MELSEC-ST Digital-Analog Converter Module

User's Manual

(PROFIBUS-DP)

MITSUBISHI

MELSEC-ST

ST1DA2-V
ST1DA2-V-F01
ST1DA1-I
ST1DA1-I-F01

● 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

● Using communication status information, create an interlock circuit on the programs so that the system will operate safely. Failure to do so may cause an accident due to incorrect output or malfunction.
When an error occurs, all outputs in the MELSEC-ST system are turned OFF. (At default)
However, I/O operation in the case of the following errors can be selected for the head module and each slice module. Configure the settings to ensure safety of the entire system.
(1) Communication error (Refer to the MELSEC-ST PROFIBUS-DP Head Module User's Manual.)
(2) Slice module failure
The output status in the case of an error can be set to Clear/Hold/Preset with a user parameter of each slice module. (For the setting, refer to each slice module manual.)
Since the parameter is set to Clear by default, outputs are turned OFF if an error occurs.
This parameter setting can be changed to Hold or Preset if necessary. (Refer to Section 3.3.2.)

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[DESIGN PRECAUTIONS]

⚠ DANGER

- Create an external fail safe circuit that will ensure the MELSEC-ST system safety even when the external power supply or the system fails.
  An accident may occur due to output error or malfunctioning.
  (1) The output status changes depending on the settings of various functions that control the output. Take sufficient caution when setting those functions.
  (2) Outputs may remain ON or OFF due to failure of the output element or its internal circuit. Configure a monitoring circuit for the output signals that could cause a serious accident.

[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.

- At the time of power ON or OFF, a voltage or current may be instantaneously output from output terminals. Therefore, ensure stable analog outputs before starting the control.

[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 end brackets when using it in an environment of frequent vibration. Tighten the screws of the end brackets 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.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- 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) I/O modules and 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 of online module change in this manual.

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

- 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 before installing the module or placing wiring. Failure to do so could result in an electric shock or damage to the product.

⚠ CAUTION

- 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.

- Use applicable solderless terminals and tighten them with the specified torque. If any solderless spade terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.

- 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.

[WIRING PRECAUTIONS]

⚠ CAUTION

- 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.

[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.

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[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ CAUTION
● 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
Jan. 2004	SH(NA)-080444ENG-A	First edition
Jul. 2005	SH(NA)-080444ENG-B	Addition Section 2.4, Appendix 2 Correction Section 3.1, 4.5, 5.6, 6.1, 7.4.1, 8.5.4, 8.5.5, Appendix 3
Jun. 2006	SH(NA)-080444ENG-C	Correction SAFETY PRECAUTIONS, Compliance with the EMC Directive and the Low Voltage Directive, Appendix 3
Aug. 2008	SH(NA)-080444ENG-D	Model addition ST1DA2-V-F01, ST1DA1-I-F01 Addition Section 2.2.5 Correction SAFETY PRECAUTIONS, About the Generic Terms and Abbreviations, Compliance with the EMC and Low Voltage Directives, Chapter 1, Section 2.2.4, 2.4, 3.1, 3.3.1, 3.4.4, 3.5.2, 4.2, 4.3, 4.4.2, 5.2, 5.3, 5.5, 6.2, 7.4, Chapter 8, Section 9.2.3, Appendix 1, Appendix 3

Japanese Manual Version SH-080443-D

INTRODUCTION

Thank you for choosing the ST1DA2-V/ST1DA1-I/ST1DA2-V-F01/ST1DA1-I-F01 type MELSEC-ST digital-analog converter module.
Before using the module, please read this manual carefully to fully understand the functions and performance of the ST1DA2-V/ST1DA1-I/ST1DA2-V-F01/ST1DA1-I-F01 type MELSEC-ST digital-analog converter module and use it correctly.

CONTENTS

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 power distribution modules, base modules and I/O modules. (Sold separately)	SH-080456ENG (13JR72)
MELSEC-ST PRFIBUS-DP Head Module User's Manual Explains the system configuration, specifications, functions, handling, wiring and troubleshooting of the ST1H-PB. (Sold separately)	SH-080436ENG (13JR68)
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 and Low Voltage Directives

(1) For the MELSEC-ST system

To configure a system meeting the EMC and Low Voltage Directives when incorporating the Mitsubishi MELSEC-ST system (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to Chapter 11 “EMC AND LOW VOLTAGE DIRECTIVES” of the MELSEC-ST System User’s Manual.

The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the MELSEC-ST system.

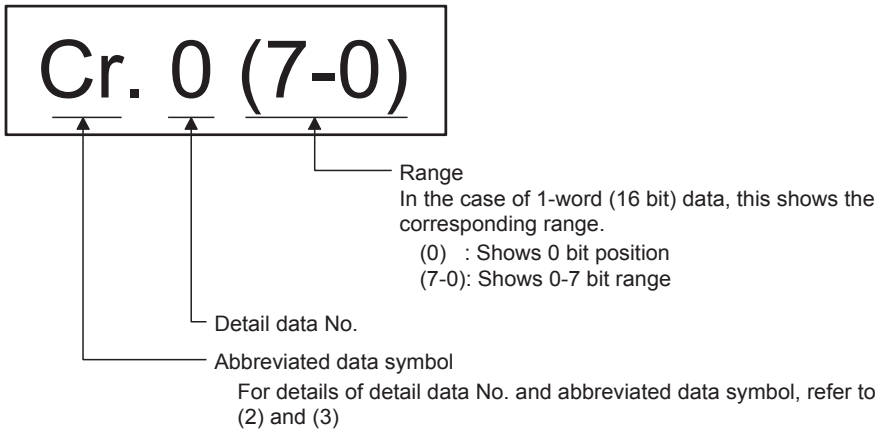
(2) For the product

No additional measures are necessary for the compliance of this product with the EMC and Low Voltage Directives.

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/signal	Hexadecimal
Er	Er.00 to Er.FF	Error Information Area	1 bit/signal	Hexadecimal
Mr	Mr.0 to Mr.127	Module Status Area	1 bit/signal	Decimal
Cr	*1	Command Result Area	1 word/signal	Decimal
Wr	Wr.00 to Wr.33	Word Input Area	1 word/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/signal	Hexadecimal
Ew	Ew.00 to Ew.FF	Error Clear Area	1 bit/signal	Hexadecimal
Sw	Sw.0 to Sw.7	System Area	1 word/signal	Decimal
Cw	*1	Command Execution Area	1 word/signal	Decimal
Ww	Ww.00 to Ww.33	Word Output Area	1 word/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

This manual uses the following generic terms and abbreviations to describe the ST1DA, unless otherwise specified.

Generic Term/Abbreviation	Description
ST1DA2-V	Generic term for ST1DA2-V and ST1DA2-V-F01 MELSEC-ST digital-analog converter modules.
ST1DA2-V-F01	Abbreviation for ST1DA2-V-F01 MELSEC-ST digital-analog converter module.
ST1DA1-I	Generic term for ST1DA1-I and ST1DA1-I-F01 MELSEC-ST digital-analog converter modules.
ST1DA1-I-F01	Abbreviation for ST1DA1-I-F01 MELSEC-ST digital-analog converter module.
ST1DA	Generic term for ST1DA-V, ST1DA2-V-F01, ST1DA1-I and ST1DA1-I-F01.
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)
User parameter	Generic term for setting items (output range setting, Clear/Hold/Preset setting) set by the configuration software of the master station.
Command parameter	Generic term for setting items (D/A conversion enable/disable setting, preset value setting) set by commands. They can also be set by GX Configurator-ST.
Parameter	Generic term for user parameters and command parameters.

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
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.

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Packing list

One of the following ST1DA products is included.

Model name	Product name	Quantity
ST1DA2-V	ST1DA2-V MELSEC-ST digital-analog converter module	1
ST1DA1-I	ST1DA1-I MELSEC-ST digital-analog converter module	1
ST1DA2-V-F01	ST1DA2-V-F01 MELSEC-ST digital-analog converter module	1
ST1DA1-I-F01	ST1DA1-I-F01 MELSEC-ST digital-analog converter module	1

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1 OVERVIEW

This User's Manual provides information such as the specifications, handling instructions, and programming methods for the ST1DA2-V and ST1DA2-V-F01 MELSEC-ST digital-analog converter modules (hereinafter referred to as the ST1DA2-V) and ST1DA1-I and ST1DA1-I-F01 MELSEC-ST digital-analog converter modules (hereinafter referred to as the ST1DA1-I).
In this manual, the ST1DA2-V, ST1DA2-V-F01, ST1DA1-I and ST1DA1-I-F01 are collectively referred to as the ST1DA.
This manual describes only the ST1DA.
For information on the MELSEC-ST system, refer to the MELSEC-ST System User's Manual.

REMARK

Only the default values for the D/A conversion enable/disable function are different between the ST1DA2-V and ST1DA2-V-F01, and between the ST1DA1-I and ST1DA1-I-F01. (Refer to Section 3.3.1.)
• ST1DA2-V, ST1DA1-I: D/A conversion disabled for all channels
• ST1DA2-V-F01, ST1DA1-I-F01: D/A conversion enabled for all channels

1.1 Features

(1) Available models

- ST1DA2-V····· 2-channel voltage output type.
- ST1DA1-I····· 1-channel current output type.

(2) Up to 26 modules can be mounted.

For one head module, up to 26 ST1DA modules (ST1DA2-V: 52 channels, ST1DA1-I: 26 channels) can be mounted.

(3) Output range can be changed for each channel.

The analog output range*1 can be changed for each channel to change the I/O conversion characteristic.

*1 The output range refers to the type of offset/gain settings. The most frequently used range is set as the default, but the user can make offset/gain settings according to the purpose.

(4) Clear/Hold/Preset functions

The analog output status in the case of a communication error or module fault can be selected. (Refer to Section 3.3.2)

- Clear : Outputs an offset value.
- Hold : Holds the latest analog value output from each channel.
- Preset : Outputs the preset value.

(5) Command function

By writing command parameters to the ROM using a command, D/A conversion can be made without setting the command parameters at module startup (power-on).

(6) High-speed conversion processing

Conversion processing is performed at a speed of 0.1ms/channel.

(7) High accuracy

This module performs D/A conversion at the accuracy of ± 0.8% relative to the maximum analog output value.

(8) Online module change

The module can be changed without the system being stopped.

(9) Easy setting using GX Configurator-ST

A software package (GX Configurator-ST) is separately available.
GX Configurator-ST is not necessarily required for the system.
However, GX Configurator-ST offers on-screen parameter and offset/gain setting features, reducing programs on the master station and making the setting/operating status check easier.

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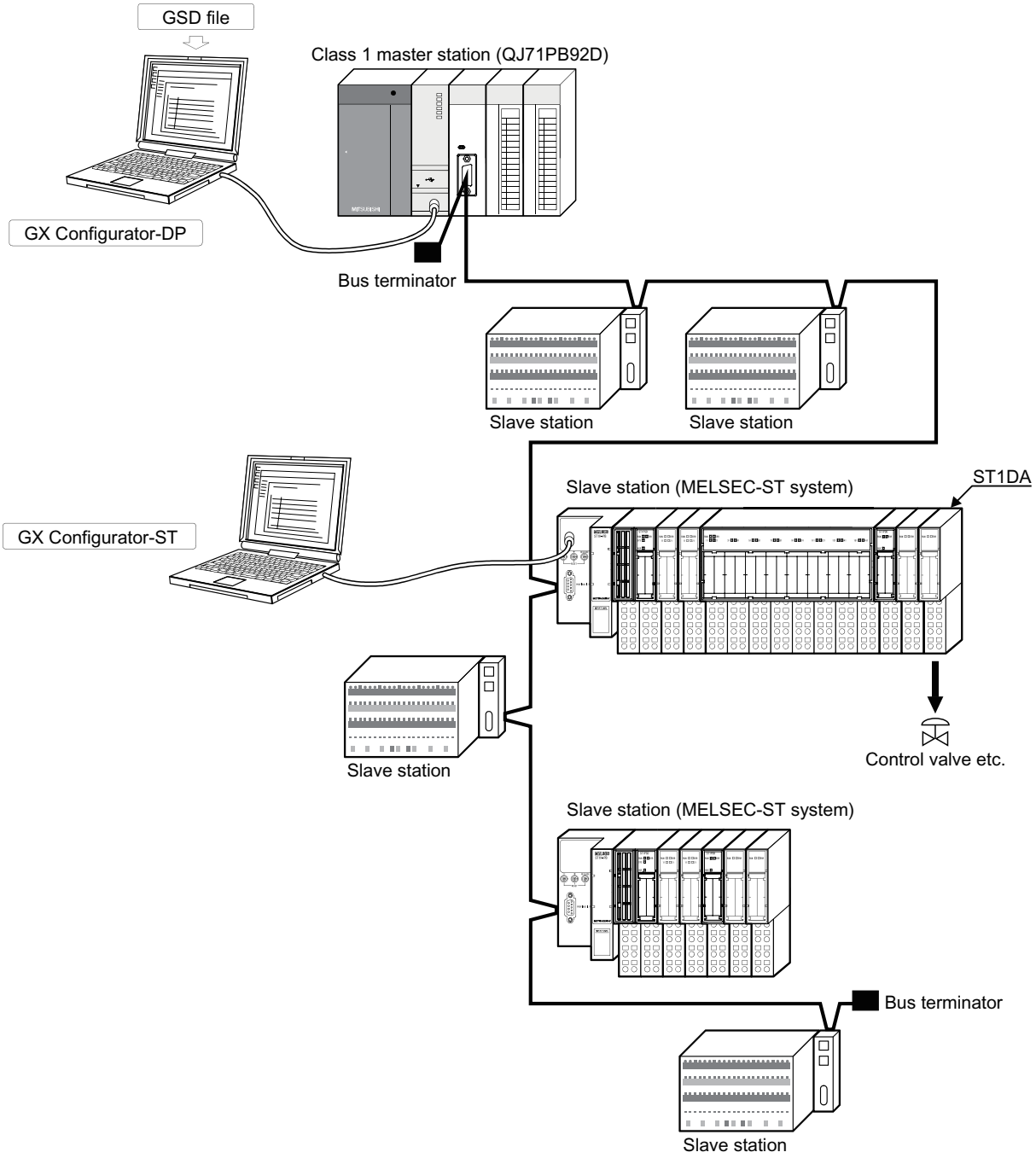
2 SYSTEM CONFIGURATION

This chapter describes the system configuration for use of the ST1DA.

2.1 Overall Configuration

The overall configuration for use of the ST1DA is shown below.

<The system which used QJ71PB92D>



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2.2 Applicable System

This section explains the applicable system.

2.2.1 Applicable head module

The head module applicable to the ST1DA is indicated below.

Product name	Model name
MELSEC-ST PROFIBUS-DP Head Module	ST1H-PB

2.2.2 Applicable base module

The base modules applicable to the ST1DA are indicated below.

Type	Model name
Spring Clamp Type	ST1B-S4IR2
Screw Clamp Type	ST1B-E4IR2

2.2.3 Applicable coding element

The coding elements applicable for the ST1DA are indicated below.
The coding element is fitted before shipment.
It is also available as an option in case it is lost.

Item	Model name
ST1DA2-V coding element	ST1A-CKY-11
ST1DA1-I coding element	ST1A-CKY12

2.2.4 Applicable software package

The software package applicable to the ST1DA is indicated below.

Product name	Model name
GX Configurator-ST	SW1D5C-STPB-E

2.2.5 Applicable GSD file

The GSD file shown below is applicable to the ST1DA2-V-F01 and ST1DA1-I-F01.
For GSD files, please consult your local Mitsubishi representative.
For information on how to update GSD files, refer to the manual for the configuration software on the master station.

Item	Version *1
GSD file	rel. 1.05 or later

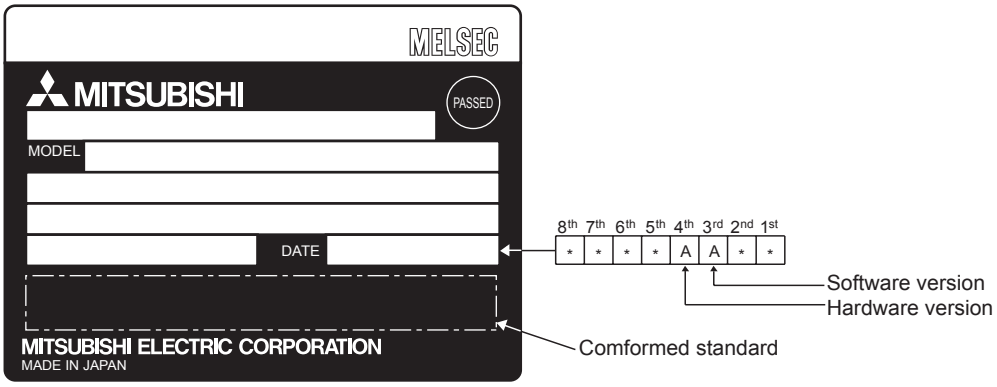
*1: In the GSD file list in the configuration software on the master station, the names and versions of the GSD files are shown.
Check that the versions are rel. 1.05 or later.

2.3 Precautions for System Configuration

For precautions for ST1DA system configuration, refer to Section 3.4 "Precautions for System Configuration" in MELSEC-ST system user's manual.

2.4 Checking Hardware and Software Versions

The hardware and software versions of the ST1DA can be checked on the DATE section on the rating plate, which is situated on the side of the module.



3 SPECIFICATIONS

This chapter provides the specifications of the ST1DA.
For the general specifications of the ST1DA, refer to the MELSEC-ST System User's Manual.

3.1 Performance Specifications

Table 3.1 indicates the performance specifications of the ST1DA.

Table 3.1 Performance specifications list

Item \ Model name		ST1DA2-V ST1DA2-V-F01	ST1DA1-I ST1DA1-I-F01
Number of analog output points		2 points (2 channels)	1 point (1 channel)
Digital input		16-bit signed binary (-4096 to 4095)	16-bit signed binary (0 to 4095),
Analog output	Voltage	–10 to 10 V DC (External load resistance value: 1 kΩ to 1MΩ)	—
	Current	—	0 to 20 mA DC (External load resistance value: 0 to 500Ω*1)
I/O characteristics, Maximum resolution		See the table below	
Accuracy (Accuracy in respect to maximum analog output value)	Ambient temperature 0 to 55 °C	Within ± 0.8 % (± 80mV)	Within ± 0.8 % (± 160 μA)
Conversion speed		0.1 ms/channel	
Settling time		1 ms (maximum change within the range)	
Absolute maximum output	Voltage	± 12 V	—
	Current	—	21 mA
ROM write count		ROM write count of user range or parameter setting: Maximum 10,000 times	
Number of occupied I/O points		4 points for each of input and output	
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 2	
	Output data	Bw.n : Number of Occupancy 4, Ew.n : Number of Occupancy 4, Ww.n : Number of Occupancy 2	
Isolation specifications		See the table below	
Applicable base module		Spring clamp type: ST1B-S4IR2, Screw clamp type: ST1B-E4IR2	
Applicable coding element		ST1A-CKY-11 (blue)	ST1A-CKY-12 (blue)
External AUX. power supply		24V DC (+20%/-15%, ripple ratio within 5%) 24V DC current : 0.065 A	
5V DC internal current consumption		0.095 A (0.10A is shown on the rating plate of the module.)	
External dimensions		77.6 (3.06 in.)(H) × 12.6 (0.50 in.)(W) × 55.4 (2.18 in.)(D) [mm]	
Weight		0.04 kg	

I/O characteristics, Maximum resolution

Analog output range		Digital input value	Maximum resolution
ST1DA2-V ST1DA2-V-F01 (Voltage)	0 to 10 V	0 to 4000	2.5 mV
	0 to 5 V		1.25 mV
	1 to 5 V		1.0 mV
	-10 to 10V	-4000 to 4000	2.5 mV
	User range setting		1.0 mV
ST1DA1-I ST1DA1-I-F01 (Current)	0 to 20 mA	0 to 4000	5 μA
	4 to 20 mA		4 μA
	User range setting		4 μA

Isolation specifications

Specific isolated area	Isolation method	Dielectric withstand	Insulation resistance
Between analog output terminals and internal bus	Photo coupler insulation	560V AC rms/3 cycles (elevation 2000m)	500V DC 10MΩ or more
Between analog output channels	No insulation	—	—

*1: When the hardware version is C or earlier, it is 100 to 500Ω.

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3.2 I/O Conversion Characteristics

The I/O conversion characteristics are shown as an inclination of a straight line that connects an offset value and a gain value at the time when the digital value written from the master station is converted into an analog value (voltage or current output).
The offset value is an analog value (voltage or current) output when the digital value is 0.
The gain value is an analog value (voltage or current) output when the digital value is 4000.

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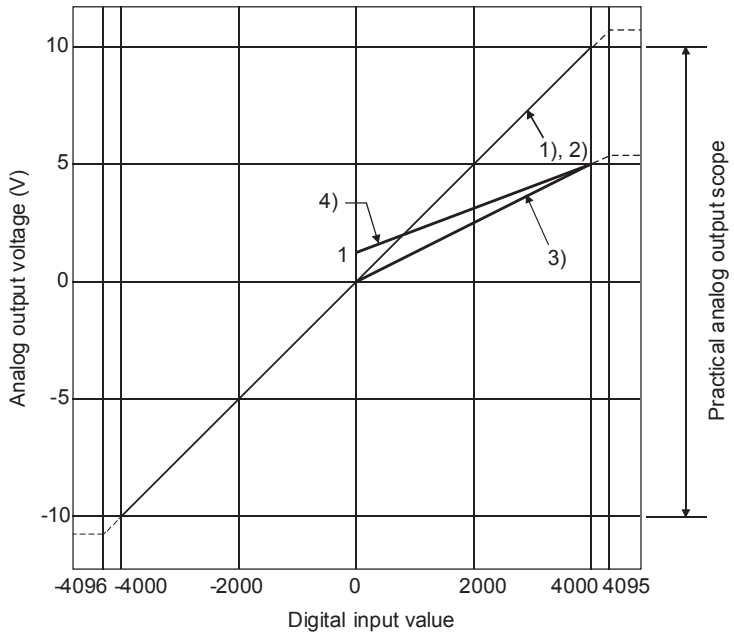
3.2.1 Output characteristics of ST1DA2-V

A graph of the ST1DA2-V output characteristics is shown below.



Number	Analog Output Range Setting	Offset Value	Gain Value	Digital Input Value	Maximum Resolution
1)	-10 to +10V	0V	10V	-4000 to 4000	2.5mV
2)	0 to 10V	0V	10V	0 to 4000	
3)	0 to 5V	0V	5V		1.25mV
4)	1 to 5V	1V	5V		1.0mV
—	User range setting	*1	*1	-4000 to 4000	1.0mV

Fig. 3.1 Output characteristics of ST1DA2-V

POINT

(1) Within the digital input and analog output scopes of each output range, the maximum resolution and accuracy are within the performance specification range. Outside those scopes, however, they may not fall within the performance specification range. (Avoid using the dotted line part in Fig. 3.1.)

(2) Set the offset/gain values for the user setting range*1 within a range in which the following conditions are satisfied.

(a) Offset/gain value setting range: -10 to 10V

(b) (Gain value) > (Offset value)

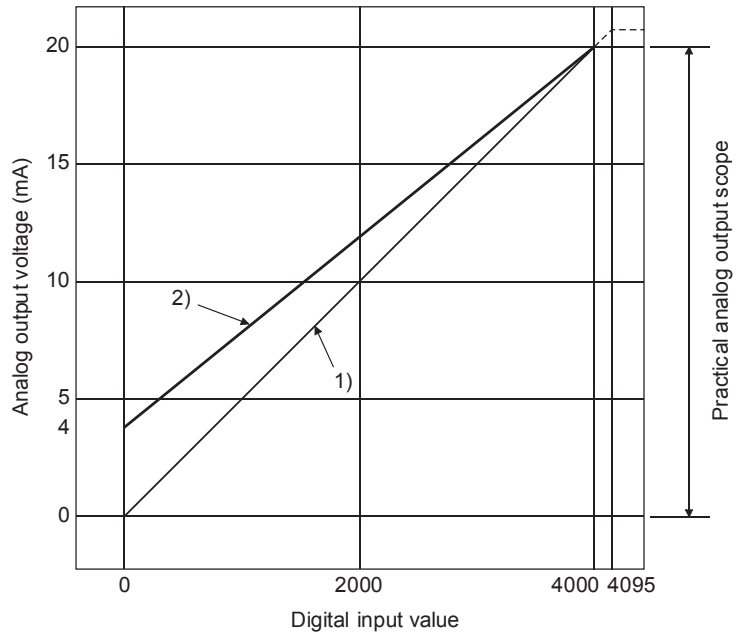
(c) { (Gain value) – (Offset value) } ≧ 4V

If condition (b) is not satisfied, ERR.LED turns on, the value will not be written to the module.

When the setting is outside the condition in (c), conversion is made but the resolution is within the maximum resolution range of the performance specifications.

3.2.2 Output characteristics of ST1DA1-I

A graph of the ST1DA1-I output characteristics is shown below.



Number	Analog Output Range Setting	Offset Value	Gain Value	Digital Input Value	Maximum Resolution
1)	0 to 20mA	0mA	20mA	0 to 4000	5μA
2)	4 to 20mA	4mA	20mA		4μA
—	User range setting	*1	*1		4μA

Fig. 3.2 Output characteristics of ST1DA1-I

POINT

(1) Within the digital input and analog output scopes of each output range, the maximum resolution and accuracy are within the performance specification range. Outside those scopes, however, they may not fall within the performance specification range. (Avoid using the dotted line part in Fig. 3.2.)

(2) Set the offset/gain values for the user setting range*1 within a range in which the following conditions are satisfied.

(a) Offset/gain value setting range: 0 to 20mA

(b) (Gain value) > (Offset value)

(c) { (Gain value) – (Offset value) } ≧ 16mA

If condition (b) is not satisfied, ERR.LED turns on, the value will not be written to the module.

When the setting is outside the condition in (c), conversion is made but the resolution is within the maximum resolution range of the performance specifications.

3.2.3 Relation between offset/gain setting and analog output value

The resolution of ST1DA can be set arbitrarily by modifying the setting of the offset value and gain value.
The following shows how to calculate the analog value resolution and the analog output value for a given digital input value when the settings of the offset value and gain value are changed.

(1) Resolution

Find the resolution with the following expression.

$$\text{(Analog resolution)} = \frac{\text{(Gain value) - (Offset value)}}{4000}$$

(2) Analog output value

Find the analog output value with the following expression.

(Analog output) = (Analog resolution) × (Digital input value) + (Offset value)

3.2.4 Accuracy

Accuracy is relative to the maximum value of the analog output value.
If you change the offset/gain setting or output range to change the output characteristic, accuracy does not change and is held within the range indicated in the performance specifications.

(1) Accuracy of ST1DA2-V

The accuracy of the ST1DA2-V is relative to the maximum value (10V) of the analog output value.
Analog output is provided at the accuracy of within ±0.8% (±80mV).

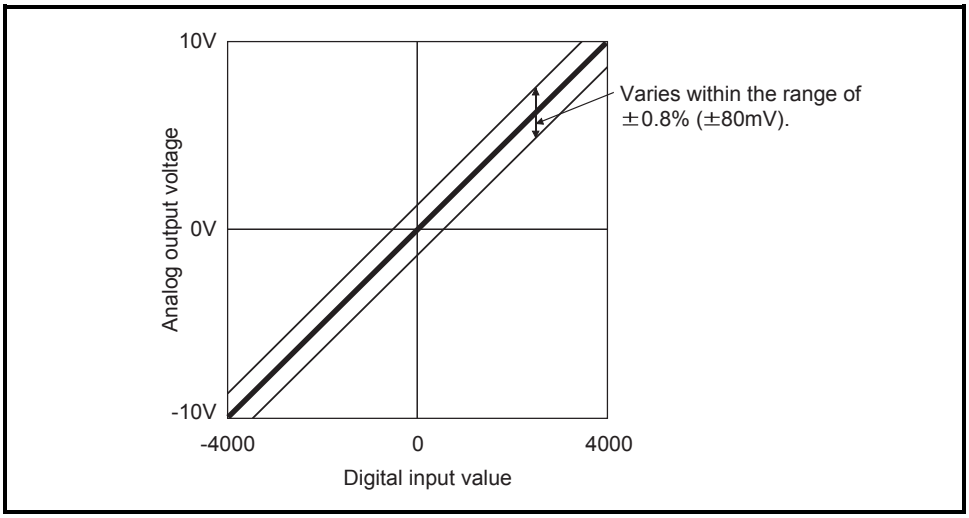


Fig. 3.3 Accuracy of ST1DA2-V

(2) Accuracy of ST1DA1-I

The accuracy of the ST1DA1-I is relative to the maximum value (20mA) of the analog output value.
Analog output is provided at the accuracy of within ±0.8% (±160μA).

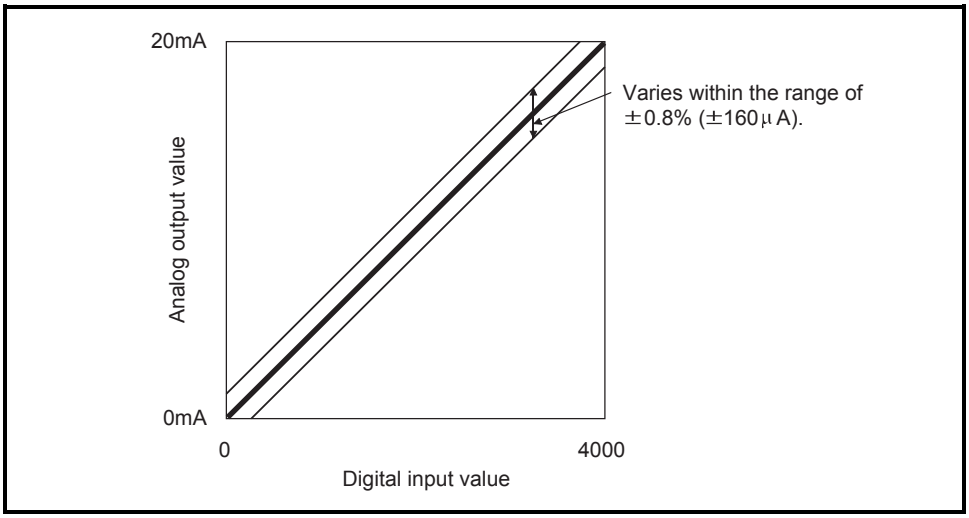


Fig. 3.4 Accuracy of ST1DA1-I

3.2.5 Conversion speed

The conversion speed of the ST1DA is 0.1ms × number of conversion enabled channels.

3.2.6 Intelligent function module processing time

The intelligent function module processing time of the ST1DA is 0.1ms × number of conversion enabled channels.
For the output transmission delay time, refer to the used head module user's manual.

3.3 Functions

This section explains the functions of the ST1DA.

3.3.1 Function list

Table 3.2 lists the functions of ST1DA.

Table 3.2 ST1DA Function List

<table>
<tr><th>Item</th><th>Function</th><th>Reference section</th></tr>
<tr><td>D/A conversion enable/disable function</td><td>(1) Specifies whether to enable or disable the D/A conversion for each channel.
(2) By disabling the D/A conversion for the unused channels, the conversion speed can be shortened.
(3) The default value differs depending on the model.
• ST1DA2-V, ST1DA1-I: D/A conversion disabled for all channels
• ST1DA2-V-F01, ST1DA1-I-F01: D/A conversion enabled for all channels
[Setting method]
• GX Configurator-ST (see Section 5.3.)
• D/A conversion enable/disable setting write (Command number: 2200H, see Section 8.4.1.)</td><td>—</td></tr>
<tr><td>D/A output enable/disable function</td><td>(1) Specifies whether to enable or disable D/A conversion value output for each channel.
(2) The conversion speed is constant regardless of whether D/A output is enabled or disabled.
(3) By default, the D/A output for all channels is disabled.
[Setting method]
• Master station program (Bw.n+3, Bw.n+2 output enable/disable flag)</td><td>—</td></tr>
<tr><td>Output range changing function</td><td>(1) The analog output range can be set for each to change the I/O conversion characteristics.
(2) The output range is selectable from the following.
<table>
<tr><th>Model</th><th>Output range</th></tr>
<tr><td rowspan="5">ST1DA2-V</td><td>-10 to 10V (default)</td></tr>
<tr><td>0 to 10V</td></tr>
<tr><td>0 to 5V</td></tr>
<tr><td>1 to 5V</td></tr>
<tr><td>User range setting</td></tr>
<tr><td rowspan="3">ST1DA1-I</td><td>4 to 20mA (default)</td></tr>
<tr><td>0 to 20 mA</td></tr>
<tr><td>User range setting</td></tr>
</table>
[Setting method]
• Master station configuration software
• GX Configurator-ST (see Section 5.3)</td><td>—</td></tr>
<tr><td>Clear/Hold/Preset functions</td><td>(1) The analog output provided at a communication error or module fault can be selected.
• Clear : Outputs an offset value.
• Hold : Holds the latest analog value output from each channel.
• Preset : Outputs the preset value.
(2) When Preset is selected, the preset value must be set.
(3) When Clear/Hold/Preset is specified, all channels are cleared by default.
(4) By default, the preset value is 4000.
[Clear/Hold/Preset setting method]
• Master station Configuration software
• GX Configurator-ST (see Section 5.3)
[Preset value setting method]
• GX Configurator-ST (see Section 5.3.)
• CH□ preset value write (Command number: 2201H, 2202H, see Section 8.4.2.)</td><td>Section 3.3.2</td></tr>
<tr><td>Command</td><td>(1) Using commands, command parameters can be set, and the parameter settings can be written from RAM to ROM and read from ROM to RAM.</td><td>Chapter 8</td></tr>
</table>

Item	Function	Reference section
Offset/gain settings	(1) Setting of any offset value/gain value optimizes the I/O conversion characteristic according to the system. [Setting method] • GX Configurator-ST * Master station program	Section 4.5 Section 5.6
Online module change	(1) A module change is made without the system being stopped. [Execution procedure] • Button operation of head module • GX Configurator-ST	Chapter 7

3.3.2 Combinations of various functions

By using D/A conversion enable/disable (command parameter), Bw.n+3, Bw.n+2 output enable/disable flag, and Clear/Hold/Preset setting (user parameter), analog output can be set as indicated in Table 3.3 and Table 3.4.
Make setting according to your system application.

Table 3.3 List of Analog Output Status Combinations in Normal Mode

Setting combination / Execution status						
	D/A conversion enable/disable	Enable				Disable
	Output enable/disable	Enable			Disable	Enable or disable
	Clear/Hold/Preset setting	Hold	Clear	Preset	Clear/Hold/Preset	Clear/Hold/Preset
When normal (other than the following execution statuses)		The analog value converted from the digital value set from the master station is output.			Offset value	0V/0mA
When the head module detects a communication error between the master station and head module		The analog value prior to a communication error is held.	Offset value	Preset value	Offset value	0V/0mA
When the other slice module does not respond	The operating status setting of the head module is stop setting	The analog value prior to a response stop is held.	Offset value	Preset value	Offset value	0V/0mA
	The operating status setting of the head module is continue setting	The analog value converted from the digital value set from the master station is output.			Offset value	0V/0mA
When an internal bus error occurs		The analog value prior to error occurrence is held.	Offset value	Preset value	Offset value	0V/0mA
When a digital value setting error occurs		Output of the maximum or minimum analog value.			Offset value	0V/0mA
When a watchdog timer error*1 occurs		0V/0mA				
Online module change enabled status		0V/0mA				

*1: This occurs when program operations are not completed within the predetermined time due to a hardware problem of the ST1DA.

Table 3.4 List of Analog Output Status Combinations in Offset/Gain Setting Mode

Setting combination / Execution status						
	D/A conversion enable/disable	Enable				Disable
	Output enable/disable	Enable			Disable	Enable or disable
	Clear/Hold/Preset setting	Hold	Clear	Preset	Clear/Hold/Preset	Clear/Hold/Preset
When normal (other than the following execution statuses)		The offset/gain setting is output.				
When the head module detects a communication error between the master station and head module		The offset/gain setting is output.				
When the other slice module does not respond	The operating status setting of the head module is stop setting	The offset/gain setting is output.				
	The operating status setting of the head module is continue setting	The offset/gain setting is output.				
When an internal bus error occurs		The offset/gain setting is output.				
When a watchdog timer error[*1] occurs		0V/0mA				

*1: This occurs when program operations are not completed within the predetermined time due to a hardware problem of the ST1DA.

3.4 I/O Data

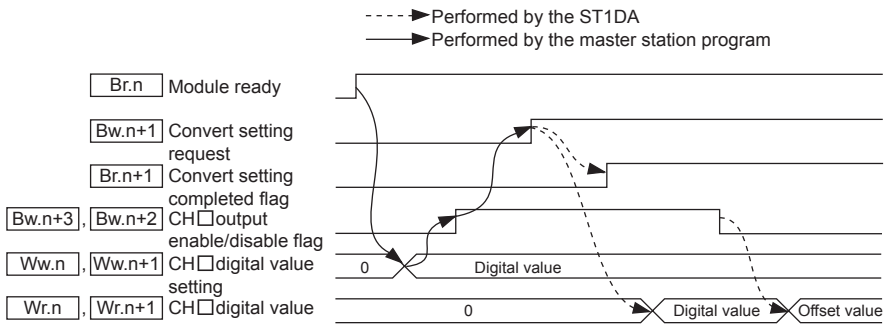
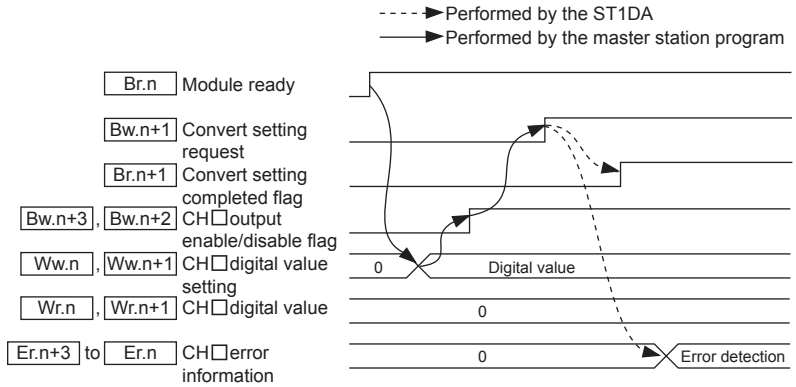
The ST1DA has the areas for data transfer with the head module as indicated in Table 3.5.
This section explains the composition of each area.

Table 3.5 I/O Data List

Transfer direction	Item		Number of Occupancy	Default value	Refer section
ST1DA → Head module (Input Data)	Br Bit Input Area		4	0	Section 3.4.1
	Information Area	Er Error Information Area	4	0	Section 3.4.2
		Mr Module Status Area	2	0	Section 3.4.3
	Wr Word Input Area		2	0	Section 3.4.4
Head module → ST1DA (Output Data)	Bw Bit Output Area		4	0	Section 3.4.5
	Request Area	Ew Error Clear Area	4	0	Section 3.4.6
	Ww Word Output Area		2	0	Section 3.4.7

3.4.1 Bit Input Area

This section explains the Br bit input area.

Bit input	Item	Description
Br.n	Module ready	(1) Turns on (1) as soon as D/A conversion is ready when the MELSEC-ST system (ST1DA) is powered on or the head module is reset. (2) When the Br.n Module ready signal is off (0), D/A conversion processing is not performed. Br.n Module ready turns off (0) in the following situations: • During offset/gain setting mode • When the ST1DA has a watchdog timer error • In module change enabled status during online module change (refer to Chapter 7)
Br.n+1	Convert setting completed flag	(1) After Bw.n+1 convert setting request has turned on (1), this turns on (1) when user parameter and command parameter setting check is completed. (Turns on (1) if a setting error is detected.) [When parameter setting check result is normal]  [When parameter setting check result is abnormal] 
Br.n+2 Br.n+3	System area	Use prohibited (fixed to 0)

3.4.2 Error information area

This section explains the Er error information area.

<table>
<tr><th colspan="2">Error information bit</th><th>Item</th><th>Description</th></tr>
<tr><td>Er.n+1</td><td>Er.n</td><td>CH1 error information</td><td rowspan="2">(1) At error occurrence, the error information is stored.
(2) The stored error information can be cleared by turning on (1) the Ew.n error clear request. (Refer to Section 3.4.6)
(3) In the case of the ST1DA1-I, Er.n+3 and Er.n+2 are fixed to "00". *1
*1: "11" is stored when a watchdog timer error occurs.
<table>
<tr><th>Er.n+1
Er.n+3</th><th>Er.n
Er.n+2</th><th>Information</th></tr>
<tr><td>0</td><td>0</td><td>Normally operating</td></tr>
<tr><td>1</td><td>0</td><td>Warning occurrence</td></tr>
<tr><td>1</td><td>1</td><td>System error occurrence</td></tr>
</table>
</td></tr>
<tr><td>Er.n+3</td><td>Er.n+2</td><td>CH2 error information</td></tr>
</table>

3.4.3 Module status area

This section explains the Mr module status area.

<table>
<tr><th colspan="2">Module status</th><th>Item</th><th>Description</th></tr>
<tr><td>Mr.n+1</td><td>Mr.n</td><td>Module status</td><td>(1) The operating status of the ST1DA is stored.
<table>
<tr><th>Mr.n+1</th><th>Mr.n</th><th>Information</th></tr>
<tr><td>0</td><td>0</td><td>Online module change in progress or internal bus error occurred</td></tr>
<tr><td>1</td><td>1</td><td>Normally operating</td></tr>
</table>
</td></tr>
</table>

3.4.4 Word input area

This section explains the Wr word input area.
The ST1DA can operate even if the Wr word input area area is not reserved.
For effective use of the Wr word input area, select one of the following in configuration software on the master station or in GX Configurator-ST.
• "ST1DA2-V (without Wr)" or
• "ST1DA2-V-F01 (without Wr)"
• "ST1DA1-I (without Wr)"
• "ST1DA1-I-F01 (without Wr)"
The number of occupancy of the Wr word input area in the ST1DA is 0.

Word input	Item	Description
Wr.n	CH1 digital value	(1) D/A conversion is performed, and the digital value output in analog form is stored for each channel. (2) The digital value is stored in 16-bit, signed binary form. (3) In the case of the ST1DA1-I, Wr.n+1 is fixed to 0.
Wr.n+1	CH2 digital value	

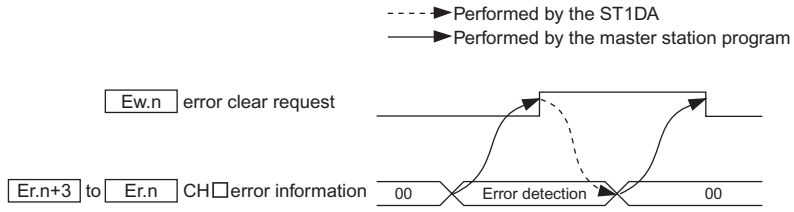
3.4.5 Bit output area

This section explains the Bw bit output area.

Bit output	Item	Description
Bw.n	System area	Use prohibited (fixed to 0)
Bw.n+1	Convert setting request	(1) This turns from off (0) to on (1) to validate the settings of the user parameters and command parameters. (a) When writing the command parameters, make sure to turn the Bw.n+1 convert setting request off (0) to stop the conversion. When it is on (1), the command parameters cannot be written. (b) Regardless of whether the Bw.n+1 convert setting request is on or off, the user parameters are written but not validated. (Turn the Bw.n+1 convert setting request from off (0) to on (1).) (2) This turns on (1) to start D/A conversion of the channel set for conversion enable in the D/A conversion enable/disable setting (command parameter). (3) For the on (1)/off (0) timing, refer to the Br.n+1 column in Section 3.4.1. OFF (0): Conversion stop (Default) ON (1): Conversion start
Bw.n+2	CH1 output enable/disable flag	(1) Set whether D/A conversion value output will be enabled or disabled for each channel. (2) The conversion speed is constant regardless of the output enable/disable setting. (3) In the case of the ST1DA1-I, Bw.n+3 is fixed to off (0). Any other set value is invalid. (4) For the on (1)/off (0) timing, refer to the Br.n+1 column in Section 3.4.1. OFF (0): Output disable (Default) ON (1): Output enable
Bw.n+3	CH2 output enable/disable flag	

3.4.6 Error clear area

This section explains the Ew error clear area.

Error clear area	Item	Description
Ew.n	Error clear request	(1) Turn on (1) to clear the Er.n+3 to Er.n CH☐ error information. (2) After confirming that the Er.n+3 to Er.n CH☐ error information has been cleared, turn off (0) the Ew.n error clear request. OFF (0): No error clear requested (Default) ON (1): Error clear requested 
Ew.n+1 Ew.n+2 Ew.n+3	System area	Use prohibited (fixed to 0)

3.4.7 Word output area

This section explains the Ww word output area.

Word output	Item	Description
Ww.n	CH1 digital value setting	(1) In this area, digital values to be converted into analog values are written from the master station. (2) When Mr.n+1, Mr.n module status becomes "11 (normal)" after power-on, the digital values of all channels become 0. (3) The digital value that may be set is a 16-bit signed binary within the setting range which matches the output range setting. If the digital value outside the setting range is set, the data indicated in the following table is used to perform D/A conversion.
Ww.n+1	CH2 digital value setting	(4) In the case of the ST1DA1-I, setting to Ww.n+1 is invalid.

Output range	Available setting range	Digital value that is set when a value outside the valid range is written
-10 to 10V User range setting (ST1DA2-V)	-4096 to 4095 (Practical scope: -4000 to 4000)	4096 or more: 4095 -4097 or less: -4096
0 to 10V 0 to 5V 0 to 20mA 4 to 20mA User range setting (ST1DA1-I)	0 to 4095 (Practical scope: 0 to 4000)	4096 or more: 4095 -1 or less: 0

3.5 Memory and Parameters

This section explains the memory and parameters of the ST1DA.

3.5.1 Memory

RAM and ROM are available as the parameter storage memory of the ST1DA.

(1) RAM

(a) The ST1DA operates based on the parameter settings stored in the RAM.

(b) The parameter settings stored in the RAM become valid when the Bw.n+1 convert setting request turns from OFF to ON.

(2) ROM

(a) The ROM stores the parameters.
The stored parameters are not erased at power-off.

(b) The parameters stored in the ROM are transferred to the RAM when:
- The MELSEC-ST system (ST1DA) is powered off, then on;
- The head module is reset;
- Parameter setting ROM read (command number: 3200H) is executed.

3.5.2 Parameters

The ST1DA has user parameters and command parameters.

(1) User parameters

(a) Setting item

- Output range setting
- Clear/Hold/Preset setting

(b) Setting method

Set the parameters using the configuration software of the master station. When the MELSEC-ST system is tested alone, set the parameters using GX Configurator-ST.

(2) Command parameters

(a) Setting item

- D/A conversion enable/disable setting
- Preset value setting

(b) Setting method

1) GX Configurator-ST

Use of GX Configurator-ST allows the parameters to be easily set on-screen, reducing master station programs.
If these parameters should be used every time when the MELSEC-ST system starts up, these parameters must be written to the ROM.
(Writing the parameters to the RAM is used only for temporary testing.)

2) Command

Execute a command from the master station to write the settings to the RAM of the ST1DA.
Writing ommand parameters in advance using the Parameter setting ROM write command (command number: 3201H) can reduce master station programs.

4 SETUP AND PROCEDURES BEFORE OPERATION

4.1 Handling Precautions

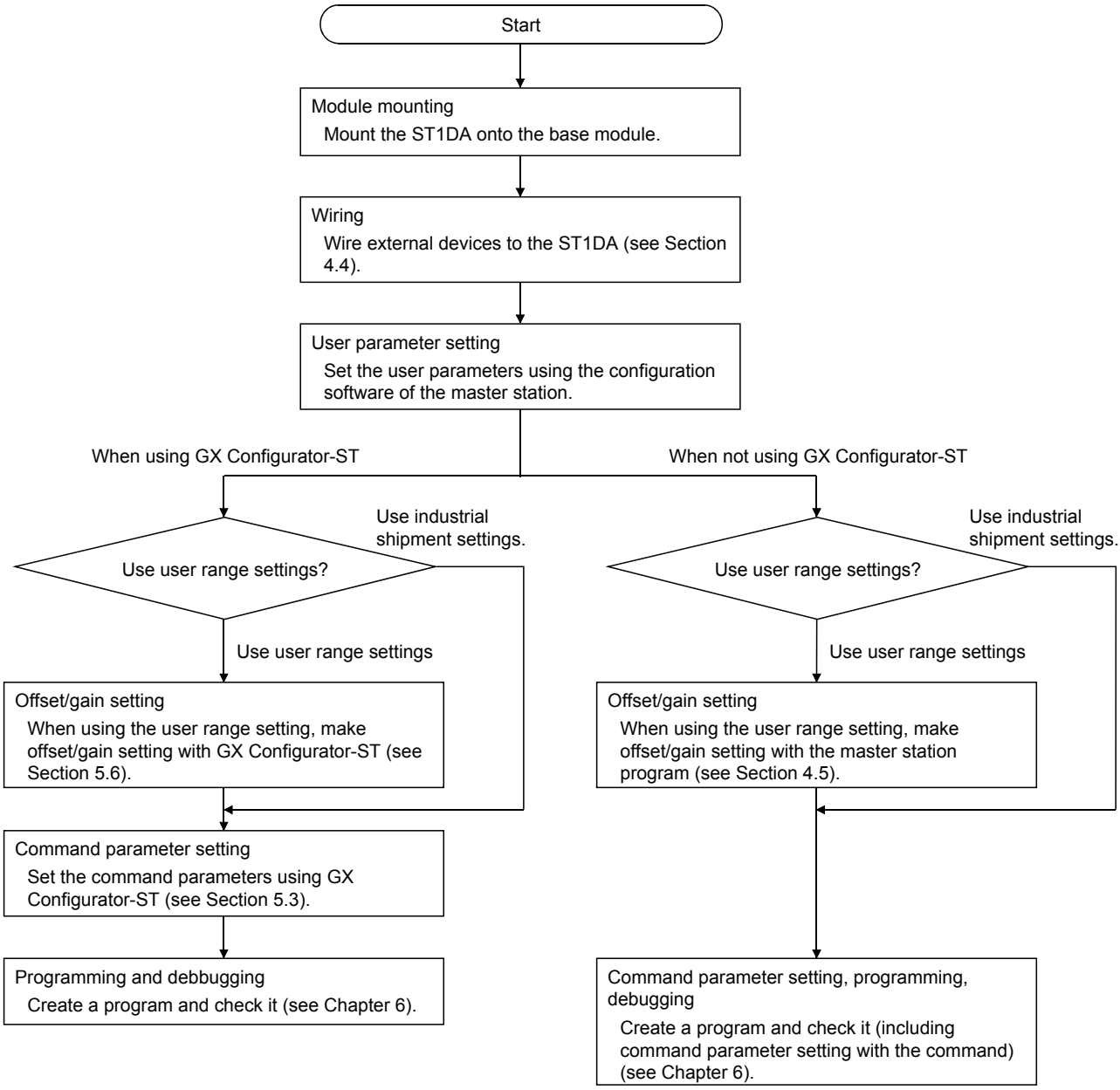
(1) Do not drop the module or give it hard impact since its case is made of resin.
Doing so can damage the module.

(2) Do not disassemble or modify the modules.
Doing so could cause failure, malfunction injury or fire.

(3) Be careful not to let foreign particles such as swarf or wire chips enter the module.
They may cause a fire, mechanical failure or malfunction.

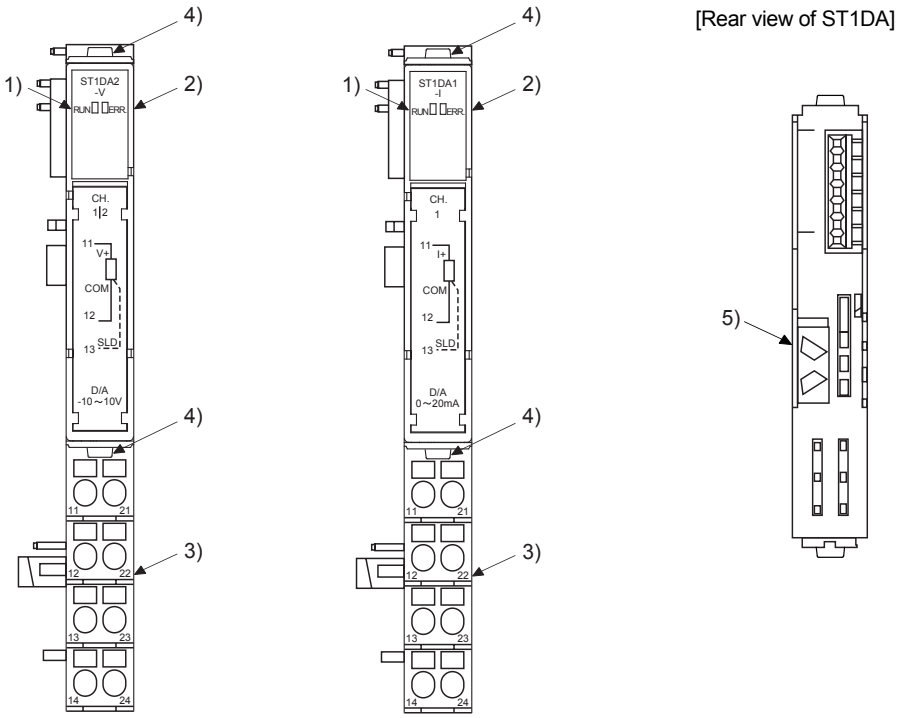
4 - 1

4.2 Setup and Procedure before Operation



4.3 Part Names

The name of each part in the ST1DA is listed below.
The following shows the ST1DA mounted on the spring clamp type base module.
Appearances of the ST1DA2-V-F01 and ST1DA1-I-F01 are the same as below, except for the model name parts.



No.	Name and appearance	Description
1)	RUN LED	RUN LED and ERR. LED (on/flashing/off) indicate various states of the ST1DA (see section 4.3.1).
2)	ERR. LED	
3)	Terminal block	The output signals of the ST1DA are wired to the terminal block of the base module. [Applicable base modules] Spring Clamp Type : ST1B-S4IR2 Screw Clamp Type : ST1B-E4IR2
4)	Slice module fixing hooks (at both ends)	Used for mounting/dismounting the ST1DA to/from the base module. While the hooks at both ends are pressed, mount/dismount the ST1DA.
5)	Coding element	Prevents the module from being mounted incorrectly. The coding element consists of two pieces, and its shape changes depending on the model name. When the ST1DA is mounted on the base module and then dismounted, one piece of the coding element remains on the base module, and the other remains on the ST1DA. The ST1DA can be mounted onto the base module that matches the ST1DA coding element. [Applicable coding element] ST1DA2-V, ST1DA2-V-F01: ST1A-CKY-11 ST1DA1-I, ST1DA1-I-F01: ST1A- CKY-12

POINT

In order to ensure safety, make sure to attach the coding element to the base module and ST1DA.

Terminal No.	Signal name			
	ST1DA2-V		ST1DA1-I	
11	CH1	V +	CH1	I +
12		COM		COM
13		SLD		SLD
14		Vacancy		Vacancy
21	CH2	V +	Vacancy	
22		COM	Vacancy	
23		SLD	Vacancy	
24		Vacancy	Vacancy	

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4.3.1 Status confirmation by LED

Table 4.1 explains the LED indications.

Table 4.1 LED Indications

LED indication		Operating status
RUN LED	ERR.LED	
On	Off	Module is operating normally
	Flashing (0.5s interval)	Warning is occurring
	On	System error is occurring
Flashing (1s interval)	Off	The data communication has stopped and the parameter communication is faulty between the master module and head module, other slice module is faulty and an internal bus error is occurring
	Flashing (0.5s interval)	Warning is occurring when the data communication has stopped and the parameter communication is faulty between the master module and head module, other slice module is faulty and an internal bus error has occurred.
	On	System error is occurring when the data communication has stopped and the parameter communication is faulty between the master module and head module, other slice module is faulty and an internal bus error has occurred.
Flashing (0.5s interval)	Off	Module is in offset/gain setting mode
	Flashing (0.5s interval)	Warning is occurring in offset/gain setting mode
	On	System error is occurring in offset/gain setting mode
Flashing (0.25s interval)	Off	Module is selected as the target of online module change
	Flashing (0.5s interval)	Warning is occurring when module is selected as the target of online module change
	On	System error is occurring when module is selected as the target of online module change
Off	Off	Power is off or online module change is being made
	Flashing (0.5s interval)	Warning is occurring during online module change
	On	System error is occurring during online module change

4.4 Wiring

The wiring precautions and examples of module connection are provided below.

4.4.1 Wiring precautions

In order to optimize the functions of the ST1DA and ensure system reliability, external wiring, that is protected from noise, is required.
Please observe the following precautions for external wiring:

(1) Use separate cables for the AC control circuit and the external input signals of the ST1DA to avoid the influence of the AC side surges and inductions.

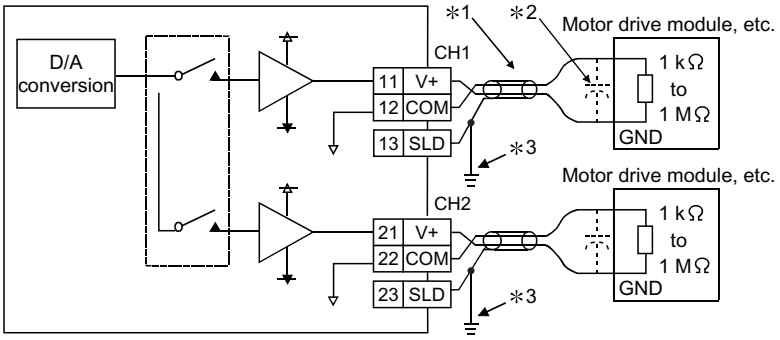
(2) Do not bring/install the cables closer to/together with the main circuit line, a high-voltage cable or a load cable from other than the MELSEC-ST system. This may increase the effects of noise, surges and induction.

(3) Though it is not required to ground the SLD terminal, grounding it may provide higher accuracy depending on noise conditions.

4.4.2 External wiring

Wire the cables to the base module (option).

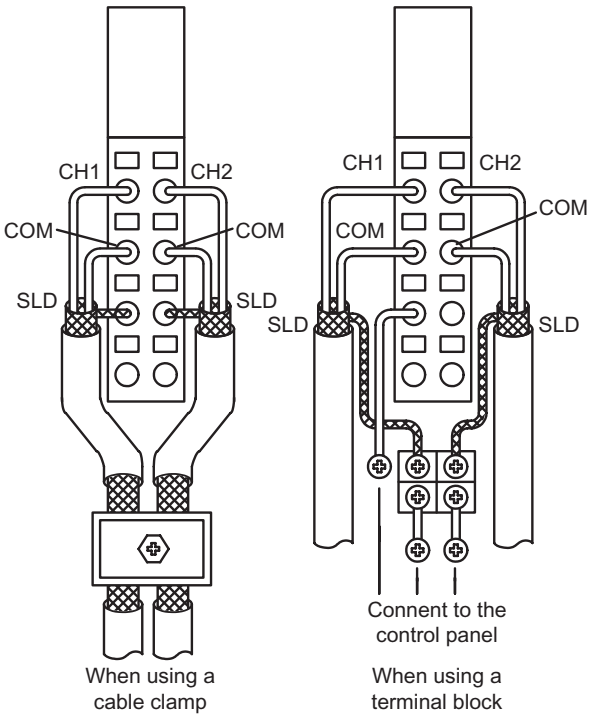
(1) For ST1DA2-V



*1 Use a twisted two core shielded wire for the power wire.

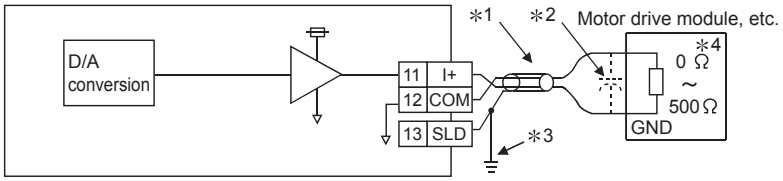
*2 When using an external device with high frequency response, connect a 0.01 to 0.47 μ F 25V capacitor between its terminals.

*3 Though it is not required to ground the SLD terminal, grounding it may provide higher accuracy depending on noise conditions.
Make sure to use a cable clamp or terminal block to ground the SLD terminal.
The SLD terminal is not grounded to the FG of power distribution module inside the module.



4 - 6

(2) For ST1DA1-I

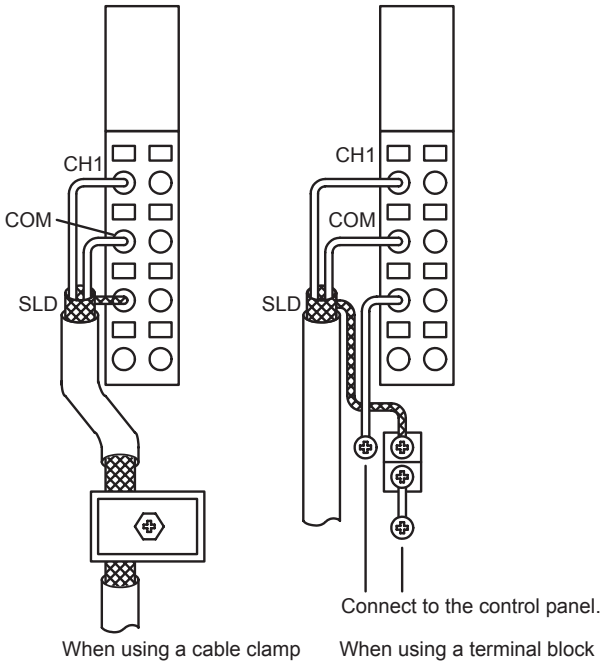


*1 Use a twisted two core shielded wire for the power wire.

*2 When using an external device with high frequency response, connect a 0.01 to 0.47 μ F 25V capacitor between its terminals.

*3 Though it is not required to ground the SLD terminal, grounding it may provide higher accuracy depending on noise conditions.
Make sure to use a cable clamp or terminal block to ground the SLD terminal.
The SLD terminal is not grounded to the FG of power distribution module inside the module.

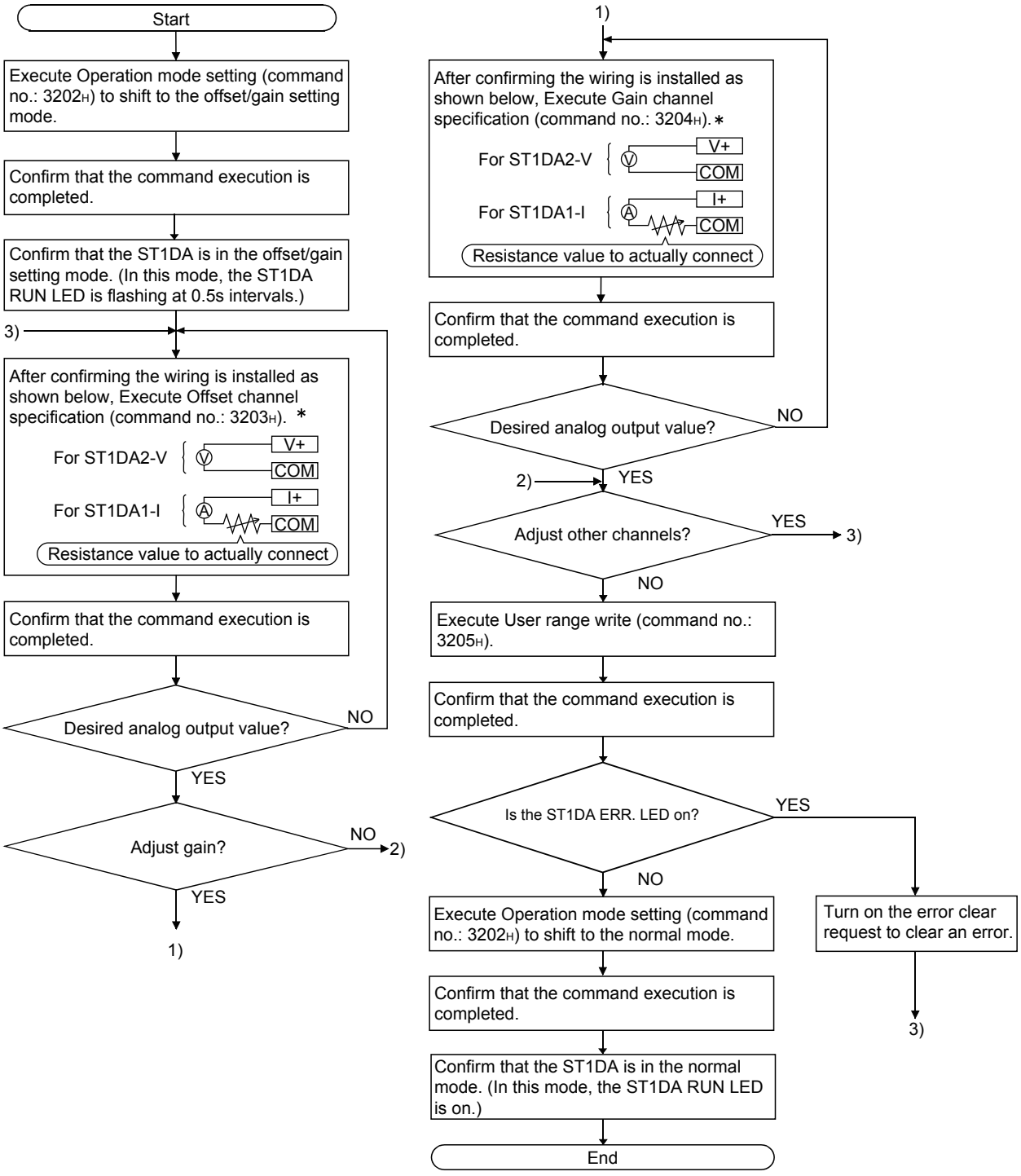
*4 If the hardware version of the ST1DA1-I is "C" or earlier, this range is 100 Ω to 500 Ω.



4.5 Offset/Gain Settings

When the user range setting is used, perform the offset and gain settings according to the following procedure.
When the industrial shipment setting is used, offset/gain setting is not necessary.
If the GX Configurator-ST is installed, perform the offset/gain settings according to the procedure described in Section 5.6.

(1) Offset/gain setting procedure



*: When the command is executed, the analog output value is adjusted according to the argument 1/argument 2 setting.

POINT

(1) Make the offset/gain setting in the ranges that satisfy the conditions indicated in POINT (2) of Section 3.2.1 or POINT (2) of Section 3.2.2.
When the setting exceeds this range, the maximum resolution or total accuracy may not be within the range indicated in the performance specification.

(2) Set the offset value and gain value in the status of actual use.
After the setting is completed, make sure that the offset value and gain value are set correctly in the status of actual use.

(3) The offset and gain values are stored into the ROM and are not erased at power-off.

(4) When making the offset/gain setting, write the values to the ROM using User range write (command number: 3205H).
Data can be written to the ROM up to 10,000 times.
To prevent accidental write to the ROM, write to ROM is counted, starting at power-on.

(5) If an error occurs during offset/gain setting, the offset and gain values are not written to the ST1DA.
Set the correct offset and gain values again.

(2) Programming

The program example given here switches the modes (from normal mode to offset/gain setting mode, from offset/gain setting mode to normal mode), specifies the channel on which offset/gain setting will be made, adjusts the offset/gain values, and writes the offset/gain values to the ST1DA.

(a) When QJ71PB92D is used as master station

The following program example is based on the system configuration given in Section 6.2.

1) Device assignment to program examples

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		

Devices used by user

Device	Application	Device	Application
X20	PROFIBUS-DP exchange start command	M0	Refresh start request
X25	Offset/gain setting mode select signal		
X26	Offset channel specification signal		
X27	Gain channel specification signal		—
X28	User range write signal		
X29	Normal mode select signal		

Devices used in I/O data

Br Bit input area

Br.n Bit input	Information	Master station side device	Slice No.	Module name
Br.00	Module READY	D1000.0	0	ST1H-PB
Br.01	Forced output test mode	D1000.1		
Br.02	Module being changed online	D1000.2	1	
Br.03	Command execution	D1000.3		
Br.04	External power supply status	D1000.4	2	ST1PSD
Br.05		D1000.5		
Br.06	Module ready	D1000.6	3	ST1DA2-V
Br.07	Convert setting completed flag	D1000.7		
Br.08	System area (0 fixed)	D1000.8	4	
Br.09	System area (0 fixed)	D1000.9		
Br.0A	—	D1000.A	—	—
to				
Br.1F	—	D1001.F	—	—

Er Error information area

Er.n Error information	Information	Master station side device	Slice No.	Module name
Er.00	Head module error information	D1002.0	0	ST1H-PB
Er.01		D1002.1		
Er.02		D1002.2	1	
Er.03		D1002.3		
Er.04	Bus refreshing module error information	D1002.4	2	ST1PSD
Er.05		D1002.5		
Er.06	CH1 error information	D1002.6	3	ST1DA2-V
Er.07		D1002.7		
Er.08	CH2 error information	D1002.8	4	
Er.09		D1002.9		
Er.0A	_	D1002.A	_	_
to				
Er.1F	_	D1003.F	_	_

Mr Module status area

Mr.n Module status	Information	Master station side device	Slice No.	Module name
Mr. 0	Head module existence information	D1004.0	0	ST1H-PB
Mr. 1		D1004.1	1	
Mr.2	Bus refreshing module existence information	D1004.2	2	ST1PSD
Mr.3	Module status	D1004.3	3	ST1DA2-V
Mr.4		D1004.4	4	
Mr.5	_	D1004.5	_	_
to				
Mr.15	_	D1004.F	_	_

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	D1005	_	_
Cr.1	Executed Command No.	D1006		
Cr.2	Response Data 1	D1007		
Cr.3	Response Data 2	D1008		

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Bw Bit output area

Bw.n Bit output	Information	Master station side device	Slice No.	Module name
Bw.00	System area (0 fixed)	D2000.0	0	ST1H-PB
Bw.01	System area (0 fixed)	D2000.1		
Bw.02	System area (0 fixed)	D2000.2	1	
Bw.03	Command request	D2000.3		
Bw.04	System area (0 fixed)	D2000.4	2	ST1PSD
Bw.05	System area (0 fixed)	D2000.5		
Bw.06	System area (0 fixed)	D2000.6	3	ST1DA2-V
Bw.07	Convert setting request	D2000.7		
Bw.08	CH1 output enable/disable flag	D2000.8	4	
Bw.09	CH2 output enable/disable flag	D2000.9		
Bw.0A	_	D2000.A	_	_
to				
Bw.1F	_	D2001.F	_	_

Ew Error clear area

Ew.n Error clear	Information	Master station side device	Slice No.	Module name
Ew.00	Error clear request	D2002.0	0	ST1H-PB
Ew.01	System area (0 fixed)	D2002.1		
Ew.02	System area (0 fixed)	D2002.2	1	
Ew.03	System area (0 fixed)	D2002.3		
Ew.04	Error clear request	D2002.4	2	ST1PSD
Ew.05	System area (0 fixed)	D2002.5		
Ew.06	Error clear request	D2002.6	3	ST1DA2-V
Ew.07	System area (0 fixed)	D2002.7		
Ew.08	System area (0 fixed)	D2002.8	4	
Ew.09	System area (0 fixed)	D2002.9		
Ew.0A	_	D2002.A	_	_
to				
Ew.1F	_	D2003.F	_	_

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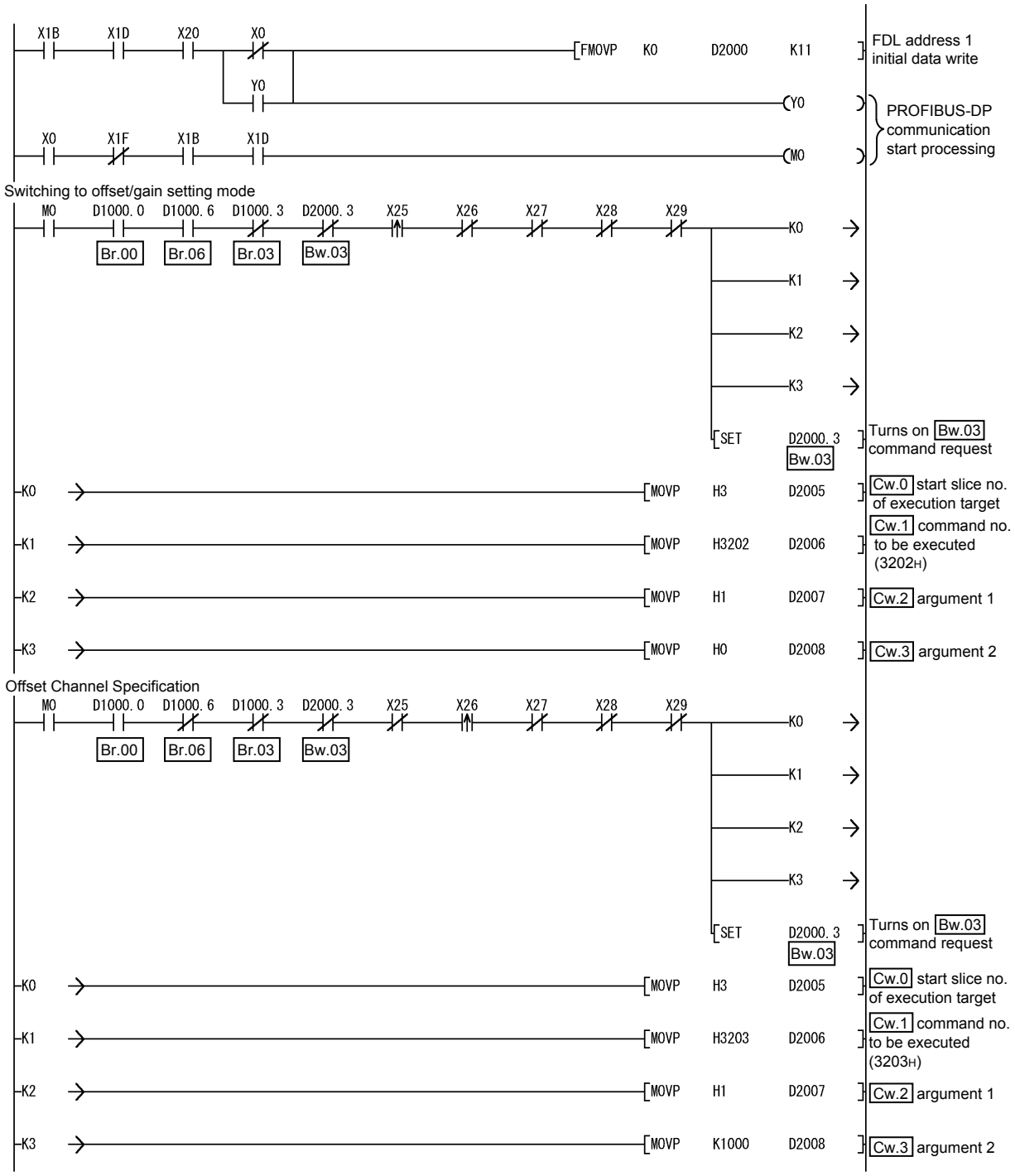
Sw System area

Sw System area	Information	Master station side device	Slice No.	Module name
Sw.0	System area (0 fixed)	D2004	—	—

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	D2005	—	—
Cw.1	Command No. to be Executed	D2006		
Cw.2	Argument 1	D2007		
Cw.3	Argument 2	D2008		

2) Programming example



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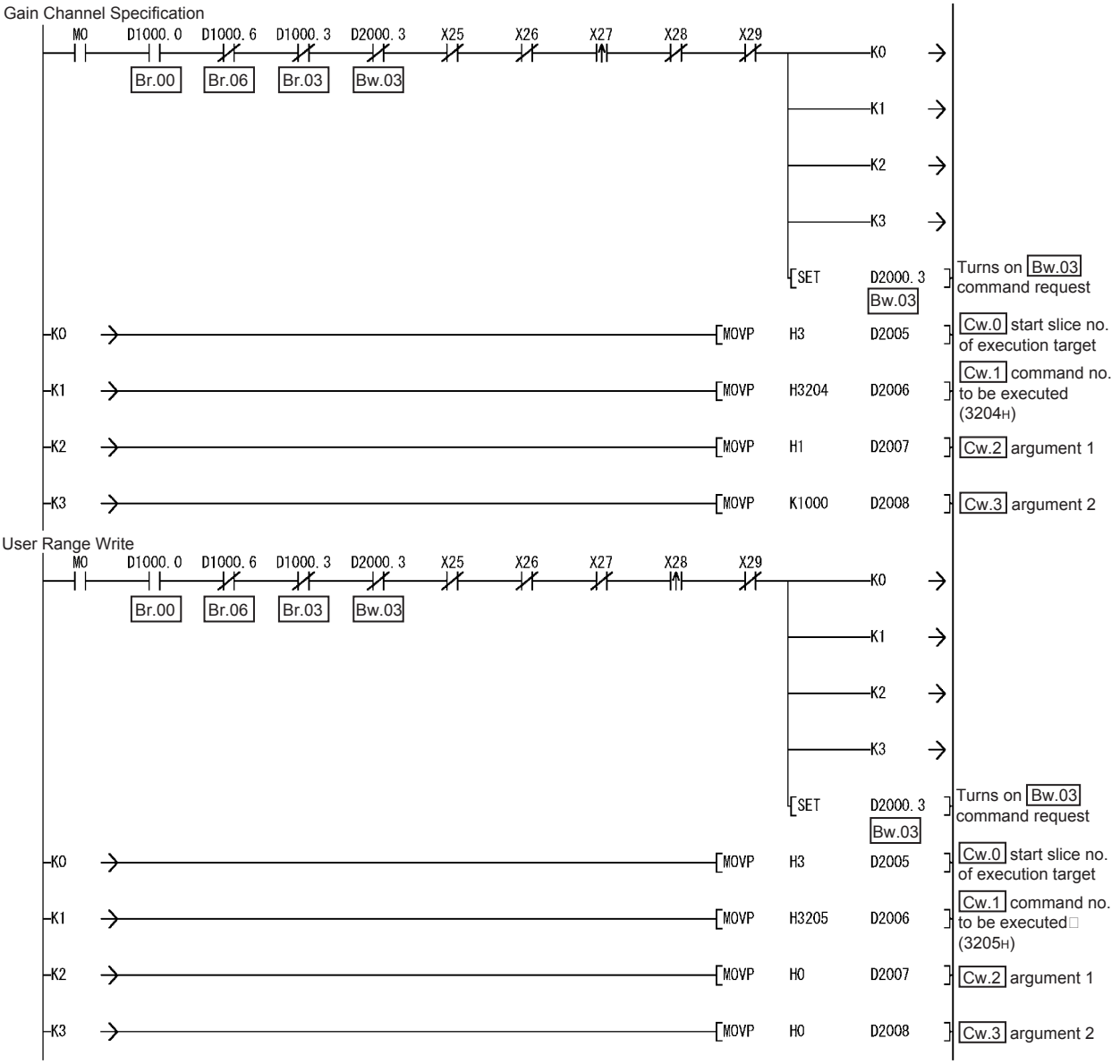
Gain Channel Specification



User Range Write

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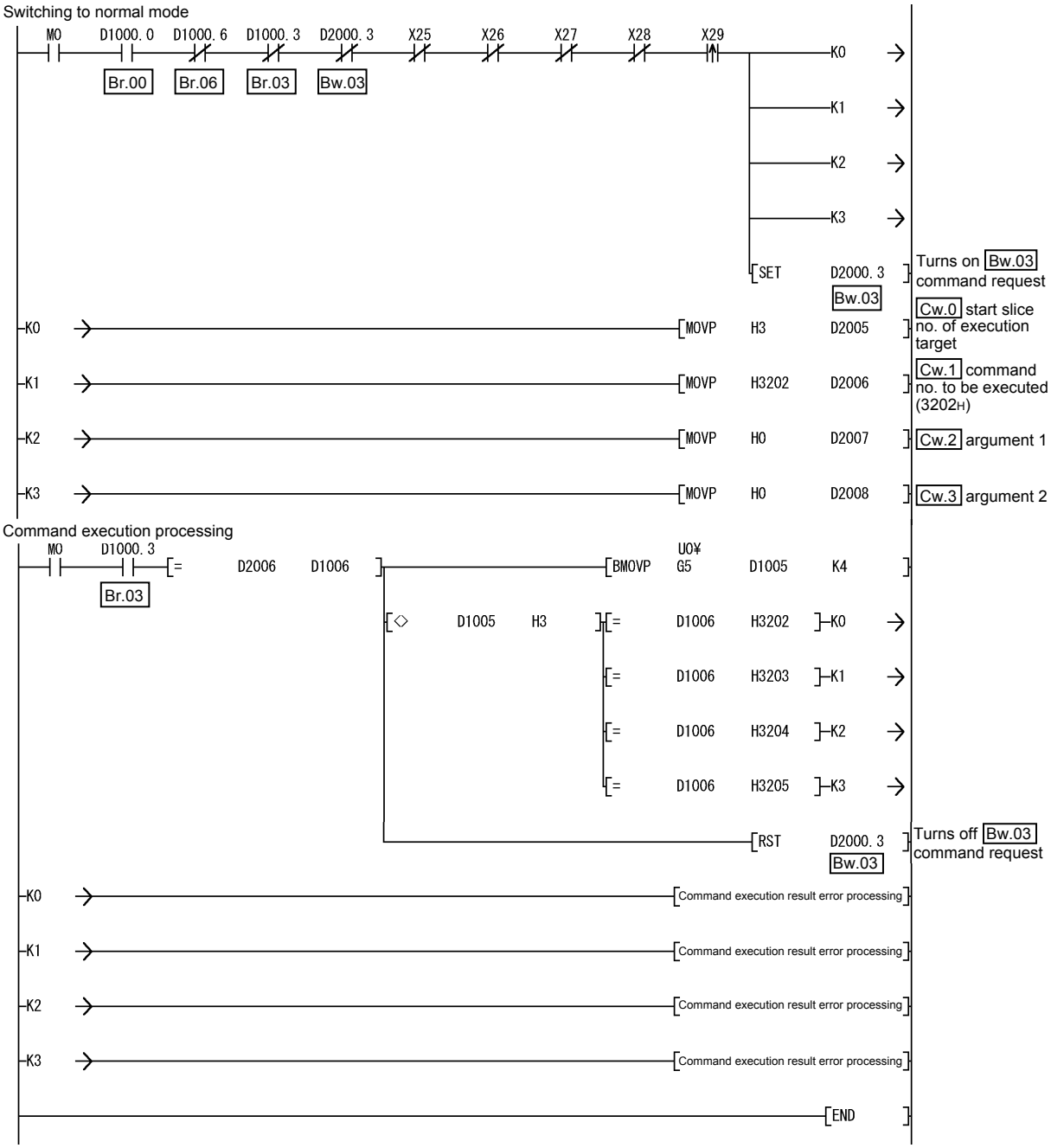
Switching to normal mode
M0
D1000.0
D1000.6
D1000.3
D2000.3
X25
X26
X27
X28
X29
Br.00
Br.06
Br.03
Bw.03
K0
K1
K2
K3
SET D2000.3
Bw.03
Turns on Bw.03 command request
K0 MOVP H3 D2005
Cw.0 start slice no. of execution target
K1 MOVP H3202 D2006
Cw.1 command no. to be executed (3202H)
K2 MOVP H0 D2007
Cw.2 argument 1
K3 MOVP H0 D2008
Cw.3 argument 2
Command execution processing
M0
D1000.3
Br.03
= D2006 D1006
BMOVP U0¥G5 D1005 K4
<> D1005 H3
= D1006 H3202 K0
= D1006 H3203 K1
= D1006 H3204 K2
= D1006 H3205 K3
RST D2000.3
Bw.03
Turns off Bw.03 command request
K0 Command execution result error processing
K1 Command execution result error processing
K2 Command execution result error processing
K3 Command execution result error processing
END

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(b) When AJ71PB92D/A1SJ71PB92D is used as master station

The following program example is based on the system configuration given in Section 6.3.

1) Device assignment to program examples

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		

Devices used by user

Device	Application	Device	Application
X20	PROFIBUS-DP exchange start command	M0	Refresh start request
X25	Offset/gain setting mode select signal	M225	Conversion of offset/gain setting mode select signal into pulse
X26	Offset channel specification signal	M226	Conversion of offset channel specification signal into pulse
X27	Gain channel specification signal	M227	Conversion of gain channel specification signal into pulse
X28	User range write signal	M228	Conversion of user range write signal into pulse
X29	Normal mode select signal	M229	Conversion of normal mode select signal into pulse

Devices used in I/O data

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	Module ready	B6	3	ST1DA2-V
Br.07	Convert setting completed flag	B7		
Br.08	System area (0 fixed)	B8	4	
Br.09	System area (0 fixed)	B9		
Br.0A	—	BA	—	—
to				
Br.1F	—	B1F	—	—

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	CH1 error information	B26	3	ST1DA2-V
Er.07		B27		
Er.08	CH2 error information	B28	4	
Er.09		B29		
Er.0A	_	B2A	_	_
to				
Er.1F	_	B3F	_	_

Mr Module status area

Mr.n Module status	Information	Master station side device	Slice No.	Module name
Mr. 0	Head module existence information	B40	0	ST1H-PB
Mr. 1		B41	1	
Mr.2	Bus refreshing module existence information	B42	2	ST1PSD
Mr.3	Module status	B43	3	ST1DA2-V
Mr.4		B44	4	
Mr.5	_	B45	_	_
to				
Mr.15	_	B5F	_	_

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		

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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	ST1DA2-V
Bw.07	Convert setting request	B1007		
Bw.08	CH1 output enable/disable flag	B1008	4	
Bw.09	CH2 output enable/disable flag	B1009		
Bw.0A	_	B100A	_	_
to				
Bw.1F	_	B101F	_	_

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	ST1DA2-V
Ew.07	System area (0 fixed)	B1027		
Ew.08	System area (0 fixed)	B1028	4	
Ew.09	System area (0 fixed)	B1029		
Ew.0A	_	B102A	_	_
to				
Ew.1F	_	B103F	_	_

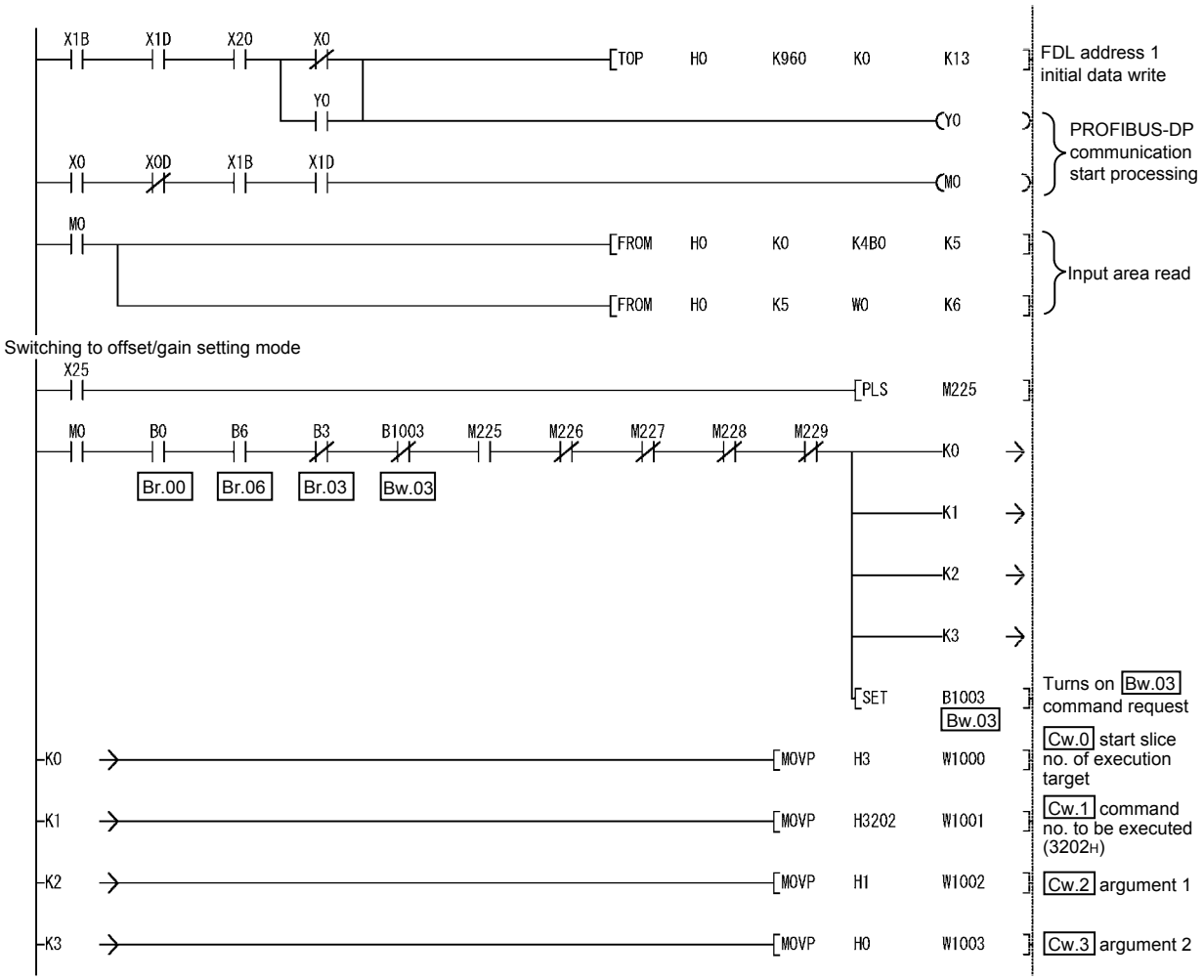
Sw System area

Sw System area	Information	Master station side device	Slice No.	Module name
Sw.0	System area (0 fixed)	B1040 to B104F	—	—

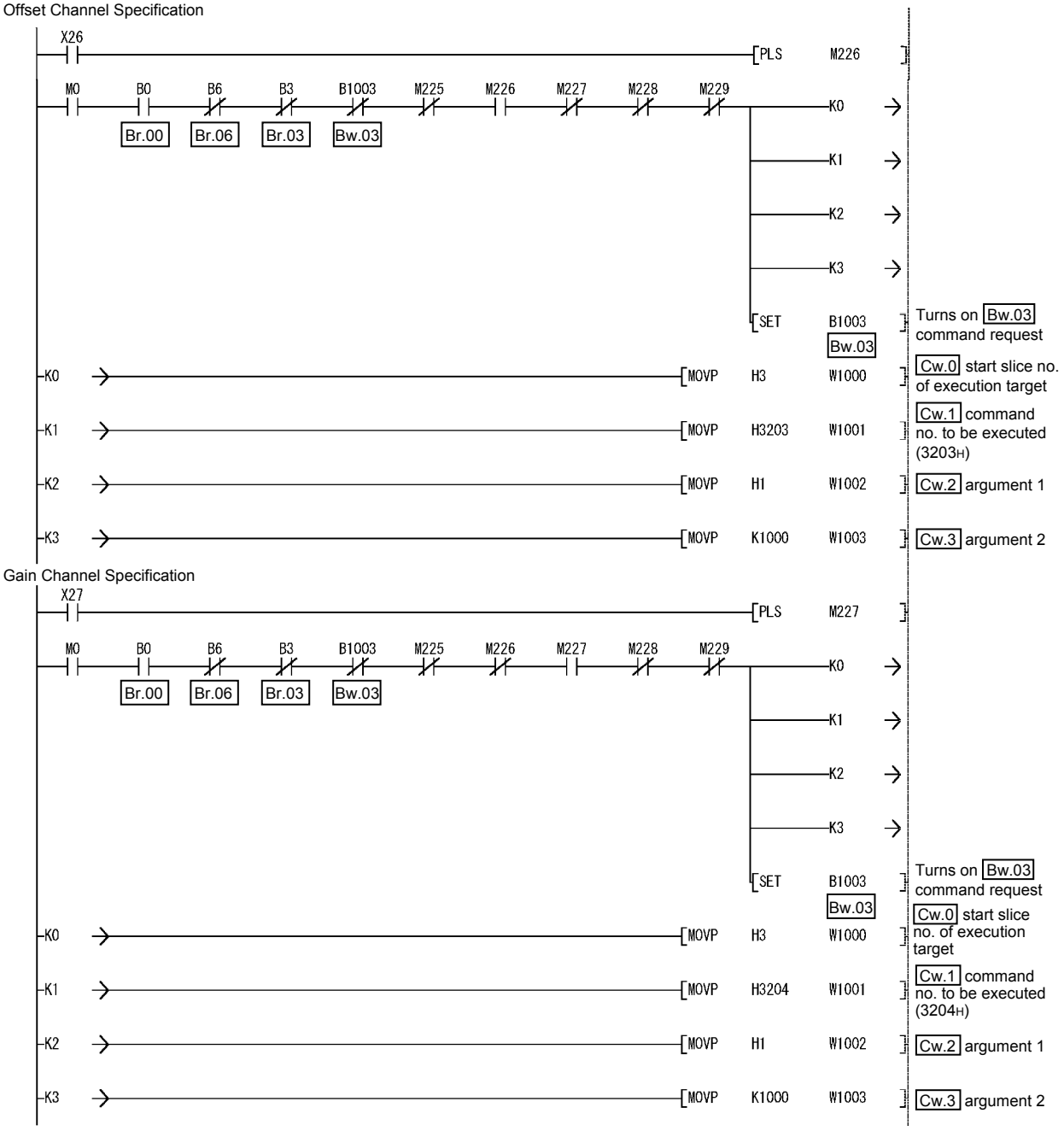
Cw Command execution area

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		

2) Programming example



Offset Channel Specification



Gain Channel Specification

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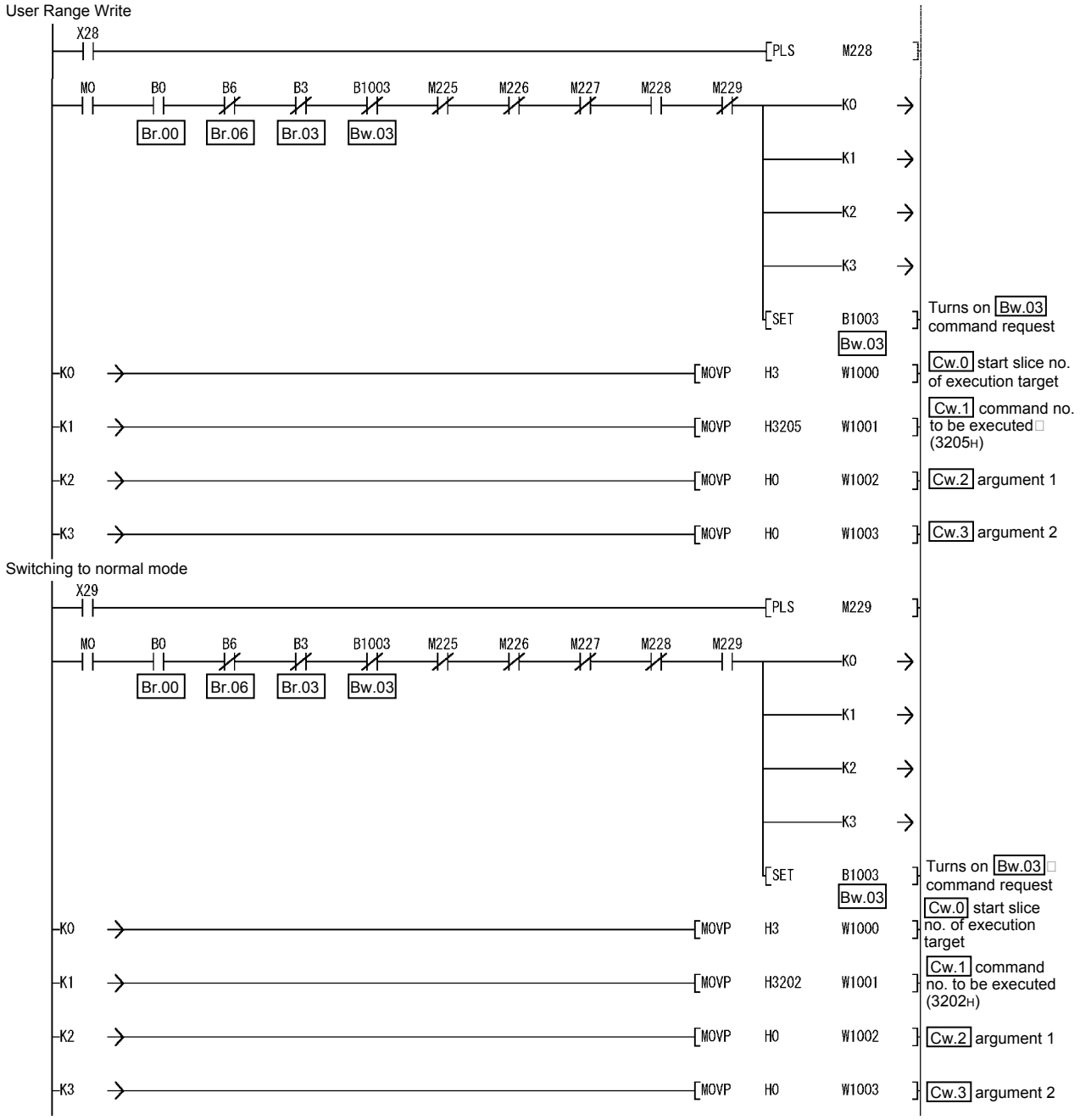
User Range Write



Switching to normal mode

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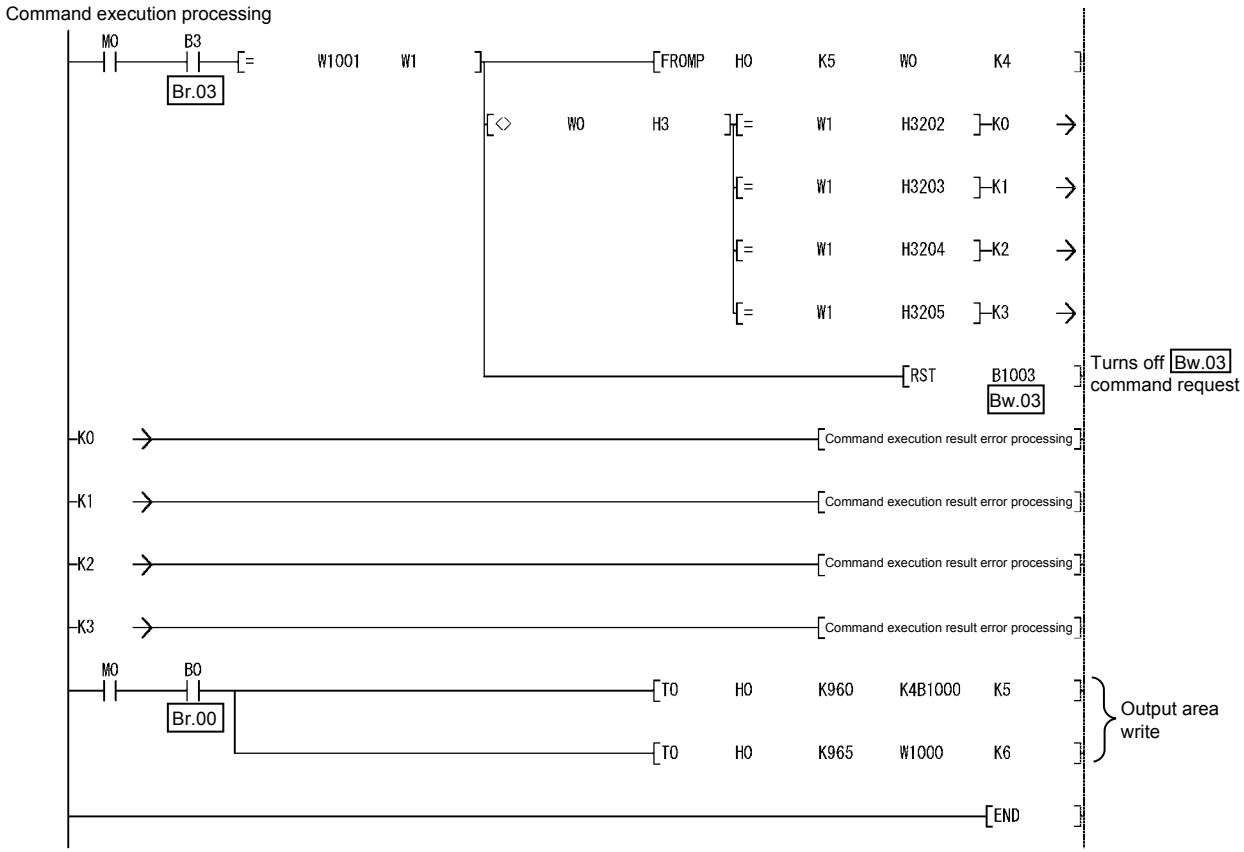
Command execution processing
M0
B3
Br.03
=
W1001
W1
FROMP
H0
K5
W0
K4
<>
W0
H3
=
W1
H3202
K0
=
W1
H3203
K1
=
W1
H3204
K2
=
W1
H3205
K3
RST
B1003
Bw.03
Turns off Bw.03
command request
K0
Command execution result error processing
K1
Command execution result error processing
K2
Command execution result error processing
K3
Command execution result error processing
M0
B0
Br.00
T0
H0
K960
K4B1000
K5
T0
H0
K965
W1000
K6
Output area
write
END

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5 GX Configurator-ST

This chapter explains the functions of GX Configurator-ST used with the ST1DA.
For details of GX Configurator-ST, refer to the GX Configurator-ST Operating Manual.

5.1 GX Configurator-ST Functions

Table 5.1 lists the GX Configurator-ST functions used with the ST1DA.

Table 5.1 List of GX Configurator-ST functions used with ST1DA

Item	Description	Reference section
Parameter Setting	(1) The following parameter items can be set on GX Configurator-ST. • CH☐ output range setting • CH☐ Clear/Hold/Preset setting • CH☐ D/A conversion enable/disable setting • CH☐ Preset Value (2) Specify the area (RAM or ROM) where parameter setting will be registered. (3) Using GX Configurator-ST, parameter setting can be made while online module change is performed.	Section 5.3
Input/output monitor	(1) The I/O data of the ST1DA can be monitored.	Section 5.4
Forced output test	(1) Test can be conducted with the values set in the Bw bit output area, Ew error clear area and Ww word output area of the ST1DA.	Section 5.5
Offset/gain setting	(1) The offset and gain values of the user range can be easily set on-screen. (2) Using GX Configurator-ST, gain/offset setting can be made while online module change is performed.	Section 5.6
Online module change	(1) A module change is made without the system being stopped.	Chapter 7

5.2 Creating a Project

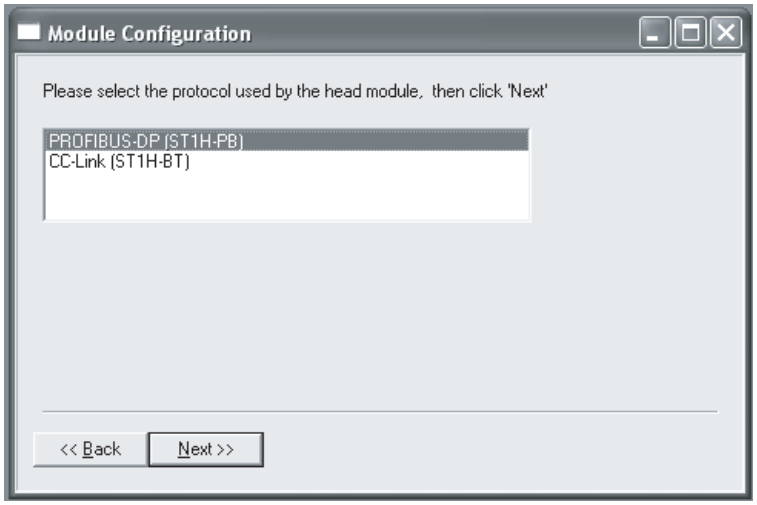
(1) Creating a new project

A new project can be created by reading the real MELSEC-ST system from the communication port and by creating it offline if there is no MELSEC-ST system. For more details about creating a project, refer to the GX Configurator-ST Operating Manual.

(2) Selecting a head module

To create a project offline, select "PROFIBUS-DP (ST1H-PB)" and click the Next button on the screen below.

(3) Display/setting screen



5.3 Parameter Setting

This section explains how to set the parameters.

(1) Mode changing

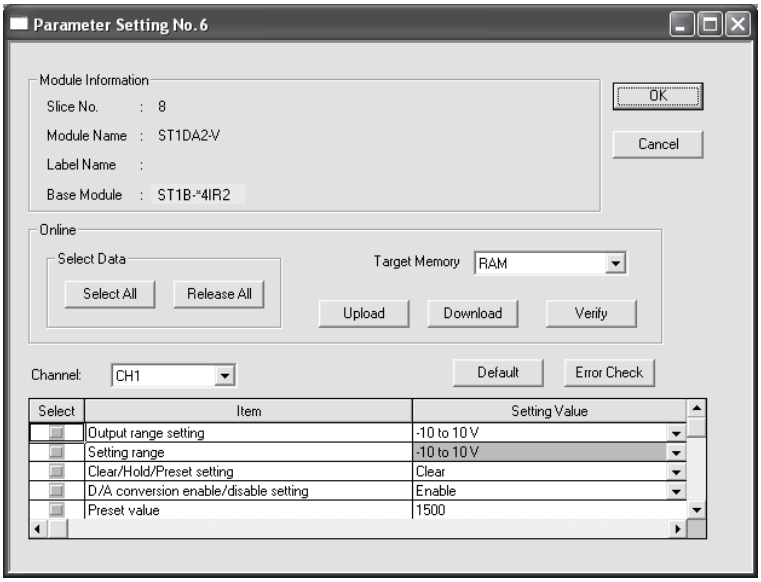
The mode need not be changed.
Either the edit mode or diagnosis mode can be set.

(2) "Parameter Setting" screen display

1) Select ST1DA on the "Module Configuration" screen or "System Monitor" screen.

2) Click the [Edit] → [Parameter Setting].

(3) Display/setting screen



(4) Display/setting details

When setting the parameters of multiple channels, make the following setting for each channel.

(a) User parameters

Set the user parameters using the configuration software of the master station.

When the MELSEC-ST system is tested alone, set the parameters using GX Configurator-ST.

1) Output range setting

Set the output range.

Select the output range from among the following types.

Corresponding module	Output range
ST1DA2-V	-10 to 10V
	0 to 10V
	0 to 5V
	1 to 5V
	User range setting
ST1DA1-I	4 to 20mA
	0 to 20mA
	User range setting

2) Setting range

The output range setting currently valid is stored.

Setting cannot be made.

3) Clear/Hold/Preset setting

Specify Clear/Hold/Preset

(b) Command parameters

By setting the command parameters using GX Configurator-ST, master station programs can be reduced.

If these parameters should be used every time when the MELSEC-ST system starts up, these must be written to the ROM. (Writing the parameters to the RAM is used only for temporary testing.)

1) D/A conversion enable/disable setting

Set the D/A conversion enable / disable.

Disable : Conversion disabled

Enable : Conversion enabled

2) Preset value

Set the preset value.

The preset value setting range is indicated below.

ST1DA2-V : -4000 to 4000

ST1DA1-I : 0 to 4000

(5) Writing parameters

1) In Input/Output Monitor of GX Configurator-ST, check that the Bw.n+1 Convert setting request is set to OFF (0). (Refer to Section 5.4.)
2) From the "Channel:" pull-down menu, select the channel where the parameters will be set.
3) Select the parameter items to be written to the ST1DA by checking the corresponding "Select" check box.
4) Make setting in the "Setting Value" field.
5) Select the target memory (RAM or ROM) of parameter write from the pull-down menu of "Target Memory".
6) Click the Download button.
   When writing the parameters of multiple channels to the ST1DA, perform these steps 1) to 6) for each channel.

POINT
Confirm that the Bw.n+1 Convert setting request is set to OFF (0) before writing parameters. If it is set to ON (1), parameters cannot be written.

5.4 Input/Output Monitor

This section explains how to monitor the I/O data of the ST1DA.

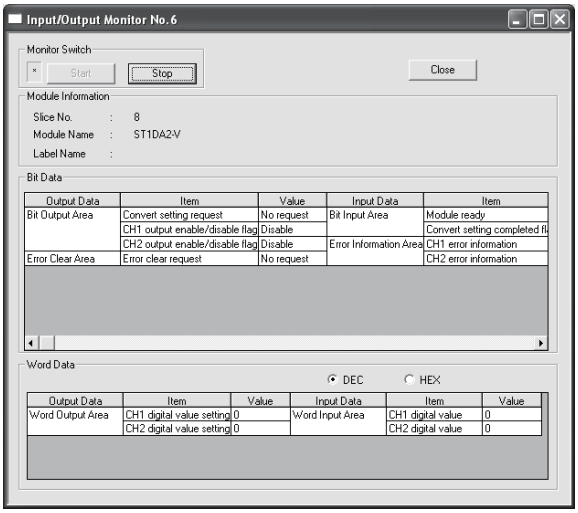
(1) Mode changing

Click the [Mode] → [Diagnosis].

(2) "Input/Output Monitor" screen display

1) Select ST1DA on the "System Monitor" screen.
2) Click the Input/Output Monitor button.
   Monitor starts as soon as the "Input/Output Monitor" screen is displayed.

(3) Display/setting screen



(4) Display/setting details

(a) Bit Data

Input/Output Data	Item	Description
Bit Output Area	Convert setting request	The status of Bw.n+1 convert setting request is displayed.
	CH☐ output enable/disable flag	The status of Bw.n+3 , Bw.n+2 CH☐ output enable/disable flag is displayed.
Error Clear Area	Error clear request	The status of Ew.n error clear request is displayed.
Bit Input Area	Module ready	The status of Br.n module ready is displayed.
	Convert setting completed flag	The status of Br.n+1 convert setting completed flag is displayed.
Error Information Area	CH☐ error information	The status of Er.n+3 to Er.n CH☐ error information is displayed.

(b) Word Data

The display format (decimal/hexadecimal) can be changed.

Input/Output Data	Item	Description
Word Output Area	CH☐ digital value setting	The value of Ww.n , Ww.n+1 CH☐ digital value setting is displayed.
Word Input Area	CH☐ digital value	The value of Wr.n , Wr.n+1 CH☐ digital value is displayed.

5.5 Forced Output Test

This section explains a forced output test.
Conduct the test after setting values to the bit output area, error clear area or word output area of the ST1DA.

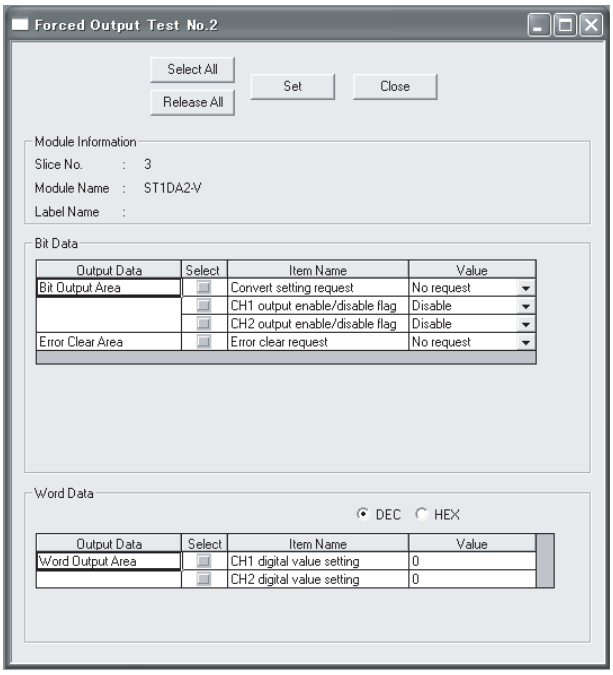
(1) Mode changing

Click the [Mode] → [Diagnosis].

(2) "Forced Output Test" screen display

1) Select ST1DA on the "System Monitor" screen.
2) Click the Forced Output Test button.

(3) Display/setting screen



(4) Display/setting details

(a) Bit Data

Output Data	Item	Description
Bit Output Area	Convert setting request	The setting of Bw.n+1 convert setting request can be changed.
	CH☐ output enable/disable flag	The setting of Bw.n+3 , Bw.n+2 CH☐ output enable/disable flag can be changed.
Error Clear Area	Error clear request	The setting of Ew.n error clear request can be changed.

(b) Word Data

The input format (decimal/hexadecimal) can be changed.

Output Data	Item	Description
Word Output Area	CH☐ digital value setting	The setting of Ww.n , Ww.n+1 CH☐ digital value setting can be changed.

(5) Test operation

1) Select the test item by checking the corresponding "Select" check box.
2) Make setting in the "Value" filed.
3) Click the [Set] button.*1
   Clicking the [Set] button executes the test.
   *1: When the module is not in the forced output test mode, the screen for confirmation of switching to the forced output test mode is displayed. Click the [OK] button to switch to the forced output test mode. When the module is switched to the forced output test mode, the RUN LED of the head module flashes.

POINT
(1) If any of [Bw.n+1] convert setting request, [Bw.n+3], [Bw.n+2] CH□ output enable/disable flag ON/OFF, and [Ww.n], [Ww.n+1] CH□ digital value setting is changed in the forced output test, fully ensure safety before starting the test as the analog output will change.
(2) When the forced output test mode has been canceled, make sure that the RUN LED of the head module is on.

5.6 Offset/Gain Setting

This section explains how to make offset/gain setting.

(1) Mode changing

Click the [Mode] → [Diagnosis].

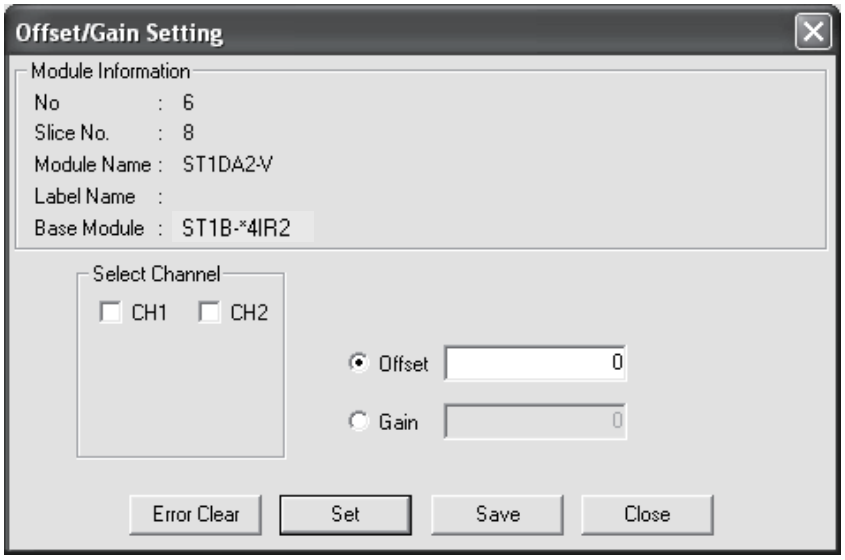
(2) "Offset/Gain Setting" screen display

1) Select ST1DA on the "System Monitor" screen.
2) Click the Offset/Gain Setting button.*1

*1: When the module is not in the forced output test mode, a screen appears asking whether to switch to the forced output test mode. Click the OK button to switch to the forced output test mode.
When the module is switched to the forced output test mode, the RUN LED of the head module flashes.

3) As a screen appears asking whether to switch to the offset/gain setting mode, click the OK button to switch to the offset/gain setting mode. After switched to the offset/gain setting mode, the RUN LED of ST1DA flashes (0.5s interval) and the ST1DA stops.

(3) Display/setting screen



(4) Offset/gain setting operation

When setting different offset and gain values for different channels, perform the operations in (a), (b) for each channel.

Perform the operation in (c) only once finally since it writes the offset/gain settings of all channels to the ST1DA.

(a) Offset value setting operation

1) Select the channel where the offset value will be set by checking the corresponding "Select Channel" check box.
   By checking multiple check boxes, values can be set to multiple channels at the same time.
2) Specify "Offset".
3) Set the adjustment amount and click the Set button.
   The adjustment amount can be set within the range -3000 to 3000.
   When the setting is 1000, the analog output value can be adjusted about 0.33V for the ST1DA2-V or about 0.76mA* for the ST1DA1-I.
   When the Set button is clicked, the analog output value is adjusted according to the setting.
   Repeat the operation in Step 3) until the desired offset value is reached.

(b) Gain value setting operation

1) Select the channel where the gain value will be set by checking the corresponding "Select Channel" check box.
   By checking multiple check boxes, values can be set to multiple channels at the same time.
2) Specify "Gain".
3) Set the adjustment amount and click the Set button.
   The adjustment amount can be set within the range -3000 to 3000.
   When the setting is 1000, the analog output value can be adjusted about 0.33V for the ST1DA2-V or about 0.76mA* for the ST1DA1-I.
   When the Set button is clicked, the analog output value is adjusted according to the setting.
   Repeat the operation in Step 3) until the desired gain value is reached.

(c) Offset/gain setting writing operation

Click the Save button.

The offset/gain settings of all channels are written to the ST1DA.

* When the hardware version is C or earlier, it is approx. 0.38mA.

POINT

(1) An error occurs if the Save button is clicked when the offset value is equal to/greater than the gain value.
In this case, click the Error Clear button to clear the error, and make setting again.

(2) When the offset/gain setting screen is closed, the screen displays a message that asks if you are sure to change to the normal mode. Click the OK button to change to the normal mode.
When the module is put in the normal mode, the RUN LED of the ST1DA turns on.

(3) When the forced output test mode has been released, make sure that the RUN LED of the head module is on.

6 PROGRAMMING

This chapter explains program examples available when the QJ71PB92D and AJ71PB92D/A2SJ71PB92D are used as the master station.

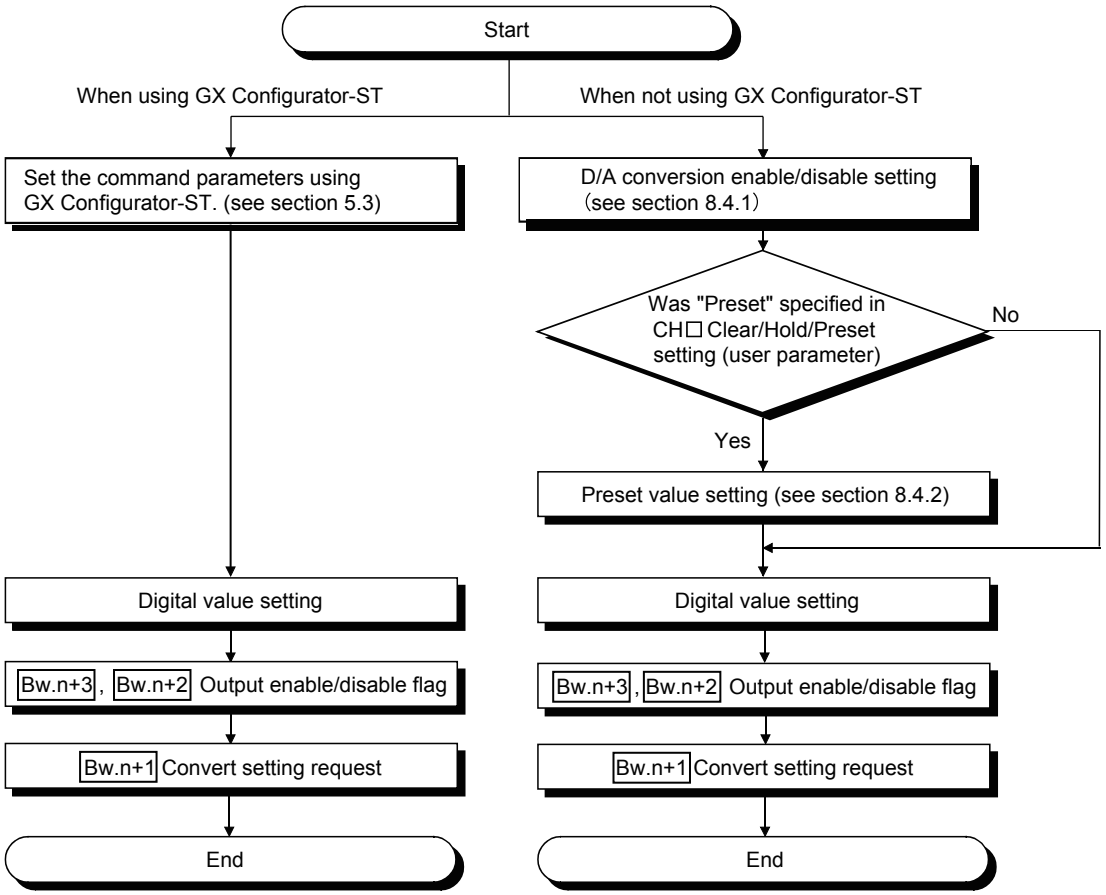
REMARK

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)

6.1 Programming Procedure

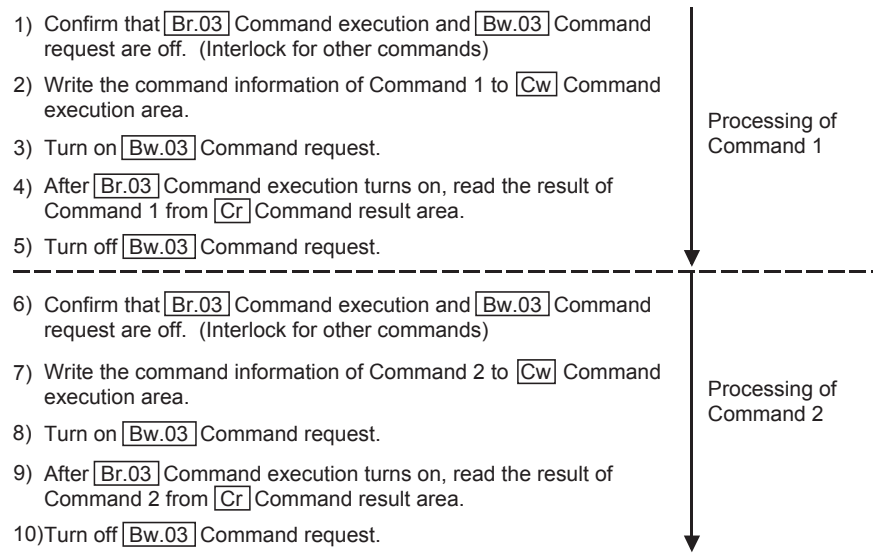
In the following procedure, create a program that will execute the D/A conversion of the ST1DA.
When applying any of the program examples introduced in this chapter to the actual system, verify the applicability and confirm that no problems will occur in the system control.



POINT

(1) 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.

(2) Performing online module change may require a previous arrangement, depending on the use condition.
For details, refer to Section 7.2.

6 - 2

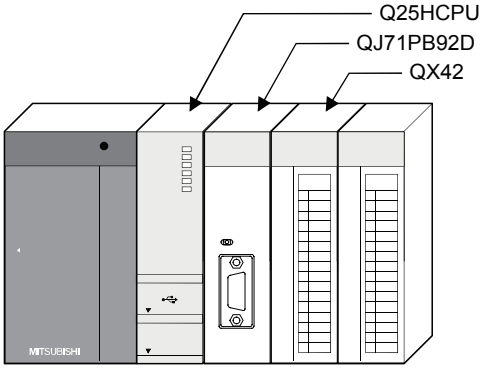
6.2 When QJ71PB92D is Used as Master Station

This section explains program examples available when the QJ71PB92D is used as the master station.
Section 6.2.1 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 10($0A_H$)
	Output data	960($3C0_H$) to 970($3CA_H$)

REMARK

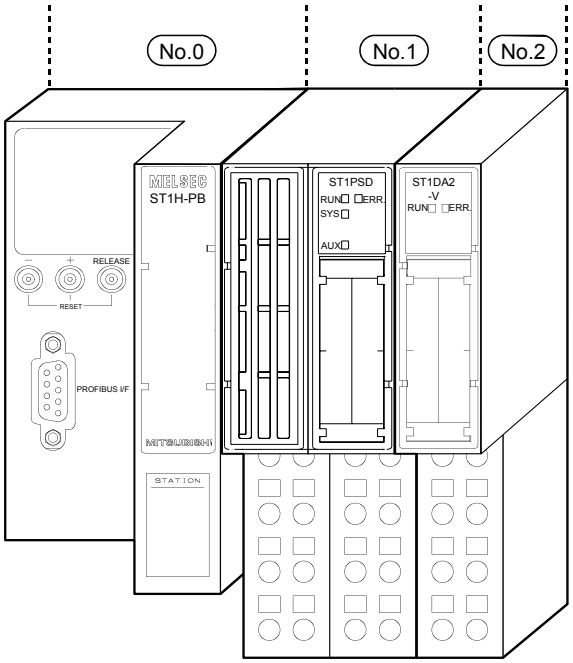
The MELSEC-ST system changes in I/O data size depending on the maximum input/output points and the number of mounted intelligent function modules. Hence, the master station operation mode is set to the extended service mode (MODE E) variable in data size.

(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) FD address: 1
2) Maximum input/output points: 32-point mode

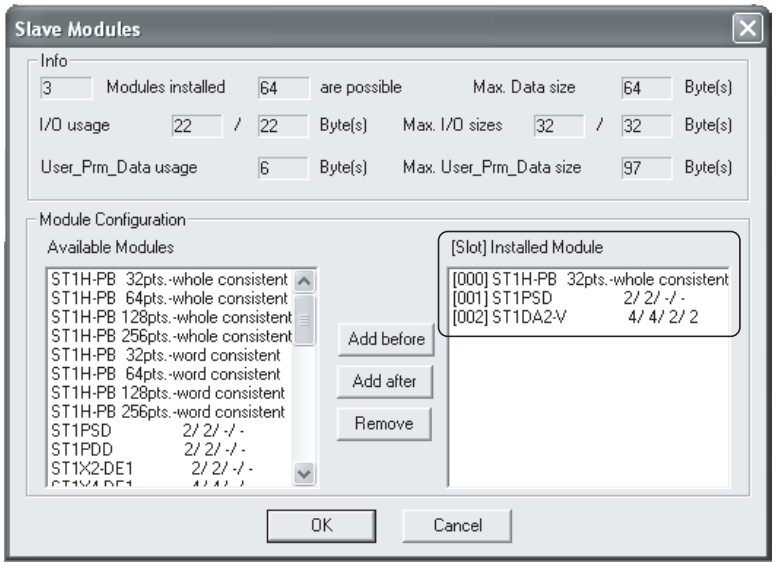


The following table uses the maximum input/output points setting sheet given in the Head Module User's Manual.

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)	System Length (Total)
0	ST1H-PB	4	0(2)	—	—	0.530A(0.530A)	0A(0A)	—
1	ST1PSD	2	2(1)	—	—	—	—	25.2mm(25.2mm)
2	ST1DA2-V	4	3(2)	2	2	0.095A(0.625A)	*1	12.6mm(37.8mm)
Total		10	—	2	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.

(b) GX Configurator-DP setting



(c) ST1DA2-V setting

The output range setting and Clear/Hold/Preset setting are made using GX Configurator-DP.

- Convert enabled channel CH1
- Output enabled channel CH1
- CH1 Output range setting ..... -10 to 10V
- CH1 Clear/Hold/Preset setting ..... Preset
- CH1 Preset setting 3000

(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
	0						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																
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
	0						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																
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.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 CH1 digital value (Wr.n)																Wr Word input area
10 (AH)	Wr.01 CH2 digital value (Wr.n+1)																

No. 0: Head module (ST1H-PB)
No. 1: Bus refreshing module (ST1PSD)
No. 2: 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
	0						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																
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
	0						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																
964(3C4H)	Sw.0 System Area																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 CH1 digital value setting (Ww.n)																Ww Word output area
970(3CAH)	Ww.01 CH2 digital value setting (Ww.n+1)																

No.0: Head Module(ST1H-PB)
No.1: Bus refreshing module (ST1PSD)
No.2: Intelligent Function Module (ST1DA2-V)

(4) Device assignment to program examples

The program example in this section uses 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	ST1DA2-V error code read request	M200	D/A conversion enable/disable setting write signal
X31	ST1DA2-V error clear request	M201	CH1 preset value write signal
D600	ST1DA2-V error code read destination	M210	D/A conversion start signal
—		M230	ST1DA2-V error clear request signal

(c) Devices used in 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	D1000.0	0	ST1H-PB
Br.01	Forced output test mode	D1000.1		
Br.02	Module being changed online	D1000.2	1	
Br.03	Command execution	D1000.3		
Br.04	External power supply status	D1000.4	2	ST1PSD
Br.05		D1000.5		
Br.06	Module ready	D1000.6	3	ST1DA2-V
Br.07	Convert setting completed flag	D1000.7		
Br.08	System area (0 fixed)	D1000.8	4	
Br.09	System area (0 fixed)	D1000.9		
Br.0A	—	D1000.A	—	—
to				
Br.1F	—	D1001.F	—	—

2) Er Error information area

Er.n Error information	Information	Master station side device	Slice No.	Module name
Er.00	Head module error information	D1002.0	0	ST1H-PB
Er.01		D1002.1		
Er.02		D1002.2	1	
Er.03		D1002.3		
Er.04	Bus refreshing module error information	D1002.4	2	ST1PSD
Er.05		D1002.5		
Er.06	CH1 error information	D1002.6	3	ST1DA2-V
Er.07		D1002.7		
Er.08	CH2 error information	D1002.8	4	
Er.09		D1002.9		
Er.0A	_	D1002.A	_	_
to				
Er.1F	_	D1003.F	_	_

3) Mr Module status area

Mr.n Module status	Information	Master station side device	Slice No.	Module name
Mr. 0	Head module existence information	D1004.0	0	ST1H-PB
Mr. 1		D1004.1	1	
Mr.2	Bus refreshing module existence information	D1004.2	2	ST1PSD
Mr.3	Module status	D1004.3	3	ST1DA2-V
Mr.4		D1004.4	4	
Mr.5	_	D1004.5	_	_
to				
Mr.15	_	D1004.F	_	_

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	D1005	_	_
Cr.1	Executed Command No.	D1006		
Cr.2	Response Data 1	D1007		
Cr.3	Response Data 2	D1008		

5) Wr Word input area

Wr.n Word input	Information	Master station side device	Slice No.	Module name
Wr.00	CH1 digital value (Wr.n)	D1009	3	ST1DA2-V
Wr.01	CH2 digital value (Wr.n+1)	D1010		

6) Bw Bit output area

Bw.n Bit output	Information	Master station side device	Slice No.	Module name
Bw.00	System area (0 fixed)	D2000.0	0	ST1H-PB
Bw.01	System area (0 fixed)	D2000.1		
Bw.02	System area (0 fixed)	D2000.2	1	
Bw.03	Command request	D2000.3		
Bw.04	System area (0 fixed)	D2000.4	2	ST1PSD
Bw.05	System area (0 fixed)	D2000.5		
Bw.06	System area (0 fixed)	D2000.6	3	ST1DA2-V
Bw.07	Convert setting request	D2000.7		
Bw.08	CH1 output enable/disable flag	D2000.8	4	
Bw.09	CH2 output enable/disable flag	D2000.9		
Bw.0A	_	D2000.A	_	_
to				
Bw.1F	_	D2001.F	_	_

7) Ew Error clear area

Ew.n Error clear	Information	Master station side device	Slice No.	Module name
Ew.00	Error clear request	D2002.0	0	ST1H-PB
Ew.01	System area (0 fixed)	D2002.1		
Ew.02	System area (0 fixed)	D2002.2	1	
Ew.03	System area (0 fixed)	D2002.3		
Ew.04	Error clear request	D2002.4	2	ST1PSD
Ew.05	System area (0 fixed)	D2002.5		
Ew.06	Error clear request	D2002.6	3	ST1DA2-V
Ew.07	System area (0 fixed)	D2002.7		
Ew.08	System area (0 fixed)	D2002.8	4	
Ew.09	System area (0 fixed)	D2002.9		
Ew.0A	_	D2002.A	_	_
to				
Ew.1F	_	D2003.F	_	_

8) Sw System area

Sw System area	Information	Master station side device	Slice No.	Module name
Sw.0	System area (0 fixed)	D2004	—	—

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	D2005	—	—
Cw.1	Command No. to be Executed	D2006		
Cw.2	Argument 1	D2007		
Cw.3	Argument 2	D2008		

10) Ww Word output area

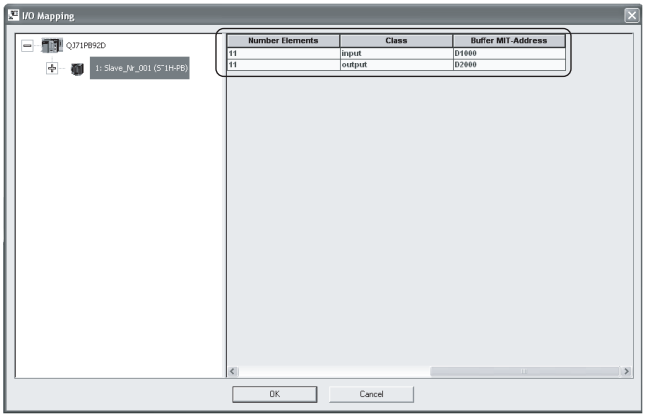
Ww Word output	Information	Master station side device	Slice No.	Module name
Ww.00	CH1 digital value setting (Ww.n)	D2009	3	ST1DA2-V
Ww.01	CH2 digital value setting (Ww.n+1)	D2010		

6.2.1 Program example available when auto refresh is used in QJ71PB92D

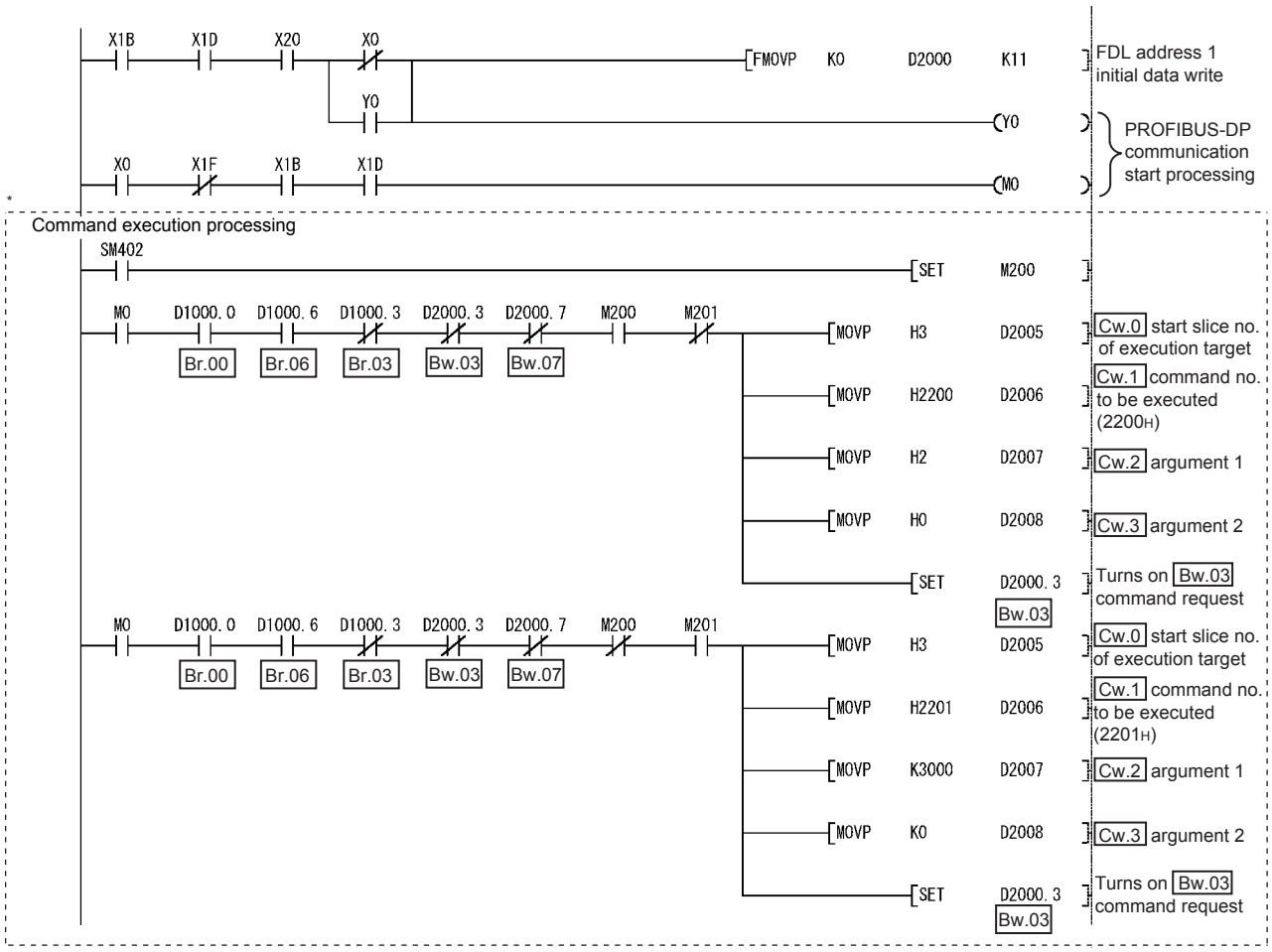
This section explains a program example available when auto refresh is used in the QJ71PB92D to communicate with the MELSEC-ST system.
The program example in this section is based on the system configuration in Section 6.2.

(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) Programming example



* The program area enclosed by the dotted line is not required when GX Configurator-ST is used to set the command parameters.

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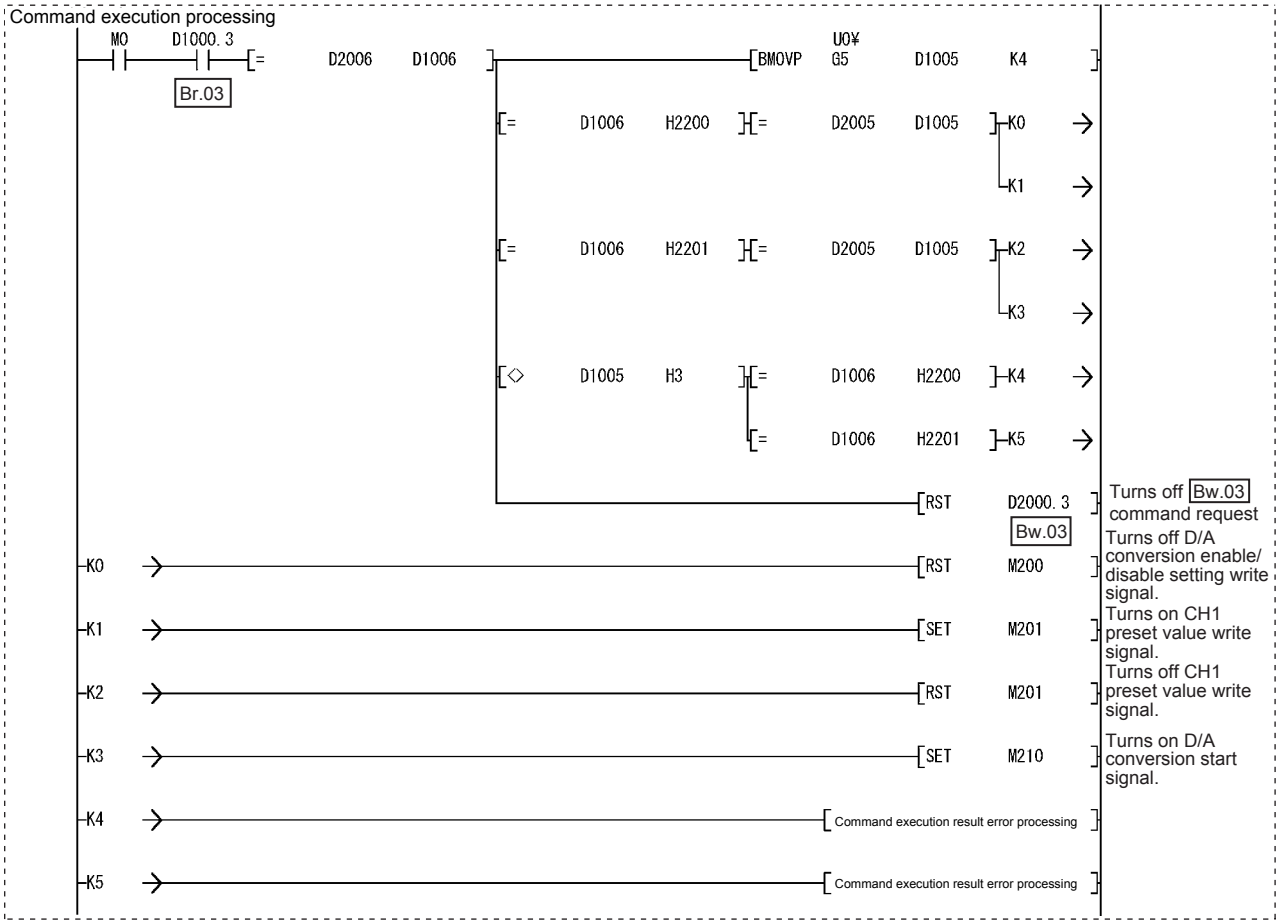
*



* The program area enclosed by the dotted line is not required when GX Configurator-ST is used to set the command parameters.

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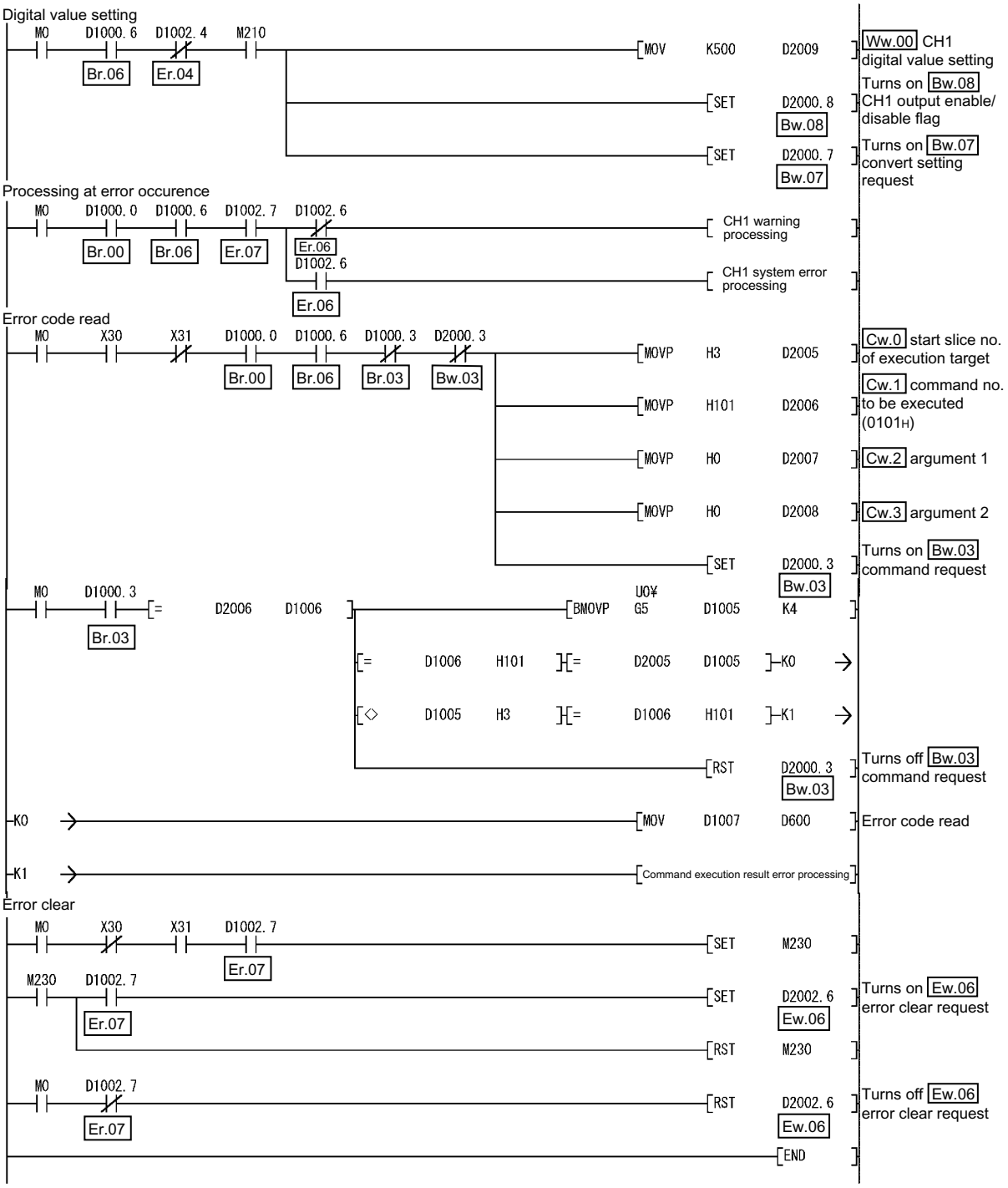

Digital value setting
M0
D1000.6
Br.06
D1002.4
Er.04
M210
MOV K500 D2009
Ww.00 CH1 digital value setting
SET D2000.8
Bw.08
Turns on Bw.08 CH1 output enable/ disable flag
SET D2000.7
Bw.07
Turns on Bw.07 convert setting request
Processing at error occurence
M0
D1000.0
Br.00
D1000.6
Br.06
D1002.7
Er.07
D1002.6
Er.06
CH1 warning processing
D1002.6
Er.06
CH1 system error processing
Error code read
M0
X30
X31
D1000.0
Br.00
D1000.6
Br.06
D1000.3
Br.03
D2000.3
Bw.03
MOVP H3 D2005
Cw.0 start slice no. of execution target
MOVP H101 D2006
Cw.1 command no. to be executed (0101H)
MOVP H0 D2007
Cw.2 argument 1
MOVP H0 D2008
Cw.3 argument 2
SET D2000.3
Bw.03
Turns on Bw.03 command request
M0
D1000.3
Br.03
= D2006 D1006
BMOVP U0¥G5 D1005 K4
= D1006 H101 = D2005 D1005 K0
◇ D1005 H3 = D1006 H101 K1
RST D2000.3
Bw.03
Turns off Bw.03 command request
K0
MOV D1007 D600
Error code read
K1
Command execution result error processing
Error clear
M0
X30
X31
D1002.7
Er.07
SET M230
M230
D1002.7
Er.07
SET D2002.6
Ew.06
Turns on Ew.06 error clear request
RST M230
M0
D1002.7
Er.07
RST D2002.6
Ew.06
Turns off Ew.06 error clear request
END

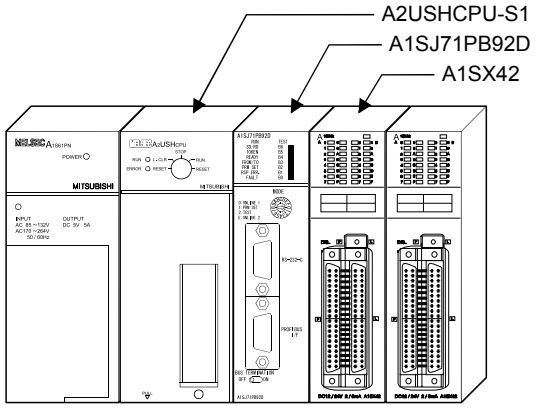
6.3 When AJ71PB92D/A1SJ71PB92D is Used as Master Station

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.

(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 10($0A_H$)
	Output data	960($3C0_H$) to 970($3CA_H$)

REMARK

The MELSEC-ST system changes in I/O data size depending on the maximum input/output points 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 6.2 (2).

(3) I/O data assignment

The I/O data assignment result is the same as that described in Section 6.2 (3).

(4) Device assignment to program examples

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	ST1DA2-V error code read request	M200	D/A conversion enable/disable setting write signal
X31	ST1DA2-V error clear request	M201	CH1 preset value write signal
D600	ST1DA2-V error code read destination	M210	D/A conversion start signal
_		M230	ST1DA2-V error clear request signal

(c) Devices used in 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	Module ready	B6	3	ST1DA2-V
Br.07	Convert setting completed flag	B7		
Br.08	System area (0 fixed)	B8	4	
Br.09	System area (0 fixed)	B9		
Br.0A	_	BA	_	_
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	CH1 error information	B26	3	ST1DA2-V
Er.07		B27		
Er.08	CH2 error information	B28	4	
Er.09		B29		
Er.0A	_	B2A	_	_
to				
Er.1F	_	B3F	_	_

3) Mr Module status area

Mr.n Module status	Information	Master station side device	Slice No.	Module name
Mr. 0	Head module existence information	B40	0	ST1H-PB
Mr. 1		B41	1	
Mr.2	Bus refreshing module existence information	B42	2	ST1PSD
Mr.3	Module status	B43	3	ST1DA2-V
Mr.4		B44	4	
Mr.5	_	B45	_	_
to				
Mr.15	_	B5F	_	_

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		

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5) Wr Word input area

Wr.n Word input	Information	Master station side device	Slice No.	Module name
Wr.00	CH1 digital value (Wr.n)	W4	3	ST1DA2-V
Wr.01	CH2 digital value (Wr.n+1)	W5		

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	ST1DA2-V
Bw.07	Convert setting request	B1007		
Bw.08	CH1 output enable/disable flag	B1008	4	
Bw.09	CH2 output enable/disable flag	B1009		
Bw.0A	_	B100A	_	_
to				
Bw.1F	_	B101F	_	_

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	ST1DA2-V
Ew.07	System area (0 fixed)	B1027		
Ew.08	System area (0 fixed)	B1028	4	
Ew.09	System area (0 fixed)	B1029		
Ew.0A	_	B102A	_	_
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	—	—

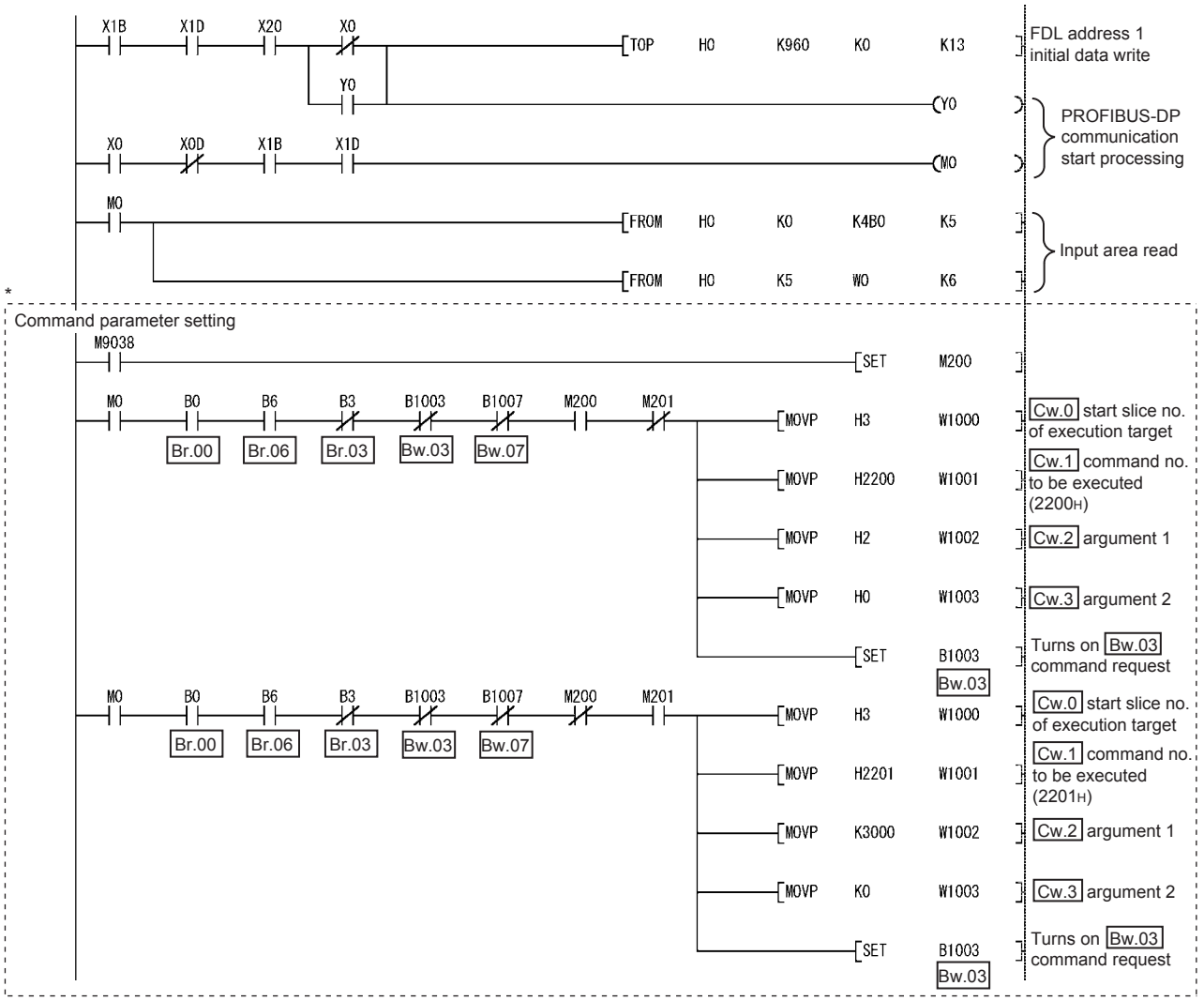
9) Cw Command execution area

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

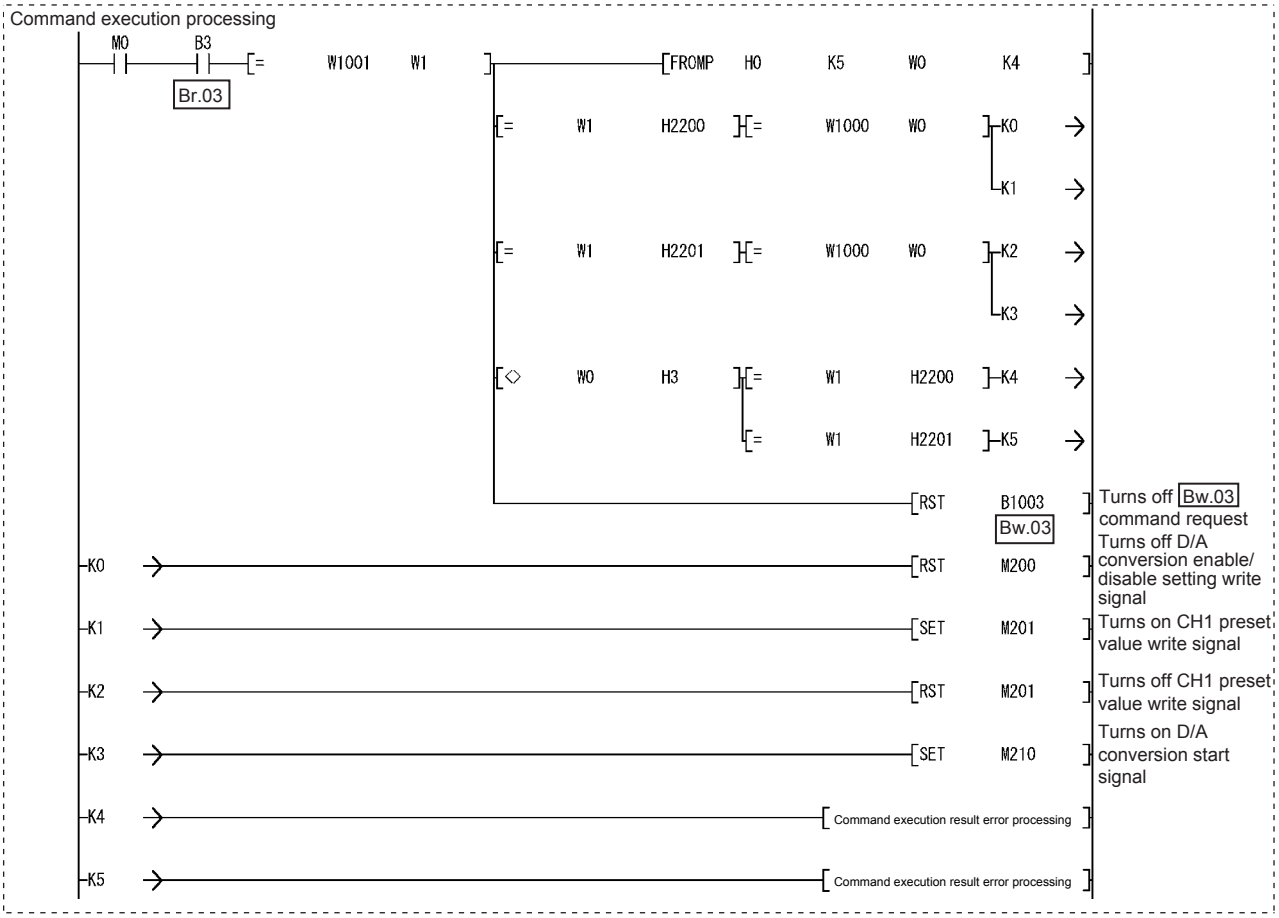
Ww Word output	Information	Master station side device	Slice No.	Module name
Ww.00	CH1 digital value setting (Ww.n)	W1004	3	ST1DA2-V
Ww.01	CH2 digital value setting (Ww.n+1)	W1005		

(5) Program example



* The program area enclosed by the dotted line is not required when GX Configurator-ST is used to set the command parameters

*



* The program area enclosed by the dotted line is not required when GX Configurator-ST is used to set the command parameters

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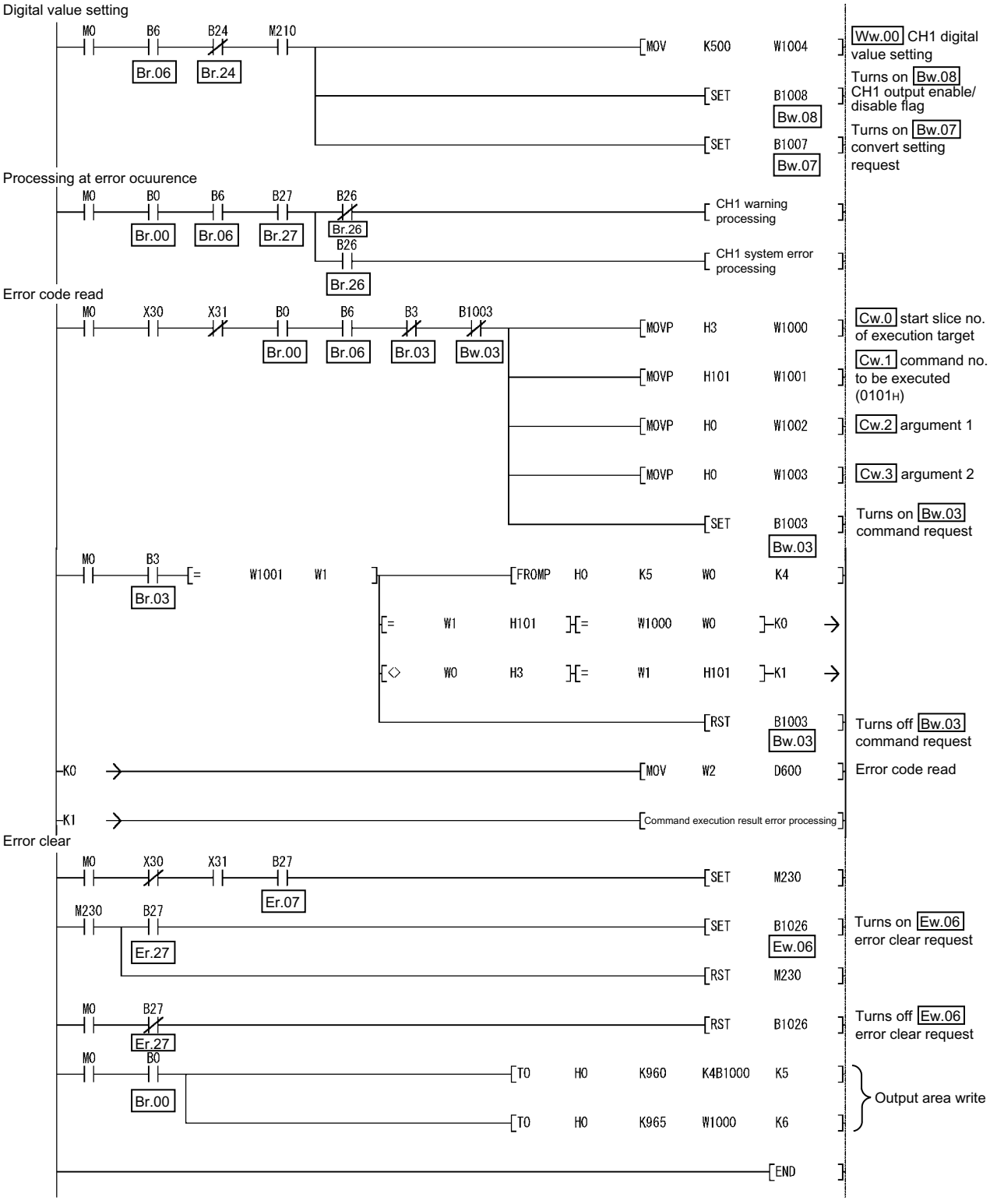

Digital value setting
M0
B6
Br.06
B24
Br.24
M210
MOV K500 W1004
Ww.00 CH1 digital value setting
SET B1008
Bw.08
Turns on Bw.08 CH1 output enable/ disable flag
SET B1007
Bw.07
Turns on Bw.07 convert setting request
Processing at error ocuurence
M0
B0
Br.00
B6
Br.06
B27
Br.27
B26
Br.26
CH1 warning processing
B26
Br.26
CH1 system error processing
Error code read
M0
X30
X31
B0
Br.00
B6
Br.06
B3
Br.03
B1003
Bw.03
MOVP H3 W1000
Cw.0 start slice no. of execution target
MOVP H101 W1001
Cw.1 command no. to be executed (0101H)
MOVP H0 W1002
Cw.2 argument 1
MOVP H0 W1003
Cw.3 argument 2
SET B1003
Bw.03
Turns on Bw.03 command request
M0
B3
Br.03
= W1001 W1
FROMP H0 K5 W0 K4
= W1 H101 = W1000 W0 K0
<> W0 H3 = W1 H101 K1
RST B1003
Bw.03
Turns off Bw.03 command request
K0
MOV W2 D600
Error code read
K1
Command execution result error processing
Error clear
M0
X30
X31
B27
Er.07
SET M230
M230
B27
Er.27
SET B1026
Ew.06
Turns on Ew.06 error clear request
RST M230
M0
B27
Er.27
RST B1026
Turns off Ew.06 error clear request
M0
B0
Br.00
TO H0 K960 K4B1000 K5
TO H0 K965 W1000 K6
Output area write
END

7 ONLINE MODULE CHANGE

When performing online module change, make sure to read through the Section 4.4 "Online module change" in the head module user's manual.
This chapter describes the specifications of an online module change.

(1) Perform an online module change by operating the head module buttons or using GX Configurator-ST.

(2) The user parameters, command parameters and user range setting's offset/gain setting values are automatically handed down to the new module.

(3) Using GX Configurator-ST, offset/gain setting can be made during an online module change.
When higher accuracy is required, perform offset/gain setting during an online module change using GX Configurator-ST.

7.1 Precautions for Online Module Change

The following are the precautions for online module change.

(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 "online module change procedure" in the user's manual of the used head module and in the procedure given in Section 7.4.1 of this manual.
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.

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

(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) 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.

(7) While the slice module is being changed 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 overwritten by the new user parameter values when the online module change is finished.

(8) 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.

(9) 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

(10) After an online module change, the accuracy of the user range setting is about three times lower than that before the online module change.
When the user range setting is used, set the offset and gain values again as necessary.

(11) Make sure to perform online module change in the normal mode.

(12) If the intelligent function module, for which "Hold" has been selected in the "Clear/Hold/Preset setting, is replaced online when the communication with the master station is disconnected, the Ww.n word output value becomes "0".
Even after this online module change is completed, the Ww.n word output value will not return to the value specified as "Hold".

(13) Except the error clear request, the forced output test of GX Configurator-ST cannot be used for the module being changed online.
If it is used, the module will not operate. It will not display an error, either.

7.2 Preparations for Online Module Change

Prepare GX Configurator-ST when changing the ST1DA online.
Depending on the module failure status, the user parameters, command parameters and user range setting's offset/gain setting values may not be saved into the head module.
Refer to Section 7.4.1 for the procedure used in parameter setting or offset/gain setting during an online module change.
When GX Configurator-ST is unavailable, make the following preparations.
Failure to do so may not import the offset/gain setting value of user range setting and others to the new module, if these settings cannot be transferred to the head module.

(1) Command parameters

When GX Configurator-ST is unavailable, the command parameters must be set by the commands after an online module change is finished. Provide a command parameter setting program in the master station program.
Refer to Section 6.2.1 and Section 6.3 for the command parameter setting program.

(2) Offset/gain setting values

When the user range setting is used and GX Configurator-ST is unavailable, offset/gain setting must be made by the commands after an online module change is finished. Provide an offset/gain setting program in the master station program.
Refer to Section 4.5 for the offset/gain setting program.

POINT

When GX Configurator-ST is unavailable, set the command parameters and offset/gain setting values after the module has operated once by default.

REMARK

The above preparations are not necessary since the user parameter values set by the configuration software of the master station are written from the head module.

7.3 Disconnecting/Connecting the External Device for Online Module Change

Disconnect and connect the ST1DA external device according to the following procedure.

(1) Disconnection

Power off the external device.

(2) Connection

Power on the external device.

7.4 Online Module Change Procedure

This section explains the parameter setting or offset/gain setting procedure used during an online module change when the user parameters, command parameters and user range setting's offset/gain setting values could not be saved in the head module or when the user range setting is used and high accuracy is required.
For the other online module change procedure, refer to the user's manual of the used head module.

7.4.1 When parameter setting or offset/gain setting is performed using GX Configurator-ST during online module change

POINT

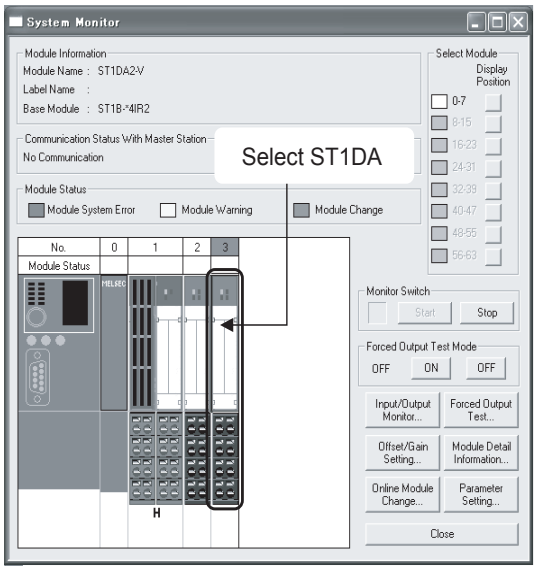
If a slice module different from the target one is selected by mistake, restart the operation as instructed below.

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

(2) When you noticed while the screen in 4) was being displayed
Do not change the slice module, click the Next button, and perform the operations in steps 7), 12), 13) to complete the online module change once.

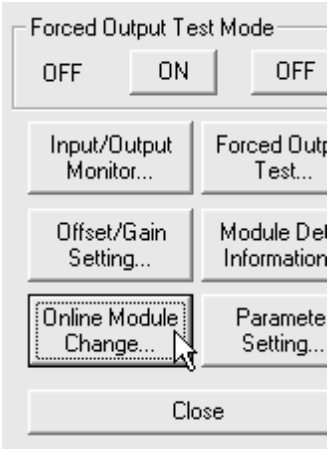
(3) To restart the operation at step 7)
Mount the removed slice module again, click the Next button, and perform the operations in steps 12), 13) to complete the online module change once.

Preparation for replacing ST1DA



1) Select the ST1DA 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 ST1DA 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 ST1DA selected at step 1), and click [Online Module change] on the menu.

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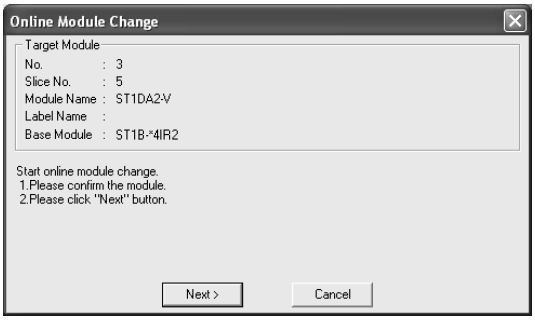

3) Confirm that the ST1DA displayed as "Target Module" is the ST1DA to be replaced and click the Next button.

(a) Clicking the Next button validates the settings and the following will be performed.
- Puts the head module into the online module change mode.
- Save the user parameters, command parameters and user range setting's offset/gain setting values of the ST1DA to be changed into 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 ST1DA 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, command parameters and user range setting's offset/gain setting values could not be read from the ST1DA, the REL. LED and ERR. LED of the head module turn on and the corresponding error message is displayed on the screen by the operation in step 7).
Confirm the error definition.
For details of the error code reading operation and error code of the head module, refer to the user's manual of the used head module.
When making parameter setting and offset/gain setting to the new ST1DA, perform the operations in step 4 and later.

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 1).

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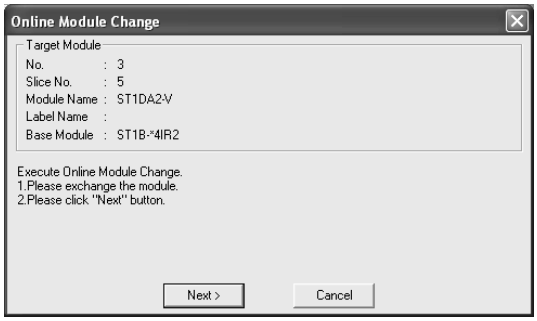
Disconnection from external device



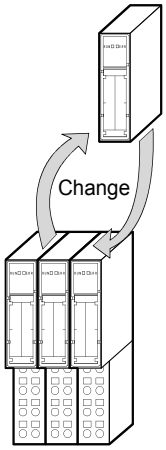
4) As the left screen appears, power off the external device connected with the ST1DA to be removed.

POINT

If the external device cannot be powered off, shut off all phases of the external power for the MELSEC-ST system and replace the ST1DA.

↓

Replacing ST1DA



5) Remove the ST1DA and replace with new one.

↓

Connection to external device after replacement

6) Mount a new ST1DA. And then, power on the external device.

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Operations after external device connection

7) After connecting to the external device, click the Next button on the screen at step 4).

(a) Clicking the Next button performs the following.

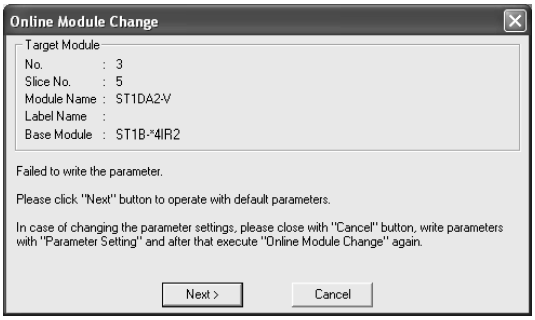
- Checks whether the module name of the newly mounted slice module is the same as that of the removed one.
- Write the user parameters, command parameters and user range setting's offset/gain setting values, which were saved in the head module in step 3), to the mounted ST1DA.

Clicking the Cancel button stops online module change.
Terminate the online module change by the following procedure.

- On the restarted screen shown in 1), select the same slice module.
- Perform the operation in 2) to display the screen in 12), and click the Next button to terminate the online module change.

(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 ST1DA is flashing (at 0.25s intervals).



If the parameter setting or user range setting's offset/gain setting values could not be written to the ST1DA, the REL. LED and ERR. LED of the head module turn on and the screen shown on the left appears.
Confirm the error definition.
For details of the error code reading operation and error code of the head module, refer to the user's manual of the used head module.

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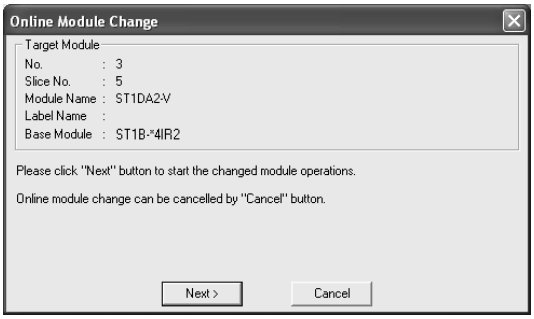
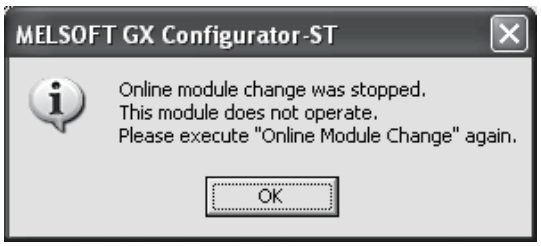
Parameter setting/offset/gain setting



8) Click the Cancel button to stop the online module change.

↓



9) Click the OK button.

↓

10) Make parameter setting or offset/gain setting.
Follow the procedure in Section 5.3 for the parameter setting, or the procedure in Section 5.6 for the offset/gain setting.
The following describes the POINT of parameter setting and offset/gain setting to be noted during the online module change.

POINT

(1) As the system is already in the diagnostic mode, the mode need not be changed.

(2) When setting the parameters during an online module change, write them to both the RAM and ROM.
After the control resumes, the module will operates with the setting written on the RAM.

(3) If the parameter setting or user range setting's offset/gain setting values could not be read from the old ST1DA, the user parameters have been written when the operation in step 7 was performed.
Using GX Configurator-ST, check whether the user parameters have been written.

(4) When offset/gain setting was made during an online module change, the RUN LED of the ST1DA flickers at 0.25s intervals even in the offset/gain setting mode.

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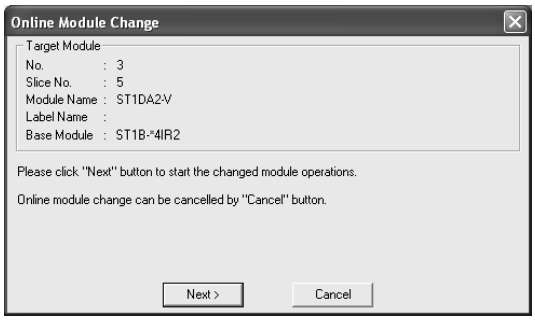
Processing after parameter setting or offset/gain setting

11) After parameter setting or offset/gain setting, execute the operations in steps 1), 2) to resume the online module change.
* Select the same ST1DA as before the online module change was stopped.
If the selected ST1DA is different, an error will occur.



12) 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.

Clicking the Cancel button stops online module change.
When stopped, the screen in 1) is displayed.
Terminate the online module change by the following procedure.
- On the restarted screen shown in 1), select the same slice module.
- Follow the instructions in 2) to display the screen in 3), and click the Cancel button.

(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 ST1DA is on.
- The "Module Status" indicator of the target ST1DA 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.
Confirm the error definition.
For details of the error code reading operation and error code of the head module, refer to the user's manual of the used head module.

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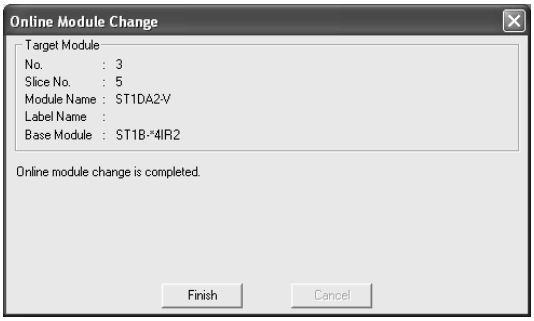

↓

(Completed)

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

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8 COMMAND

This chapter explains the commands.

8.1 Command List

The ST1DA supports command execution that uses the Cw Command execution area/Cr Command result area of the head module.
For the command execution procedure, refer to the user's manual of the used head module.
The list of commands that can be executed by the ST1DA and conditions for respective command executions are shown below.

Table 8.1 Command List

Command			Description	Execution condition	Reference section
Command classification	Command No.	Command name			
Common command	0100H	Operating status read request	Reads the operating status of the ST1DA.	-	Section 8.2.1
	0101H	Error code read request	Reads the error code of the ST1DA.	-	Section 8.2.2
ST1DA parameter setting read command	1200H	D/A Conversion enable/disable setting read	Reads the D/A conversion enable/disable setting from the RAM of the ST1DA.	-	Section 8.3.1
	1201H	CH1 preset value read	Reads the preset value from the RAM of the ST1DA.	-	Section 8.3.2
	1202H*1	CH2 preset value read			
	1209H	Output range set value read	Reads the output range setting and Clear/Hold/Preset setting from the RAM of the ST1DA.	-	Section 8.3.3
ST1DA parameter setting write command	2200H	Conversion enable/disable setting write	Writes the D/A conversion enable/disable setting to the RAM of the ST1DA.	Condition 1	Section 8.4.1
	2201H	CH1 preset value write	Writes the preset value to the RAM of the ST1DA.	Condition 1	Section 8.4.2
	2202H*1	CH2 preset value write			
ST1DA control command	3200H	Parameter setting ROM read	Reads the parameters from the ROM of the ST1DA to the RAM.	Condition 1	Section 8.5.1
	3201H	Parameter setting ROM write	Writes the parameters from the RAM of the ST1DA to the ROM.	Condition 1	Section 8.5.2
	3202H	Operation mode setting	Changes the mode of the ST1DA.	Condition 2	Section 8.5.3
	3203H	Offset channel specification	Specifies the offset channel of offset/gain setting and adjusts the offset value.	Condition 3	Section 8.5.4
	3204H	Gain channel specification	Specifies the gain channel of offset/gain setting and adjusts the gain value.	Condition 3	Section 8.5.5
	3205H	User range write	Writes the adjusted offset/gain settings to the ROM of the ST1DA	Condition 3	Section 8.5.6

*1: If this command is executed for the ST1DA1-I, it fails and "01H" is stored into Cr.0(15-8) Command execution result.

Table 8.2 Conditions for command execution

Condition	Description
-	Commands are always executable.
Condition 1	Commands are only executable in normal mode and when Bw.n+1 Convert setting request is OFF (0).
Condition 2	Commands are only executable in normal mode and when Bw.n+1 Convert setting request is OFF (0), or in offset/gain setting mode.
Condition 3	Commands are executable only in offset/gain setting mode.

8.2 Common Command

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

Reads the operating status of the ST1DA.

(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (0100H). (Hexadecimal)
Cw.2	Fixed to 0000H (Any other value is treated as 0000H.)
Cw.3	

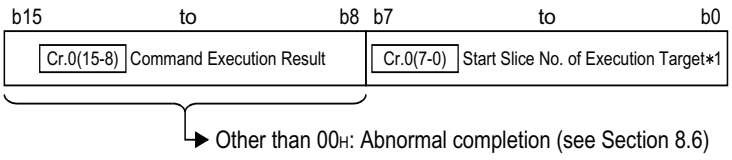
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower 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: Normal completion
Cr.1	The executed command no. (0100H) is stored. (Hexadecimal)
Cr.2	The operating status of the ST1DA is stored. Fixed to 0 Fixed to 0 0 0 H 0H: Normal 1H: System error 0H: Normal 1H: Warning
Cr.3	The current operation mode of the ST1DA is stored. 0 0 0 H Fixed to 0 1H: Normal mode 2H: Offset/gain setting mode

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (0100H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

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

Reads the error code of the ST1DA.

(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (0101H). (Hexadecimal)
Cw.2	Fixed to 0000H (Any other value is treated as 0000H.)
Cw.3	

(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower 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: Normal completion
Cr.1	The executed command no. (0101H) is stored. (Hexadecimal)
Cr.2	The error code currently occurring in the ST1DA is stored. (Hexadecimal) Refer to Section 9.1 for details of the error code.
Cr.3	0000H is stored.

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower 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 00H: Abnormal completion (see Section 8.6) *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	The executed command no. (0101H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.3 ST1DA Parameter Setting Read Command

8.3.1 D/A conversion enable/disable setting read (Command No.: 1200H)

Reads the D/A conversion enable/disable setting from the RAM of the ST1DA.

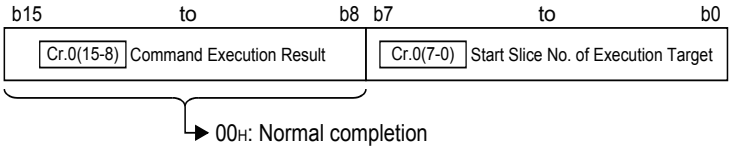
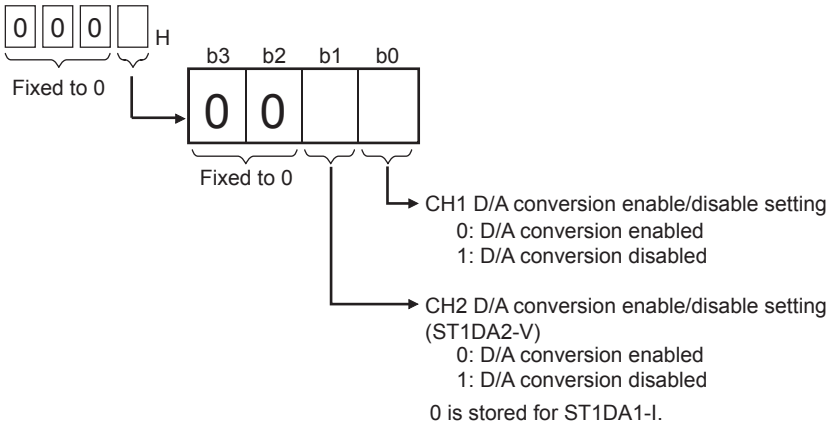
(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (1200H). (Hexadecimal)
Cw.2	Fixed to 0000H (Any other value is treated as 0000H.)
Cw.3	

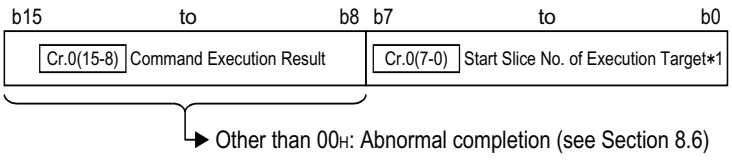
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The D/A command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (1200H) is stored. (Hexadecimal)
Cr.2	The D/A conversion enable/disable setting is stored. 
Cr.3	0000H is stored.

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (1200H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.3.2 CH□ preset value read (Command No.: 1201H, 1202H)

Reads the preset value from the RAM of the ST1DA.

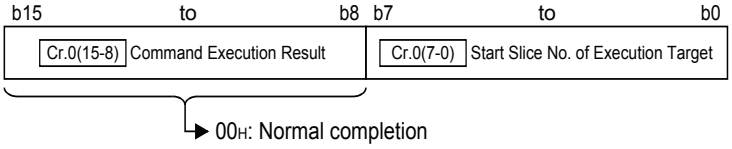
(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed. (Hexadecimal) CH1 preset value read: 1201H CH2 preset value read: 1202H*1 *1: If this command is executed for the ST1DA1-I, it fails and "01H" is stored into Cr.0(15-8) Command execution result.
Cw.2	Fixed to 0000H (Any other value is treated as 0000H.)
Cw.3	

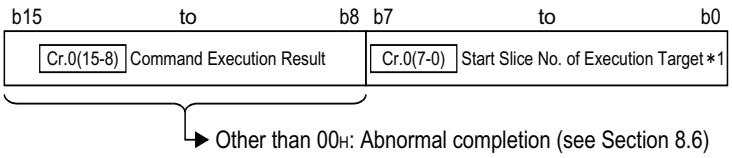
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (1201H, 1202H) is stored. (Hexadecimal)
Cr.2	The CH□ preset value is stored. (16-bit signed binary) The value in the following range is stored. ST1DA2-V : -4000 to 4000 ST1DA1-I : 0 to 4000
Cr.3	0000H is stored.

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (1201H, 1202H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.3.3 Output range set value read (Command No.: 1209H)

Reads the output range setting and Clear/Hold/Preset setting from the RAM of the ST1DA.

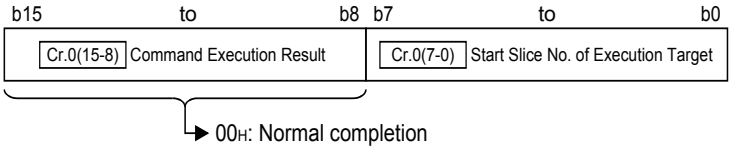
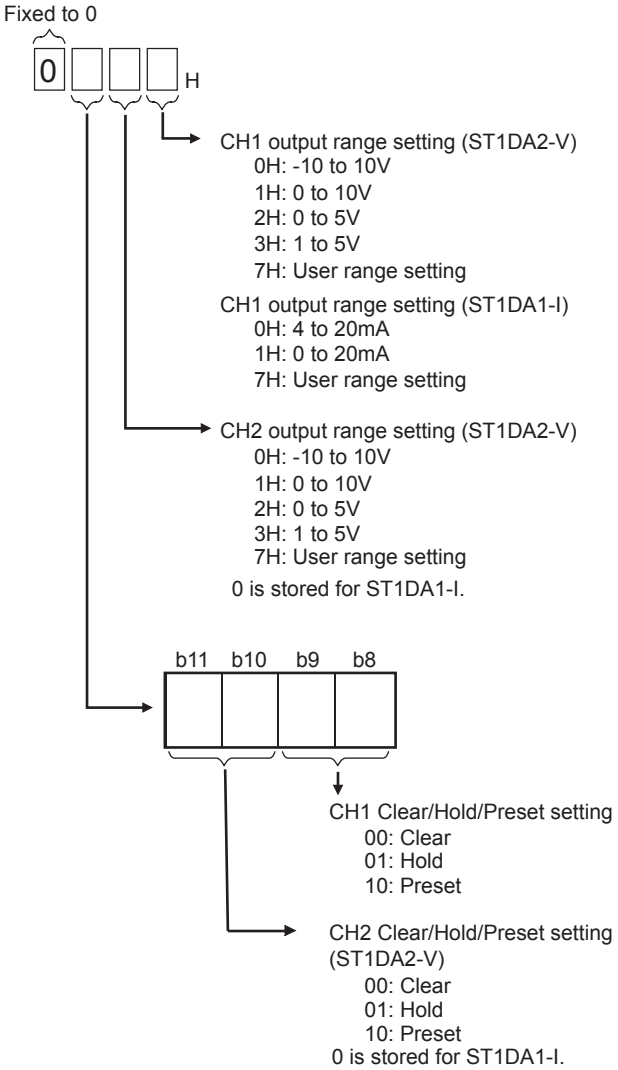
(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (1209H). (Hexadecimal)
Cw.2	Fixed to 0000H (Any other value is treated as 0000H.)
Cw.3	

(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

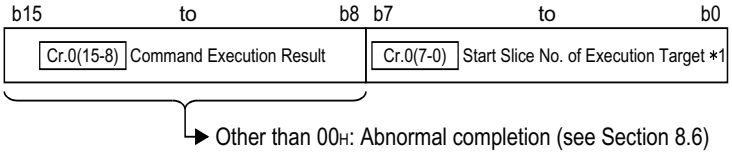
(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (1209H) is stored. (Hexadecimal)
Cr.2 *1	The output range setting and clear/hold/preset specification values written to the RAM are stored for each channel. 

Cr Command result area	Result details
Cr.3 *1	The currently valid output range setting and Clear/Hold/Preset setting values are stored for each channel. The stored values are the same as those of Cr.2 response data 1.

*1: If the stored values differs between Cr.2 and Cr.3, the parameters written to RAM with a command has not taken effect in the module.
Set Bw.n+1 Convert setting request to ON (1) so that the parameters in RAM will take effect in the module.

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

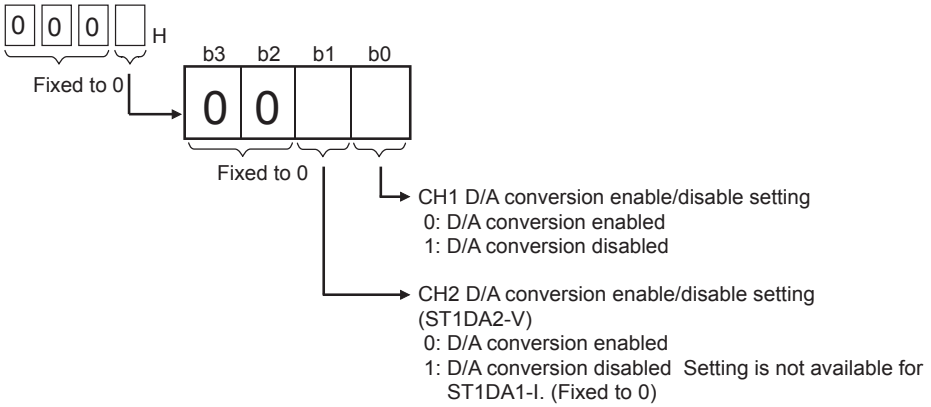
Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *1: When $0F_H$ is stored into the Cr.0(15-8) Command Execution Result, 00_H (start slice No. of head module) is stored into the Cr.0(7-0) Start Slice No. of Execution Target.
Cr.1	The executed command no. (1209H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.4 ST1DA Parameter Setting Write Command

8.4.1 D/A conversion enable/disable setting write (Command No.: 2200H)

Writes the D/A conversion enable/disable setting to the RAM of the ST1DA.
This command can be executed only when Bw.n+1 convert setting request is off (0) in the normal mode.

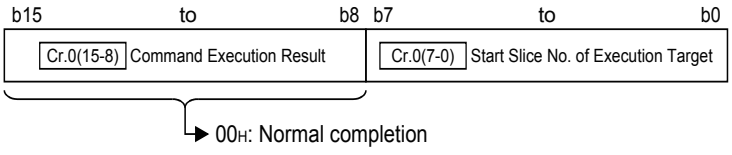
(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (2200H). (Hexadecimal)
Cw.2	Set the D/A conversion enable/disable setting for each channel. 
Cw.3	Fixed to 0000H (Any other value is treated as 0000H.)

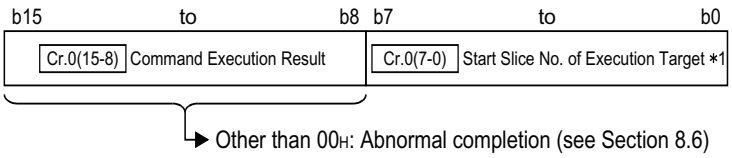
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (2200H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	0000H is stored.

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (2200H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.4.2 CH□ preset value write (Command No.: 2201H, 2202H)

Writes the preset value to the RAM of the ST1DA.
This command can be executed only when Bw.n+1 convert setting request is off (0) in the normal mode.

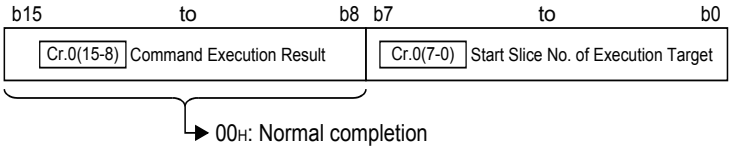
(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed. (Hexadecimal) CH1 preset value write: 2201H CH2 preset value write: 2202H * If this command is executed for the ST1DA1-I, it fails and "01H" is stored into Cr.0(15-8) Command execution result.
Cw.2	Set the CH□ preset value. (16-bit signed binary) The value in the following range can be set. ST1DA2-V : -4000 to 4000 ST1DA1-I : 0 to 4000
Cw.3	Fixed to 0000H (Any other value is treated as 0000H.)

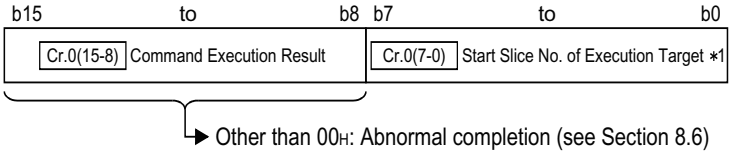
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (2201H, 2202H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	0000H is stored.

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (2201H, 2202H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

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8.5 ST1DA Control Command

8.5.1 Parameter setting ROM read (Command No.: 3200H)

Reads the parameters from the ROM of the ST1DA to the RAM.
This command can be executed only when Bw.n+1 convert setting request is off (0) in the normal mode.

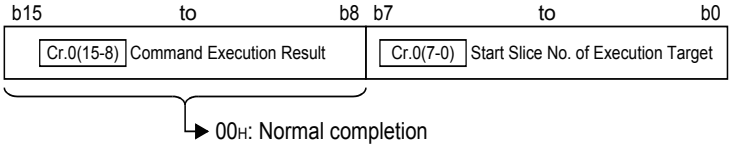
(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (3200H). (Hexadecimal)
Cw.2	Fixed to 0000H (Any other value is treated as 0000H.)
Cw.3	

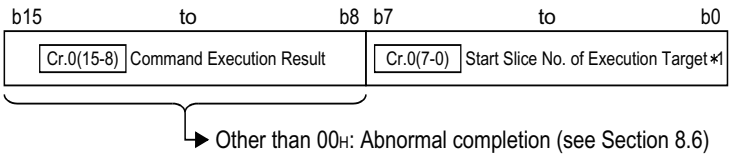
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (3200H) is stored. (Hexadecimal)
Cr.2	0000H is stored.
Cr.3	

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (3200H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.5.2 Parameter setting ROM write (Command No.: 3201H)

Writes the parameters from the RAM of the ST1DA to the ROM.
This command can be executed only when Bw.n+1 convert setting request is off (0) in the normal mode.

(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (3201H). (Hexadecimal)
Cw.2	Fixed to 0000H (Any other value is treated as 0000H.)
Cw.3	

(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower 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: Normal completion
Cr.1	The executed command no. (3201H) is stored. (Hexadecimal)
Cr.2	0000H is stored.
Cr.3	

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower 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 00H: Abnormal completion (see Section 8.6) *1: When 0FH is stored into the Cr.0(15-8) Command Execution Result, 00H (start slice No. of head module) is stored into the Cr.0(7-0) Start Slice No. of Execution Target.
Cr.1	The executed command no. (3201H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

POINT
Execute Parameter setting ROM write (command number: 3201H) after confirming that normal operation is performed with the settings written to the RAM.

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8.5.3 Operation mode setting (Command No.: 3202H)

Changes the mode of the ST1DA. (Normal mode to offset/gain setting mode, offset/gain setting mode to normal mode)
This command can be executed when Bw.n+1 convert setting request is off (0) in the normal mode or when the module is in the offset/gain setting mode.

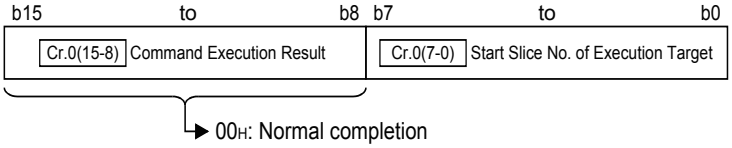
(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (3202H). (Hexadecimal)
Cw.2	Set the operation mode. 0000H : Normal mode 0001H : Offset/gain setting mode
Cw.3	Fixed to 0000H (Any other value is treated as 0000H.)

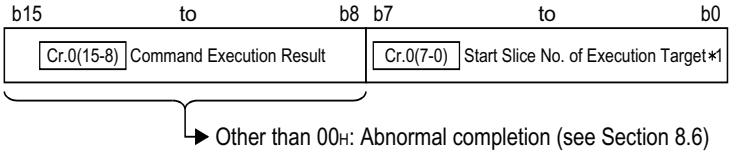
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (3202H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	0000H is stored.

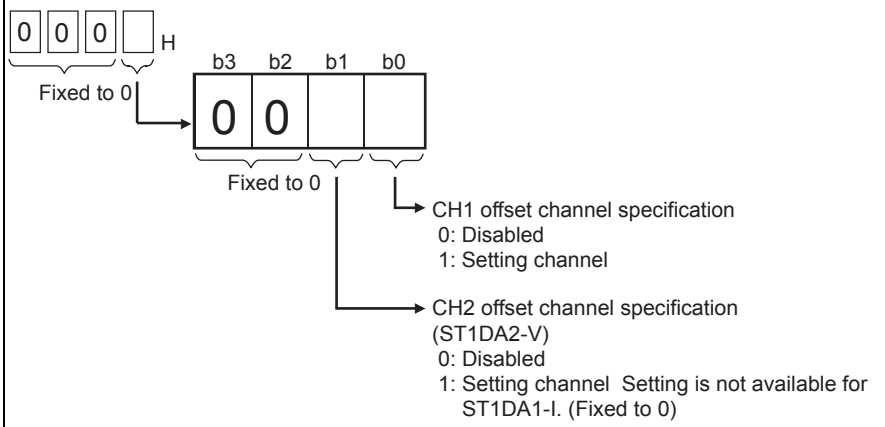
(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (3202H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.5.4 Offset channel specification (Command No.: 3203H)

Specifies the channel where the offset value will be adjusted and adjusts the offset value.
This command can be executed only in the offset/gain setting mode.

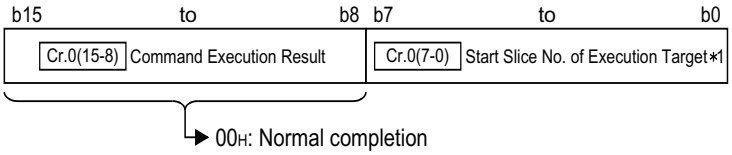
(1) Values set to [Cw] Command execution area

[Cw] Command execution area	Setting value
[Cw.0]	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
[Cw.1]	Set a command No. to be executed (3203H). (Hexadecimal)
[Cw.2]	Specify the channel where the offset value of offset/gain setting will be adjusted. Values can be set to multiple channels at the same time. 
[Cw.3]	Set the adjustment amount of the analog output value. The adjustment amount can be set within the range -3000 to 3000. When the setting value is 1000, the analog output value can be adjusted about 0.33V for the ST1DA2-V or about 0.76mA*1 for the ST1DA1-I. When the command is executed, the analog output value is adjusted according to the setting. *1: When the hardware version is C or earlier, it is approx. 0.38mA.

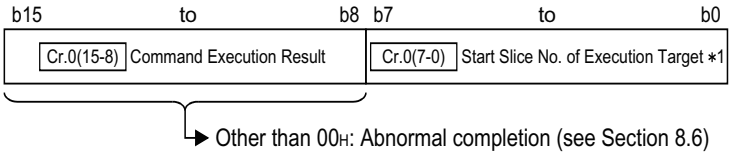
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (3203H) is stored. (Hexadecimal)
Cr.2	0000H is stored.
Cr.3	

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (3203H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

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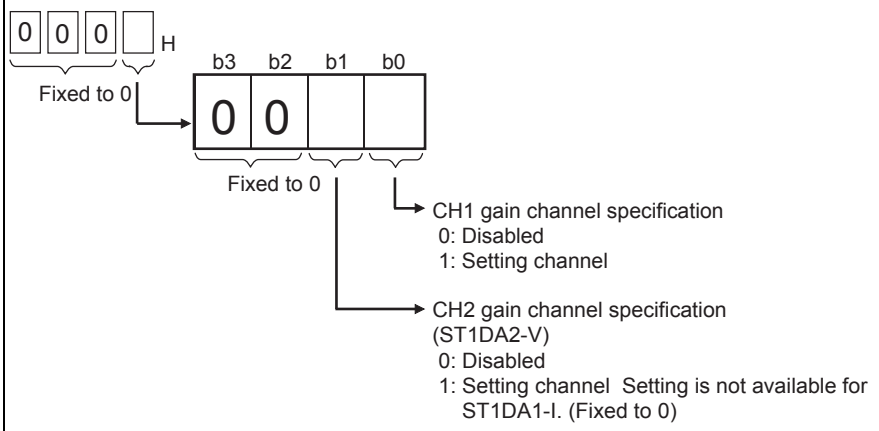
8.5.5 Gain channel specification (Command No.: 3204H)

Specifies the channel where the gain value will be adjusted and adjusts the gain value.
This command can be executed only in the offset/gain setting mode.

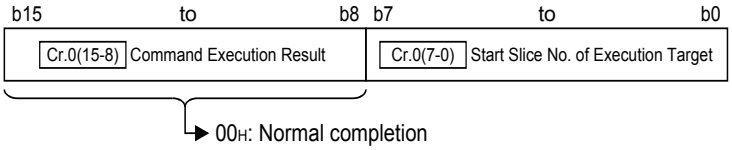
(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (3204H). (Hexadecimal)
Cw.2	Specify the channel where the gain value of offset/gain setting will be adjusted. Values can be set to multiple channels at the same time. 
Cw.3	Set the adjustment amount of the analog output value. The adjustment amount can be set within the range -3000 to 3000. When the setting value is 1000, the analog output value can be adjusted about 0.33V for the ST1DA2-V or about 0.76mA*1 for the ST1DA1-I. When the command is executed, the analog output value is adjusted according to the setting. *1: When the hardware version is C or earlier, it is approx. 0.38mA.

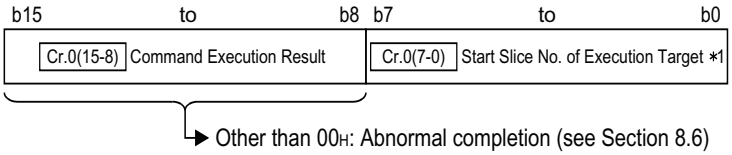
(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below. 
Cr.1	The executed command no. (3204H) is stored. (Hexadecimal)
Cr.2	0000H is stored.
Cr.3	

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower byte in hexadecimal as shown below.  *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	The executed command no. (3202H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.5.6 User range write (Command No.: 3205H)

Writes the adjusted offset/gain settings to the ROM of the ST1DA.
This command can be executed only in the offset/gain setting mode.

(1) Values set to Cw Command execution area

Cw Command execution area	Setting value
Cw.0	Set the start slice no. of the ST1DA where the command will be executed. (Hexadecimal)
Cw.1	Set a command No. to be executed (3205H). (Hexadecimal)
Cw.2	Fixed to 0000H (Any other value is treated as 0000H.)
Cw.3	

(2) Values stored in Cr Command result area

The execution result of the command changes depending on the result (normal completion or abnormal completion) in Cr.0(15-8) Command execution result.

(a) Normal completion (When Cr.0(15-8) Command execution result is 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower 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: Normal completion
Cr.1	The executed command no. (3205H) is stored. (Hexadecimal)
Cr.2	0000H is stored.
Cr.3	

(b) Abnormal completion (When Cr.0(15-8) Command execution result is other than 00H)

Cr Command result area	Result details
Cr.0	The command execution result is stored into the higher byte, and the start slice No. of execution target into the lower 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 00H: Abnormal completion (see Section 8.6) *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	The executed command no. (3205H) is stored. (Hexadecimal)
Cr.2	Cw.2 Argument 1 at command execution is stored.
Cr.3	Cw.3 Argument 2 at command execution is stored.

8.6 Values Stored into Command Execution Result

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

Cr.0 (15-8) Command execution result	Description	Corrective action
00H	Normal completion	—
01H	The requested command is not available for the specified module.	Check Table 8.1 to see if the requested command number can be used with the ST1DA or not.
		Check whether the specified start slice No. of execution target is the start slice No. of the ST1DA.
02H	The value set in Cw.2 Argument 1 or Cw.3 Argument 2 is outside the range.	Check whether the value set to Cw.2 Argument 1 or Cw.3 Argument 2 in the command execution area is within the range usable for the requested command number.
03H	The start slice No. of the execution target is wrong.	Check whether the ST1DA is mounted to the specified start slice No. of execution target.
		Check whether the specified start slice No. of execution target is the start slice No. of the ST1DA.
04H	There is no response from the specified module.	Check Table 8.1 to see if the requested command number can be used with the ST1DA or not. When the requested command number can be used, the possible cause is a ST1DA failure. Contact the nearest distributor or branch office with a description of the problem.
05H	No communication is available with the specified module.	The possible cause is a ST1DA failure. Contact the nearest distributor or branch office with a description of the problem.
06H	The requested command is not executable in the current operating status (operation mode) of the module.	Check Table 8.1 to see if the requested command number can be used with the ST1DA or not.
		User range write (command number: 3205H) or Parameter setting ROM write (command number: 3201H) was executed more than 25 times after power-on. (error code: 1200H) Execute the command after clearing the error using Ew.n error clear request.
		When offset/gain setting was made, the offset value was greater than or equal to the gain value (error code: 400□H).After clearing the error using Ew.n error clear request, make offset/gain setting again so that the offset value is less than the gain value.
07H	The module has already been in the specified mode.	Continue the processing since the operation mode of the ST1DA specified by the start slice No. of execution target is the mode already requested.
08H	The module cannot be changed into the specified mode.	Execute the command after turning Bw.n+1 convert setting request to OFF (0).

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Cr.0 (15-8) Command execution result	Description	Corrective action
09H	The specified module is in the online module change status.	Execute the command after online module change is completed.
0FH	The Cw.0 Start slice No. value is out of range.	Check if the value set for Cw.0 Start slice No. is within the range of 0H to 7FH.
10H	Parameters cannot be read from the specified module.	Execute the command again. If the phenomenon given on the left still occurs, the possible cause is a ST1DA failure. Contact the nearest distributor or branch office with a 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.	Execute the command after turning Bw.n+1 convert setting request to OFF (0).

9 TROUBLESHOOTING

This chapter explains the errors that may occur when the ST1DA is used, and how to troubleshoot them.

9.1 Error Code List

In the ST1DA, when an error occurs due to write of data to the master module, executing Error code read request (command no.: 0101H) stores the error code into Cr command result area of the head module.

Table 9.1 Error code list

Error code (Hexa-decimal)	Error level	Error name	Description	Corrective action
1100H	System error	ROM error	ROM fault.	Power the ST1DA off and then on, or reset the head module. If the error code given on the left is still stored, the possible cause is a ST1DA failure. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.
1200H	System error	Number of writes for ROM error	Parameter setting ROM write (command number: 3201H) or User range write (command number: 3205H) was executed more than 25 times after power-on.	After power-on, execute the command for a single module, or write offset/gain settings to the ROM using GX Configurator-ST, within 25 times.
			Offset/gain settings were written to the ROM using GX Configurator-ST more than 25 times after power-on.	
200☐H	System error	Output range setting error	The value set to output range setting is outside the valid range. ☐ indicates the channel number causing the error.	Set a value within the valid range.
210☐H	System error	Clear/Hold/ Preset error	The value set to Clear/Hold/Preset setting is outside the valid range. ☐ indicates the channel number causing the error.	Set a value within the valid range.
400☐H	System error	User range setting error	When user range setting was made, the offset value was greater than or equal to the gain value. ☐ indicates the channel number causing the error.	Set so that the offset value becomes smaller than the gain value.
600☐H	Warning	Digital value setting error	The value set to Ww.n , Ww.n+1 CH☐ digital value setting is outside the valid range. ☐ indicates the channel number causing the error.	Set a value within the valid range.
700☐H	Warning	Offset/ gain setting error	Cw.3 Argument 2 of offset channel specification (command number: 3203H) or gain channel specification (command number: 3204H) is outside the range -3000 to 3000. ☐ indicates the channel number causing the error.	Set a value within the valid range.

POINT

(1) If a system error and a warning have occurred, the error code of the system error is stored with higher priority.
(2) When multiple errors of the same level occur, the code of the error first found by the ST1DA is stored.
(3) The error can be cleared by turning on Ew.n error clear request.

9.2 Troubleshooting

9.2.1 When the RUN LED is flashing or turned off

(1) When flashing at 0.5s intervals

Check item	Corrective action
Is the mode set to the offset/gain setting mode?	Execute Operation mode setting (command number: 3202_H) to select the normal mode. (see Section 8.5.3).

(2) When flashing at 0.25s intervals

Check item	Corrective action
Is the module selected as the target of online module change?	Refer to Chapter 7 and take corrective action.

(3) When flashing at 1s intervals

Check item	Corrective action
Has a parameter communication error occurred between the master station and head module?	Refer to the MELSEC-ST System User's Manual and take corrective action.
Has a parameter communication error occurred between the master station and head module?	
Has an error occurred in another slice module?	
Has an internal bus error occurred?	

(4) When off

Check item	Corrective action
Is a module change enabled during an online module change?	Refer to Chapter 7 and take corrective action.
Is external SYS. power supply being supplied?	Check whether the supply voltage of the bus refreshing module is within the rated range.
Is the capacity of the bus refreshing module adequate?	Calculate the current consumption of the mounted module, and check that the power supply capacity is sufficient.
Is the ST1DA correctly mounted on the base module?	Check the mounting condition of the ST1DA.
Has a watchdog timer error occurred?	Power the ST1DA off and then on, or reset the head module, and check whether the LED turns on. If the LED still does not turn on, the possible cause is a ST1DA failure. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

9.2.2 When the RUN LED turned on and the ERR. LED turned on or is flashing

Check item	Corrective action
Is an error being generated?	Confirm the error code and take corrective action described in Section 9.1.

9.2.3 When an analog value is not output

Check item	Corrective action
Is external AUX. power supply being supplied?	Check whether the power distribution module is supplied with a 24V DC voltage.
Is there any fault with the analog signal lines such as broken or disconnected line?	Check for any abnormality on the signal lines by doing a visual check and performing a continuity check.
Are the offset/gain settings correct?	Verify that the offset/gain settings are correct. (See section 4.5 and 5.6) When the user range setting is used, switch to the factory-set output range and check whether D/A conversion is performed correctly or not. If it is correctly performed, redo the offset/gain setting.
Is the output range setting correct?	Execute output range set value read (command number: 1209H) and confirm the output range setting. (See section 8.3.1) If the output range setting is wrong, make the output range setting again using the configuration software of the master station.
Is the D/A conversion enable/disable setting for the channel set to Disable?	Execute D/A conversion enable/disable setting read (command number: 1200H) and confirm the D/A conversion enable/disable setting. (See section 8.3.3.) If conversion is disabled, enable conversion by using GX Configurator-ST or by executing the D/A conversion enable/disable setting write command (command number: 2200H). (See section 5.3 and 8.4.1.)
Is the output enable/disable setting for the channel set to Disable?	Check whether Bw.n+3 or Bw.n+2 output enable/disable flag is on or off in Input/Output Monitor of GX Configurator-ST or on the program of the master station (see section 5.4). If the output enable/disable flag is off, reexamine the program of the master station (see section 3.4.5).
Is any digital value being written to the channel?	Check Ww.n or Ww.n+1 CH□ digital value setting in Input/Output Monitor of GX Configurator-ST or on the program of the master station (see section 5.4).
Are Bw.n+1 convert setting request and Br.n+1 convert setting completed flag on?	Check whether Bw.n+1 Convert setting request and Br.n+1 Convert setting completed flag are on or off in Input/Output Monitor of GX Configurator-ST or on the program of the master station (see section 5.4). If Bw.n+1 convert setting request and Br.n+1 convert setting completed flag are off, reexamine the program of the master station (see section 3.4.1 and 3.4.5).

POINT

If the analog output value is not output after the proper corrective action is taken in accordance with the above check item, the possible cause is a module failure. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

APPENDIX

Appendix 1 Accessories

This section explains the accessories related to the ST1DA.

(1) Wiring marker

For how to use the wiring marker, refer to the MELSEC-ST System User's Manual.

Model name	Description	Color
ST1A-WMK-BL	Terminal marker (-, 0V, N)	Blue
ST1A-WMK-GN	Terminal marker (Shield)	Green
ST1A-WMK-BK	Terminal marker (Signal wire)	Black

(2) Coding element

The coding element is fitted before shipment.
It is also available as an option in case it is lost.

Model name	Description	Shape*		Color
		Base module side	Slice module side	
ST1A-CKY-11	Coding element for ST1DA2-V, ST1DA2-V-F01			Blue
ST1A-CKY-12	Coding element for ST1DA1-I, ST1DA1-I-F01			

*Indicates the position of the projection or hole when the coding element is viewed from above.
: Projection : Hole

Appendix 2 Hardware/Software Version Comparisons in Specifications

The hardware/software version comparisons in specifications are show below.
For checking the hardware/software version, refer to Section 2.4.

Item	Version comparisons in specification		Reference section
	Hardware version C or earlier	Hardware version D or later	
External load resistance of the ST1DA1-I	100 to 500Ω	0 to 500Ω	Section 3.1
Adjusted amount in the offset/gain setting of the ST1DA1-I	Approx. 0.38mA when the set value is 1000	Approx. 0.76mA when the set value is 1000	Section 5.6 Section 8.5.4 Section 8.5.5

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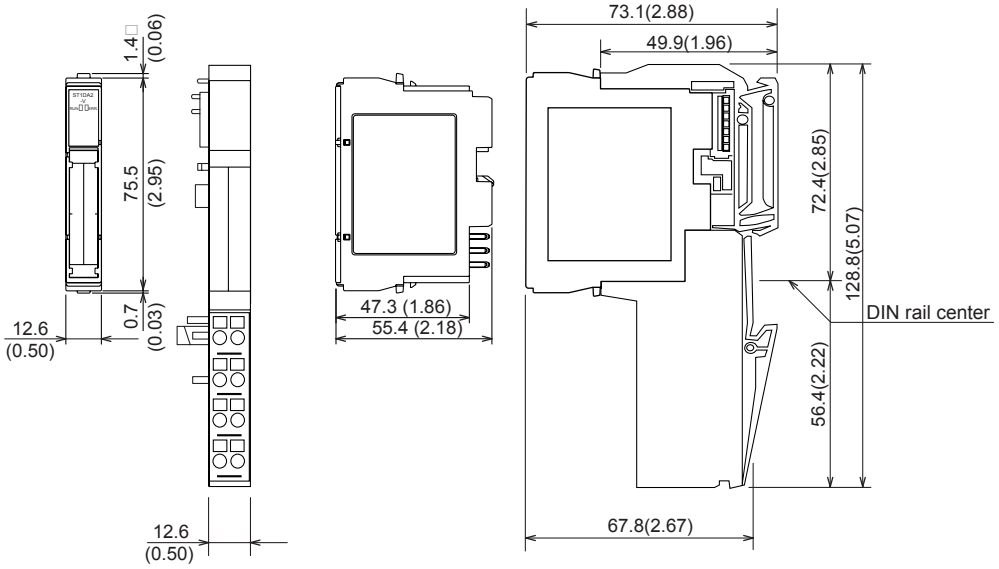
Appendix 3 External Dimensions

(1) ST1DA2-V

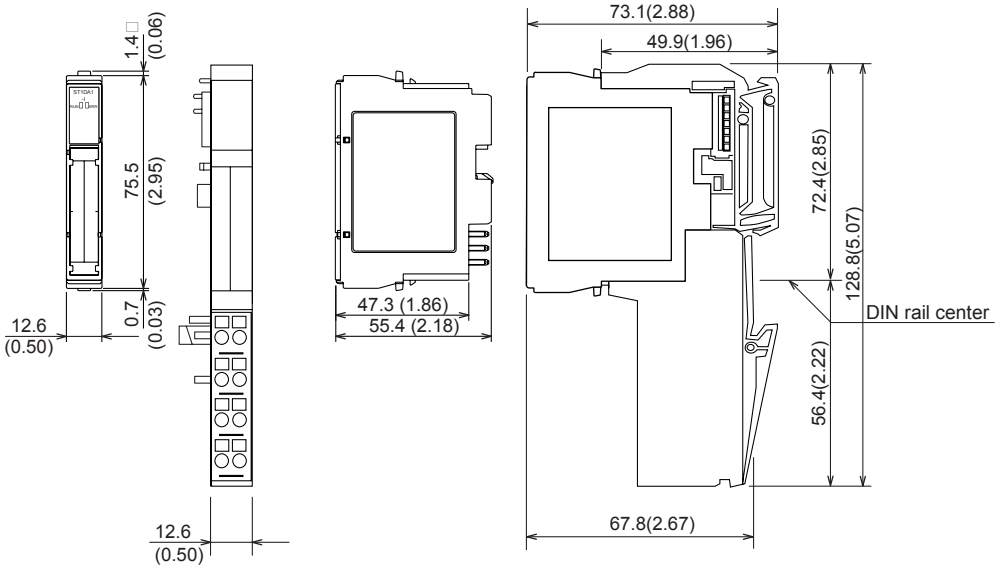
The appearance of the ST1DA2-V-F01 is almost the same as the illustration shown below except for the model name part and rating plate.



Unit: mm (inch)

(2) ST1DA1-I

The appearance of the ST1DA1-I-F01 is almost the same as the illustration shown below except for the model name part and rating plate.



Unit: mm (inch)

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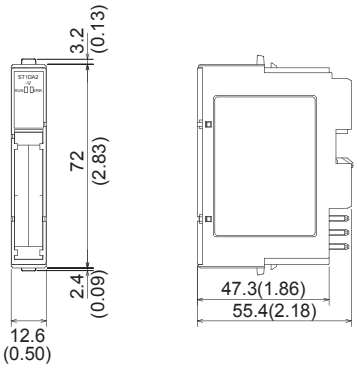
REMARK

For ST1DA2-V of hardware version E or before and ST1DA1-I of hardware version D or before, side face diagram of the module is as follows.



Unit: mm (inch)

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WARRANTY

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

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

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

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

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

5. Changes in product specifications

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

6. Product application

(1) In using the Mitsubishi MELSEC programmable 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 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 Public service purposes shall be excluded from the programmable logic controller applications.
In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable logic controller range of applications.
However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

SH(NA)-080444ENG-D

MELSEC-ST Digital-Analog Converter Module

User's Manual (PROFIBUS-DP)

MODEL	ST1DA-U-SY-E
MODEL CODE	13JR70
SH(NA)-080444ENG-D(0808)MEE	

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