enable">



1) Bw.03 Command request
2) Command execution data (Cw Command execution area)
3) Command result data (Cr Command result area)
4) Br.03 Command execution

- When a command request is received by the head module
  After receiving 1), the head module accepts 2) in the next ST bus cycle and executes the command.
- When a command result is sent from the head module
  The head module sends 3) and 4) in the same ST bus cycle.

<When head module setting is "Disable">

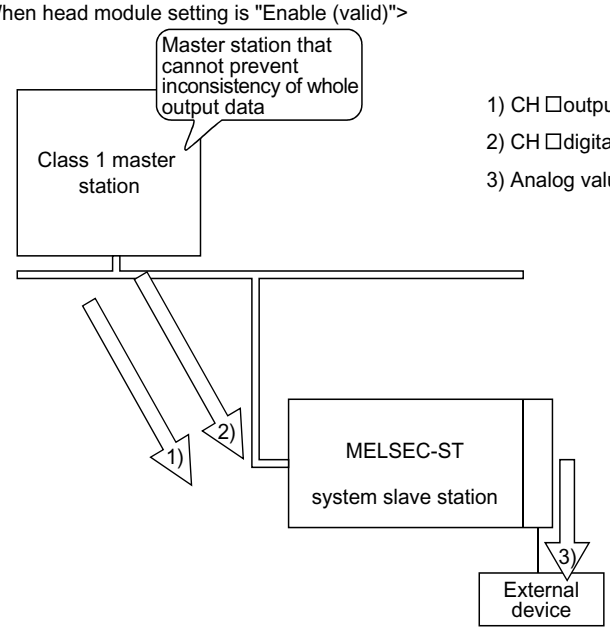


1) Bw.03 Command request
2) Command execution data (Cw Command execution area)
3) Command result data (Cr Command result area)
4) Br.03 Command execution

- When a command request is received by the head module
  The head module accepts 1) and 2) in the same ST bus cycle and executes the command.
- When a command result is sent from the head module
  The head module sends 3) and 4) in the same ST bus cycle.

(b) Example of communication with intelligent function module (digital-analog conversion module)

<When head module setting is "Enable (valid)">

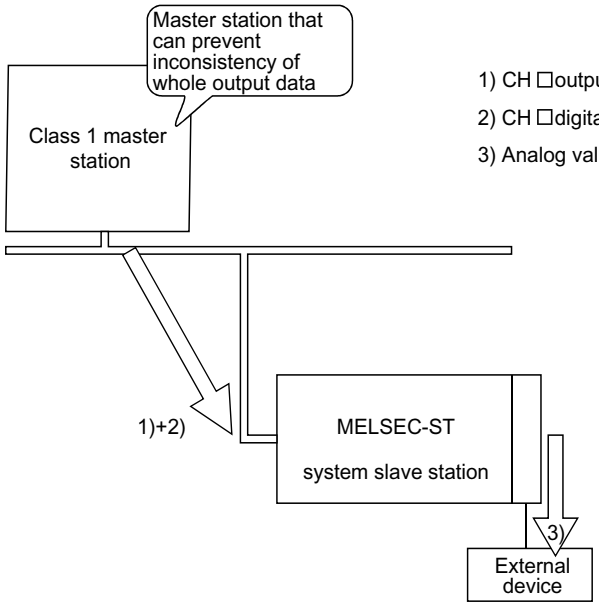


1) CH □output enable/disable flag (Bw Bit output area)
2) CH □digital value setting (Ww Word output area)
3) Analog value output

・When receiving the CH □output enable/disable flag, the intelligent function module receives 1) and then receives 2) in the next ST bus cycle.

・After receiving 2), the intelligent function module outputs 3) to the external device.

<When head module setting is "Disable (invalid)">



1) CH □output enable/disable flag (Bw Bit output area)
2) CH □digital value setting (Ww Word output area)
3) Analog value output

・When receiving the CH □output enable/disable flag, the intelligent function module receives 1) and 2) in the same ST bus cycle.

・After receiving 1) and 2), the intelligent function module outputs 3) to the external device.

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4.3 Control Functions

This section explains the functions used to control each slice module.

4.3.1 Setting of output status at module error

(1) Setting of output status at module error

This is set to determine whether the refresh of output data to the other normally-operating output modules and intelligent function modules will be stopped or continued when an error occurs in a slice module (except the power distribution module).

This function is executed when the head module or slice module is in either of the following statuses.

- When the slice module fails to respond due to a hardware fault, etc.
- When the slice module is removed forcibly while the external power supply is on

POINT
(1) The output status of the slice module where an error occurred changes to the status set with its user parameter. (2) The input data are kept refreshed even if an error occurs in the slice module.

(2) Setting at master station

To use the Setting of output status at module error, the output status in the event of a module error must be set on the configuration software of the master station. Use the "Output status at module error" user parameter to make this setting.

The setting items of Output status at module error are as follows.

Item	Description
Stop (Default)	When a slice module error occurs, the output data of the normally operating output module and intelligent function module are brought into the statuses preset by the user parameters ＊1 of the corresponding slice modules.
Continue	When a slice module error occurs, the output data of the normally operating output module and intelligent function module are kept refreshed.

＊1: For the user parameters of the output module and intelligent function module, refer to the relevant manuals.

(3) I/O status at error occurrence

(a) When communication timeout occurs between head module and master station

The following shows the I/O statuses of the normally operating slice modules when a communication timeout occurs between the head module and the master station.

In order to detect a communication timeout with the master station, the communication watchdog timer must be preset using configuration software on the master station.

For details, refer to Section 6.2.

Type	Slice module	I/O status (RUN LED flicker (1s interval))
Output	Output module	Hold/Clear
	Intelligent function module	Hold/Clear/Preset ∗1
Input	Input module	Refresh
	Intelligent function module	

∗1: The Hold/Clear/Preset status changes depending on the Bw.n Bit output status prior to error occurrence.
For details, refer to the manual of the intelligent function module.

REMARK

If the communication watchdog timer has not been set, no communication timeout will be detected.
The slice module I/O status will be in the refresh status (RUN LED on).

(b) When error occurs in other slice module

When an error occurs in the other slice module, the I/O statuses of the normally operating slice modules are as indicated below.

Type	Slice module	I/O status	
		When "Stop" is selected (RUN LED flicker (1s interval))	When "Continue" is selected (RUN LED on)
Output	Output module	Hold/Clear ∗1	Refresh
	Intelligent function module	Hold/Clear/Preset ∗1 ∗2	
Input	Input module	Refresh	Refresh
	Intelligent function module		

∗1: When other faulty slice module is replaced with a normal one by the online module change, the Hold/Clear/Preset status is turned into the refresh status (RUN LED on) upon completion of the online module change.
∗2: The Hold/Clear/Preset status changes depending on the Bw.n Bit output status prior to error occurrence.
For details, refer to the manual of the intelligent function module.

4.3.2 Status monitor

(1) Status monitor

Various information of the head module and slice modules can be monitored using input data, a command request from the master station or GX Configurator-ST.

(2) Items that can be monitored

The following table indicates various information that can be monitored by the status monitor.

Monitored item	Monitoring method		
	1)	2)	3)
Operating status of each module (Input data: Br Bit input area)	○	×	○
Existence and information of error that occurred in each module (Input data: Er Error information area)	○	×	○
Mounting status of each module (Input data: Mr Module status area)	○	×	○
Error code of error that occurred in each module	×	○	○
Error history of head module	×	○	○

1) Confirmation using I/O data (refer to Section 3.2.3)

2) Confirmation by execution of command from master station (refer to Chapter 8)

3) Confirmation using GX Configurator-ST (refer to (3) in this section)

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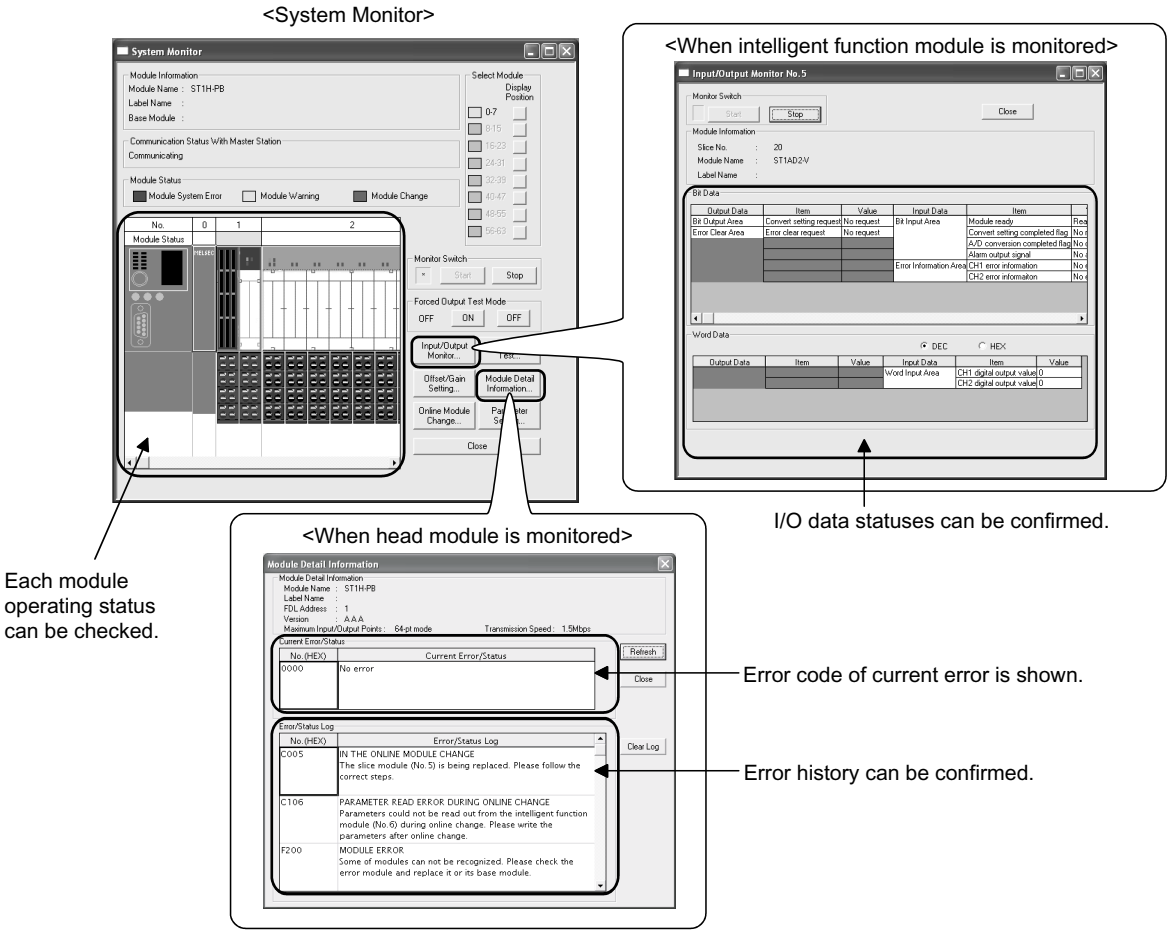
(3) When using GX Configurator-ST for monitoring

When monitoring each module from GX Configurator-ST, activate the System Monitor screen.

For details, refer to the GX Configurator-ST Manual.



4.3.3 Intelligent function module parameter read/write

(1) Intelligent function module parameter read/write

Parameters can be read from or written to the ROM or RAM of the intelligent function module.

(2) Intelligent function module parameter read/write operation

Read or write the intelligent function module parameters as described below.

(a) User parameters

1) Reading the user parameters

Read the user parameters in either of the following methods.

- Execute a command from the master station.
- Use GX Configurator-ST.

2) Writing the user parameters

Write the user parameters in either of the following methods.

- Make setting using the configuration software of the master station.
- When testing the MELSEC-ST system singly, make setting using GX Configurator-ST.

(b) Command parameters

1) Reading the command parameters

Read the command parameters in either of the following methods.

- Execute a command from the master station.
- Use GX Configurator-ST.

2) Writing the command parameters

Write the command parameters in either of the following methods.

- Execute a command from the master station.
- Make setting using GX Configurator-ST.

REMARK

For details of intelligent function module parameter read/write, refer to the manual of the intelligent function module.

4.4 Online module change

(1) Online module change function

The I/O modules and intelligent function modules can be replaced without stopping the MELSEC-ST system.
An online module change can be executed by operation of the head module buttons or from GX Configurator-ST.

4.4.1 Precautions for the online module change

The precautions for the online module change are given below.

(1) To perform the online module change, the system configuration must be appropriate for execution of the online module change.
For details, refer to the MELSEC-ST System User's Manual, "3.4 Precautions for System Configuration".
Executing the online module change in an inappropriate system configuration may result in malfunction or failure.
In such a system configuration, shut off all phases of the external power supply for the MELSEC-ST system to replace a slice module.

(2) Be sure to perform an online module change in the procedure given in section 4.4.2.
Failure to do so can cause a malfunction or failure.

(3) Before starting an online module change, confirm that the external device connected with the slice module to be removed will not malfunction.
It is recommended to set 0 (OFF) to Bw.n Bit output and Ww.n Word output of the slice module to be replaced in advance.

(4) Only the slice modules of the same model name can be replaced online. It is not possible to replace with the slice module of different model name and addition of slice modules is not allowed.

(5) Only one slice module can be replaced in a single online module change.
To replace multiple slice modules, perform an online module change for each module.

(6) This function is available for I/O module and intelligent function module; not available for power distribution module and base module.
Shut off all phases of the external power supply before installing or removing the power distribution module and/or the base module.
Failure to do so may result in damage to all devices of the MELSEC-ST system.

(7) While an online module change is being executed (while the REL. LED of the head module is on), no command can be executed from the master station to the slice module being replaced online.
To do so will cause an error.

(8) While the slice module is being replaced online (while the head module's REL. LED is on), change its user parameter setting from the master station after the online module change is completed.
If the user parameter setting is changed from the master station during the online module change, the new setting is not validated since the user parameters saved in the head module are written over the new user parameter values when the online module change is finished.

(9) During an online module change, the ERR. LED of the head module turns on only when an error related to the online module change occurs.
It will not turn on or flicker when any other error occurs.

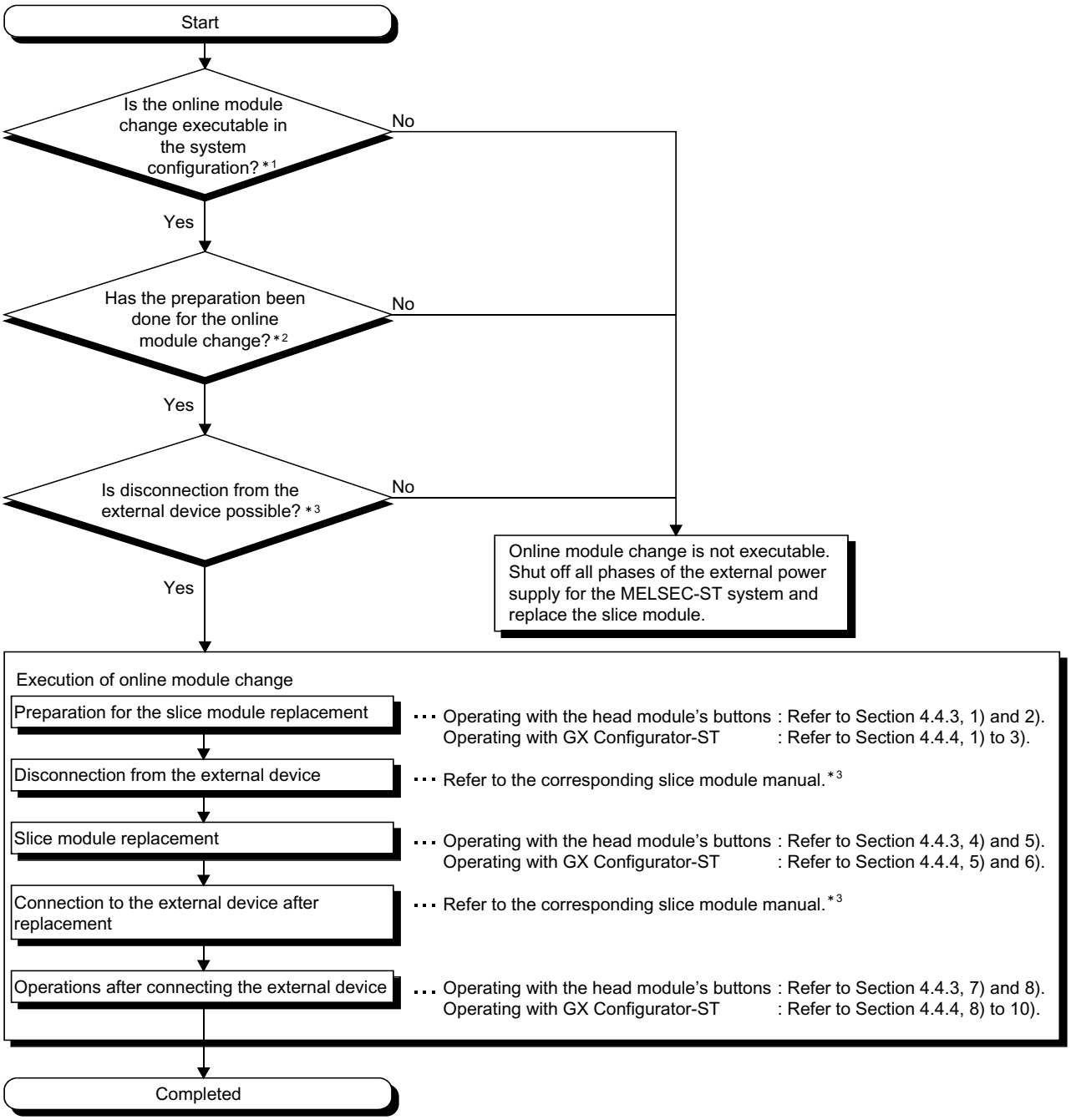
(10) While an online module change is being executed (while the REL. LED of the head module is on), the following data of the slice module being replaced online all turn to 0 (OFF).
- Br.n Bit input
- Er.n Error information
- Mr.n Module status
- Wr.n Word input

(11) When the communication with the master station is disconnected, replacing the output module online, whose CLEAR/HOLD setting is set to HOLD, turns the Bw.n Bit Output value to 0 (OFF).
After the online module change is finished, the Bw.n Bit Output value will not return to the held value.

(12) When the forced output test is executed on the slice module being replaced online, only Ew.n Error Clear can be tested.
Bw.n Bit Output and Ww.n Word Output cannot be tested.

4.4.2 Procedures for online module change

This section explains the procedures for the online module change.
Replace a module online as shown below.

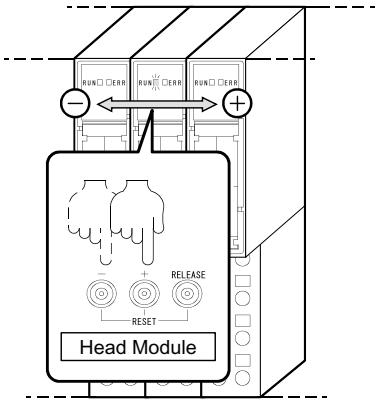


*1: Refer to the MELSEC-ST System User's Manual, "3.4 Precautions for System Configuration".
*2: Refer to "Preparation for online module change" in the corresponding slice module manual.
*3: Refer to "External device connection and disconnection procedures for online module change".

4.4.3 Online module change using head module buttons

This section explains the procedures for the replacing a module online by operating the buttons on the head module.

Before replacing slice module

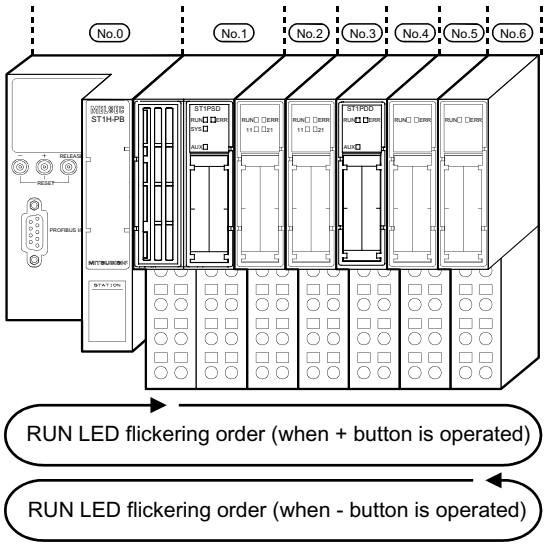


1) Specify the module to be replaced online.
Press the "+" button of the head module. Then, the RUN LED of the bus refreshing module mounted next to the head module flickers at intervals of 0.25 seconds.
By pressing the "+" and/or "-" buttons, make the target module's RUN LED flicker (at 0.25s intervals). ∗1
When terminating the online module change, press the "+" and/or "-" buttons until the RUN LED of the head module flickers (at 0.25s intervals) again.
For the "+", "-" button operation, refer to the REMARK below.

∗1: If the RUN LED does not flicker (at 0.25s intervals), the slice module may have a hardware fault. Use GX the Configurator-ST to perform the online module change.
When not using the GX Configurator-ST, specify the slice module to be replaced as follows:
- By making the RUN LEDs of both adjacent slice modules flicker (at 0.25s intervals), confirm the module to be replaced.

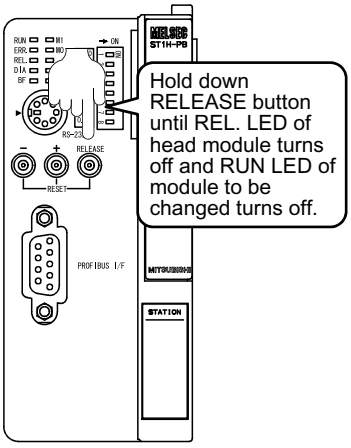
REMARK

The following explains how to operate the + and - buttons of the head module.



<When + button is pressed>
1) When the + button is pressed, the RUN LED of the No. 1 (bus refreshing module on the right of the head module) flickers (at 0.25s intervals).
2) Every time the + button is pressed, the RUN LED flickers (at 0.25s intervals) in order of the No. 2 to No. 6.
3) After the RUN LED of the No. 6 slice module has flickered (at 0.25s intervals), further pressing the + button returns to the head module. Note that the ON status of the head module's RUN LED does not change. Refer to Section 5.3 (1) for the flickering status of the head module's RUN LED.

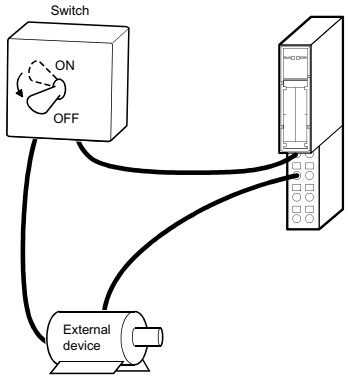
<When - button is pressed>
1) When the - button is pressed, the RUN LED of the No. 6 (right-end slice module of the MELSEC-ST system) flickers (at 0.25s intervals).
2) Every time the - button is pressed, the RUN LED flickers (at 0.25s intervals) in order of the No. 5 to No. 1.
3) After the RUN LED of the No. 1 slice module has flickered (at 0.25s intervals), further pressing the - button returns to the head module. Note that the status of the head module's RUN LED does not change. Refer to Section 5.3 (1) for the flickering status of the head module's RUN LED.



2) Keep pressing the RELEASE button of the head module until its REL. LED lights up.
When the REL. LED turns on, the head module saves the user parameters and command parameters from the target slice module into the head module.
Since the following conditions means the online module change is available, release the RELEASE button.
- The REL. LED of the head module turns on. ∗2
- The RUN LED of the slice module to be replaced turns OFF.

∗2: If the REL. and ERR. LEDs turn on, an error may have occurred during online module change.
Check the error and take corrective actions.
For error code reading and details, refer to Section 9.2.

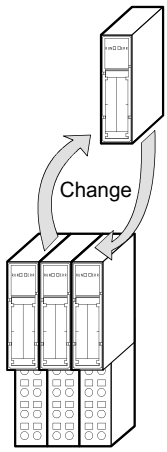
Disconnection from external device



3) Disconnect the external device from the slice module to be replaced online.
For details, refer to "External device connection and disconnection procedures for online module change" in the corresponding slice module manual.

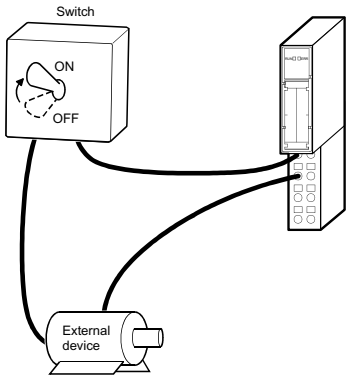
POINT
If the disconnection procedure given in the relevant slice module manual cannot be executed, shut off all phases of the external power supply for the MELSEC-ST system to replace the slice module.

Replacing slice module



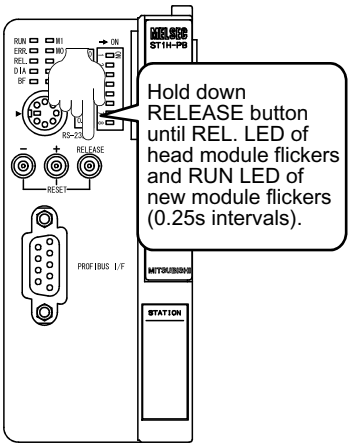
4) Remove the slice module to be replaced from the base module.
5) Mount a new slice module with the same model name as the one of the removed.

Connection to external device after replacement



6) After mounting a new slice module, connect it to the external device. For details, refer to "External device connection and disconnection procedures for online module change".

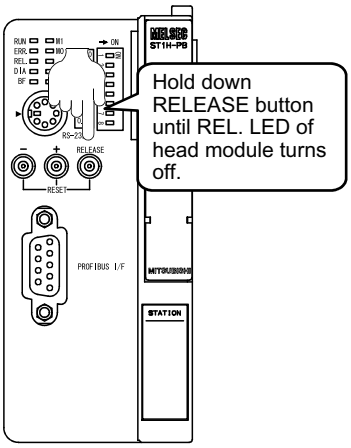
Operations after external device connection



7) After mounting the new slice module, press the RELEASE button of the head module until its REL. LED flickers.
When the REL. LED flickers, the head module starts writing the saved user parameters and command parameters into the new slice module.
When the following conditions are confirmed, release the RELEASE button.
- The REL. LED of the head module flickers. ∗3 ∗4
- The RUN LED of the newly mounted slice module flickers (at 0.25s intervals).

∗3: If the REL. and ERR. LEDs turn on, an error may have occurred during online module change.
Check the error and take corrective actions.
For error code reading and details, refer to Section 9.2.

∗4: When an error has occurred in step 2) (Error code C101H to C13FH), the REL. LED flickers and the ERR. LED turns on.
When step 8) has completed in this status, the intelligent function module starts its operation with the command parameters set as default.



8) Press the RELEASE button again and hold it until the REL. LED turns off. ∗5
When the REL. LED turns off, the online module is complete. ∗6
Release the RELEASE button.
After the REL. LED turns off, the head module enters the normal mode and resumes the operation such as I/O data refreshing.

∗5: If the RELEASE button is released before the REL. LED turns off, the following status (status after completion of operation in step 2)) will result.
- The REL. LED of the head module turns on.
- The RUN LED of the slice module changed online turns off.

Operations can be retried from step 4).

∗6: If the REL. and ERR. LEDs turn on, an error may have occurred during online module change.
Check the error and take corrective actions.
For error code reading and details, refer to Section 9.2.

4.4.4 Online module change from GX Configurator-ST

Here is an explanation of how to replace a module online from GX Configurator-ST.

POINT

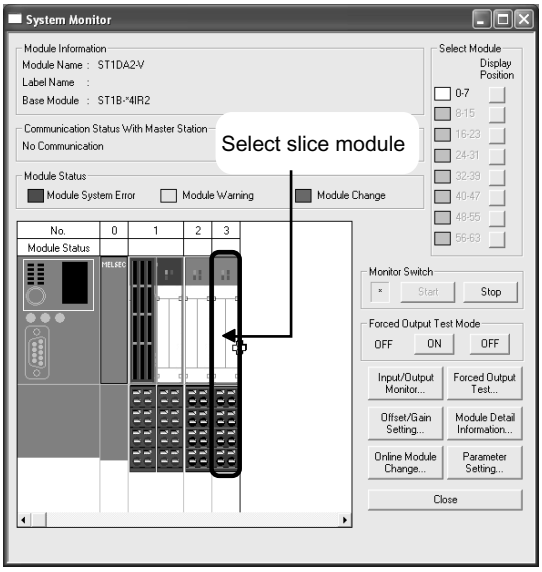
If a slice module different from the target one is selected by mistake, restart the operation as instructed below.

(1) To restart the operation at step 3)
Click the Cancel button on the screen to terminate online module change.

(2) To restart the operation at step 4)
Click the Next button without executing online module change, continue to step 10) and then terminate online module change.

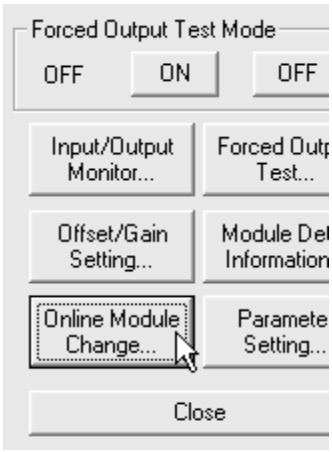
(3) To restart the operation at step 8)
Mount the removed slice module again, click the Next button, continue to step 10) and then terminate online module change.

Preparation for replacing slice module



1) Select the slice module to be replaced online on the "System Monitor" screen.

↓



2) Click the Online Module Change button on the "System Monitor" screen.
Then, confirm that the RUN LED of the selected slice module is flashing at 0.25s intervals.

REMARK

In addition to above, the following operations are also available.

- Select [Diagnostics] → [Online Module Change].
- Right-click the slice module selected at step 1), and click [Online Module change] on the menu.

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(Continued to next page.)

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(From the previous page.)

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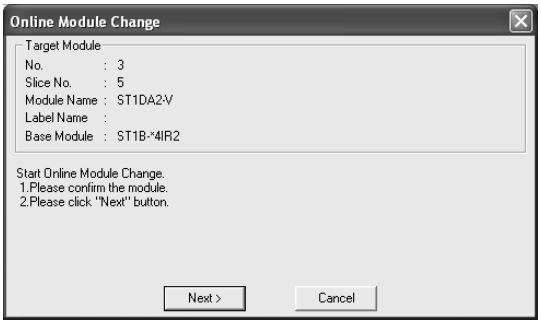

3) Confirm that the slice module displayed as "Target Module" is the slice module to be replaced and click the Next button.

(a) Clicking the Next button validates the settings and the following will be performed.

- Puts the head module into the online module change mode.
- Transfers the user parameters and command parameters of the target slice module to the head module.

(b) After clicking the Next button, confirm the following module statuses.

- The REL. LED of the head module is on.
- The RUN LED of the target slice module is off.
- The "Module Status" indicator of the target module has turned purple. This applies only when monitoring from the "System Monitor" screen.

(c) If the user parameters and command parameters cannot be read from the slice module, both REL. LED and ERR. LED of the head module turns on, and the error message will appear on the screen at step 8).
In this case, confirm the error details and take corrective action. For how to read error codes and error code details, refer to Section 9.2.

When not executing online module change, click the Cancel button.

(a) Clicking the Cancel button causes the screen to show that online module change is cancelled.

Clicking the Exit button returns to the step 2).

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(From the previous page.)

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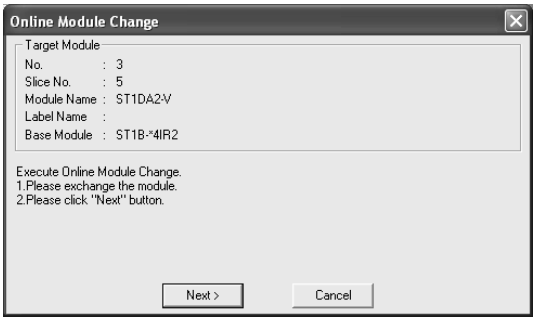
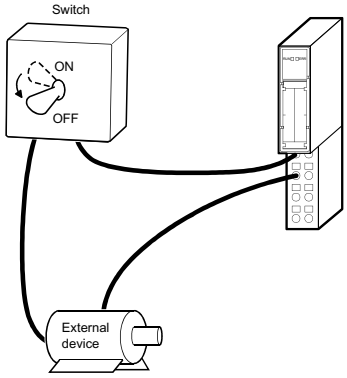
Disconnection from external device



4) When the left screen appears, disconnect the external device from the slice module to be replaced online.
For details, refer to "External device connection and disconnection procedures for online module change" in the corresponding slice module manual.

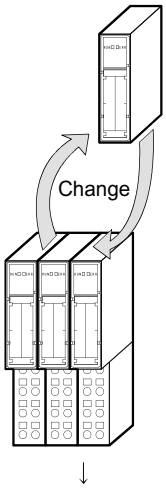
POINT

If the disconnection procedure given in the relevant slice module manual cannot be executed, shut off all phases of the external power supply for the MELSEC-ST system to replace the slice module.



↓

Replacing slice module



5) Remove the slice module to be replaced from the base module.

6) Mount a new slice module with the same model name as the one of the removed.

↓

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(From the previous page.)

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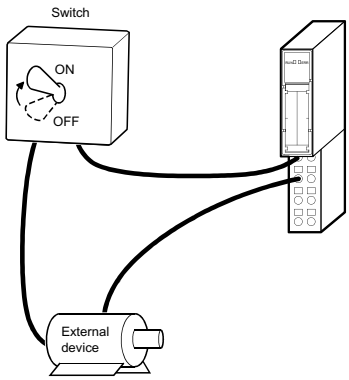
Connection to external device after replacement



7) After mounting a new slice module, connect it to the external device.
For details, refer to "External device connection and disconnection procedures for online module change".

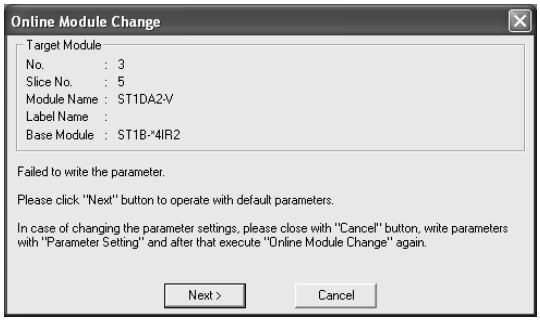
Operations after external device connection

8) After connecting the external device, click the Next button on the screen in step 4).

(a) Clicking the Next button performs the following.
- Checks whether the module name of the newly mounted slice module is the same as that of the removed one.
- Writes the user parameters and command parameters transferred to the head module (at step 3)) to the newly mounted slice module.

(b) After clicking the Next button, confirm the following module statuses.
- The REL. LED of the head module is flashing.
- The RUN LED of the newly mounted slice module is flashing (at 0.25s intervals).

Clicking the Cancel button, i.e., interrupting online module change returns to step 1) In this case, select the same slice module as selected before, and complete online module change. Note that selecting different one causes an error.



When the user parameters and command parameters could not be read from the old slice module by the operation in step 3), the REL. LED and ERR. LED of the head module turn on and the screen shown on the left appears on GX Configurator-ST.
In this case, confirm the error details and take corrective action.
For how to read error codes and error code details, refer to Section 9.2.
When step 10) has completed in this status, the intelligent function module starts its operation with the command parameters set as default.

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(Continued to next page.)

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(From the previous page.)

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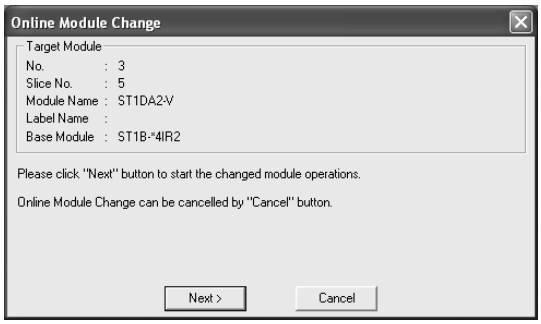


9) Clicking the Next button releases the head module from the online module change mode.

(a) Clicking the Next button performs the following.
- Releases the head module from the online module change mode.
- Restarts refreshing the I/O data, etc.

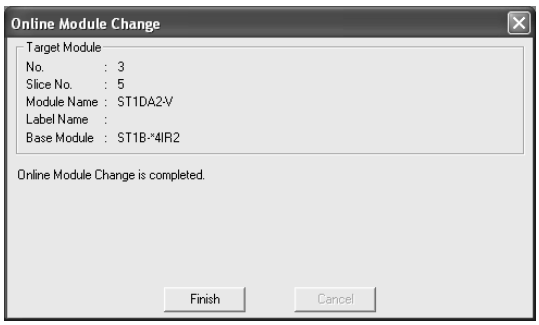
(b) After clicking the Next button, confirm the following module statuses.
- The REL. LED of the head module is off.
- The RUN LED of the newly mounted slice module is on.
- The "Module Status" indicator of the target slice module has turned white. This applies only when monitoring from the "System Monitor" screen.

(c) If the head module cannot be released from the online module change mode, both REL. LED and ERR. LED of the head module turn on.
In this case, confirm the error details and take corrective action.
For how to read error codes and error code details, refer to Section 9.2.

When interrupting online module change, click the Cancel button.

(a) Clicking the Cancel button, i.e., interrupting online module change returns to step 1). In this case, select the same slice module as selected before, and complete online module change.
Note that selecting different one causes an error.

↓



10) The left screen appears showing that online module change has been completed.
Click the Finish button.

↓

(Completed)

5 PRE-OPERATION PROCEDURE AND SETTING

This chapter explains the procedure and setting method for operating the head module in the MELSEC-ST system.

5.1 Mounting and Installation

This section explains the handling precautions on procedures from product unpacking to mounting.
For the mounting and installation of the MELSEC-ST system, refer to the MELSEC-ST System User's Manual.

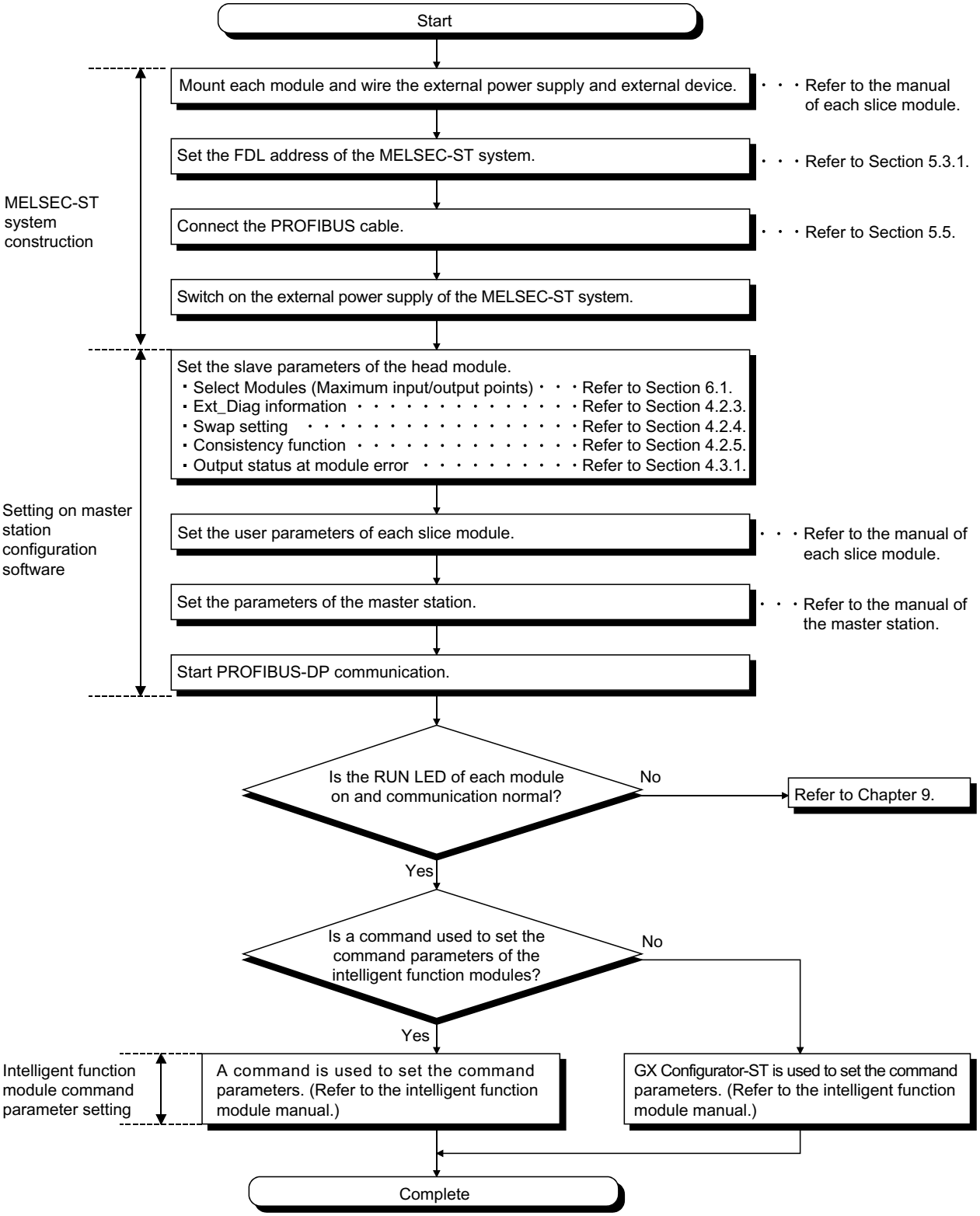
5.1.1 Handling precautions

This section explains the precautions for handling the head module singly.

(1) Do not drop or give a strong impact to the module since its case is made of resin. Doing so can damage the module.
(2) Do not disassemble or modify the modules. Doing so could cause failure, erroneous operation, injury, or fire.
(3) Prevent foreign matter such as chips or wiring debris from entering the module. Failure to do so may cause fires, damage, or erroneous operation.

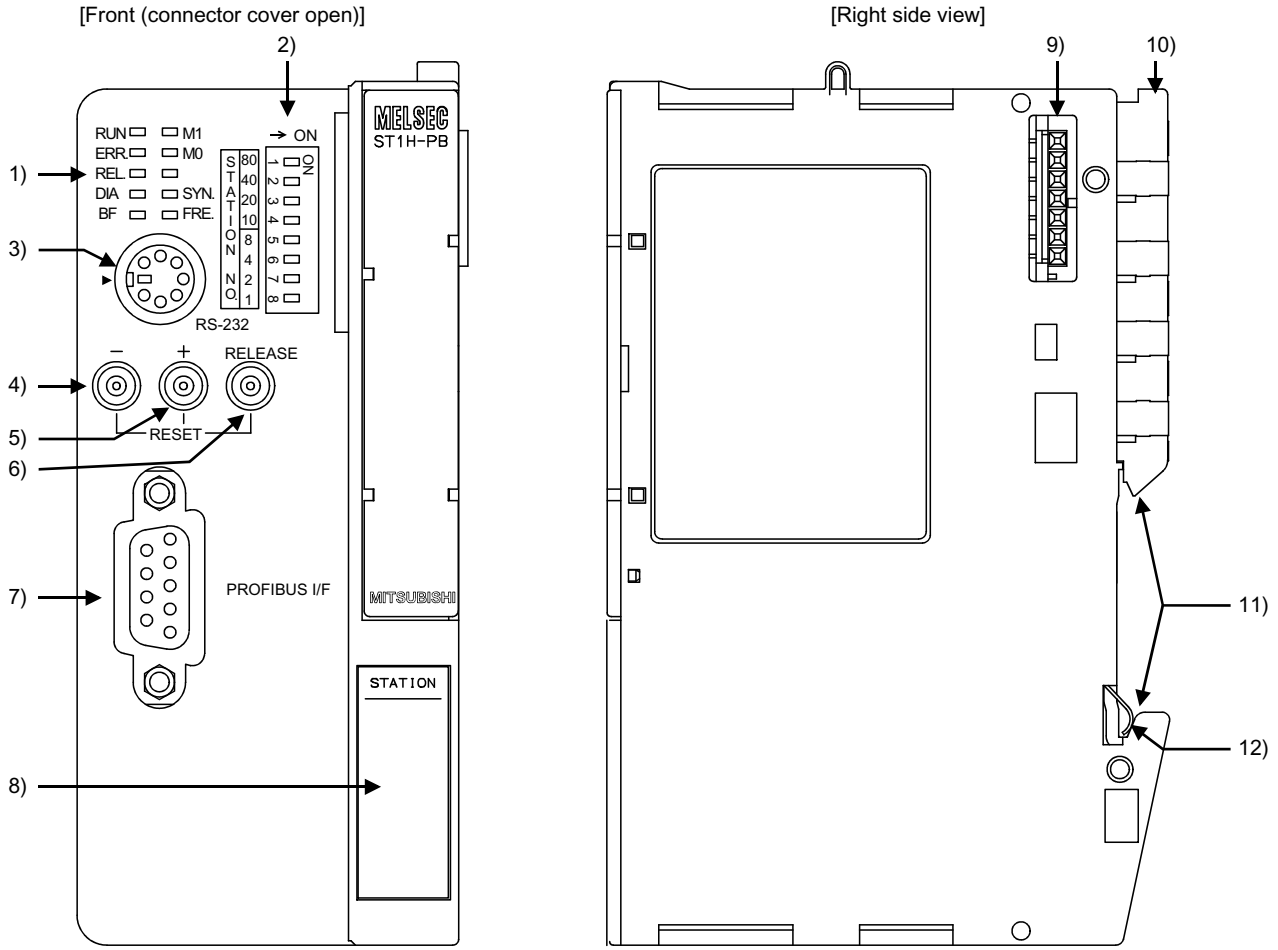
5.2 Pre-operation Procedure and Setting

A rough pre-operation procedure is given below.



5.3 Part Names and Settings

This section explains the part names and settings of the head module.



	Name	Description
1)	Operating status LED	Indicates the operating status of the head module. Refer to (1) in this section for details.
2)	FDL address setting switches	Sets the FDL address of the head module and the selection of the self-diagnostics. FDL address setting range: 0 to 99 (factory setting: 0) Selection of self-diagnostics: 150 Refer to Section 5.3.1 for the FDL address setting method.
3)	RS-232 interface connector	Connects the personal computer when using GX Configurator-ST ＊1.
4)	- button	Used to make online module change and reset the head module. Refer to Section 4.4 for online module change operation. Refer to Section 5.3.2 for head module reset operation.
5)	+ button	
6)	RELEASE button	
7)	PROFIBUS-DP interface connector	Connects the PROFIBUS cable to the head module.

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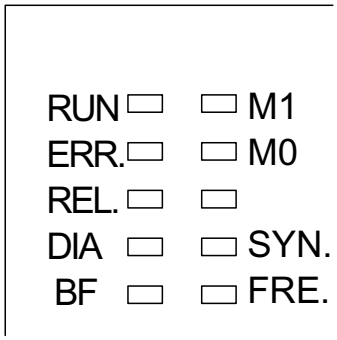
＊1: For the system configuration for use of GX Configurator-ST, refer to the GX Configurator-ST Operating Manual.

	Name	Description
8)	Display plate	Write the FDL address, etc. of the head module.
9)	Base module connector	Connects the power distribution module base next to the right of the head module.
10)	Lock lever	Dismounts the head module from the DIN rail.
11)	DIN rail mounting groove	Mounts the module to the DIN rail.
12)	FG contact	Grounding metal spring. When the module is mounted on the DIN rail, the function ground (FG1) of the corresponding base unit is connected via the DIN rail.

(1) Operating status LED



LED indication	LED status *1	Description
RUN	On	Normally operating
	Flickering	Self-diagnostics or forced output test mode being executed
	Off	Watchdog time error occurred or external power-off
ERR.	On	Error occurred in head module or slice module (Refer to Section 9.2)
	Flickering	Communication error or FDL address change error occurred (Refer to Section 9.2)
	Off	Head module and slice module normal
REL.	On	Module being changed online (Refer to Section 4.4)
	Flickering	
	Off	Online module change completed or not yet executed
DIA	On	Extended diagnostic information being sent to master station (Refer to Section 4.2.3)
	Flickering	Self-diagnostics of head module being executed
	Off	No extended diagnostic information
BF	On	PROFIBUS-DP data communication stop
	Off	PROFIBUS-DP data communication normal
M1 M0	—	The M0 LED and M1 LED indicate the maximum input/output points setting status of the head module. The M0 LED and M1 LED statuses are indicated below.
SYN.	On	SYNC mode
	Off	Normal mode
FRE.	On	FREEZE mode
	Off	Normal mode

Maximum input/output points	LED status	
	M1	M0
32-point mode	Off	Off
64-point mode	Off	On
128-point mode	On	Off
256-point mode	On	On

*1: All LEDs are off during reset processing.

5.3.1 Setting of FDL address setting switches

This section explains the applications, setting ranges and setting method of the head module's FDL address setting switches.

(1) Applications

Use the FDL address setting switches of the head module for the following:

- Setting the FDL address as a PROFIBUS-DP slave station.
- Executing the self-diagnostics of the head module.

(2) Setting range

Set the FDL address setting switches within the following ranges.
They are factory-set to 0 (all OFF).

- When setting the FDL address of the slave station: 0 to 99
- When executing the self-diagnostics: 150

REMARK

Set the FDL address setting switches within the ranges given in (2) in this section. Failure to do so will cause an error when the external power supply of the head module is switched on or the head module is reset.

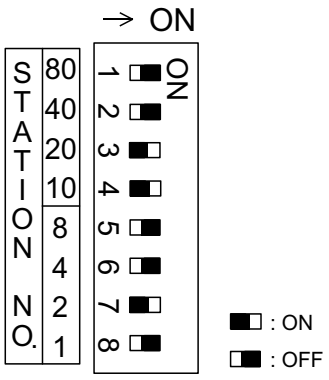
(3) Setting method

The sum of the switch Nos. of the FDL address setting switches that are set to ON is registered as the FDL address of the head module.
Set the tens place of the FDL address with any of the STATION NO. "10", "20", "40" and "80" switches.
Set the units place of the FDL address with any of the STATION NO. "1", "2", "4" and "8" switches.

FDL address	STATION NO.							
	10s place				1s place			
	80	40	20	10	8	4	2	1
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
:	:	:	:	:	:	:	:	:
10	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
11	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
:	:	:	:	:	:	:	:	:
98	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
99	ON	OFF	OFF	ON	ON	OFF	OFF	ON

When setting the head module FDL address to "32", set the switches as shown below.

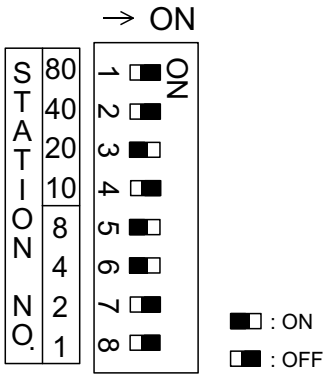
FDL address	STATION NO.							
	10s place				1s place			
	80	40	20	10	8	4	2	1
32	OFF	OFF	ON	ON	OFF	OFF	ON	OFF



REMARK

Never set the switches as shown below (a sum of the switch Nos. in the units place is 10 or more).
To do so will cause an error in the head module.

FDL address	STATION NO.							
	10s place				1s place			
	80	40	20	10	8	4	2	1
32	OFF	OFF	ON	OFF	ON	ON	OFF	OFF



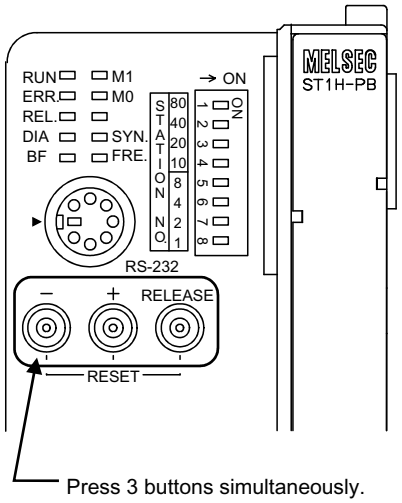
5.3.2 Reset operation

This section explains how to reset the head module using its RELEASE, + and - buttons.

(1) Reset method

Reset the head module as described below.

1) Press the RELEASE, + and - buttons at the same time.



2) When all LEDs turn off, reset processing is completed.
Release the RELEASE, + and - buttons.

(2) Reset application

Perform this reset operation when changing the FDL address from 150 to any slave station FDL address (switching from the self-diagnostics to the normal mode) while the external power supply is on.

REMARK

The head module can also be reset from the GX Configurator-ST.
In this case, choose [Online] → [Reset Head Module].
Refer to the GX Configurator-ST Manual for details.

5.4 Self-diagnostics

Self-diagnostics tests the head module singly.

(1) Self-diagnostics execution procedure

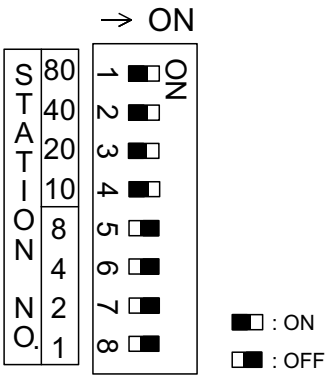
Execute the self-diagnostics in the following procedure.

(a) When the external power supply of the MELSEC-ST system is on, switch it off.

(b) Disconnect the PROFIBUS cable from the head module.

(c) Set the FDL address of the head module to 150 as shown below.

FDL address	STATION NO.							
	10 place				1 place			
	80	40	20	10	8	4	2	1
150	ON	ON	ON	ON	OFF	OFF	OFF	OFF



(d) Switch on the external power supply of the MELSEC-ST system.

(e) The self-diagnostics are then started automatically.
While the self-diagnostics are being executed, the RUN LED and DIA LED are flickering.
When the self-diagnostics end, the RUN LED turns on (normal termination) or off (abnormal termination).

(2) Self-diagnostics result

(a) RUN LED turns on (at normal termination)

After the self-diagnostics are executed, the RUN LED turns on to indicate a normal termination.
Change the current setting of the head module to the FDL address for a slave station.

(b) RUN LED turns off (at abnormal termination)

After the self-diagnostics are executed, the RUN LED turns off to indicate an abnormal termination.
Execute the self-diagnostics again.
If an error results again, it suggests a hardware fault of the head module.
Please check whether the REL. LED, DIA LED and BF LED are on/off after the self-diagnostics, and consult your local Mitsubishi representative, explaining a detailed description of the problem.

5.5 Wiring

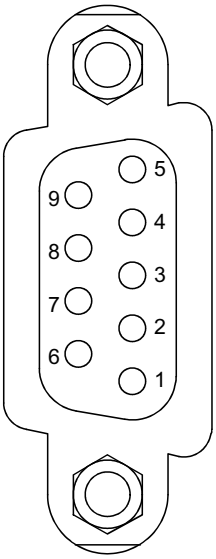
This section explains PROFIBUS cable wiring and wiring precautions.

5.5.1 PROFIBUS cable wiring

This section explains the PROFIBUS-DP interface connector pin-outs of the head module, the wiring specifications of the PROFIBUS cable, and the bus terminator.

(1) PROFIBUS-DP interface connector pin-outs

The PROFIBUS-DP interface connector (D-sub 9-pin female connector) pin-outs of the head module are indicated below.



Pin No.	Signal symbol	Name	Application
1	—	SHIELD ∗1	Shield, protective earth
2	—	M24V ∗1	Free
3	B/B'	RxD/TxD-P	Received/sent data-P
4	—	CNTR-P ∗1	Free
5	C/C'	DGND ∗2	Data earth
6	—	VP ∗2	Voltage+
7	—	P24V ∗1	Free
8	A/A'	RxD/TxD-N	Received/sent data-N
9	—	CNTR-N ∗1	Free

∗1: Optional signal.

∗2: Signal used to connect the bus terminator.

(2) PROFIBUS cable

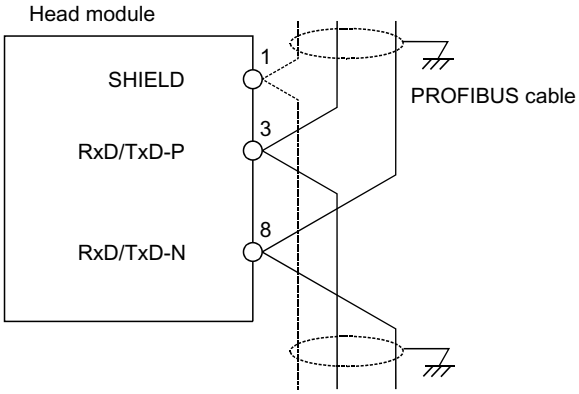
The following indicates the PROFIBUS cable specifications and wiring specifications.

(a) PROFIBUS cable

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

Item	Transmission line
Applicable cable	Shielded twisted pair cable
Impedance	130 to 165 Ω (f = 3 to 20 MHz)
Capacity	Less than 30pF/m
Conductor resistance	Less than 110 Ω/km
Conductor cross section	0.34mm^2 or more

(b) Wiring specifications

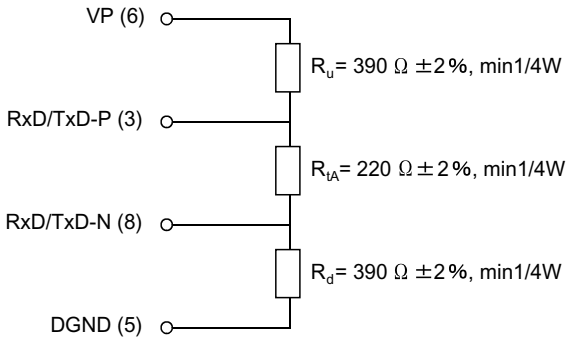


(c) Connector

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

(3) Bus terminator

The bus terminator is user-prepared.



5 - 12

5.5.2 Wiring precautions

As one of the conditions to make full use of the head module functions and configure a reliable system, the influence of noise must be minimized in the external wiring.
The following gives the precautions for external wiring of the head module.

(1) Do not install the PROFIBUS cable together with the main circuit and power cables or the load wires used for other than the MELSEC-ST system.
To do so will cause the head module to be affected by noise and surge induction.

(2) Separate the PROFIBUS cable as far away as possible from the I/O module wires.

6 PARAMETER SETTING

This chapter explains the head module parameters.
Each of the modules that comprise the MELSEC-ST system has the following parameters.

Parameter		Description	Setting item			
			1)	2)	3)	4)
Slave parameter	Select Modules *1	Parameters for storing the mounting status (Module Configuration) of each module set by the configuration software of the master station. By setting this parameter, the user parameter setting of each module is enabled.	○	○	○	○
	User parameter	Can be set by the configuration software of the master station to use the functions of each module. For the intelligent function module, they can also be set from GX Configurator-ST.	○	×	○	○
Command parameter		Parameters of the intelligent function module that can be set using a command or GX Configurator-ST.	×	×	×	○

○: With setting items ×: Without setting items

1) Head module
2) Power distribution module
3) I/O module
4) Intelligent function module

*1: For the Select Modules, be sure to set the model name same as that of the actual module used in the system.

REMARK

For details of the head module's slave parameters, refer to Section 6.1 and 6.2.
For the parameters of each slice module, refer to the manual of the corresponding slice module.

6 - 1

6.1 Select Modules

To set the "Select Modules" slave parameter, the configuration of the MELSEC-ST system and the maximum input/output points of the head module must be taken into consideration.

(1) MELSEC-ST system construction

Construct the MELSEC-ST systems within the ranges where the head module and slice modules satisfy the following conditions 1) to 4).

Condition	Description	Range	Reference section
1)	Slice module mounting restriction	63 or less modules (26 or less modules for the intelligent function modules)	—
2)	Sum total of occupied I/O points	256 points or less	Section 6.1.1
3)	Sum total of Wr.n Word inputs	32 words or less or 52 words or less	
	Sum total of Ww.n Word outputs	32 words or less or 52 words or less	
4)	Sum total of user parameter sizes	97 bytes or less	Section 6.1.2

REMARK

When the MELSEC-ST system is mounted with no intelligent function modules, the above condition 3) need not be considered.

(2) Selection of maximum input/output points

Select the maximum input/output points setting according to the conditions 2) and 3) in (1) of this section.
The maximum input/output points determine the sizes of the input data and output data.
Refer to Section 6.1.1 for the selection and setting of the maximum input/output points.

6 - 2

6.1.1 Selection and setting of maximum input/output points

To use the head module, the maximum input/output points must be set in consideration of the following items.

- [A] Sum total of occupied I/O points of MELSEC-ST system (Refer to (1) in this section)
- [D] Maximum word input/output points used by intelligent function modules (Refer to (2) in this section)

(1) Number of occupied I/O points of MELSEC-ST system

Up to 256 points are allowed for [A] Sum total of occupied I/O points of MELSEC-ST system.
Using the following expression, calculate the [A] Sum total of occupied I/O points of MELSEC-ST system.

4 ∗1 + sum total of occupied I/O points of slice modules ∗2 = [A] ≤ 256

∗1: Occupied I/O points of head module

∗2: Bus refreshing module on the right of the head module is included.

(2) Sum total of Wr.n Word inputs and Ww.n Word outputs used by intelligent function modules

To mount intelligent function modules in the MELSEC-ST system, the [B] Sum total of Wr.n Word inputs and [C] Sum total of Ww.n Word outputs used by the intelligent function modules must be calculated.
Choose the [B] or [C] value, whichever is greater, as the [D] Maximum word input/output points to make it as the selection target of the maximum input/output points.

REMARK

To the intelligent function module, both the Wr Word input area and Ww Word output area are assigned in the standard setting.
To make effective use of these two areas, only the Wr.n Word inputs or Ww.n Word outputs can be assigned.
Refer to Section 6.1.4 for details.

(3) Selection of maximum input/output points

Set the maximum input/output points to the head module within the range that satisfies the "[A] Sum total of occupied I/O points" and "[D] Maximum word input/output points" obtained in (1) and (2).
The following gives a maximum input/output points selection table.

Sum total of occupied I/O points	Maximum word input/output points							
	0 to 32 words				33 to 52 words			
4 to 32 points	32-point mode	64-point mode	128-point mode	256-point mode	32-point mode	64-point mode	128-point mode	—
33 to 64 points	—	64-point mode	128-point mode	256-point mode	—	64-point mode	128-point mode	—
65 to 128 points	—		128-point mode	256-point mode	—		128-point mode	—
129 to 256 points	—			256-point mode	—			

Select the shaded setting when planning an expansion of the MELSEC-ST system for the future.

6 - 3

(4) Setting of maximum input/output points

After the maximum input/output points used in the MELSEC-ST system are selected, they must be set to the head module.

The maximum input/output points determine the I/O data size. (Refer to Section 3.2.)

Set the maximum input/output points using the slave parameter (Select Modules) of the master station.

The setting item of Select Modules is determined by the maximum input/output points and master station's consistency function.

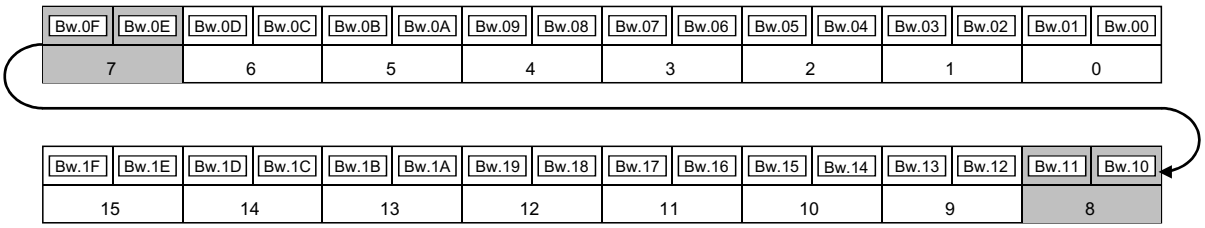
Maximum input/output points	Consistency of master station ∗1	Select Modules setting
32-point mode	Module unit (9-word or more consistency allowed)	ST1H-PB 32pts.-whole consistent
	Word unit	ST1H-PB 32pts.-word consistent
64-point mode	Module unit (14-word or more consistency allowed)	ST1H-PB 64pts.-whole consistent
	Word unit	ST1H-PB 64pts.-word consistent
128-point mode	Module unit (24-word or more consistency allowed)	ST1H-PB 128pts.-whole consistent
	Word unit	ST1H-PB 128pts.-word consistent
256-point mode	Module unit (44-word or more consistency allowed)	ST1H-PB 256pts.-whole consistent
	Word unit	ST1H-PB 256pts.-word consistent

∗1: When using the master station that cannot prevent inconsistency of each module, choose a word consistent setting item.

When the word unit item is set, consistency of data is not guaranteed if the data is split across the word units as shown in the following example.

<When data are not guaranteed>

When [Bw.n] Bit outputs and [Ew.n] Error clear of the slice module are assigned to 2 words



When the start slice No. is "7" and the number of occupied slices is "2", data are not guaranteed since the [Bw.n] Bit output information of the slice module are assigned to 2 words.

6.1.2 User parameter size

To construct a MELSEC-ST system, the sum total of [E] User parameter size must be considered.

Construct the MELSEC-ST system so that the [E] User parameter size does not exceed 97 bytes.

The following is the expression for calculating the maximum user parameter size.

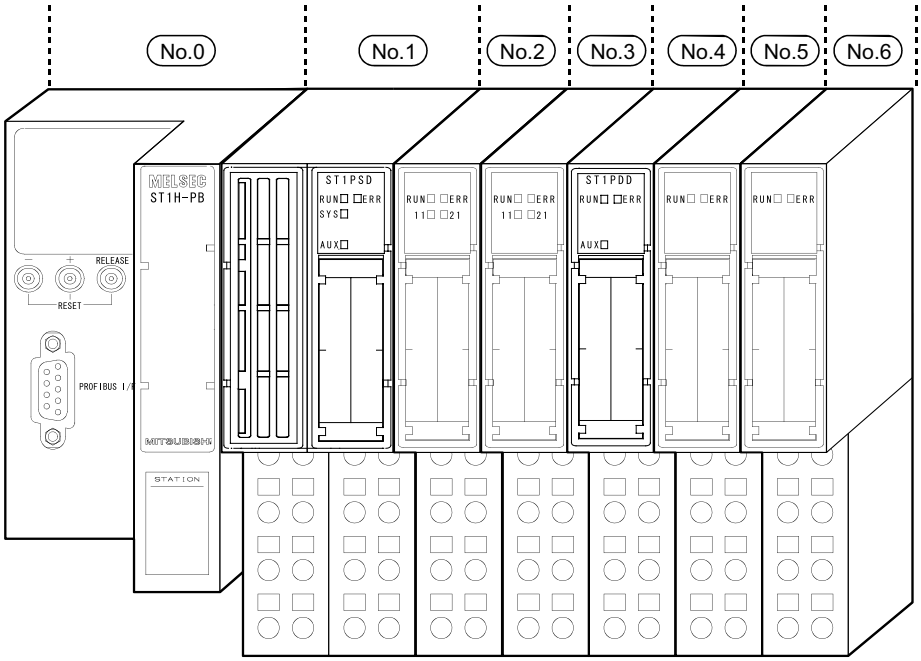
2 + number of mounted slice modules + sum total of occupied slices of intelligent function modules = [E] ≤ 97

6.1.3 Parameter setting example

The following system configuration example is used to explain a parameter setting example and I/O data assignment.

(1) System configuration example

The following system configuration example is used to make explanation in this section.



(2) Setting of maximum input/output points

In the system configuration example in (1) of this section, the "[A] Sum total of occupied I/O points" and "[D] Maximum word input/output points" are as listed below.

(The following table uses the maximum input/output points setting sheet provided in Appendix 2.1.)

No.	Module Name	Number of Occupied I/O Points	Start Slice No. (Number of occupied slices)	Wr.n	Ww.n	5V DC Internal Current Consumption (Total)	24V DC Current (Total)	Slot Width (Total)
0	ST1H-PB	4	0(2)	—	—	0.530A(0.530A)	0A(0A)	—
1	ST1PSD	2	2(1)	—	—	—	—	25.2mm(25.2mm)
2	ST1X2-DE1	2	3(1)	—	—	0.085A(0.615A)	*1	12.6mm(37.8mm)
3	ST1Y2-TE2	2	4(1)	—	—	0.090A(0.705A)	*1	12.6mm(50.4mm)
4	ST1PDD	2	5(1)	—	—	0.060A(0.765A)	—	12.6mm(63.0mm)
5	ST1AD2-V (without Ww)	4	6(2)	2	0	0.110A(0.875A)	*1	12.6mm(75.6mm)
6	ST1DA2-V	4	8(2)	2	2	0.095A(0.970A)	*1	12.6mm(88.2mm)
Total		20	—	4	2	—	—	—

*1: The 24V DC current changes depending on the external device connected to each slice module.
Confirm the current consumption of the external device connected to each slice module, and calculate the total value.
Refer to the MELSEC-ST System User's Manual for details of current consumption calculation.

According to the above table

- [A] Sum total of occupied I/O points = 20
- [D] Maximum word input/output points = 4

By applying the [A] and [D] values to the maximum input/output points selection table in Section 6.1.1 (3), the "32-point mode" can be selected.

Also, since the [E] User parameter size is as follows:

[E] = 2 + number of mounted slice modules + sum total of occupied slices of intelligent function modules
= 2 + 6 + (2 + 2) = 12 ≤ 97

the MELSEC-ST system can be constructed.

Refer to the next section (3) for I/O data assignment under the "32-point mode" setting in the system configuration example in the previous section (1).

(3) I/O data assignment

The following shows the I/O data assignment result in the system configuration example in (1) of this section.

(a) Input data

Offset address	b15							b8	b7							b0	
+0	Br.0F	Br.0E	Br.0D	Br.0C	Br.0B	Br.0A	Br.09	Br.08	Br.07	Br.06	Br.05	Br.04	Br.03	Br.02	Br.01	Br.00	Br Bit input area
	No.5				No.4		No.3		No.2		No.1		No.0				
+1	Br.1F	Br.1E	Br.1D	Br.1C	Br.1B	Br.1A	Br.19	Br.18	Br.17	Br.16	Br.15	Br.14	Br.13	Br.12	Br.11	Br.10	
	0												No.6				
+2	Er.0F	Er.0E	Er.0D	Er.0C	Er.0B	Er.0A	Er.09	Er.08	Er.07	Er.06	Er.05	Er.04	Er.03	Er.02	Er.01	Er.00	Er Error information area
	No.5				No.4		No.3		No.2		No.1		No.0				
+3	Er.1F	Er.1E	Er.1D	Er.1C	Er.1B	Er.1A	Er.19	Er.18	Er.17	Er.16	Er.15	Er.14	Er.13	Er.12	Er.11	Er.10	
	0												No.6				
+4	Mr.15	Mr.14	Mr.13	Mr.12	Mr.11	Mr.10	Mr.9	Mr.8	Mr.7	Mr.6	Mr.5	Mr.4	Mr.3	Mr.2	Mr.1	Mr.0	Mr Module existence information area
	0						No.6		No.5		No.4	No.3	No.2	No.1	No.0		
+5	Cr.0(15-8) Command execution result								Cr.0(7-0) Start slice No. of execution target								Cr Command result area
+6	Cr.1 Executed command No.																
+7	Cr.2 Response data 1																
+8	Cr.3 Response data 2																
+9	Wr.00 For No. 5																Wr Word input area
+10	Wr.01 For No. 5																
+11	Wr.02 For No. 6																
+12	Wr.03 For No. 6																

No. 0: Head module (ST1H-PB)
No. 1: Bus refreshing module (ST1PSD)
No. 2: Input module (ST1X2-DE1)
No. 3: Output module (ST1Y2-TE2)
No. 4: Power feeding module (ST1PDD)
No. 5: Intelligent function module (ST1AD2-V (without Ww))
No. 6: Intelligent function module (ST1DA2-V)

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(b) Output data

Offset address	b15							b8	b7							b0	
+0	Bw.0F	Bw.0E	Bw.0D	Bw.0C	Bw.0B	Bw.0A	Bw.09	Bw.08	Bw.07	Bw.06	Bw.05	Bw.04	Bw.03	Bw.02	Bw.01	Bw.00	Bw Bit output area
	No.5				No.4		No.3		No.2		No.1		No.0				
+1	Bw.1F	Bw.1E	Bw.1D	Bw.1C	Bw.1B	Bw.1A	Bw.19	Bw.18	Bw.17	Bw.16	Bw.15	Bw.14	Bw.13	Bw.12	Bw.11	Bw.10	
	0												No.6				
+2	Ew.0F	Ew.0E	Ew.0D	Ew.0C	Ew.0B	Ew.0A	Ew.09	Ew.08	Ew.07	Ew.06	Ew.05	Ew.04	Ew.03	Ew.02	Ew.01	Ew.00	Ew Error clear area
	No.5				No.4		No.3		No.2		No.1		No.0				
+3	Ew.1F	Ew.1E	Ew.1D	Ew.1C	Ew.1B	Ew.1A	Ew.19	Ew.18	Ew.17	Ew.16	Ew.15	Ew.14	Ew.13	Ew.12	Ew.11	Ew.10	
	0												No.6				
+4	Sw.0 System Area 1																Sw System Area
+5	Cw.0 Start slice No. of execution target																Cw Command execution area
+6	Cw.1 Command No. to be executed																
+7	Cw.2 Argument 1																
+8	Cw.3 Argument 2																
+9	Ww.00 For No. 6																Ww Word output area
+10	Ww.01 For No. 6																

No. 0: Head module (ST1H-PB)
No. 1: Bus refreshing module (ST1PSD)
No. 2: Input module (ST1X2-DE1)
No. 3: Output module (ST1Y2-TE2)
No. 4: Power feeding module (ST1PDD)
No. 5: Intelligent function module (ST1AD2-V (without Ww))
No. 6: Intelligent function module (ST1DA2-V)

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6.1.4 Word input/output points of intelligent function modules

To the intelligent function module, both the Wr Word input area and Ww Word output area are assigned in the standard setting.
To make effective use of these two areas, only the Wr.n Word inputs or Ww.n Word outputs can be assigned.

(1) Changing the word input/output points of intelligent function module

(a) Intelligent function module not using Ww.n Word outputs

For the intelligent function module that can be operated by only the Wr.n Word inputs, the points of the Ww Word output area can be changed to 0 by the configuration software of the master station.
When not using the Ww.n Word outputs, select the model name provided with a comment "(without Ww)" when selecting the module on the configuration software of the master station.

(b) Intelligent function module not using Wr.n Word inputs

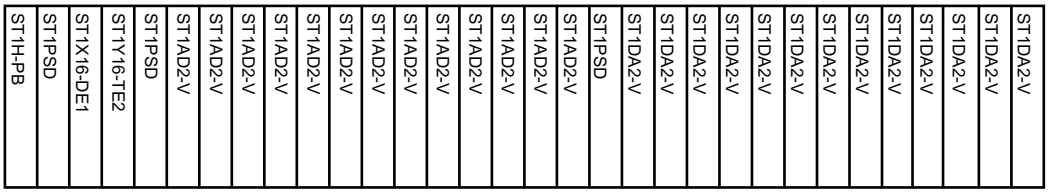
For the intelligent function module that can be operated by only the Ww.n Word outputs, the points of the Wr Word input area can be changed to 0 by the configuration software of the master station.
When not using the Wr.n Word inputs, select the model name provided with a comment "(without Wr)" when selecting the module on the configuration software of the master station.

(2) Example of changing the word input/output points

In the system configuration example in (2) (a) of this section, it is desired to set the maximum input/output points to the 256-point mode since the [A] Sum total of occupied input/output points are 146.
However, it is not possible because the [D] Maximum word input/output points exceed 32 words.
If the word input/output points of the intelligent function module are changed as in (2) (b) of this section, the [D] Maximum word input/output points are 18 words and the 256-point mode can be set.

(a) Example where the used word input/output points exceed 32 words though it is desired to set the maximum input/output points to the 256-point mode.

1) System configuration example



2) Setting of maximum input/output points
The following table uses the maximum input/output points setting sheet given in Appendix 2.1.

No.	Module Name	Number of Occupied I/O Points	Start Slice No. (Number of occupied slices)	Wr.n	Ww.n	5V DC Internal Current Consumption (Total)	24V DC Current (Total)	Slot Width (Total)
0	ST1H-PB	4	0(2)	—	—	0.530A(0.530A)	0A(0A)	—
1	ST1PSD	2	2(1)	—	—	—	—	25.2mm(25.2mm)
2	ST1X16-DE1	16	3(8)	—	—	0.120A(0.650A)	＊1	101.0mm(126.2mm)
3	ST1Y16-TE2	16	11(8)	—	—	0.150A(0.800A)	＊1	101.0mm(227.2mm)
4	ST1PSD	2	19(1)	—	—	—	—	25.2mm(252.4mm)
5	ST1AD2-V	4	20(2)	2	2	0.110A(0.110A)	＊1	12.6mm(265.0mm)
6	ST1AD2-V	4	22(2)	2	2	0.110A(0.220A)	＊1	12.6mm(277.6mm)
7	ST1AD2-V	4	24(2)	2	2	0.110A(0.330A)	＊1	12.6mm(290.2mm)
8	ST1AD2-V	4	26(2)	2	2	0.110A(0.440A)	＊1	12.6mm(302.8mm)
9	ST1AD2-V	4	28(2)	2	2	0.110A(0.550A)	＊1	12.6mm(315.4mm)
10	ST1AD2-V	4	30(2)	2	2	0.110A(0.660A)	＊1	12.6mm(328.0mm)
11	ST1AD2-V	4	32(2)	2	2	0.110A(0.770A)	＊1	12.6mm(340.6mm)
12	ST1AD2-V	4	34(2)	2	2	0.110A(0.880A)	＊1	12.6mm(353.2mm)
13	ST1AD2-V	4	36(2)	2	2	0.110A(0.990A)	＊1	12.6mm(365.8mm)
14	ST1AD2-V	4	38(2)	2	2	0.110A(1.100A)	＊1	12.6mm(378.4mm)
15	ST1AD2-V	4	40(2)	2	2	0.110A(1.210A)	＊1	12.6mm(391.0mm)
16	ST1AD2-V	4	42(2)	2	2	0.110A(1.320A)	＊1	12.6mm(403.6mm)
17	ST1AD2-V	4	44(2)	2	2	0.110A(1.430A)	＊1	12.6mm(416.2mm)
18	ST1PSD	2	46(1)	—	—	—	—	25.2mm(441.4mm)
19	ST1DA2-V	4	47(2)	2	2	0.095A(0.095A)	＊1	12.6mm(454.0mm)
20	ST1DA2-V	4	49(2)	2	2	0.095A(0.190A)	＊1	12.6mm(466.6mm)
21	ST1DA2-V	4	51(2)	2	2	0.095A(0.285A)	＊1	12.6mm(479.2mm)
22	ST1DA2-V	4	53(2)	2	2	0.095A(0.380A)	＊1	12.6mm(491.8mm)
23	ST1DA2-V	4	55(2)	2	2	0.095A(0.475A)	＊1	12.6mm(504.4mm)
24	ST1DA2-V	4	57(2)	2	2	0.095A(0.570A)	＊1	12.6mm(517.0mm)
25	ST1DA2-V	4	59(2)	2	2	0.095A(0.665A)	＊1	12.6mm(529.6mm)
26	ST1DA2-V	4	61(2)	2	2	0.095A(0.760A)	＊1	12.6mm(542.2mm)
27	ST1DA2-V	4	63(2)	2	2	0.095A(0.855A)	＊1	12.6mm(554.8mm)
28	ST1DA2-V	4	65(2)	2	2	0.095A(0.950A)	＊1	12.6mm(567.4mm)
29	ST1DA2-V	4	67(2)	2	2	0.095A(1.045A)	＊1	12.6mm(580.0mm)
30	ST1DA2-V	4	69(2)	2	2	0.095A(1.140A)	＊1	12.6mm(592.6mm)
31	ST1DA2-V	4	71(2)	2	2	0.095A(1.235A)	＊1	12.6mm(605.2mm)
Total		146	—	52	52	—	—	—

＊1: The 24V DC current changes depending on the external device connected to each slice module.
Confirm the current consumption of the external device connected to each slice module, and calculate the total value.
Refer to the MELSEC-ST System User's Manual for details of current consumption calculation.

It is desired to set the maximum input/output points to the 256-point mode since the [A] Sum total of occupied I/O points are 146, however, it is not possible because the [D] Maximum word input/output points exceed 32 words.

(b) Example of changing the word input/output points in system configuration example in (a)

1) System configuration example

2) Setting of maximum input/output points
The following table uses the maximum input/output points setting sheet given in Appendix 2.1.

No.	Module Name	Number of Occupied I/O Points	Start Slice No. (Number of occupied slices)	Wr.n	Ww.n	5V DC Internal Current Consumption (Total)	24V DC Current (Total)	Slot Width (Total)
0	ST1H-PB	4	0(2)	—	—	0.530A(0.530A)	0A(0A)	—
1	ST1PSD	2	2(1)	—	—	—	—	25.2mm(25.2mm)
2	ST1X16-DE1	16	3(8)	—	—	0.120A(0.650A)	＊1	101.0mm(126.2mm)
3	ST1Y16-TE2	16	11(8)	—	—	0.150A(0.800A)	＊1	101.0mm(227.2mm)
4	ST1PSD	2	19(1)	—	—	—	—	25.2mm(252.4mm)
5	ST1AD2-V	4	20(2)	2	0	0.110A(0.110A)	＊1	12.6mm(265.0mm)
6	ST1AD2-V	4	22(2)	2	0	0.110A(0.220A)	＊1	12.6mm(277.6mm)
7	ST1AD2-V	4	24(2)	2	0	0.110A(0.330A)	＊1	12.6mm(290.2mm)
8	ST1AD2-V	4	26(2)	2	0	0.110A(0.440A)	＊1	12.6mm(302.8mm)
9	ST1AD2-V	4	28(2)	2	0	0.110A(0.550A)	＊1	12.6mm(315.4mm)
10	ST1AD2-V	4	30(2)	2	0	0.110A(0.660A)	＊1	12.6mm(328.0mm)
11	ST1AD2-V	4	32(2)	2	0	0.110A(0.770A)	＊1	12.6mm(340.6mm)
12	ST1AD2-V	4	34(2)	2	0	0.110A(0.880A)	＊1	12.6mm(353.2mm)
13	ST1AD2-V	4	36(2)	2	0	0.110A(0.990A)	＊1	12.6mm(365.8mm)
14	ST1AD2-V	4	38(2)	2	0	0.110A(1.100A)	＊1	12.6mm(378.4mm)
15	ST1AD2-V	4	40(2)	2	0	0.110A(1.210A)	＊1	12.6mm(391.0mm)
16	ST1AD2-V	4	42(2)	2	0	0.110A(1.320A)	＊1	12.6mm(403.6mm)
17	ST1AD2-V	4	44(2)	2	0	0.110A(1.430A)	＊1	12.6mm(416.2mm)
18	ST1PSD	2	46(1)	—	—	—	—	25.2mm(441.4mm)
19	ST1DA2-V	4	47(2)	0	2	0.095A(0.095A)	＊1	12.6mm(454.0mm)
20	ST1DA2-V	4	49(2)	0	2	0.095A(0.190A)	＊1	12.6mm(466.6mm)
21	ST1DA2-V	4	51(2)	0	2	0.095A(0.285A)	＊1	12.6mm(479.2mm)
22	ST1DA2-V	4	53(2)	0	2	0.095A(0.380A)	＊1	12.6mm(491.8mm)
23	ST1DA2-V	4	55(2)	0	2	0.095A(0.475A)	＊1	12.6mm(504.4mm)
24	ST1DA2-V	4	57(2)	0	2	0.095A(0.570A)	＊1	12.6mm(517.0mm)
25	ST1DA2-V	4	59(2)	0	2	0.095A(0.665A)	＊1	12.6mm(529.6mm)
26	ST1DA2-V	4	61(2)	0	2	0.095A(0.760A)	＊1	12.6mm(542.2mm)
27	ST1DA2-V	4	63(2)	0	2	0.095A(0.855A)	＊1	12.6mm(554.8mm)
28	ST1DA2-V	4	65(2)	0	2	0.095A(0.950A)	＊1	12.6mm(567.4mm)
29	ST1DA2-V	4	67(2)	0	2	0.095A(1.045A)	＊1	12.6mm(580.0mm)
30	ST1DA2-V	4	69(2)	0	2	0.095A(1.140A)	＊1	12.6mm(592.6mm)
31	ST1DA2-V	4	71(2)	0	2	0.095A(1.235A)	＊1	12.6mm(605.2mm)
Total		146	—	26	26	—	—	—

＊1: The 24V DC current changes depending on the external device connected to each slice module.
Confirm the current consumption of the external device connected to each slice module, and calculate the total value.
Refer to the MELSEC-ST System User's Manual for details of current consumption calculation.

When the word input/output points of the intelligent function modules are set as in above 1), the [D] Maximum word input/output points are 26 words and the 256-point mode can be set.

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6.2 User Parameters

The following table describes the user parameters to be set by the configuration software of the master station.
For the user parameters of each slice module, refer to the relevant manual.

Item	Description	Reference section
FDL address	Enter the FDL address of the head module. [Setting range] 0 to 99	Section 5.3.1
Watchdog time	Set the watchdog time. (Set value × 10ms) [Setting range] 0 : Watchdog time invalid 2 to 65025 : Watchdog time valid	*1
min T_sdr	Set the minimum response time to be used until a response frame can be sent to the master station. [Setting range] 1 to 255	*1
Group identification number	Set the group to which the head module will belong. The head module is allowed to belong to multiple groups (Grp 1 to Grp 8).	*1
Output status at module error	Set the output status at a head module error. [Setting range] Stop : Stop (Default) Continue: Continue	Section 4.3.1
Ext_Diag information	Set whether the master station will be notified of extended diagnostic information. [Setting range] Disable: Not notified Enable: Notified (Default)	Section 4.2.3
Swap of input/output data	Set the swap of high and low bytes of I/O data. [Setting range] Disable: Not swapped (Default) Enable: Swapped	Section 4.2.4
Swap of Ext_Diag information	Set the swap of high and low bytes of extended diagnostic information. [Setting range] Disable: Not swapped (Default) Enable: Swapped	Section 4.2.4
Consistency function	Set the consistency function. [Setting range] Disable: Consistency disabled Enable: Consistency enabled (Default)	Section 4.2.5

*1: Refer to the manual of the master station configuration software.

7 PROGRAMMING

This chapter explains program examples available when the QJ71PB92D and AJ71PB92D/A1SJ71PB92D are used as the master station.

REMARK

Refer to the following manuals for details of the QJ71PB92D and AJ71PB92D/A1SJ71PB92D.
<QJ71PB92D>
- PROFIBUS-DP Interface Module User's Manual
- SH-080127 (13JR22)

<AJ71PB92D/A1SJ71PB92D>
- PROFIBUS-DP Interface Module type AJ71PB92D/A1SJ71PB92D User's Manual
- IB-66773 (13JL20)

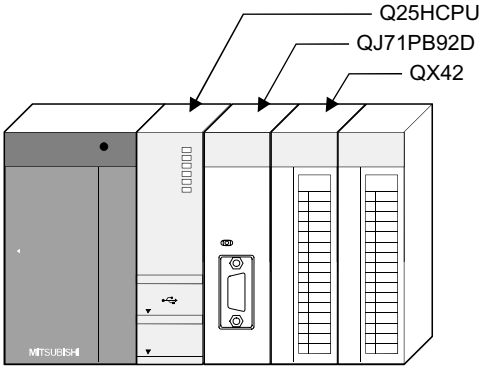
7.1 When Using QJ71PB92D as Master Station

This section explains program examples available when the QJ71PB92D is used as the master station.
Section 7.1.1 and 7.1.2 uses the following system configuration example for explanation.

(1) System configuration of master station (QJ71PB92D)

The system configuration of the master station (QJ71PB92D) used in this section is shown below.

(a) System configuration of master station (QJ71PB92D)



(b) Settings of master station (QJ71PB92D)

Item		Setting
I/O signals		X/Y000 to X/Y01F
Operation mode		Extended service mode (MODE E)
I/O data area (buffer memory) for FDL address 1 (MELSEC-ST system)	Input data	0(0_H) to 12($0C_H$)
	Output data	960($3C0_H$) to 972($3CC_H$)

REMARK

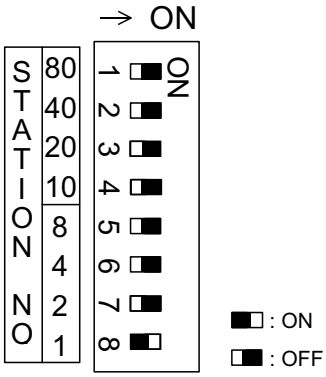
The MELSEC-ST system changes in I/O data size depending on the maximum input/output point setting and the number of mounted intelligent function modules. Hence, the master station operation mode is set to the extended service mode (MODE E) variable in data size.

(2) System configuration of MELSEC-ST system

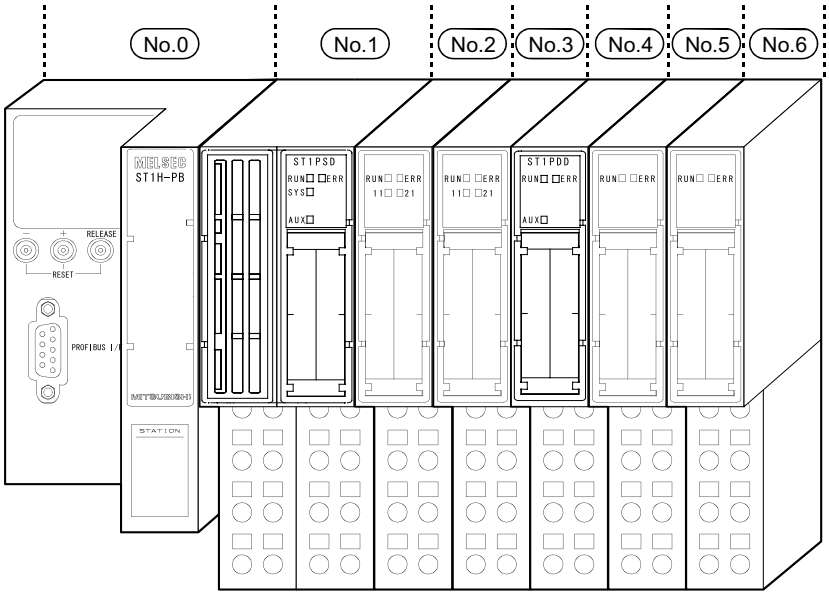
The following system configuration is used as the MELSEC-ST system for explanation.

(a) System configuration of slave station (MELSEC-ST system)

1) FDL address: 1



2) Maximum input/output points: 32-point mode

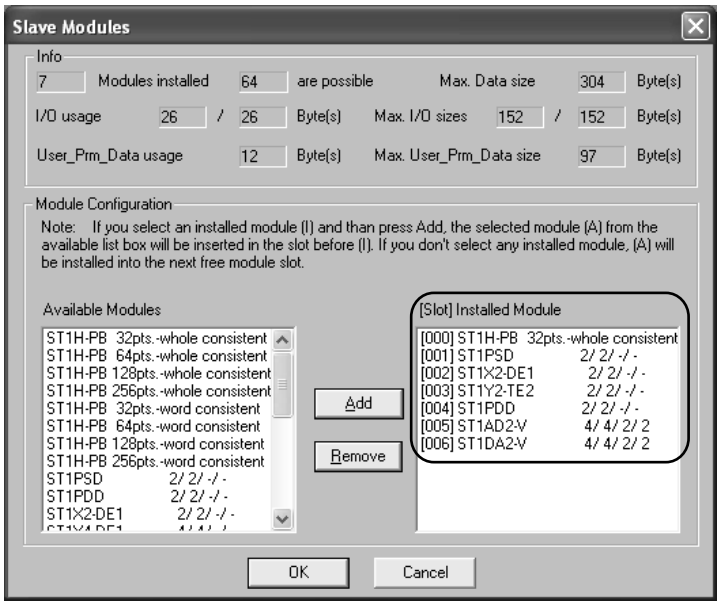


The following table uses the maximum input/output points setting sheet given in Appendix 2.1.

No,	Module Name	Number of Occupied I/O Points	Start Slice No. (Number of occupied slices)	Wr,n	Ww,n	5V DC Internal Current Consumption (Total)	24V DC Current (Total)	Slot Width (Total)
0	ST1H-PB	4	0(2)	—	—	0.530A(0.530A)	0A(0A)	—
1	ST1PSD	2	2(1)	—	—	—	—	25.2mm(25.2mm)
2	ST1X2-DE1	2	3(1)	—	—	0.085A(0.615A)	＊1	12.6mm(37.8mm)
3	ST1Y2-TE2	2	4(1)	—	—	0.090A(0.705A)	＊1	12.6mm(50.4mm)
4	ST1PDD	2	5(1)	—	—	0.060A(0.765A)	—	12.6mm(63.0mm)
5	ST1AD2-V	4	6(2)	2	2	0.110A(0.875A)	＊1	12.6mm(75.6mm)
6	ST1DA2-V	4	8(2)	2	2	0.095A(0.970A)	＊1	12.6mm(88.2mm)
Total		20	—	4	4	—	—	—

＊1: The 24V DC current changes depending on the external device connected to each slice module.
Confirm the current consumption of the external device connected to each slice module, and calculate the total value.
Refer to the MELSEC-ST System User's Manual for details of current consumption calculation.

(b) GX Configurator-DP setting



(3) I/O data assignment

The following shows the I/O data assignment result in the system configuration example given in (2) in this section.

(a) Input data

Buffer memory address
Decimal (Hexadecimal)

	b15							b8	b7							b0	
0(0H)	Br.0F	Br.0E	Br.0D	Br.0C	Br.0B	Br.0A	Br.09	Br.08	Br.07	Br.06	Br.05	Br.04	Br.03	Br.02	Br.01	Br.00	Br Bit input area
	No.5				No.4		No.3		No.2		No.1		No.0				
1(1H)	Br.1F	Br.1E	Br.1D	Br.1C	Br.1B	Br.1A	Br.19	Br.18	Br.17	Br.16	Br.15	Br.14	Br.13	Br.12	Br.11	Br.10	
	0												No.6				
2(2H)	Er.0F	Er.0E	Er.0D	Er.0C	Er.0B	Er.0A	Er.09	Er.08	Er.07	Er.06	Er.05	Er.04	Er.03	Er.02	Er.01	Er.00	Er Error information area
	No.5				No.4		No.3		No.2		No.1		No.0				
3(3H)	Er.1F	Er.1E	Er.1D	Er.1C	Er.1B	Er.1A	Er.19	Er.18	Er.17	Er.16	Er.15	Er.14	Er.13	Er.12	Er.11	Er.10	
	0												No.6				
4(4H)	Mr.15	Mr.14	Mr.13	Mr.12	Mr.11	Mr.10	Mr.9	Mr.8	Mr.7	Mr.6	Mr.5	Mr.4	Mr.3	Mr.2	Mr.1	Mr.0	Mr Module status area
	0						No.6		No.5		No.4		No.3		No.2		No.1		No.0
5(5H)	Cr.0(15-8) Command execution result								Cr.0(7-0) Start slice No. of execution target								Cr Command result area
6(6H)	Cr.1 Executed command No.																
7(7H)	Cr.2 Response data 1																
8(8H)	Cr.3 Response data 2																
9(9H)	Wr.00 For No. 5																Wr Word input area
10(AH)	Wr.01 For No. 5																
11(BH)	Wr.02 For No. 6																
12(CH)	Wr.03 For No. 6																

No. 0: Head module (ST1H-PB)
No. 1: Bus refreshing module (ST1PSD)
No. 2: Input module (ST1X2-DE1)
No. 3: Output module (ST1Y2-TE2)
No. 4: Power feeding module (ST1PDD)
No. 5: Intelligent function module (ST1AD2-V)
No. 6: Intelligent function module (ST1DA2-V)

(b) Output data

Buffer memory address
Decimal (Hexadecimal)

	b15							b8	b7							b0	
960(3C0H)	Bw.0F	Bw.0E	Bw.0D	Bw.0C	Bw.0B	Bw.0A	Bw.09	Bw.08	Bw.07	Bw.06	Bw.05	Bw.04	Bw.03	Bw.02	Bw.01	Bw.00	Bw Bit output area
	No.5				No.4		No.3		No.2		No.1		No.0				
961(3C1H)	Bw.1F	Bw.1E	Bw.1D	Bw.1C	Bw.1B	Bw.1A	Bw.19	Bw.18	Bw.17	Bw.16	Bw.15	Bw.14	Bw.13	Bw.12	Bw.11	Bw.10	
	0												No.6				
962(3C2H)	Ew.0F	Ew.0E	Ew.0D	Ew.0C	Ew.0B	Ew.0A	Ew.09	Ew.08	Ew.07	Ew.06	Ew.05	Ew.04	Ew.03	Ew.02	Ew.01	Ew.00	Ew Error clear area
	No.5				No.4		No.3		No.2		No.1		No.0				
963(3C3H)	Ew.1F	Ew.1E	Ew.1D	Ew.1C	Ew.1B	Ew.1A	Ew.19	Ew.18	Ew.17	Ew.16	Ew.15	Ew.14	Ew.13	Ew.12	Ew.11	Ew.10	
	0												No.6				
964(3C4H)	Sw.0 System Area 1																Sw System Area
965(3C5H)	Cw.0 Start slice No. of execution target																Cw Command execution area
966(3C6H)	Cw.1 Command No. to be executed																
967(3C7H)	Cw.2 Argument 1																
968(3C8H)	Cw.3 Argument 2																
969(3C9H)	Ww.00 For No. 5																Ww Word output area
970(3CAH)	Ww.01 For No. 5																
971(3CBH)	Ww.02 For No. 6																
972(3CCH)	Ww.03 For No. 6																

No. 0: Head module (ST1H-PB)
No. 1: Bus refreshing module (ST1PSD)
No. 2: Input module (ST1X2-DE1)
No. 3: Output module (ST1Y2-TE2)
No. 4: Power feeding module (ST1PDD)
No. 5: Intelligent function module (ST1AD2-V)
No. 6: Intelligent function module (ST1DA2-V)

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(4) Device assignment in program examples

The program examples in Section 7.1.1 and 7.1.2 use the following device assignment.

(a) Devices used by QJ71PB92D

Device	Application	Device	Application
X0	Exchange start end signal	Y0	Exchange start request signal
X1B	Communication READY signal	—	
X1D	Module READY signal		
X1F	Watchdog timer error signal		

(b) Devices used by user

Device	Application	Device	Application
X20	PROFIBUS-DP exchange start command	M0	Refresh start request
X30	ST1H-PB error clear request signal	M100	ST1H-PB error handling start signal
X31	ST1PSD error clear request signal	M110	ST1PSD external AUX. power supply error handling start signal
X32	ST1X2-DE1 error clear request signal	M120	ST1X2-DE1 error handling start signal
X33	ST1Y2-TE2 error clear request signal	M130	ST1Y2-TE2 error handling start signal
X34	ST1PDD error clear request signal	M140	ST1PDD external AUX. power supply error handling start signal
X35	ST1AD2-V error clear request signal	M150	ST1AD2-V error handling start signal
X36	ST1DA2-V error clear request signal	M160	ST1DA2-V error handling start signal
X40	Output condition for ST1Y2-TE2 first output point	M200	ST1H-PB error clear signal
X41	Output condition for ST1Y2-TE2 second output point	M210	ST1PSD error clear signal
X42	ST1AD2-V convert setting request condition	M220	ST1X2-DE1 error clear signal
X43	ST1DA2-V convert setting request condition	M230	ST1Y2-TE2 error clear signal
D100	ST1AD2-V CH1 digital output value read destination	M240	ST1PDD error clear signal
D101	ST1AD2-V CH2 digital output value read destination	M250	ST1AD2-V error clear signal
—		M260	ST1DA2-V error clear signal
		M300	Command execution start flag
		M301	Processing flag for normal command execution result

(c) Devices used by I/O data

1) Br Bit Input Area

Br.n Bit Input	Information	Master Station Side Device	Slice No.	Module Name
Br.00	Module READY	D0.0	0	ST1H-PB
Br.01	Forced output test mode	D0.1		
Br.02	Module being changed online	D0.2	1	
Br.03	Command execution	D0.3		
Br.04	External power supply status	D0.4	2	ST1PSD
Br.05		D0.5		
Br.06	Input status (first point)	D0.6	3	ST1X2-DE1
Br.07	Input status (second point)	D0.7		
Br.08	System Area (0 fixed)	D0.8	4	ST1Y2-TE2
Br.09	System Area (0 fixed)	D0.9		
Br.0A	External AUX. power supply status	D0.A	5	ST1PDD
Br.0B		D0.B		
Br.0C	Module READY	D0.C	6	ST1AD2-V
Br.0D	Convert setting completed flag	D0.D		
Br.0E	A/D conversion completed flag	D0.E	7	
Br.0F	Alarm output signal	D0.F		
Br.10	Module READY	D1.0	8	ST1DA2-V
Br.11	Convert setting completed flag	D1.1		
Br.12	System Area (0 fixed)	D1.2	9	
Br.13	System Area (0 fixed)	D1.3		
Br.14	—	D1.4	—	—
to				
Br.1F	—	D1.F	—	—

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2) Er Error Information Area

Er.n Error Information	Information	Master Station Side Device	Slice No.	Module Name
Er.00	Head module error information	D2.0	0	ST1H-PB
Er.01		D2.1		
Er.02		D2.2	1	
Er.03		D2.3		
Er.04	Bus refreshing module error information	D2.4	2	ST1PSD
Er.05		D2.5		
Er.06	Module error information	D2.6	3	ST1X2-DE1
Er.07		D2.7		
Er.08	Module error information	D2.8	4	ST1Y2-TE2
Er.09		D2.9		
Er.0A	Power feeding module error information	D2.A	5	ST1PDD
Er.0B		D2.B		
Er.0C	CH1 error information	D2.C	6	ST1AD2-V
Er.0D		D2.D		
Er.0E	CH2 error information	D2.E	7	
Er.0F		D2.F		
Er.10	CH1 error information	D3.0	8	ST1DA2-V
Er.11		D3.1		
Er.12	CH2 error information	D3.2	9	
Er.13		D3.3		
Er.14	—	D3.4	—	—
to				
Er.1F	—	D3.F	—	—

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3) Mr Module Status Area

Mr.n Module Status	Information	Master Station Side Device	Slice No.	Module Name
Mr.0	Head module status	D4.0	0	ST1H-PB
Mr.1		D4.1	1	
Mr.2	Bus refreshing module status	D4.2	2	ST1PSD
Mr.3	ST1X2-DE1 module status	D4.3	3	ST1X2-DE1
Mr.4	ST1Y2-TE2 module status	D4.4	4	ST1Y2-TE2
Mr.5	Power feeding module status	D4.5	5	ST1PDD
Mr.6	ST1AD2-V module status	D4.6	6	ST1AD2-V
Mr.7		D4.7	7	
Mr.8	ST1DA2-V module status	D4.8	8	ST1DA2-V
Mr.9		D4.9	9	
Mr.10	—	D4.A	—	—
to				
Mr.15	—	D4.F	—	—

4) Cr Command Result Area

Cr.n Command Result Area	Information	Master Station Side Device	Slice No.	Module Name
Cr.0	Cr.0(15-8) Command Execution Result, Cr.0(7-0) Start Slice No. of Execution Target	D5	—	—
Cr.1	Executed Command No.	D6	—	—
Cr.2	Response Data 1	D7	—	—
Cr.3	Response Data 2	D8	—	—

5) Wr Word Input Area

Wr.n Word Input	Information	Master Station Side Device	Slice No.	Module Name
Wr.00	CH1 Digital Output Value (Wr.n)	D9	6	ST1AD2-V
Wr.01	CH2 Digital Output Value (Wr.n+1)	D10		
Wr.02	CH1 Digital Value (Wr.n)	D11	8	ST1DA2-V
Wr.03	CH2 Digital Value (Wr.n+1)	D12		

6) Bw Bit Output Area

Bw.n Bit Output	Information	Master Station Side Device	Slice No.	Module Name
Bw.00	System Area (0 fixed)	D1000.0	0	ST1H-PB
Bw.01	System Area (0 fixed)	D1000.1		
Bw.02	System Area (0 fixed)	D1000.2	1	
Bw.03	Command request	D1000.3		
Bw.04	System Area (0 fixed)	D1000.4	2	ST1PSD
Bw.05	System Area (0 fixed)	D1000.5		
Bw.06	System Area (0 fixed)	D1000.6	3	ST1X2-DE1
Bw.07	System Area (0 fixed)	D1000.7		
Bw.08	Output status (first point)	D1000.8	4	ST1Y2-TE2
Bw.09	Output status (second point)	D1000.9		
Bw.0A	System Area (0 fixed)	D1000.A	5	ST1PDD
Bw.0B	System Area (0 fixed)	D1000.B		
Bw.0C	System Area (0 fixed)	D1000.C	6	ST1AD2-V
Bw.0D	Convert setting request	D1000.D		
Bw.0E	System Area (0 fixed)	D1000.E	7	
Bw.0F	System Area (0 fixed)	D1000.F		
Bw.10	System Area (0 fixed)	D1001.0	8	ST1DA2-V
Bw.11	Convert setting request	D1001.1		
Bw.12	CH1 output enable/disable flag	D1001.2	9	
Bw.13	CH2 output enable/disable flag	D1001.3		
Bw.14	—	D1001.4	—	—
to				
Bw.1F	—	D1001.F	—	—

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7) Ew Error Clear Area

Ew.n Error Clear	Information	Master Station Side Device	Slice No.	Module Name
Ew.00	Error Clear Request	D1002.0	0	ST1H-PB
Ew.01	System Area (0 fixed)	D1002.1		
Ew.02	System Area (0 fixed)	D1002.2	1	
Ew.03	System Area (0 fixed)	D1002.3		
Ew.04	Error Clear Request	D1002.4	2	ST1PSD
Ew.05	System Area (0 fixed)	D1002.5		
Ew.06	Error Clear Request	D1002.6	3	ST1X2-DE1
Ew.07	System Area (0 fixed)	D1002.7		
Ew.08	Error Clear Request	D1002.8	4	ST1Y2-TE2
Ew.09	System Area (0 fixed)	D1002.9		
Ew.0A	Error Clear Request	D1002.A	5	ST1PDD
Ew.0B	System Area (0 fixed)	D1002.B		
Ew.0C	Error Clear Request	D1002.C	6	ST1AD2-V
Ew.0D	System Area (0 fixed)	D1002.D		
Ew.0E	System Area (0 fixed)	D1002.E	7	
Ew.0F	System Area (0 fixed)	D1002.F		
Ew.10	Error Clear Request	D1003.0	8	ST1DA2-V
Ew.11	System Area (0 fixed)	D1003.1		
Ew.12	System Area (0 fixed)	D1003.2	9	
Ew.13	System Area (0 fixed)	D1003.3		
Ew.14	_	D1003.4	_	_
to				
Ew.1F	_	D1003.F	_	_

8) Sw System Area

Sw System Area	Information	Master Station Side Device	Slice No.	Module Name
Sw.0	System Area (0 fixed)	D1004	_	_

9) Cw Command Execution Area

Cw Command Execution Area	Information	Master Station Side Device	Slice No.	Module Name
Cw.0	Start Slice No. of Execution Target	D1005	_	_
Cw.1	Command No. to be Executed	D1006	_	_
Cw.2	Argument 1	D1007	_	_
Cw.3	Argument 2	D1008	_	_

10) Ww Word Output Area

Ww.n Word Output	Information	Master Station Side Device	Slice No.	Module Name
Ww.00	System Area (0 fixed)	D1009	6	ST1AD2-V
Ww.01	System Area (0 fixed)	D1010		
Ww.02	CH1 digital value setting (Ww.n)	D1011	8	ST1DA2-V
Ww.03	CH2 digital value setting (Ww.n+1)	D1012		

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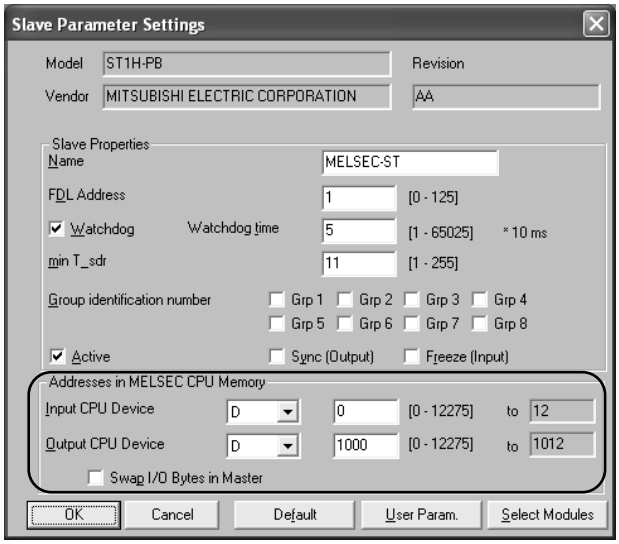
7.1.1 Program example available when auto refresh is used in QJ71PB92D

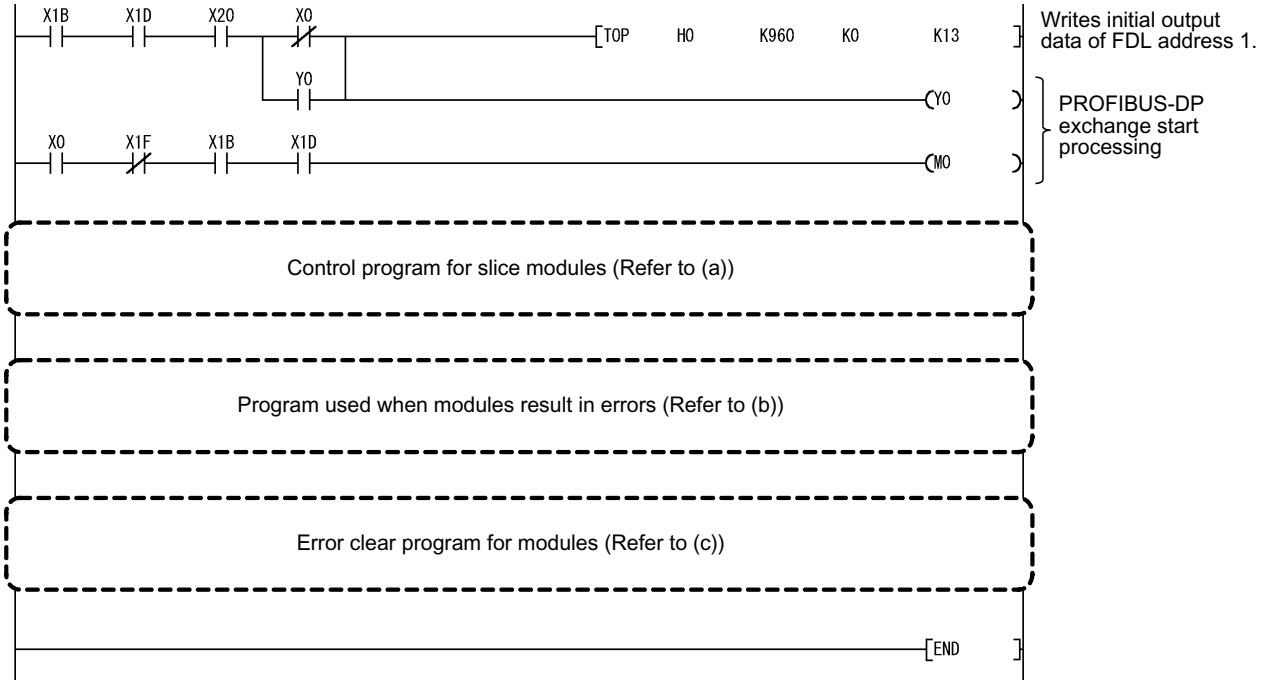
This section explains a program example available when auto refresh is used in the QJ71PB92D to communicate with the MELSEC-ST system.
The program example in this section is based on the system configuration in Section 7.1.
The command parameters of the ST1AD2-V and ST1DA2-V are assumed to have already been written.

(1) Auto refresh setting

To use auto refresh, setting must be made on GX Configurator-DP.
Refer to the GX Configurator-DP Manual for details.

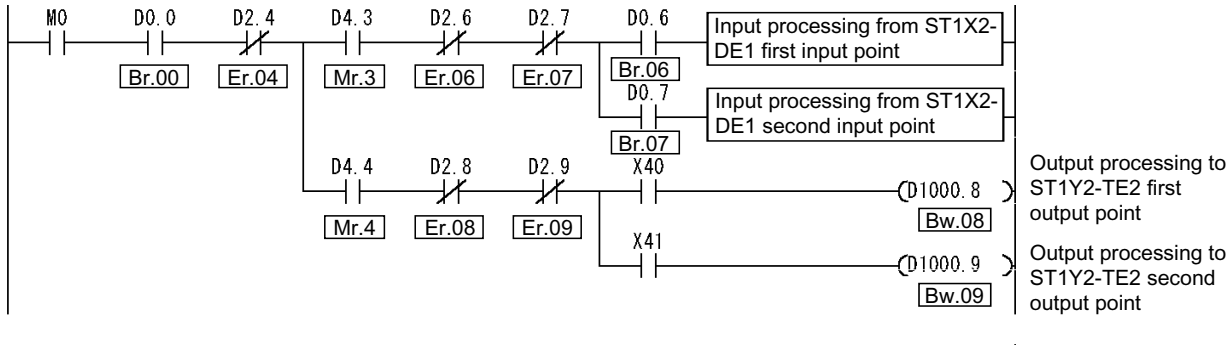


(2) Program example

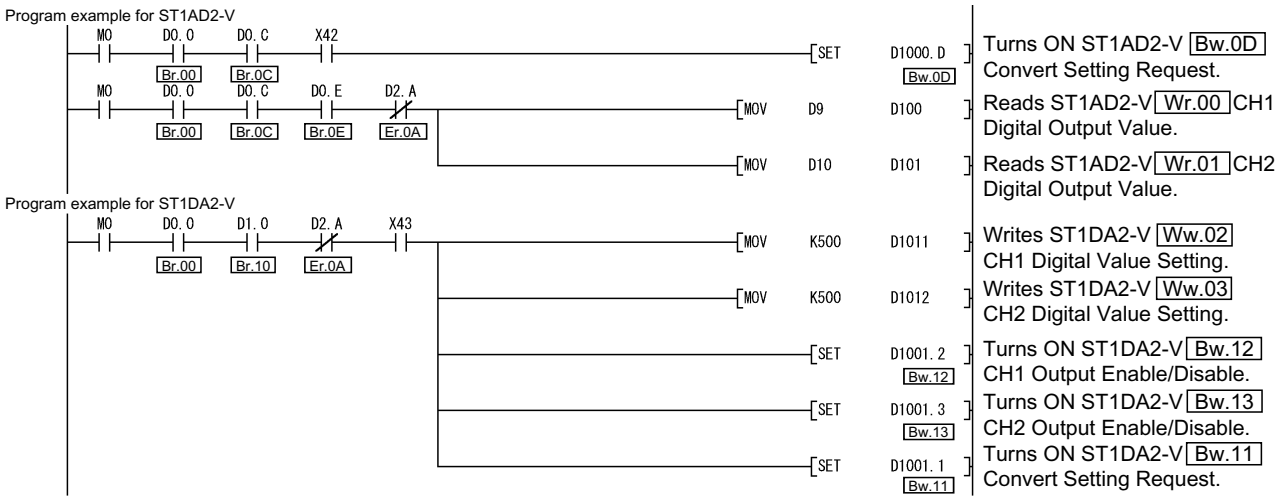


(a) Control program examples for slice modules

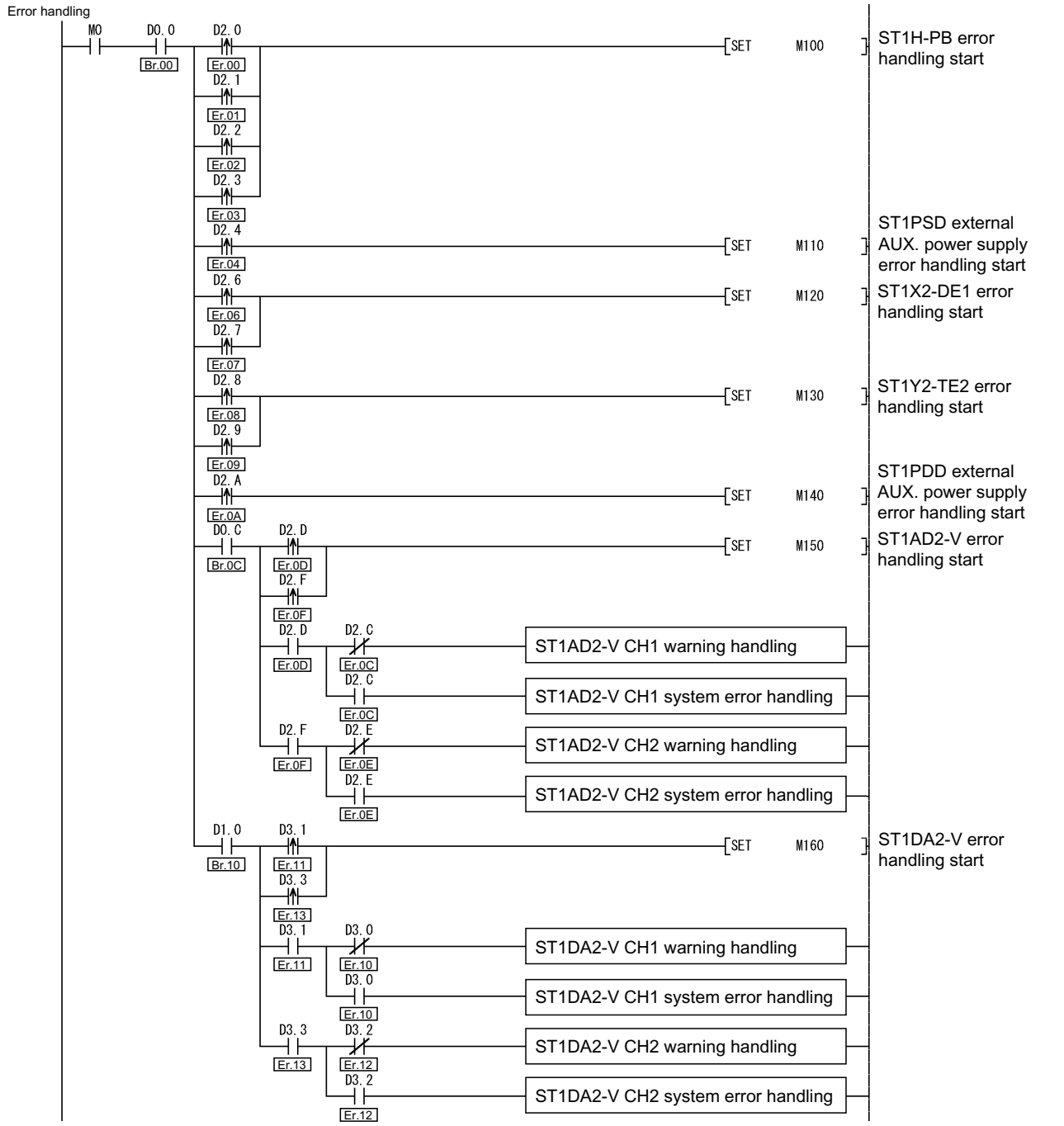
1) Program example for input module (ST1X2-DE1) and output module (ST1Y2-TE2)



2) Program example for intelligent function modules (ST1AD2-V, ST1DA2-V)



(b) Program example used when modules result in errors



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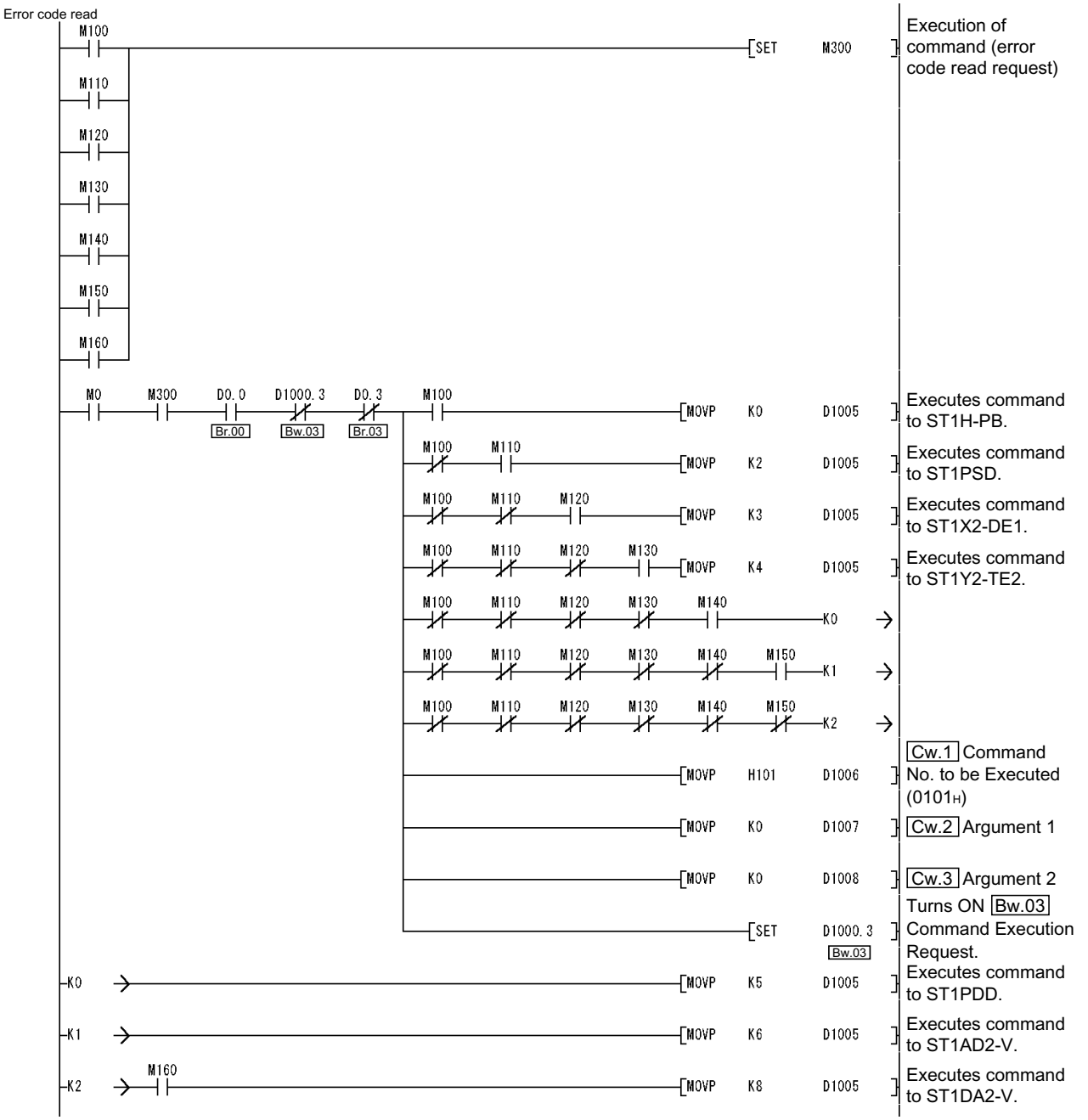

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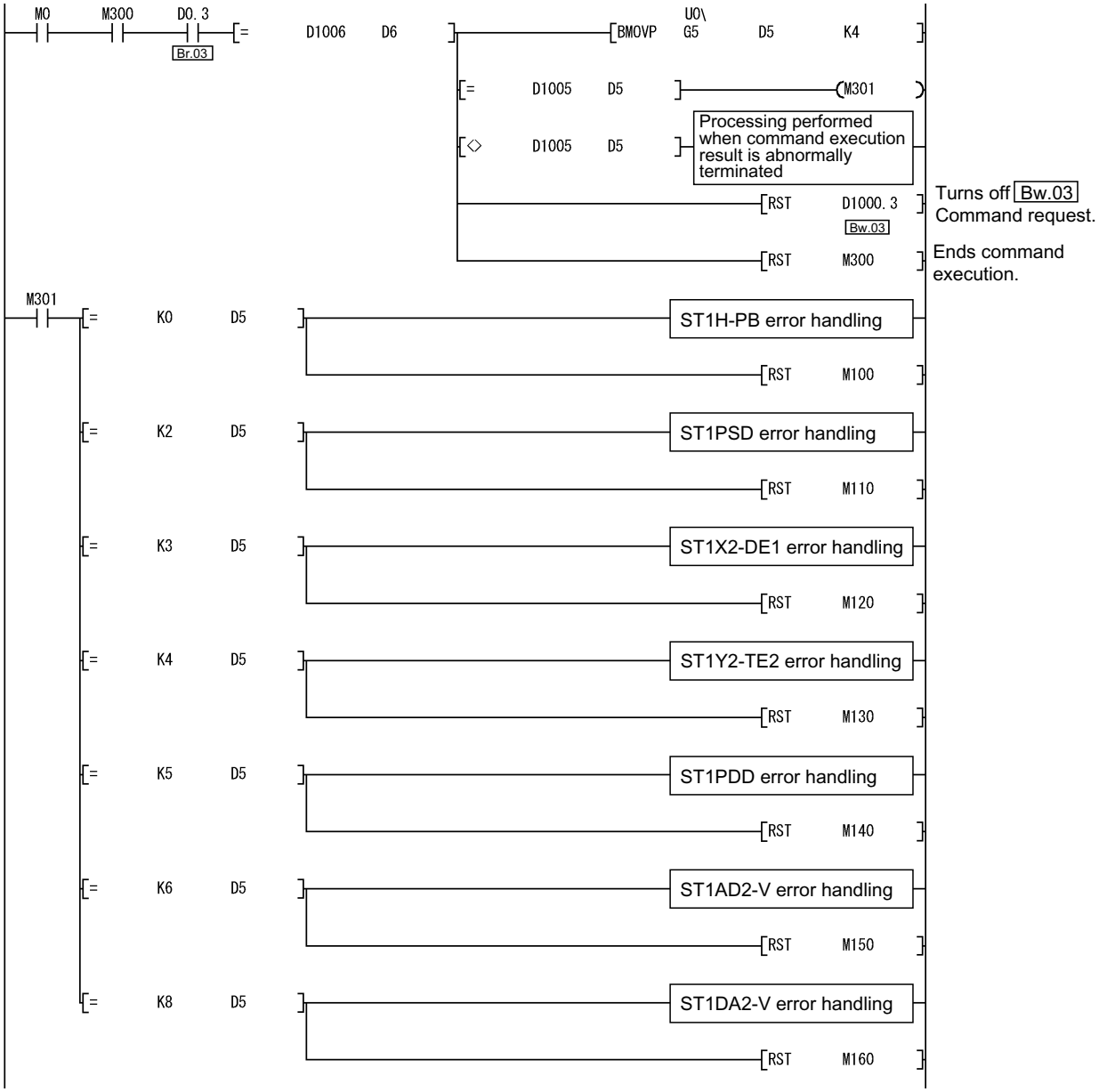
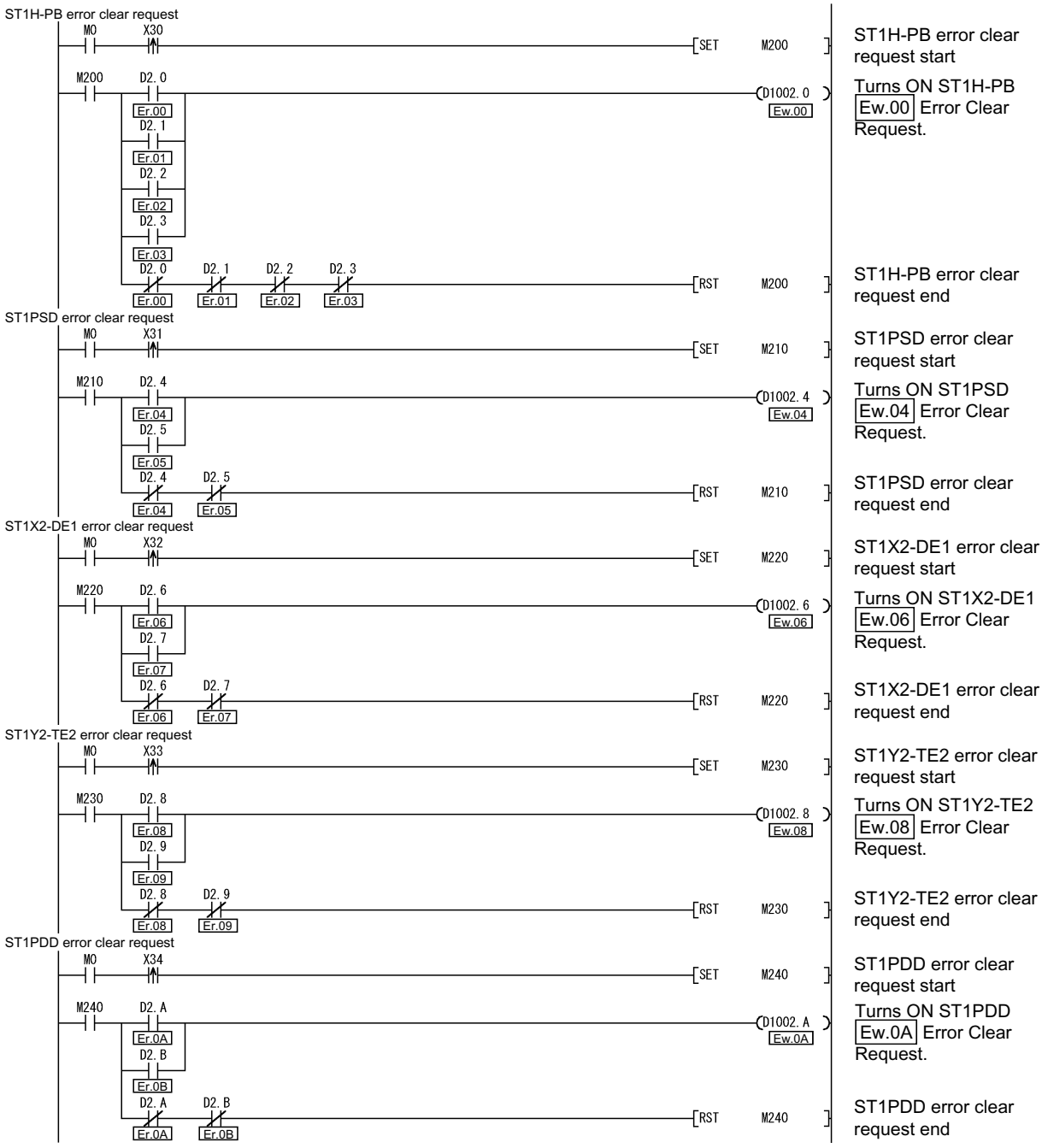

M0
M300
D0.3
Br.03
=
D1006
D6
BMOVP
U0\G5
D5
K4
=
D1005
D5
M301
<>
D1005
D5
Processing performed when command execution result is abnormally terminated
RST
D1000.3
Bw.03
Turns off Bw.03 Command request.
RST
M300
Ends command execution.
M301
=
K0
D5
ST1H-PB error handling
RST
M100
=
K2
D5
ST1PSD error handling
RST
M110
=
K3
D5
ST1X2-DE1 error handling
RST
M120
=
K4
D5
ST1Y2-TE2 error handling
RST
M130
=
K5
D5
ST1PDD error handling
RST
M140
=
K6
D5
ST1AD2-V error handling
RST
M150
=
K8
D5
ST1DA2-V error handling
RST
M160

(c) Error clear program for modules



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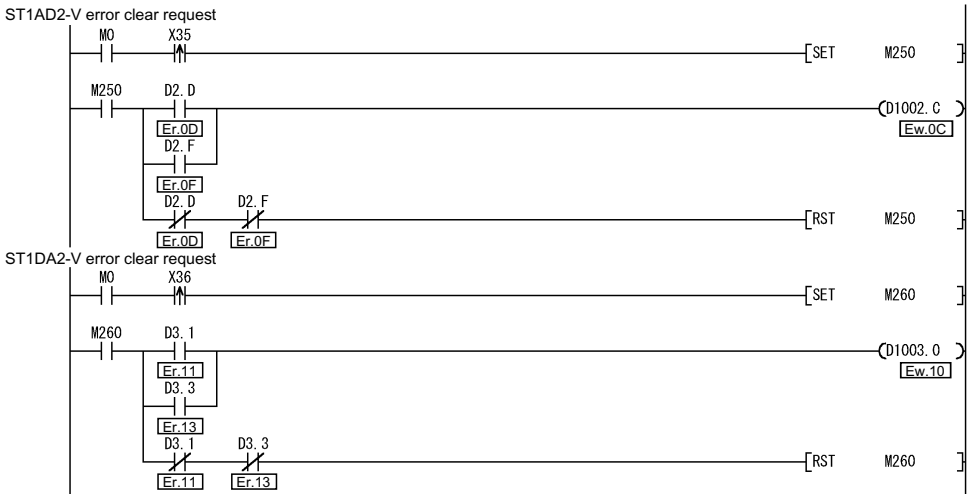
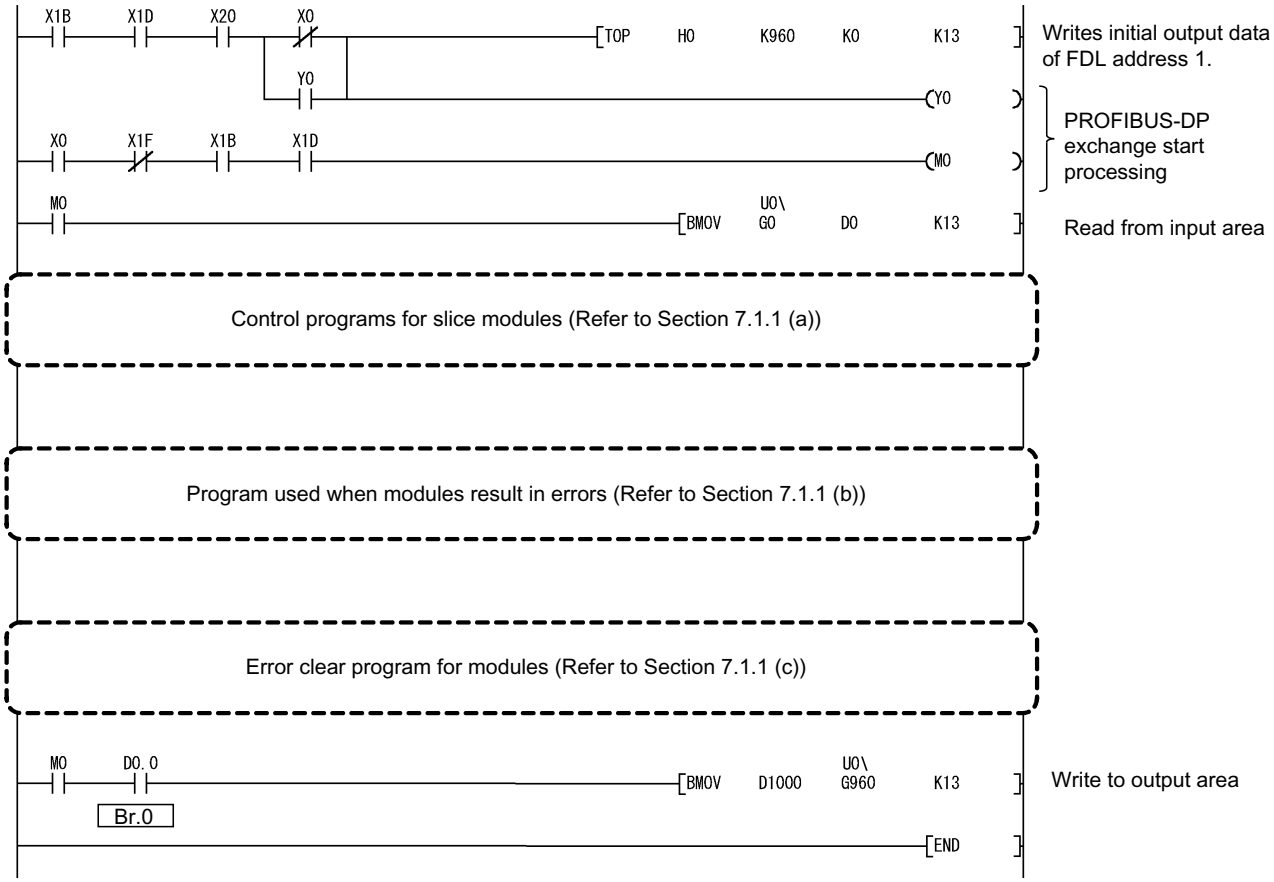

ST1AD2-V error clear request
M0
X35
SET
M250
ST1AD2-V error clear request start
M250
D2. D
Er.0D
D2. F
Er.0F
D1002. C
Ew.0C
Turns ON ST1AD2-V Ew.0C Error Clear Request.
D2. D
Er.0D
D2. F
Er.0F
RST
M250
ST1AD2-V error clear request end
ST1DA2-V error clear request
M0
X36
SET
M260
ST1DA2-V error clear request start
M260
D3. 1
Er.11
D3. 3
Er.13
D1003. 0
Ew.10
Turns ON ST1DA2-V Ew.10 Error Clear Request.
D3. 1
Er.11
D3. 3
Er.13
RST
M260
ST1DA2-V error clear request end

7.1.2 Program example available when auto refresh is not used in QJ71PB92D

This section explains a program example available when auto refresh is not used in the QJ71PB92D to communicate with the MELSEC-ST system.
The program example in this section is based on the system configuration in Section 7.1.
The command parameters of the ST1AD2-V and ST1DA2-V are assumed to have already been written.



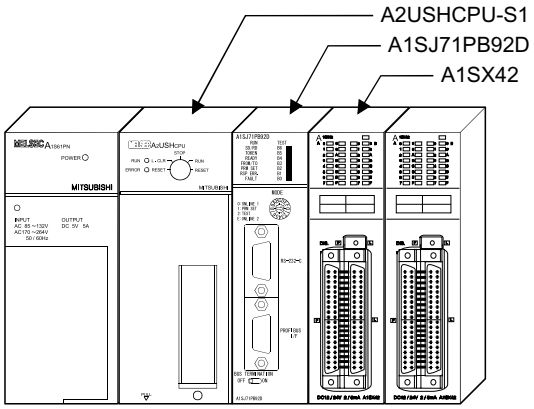
7.2 When Using AJ71PB92D/A1SJ71PB92D as Master Station

This section explains a program example available when the AJ71PB92D/A1SJ71PB92D is used as the master station.
This section provides the program example available when the A1SJ71PB92D is used as the master station.
The command parameters of the ST1AD2-V and ST1DA2-V are assumed to have already been written.

(1) System configuration of master station (A1SJ71PB92D)

The system configuration of the master station (A1SJ71PB92D) used in this section is shown below.

(a) System configuration of master station (A1SJ71PB92D)



(b) Settings of master station (A1SJ71PB92D)

Item		Setting
I/O signals		X/Y000 to X/Y01F
Operation mode		Extended service mode (MODE E)
I/O data area (buffer memory) for FDL address 1 (MELSEC-ST system)	Input data	0(0_H) to 12($0C_H$)
	Output data	960($3C0_H$) to 972($3CC_H$)

REMARK

The MELSEC-ST system changes in I/O data size depending on the maximum input/output point setting and the number of mounted intelligent function modules. Hence, the master station operation mode is set to the extended service mode (MODE E) variable in data size.

(2) System configuration of MELSEC-ST system

The MELSEC-ST system has the system configuration as described in Section 7.1 (2).

(3) I/O data assignment

The I/O data assignment result is the same as that described in Section 7.1 (3).

(4) Device assignment in program example

The program example in this section uses the following device assignment.

(a) Devices used by A1SJ71PB92D

Device	Application	Device	Application
X0	Exchange start end signal	Y0	Exchange start request signal
X0D	Watchdog timer error signal	—	
X1B	Communication READY signal		
X1D	Module READY signal		

(b) Devices used by user

Device	Application	Device	Application
X20	PROFIBUS-DP exchange start command	M0	Refresh start request
X30	ST1H-PB error clear request signal	M100	ST1H-PB error handling start signal 1
X31	ST1PSD error clear request signal	M101	ST1H-PB error handling start signal 2
X32	ST1X2-DE1 error clear request signal	M110	ST1PSD external AUX. power supply error handling start signal 1
X33	ST1Y2-TE2 error clear request signal	M111	ST1PSD external AUX. power supply error handling start signal 2
X34	ST1PDD error clear request signal	M120	ST1X2-DE1 error handling start signal 1
X35	ST1AD2-V error clear request signal	M121	ST1X2-DE1 error handling start signal 2
X36	ST1DA2-V error clear request signal	M130	ST1Y2-TE2 error handling start signal 1
X40	Output condition for ST1Y2-TE2 first output point	M131	ST1Y2-TE2 error handling start signal 2
X41	Output condition for ST1Y2-TE2 second output point	M140	ST1PDD external AUX. power supply error handling start signal 1
X42	ST1AD2-V convert setting request condition	M141	ST1PDD external AUX. power supply error handling start signal 2
X43	ST1DA2-V convert setting request condition	M150	ST1AD2-V error handling start signal 1
D100	ST1AD2-V CH1 digital output value read destination	M151	ST1AD2-V error handling start signal 2
D101	ST1AD2-V CH2 digital output value read destination	M160	ST1DA2-V error handling start signal 1
—		M161	ST1DA2-V error handling start signal 2
		M200	ST1H-PB error clear signal 1
		M201	ST1H-PB error clear signal 2
		M210	ST1PSD error clear signal 1
		M211	ST1PSD error clear signal 2
		M220	ST1X2-DE1 error clear signal 1
		M221	ST1X2-DE1 error clear signal 2
		M230	ST1Y2-TE2 error clear signal 1
		M231	ST1Y2-TE2 error clear signal 2
		M240	ST1PDD error clear signal 1
		M241	ST1PDD error clear signal 2
		M250	ST1AD2-V error clear signal 1
		M251	ST1AD2-V error clear signal 2
		M260	ST1DA2-V error clear signal 1
		M261	ST1DA2-V error clear signal 2
		M300	Command execution start flag
		M301	Processing flag for normal command execution result

(c) Devices used by I/O data

1) Br Bit Input Area

Br.n Bit Input	Information	Master Station Side Device	Slice No.	Module Name
Br.00	Module READY	B0	0	ST1H-PB
Br.01	Forced output test mode	B1		
Br.02	Module being changed online	B2	1	
Br.03	Command execution	B3		
Br.04	External power supply status	B4	2	ST1PSD
Br.05		B5		
Br.06	Input status (first point)	B6	3	ST1X2-DE1
Br.07	Input status (second point)	B7		
Br.08	System Area (0 fixed)	B8	4	ST1Y2-TE2
Br.09	System Area (0 fixed)	B9		
Br.0A	External AUX. power supply status	BA	5	ST1PDD
Br.0B		BB		
Br.0C	Module READY	BC	6	ST1AD2-V
Br.0D	Convert setting completed flag	BD		
Br.0E	A/D conversion completed flag	BE	7	
Br.0F	Alarm output signal	BF		
Br.10	Module READY	B10	8	ST1DA2-V
Br.11	Convert setting completed flag	B11		
Br.12	System Area (0 fixed)	B12	9	
Br.13	System Area (0 fixed)	B13		
Br.14	_	B14	_	_
to				
Br.1F	_	B1F	_	_

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2) Er Error Information Area

Er.n Error Information	Information	Master Station Side Device	Slice No.	Module Name
Er.00	Head module error information	B20	0	ST1H-PB
Er.01		B21		
Er.02		B22	1	
Er.03		B23		
Er.04	Bus refreshing module error information	B24	2	ST1PSD
Er.05		B25		
Er.06	Module error information	B26	3	ST1X2-DE1
Er.07		B27		
Er.08	Module error information	B28	4	ST1Y2-TE2
Er.09		B29		
Er.0A	Power feeding module error information	B2A	5	ST1PDD
Er.0B		B2B		
Er.0C	CH1 error information	B2C	6	ST1AD2-V
Er.0D		B2D		
Er.0E	CH2 error information	B2E	7	
Er.0F		B2F		
Er.10	CH1 error information	B30	8	ST1DA2-V
Er.11		B31		
Er.12	CH2 error information	B32	9	
Er.13		B33		
Er.14	—	B34	—	—
to				
Er.1F	—	B3F	—	—

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3) Mr Module Status Area

Mr.n Module Status	Information	Master Station Side Device	Slice No.	Module Name
Mr.0	Head module status	B40	0	ST1H-PB
Mr.1		B41	1	
Mr.2	Bus refreshing module status	B42	2	ST1PSD
Mr.3	ST1X2-DE1 module status	B43	3	ST1X2-DE1
Mr.4	ST1Y2-TE2 module status	B44	4	ST1Y2-TE2
Mr.5	Power feeding module status	B45	5	ST1PDD
Mr.6	ST1AD2-V module status	B46	6	ST1AD2-V
Mr.7		B47	7	
Mr.8	ST1DA2-V module status	B48	8	ST1DA2-V
Mr.9		B49	9	
Mr.10	_	B4A	_	_
to				
Mr.15	_	B4F	_	_

4) Cr Command Result Area

Cr Command Result Area	Information	Master Station Side Device	Slice No.	Module Name
Cr.0	Cr.0(15-8) Command Execution Result, Cr.0(7-0) Start Slice No. of Execution Target	W0	_	_
Cr.1	Executed Command No.	W1	_	_
Cr.2	Response Data 1	W2	_	_
Cr.3	Response Data 2	W3	_	_

5) Wr Word Input Area

Wr.n Word Input	Information	Master Station Side Device	Slice No.	Module Name
Wr.00	CH1 Digital Output Value (Wr.n)	W4	6	ST1AD2-V
Wr.01	CH2 Digital Output Value (Wr.n+1)	W5		
Wr.02	CH1 Digital Value (Wr.n)	W6	8	ST1DA2-V
Wr.03	CH2 Digital Value (Wr.n+1)	W7		

6) Bw Bit Output Area

Bw.n Bit Output	Information	Master Station Side Device	Slice No.	Module Name
Bw.00	System Area (0 fixed)	B1000	0	ST1H-PB
Bw.01	System Area (0 fixed)	B1001		
Bw.02	System Area (0 fixed)	B1002	1	
Bw.03	Command request	B1003		
Bw.04	System Area (0 fixed)	B1004	2	ST1PSD
Bw.05	System Area (0 fixed)	B1005		
Bw.06	System Area (0 fixed)	B1006	3	ST1X2-DE1
Bw.07	System Area (0 fixed)	B1007		
Bw.08	Output status (first point)	B1008	4	ST1Y2-TE2
Bw.09	Output status (second point)	B1009		
Bw.0A	System Area (0 fixed)	B100A	5	ST1PDD
Bw.0B	System Area (0 fixed)	B100B		
Bw.0C	System Area (0 fixed)	B100C	6	ST1AD2-V
Bw.0D	Convert setting request	B100D		
Bw.0E	System Area (0 fixed)	B100E	7	
Bw.0F	System Area (0 fixed)	B100F		
Bw.10	System Area (0 fixed)	B1010	8	ST1DA2-V
Bw.11	Convert setting request	B1011		
Bw.12	CH1 output enable/disable flag	B1012	9	
Bw.13	CH2 output enable/disable flag	B1013		
Bw.14	_	B1014	_	_
to				
Bw.1F	_	B101F	_	_

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7) Ew Error Clear Area

Ew.n Error Clear	Information	Master Station Side Device	Slice No.	Module Name
Ew.00	Error Clear Request	B1020	0	ST1H-PB
Ew.01	System Area (0 fixed)	B1021		
Ew.02	System Area (0 fixed)	B1022	1	
Ew.03	System Area (0 fixed)	B1023		
Ew.04	Error Clear Request	B1024	2	ST1PSD
Ew.05	System Area (0 fixed)	B1025		
Ew.06	Error Clear Request	B1026	3	ST1X2-DE1
Ew.07	System Area (0 fixed)	B1027		
Ew.08	Error Clear Request	B1028	4	ST1Y2-TE2
Ew.09	System Area (0 fixed)	B1029		
Ew.0A	Error Clear Request	B102A	5	ST1PDD
Ew.0B	System Area (0 fixed)	B102B		
Ew.0C	Error Clear Request	B102C	6	ST1AD2-V
Ew.0D	System Area (0 fixed)	B102D		
Ew.0E	System Area (0 fixed)	B102E	7	
Ew.0F	System Area (0 fixed)	B102F		
Ew.10	Error Clear Request	B1030	8	ST1DA2-V
Ew.11	System Area (0 fixed)	B1031		
Ew.12	System Area (0 fixed)	B1032	9	
Ew.13	System Area (0 fixed)	B1033		
Ew.14	_	B1034	_	_
to				
Ew.1F	_	B103F	_	_

8) Sw System Area

Sw System Area	Information	Master Station Side Device	Slice No.	Module Name
Sw.0	System Area (0 fixed)	B1040 to B104F	_	_

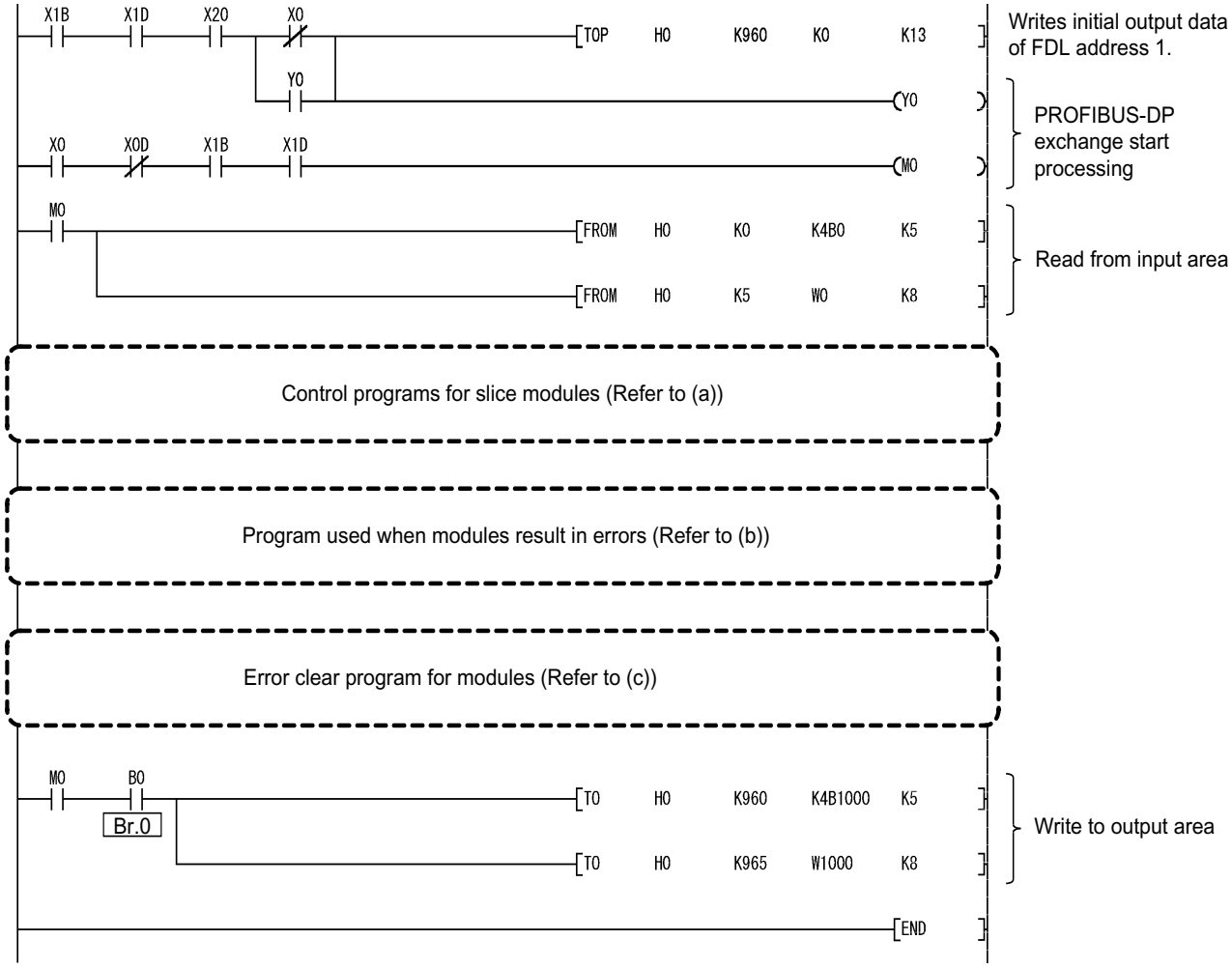
9) Cw Command Execution Area

Cw Command Execution Area	Information	Master Station Side Device	Slice No.	Module Name
Cw.0	Start Slice No. of Execution Target	W1000	_	_
Cw.1	Command No. to be Executed	W1001	_	_
Cw.2	Argument 1	W1002	_	_
Cw.3	Argument 2	W1003	_	_

10) Ww Word Output Area

Ww.n Word Output	Information	Master Station Side Device	Slice No.	Module Name
Ww.00	System Area (0 fixed)	W1004	6	ST1AD2-V
Ww.01	System Area (0 fixed)	W1005		
Ww.02	CH1 digital value setting (Ww.n)	W1006	8	ST1DA2-V
Ww.03	CH2 digital value setting (Ww.n+1)	W1007		

(5) Program example



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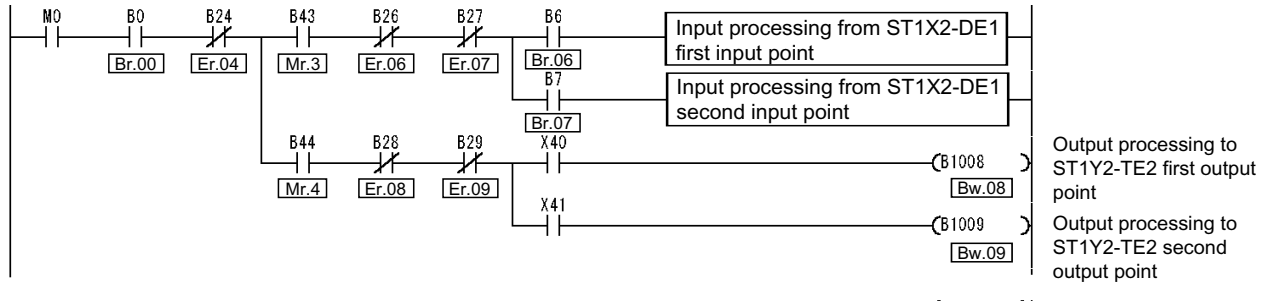
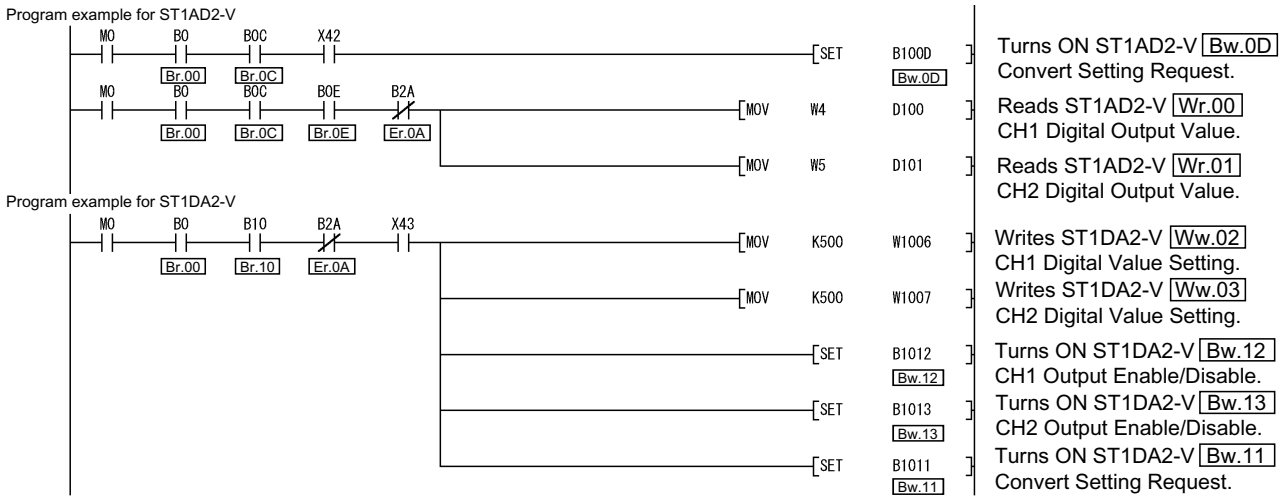
(a) Control program examples for slice modules

1) Program example for input module (ST1X2-DE1) and output module (ST1Y2-TE2)



2) Program example for intelligent function modules (ST1AD2-V, ST1DA2-V)



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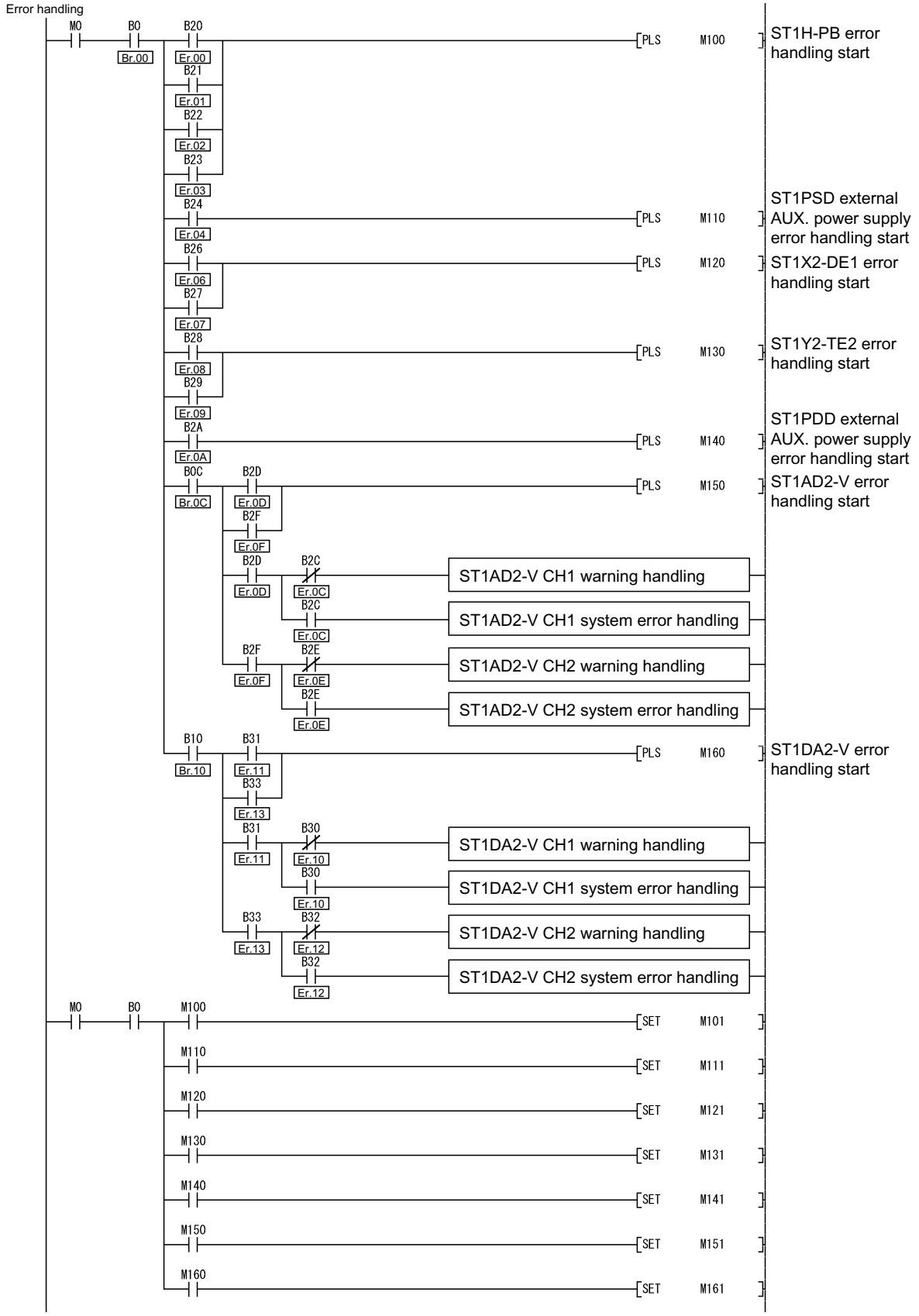
(b) Program example used when modules result in errors



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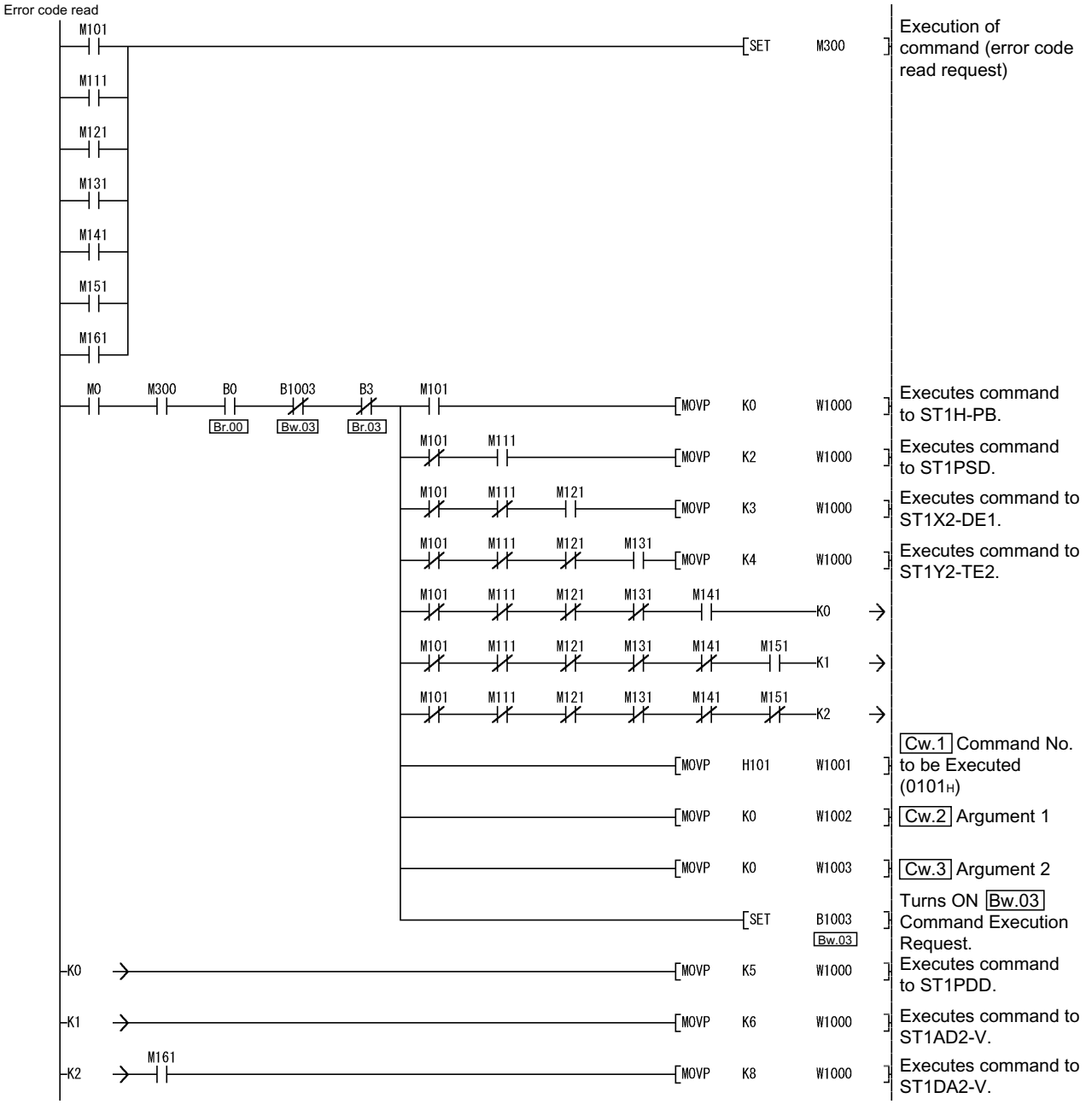

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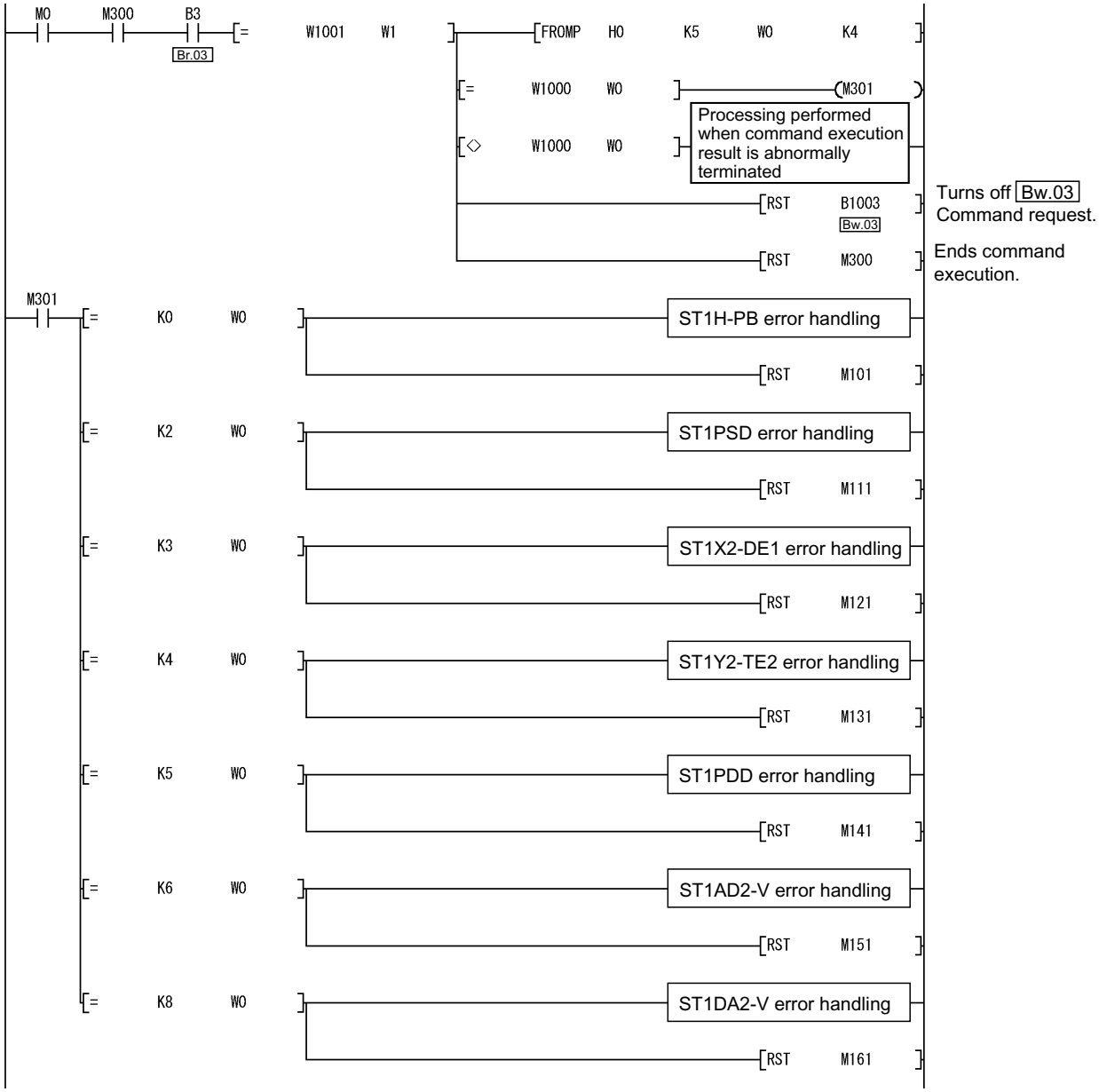
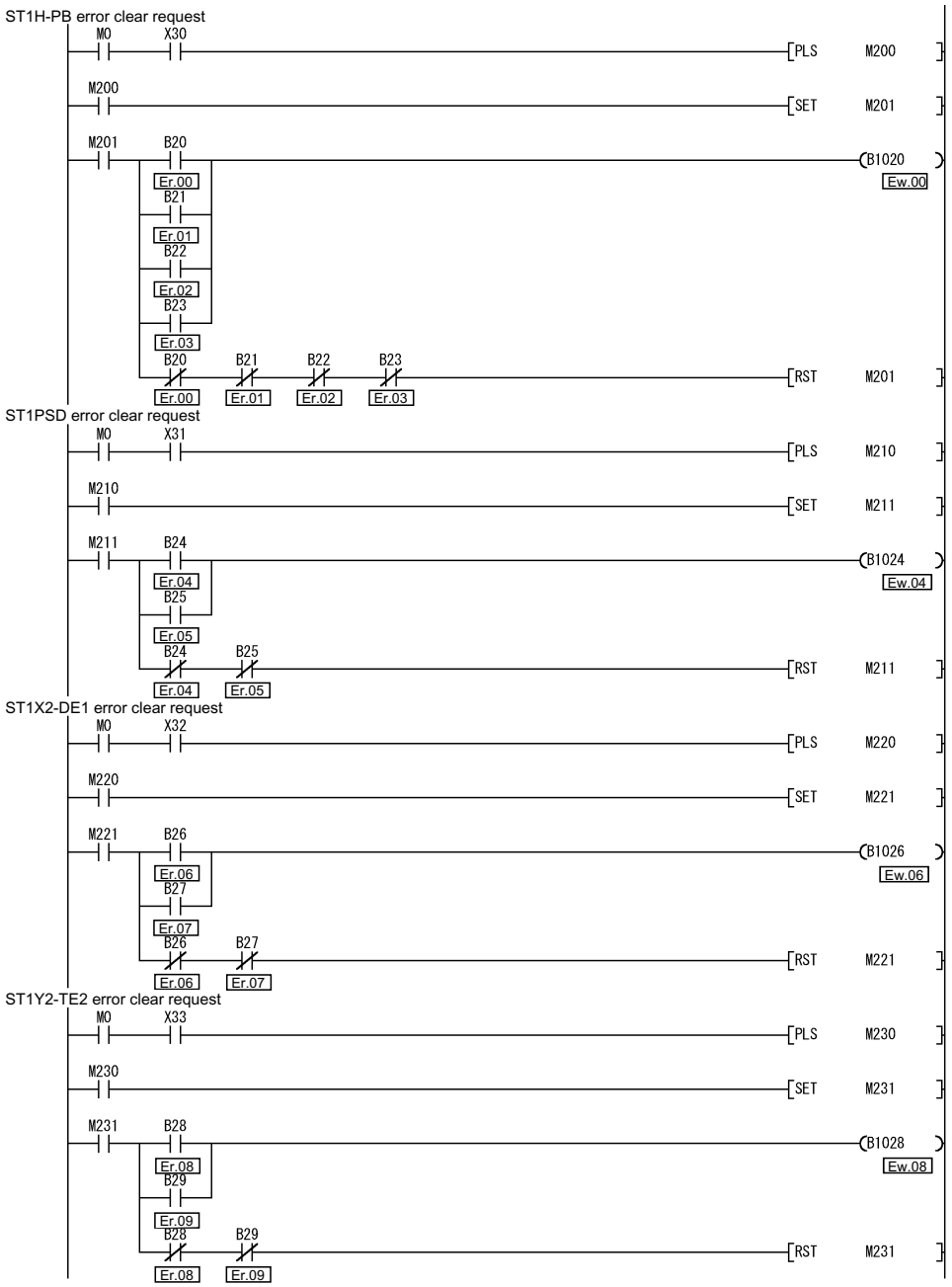

M0
M300
B3
Br.03
=
W1001
W1
FROMP
H0
K5
W0
K4
=
W1000
W0
M301
Processing performed when command execution result is abnormally terminated
◇
W1000
W0
RST
B1003
Bw.03
Turns off Bw.03 Command request.
RST
M300
Ends command execution.
M301
=
K0
W0
ST1H-PB error handling
RST
M101
=
K2
W0
ST1PSD error handling
RST
M111
=
K3
W0
ST1X2-DE1 error handling
RST
M121
=
K4
W0
ST1Y2-TE2 error handling
RST
M131
=
K5
W0
ST1PDD error handling
RST
M141
=
K6
W0
ST1AD2-V error handling
RST
M151
=
K8
W0
ST1DA2-V error handling
RST
M161

(c) Error clear program for modules



ST1H-PB error clear request start

Turns ON ST1H-PB Ew.00 Error Clear Request.

ST1H-PB error clear request end

ST1PSD error clear request start

Turns ON ST1PSD Ew.04 Error Clear Request.

ST1PSD error clear request end

ST1X2-DE1 error clear request start

Turns ON ST1X2-DE1 Ew.06 Error Clear Request.

ST1X2-DE1 error clear request end

ST1Y2-TE2 error clear request start

Turns ON ST1Y2-TE2 Ew.08 Error Clear Request.

ST1Y2-TE2 error clear request end

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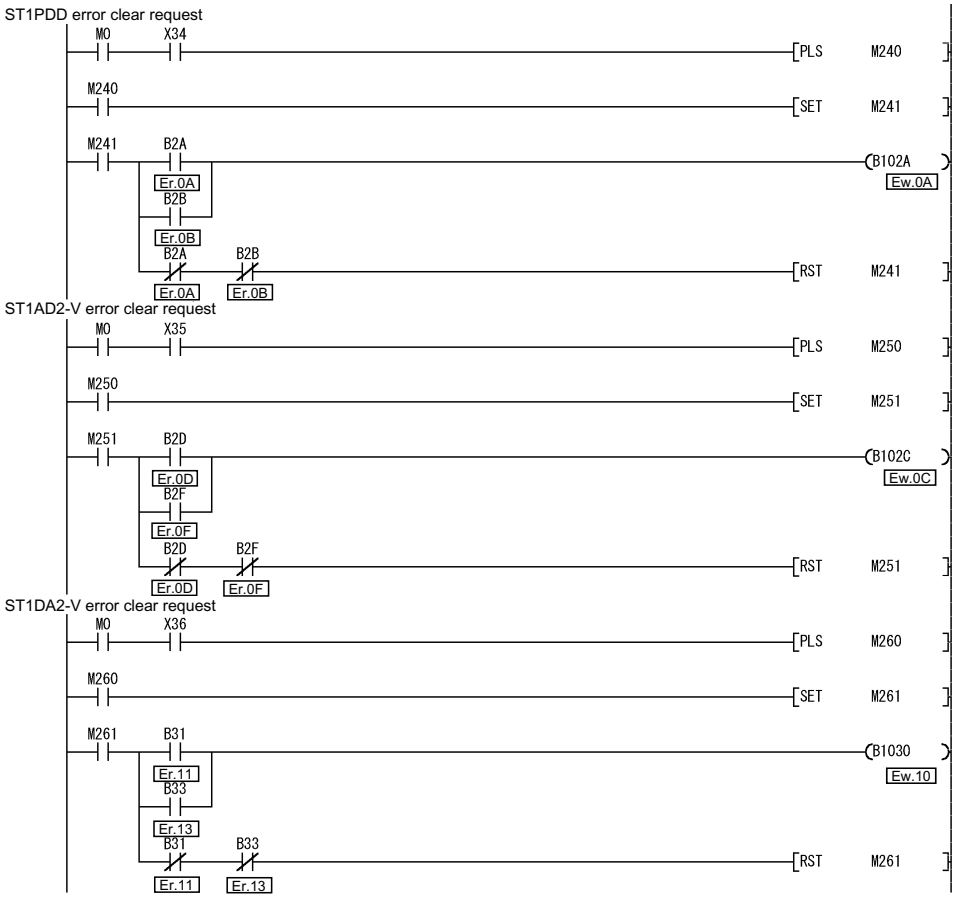


ST1PDD error clear request start

Turns ON ST1PDD Ew.0A Error Clear Request.

ST1PDD error clear request end

ST1AD2-V error clear request start

Turns ON ST1AD2-V Ew.0C Error Clear Request.

ST1AD2-V error clear request end

ST1DA2-V error clear request start

Turns ON ST1DA2-V Ew.10 Error Clear Request.

ST1DA2-V error clear request end

8 COMMANDS

This chapter explains the commands executed in the head module and slice modules.

8.1 Command Overview

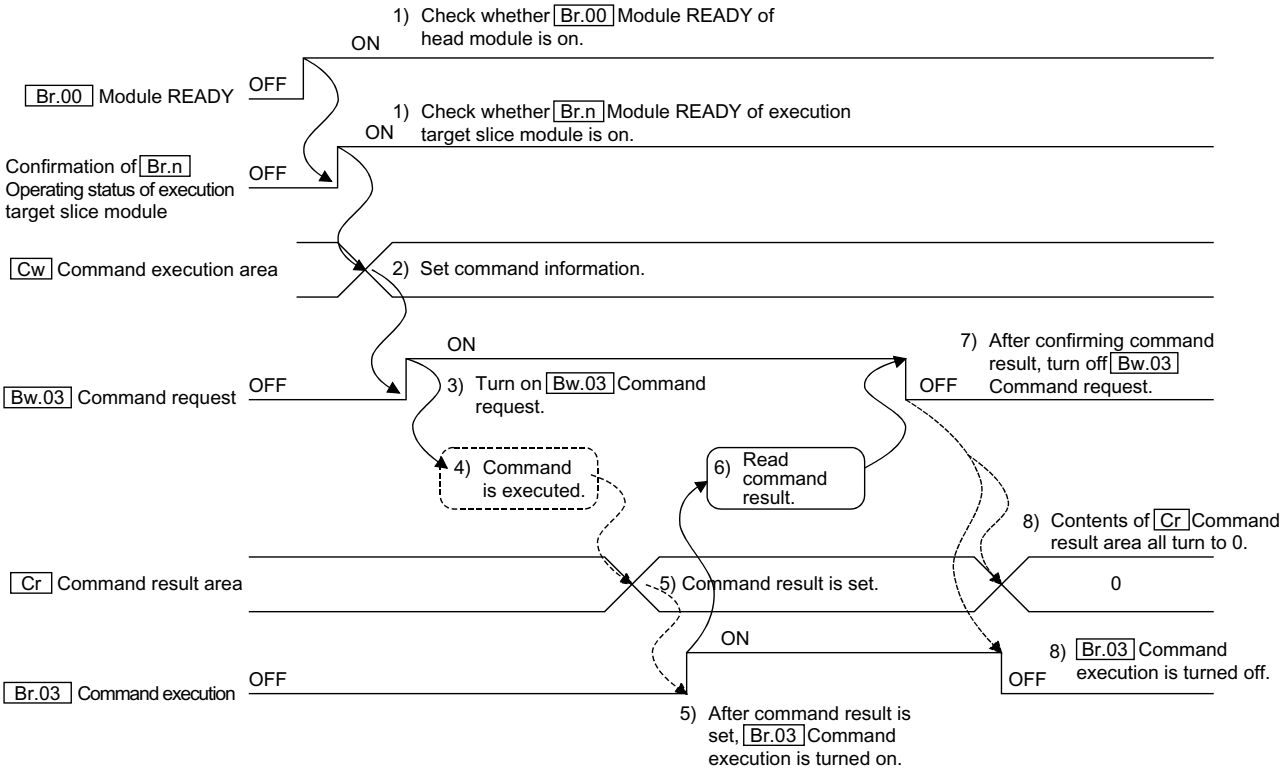
By sending a command from the master station to the head module, the operating status or error code of the head module can be read and the command parameters of the intelligent function module can be set.

(1) Procedure for using command

Use a command in the following procedure.

1) Before executing a command, check that the Br.00 Module READY and the operating status of target slice module Br.n are on.
2) After confirmation, write the command to the Cw Command execution area of the output image assigned to the head module. ∗1
3) Turn on Bw.03 Command request assigned to the Bw Bit output area of the head module.
4) The command is executed in the head module and/or corresponding module.
5) The command execution result is stored into the Cr Command Result Area, and Br.03 Command Execution assigned to the Br Bit Input Area of the head module is turned ON.
6) Read the result stored in the Cr Command result area.
7) After reading the result from the Cr Command result area, turn off Bw.03 Command request.
8) When Bw.03 Command request is turned off, Br.03 Command execution turns off and the contents of the Cr Command result area all turn to 0 automatically.

∗1: When the command to be executed is the same as the previous one, it is not necessary to write the command information to the Cw Command execution area again.



<Cr Command result area>

b15 ... b8	b7 ... b0
Cr.0(15-8) Command execution result	Cr.0(7-0) Start slice No. of execution target
Cr.1 Executed command No.	
Cr.2 Response data 1	
Cr.3 Response data 2	

<Cw Command execution area>

b15 ... b0
Cw.0 Start slice No. of execution target
Cw.1 Command No. to be executed
Cw.2 Argument 1
Cw.3 Argument 2

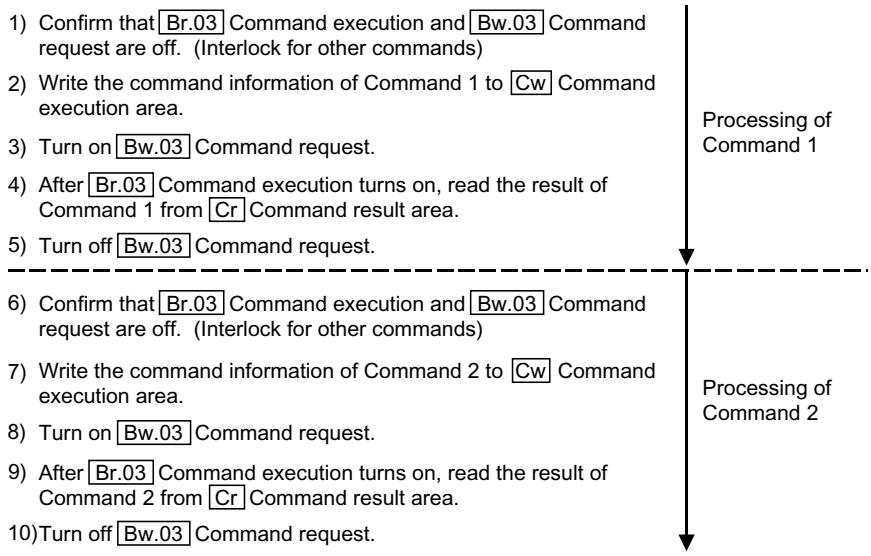
(2) Precautions for command execution

(a) When the head module is in the self-diagnostics operation mode, the command cannot be executed for the corresponding module.

(b) When a slice module is being replaced online (when the REL. LED is on), the command cannot be executed for the slice module.

(c) While a command is being executed, other command is not executable. Also, a command can be executed for only one module.
When executing the same command for multiple modules or executing several kinds of commands, provide an interlock in the program using Br.03 Command execution and Bw.03 Command request as shown below.

<Example>
Executing 2 commands (Commands 1 and 2) consecutively



If a command is executed without any interlock, the following status will be generated.

1) When turning off Bw.03 Command request before completion of the command:
   • Br.03 Command execution does not turn on.
   • The command result is not stored in Cr Command result area.
   • The command requested once may be executed.
2) When executing a command inadvertently during execution of other command:
   The command is executed based on the information written in Cw Command execution area at the time that Bw.03 Command request turns on.

8.2 Commands

This section explains the commands for the head module, power distribution module and I/O modules.

(1) Command list

The following table lists the commands that can be sent from the master station.

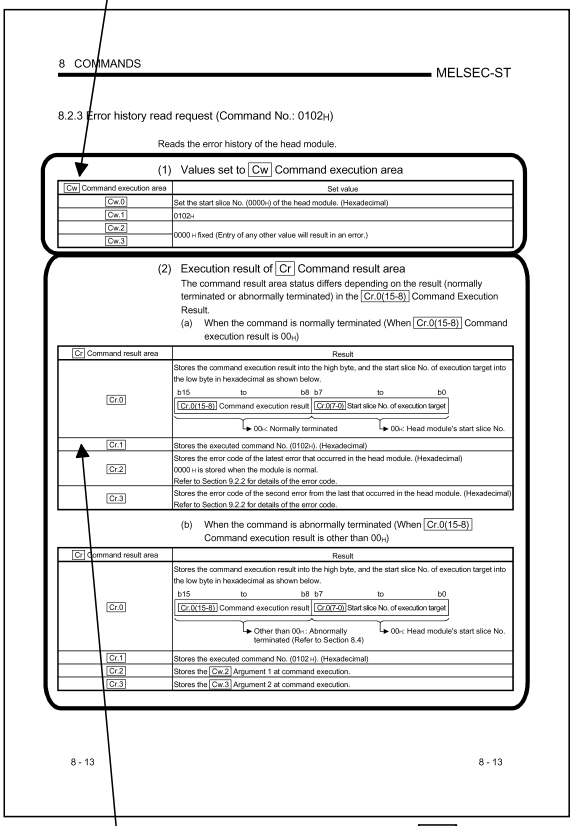
Command No.	Command name/classification	Description	Target module	Reference section
0100H	Operating status read request	Reads the operating status of the head module and each slice module.	Head module Bus refreshing module Power feeding module Input module Output module Intelligent function module	Section 8.2.1 ∗1
0101H	Error code read request	Reads the error code of the head module and each slice module.	Head module Bus refreshing module Power feeding module Input module Output module Intelligent function module	Section 8.2.2 ∗1
0102H	Error history read request	Reads the error history of the head module.	Head module	Section 8.2.3
1000H to 1□□□H	Intelligent function module parameter read command	Reads the parameters set to the intelligent function module.	Intelligent function module	∗1
2000H to 2□□□H	Intelligent function module parameter write command	Writes the parameters to be set to the intelligent function module.	Intelligent function module	∗1
3000H to 3□□□H	Intelligent function module control command	Controls the intelligent function module.	Intelligent function module	∗1

∗1: For the commands for the intelligent function module, refer to the manual of the intelligent function module.

(2) How to use the manual

The following shows how to use the manual between Section 8.2.1 and Section 8.2.3.

(1) Values set to [Cw] Command execution area
Explains the values set to the [Cw] Command execution area for executing command.



(2) Execution result of [Cr] Command result area
Explains the values stored into the [Cr] Command result area after execution of the command.

8.2.1 Operating status read request (Command No.: 0100H)

Reads the operating status of the head module, power distribution module or I/O module.

(1) Values set to Cw Command execution area

The same values must be writhen for the head module, power distribution module or I/O module except for Cw.0.

Cw Command execution area	Set value
Cw.0	Set the start slice No. of the module for which the command will be executed. (Hexadecimal)
Cw.1	0100H
Cw.2	0000H fixed (Any other value is ignored.)
Cw.3	

(2) Execution result of Cr Command result area

The command result area status differs depending on the result (normally terminated or abnormally terminated) in the Cr.0(15-8) Command Execution Result.

(a) When the command is executed for the head module

1) When the command is normally terminated (When Cr.0(15-8) Command execution result is 00_H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target 00_H: Normally terminated 00_H: Head module's start slice No.
Cr.1	Stores the executed command No. (0100_H). (Hexadecimal)
Cr.2	Stores the LED statuses of the head module into the high byte, and the setting status of the maximum input/output points into the low byte. b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0 ERR. | REL. | DIA | BF | 0 | 0 | SYN. | FRE. | | 0 | 0 | 0 | 256-point mode | 128-point mode | 64-point mode | 32-point mode 0: Off 1: On I/O data consistency setting 0: Whole (-whole consistent) 1: Word unit (-word consistent) 0: Not set 1: Set
Cr.3	Stores the settings of the head module's user parameters. b15 to b5 b4 b3 b2 b1 b0 0 | 5) | 4) | 3) | 2) | 1) 1) Output status at module error 0: Stop 1: Continue 2) Ext_Diag Information 0: Disable 1: Enable 3) Swap of Input/Output Data 0: Disable 1: Enable 4) Swap of Ext_Diag Information 0: Disable 1: Enable 5) Consistency Function 0: Disable 1: Enable

2) When the command is abnormally terminated (When Cr.0(15-8) Command execution result is other than 00_H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target Other than 00_H : Abnormally terminated (Refer to Section 8.4) 00_H: Head module's start slice No.
Cr.1	Stores the executed command No. (0100_H). (Hexadecimal)
Cr.2	Stores the Cw.2 Argument 1 at command execution.
Cr.3	Stores the Cw.3 Argument 2 at command execution.

(b) When the command is executed for the power distribution module or I/O module

1) When the command is normally terminated (When Cr.0(15-8) Command execution result is 00_H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target → 00_H: Normally terminated
Cr.1	Stores the executed command No. (0100_H). (Hexadecimal)
Cr.2	Stores the operating status of the slice module for which the command was executed. Stores a minor error into the high byte, and a major error into the low byte. <For input module> b15 to b8 b7 to b1 b0 0 | 0 | 1) 1) 0: Normal 1: Hardware fault <For output module> b15 to b9 b8 b7 to b2 b1 b0 0 | 3) | 0 | 2) | 1) 1) 0: Normal 1: Hardware fault 2) 0: Fuse not blown 1: Fuse blown 3) 0: Protective function inactive/not provided 1: Protective function active <For bus refreshing module> b15 to b10 b9 b8 b7 to b1 b0 0 | 3) | 2) | 0 | 1) 1) 0: Normal 1: Hardware fault 2) 0: External SYS. power supply normal 1: External SYS. power supply low 3) 0: External AUX. power supply normal 1: External AUX. power supply low <For power feeding module> b15 to b10 b9 b8 b7 to b1 b0 0 | 2) | 0 | 0 | 1) 1) 0: Normal 1: Hardware fault 2) 0: External AUX. power supply normal 1: External AUX. power supply low

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Cr Command result area	Result
Cr.3	Stores the user parameter settings of the slice module for which the command was executed. <For input module> b15 to b3 b2 to b0 0 | 1) 1) Filter constant 0_H: 1.5ms 1_H: 0.5ms <For output module> b15 to b4 b3 b2 b1 b0 0 | 1) | 1 | 1 | 1 1) Output status Clear/Hold setting 0: CLEAR 1: HOLD <For bus refreshing module, power feeding module> b15 to b0 0

2) When the command is abnormally terminated (When Cr.0(15-8) Command execution result is other than 00_H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target *1 Other than 00_H: Abnormally terminated (Refer to Section 8.4) *1: When $0F_H$ is stored into the Cr.0(15-8) Command Execution Result, 00_H (start slice No. of head module) is stored into the Cr.0(7-0) Start Slice No. of Execution Target.
Cr.1	Stores the executed command No. (0100_H). (Hexadecimal)
Cr.2	Stores the Cw.2 Argument 1 at command execution.
Cr.3	Stores the Cw.3 Argument 2 at command execution.

8.2.2 Error code read request (Command No.: 0101H)

Reads the error code of the head module, power distribution module or I/O module.

(1) Values set to Cw Command execution area

The same values must be written for the head module, power distribution module or I/O module except for Cw.0.

Cw Command execution area	Set value
Cw.0	Set the start slice No. of the module for which the command will be executed. (Hexadecimal)
Cw.1	0101H
Cw.2	0000H fixed (Any other value is ignored.)
Cw.3	

(2) Execution result of Cr Command result area

The command result area status differs depending on the result (normally terminated or abnormally terminated) in the Cr.0(15-8) Command Execution Result.

(a) When the command is executed for the head module

1) When the command is normally terminated (When Cr.0(15-8) Command execution result is 00_H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target 00_H: Normally terminated 00_H: Head module's start slice No.
Cr.1	Stores the executed command No. (0101_H). (Hexadecimal)
Cr.2	Stores the error code of the error currently occurring in the head module. (Hexadecimal) 0000_H is stored when the module is normal. Refer to Section 9.2.2 for details of the error code.
Cr.3	0000_H

2) When the command is abnormally terminated (When Cr.0(15-8) Command execution result is other than 00_H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target Other than 00_H : Abnormally terminated (Refer to Section 8.4) 00_H: Head module's start slice No.
Cr.1	Stores the executed command No. (0101_H). (Hexadecimal)
Cr.2	Stores the Cw.2 Argument 1 at command execution.
Cr.3	Stores the Cw.3 Argument 2 at command execution.

(b) When the command is executed for the power distribution module or I/O module

1) When the command is normally terminated (When Cr.0(15-8) Command execution result is 00_H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target 00_H: Normally terminated
Cr.1	Stores the executed command No. (0101_H). (Hexadecimal)
Cr.2	Stores the operating status of the slice module for which the command was executed. <For input module> b15 to b8 b7 to b1 b0 0 | 0 | 1) 1) 0: Normal 1: Hardware fault <For output module> b15 to b9 b8 b7 to b2 b1 b0 0 | 3) | 0 | 2) | 1) 1) 0: Normal 1: Hardware fault 2) 0: Fuse not blown 1: Fuse blown 3) 0: Protective function inactive/not provided 1: Protective function active <For bus refreshing module> b15 to b10 b9 b8 b7 to b1 b0 0 | 3) | 2) | 0 | 1) 1) 0: Normal 1: Hardware fault 2) 0: External SYS. power supply normal 1: External SYS. power supply low 3) 0: External AUX. power supply normal 1: External AUX. power supply low <For power feeding module> b15 to b10 b9 b8 b7 to b1 b0 0 | 2) | 0 | 0 | 1) 1) 0: Normal 1: Hardware fault 2) 0: External AUX. power supply normal 1: External AUX. power supply low
Cr.3	0000_H

2) When the command is abnormally terminated (When Cr.0(15-8) Command execution result is other than 00_H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target *1 → Other than 00_H: Abnormally terminated (Refer to Section 8.4) *1: When $0F_H$ is stored into the Cr.0(15-8) Command Execution Result, 00_H (start slice No. of head module) is stored into the Cr.0(7-0) Start Slice No. of Execution Target.
Cr.1	Stores the executed command No. (0101_H). (Hexadecimal)
Cr.2	Stores the Cw.2 Argument 1 at command execution.
Cr.3	Stores the Cw.3 Argument 2 at command execution.

8.2.3 Error history read request (Command No.: 0102H)

Reads the error history of the head module.

(1) Values set to Cw Command execution area

Cw Command execution area	Set value
Cw.0	Set the start slice No. (0000H) of the head module. (Hexadecimal)
Cw.1	0102H
Cw.2	0000 H fixed (Entry of any other value will result in an error.)
Cw.3	

(2) Execution result of Cr Command result area

The command result area status differs depending on the result (normally terminated or abnormally terminated) in the Cr.0(15-8) Command Execution Result.

(a) When the command is normally terminated (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target 00H: Normally terminated 00H: Head module's start slice No.
Cr.1	Stores the executed command No. (0102H). (Hexadecimal)
Cr.2	Stores the error code of the latest error that occurred in the head module. (Hexadecimal) 0000 H is stored when the module is normal. Refer to Section 9.2.2 for details of the error code.
Cr.3	Stores the error code of the second error from the last that occurred in the head module. (Hexadecimal) Refer to Section 9.2.2 for details of the error code.

(b) When the command is abnormally terminated (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result
Cr.0	Stores the command execution result into the high byte, and the start slice No. of execution target into the low byte in hexadecimal as shown below. b15 to b8 b7 to b0 Cr.0(15-8) Command execution result | Cr.0(7-0) Start slice No. of execution target Other than 00H : Abnormally terminated (Refer to Section 8.4) 00H: Head module's start slice No.
Cr.1	Stores the executed command No. (0102 H). (Hexadecimal)
Cr.2	Stores the Cw.2 Argument 1 at command execution.
Cr.3	Stores the Cw.3 Argument 2 at command execution.

8.3 Program Examples

Program examples for commands are shown here.
The program example in this section is based on the system configuration in Section 7.1.
In this program example, the operation status read request (command No.: 0100_H) is executed for the head module (start slice No.: 0) without use of auto refresh in the QJ71PB92D.

(1) Device assignment in program example

The program example in this section uses the following device assignment.

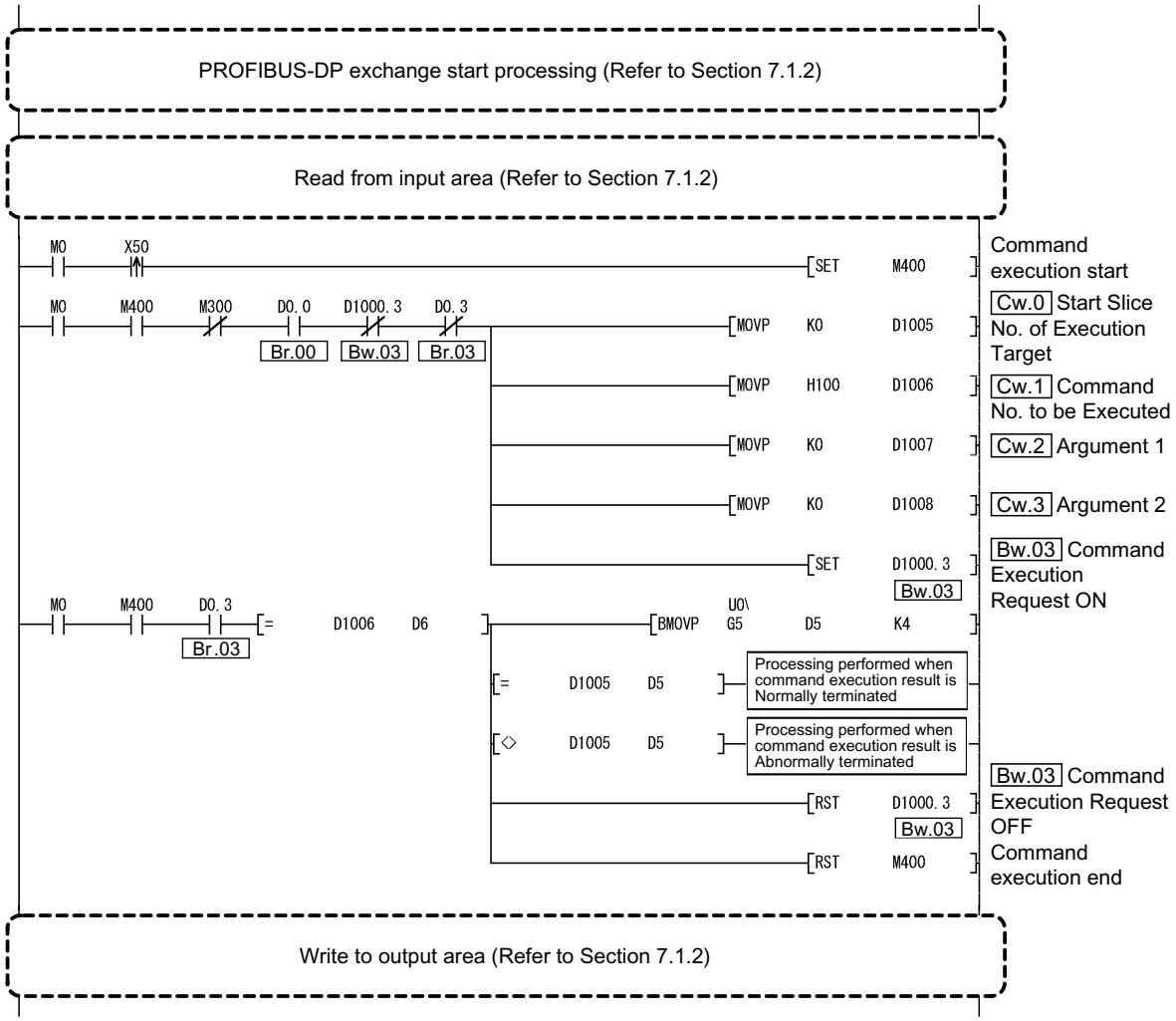
(a) Devices used by user

Device	Application	Device	Application
X50	Command execution start request signal	M0	Refresh start request
—		M300	Command execution start flag at error occurrence (Refer to Section 7.1)
		M400	Command execution start flag

(b) Devices used in I/O data

The devices used in the I/O data are the same as those given in Section 7.1 (4).

(2) Program example



8.4 Values Stored into Command Execution Result

The following table describes the values stored into the Cr.0(15-8) Command execution result of the Cr Command result area.

Cr.0(15-8) Command execution result	Description	Corrective action
00H	Normally terminated	—
01H	The requested command is not available for the specified module.	Check whether the request command is available for the module specified by the Cw.0 Start Slice No. of Execution Target.
02H	The value set in Cw.2 Argument 1 or Cw.3 Argument 2 is outside the range.	Check whether the value set in Cw.2 Argument 1 or Cw.3 Argument 2 of the Cw Command execution area is within the range available for the requested command.
03H	The Cw.0 Start Slice No. of Execution Target is wrong.	Check whether the corresponding module is mounted at the Cw.0 Start Slice No. of Execution Target. Check whether Cw.0 Start Slice No. of Execution Target is the start slice No. of the corresponding module.
04H	There is no response from the specified module.	Check whether the intelligent function module specified by the Cw.0 Start Slice No. of Execution Target can use the requested command. When the requested command can be used, the possible cause is an intelligent function module failure. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.
05H	No communication is available with the specified module.	The possible cause is a slice module failure. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.
06H	The requested command is not executable in the current operating status (operation mode) of the module.	Check the operating status of the head module or intelligent function module, and change the operating status so that the requested command can be executed.
07H	The module has already been in the specified mode.	The operation mode of the intelligent function module specified by the Cw.0 Start Slice No. of Execution Target is already in the requested mode. Continue the specified operation mode.
08H	The module cannot be changed into the specified mode.	Check the operation mode of the intelligent function module specified by the Cw.0 Start Slice No. of Execution Target, and change the status so that the mode can be set to the requested one.
09H	The specified module is in the online module change status.	Execute the command after online module change is completed.
0FH	The value of Cw.0 Start Slice No. of Execution Target is outside the applicable range.	Check whether the value set at Cw.0 Start Slice No. of Execution Target is within 7FH.
10H	Parameters cannot be read from the specified module.	Execute the command again. If the problem still persists, the possible cause is an intelligent function module failure. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.
11H	Parameters cannot be written to the specified module.	
13H	The specified module is not in the status available for parameter writing.	Enable parameter writing.

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9 TROUBLESHOOTING

This chapter explains corrective actions to be taken and the error codes displayed when problems occur in the head module.
Before starting the troubleshooting in any of Section 9.1 to 9.3, check whether the MELSEC-ST system is configured correctly.
The following provides the items for checking whether the MELSEC-ST system is configured correctly.

(1) Check that a proper number of slice modules are mounted.
Check whether 63 or less slice modules are used with the head module.
When intelligent function modules are mounted, check whether the number of the intelligent function modules is 26 or less.
If the range is exceeded, the RUN LEDs of invalid slice modules are off.

(2) Check that total number of occupied I/O points is within 256.
Check whether the total number of occupied I/O points of the modules comprising the MELSEC-ST system is 256 or less.
If the range is exceeded, the RUN LEDs of invalid slice modules are off.
For details, refer to Section 6.1.

(3) Check that slice modules are mounted on base modules
Before switching on the external power supplies of the MELSEC-ST system, check whether slice modules are mounted on all base modules.

(4) Check the combination of slice modules and base modules.
Check whether the slice modules are mounted on the applicable base modules.
For details of the applicable base modules, refer to the corresponding slice module manual.

(5) Check that the total slot width of slice modules is within 85cm.
Check whether the total slot width of the slice modules (without the head module) comprising the MELSEC-ST system is within 85cm.
For details, refer to the MELSEC-ST System User's Manual.

(6) Check that the total 5V DC internal current consumption and total 24V DC current are within the capacity of the power distribution modules.
Calculate the total 5V DC internal current consumption and total 24V DC current, and check whether they are within the capacity of the power distribution modules.
For the calculation, refer to the MELSEC-ST System User's Manual.

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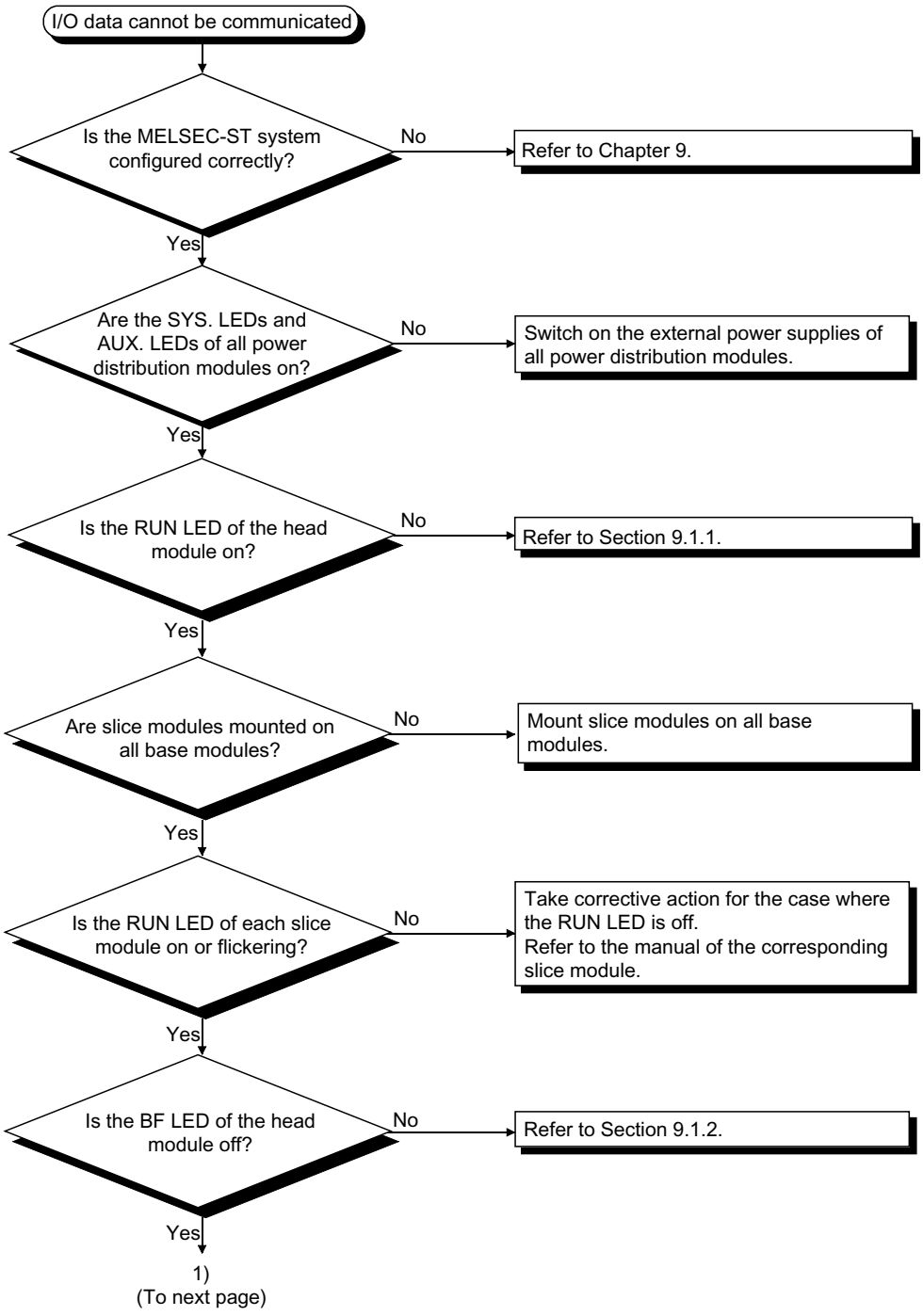
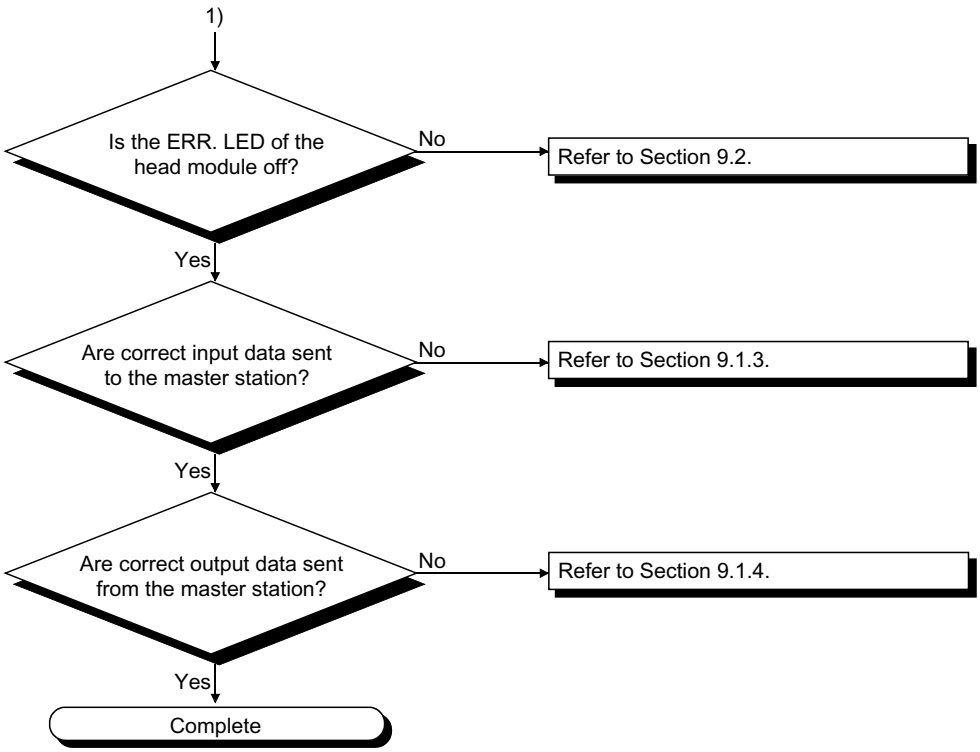
9.1 When I/O data cannot be communicated

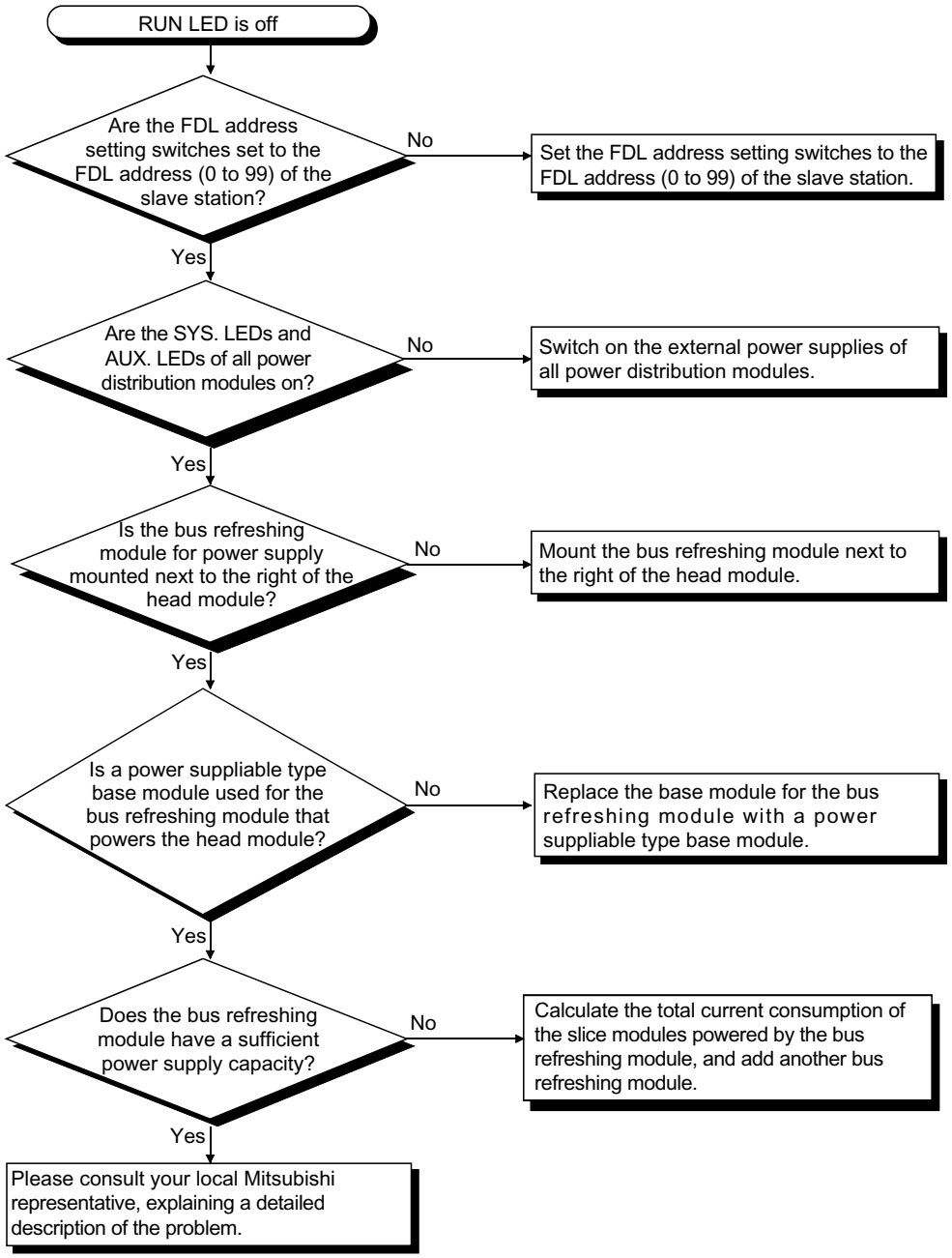
When I/O data cannot be communicated between the master station and MELSEC-ST system, troubleshoot the problem according to the following flowchart.




1)
Is the ERR. LED of the head module off?
No
Refer to Section 9.2.
Yes
Are correct input data sent to the master station?
No
Refer to Section 9.1.3.
Yes
Are correct output data sent from the master station?
No
Refer to Section 9.1.4.
Yes
Complete

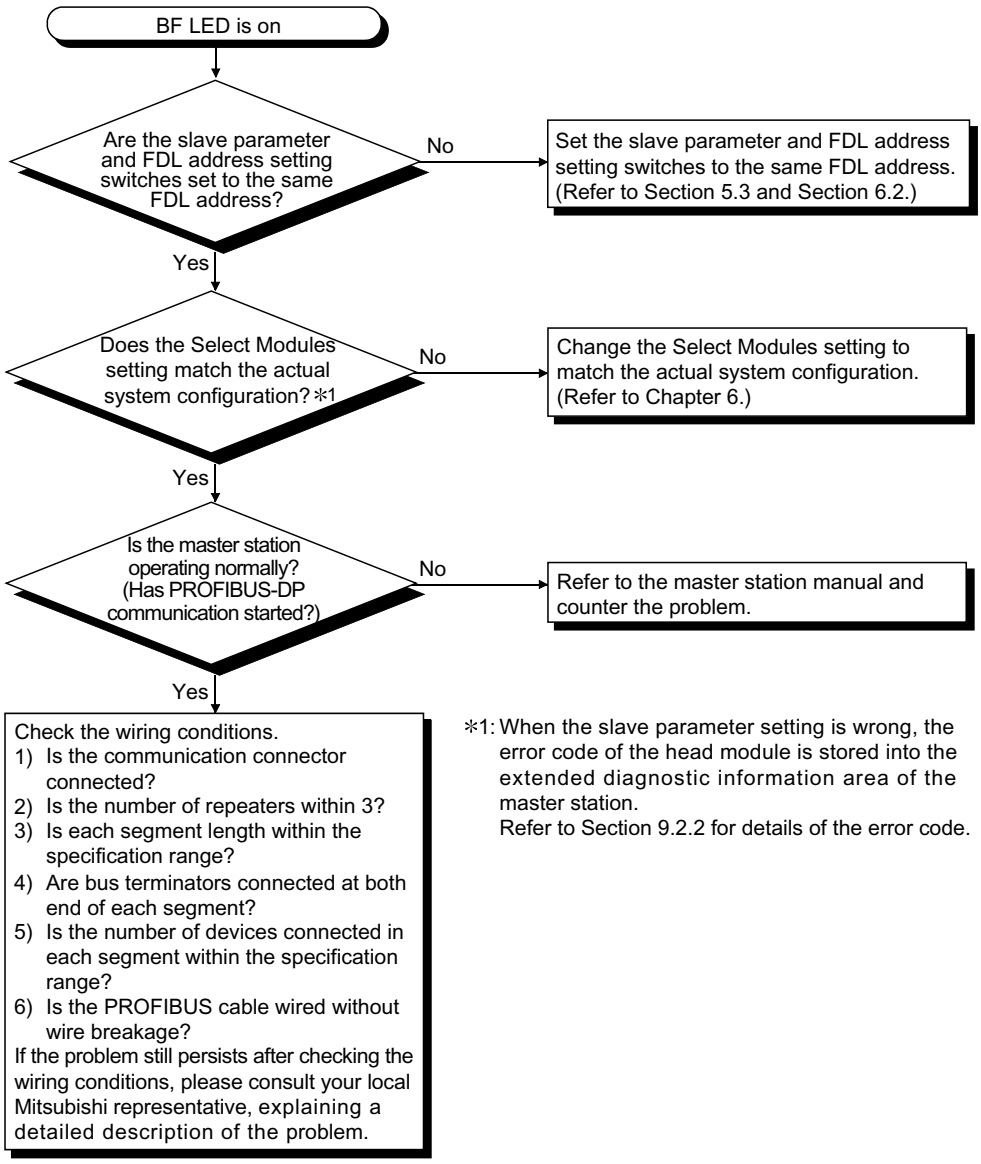
9.1.1 When RUN LED is off

When the RUN LED of the head module is off, troubleshoot the problem according to the following flowchart.



9.1.2 When BF LED is on

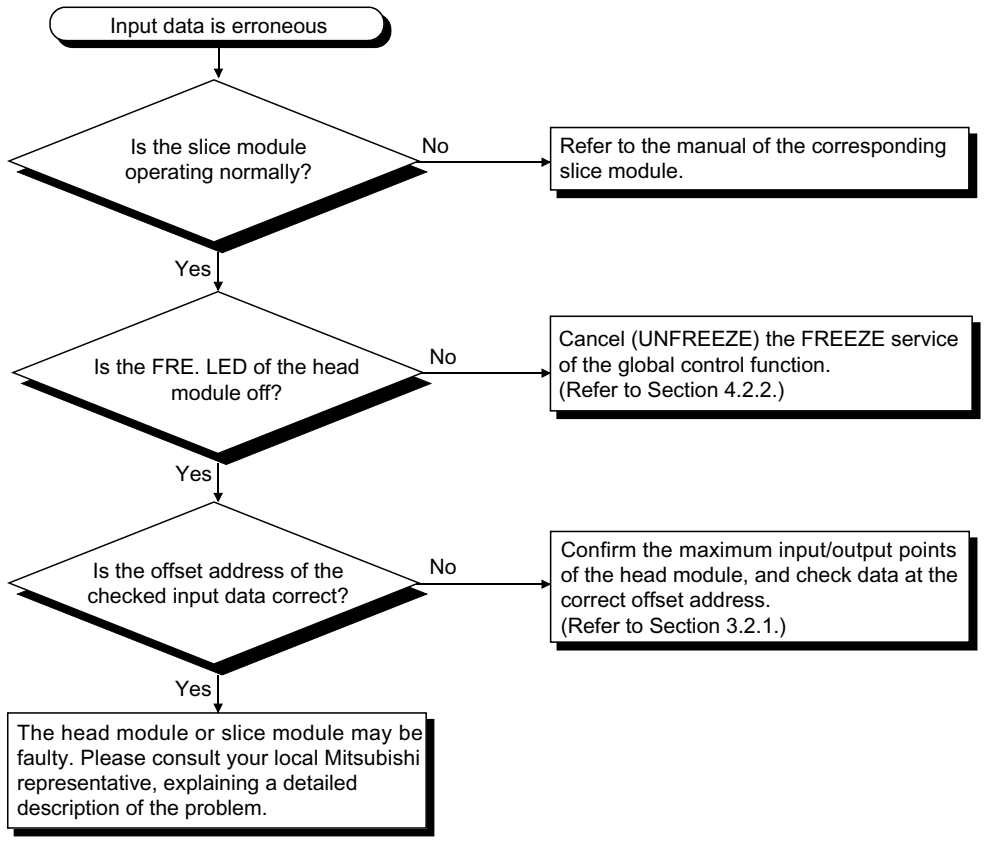
When the BF LED of the head module is on, troubleshoot the problem according to the following flowchart.



*1: When the slave parameter setting is wrong, the error code of the head module is stored into the extended diagnostic information area of the master station.
Refer to Section 9.2.2 for details of the error code.

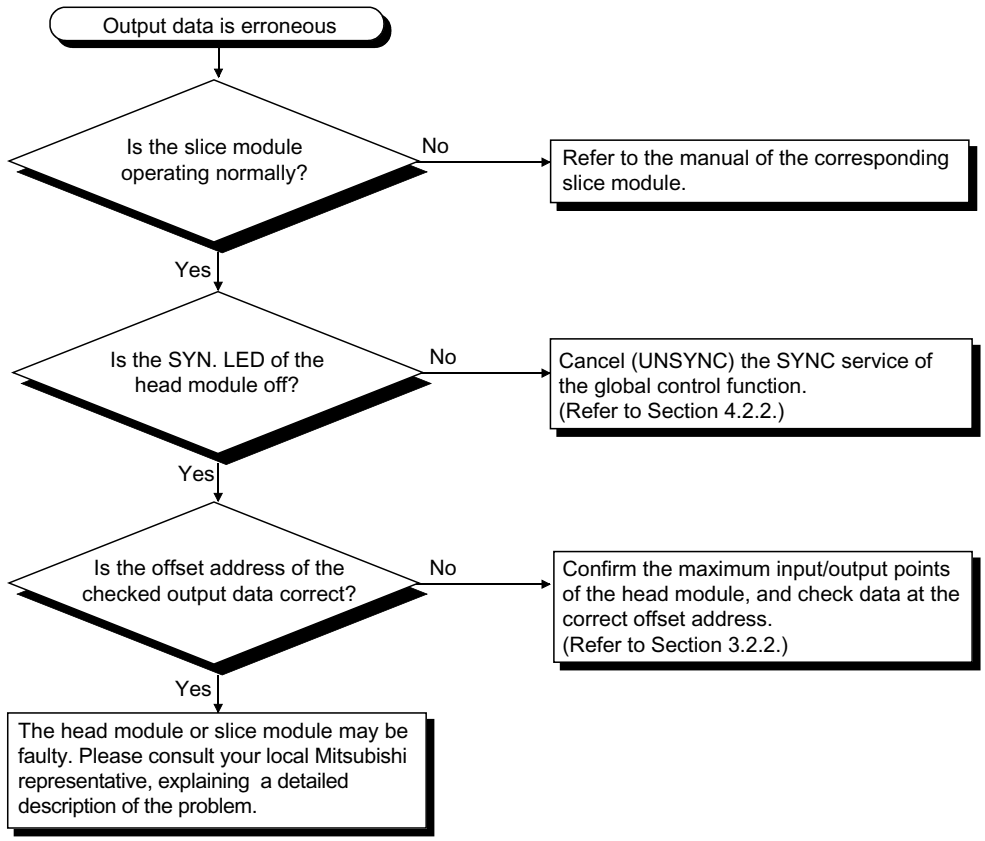
9.1.3 When input data is erroneous

When the input data sent from the head module is erroneous, troubleshoot the problem according to the following flowchart.



9.1.4 When output data is erroneous

When the output data received by the head module is erroneous, troubleshoot the problem according to the following flowchart.



9.2 When ERR. LED is on or flickering

When an error occurs in the head module, the ERR. LED turns on or flickers.
This section explains the read operation of the error code of the head module and lists the error codes.

9.2.1 Error code reading operation

This section explains the operation to read the error code.
Refer to Section 9.2.2 for details of the error code.

(1) Error code reading operation

Whether the error code can be read or not depends on the BF LED and IDA LED on/off statuses of the head module.
The following table indicates whether the error code can be read or not for each case.

LED on/off status		Whether error code can be read or not			
BF LED	DIA LED	(a)	(b)	(c)	(d)
Off	Off	○	×	○	○
Off	On	○	○	○	○
On	Off	×	×	×	○
On	On	×	○	×	○

○: Can be read ×: Cannot be read

(a) Using input data for checking

Confirm the error definition in the Er.n Error Information of the module whose ERR. LED is on or flickering, and take corrective action.
Refer to Section 3.2.3 for details of the Er.n Error Information of the head module.

(b) Using extended diagnostic information for checking

When the extended diagnostic information notification function is enabled in the head module, confirm the error details of the corresponding module in the extended diagnostic information area of the master station, and take corrective action.
Refer to Section 4.2.3 for details of the extended diagnostic information notification function.

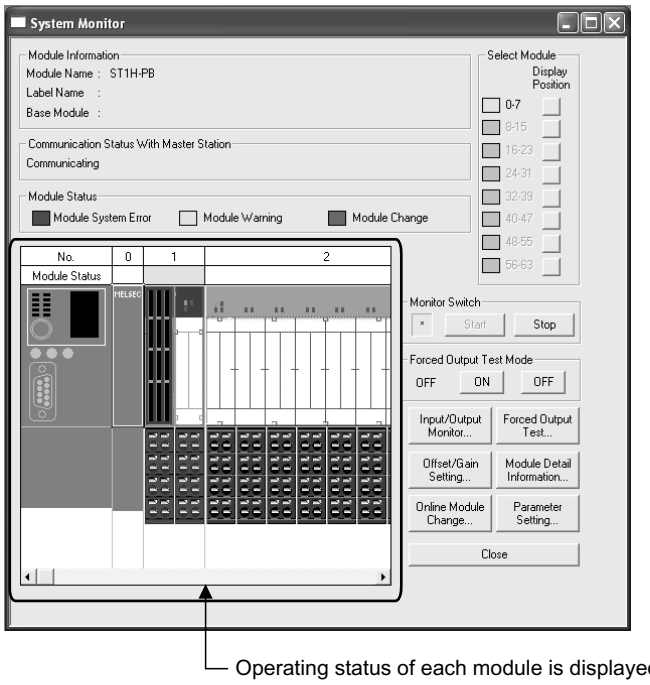
(c) Using command for checking

Execute the command (0101H) for the head module from the master station to read the error code of the head module, and take corrective action.
Refer to Chapter 8 for details of the command.

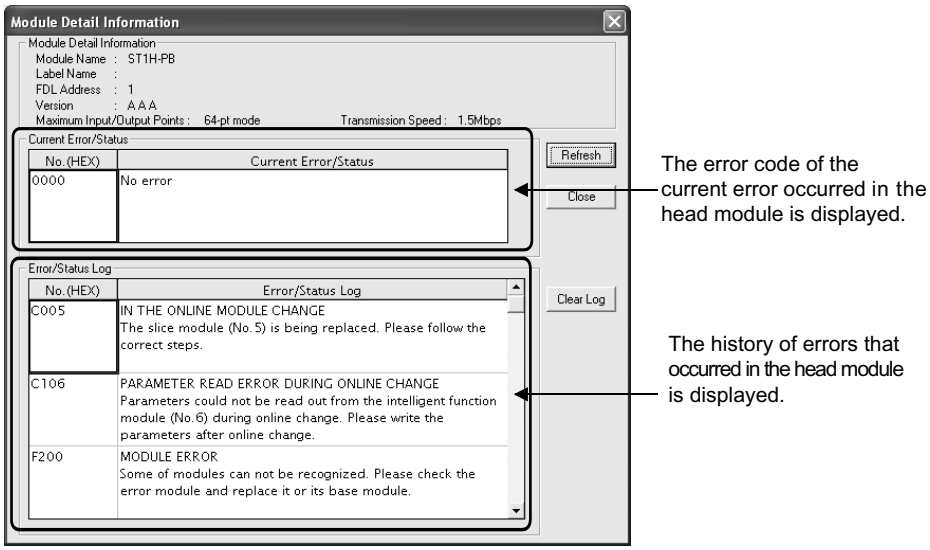
(d) Using GX Configurator-ST for checking

Connect the personal computer to the head module, and confirm the operating status and error code of each module from GX Configurator-ST. Check the operating status and error code of each module on the "System Monitor" and "Module Detail Information" screens of GX Configurator-ST. Refer to the GX Configurator-ST Manual for the operation on the "System Monitor" and "Module Detail Information" screens.

1) "System Monitor" screen



2) "Module Detail Information" screen (When head module is selected)



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9.2.2 Error code list

The following gives the error code list of the head module.
Refer to Section 9.2.1 for the error code reading operation.

(1) Error code list

(a) Error codes for PROFIBUS-DP communication

If any of the following errors occurs during online module change, the ERR. LED status change and error code are not recorded.

Error code (Hexadecimal)	Error Level	Error name	ERR. LED status	Detection timing	Description	
B100H	Warning	FDL address setting error	On	When external power supply is switched on or head module is reset	The FDL address is outside the setting range.	
B101H	System error	Hardware fault			A hardware fault occurred.	
B200H	Warning	Network parameter error	On	When communication starts (when parameters are received)	Watchdog time setting is illegal. (1 or less, or more than 65535)	
B300H	Warning	User parameter error	On	When communication starts (when parameters are received)	Slave parameter setting error (value is set to the invalid area.)	
B301H	Warning	Configuration error			In the Select Modules setting, the head module is not selected as the start module.	
B302H					Any slave parameter of the head module is illegal.	
B303H					The points for the slice modules set in Select Modules exceed the maximum input/output points. (The sum of input/output points is outside the setting range.)	
B304H					The points for the slice modules set in Select Modules exceed the maximum input/output points. (The sum of word input/output points is outside the setting range.)	
B401H to B43FH ＊1	Warning	Module select error	On	When communication starts (when parameters are received)	The Select Modules setting and actually mounted slice module differ in module type or input/output points. Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	
B501H to B53FH ＊1	Warning	Module select error	On	When communication starts (when parameters are received)	The Select Modules setting and actually mounted intelligent function module differ in model name. Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	
B601H to B63FH ＊1	Warning	Module select error	On	When communication starts (when parameters are received)	The Select Modules setting and actually mounted intelligent function module differ in module type or word input/output points. Two or more modules were set to Select Modules. Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	
E100H	Warning	Communication error	Flickering	During communication	Communication with master station stopped.	
F200H	System error	Module error	On	Always	There is an unrecognizable slice module.	
F201H	Warning	FDL address change error	Flickering	Always	The FDL address was changed after the head module started.	
F202H	System error	Module composition error	On	When external power supply is switched on or head module is reset	The bus refreshing module is not mounted next to the right of the head module.	
F203H	System error	User parameter setting error	On	When communication starts	There is a slice module whose user parameters could not be set.	
F204H ＊2	System error	System power down	—	Always	An instantaneous power failure occurs in the bus refreshing module that powers the head module (bus refreshing module mounted next to the right of the head module).	
F301H to F33FH ＊1	System error	System power down	—	Always	An error occurred in the bus refreshing module. Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	

＊1: The one low byte denotes the mounting position of the slice module from the right of the head module.
<Example> When the bus refreshing module is mounted in the first position: **01H
When the slice module is mounted in the 10th position: **0AH

＊2: If an instantaneous power failure occurs in the bus refreshing module that powers the head module, the error information is recorded in the error history.

	Error code (Hexadecimal)	Corrective action	Reading operation			
			1)	2)	3)	4)
	$B100_H$	Check whether the FDL address setting switches are set within the range 0 to 99. (Refer to Section 5.3.1.)	×	×	×	○
	$B101_H$	Hardware fault. ・ Replace the head module. ・ Please consult your local Mitsubishi representative, explaining a detailed description of the problem.	×	×	×	○
	$B200_H$	Check the watchdog time setting. (Refer to Section 6.2.)	×	○	×	○
	$B300_H$	Check the slave parameters of the head module. (Refer to Chapter 6.)	×	○	×	○
	$B301_H$	Set the head module as the start module in Select Modules. (Refer to Section 6.1.1.)	×	○	×	○
	$B302_H$	Check the slave parameters of the head module. (Refer to Section 6.2.)	×	○	×	○
	$B303_H$	Check the head module setting in Select Modules. (Check whether the sum of input/output points of the modules is within the setting range. Refer to Section 6.1.1.)	×	○	×	○
	$B304_H$	Check the head module setting in Select Modules. (Check whether the sum of word input/output points of the intelligent function modules is within the setting range. Refer to Section 6.1.1.)	×	○	×	○
	$B401_H$ to $B43F_H$ ＊1	Check the Select Modules setting.	×	○	×	○
	$B501_H$ to $B53F_H$ ＊1	Check the Select Modules setting.	×	○	×	○
	$B601_H$ to $B63F_H$ ＊1	Check the Select Modules setting.	×	○	×	○
	$E100_H$	・ Check the master station status. ・ Check the network wiring conditions. ・ Increase the watchdog time setting.	×	○	×	○
	$F200_H$	Change the slice module or base module whose RUN LED is off (the corresponding bit of the Mr Module Status Area is OFF).	○	○	○	○
	$F201_H$	・ If the FDL address was changed accidentally, return it to the FDL address set at the start of the head module. ・ When it is desired to change the FDL address after the head module started, restart the head module (reset the head module or switch the external power supply off and then on again).	○	○	○	○
	$F202_H$	Mount the bus refreshing module next to the right of the head module.	×	○	○	○
	$F203_H$	Temporarily stop PROFIBUS-DP communication and restart communication. If the same error occurs after communication restart, replace the slice module whose RUN LED is flickering during communication with the master station.	○	○	○	○
	$F204_H$ ＊2	Check whether an instantaneous power failure occurred in the external SYS. power supply that powers the bus refreshing module.	×	○	○	○
	$F301_H$ to $F33F_H$ ＊1	・ Check the status of the external SYS. power supply that powers the bus refreshing module. ・ Replace the bus refreshing module.	×	○	○	○

○: Can be read ×: Cannot be read

1) Using input data for checking
2) Using extended diagnostic information for checking
3) Using command for checking
4) Using GX Configurator-ST for checking

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(b) Operating status code and error codes for online module change

Error/Operating status code (Hexadecimal)	Error Level	Error name	ERR. LED status	Detection timing	Description	
C001H to C03FH ∗1	—	— (Normal)	—	When online module change starts (when REL. LED turns on)	Module being replaced online (changeable) Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	
				When online module change starts (when REL. LED flickers)	Module being replaced online (intelligent function module parameters being read) Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	
C101H to C13FH ∗1	System error	Online module change error	On ∗2	When module is being changed online (when REL. LED is on)	The parameters of the intelligent function module cannot be read from its ROM. (During online module change) Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	
				After module is changed online (when REL. LED turns off)	The parameters of the intelligent function module cannot be read from its ROM. (After end of online module change) Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	
C201H to C23FH ∗1	System error	Online module change error	On	When slice module mounting is confirmed (when REL. LED turns on)	The model name of the current slice module differs from that of the previous slice module. Or, the intelligent function module parameters cannot be written to the ROM of the current intelligent function module. Any of 1 to 63 (01H to 3FH) denoting the mounting position of the slice module from the right of the head module is stored into the low byte.	

∗1: The one low byte denotes the mounting position of the slice module on the right of the head module.
<Example> When the bus refreshing module is mounted in the first position: **01H
When the slice module is mounted in the 10th position: **0AH

∗2: If any of C101H to C13FH occurs, the ERR. LED remains on until the next online module change.
To turn off the ERR. LED, turn on the Ew.00 Error Clear Request after online module change.

(c) Operating status code for forced output test mode

Operating status code (Hexadecimal)	Error Level	Error name	ERR. LED status	Detection timing	Description	
D000H	—	— (Normal)	—	When forced output test mode starts	Forced output test mode being executed	

	Error/Operating status code (Hexadecimal)	Corrective action	Reading operation			
			1)	2)	3)	4)
	C001H to C03FH ＊1	Complete online module change. (Refer to Section 4.4.)	○	○	○	○
	C101H to C13FH ＊1	After online module change, write the parameters to the intelligent function module using a command or GX Configurator-ST, with the RUN LED of the currently mounted module flickering or on.	○	○	○	○
	C201H to C23FH ＊1	・When the current slice module differs in type from the previous slice module, mount the slice module whose type is the same as that of the previous slice module. ・When the current slice module is the same in type as the previous slice module, mount the other slice module.	○	○	○	○

○: Can be read ×: Cannot be read

1) Using input data for checking
2) Using extended diagnostic information for checking
3) Using command for checking
4) Using GX Configurator-ST for checking

	Operating status code (Hexadecimal)	Corrective action	Reading operation			
			1)	2)	3)	4)
	D000H	When ending the forced output test mode, perform operation from GX Configurator-ST. (Refer to the GX Configurator-ST Manual.)	○	○	○	○

○: Can be read ×: Cannot be read

1) Using input data for checking
2) Using extended diagnostic information for checking
3) Using command for checking
4) Using GX Configurator-ST for checking

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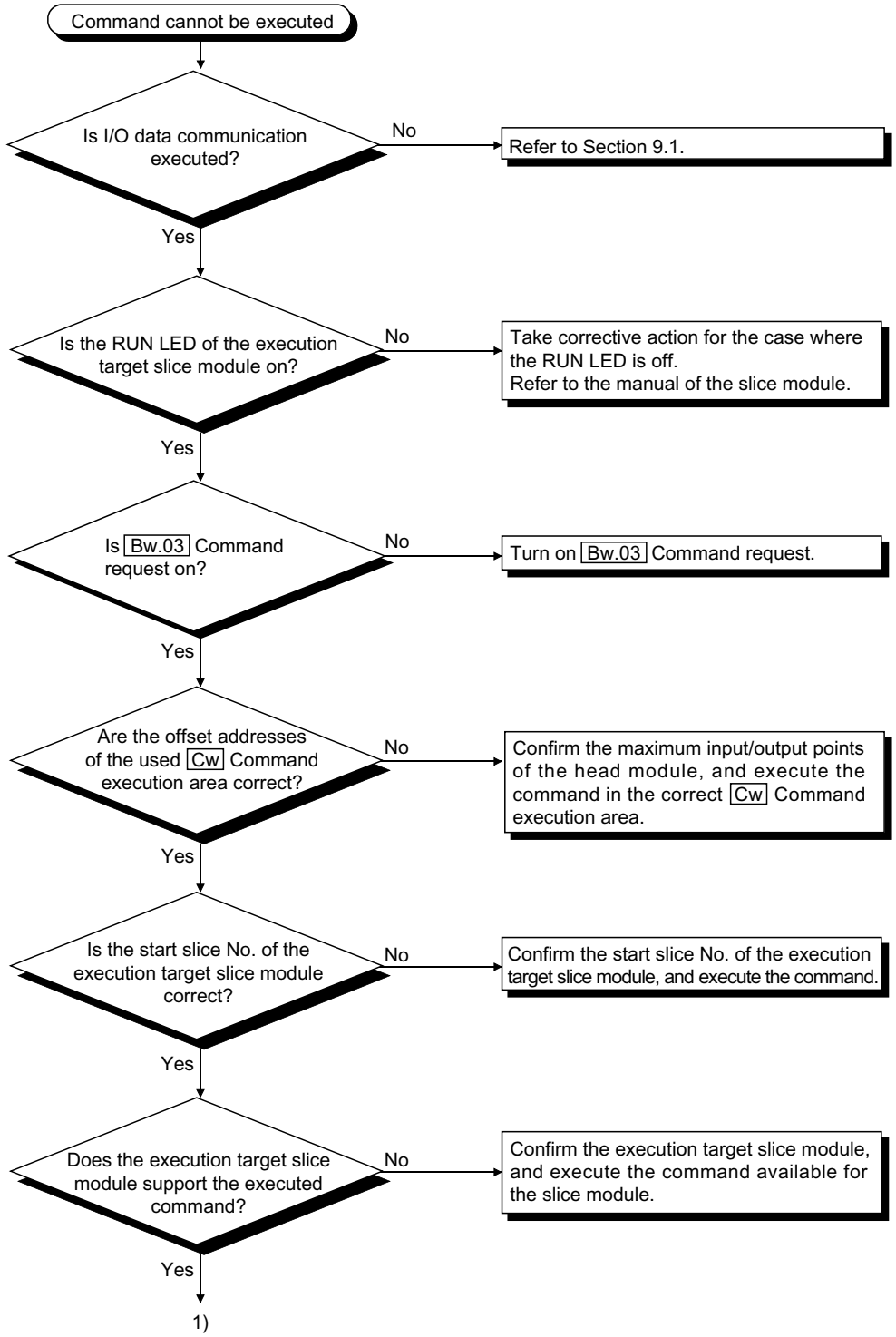
(2) When multiple errors are detected simultaneously

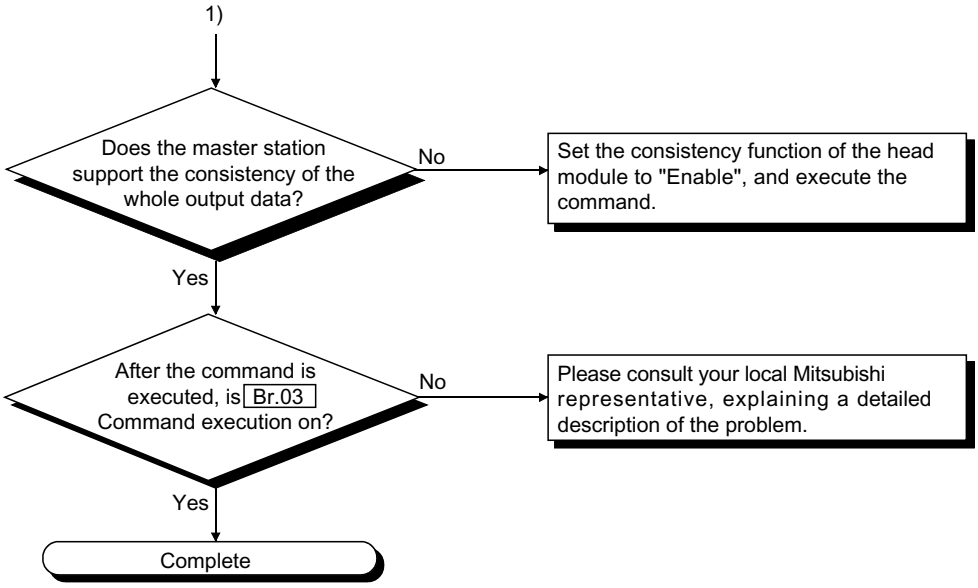
When the head module detects multiple errors simultaneously, error information is stored with the following priority.

Priority	Error code	Error name
1	$F204_H$	System power down
	$F301_H$ to $F33F_H$	
2	$F202_H$	Module composition error
3	$C201_H$ to $C23F_H$	Online module change error
4	$C301_H$ to $C33F_H$	
5	$C101_H$ to $C13F_H$	
6	$C001_H$ to $C03F_H$	Module being changed online (normal)
7	$F200_H$	Module error
8	$F203_H$	User parameter setting error
9	$F201_H$	FDL address change error
10	$D000_H$	Forced output test mode (normal)
11	$E100_H$	Communication error
12	$B100_H$	FDL address setting error
13	$B101_H$	Hardware fault
14	$B200_H$	Network parameter error
15	$B300_H$	User parameter error
16	$B401_H$ to $B43F_H$	Module select error
17	$B501_H$ to $B53F_H$	
18	$B301_H$	Configuration error
19	$B302_H$	
20	$B303_H$	
21	$B304_H$	
22	$B601_H$ to $B63F_H$	Module select error

9.3 When command cannot be executed

When the command from the master station cannot be executed, troubleshoot the problem according to the following flowchart.

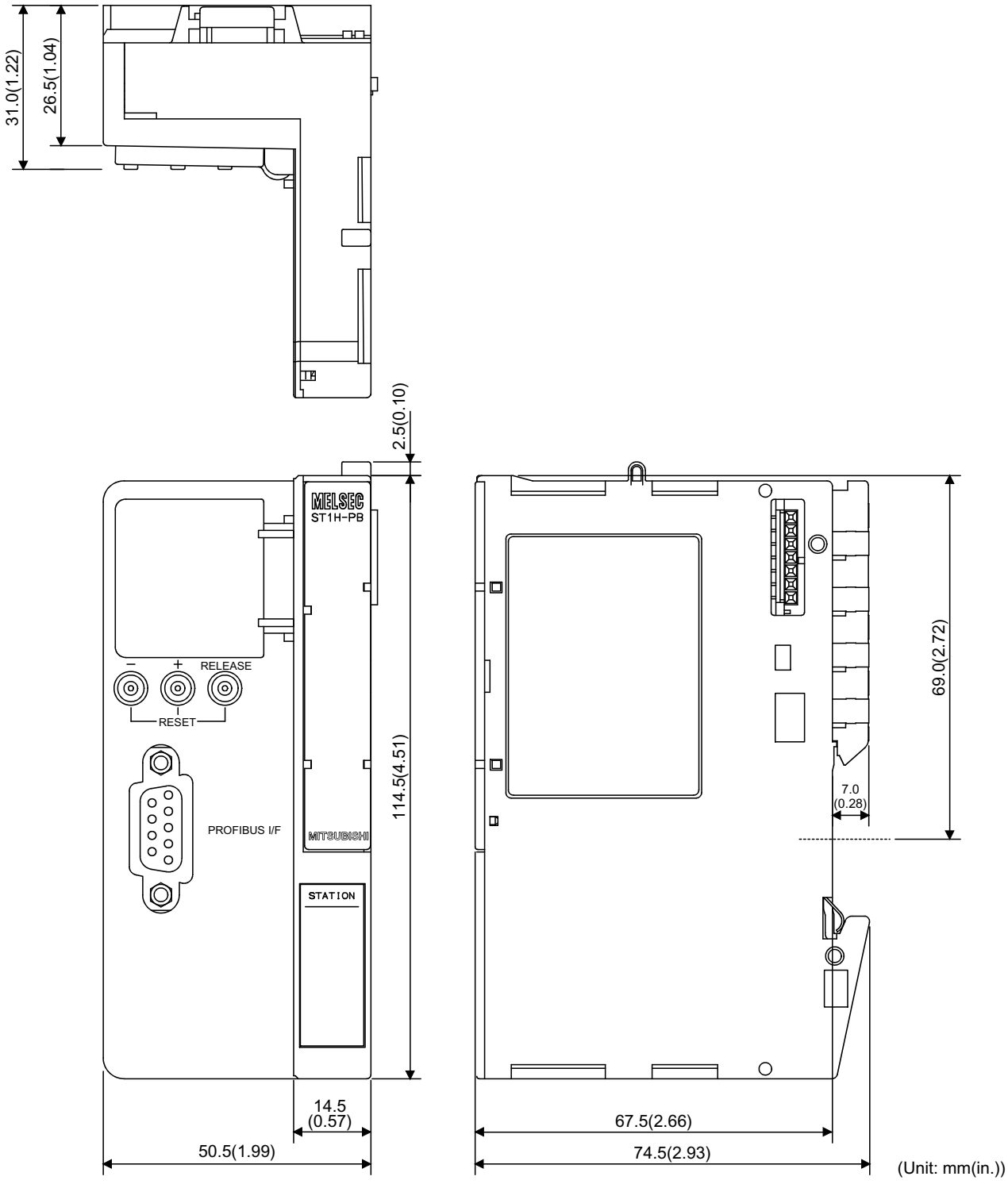



1)
Does the master station support the consistency of the whole output data?
No
Set the consistency function of the head module to "Enable", and execute the command.
Yes
After the command is executed, is Br.03 Command execution on?
No
Please consult your local Mitsubishi representative, explaining a detailed description of the problem.
Yes
Complete

APPENDICES

Appendix 1 External Dimensions

(1) Head module (ST1H-PB)



(Unit: mm(in.))

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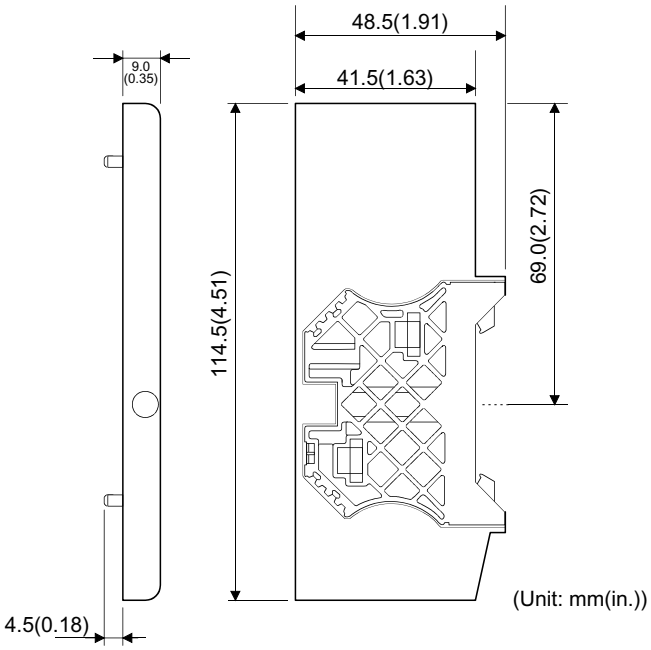
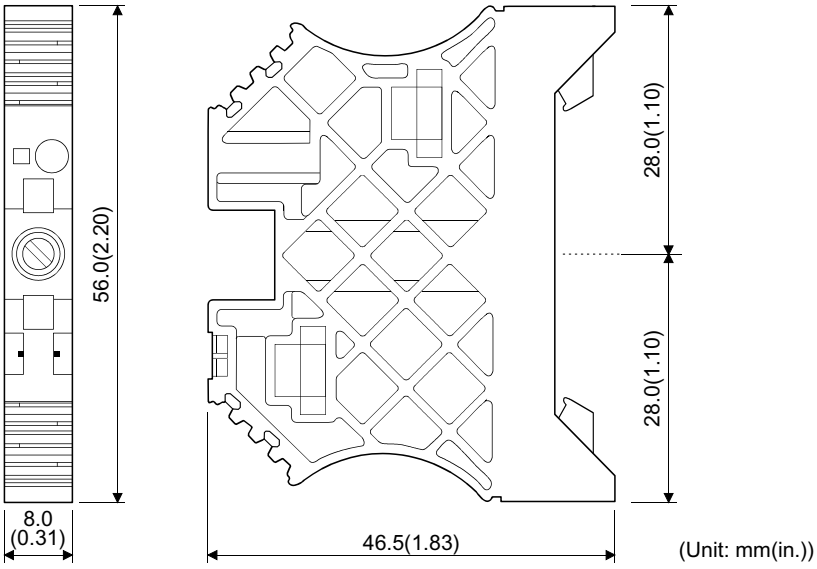
(2) End plate (ST1A-EPL) ∗1



∗1. In the above drawing, the end bracket is mounted on the end plate.

(3) End bracket (ST1A-EBR)



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Appendix 2 MELSEC-ST System Setting Sheet

Appendix 2.1 Maximum input/output points setting sheet

No.	Module Name	Number of Occupied I/O Points	Start Slice No. (Number of occupied slices)	Wr.n	Ww.n	5V DC Internal Current Consumption (Total)	24V DC Current (Total)	Slot Width (Total)
0	ST1H-PB	4	0(2)	—	—	0.530A(0.530A)	0A(0A)	—
1	ST1PSD	2	2(1)	—	—	—	—	25.2mm(25.2mm)
2			( )					
3			( )					
4			( )					
5			( )					
6			( )					
7			( )					
8			( )					
9			( )					
10			( )					
11			( )					
12			( )					
13			( )					
14			( )					
15			( )					
16			( )					
17			( )					
18			( )					
19			( )					
20			( )					
21			( )					
22			( )					
23			( )					
24			( )					
Total		*1	—	*2	*2	—	—	—

*1: Apply this value to [A] in the following table.

*2: Apply the value, whichever is larger, to [D] in the following table.

[A] Sum total of occupied I/O points	[D] Maximum word input/output points							
	0 to 32 words				33 to 52 words			
4 to 32 points	32-point mode	64-point mode	128-point mode	256-point mode	32-point mode	64-point mode	128-point mode	—
33 to 64 points	—	64-point mode	128-point mode	256-point mode	—	64-point mode	128-point mode	—
65 to 128 points	—		128-point mode	256-point mode	—		128-point mode	—
129 to 256 points	—			256-point mode	—			

Select the shaded setting when planning an expansion of the MELSEC-ST system for the future.

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Appendix 2.2 Input data assignment sheet

(1) Br Bit input area

Br.n Bit input	Information	Master station side device	Slice No.	Module name
Br.00	Module READY		0	ST1H-PB
Br.01	Forced output test mode			
Br.02	Module being changed online		1	
Br.03	Command execution			
Br.04	External power supply status		2	ST1PSD
Br.05				
Br.06			3	
Br.07				
Br.08			4	
Br.09				
Br.0A			5	
Br.0B				
Br.0C			6	
Br.0D				
Br.0E			7	
Br.0F				

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Br.n Bit input	Information	Master station side device	Slice No.	Module name
Br. □0			□□□	
Br. □1				
Br. □2			□□□	
Br. □3				
Br. □4			□□□	
Br. □5				
Br. □6			□□□	
Br. □7				
Br. □8			□□□	
Br. □9				
Br. □A			□□□	
Br. □B				
Br. □C			□□□	
Br. □D				
Br. □E			□□□	
Br. □F				

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(2) Er Error information area

Er.n Error information	Information	Master station side device	Slice No.	Module name
Er.00	Head module error information		0	ST1H-PB
Er.01				
Er.02			1	
Er.03				
Er.04	Bus refreshing module error information		2	ST1PSD
Er.05				
Er.06			3	
Er.07				
Er.08			4	
Er.09				
Er.0A			5	
Er.0B				
Er.0C			6	
Er.0D				
Er.0E			7	
Er.0F				

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Er.n Error information	Information	Master station side device	Slice No.	Module name
Er. □0			□□□	
Er. □1				
Er. □2			□□□	
Er. □3				
Er. □4			□□□	
Er. □5				
Er. □6			□□□	
Er. □7				
Er. □8			□□□	
Er. □9				
Er. □A			□□□	
Er. □B				
Er. □C			□□□	
Er. □D				
Er. □E			□□□	
Er. □F				

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(3) Mr Module status area

Mr.n Module status	Information	Master station side device	Slice No.	Module name
Mr. 0	Head module status		0	ST1H-PB
Mr. 1			1	
Mr. 2	Bus refreshing module status		2	ST1PSD
Mr. 3			3	
Mr. 4			4	
Mr. 5			5	
Mr. 6			6	
Mr. 7			7	
Mr. 8			8	
Mr. 9			9	
Mr.10			10	
Mr.11			11	
Mr.12			12	
Mr.13			13	
Mr.14			14	
Mr.15			15	

Mr.n Module status	Information	Master station side device	Slice No.	Module name
Mr. □□0			□□□	
Mr. □□1			□□□	
Mr. □□2			□□□	
Mr. □□3			□□□	
Mr. □□4			□□□	
Mr. □□5			□□□	
Mr. □□6			□□□	
Mr. □□7			□□□	
Mr. □□8			□□□	
Mr. □□9			□□□	

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(4) Wr Word input area

Wr.n Word input	Information	Master station side device	Slice No.	Module name
Wr. □0			□□□	
Wr. □1				
Wr. □2			□□□	
Wr. □3				
Wr. □4			□□□	
Wr. □5				
Wr. □6			□□□	
Wr. □7				
Wr. □8			□□□	
Wr. □9				
Wr. □A			□□□	
Wr. □B				
Wr. □C			□□□	
Wr. □D				
Wr. □E			□□□	
Wr. □F				

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Appendix 2.3 Output data assignment sheet

(1) Bw Bit output area

Bw.n Bit output	Information	Master station side device	Slice No.	Module name
Bw.00	System area (0 fixed)		0	ST1H-PB
Bw.01	System area (0 fixed)			
Bw.02	System area (0 fixed)		1	
Bw.03	Command request			
Bw.04	System area (0 fixed)		2	ST1PSD
Bw.05	System area (0 fixed)			
Bw.06			3	
Bw.07				
Bw.08			4	
Bw.09				
Bw.0A			5	
Bw.0B				
Bw.0C			6	
Bw.0D				
Bw.0E			7	
Bw.0F				

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Bw.n Bit output	Information	Master station side device	Slice No.	Module name
Bw. □0			□□□	
Bw. □1				
Bw. □2			□□□	
Bw. □3				
Bw. □4			□□□	
Bw. □5				
Bw. □6			□□□	
Bw. □7				
Bw. □8			□□□	
Bw. □9				
Bw. □A			□□□	
Bw. □B				
Bw. □C			□□□	
Bw. □D				
Bw. □E			□□□	
Bw. □F				

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(2) Ew Error clear area

Ew.n Error clear	Information	Master station side device	Slice No.	Module name
Ew. 00	Error clear request		0	ST1H-PB
Ew. 01	System area (0 fixed)			
Ew. 02	System area (0 fixed)		1	
Ew. 03	System area (0 fixed)			
Ew. 04	Error clear request		2	ST1PSD
Ew. 05	System area (0 fixed)			
Ew. 06			3	
Ew. 07				
Ew. 08			4	
Ew. 09				
Ew.0A			5	
Ew.0B				
Ew.0C			6	
Ew.0D				
Ew.0E			7	
Ew.0F				

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Ew.n Error clear	Information	Master station side device	Slice No.	Module name
Ew. □0			□□□	
Ew. □1			□□□	
Ew. □2			□□□	
Ew. □3			□□□	
Ew. □4			□□□	
Ew. □5			□□□	
Ew. □6			□□□	
Ew. □7			□□□	
Ew. □8			□□□	
Ew. □9			□□□	
Ew. □A			□□□	
Ew. □B			□□□	
Ew. □C			□□□	
Ew. □D			□□□	
Ew. □E			□□□	
Ew. □F			□□□	

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(3) Ww Word output area

Ww.n Word output	Information	Master station side device	Slice No.	Module name
Ww. □0			□□□	
Ww. □1				
Ww. □2			□□□	
Ww. □3				
Ww. □4			□□□	
Ww. □5				
Ww. □6			□□□	
Ww. □7				
Ww. □8			□□□	
Ww. □9				
Ww. □A			□□□	
Ww. □B				
Ww. □C			□□□	
Ww. □D				
Ww. □E			□□□	
Ww. □F				

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WARRANTY

Please confirm the following product warranty details before starting use.

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 dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[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 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 possible 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 chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by Failures of Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

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

6. Product application

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

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

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

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